LactoCorder TT (LC-TT) Training

Development and Production:

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Contents / Index

Training LC-TT

LC-TT equipment

Charger
USB-Connecting plug
USB-Stick
Software LACTOPRO and Updates (www.wmb.ch)
Sample bottle with bottle identification

LactoPro

Create herd data (operating data)
Evaluations / Analyses
Cleaning monitoring

Special Regulations

Maintenance / Cleaning
Akku
Replacement of rubber seal
Time synchronization

Cleaning the inside of the device
Rinse the blowpipe
Rinse the fluid housing with water
Let dry the device (upside down)

Cleaning the outside of the device (IP67)
No high-pressure cleaner
Do not use a solvent for cleaning

Maintenance and repairs

Torque / Dynamometric Key

Fitting tool:

Hexagon screw:	2.5 , 2 , 1.5
Torx wrench:	T8
Cross slot:	Philipps Klinge 0 , 1 (Philipps blade)
Slit:	1 (0.5x3.5)
Socket key/Screw wrench	5 , 5.5 , 6

Disassembly and Assembly

Electronic cover
Motor housing complete
Fluidhousing complete
Geared pump
Filter plate complete
Engine with cam plate

Encoder Tests

Service (Main Menu)

Inclination Test
USB-Communication
Bottle-ID-Reader
Keyboard/Display-Test
Endurance test orifice plate / diaphragm
Test cleaning air
Test sampling
Test pump

Setting on the Encoder

Settings (main menu)
Change time/date
Animal species
Settings (hidden service menu)
Hidden service menu
Settings for online-data
Corrections
Calibration
Delete RAM

Loading the program

Software update
Load
Herd Data / Operation Data
Load
Update
Export Data
USB stick (memory)
Read the herd data/operation data
Write data
Internal data memory

Final Testing / End tests

Annual routine testing (water test)
Final settings and checking (after successful water tests)

Support

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LactoCorder TT (LC-TT)

Water test

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A.1 Annual routine milk meter testing

A.1.1 General

	**Attention**	**The routine testing with testing fluid must be carried out with properly cleaned equipment.**

	**Attention**	**After the test, the device must be rinsed with clear water.**

A.1.2 Reference value

The reference value of a milk meter is determined, by dividing the value read on the display, by a correction factor. This correction factor for the LC-TT meter takes into account the difference between the specific gravity, viscosity and foaming characteristics of milk and of the test fluid. According to our present settings this correction factor is 1,031. For use in the periodic tests results of previous test can be made available.

A.1.3 Equipment needed

- Vacuum pump with a negative pressure of 40 to 50 kPa
- Hoses with 14-16mm internal diameter
- Flow reduction piece (flow rate about 5.5 kg/min) Art. 2506 (supplier WMB AG)
- Intermediate piece with the air inlet, Art. 2505 (supplier WMB AG)
- Calibrated electronic scales (resolution 10g)
- Bucket with min. 15 l volume
- Milking pail for receiving the test liquid
- Thermometer

