ENGLISH

USER'S GUIDE

MILK ANALYZERS

EKOMILK® TOTAL

BULTEH 2000

EKOMILK TOTAL

CE

ISO 9001:2000

AC Power Supply voltage

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

Measure modes

- *Cow milk*
- *Sheep milk*
- *Buffalo milk*
- *Goat milk*
- *Others milk*

Additional Options

- *Titratable acidity*
- *Others*

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

CONTENTS

EKOMILK TOTAL is robust, reliable, automated multi-parameter milk analyzer providing rapid test results for: Fat, Protein, Solids Not Fat, Lactose, Density , Freezing point, Added Water, pH, Temperature and Conductivity in fresh milk (cow, sheep and/or buffalo, goat). RS-232 interface, Micro printer and automatic data capture are integrateted. Based upon ultra-sound technology, the instrument does not require any costly chemicals, caustic or reagents for testing. EKOMILK TOTAL 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° - 30°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	30W max

MECHANICAL PARAMETERS:

Dimensions (WxDxH)	530 x 320 x 290 mm
Weight	12,5 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	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 with accuracy ± 0,015°C
Added water to milk	from 0% to 60% with accuracy ± 5%
pH	from 0,00 to 14 pH with accuracy ± 0,02
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
Data Collection System	Data Collection Systemis able to store upto 120 measurements.

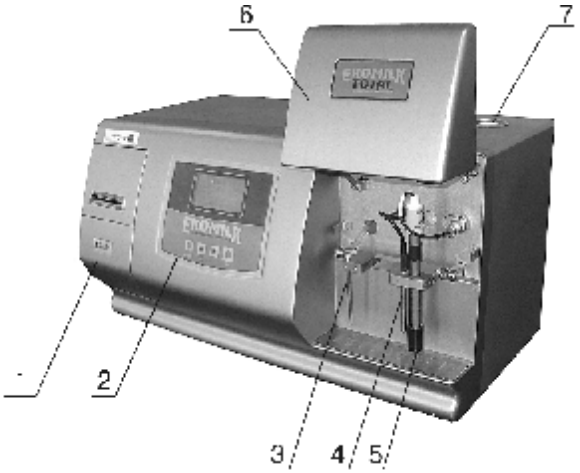


Fig. 1. Appearance
1. Printer – see section “Printer Additional information”
2. Control panel - see fig. 2
3. Tube (sucker)
4. Temperature sensor - see section “
5. pH electrode
6. Front cover
7. Plug

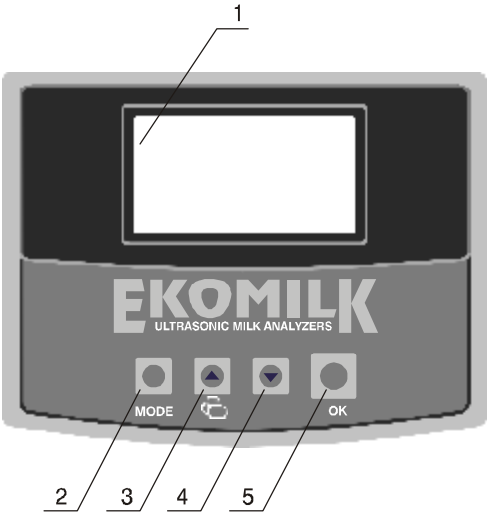


Fig. 2. Control panel
1. Display
2. Select the work mode
3. Skip and search forwards, printing
4. Skip and search backwards
5. Confirm the choice

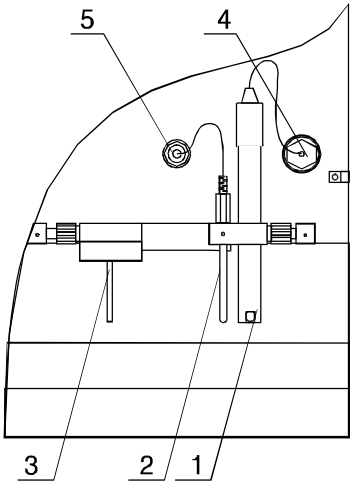
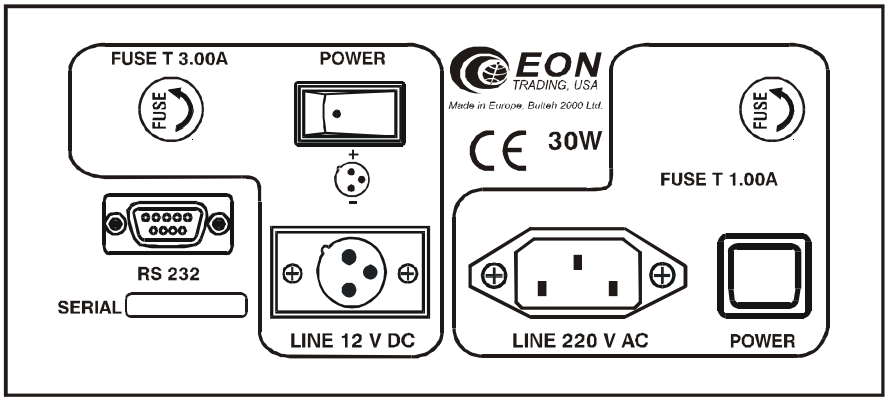


