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PMKL

PASTEURIZATION MONITOR:

USER'S GUIDE

Contents:

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1. Equipment

Basic Package:

Pasteurization monitor PMKL

Stainless holder both for the pasteurization monitor and for the bottle

Temperature sensor for measurement of pasteurization units in the bottle

Magnet for make-and-break

Communicating cable RS232 (COM ADAPTER) or USB for transfer of the data between pasteurization monitor and PC

CD with installation programme

User's guide

2. Technical data:

range of temperature measurement.....- 30 - + 70 degrees Celsius

accuracy.....0,1 degree Celsius

number of temperature sensors.....2

interval of data storage into the memory..... from 10 sec to 24 hrs (20 possibilities)

memory capacity for non-cyclic record..... 16252 records of both channels

feeding..... lithium battery

software working under WINDOWS XP and higher versions

3. Operating recommendations

range of operating temperature of the instrument.....- 30 - + 70 degrees Celsius

range of operating humidity of the instrument..... 0 až 100 % relative humidity

covering..... IP 68

COM or USB ADAPTER is supplied with every pasteurization monitor.

Forbidden handling!!!! It is forbidden to use pasteurization monitor with exchangeable sensors without connected sensor measuring the temperature in the bottle. Such handling would cause water pour into the sensor.

4. Installation of the software into the PC

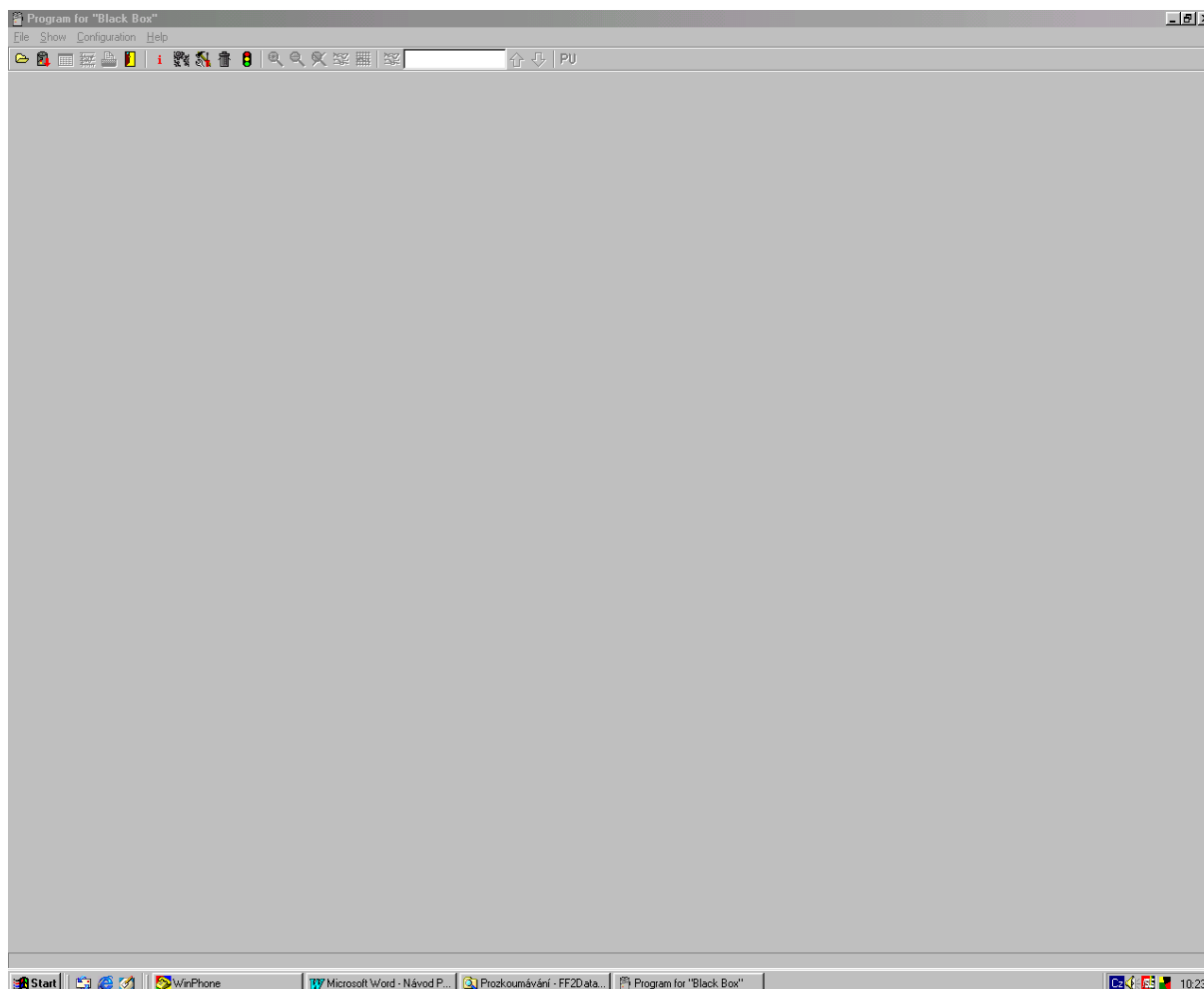
Insert the installing floppy CD into the PC and start installing programme pasteur.exe. Choose czech or english language for communication and follow the instructions.