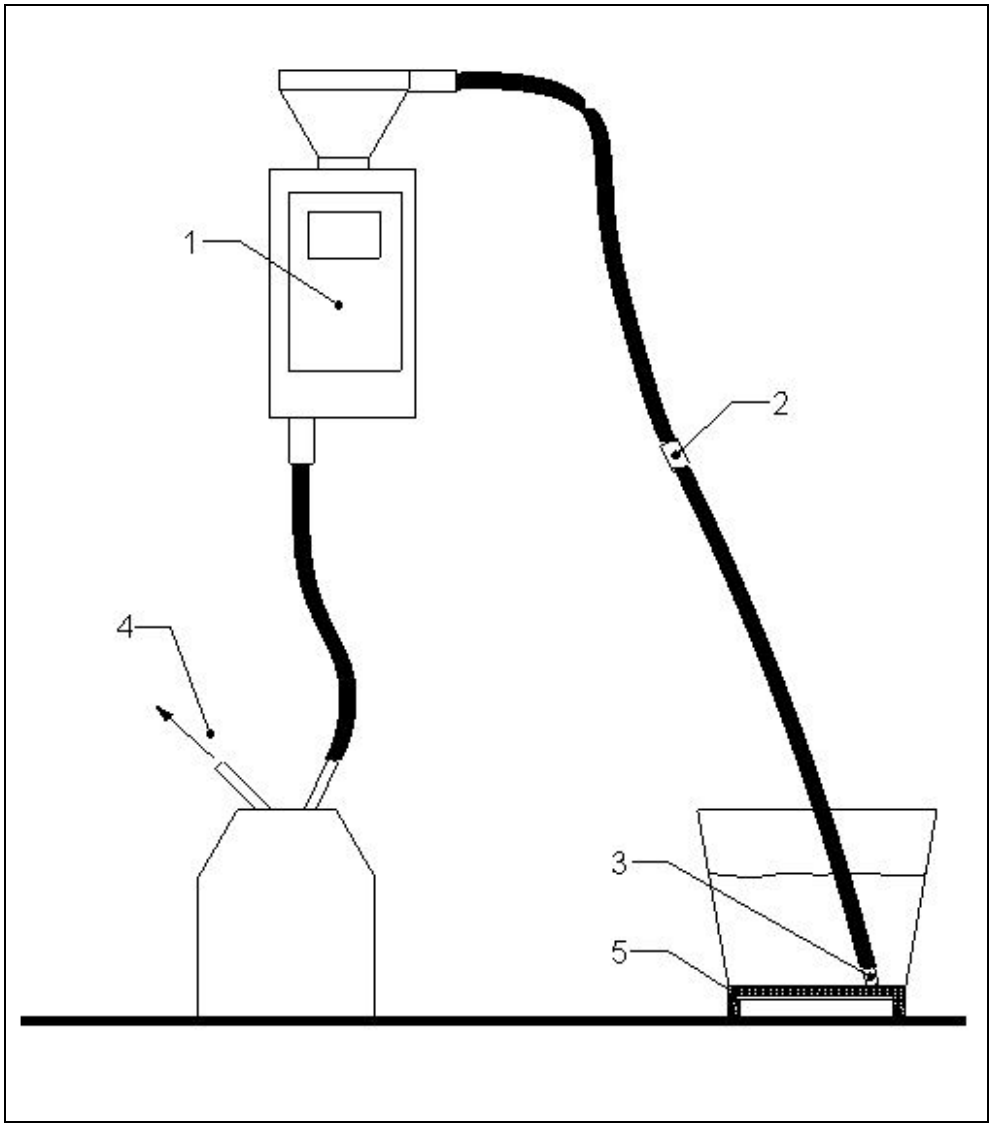
A.1.4 Test liquid

A.1.4.1 Neoagrar Top S

- Fill in 15.75 kg water with a temperature of 20°C +/- 5°C in a bucket
- Add 45ml Neoagrar Top S, Art.15566 (1 liter) (supplier WMB AG)
- Mix the fluid well

  The fluid may be used for 50 measurements / one day only.

Fig. A.4.4, Set-up for routine testing



1 *LC-TT secured free of tilting at an altitude of about 1.5 m*

2 *Art. 2505*
Intermediate piece with air inlet

3 *Art. 2506*
Flow reduction piece

4 *Connection to Vacuum*
40 to 50 kPa

5 *Calibrated scale*

A.1.5 Test procedure

1. Place bucket with the test liquid on the balance and zero
2. Switch on the LC-TT by pressing the button ON OFF.
3. In the main menu select «measurement without BD» (herd data) by pressing the <3>.
4. Key in a herd number (for example 1) and confirm with <E> «Enter» key
5. Key in a milking place (for example 1) and confirm with <E> «Enter» key
6. Select whether you want to measure with or without sampling (press the respective key)
7. When you want to measure with sampling press the <1> button
8. Enter animal number: Change or next
9. Enter the expected daily amount for cows, enter **20** kg and confirm with the key START STOP.
10. Now hold the hose connected to the LC-TT inlet head into the bucket
11. Start the measurement by pressing the <Enter> key.
12. Turn on the vacuum.
13. After the fluid quantity to be measured **10 kg** has been sucked out of the bucket, pull the hose and hold it up, so that the liquid still in the hose can flow into the LCS. It must be ensured that all liquid flowing back from the hose is collected in the bucket.
14. Then remove the hose from the bucket and wait until the indicated flow on the LC-TT display decreases to 0.0 kg / min.
15. Then exit the measurement by pressing START STOP.
16. Turn off the vacuum.
17. Add 3.1 % to the value displayed on the device to determine the reference value.

18. Measure the weight of the bucket with the remaining fluid and subtract it from the starting weight.

19. Determine the difference between the reference value and the amount of fluid effectively withdrawn from the bucket.

20. For a new measurement, press the "ENTER" key and then proceed as described in section 8 in this document.

A.1.6 Evaluation of the measurement results (in acc.with Dr. D. Nosal)

- If the first measuring value deviates less than **0.1 kg** from the reference value and the sample is between of **33 - 38g,** the device is OK.
- If the first measuring value deviates more than 0.1 kg from the reference value and the sample is higher or lower than **33 – 38 g,** a second measurement must be carried out.
- If duplicate measurements show an average deviation of 0.2 kg or less from the reference value and the second sample is between **33 – 38 g,** the device is OK.
- If the difference is higher than 0.2 kg and if the sample is still not within the tolerance, a third and fourth measurement must be carried out. Thereafter, a measurement correction and a sampling correction are carried out on the basis of the four measurements. Subsequently, a control measurement is made.
- If these values cannot be met, the measurement should be repeated after the unit has been checked for damage or incorrect installation.
- If the limits can still not be met, the device should be alternately acid / alkaline cleaned. (The test fluid has different wetting properties than milk, which is why any damage to the equipment in the water test is much more important than with the milk measurement).
- If necessary, the MPKF factors should also be alleviated, as in the case of water measurements with contaminated devices a small shift in these factors can take place. (In measurements with milk, however, these factors would automatically normalize quickly).
- If the limits still cannot be met, the device must be handed over to the service center or the manufacturer for inspection