Fig. 3. pH and temperature section
1. pH electrode
2. Temperature sensor
3. Tube (sucker)
4. pH input (BNC)
5. Temperature input (phono jack)

Fig. 4. Controls on the rear panel



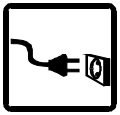
PARTS AND ACCESSORIES

	Description	Qty
1.	EKOMILK TOTAL	1
2.	User's guide (EKOMILK TOTAL)	1
3.	Connector 12V	1
4.	AC Power cable	1
5.	CD Milk analyzer software tools	1
6.	User's guide (Milk analyzer software)	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).	1
11.	Buffer solution - powder pH 7.00 ± 0,01/20°C	1
12.	Buffer solution - powder pH 4.00 ±0,01/20°C	1
13.	Buffer solution -powder pH 10.00 ±0,01/20°C	1
14.	Ekoday (alkaline cleaner – concentrate)	1
15.	Ekoweek (acid cleaner – concentrate)	1
16.	Ekopower(acid cleaner – concentrate)	1

INSTRUCTIONS FOR USE

ANALYZER INATALLATION

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.

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.

BASIC MODES FOR USE

Press the **MODE** button only once. Press the search buttons t , u 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

Press the search buttons t , u to select desired mode.

HOW TO ANALYZE THE MILK

Step 1:

Fill the measuring mug with milk sample to be measured. The tube (sucker) is knee-joint (mobile). Move it to dip the tube (sucker) into the milk sample and place the measuring mug on the Ekomilk's working surface.

Step 2:

pH and temperature measurement:

Gently remove the protective plastic cap from the pH electrode before proceeding with measurement. Use de-ionized or distilled water to rinse the electrode before use. This will remove impurities that have adhered on the electrode body. Rinsing will also serve to activate the electrode, especially if it has been dehydrated (in which case you may have to soak the electrode in water from 10 minutes onwards (See Section "pH Measurement - Additional information"). Fill another measuring mug with the same milk sample. The measuring couple (pH electrode and temperature sensor) is knee-joint (mobile). Move it to dip the electrode and temperature sensor (fig.1 – pos. 4, 5) into the sample. Be sure that the electrode is completely immersed into the sample. Stir the mug gently to create a homogeneous sample. Place it on the Ekomilk's working surface. For more information, see "pH MEASUREMENT - ADDITIONAL INFORMATION".

Remark: EKOMILK TOTAL uses 3 sensors for milk parameters measuring – ultrasound, conductivity and pH. Load on both measuring mugs with the same milk.

Step 3:

Press **MODE** and by means of the search buttons t , u 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 u changes the cursor position;
- button t changes the over cursor value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK c**onfirms the ID NUMBER and **QUANTITY: 0000.0** appears.

QUANTITY selection:
- button u changes the cursor position;
- button t 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 u and then press button t not releasing button u 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 than 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. To deactivate data storage mode
Press button **MODE** and by means of the search buttons t , u 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 t , u 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 %	**PH: PH**
FP: FREEZING VALUE	**W:ADDED WATER TO MILK%**

*FREEZING VALUE = FREEZING POINT [°C] * (-100)

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 presence 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.

Remark:
1. To get precise pH results, calibrate the pH measurement system at least twice weekly.
2. If someone of pH or temperature sensors are disconnected or the received results are out of spec limits or there is damage in the measuring system, you will have message ERR instead of pH or temperature results.
3. The pH result is valid when there is R (Ready) behind the value on the display. Otherwise make a new measurement to get a correct result.
4. pH measurement is strongly related to the temperature. If the temperature sensor does not work, the pH result will be referred to the default temperature of 25°C. The accuracy would be out of range.
5. For more information, see "pH MEASUREMENT - ADDITIONAL INFORMATION" and "CONDUCTIVITY MEASUREMENT - ADDITIONAL INFORMATION").

PRINTING DATA

Afret the current measurement is copmleted, the result could be printed. Every press on the arrow button t prints the results on the display again.

CLEANING

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 an 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's working surface.

1.1.2. Press the **MODE** button once. Press the search buttons t , u 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 t , u 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's working surface. Put the analyzer in cleaning mode, set 20 cycles and press the **OK** button. When the **CLEANING** stage is over **CLEANING END i**s 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 10% solution of acid cleaner EkoWeek as a periodical cleaning solution.
Preparation of 10% EkoWeek working solution:
a. Use pipette to add 50 mL EkoWeek to glassware with 450 mL distilled water.
b. Put into a labeled container.
Take care this solution does not contact your eyes or skin!
Attention! Use only 10% 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 10 % 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's 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. 5 – step 1.
2.4. Remove the plug as it is shown on the fig. 5 – 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's 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. 5. Hand-cleaning

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 t , u to select **CLEANING** option. Confirm with **OK**. Set 1 or 2 cleaning cycles using the search buttons t , u . 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. 5 – step 1. Remove the plug as it is shown on the fig. 5 – 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's 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.