5. Operating instructions

First activation of the programme

After successful installation of the programme new icon **Datalogger** will appear on the screen of the PC. You will start the programme for pasteurization monitor with this icon. After clicking twice on the icon **Datalogger**, window will appear. Write the name of your company in the line "Company name" and key in line of "Key". Key is advised by email when the goods is fully settled.

The following window will appear after that, please confirm the licensed arrangement if you agree with it.



And click on OK then. The programme Pasteurization monitor will start just after.

Standard settings of Pasteurization Monitor

Pasteurization Monitor is pre-set by the manufacturer to make-and-break by magnet. Period of temperature measurement - 10 sec, non-cyclic record regime, recording only if alarms is switched off. Connect pasteur.monitor with PC by communicating cable RS232 to transfer the data between PC and pasteur.monitor. One lead of the communicating cable insert into COM1, COM2 or USB in PC and the other lead of the communicating cable insert into the lock placed on the pasteur. monitor (see.pic.1). Pasteurization Monitor can be set (or re-set) after clicking on item "Configuration" in the Main Menu and then **on Logger parameters setting F6**. The window with the Logger parameters settings will appear (see pic. No. 2). You can set the following data in this window:

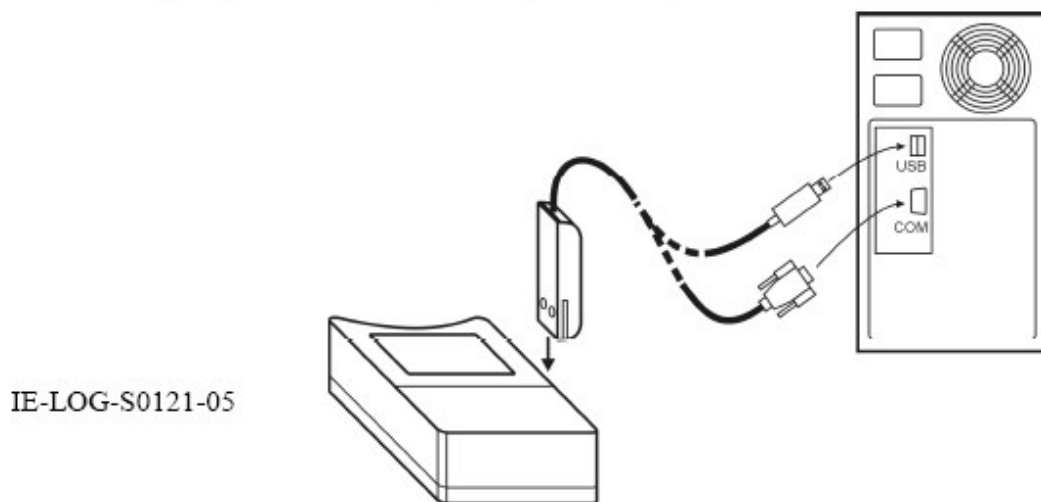
- Real time and date in the recorder
- Select suitable recording interval
- Select the recording regime (cyclic or non-cyclic)
- Check (or set) type of temperature probe (Pt1000 or Ni1000) for each channel
- Switch off the channel that you do not want to be recorded (for example-the ones with disconnected probe)
- Switch on the recorder (or switch it off in the case it should be switched on by magnet or automatically)
- Enable or disable the option to switch on the logger by magnet
- Enable or disable the option to switch off the logger by magnet
- Set date and time of logger automatic activation or disable this option
- Select if record runs permanently or only if alarm is active
- If alarms are about to be applied, set both limits and enable alarm