LactoCorder TT (LC-TT)
Loading the firmware

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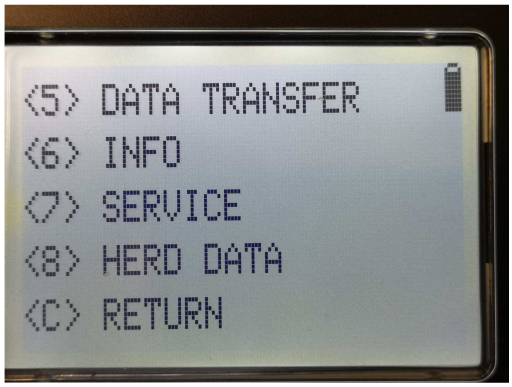
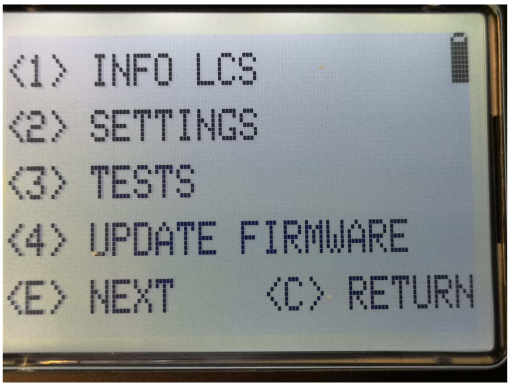
1 **Load firmware on USB stick. Important is the folder name (LCS update)**

2 **Main menu (7) service**

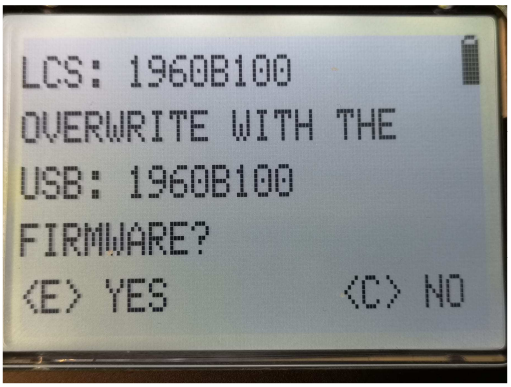


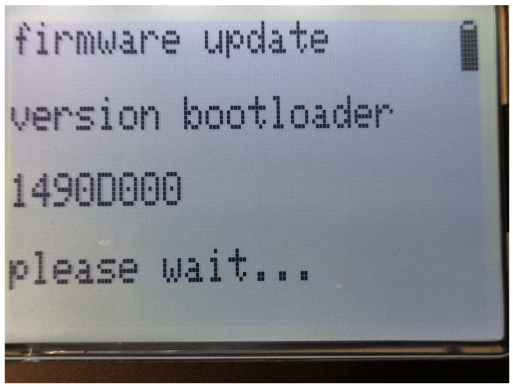
3 **Plug in USB-stick**

4 **Menu (4) Update Firmware**



5 **Confirm firmware overwrite**





When the update is complete, the device will turn off

LactoCorder TT (LC-TT)
Hidden service- menu

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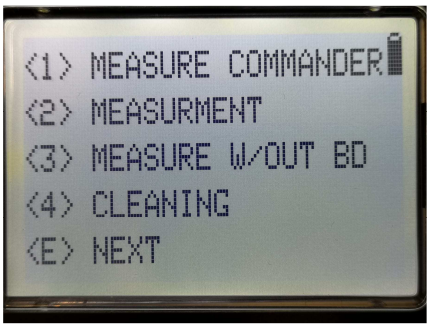
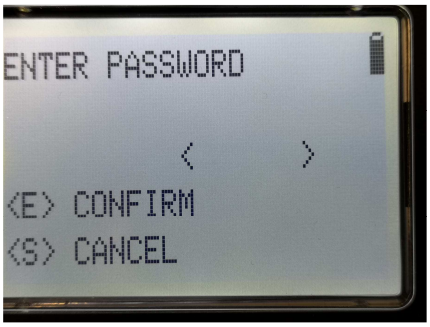
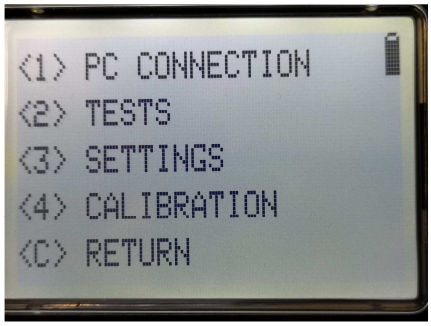
1 Plug in the USB-stick



2 Press briefly twice key 9



3 The password is the Complementary value of the device number beginning with 0 (e.g. 070158 = 929841)



In the hidden service menu there are certain points where a password is needed again. The password in the hidden service menu is 0 and device number (e.g. 70158 = 070158)

The password is always 1 with the WMB service USB stick.
To get to the service menu and the service menu.