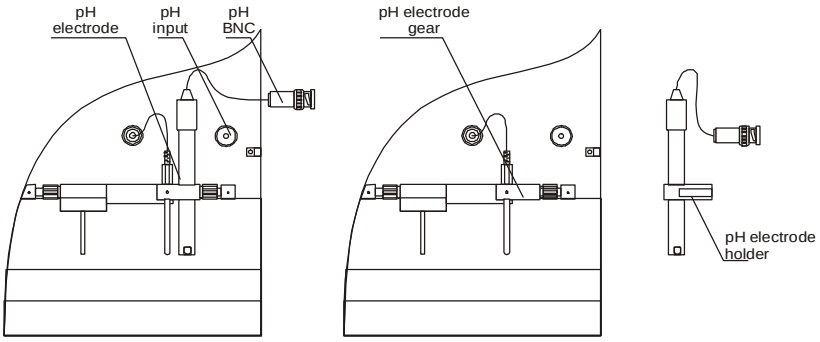
PH ELECTRODE CLEANING

When the daily job is finished, follow the sequence below for cleaning and storage of pH electrode.
1. Lift up the analyzer front cover (fig. 1 – pos. 6);
2. Rotate the BNC connector counter-clockwise and unlocks it gently - fig. 6 - step 1;
3. Move out the pH electrode and the holder together from pH electrode gear - fig. 6 - step 2.
4. Wash the electrode with de-ionized water.
5. Fill the protective cap with storage solution.

Remark:

The storage solution is pH 4 buffer containing 225 grams of KCl per liter. KCl would be replaced by NaCl or table salt. Tap water is also acceptable as storage media.

Attention: Avoid storage in de-ionized water.
6. Put the protective cap on the pH electrode.
7. Mount the pH electrode on the analyzer in the reverse order.



For more information about pH Electrode Cleaning and Storage procedure (See section “pH MEASUREMENT -ADDITIONAL INFORMATION”).

DATA TRANSFERRING

Transfer requirements:
- Milk analyzer EKOMILK TOTAL
- PC with Milk Data 2001 program Version 1.3;
- RS 232 Null Modem Cable;

Communication set up:

Step 1
Connect the milk analyzer EKOMILK TOTAL to the PC.
Switch off the milk analyzer and the PC. Connect the RS 232 cable to some free COM port on your PC and to the RS 232 connector of the Milk analyzer. First switch on the milk analyzer then the PC.

Step 2
Start Milk Data 2001 (version 1.3) program.
Choose **FROM MEMORY** (see MILK DATA 2001-2002, Version 1.30, User's Guide) from Settings menu. This mode allows you to transfer stored information in Analyzer's memory to the program Milk Data 2001.

Step 3
Press a Milk Analyzer's **MODE** button once. Scroll with the search buttons t , u 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 t , u **TRANSFER OK?Y** and confirm with button **OK**. 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;
- 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 the 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 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 the 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 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;
- Subtract the Milk analyzer **DENSITY** value from **DENSITY** value achieved by density meter. 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 the 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 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 the 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 Milk analyzer **FREEZING POINT** value from **FREEZING POINT** value achieved by 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 t , u to select

r CALIBRATION mode

- Press **OK**.
- The display shows **PASS 1** - first password number prompt.

- Set with search buttons t , u the first password number. Press **OK** to confirm it.
- A prompt for the second password number appears on the display - **PASS2**. Enter the second password number in the same way as the first one. Enter the third password number when a **PASS 3** prompt appears on the display.

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

If the right password numbers are entered the display will show **FAT COW MILK.**

Press the search buttons t , u to select the milk parameter to be calibrated:

- **FAT COW MILK** - cow milk fat calibration;
- **FAT SHEEP (BUFFALO, GOAT) MILK** - sheep (buffalo, goat) milk fat calibration;
- **SNF COW MILK** - cow milk Solids non fat (SNF) calibration;
- **SNF SHEEP (BUFFALO, GOAT) MILK** - sheep (buffalo, goat) Solids non fat (SNF) calibration.
- **DEN COW MILK** - cow milk density calibration;
- **DEN SHEEP (BUFFALO, GOAT) MILK** - sheep (buffalo, goat) density calibration;
- **PROT COW MILK** - cow milk protein calibration;
- **PROT SHEEP (BUFFALO, GOAT) MILK** - sheep (buffalo, goat) protein calibration.
- **FP COW MILK** - cow milk freezing point calibration;
- **FP SHEEP (BUFFALO, GOAT) MILK** - sheep (buffalo, goat) freezing point calibration.
- **CONDUCTIVITY** - conductivity calibration (See section “Conductivity calibration”)
- **PH** - pH calibration (See section “pH calibration”)
- **TIME & DATE** - time and date calibration (See section **“TIME AND DATE CALIBRATION”**).