- Optionally enable permanent alarm
- Optionally reset memory of MIN/MAX values
- Check free space in data memory, optionally erase the data memory
- Enter password if protection against unauthorised manipulation is necessary

The description below corresponds to parameters set according to pic. No. 2. If parameters are modified, the pasteur. Monitor doesn't have to work as described in this user's guide (for example switching on and off by magnet).

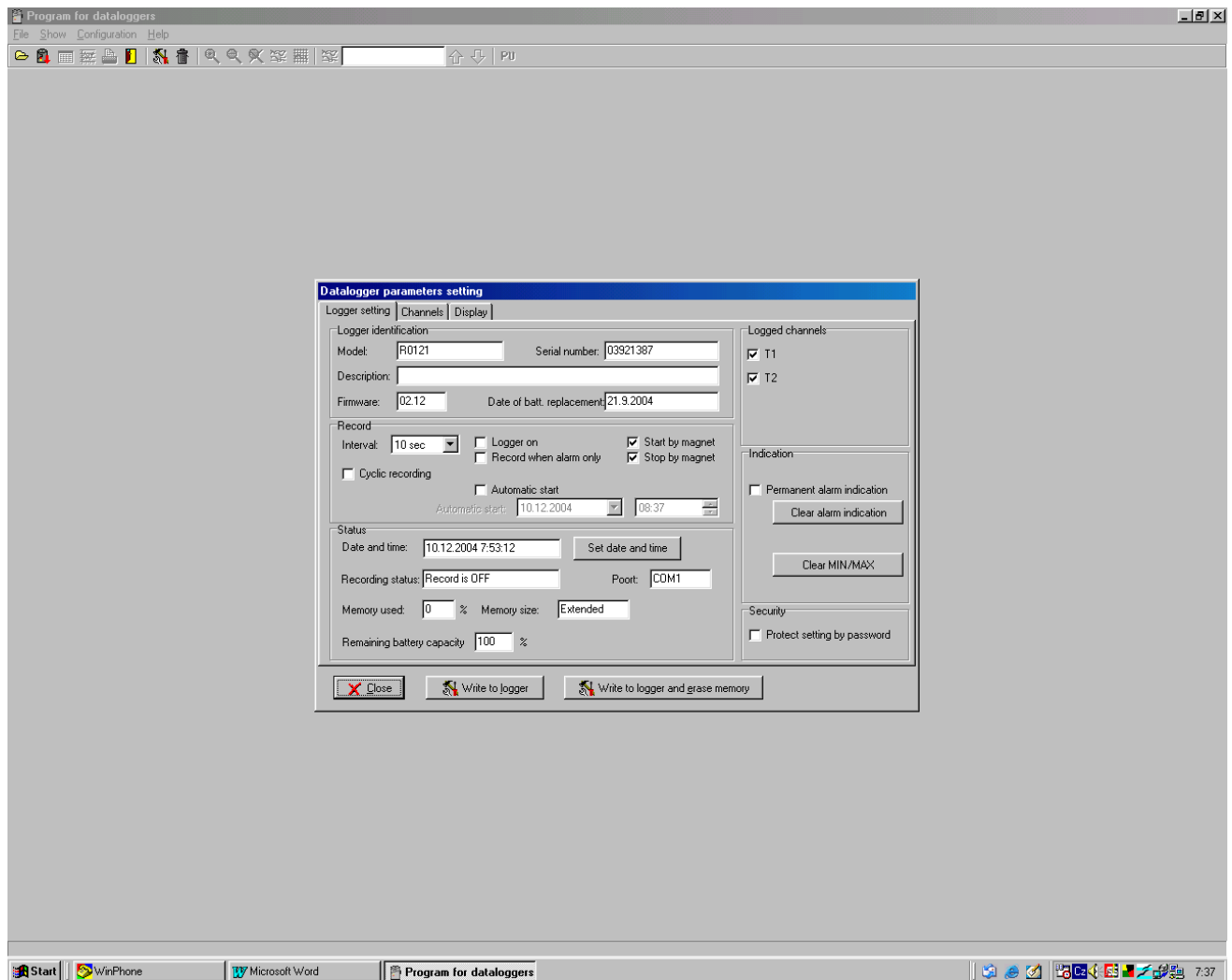


Connecting logger to the computer by means of communication adapter



Pic.1

Window with standard pasteur. monitor parameters settings.



Pic.2

Passage of the pasteurization monitor through pasteurization tunnel

Insert bottle with water or beer into the white tube with interchangeable green fillings. Place the bottle with the white tube into the stainless holder. Select the suitable temperature sensor according to the bottle height (the end of the sensor should be about 20 mm over the bottle bottom). Insert the temperature sensor into the bottle and secure it by the bar with two screws on its end. The bar should be set in the folds of the stainless holder. Insert the temperature sensor connector into the connector of the pasteurization monitor with exchangeable sensors and tighten it fully.