Settings for online-data

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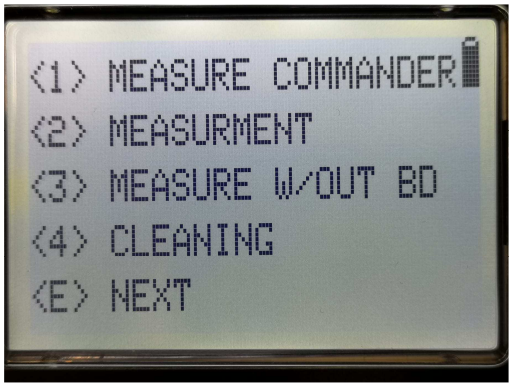
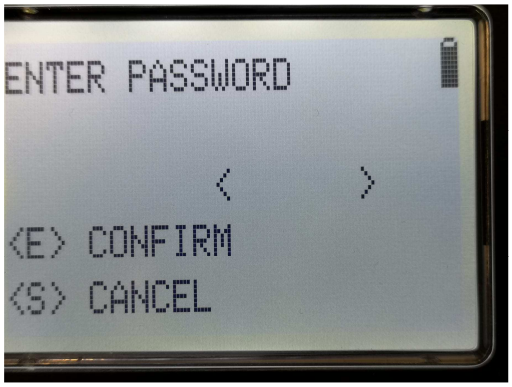
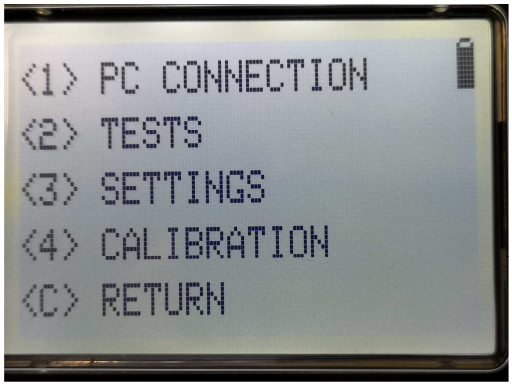
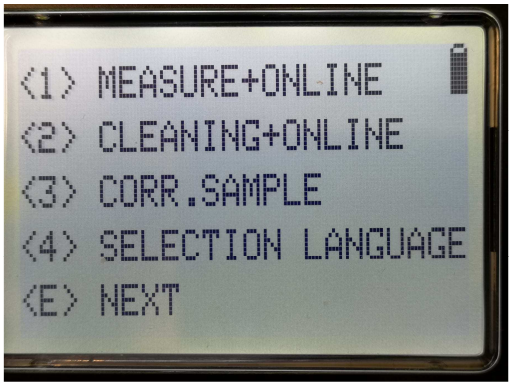
Switch on the device and insert the USB stick. And enter the hidden service menu.