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

- The inscription **VALUE** appears on the display.
- Press the buttons t , u 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.
- 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.

TIME & DATA CALIBRATION

Press the search buttons t , u 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 u changes the cursor position;
- button t 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 u changes the cursor position;
- button t 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 has been achieved during a calibration procedure a error message **ERROR SETTING TIME** 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. 3 – 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. 3 – fig. 1 the tube (sucker) to be into the solution.
5. Press the search buttons t , u 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 to make the repairs
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 to make the repairs.

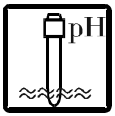
MILK CONDUCTIVITY - ADDITIONAL INFORMATION

The Conductivity (or Electrolytic Conductivity) is defined as the ability of a substance to conduct electrical current. It is the reciprocal value of the resistivity.

For a healthy animal*, the mean value of electric conductivity is:
- cow milk - between 4 to 6 mS/cm (18°C);
- sheep milk - between 3 to 5 mS/cm (18°C);
- buffalo milk - between 2,5 to 5 mS/cm (18°C);

*These values depend on the geographical region, the race and 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 mastitis progress. 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 condense milk.
- Milk conductivity change notifies of powder (dry) milk solution rate.



PH CALIBRATION

Attention: To get precise pH results, calibrate the pH measurement system before you measure the pH of the sample or at least twice a week.
For more information see section “pH MEASUREMENT - ADDITIONAL INFORMATION”.

Calibration is an important part of electrode maintenance. This assures not only that the electrode is behaving properly but that the system is operating correctly. It is recommended that the user perform at least a 2-Point calibration using standard buffers that adequately cover the expected measurement range prior to measurement. 1-Point Calibration can also be used for quick measurements. Ekomilk is capable of 3-point calibration to ensure enhanced accuracy throughout the pH measurement range. The 3 point calibration offers flexibility of calibrating at 3 internationally accepted calibration points namely, pH 7.00, 4.00 and 10.00. pH measurement is temperature sensitive. Automatic Temperature compensation is performed by the milk analyzer. To activate the ATC, simply plug the temperature probe to the temperature input.

Attention: It is best to select a buffer as close as possible to the actual pH value of the sample to be measured.Use standard calibration buffers that the temperature and the sample solution are the same.

Steps:

1. Press the search buttons t , u to select **CALIBRATION** mode. Enter the password as it is described in “CALIBRATION VALUES SAVING” and select the pH to be calibrated. Confirm it with **OK**. The inscription **LOAD PH 7 LIQUID** appears on the display.
This message indicates that pH 7.00 is ready for calibration.
2. Rinse the electrode well with de-ionized water. (Do not wipe the electrode as this may cause a build-up of electrostatic charge on the glass surface!).
3. Fill a measuring mug with the buffer 7.00 and dip the electrode and temperature probe into the buffer, ensuring that the electrode is completely immersed into the sample. Stir the electrode gently in the buffer.
Once you have selected the correct solution, Press **OK** key to confirm. The message **WAIT, PLEASE**.... appears on the display. Wait for the measured pH value to stabilize. The next message **LOAD PH 4 LIQUID** will be displayed when the reading is ready. Ekomilk is calibrated to buffer 7.00.

NOTE: Press button u to interrupt calibration. Message **CAL FINISHED** appears. Confirm it with **OK**. The 1-point calibration procedure is now complete.
For 2 or 3 point calibration perform the 1, 2, 3 steps following the Ekomilk prompts until completion.

Attention: pH buffer solutions can be used many times.

pH. CAL ERROR MESSAGE	PROBLEM & CAUSES	REMEDY
CAL ERROR 41	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 43	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 to make the repairs.
CAL ERROR 44	pH electrode or termosensor is disconnected	Check the connections.
	pH Electrode damaged	Activate or replace the out of order pH electrode with a new one - see "pH measurement - Additional information"
	Temperature probe damaged	Replace the out of order Temperature probe with a new one.
	pH measuring system is damaged	Try again to calibrate the milk analyzer If the problem still exists, the pH measuring system is damaged. Contact your dealer to make the repairs.
CAL ERROR 46	Wrong buffer solution	Fill the measuring mug with right buffer and repeat the calibration procedure.
CAL ERROR 47	pH measuring system is damaged	Switch off the milk analyzer and switch it on after 10-15 sec. If the problem still exists, the pH measuring system is out of order. Contact your dealer to make the repairs.

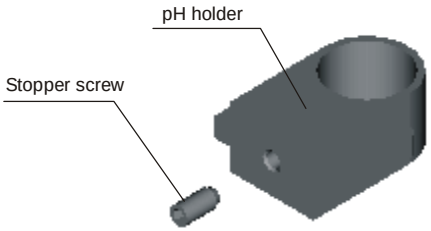
PH ELECTRODE - REPLACEMENT

pH electrodes have a finite lifespan due to their inherent properties. How long a pH electrode will last will depend on how it is cared and the solution it is used to measure. Even if an electrode is not used it still ages. For this reason it is always a good idea to have a back-up electrode on hand.