Important!!! There is sealing rubber "o-ring" which seals properly only if the cap nut is tighten well. If not water can get into the connector causing inaccurate temperature and fast battery discharge.

Place pasteurization monitor with temp. sensor into the stainless holder and secure it by stainless nut.

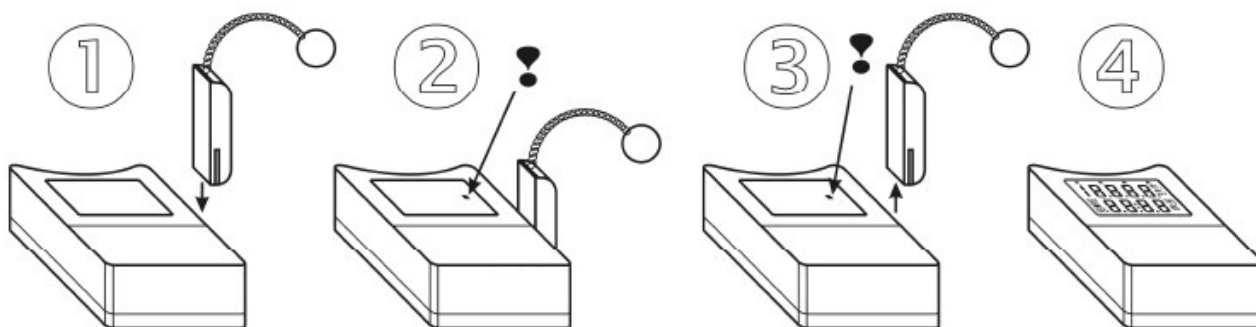
Start / stop by magnet

The function must be enabled from the PC before. If only switching OFF by magnet is enabled, it is of course necessary to switch ON the logger from the computer.

Notice: It is not possible to combine function switching OFF by magnet and MIN/MAX memory clear by magnet! User software enables only one of them to select.

Switching the logger ON by magnet

Plug magnet to guide slots from logger front side and wait approximately 1 s for decimal point appears right on LCD upper line. After appearance it is necessary immediately (till indication point is displayed) to remove magnet from guide slots and logger switches ON.



Switching the logger OFF by magnet

The procedure is identical with the above procedure for switching ON. If decimal point does not appear after 1 s, it is necessary remove the magnet and repeat the procedure.