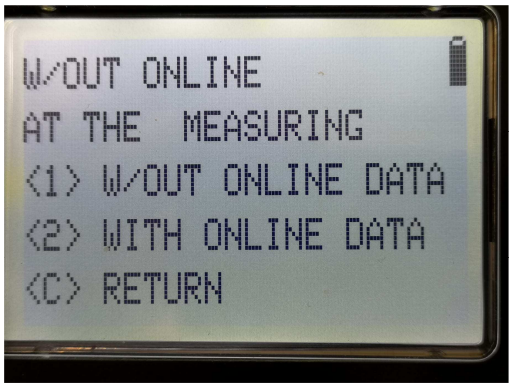
<3> Settings

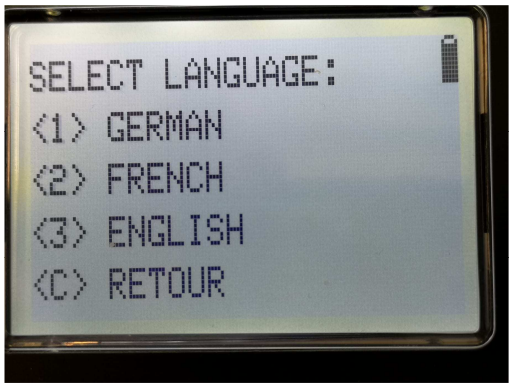




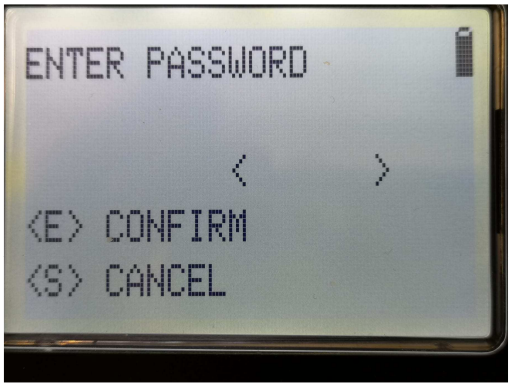
<1> Online in the measurement

<4> Select your language

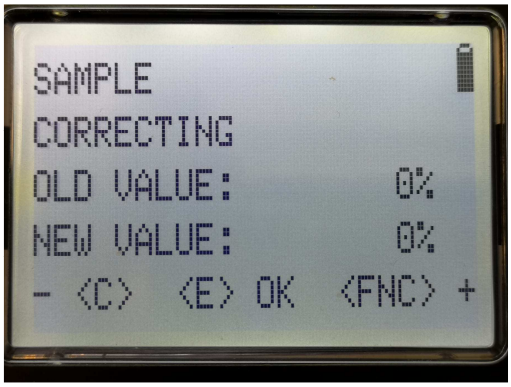




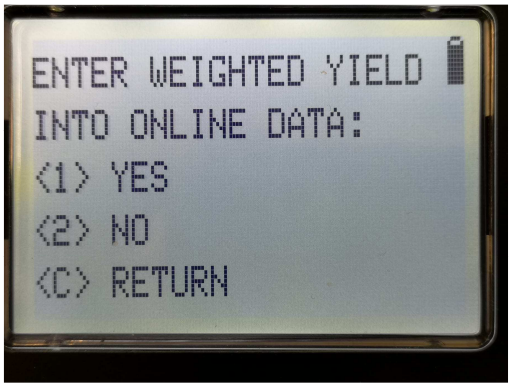
<3> Sampling correct. The password is the device number, starting with „0“ .
(e.g. 70158 = 070158)



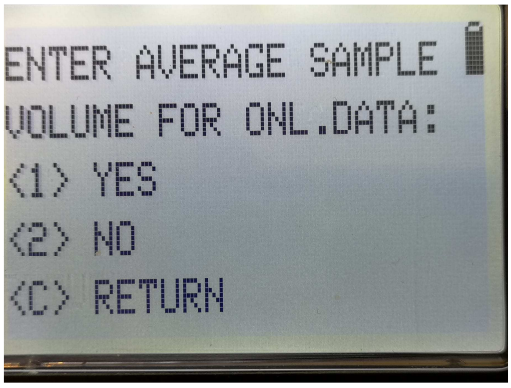
<8> selected milk quantity

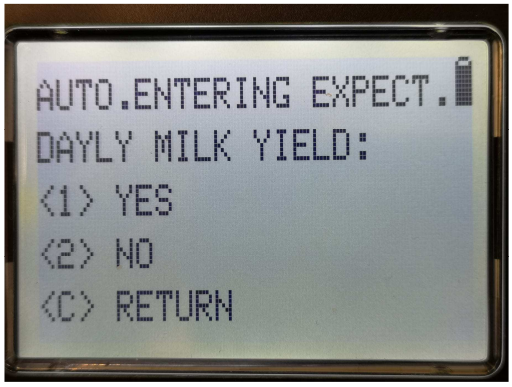


<9> Input sample quantity

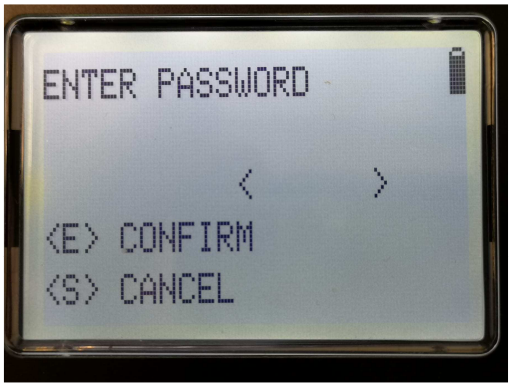


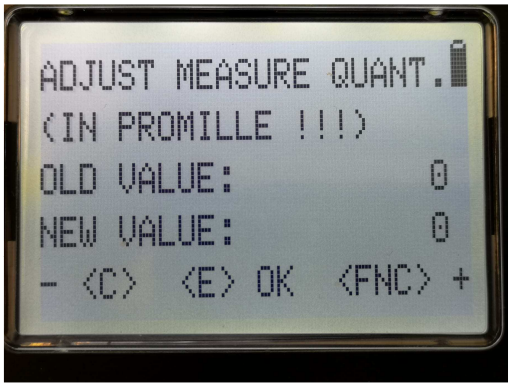
<11> expected milk quantity autom.





<15> Sampling correct. The password is the device number, starting with „0“ .
(e.g. 70158 = 070158)


ENTER PASSWORD
<E> CONFIRM
<S> CANCEL


ADJUST MEASURE QUANT.
(IN PROMILLE !!!)
OLD VALUE: 0
NEW VALUE: 0
- <C> <E> OK <FNC> +

LactoCorder TT (LC-TT)

Final adjustment and control

(after successful water tests)

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1 <3> Settings (in the hidden service menu)

- <3> Check the quantity of sampling
- <13> Clear RAM (delete)
- <15> Check measurement in promille
- <17> Check sampling quantity target

2 Rinse the device under tap

- Fluid housing
- Pump
- Diaphragm

3 Allow device to dry, deposite the device upside down

- 12 hours

4 View control of the device

- Screws
- Blowpipe
- Filter
- Inlet head
- Hanging bracket

Evaluation of milk flow curves with the program LactoPro

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The analysis of milk flow curves is part of the program LACTOPRO. The requirement profile is to automatically plausibly and reliably analyse milk flow curves which were recorded under the most varied conditions (milking technology, milking routine). This is why some analysis parameters require very complex defining. The most sensitive areas with regard to this are zero and post-milking, detection of air influx, detection of bimodality (double-peak upward sloping curves) and phase demarcation in the main milking area. Considerable variations in curve development and borderline cases which continually arise mean that it is not always possible to ensure 100% “security” and “plausibility.