How to replace the electrode?

1. Demount the electrode as it is described in section “Cleaning. pH electrode cleaning”. Unscrew the stopper screw using hex key 1.5 mm – see fig. 7.
2. Remove the damaged pH electrode.
3. Put the new one and screw it.
4. Mount the pH electrode on the analyzer in the reverse order.
5. Calibrate the new pH electrode following the 3 points procedure described in section “pH calibration”.

Fig. 7. pH holder



PH MEASUREMENT - ADDITIONAL INFORMATION

1. General

pH is a unit to measure which describes the degree of acidity or alkalinity of a solution. It is measured on scale of 0 to 14. The term pH is derived from “p”, the mathematical symbol of the negative logarithm, and “H”, the chemical symbol of Hydrogen. The formal definition of pH is the negative logarithm of the Hydrogen ion activity.

2. pH Electrode

For pH measurement Ekomilk needs a combination electrode, compatible with most pH electrodes that have BNC connectors and zero potential (the millivolt output of the electrode is 0) near 7 pH.

2.1. Electrode part

The electrode is the most important part of the pH measurement. The electrode glass membrane is fragile and must be handled with care. To protect the glass membrane and to maintain activation, the glass membrane is covered by a protective rubber cap containing a suitable storage solution.

2.2. Electrode care & Electrode maintenance

pH Electrodes are susceptible to dirt and contamination and need to be

clean regularly depending on the extent and condition of use. At no time should one touch or rub the glass bulb as this causes the build-up of electrostatic charge.

2.3. Storage

For best results, always keep the pH bulb wet. An optimal storage solution for combination electrode is pH 4 buffer (cleat not pink) with 225 grams of KCl per liter. Table salt, NaCl, can be used if KCl is not really available. Other pH buffers or tap water are also acceptable storage media, but avoid storage in de-ionized water. The protective rubber cap filled with the buffer solution provides ideal storage for long periods.

2.4. After Use

After measurement is complete, follow the sequence elaborated below for storage.

a) Wash the electrode and reference junction in de-ionized water.

b) Close the refilling hole by returning its rubber sleeve or stopper cap (necessary for only refillable electrode).

c) Store the electrode as mentioned above (see section Storage).

2.5. Electrolyte Replacement (for refillable electrode only).

The reference electrolyte needs to be refilled when the electrode has been used for an external period, or when the internal electrolyte has dried up. To accomplish this, follow the procedure detailed below.

a) Remove the protective rubber cap or sleeve.

Remove the protective rubber sleeve to expose the filling port of the electrode. Remove the old reference electrolyte with a syringe.

b) Fill the new reference electrolyte.

New electrolyte preparation:

Open the small container with KCl.

Add in de-ionized water until it reaches the level of 20 ml. Close the container and shake it to dissolve the KCl.

Add in fresh electrolyte until it reaches the level of the refilling port. The reference electrolyte used should be 3M (Mol) KCl. Replace the rubber sleeve.

c) Re-use the electrode

Rinse the liquid junction with de-ionized water.

Note: If these steps fail to restore normal electrode response, you may attempt to rejuvenate it. (See: Electrode Rejuvenation).

2.6. Electrode cleaning

Electrodes which are mechanically intact can often be restored to normal performance by one or combination of the following procedures.

a) Salt deposits:

Dissolve the deposit by immersing the electrode in tap water for ten to fifteen minutes. Then thoroughly rinse with de-ionized water.

b) Oil/Grease Films

Wash electrode pH bulb in a little detergent and water. Rinse electrode tip with de-ionized water.

c) Clogged Reference Junction: pH electrodes have junction which allows the internal fill solution of the measuring electrode to leak out into the solution being measured. The junction can become clogged by particulate in the solution. If a clogged junction is suspected it is best to clear the junction.

Heat a dilute KCl solution to 60-80°C. Place the sensing portion of the pH electrode into the heated KCl solution for approximately 10 minutes. Allow the electrode to cool while immersed in some unheated KCl solution.

d) Protein Deposits

Prepare a 1% pepsin solution in 0.1M HCl. Allow the electrode to stand in this solution for five to ten minutes. Rinse the electrode with de-ionized water.

2.7. Electrode activation

Generally, if the procedure of storage and maintenance had been closely followed, the electrode can be used immediately. However, should the electrode response become sluggish, it may be possible that the bulb has dehydrated. The bulb can be rehydrated by immersing the electrode in an ideal storage solution (e.g. buffer pH 4 solution) for 1 - 2 hours. If this fails, the electrode may require re-activation.

If the above procedure does not reactivate the electrode to acceptable status, try rejuvenation the electrode by following the procedure outlined below.