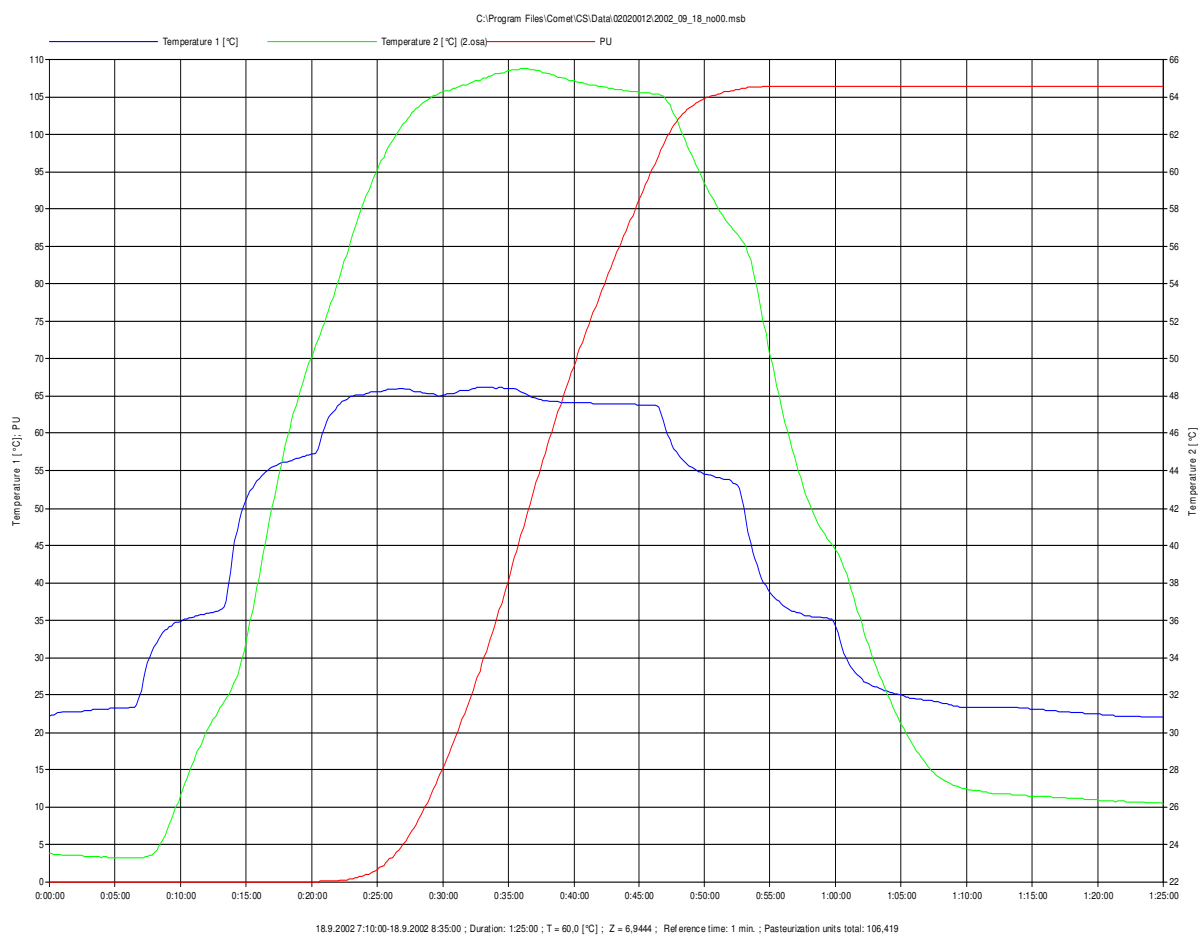
Place the pasteurization monitor holder on the belt of the pasteurization tunnel and let the holder go through the tunnel. Pasteurization monitor can go through the pasteurization tunnel more than once in the different parts to find out the pasteurization process in the different parts of the tunnel.

Transfer the data from pasteurization monitor into the PC and the data presentation in PC:

Switch off the pasteurization monitor by magnet when the pasteurization monitor is out of pasteurization tunnel. The way to switch off is similar to the one described above.