The milk flow values are registered in the LactoCorder® at intervals of 2.8 seconds and accepted by the analysis software in this form. They are, however, poorly filtered there (gauss process) before the graphic illustration and analysis operations (apart from LE) are carried out.

Sub-division of milk flow Curves

The milk flow curves are divided as follows:

- Milk flow starting phase
- Main milking phase
- Zero milking phase 1
- Post-milking phase
- Zero milking phase 2

Further to the parameters total milk yield **(MGG)** and total milking duration **(tMGG),** which are each calculated from the start of milking to the end of milking, the following parameters are prepared.

Milk flow starting phase (tS500)

Phase from start of measuring until 0.50 kg/min threshold is reached.

Main milking phase (MHG; tMHG, DMHG, tAN, tPL, tAB, BIMO, HMF, LE F, LE)

Begins with the first milk flow value ≥ 0.50 kg/min. The end is normally reached if the milk flow reaches the standard international 0.20 kg/min threshold. However, there are exceptions to this:

- not exceeding the 0.20 kg/min threshold during the curve ascent phase (see below).
- air influxes which lead to a respective drop in milk flow are not evaluated as "End of milking".
- The "End of milking" can be reached earlier if post-milking is begun before the 0.20 kg/min threshold is reached ™ special method (ascent threshold) for recording this kind of post-milking (see below).

These are generally described by the following parameters: MHG, tMHG and DMHG

The main milking is also subdivided into three characteristic sections: flow increase phase, plateau, flow decrease phase. The time duration of the individual phases (tAN, tPL and tAb) is used to aid description.

Demarcation between flow increase and plateau

The start of the flow increase phase is also the start of the main milking phase. It can run continuously or in an interrupted manner (bimodal) which, in extreme cases, can lead to a milk flow drop down to or near to 0.00 kg/min.

The end of the flow increase phase, and therefore the start of the plateau phase, is defined as follows.

- The milk flow must have shown an increase of less than 0.80 kg/min^2 .
- In order to record the change-over point exactly (border between the increase and plateau), a short test is carried out to check the curve (three measuring points (for approx. 9 sec)).
- If the flow increase condition is met then persistence of the shortfall situation is checked by successively extending the test by up to 1.25 min.

Demarcation between a plateau and the decreasing flow phase

- The milk flow must increase by less than 0.80 kg/min^2.
- In order to record the change-over point exactly (border between the plateau/decreasing flow phase) a short test is carried out to check the curve (three measuring points (approx. 9 sec).
- In order to test persistence a tangent with an upward slope of -0.80 kg/min^2 is applied to the short test which should no longer be reached by the milk flow again until 85% of the output milk flow value of the tangent has been reached. The end of the flow decrease phase is also the end of the main milking

Bimodalität (BIMO)

Bimodality is a parameter in the flow increase phase and records a stimulated double peak flow development at the start of milking. The following definition forms its basis:

- Test start: from a milk flow of 0.50 kg/min (time tS500)
- Test end: tS500 + 95 sec
- The milk flow peak should not be too flat --> time duration between 90% of peak level (in-/decrease):< 45 sec.

- Conditions for milk flow drop:
- > 0.20 kg/min with time restriction **or**
- If the increase interruption takes 5 measuring points (14 seconds) or more a drop > 0.10 kg/min is sufficient **or**
- If the milk flow of the first peak has reached or exceeded 80% of the HMF the milk flow drop must be 16% of the HMF, or at least 0.50 kg/min (--> demarcation of BIMO from plateau deviations)
- Conditions for a resumption of flow increase: > 0.50 kg/min within 38 seconds (equals an ascent of 0.80 kg/min²)

The highest milk flow (HMF)

The highest milk flow is the maximum milk flow within a time interval of 8 measuring points (approx. 22 seconds). It mostly occurs in the plateau phase, but can occur in the case of existing bimodality during the flow increase phase (BIMO peak.

Air influx (LE)

Air influx is identified if an extreme milk flow drop occurs, followed by a resumed increase (always with steep slopes). Air influx can also occur in the plateau and flow decrease phases.

The unfiltered measured data is accessed when recording an LE so the definition on the displayed milk curve cannot always be traced. The test conditions are as follows:

- The influx must occur before a slight ascent (acceleration of milk into the diversion system due to atmospheric air): at least 0.10 kg/min within 4 measuring points (11.2 seconds)
- Milk flow drop > 50 % of HMF within 4 measuring points (11.2 seconds)
- Resumption of milk flow increase > 40 % of HMF within 4 measuring points (11.2 seconds)

Zero milking phase 1 (tMBG / MBG)

Phase between main and post-milking with a milk flow of ≤ 0.20 kg/min. However, there are exceptions here:

- No zero milking phase 1 (post-milking is started before threshold value is reached.
- Under certain circumstances the milk flow > 0.20 kg/min during zero milking

Post-milking phase (tMNG / MNG / OS / MFOS)

Start of post-milking phase

a) Straight after the zero milking phase 1. It is based on the following conditions:

- Milk flow exceeds the 0.20 kg/min threshold with an ascent > 0.20 kg/min within 6 measuring points.

  or

- 0.35 kg/min is exceeded on two consecutive occasions.

b) It starts directly after the main milking. Testing is carried out if post-milking (as described under a)) is not available.