2.8. Rejuvenation Procedure

a) Dip and stir the electrode in freon or alcohol for 5 minutes.

b) Leave the electrode in tap water for 15 minutes.

c) Dip and stir the electrode in concentrated acid (HCl, H_2SO_4) for 5 minutes.

d) Repeat Step b - leave the electrode in tap water for 15 minutes.

e) Dip and stir in strong base (NaOH) for 5 minutes.

f) Repeat Step b - leave the electrode in tap water for 15 minutes.

g) Test with standard calibration solution.

Finally, test with standard calibration buffer solution to see if the electrode yields acceptable results. You may repeat steps ‘c’ to ‘f’ again for better response (maximum 3 times). If the response does not improve, then the electrode has completed its useful life. Replace with a new electrode.

3. Electrode Lifespan

pH electrodes have a finite lifespan due to their inherent properties. How long a pH electrode will last will depend on how it is cared and the solution it is used to measure. Even if an electrode is not used it still ages. Electrode demise can usually be characterized by a sluggish response, erratic readings or a reading which will not change. When this occurs an electrode can no longer be calibrated. pH electrodes are fragile and have a limited lifespan. How long an electrode will last is determined by how well it is maintained and the pH application. The harsher the system, the shorter the lifespan. For this reason it is always a good idea to have a back-up electrode on hand to avoid any system down time.

4. Buffer Solutions

Buffers are solutions that have constant pH values and the ability to resist changes in that pH level. They are used to calibrate pH measurement system.

5. Automatic Temperature Compensation (ATC)

Automatic Temperature Compensation is built in the milk analyzer, because pH measurement is temperature sensitive. To activate the ATC, simply plug in the temperature probe into the phono jack.

6. pH Electrode Calibration

pH Electrodes are like batteries; they run down with time and use. As an

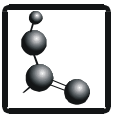
electrode ages, its glass changes resistance. For this reason, electrodes need to be calibrated on a regular basis. Calibration in pH buffer solution corrects for this change.
Calibration is an important part of electrode maintenance. This assures not only that the electrode is behaving properly but that the system is operating correctly.
Usually pH meters require calibration at 3 specific pH values. One calibration is usually performed at pH 7, second and third are typically performed at pH 4 and pH 10.

Attention: It is best to select a buffer as close as possible to the actual pH value of the sample to be measured. Use standard calibration buffers with temperature same as the samlpe temperature.

7. Milk acidity and pH

The following table shows the relation between pH value and °T.

T	Variations	pH (average value)	T	Variations	pH (average value)
Raw milk			**Pasteurize milk**		
16	6,74 - 6,70	6,72	16	6,68 - 6,64	6,66
17	6,69 - 6,65	6,68	17	6,63 - 6,58	6,61
18	6,64 - 6,58	6,62	18	6,57 - 6,52	6,55
19	6,57 - 6,52	6,55	19	6,51 - 6,46	6,49
20	6,51 - 6,46	6,49	20	6,45 - 6,40	6,43
21	6,45 - 6,40	6,43	21	6,39 - 6,35	6,37
22	6,39 - 6,35	6,37	22	6,34 - 6,30	6,32
23	6,34 - 6,30	6,32	23	6,29 - 6,24	6,26
24	6,29 - 6,24	6,25	24	6,23 - 6,19	6,21



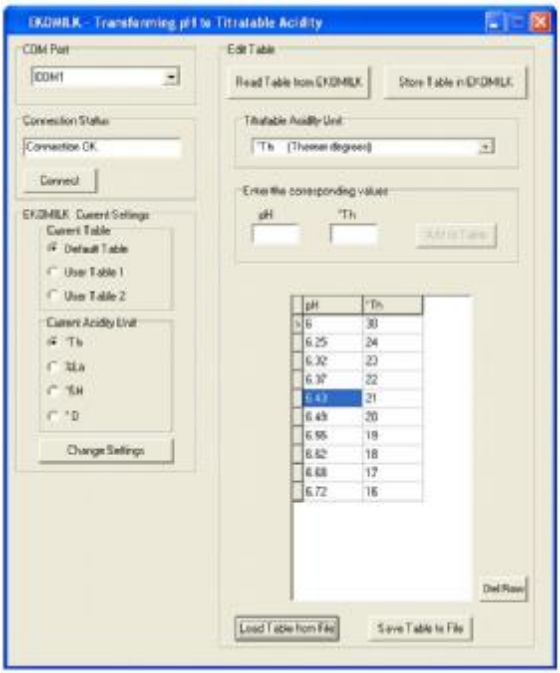
TITRATABLE ACIDITY - ADDITIONAL INFORMATION

This option transforms pH value to titratable acidity (in one of the following units °Th , %La, °SH or °D) using on of the 3 tables of correspondence (1 default and 2 user's) stored in the analyzer memory.
There is not strong correlation between pH and titratable acidity.
pH is a unit to measure which describes the degree of acidity or alkalinity of a solution. It is measured on scale of 0 to 14. The formal definition of pH is the negative logarithm of the Hydrogen ion activity.
Acidity can also be expressed as the titratable. The titratable acidity of a solution is measured by reacting the acids present with a base such as sodium hydroxide(NaOH) to a chosen end point, close to neutrality, as indicated by an acid sensitive colour indicator.
But the practice shows that for some type of milk there is a good relation between these two parameters.