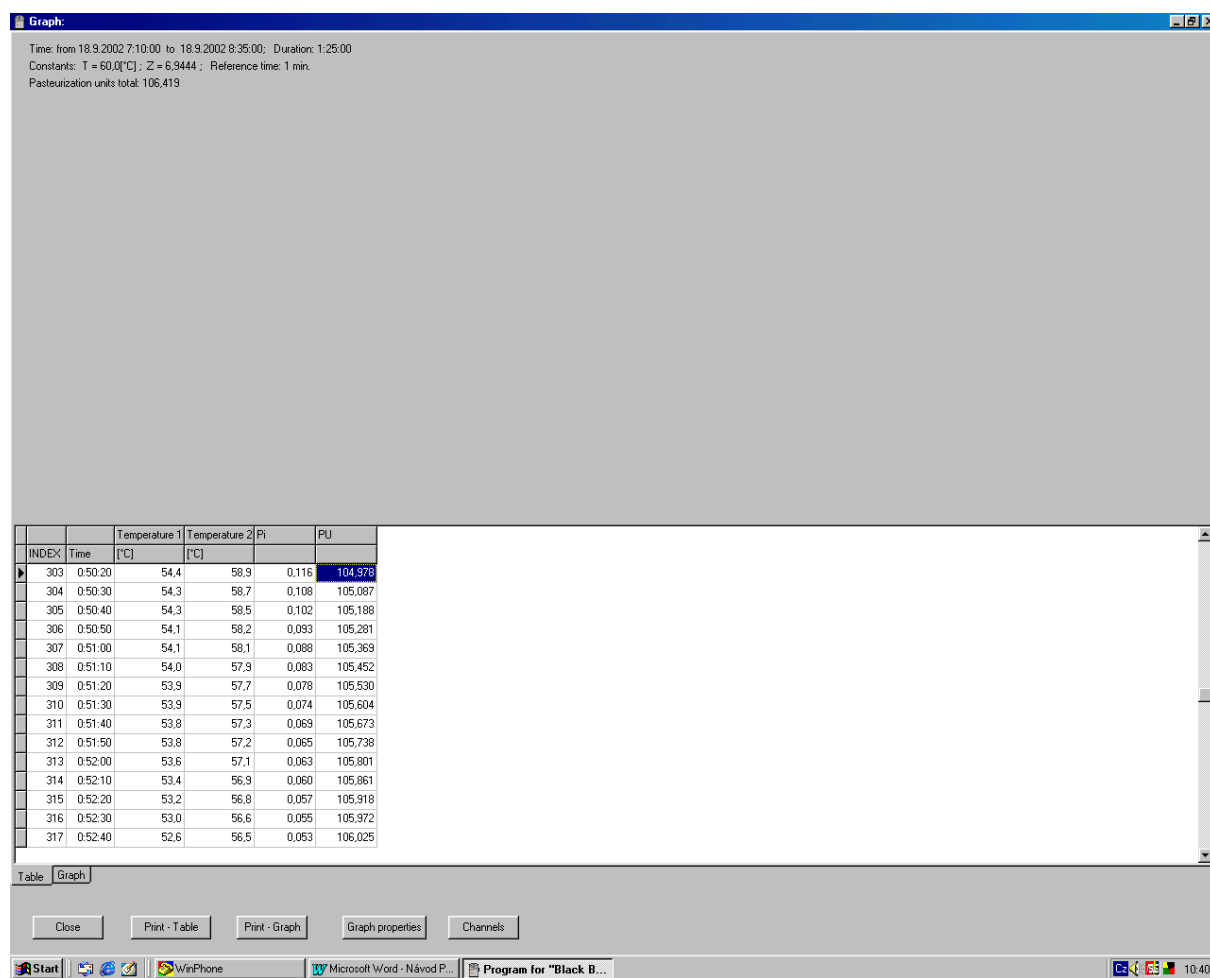
Bring switched off pasteurization to PC with installed programme for the pasteurization monitor. Insert one lead of the communicating cable into COM or USB in PC (we recommend to leave it connected constantly) and the other lead of the communicating cable insert into the lock placed on the pasteur. monitor. The decimal point appears on LCD for a second on the side of the monitor, after that there is no more decimal point in the LCD. Click twice on the icon **Datalogger** on PC monitor to start pasteurization monitor programme. Click on the second button in the left upper part as shown on pic. No. 2. The dialogue to save data in PC will be opened. Programme offers the name of the file and location to save data. The offered name in the way for example 2003_06_18_no00 - means 2003 - year, 06 - month, 18 - day and no00 - measurement number of the day. Files are saved implicitly into the directory with the equivalent production number of the pasteurization monitor. If the name of the file suits you just click on **"Save"** and the file will be saved with the above stated name. Of course it is possible to save the file with different name chosen by you. It is possible to write a note in the window "description" while saving. **Important!!! While saving the data from pasteurization monitor into PC, the programme asks if you want to delete memory of pasteurization monitor, confirm it. If you don't delete the memory while saving, it will have to be done before taking next measurement. Click on "Configuration" in the "Main menu" and follow with "Instrument memory erasing".**