- The milk flow must not have reached 1.00 kg/min or 50 % of the HMF in processes with a HMF < 2.00 kg/min (to rule out that the test was caused by plateau deviations)
- A flow increase must exist of 0.30 kg/min within a max. of 5 measuring points (approx. -1.3 kg/min2)

Such post-milking is coded with “OS=1“. The minimum flow between the main and post-milking phase is given as “MFOS”.

End of the post-milking phase

Generally indicates that the milk flow has dropped below 0.15 kg/min and is ≤ 0.20 kg/min.

Checks are carried out for post-milking under a) to see if the end is persistently reached (i.e. further checking is done under the conditions mentioned in a).

- If the mentioned conditions under a) are met again within 9 measuring points (approx. 25 seconds), the entire period will accredited to post-milking.
- If after an interruption of 10 measuring points or more, the mentioned conditions under a) are met again, the first post-milking identified is accredited to the zero milking period and the newly identified period is evaluated as post-milking

Post-milking is identified by its duration (tMNG) and its yield (MNG).

Zero milking phase 2 (tMBG2 / MBG2)

It starts directly after post-milking and can generally be traced back to an omission to terminate the measuring in a timely manner.

LactoCorder TT (LC-TT)
List of error codes

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LC-TT Error

110 Invalid value in the input
111 Input canceled by input keyboard
112 Password: Length longer than allowed on display
113 Division / divided by 0
114 Overflow of a variable or arrays occurred

Inclinationsensor

150 Inclinationsensor is not calibrated
151 Inclination: at testing higher than limits in EEPROM
152 Inclination higher than 30° -> close the panel (blind/diaphragm)

EEPROM

170 Checksum in EEPROM not ok
171 Wrong value of EEPROMs

internal/external Flash

190 In the flash is not the right identifier

external RAM

195 RAM error

Measurement

200 Max. duration of measurement exceeded
201 Invalid measurement state (variable measurement state)
202 Error at emptying the LC-TT at the end of the measurement

Shutter motor

250 Shutter motor (diaphragm) loses more than BM_MAX_LOST_STEPS, the blind/diaphragm no longer turns correctly

Sampling

270 Engine of sampling could not be brought to the defined position
271 Sampling overrided (too many samplings ==> sample bottle full)

Vacuum shutdown

280 Vacuum-engine could not be brought to the defined position

USB

300 Error accessing the USB stick
301 Filesystem is not linked, can not be used
302 Desired directory does not exist
303 Error while changing the directory
304 Wrong or no file type specified
305 Temporary path not available for access to USB stick
306 Error deleting the USB task

307 Error deleting the KHCI-task (this task is generated by the USB task)
308 Error initializing the MFS file system of the USB interface
309 Error with parameters for USB-Communication (usb-kom of type t-USB-Data)
310 No file extension found
311 Error writing to LAST_BD.txt
312 Too many files of the searched file type
313 The line that was read contains no data
314 Timeout occurred while reading the USB stick
315 Error opening the file
316 Error closing the file
317 No data in the USB data array
318 Error initializing the USB pointer
319 Error while allocating the abs_path-pointer
320 No more storage space in teh MFS-file-system
321 At «dir / you» command was no more file to be found
322 File-Pointer not valid
323 Error while setting the file cursor
324 Error creating a new folder
325 Pointer-error absolut pointer and/or file pointer
326 Error initializing the USB task
327 Error writing to the USB stick
328 USB-test: read file does not match to written content

Akku / battery
360 Akku voltage in impermissible range

HW-Version
380 AD-value in impermissible range

Herd Data / Operating Data
500 No operating data / no herd data file available
501 No operating data found (ID for BD (herd data) not available
502 Wrong operating data format
503 Checksum of the operating data is wrong
504 Max. number of animals per farm exceeded
505 Too many files in the folder with herd data (number defined in usb_io.h)

Measurement value
600 Error in the format/size in the measured value range
601 MW_RAM full, no space for further measurement
602 Interlinking of measured values incorrect
603 Error of the checksum of the management area of the measured values
604 Linking of measured values defective, offset from measured values to the next is no longer correct
605 Measured value RAM contains milking data, delete from MW-RAM not allowed
606 Error while reading pointer

Online-Measurements

620 Error in the format/size in the online measurement area
621 ONL_MW_RAM full, no room for further online measurement
622 Interlinking of online measured values incorrect
623 Error checksum of the management area of online measurement values
624 Interlinking of the online measured values is defective, offset from online measured values to the next one is not correct anymore

Commander

700 Not allowed with b_probe_status_betrieb == PROBE_NR_COMMANDER
701 No sampling status defined
702 Invalid specification of how to read the sample-ID at Commander measurement