The user can choose the measuring unit, the table of transformation and can edit user's tables.
These procedures are performed by PC program named **pH2TA.EXE**.

Steps:

1. Copy the file **pH2TA.EXE** from CD to some hard disk of your PC.
2. Connect the RS232 cable to some free COM port to the PC and to the RS 232 connector of milk analyzer.
3. Switch on the milkanalyzer.
4. Press a milk analyzer's **MODE** button only once. The display will show the message **COW MILK**.
5. Press the button u and next press t without releasing u.
6. Release both buttons. The display will show the message **Bulteh 2000 Bootloader 1.01.**
7. Use **Windows Explorer** to run **pH2TA.EXE**.
8. The program window will appear on the PC screen.
9. Click on the **COM PORT** box and the list of all available COM ports appears. Choose the COM port connected to the milk analyzer. If the connection is done the **Connection Status** will be **Connection OK**. **Ekomilk Current settings** area shows the current values for acidity unit and table.
10. The milk analyzer is ready for changing the titratable acidity properties.
11. Choice of acidity measuring unit and transformation table.Press button **Change Settings**, choose the desired measuring unit and table and press the button **Store Settings**.



12. Edit the user's tables
The user can edit only the user's tables. The user's tables can contents from 2 to 30 rows.

Default table

pH	Th[°]	La[%]	SH[°]	D[°]
6.25	24	0.216	9.6	21.6
6.32	23	0.207	9.2	20.7
6.37	22	0.198	8.8	19.8
6.43	21	0.189	8.4	18.9
6.49	20	0.18	8	18
6.55	19	0.171	7.6	17.1
6.62	18	0.162	7.2	16.2
6.68	17	0.153	6.8	15.3
6.72	16	0.144	6.4	14.4

The producer recommends to prepare minimum 6 samples of milk with different acidity that cover all measuring range. Make measurements for both pH and titratable acidity. Use pH-Meter for determination of pH value. Use the classical method (titration with NaOH) for determination of titratable acidity of the same samples of milk. See the default table as example for user's table creating.
12.1. Choose the used measuring unit from box: **Edit Table > Titratable Acidity Unit.**
12.2. Press button **Read Table from EKOMILK**, choose the user's table and click on button **Read Table**. The program will load the chosen table.
12.3. To add a row - write values for pH and titratable acidity in the field **Enter the Corresponding value** and press **Add to Table**.
12.4. To delete a row: place the pointer to the row to be deleted and press **Del Row**.
12.5. To save changes to the Ekomilk's memory - press **Store Table in EKOMILK,** choose a table and click on **Store Table**.
12.6. The table can be saved in *.txt file.
Save Table to File button to open **Save as** dialog box.
Press **Load Table from File** to load a previously saved file.
13. To finish this procedure and to start working press a milk analyzer's **OK** button. The message **Warm Up ...** appears on the display. Wait about 5 minutes for message **EKOMILK**. The analyzer is ready to work.

MICRO PRINTER - ADDITIONAL INFORMATION

BASIC SPECIFICATIONS

Printing system: Line thermal dot printing
Printing width:48 mm (384 dots/line)
Dot density: 8 dots/mm (Width, Length)
Paper feed pitch: 0.125 mm
Printing speed: Approx. 11 lines/sec. (At maximum)
Paper Thermal: paper roll: 58 + 0/- 1 mm x ø83 (max.) mm, (Paper Specifications) 60 ~75 µm thick
Supply voltage:100 ~ 240 V 50/60 Hz

Paper Specifications (Recommended Paper)
Thermal paper roll
Type: Thermal paper
Paper width: 58 + 0/–1 mm
Paper thickness: 60~75mm
Roll diameter: f83 mm or less
Printing surface: Outside of the roll (Surface)
Recommended paper: TF50KS-E2C (Monochrome) made by NIPPON SEISHI or its equivalent 735FA(2-color, Black based) made by RICOH or its equivalent PB670(2-color, Red based) made by MITSUBISHI SEISHI or its equivalent.
Core: f12 mm(Inner dia.), f18 mm (Outer dia.)
CAUTION:
Use of non-specified paper may cause irregularity of print density. If this is the case, use the DIP switch to reset print density.
Do not paste the paper to the core.
If the paper comes in contact with a chemical or oil, it may discolor or lose a record.
Do not rub the paper surface strongly with a nail or hard metal. It may discolor.
Discoloring starts at about 70°C. Watch out for effects of heat, humidity, light, and others.