After the successful transfer the windows shown on pics No.5 or 4 appears.



Pic.No.4

Pasteurization units sum can be read on the left vertical axes, temperature 1 (in the bottle) is on the right horizontal axes. Click on the flag "Table" (on the left side in the bottom) to watch the table form of the values - see pic. No. 5. All tables can be printed out.



pic.5

Click on the flag "Graph" (on the left side in the bottom) to get back to graphic version (pic. 4).

After closing this window the transferred data will appear in the table (pic. 3B) or graphic form (pic. 3A) on the screen. You can change between the pictures 3A and 3B by clicking on the 3rd or the 4th key in the upper left part.

The transfered data appears on the the screen in the table form, where T1 = sensor temperature in the bottle, T2 = sprinkling water temperature in the pasteurization tunnel.

Program for dataloggers

File Show Configuration Help

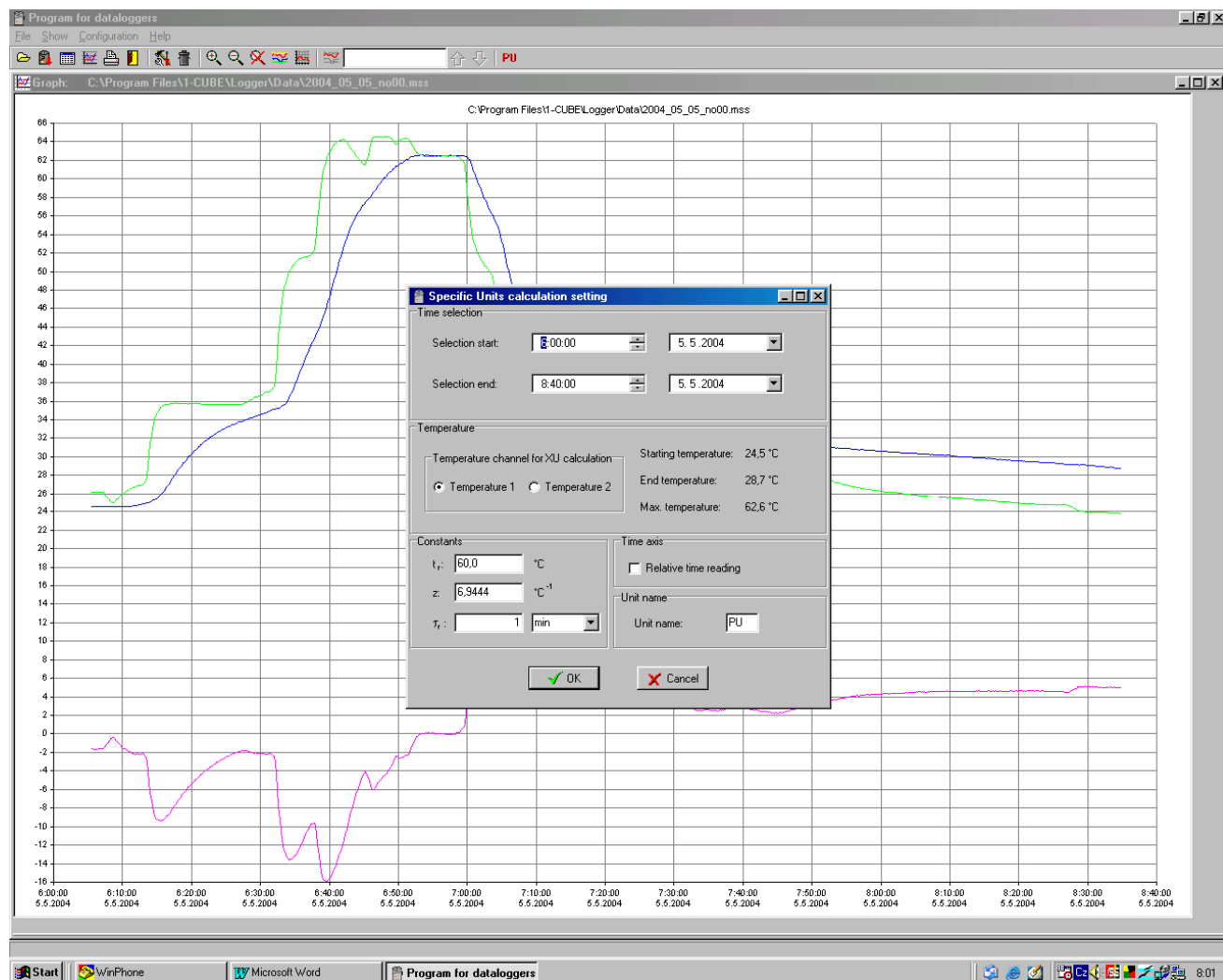
Table: C:\Program Files\VI-CUBE\Logger\Data\2004_05_05_no00.mss