Akku / I2C-Extern

800 I2C-interface 1 not activated
801 Timeout during communication with I2C interface 1

RTC / EEPROM / inclination sensor

810 I2C-interface 1 not activated
811 Timeout at communication with I2C-interface 1
812 Mutex not available

RTC

900 Invalid datas/values read by RTC

Printmodul

1000 Characters/signs on the UART could not be sent
1001 Timeout reading a UART-interface
1002 Answer available, but wrong answer
1003 Error in the checksum oft he transmitted data
1004 Unknown error code received back
1005 Air bubble detection failed
1006 Error executing the bubble detection command
1007 No communication with print module
1008 No sieve put into the LC-TT
1009 Firmware-version is not correct
1010 NOK failed

Radio module (Funkmodul)

1020 Characters/signs on the UART could not be sent
1021 Timeout reading a UART interface
1022 Answer available, but wrong start sign of the answer
1023 Error in the checksum of the transmitted data
1024 Not received the desired number of bytes when reading from radio module
1025 Error at start address when reading the data
1026 Error during echo test (wrong character/wrong sign)
1027 Communication error with the radio module (general error)

1028 Wrong data type requested by the radio module
1029 No configuration data announced by the radio module
1030 Data does not start with the start character @
1031 Firmware-version is not correct
1032 Invalid RFID address in the FM

Transponder modul

1040 Characters/signs on the UART could not be sent
1041 Timeout reading a UART interface
1042 Answer available, but wrong start sign of the answer
1043 Error in the checksum of the transmitted data
1044 Communication error with the transponder module (general error)
1045 No transponder module installed
1046 Firmware-version is not correct

Barcodereader modul

1050 No barcode reader installed, but was required

QSPI (Display / serial Flash)

1060 Timeout sending with the QSPI

Serial Flash

1070 Overflow in the Flash
1071 Too many characters/signs received
1072 Wrong value read

Parallel Flash

1080 Value that was written is not identical to the value read
1081 When deleting or programming, a timeout has arisen

Cleaning

1100 Max. duration of cleaning exceeded

Firmware-Update

1200 The identifier is not correct
1201 Error in the header of the Update-File
1202 Error in the checksum of the update file
1203 Error in the concatenation of the peripheral header
1204 Unknown periphery
1205 Too many peripheral updates

Virtual animal measurement

1300 No online data for the virtual measurement
1301 The virtual data is too long for the measured value RAM
1302 Too many files in the virtual data folder

Calibration

1400	The offset of the LC-TT is not calibrated
1401	The difference between the lower and upper offset during the offset calibration is too large

LC-TT warnings

10001	Desired text can not be shown in the display or characters are not available in the font
10002	No picture found for the picture number
10003	Reading stopped by Flag End of File
10004	Function was canceled by the user
10005	LC-TT is emptied, the liquid has not yet completely drained
10006	RAM for online values full, Measurement is not necessarily terminated
10007	Warning that no USB stick is plugged in (check for hidden service menu)
10008	Timeout while waiting for user input
10009	End measurement
10010	Config data is invalid
10011	Config data is invalid because the time in it is not plausible
10012	Config data is invalid because wrong animal species is loaded
10013	Config data is invalid because the validity period has expired
10014	Config data is invalid because the checksum is wrong
10015	New format/size detected in service buffer
10016	Unknown value in a switch case statement

LactoCorder TT (LC-TT)

Torque specification

Development and Production:

WMB AG
Wegenstrasse 6 ● CH-9436 Balgach
Switzerland
Tel. +41(0)71 727 18 30 ● Fax +41(0)71 727 18 31
E-Mail info@wmb.ch
Internet www.wmb.ch

Torques specification (in Ncm)

22581 LC-TT Var 3

14915	40	Motor housing
14915	60	Electronic cover
11602	40	Ramp AIMP

22582 Fluid Housing complete Var 3

15734	40	Connection sleeve
1252	25	Support
11580	60	Base plate
1224	60	Suspension bracket
11602	40	Filter plate complete
11602	40	Motor with cam disk
11602	40	Adapter complete 17 AIMP
22199	40	Gear pump
22034	40	Measuring electrode
22033	40	Mass

15712 Fluidgehäuse mit Messbolzen und Fühler

16746	40	Measuring electrode long
16557	40	Masse electrode

15738 Filter plate complete

12404	25	Sensor print

18960 Motor with cam disc

15083	25	Cam disc

15718 Motor housing complete

12040	40	Motor housing cover	

22580 Electronic cover complete Var 3

1392	40	Position disk	
13725	40	Wave	
10094	40	Disk	(secure the screw Loctite 243)
16191	40	Leaf spring	
12404	40	Display	
12404	25	LC-TT Print with radio module	

When working with a cordless screwdriver:

The torques depend on the battery condition and must therefore be checked regularly.

LactoCorder TT (LC-TT)
Name of the directory

Development and Production:

WMB AG
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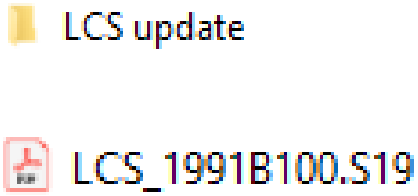
Name of the directory

Firmware



Herd data