Printer Control panel

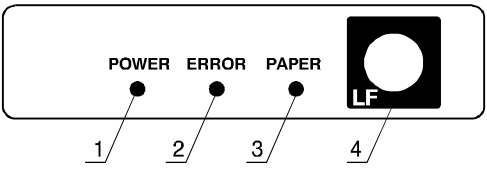


Fig. 8. Printer Control panel
(1) POWER lamp
(2) ERROR lamp

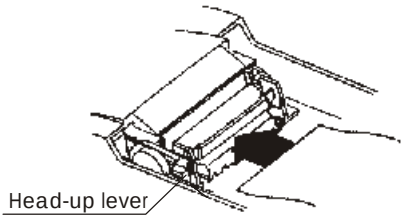
Illuminated at the time of a head-up mechanical error, and blinks at the time of starting a macro.
(3) PAPER lamp
Illuminated when the paper is running out .
(4) FEED switch
Feeds the paper. It is feeding continuously while the switch is pressed.
CAUTION:
Be sure to use the specified paper roll.
Use of non-specified peper may not guarantee the print quality and printing head life.

Fig. 9 Paper replacing

1. Open the Printer bottom cover - Step 2 (fig. 9).
2. Detach the printer top cover – Step 3 (fig. 9).
3. The device is ready for paper replacing Step 4 (fig. 9).

CAUTION:
After detaching it, be careful not to lose or break it.
4. Pull the head-up lever to this side to raise up the printing head – fig. 10.

Fig. 10. Printer head



• Do not insert a ragged or dog-eared ends to the paper roll, because it could result the paper jam or provoke insertion error.

5. Insert the front end of the paper roll straight into a paper insertion slot.
6. Set the paper roll firmly in the paper holder.
7. Put back the head-up lever. The paper roll is automatically pulled in by the platen roller to feed an amount of paper. (When auto-loading is en-

abled.)
8. Put back the printer covers in reverse order.

CAUTION:
• If the paper roll is still slack, rewind the paper to remove the slack
• If the paper roll is tilted, rais the head-up lever to correct the paper roll posotion, or pull out the paper roll and set it again.
• Do not open the printer cover while printing.
• Do not hold or press the paper roll while printing, because it could cause a paper jam.
• After the paper is set, the printer is ready for printing. Note that if data is remaining in the buffer, the printer will start printing.
• Do not run the printer with removed covers, because it could cause malfunctioning.

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, 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 +10 -15%) 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.

ERROR LIST

ERROR MESSAGE	PROBLEM & CAUSES & REMEDY
MOTOR ERROR	Motor damage. Contact your dealer to make the repairs.
EMPTY CAMERA **ERROR 02**	1. Air bubbles in the measuring sensor. Fill again the mug with milk and repeat the measurement. 2. The suction system has some air leak. Check the Plug (on the top of the analyzer) position and fix it using the plunger if it is necessary. 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 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.
WRONG PASSWORD	Incorrect Password. 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. Contact your dealer to make the repairs.
FW MISHMACH	The Main processor is damaged. Contact your dealer for repairs.
ERROR 03	PROM is damaged or erased. Contact your dealer for repairs.
ERROR 06	Data collection system error - incorrect or lost data for suppliers and milk parameters. Refresh Analyzer's memory to correct this error. Press **MODE** button, select with search buttons t , u **SEND & CLEAR**, confirm with OK. The message **PLEASE, WAIT...** appears on the display while memory clearing is going on. 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 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. 2.The measuring system is out of order. Contact your dealer to make the repairs.
ERROR 15	PROM reading/writing problem. Switch off/on the analyzer and try again. If the problem still exists, the PROM is damaged. Contact your dealer to make the repairs.

ERROR MESSAGE	PROBLEM & CAUSES & REMEDY
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.
NO MEMORY SPACE	Data collection system error - attempt to enter a new record out of allowed number. The maximum number of records can be 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 41	PH callibration 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 43	PH callibration error - 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 to make the repairs.
CAL ERROR 44	PH callibration error - pH electrode or termosensor disconnected or damaged. Check the connections. Replace the out of order pH electrode ot termosensor with new. Try again to calibrate the milk analyzer. If the problem still exists, the pH measuring system is damaged is out of order. Contact your dealer to make the repairs.
CAL ERROR 46	PH callibration error - wrong buffer solution. Fill the measuring mug with right buffer and repeat the calibration procedure.
CAL ERROR 47	PH callibration error - pH measuring system damage. 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 pH measuring system is out of order. Contact your dealer to make the repairs.
CAL ERROR 64	Conductivity callibration 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 callibration error - 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	Conductivity callibration error - power supply damage. 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 pH measuring system is out of order. Contact your dealer to make the repairs.

EKOMILK TOTAL

GUARANTEE CARD

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

DATE OF PURCHASE:

PASSWORD:

Distributor:

SERIAL [1] :

Signature:

Purchaser

Service report

Service entry date	Damage	Deliveriy date	Signature

EON TRADING LLC, USA

Exclusive international exporter of BULTEH 2000 production