INDEX	Date	Time	T1 °C	T2 °C	DIF (Dif.) °C
1	5.5.2004	6:05:30	24,5	26,2	-1,6
2	5.5.2004	6:05:40	24,5	26,2	-1,6
3	5.5.2004	6:05:50	24,5	26,2	-1,7
4	5.5.2004	6:06:00	24,5	26,2	-1,7
5	5.5.2004	6:06:10	24,5	26,2	-1,7
6	5.5.2004	6:06:20	24,5	26,2	-1,7
7	5.5.2004	6:06:30	24,5	26,2	-1,6
8	5.5.2004	6:06:40	24,5	26,2	-1,6
9	5.5.2004	6:06:50	24,6	26,1	-1,6
10	5.5.2004	6:07:00	24,6	26,2	-1,6
11	5.5.2004	6:07:10	24,5	26,1	-1,6
12	5.5.2004	6:07:20	24,5	26,0	-1,5
13	5.5.2004	6:07:30	24,5	25,8	-1,3
14	5.5.2004	6:07:40	24,5	25,7	-1,2
15	5.5.2004	6:07:50	24,5	25,5	-1,0
16	5.5.2004	6:08:00	24,5	25,3	-0,8
17	5.5.2004	6:08:10	24,5	25,2	-0,7
18	5.5.2004	6:08:20	24,5	25,0	-0,5
19	5.5.2004	6:08:30	24,6	24,9	-0,3
20	5.5.2004	6:08:40	24,5	24,9	-0,4
21	5.5.2004	6:08:50	24,5	25,0	-0,5
22	5.5.2004	6:09:00	24,5	25,1	-0,6
23	5.5.2004	6:09:10	24,5	25,3	-0,8
24	5.5.2004	6:09:20	24,5	25,5	-0,9
25	5.5.2004	6:09:30	24,5	25,6	-1,0
26	5.5.2004	6:09:40	24,5	25,8	-1,2
27	5.5.2004	6:09:50	24,5	25,9	-1,4
28	5.5.2004	6:10:00	24,5	26,0	-1,5
29	5.5.2004	6:10:10	24,5	26,1	-1,6
30	5.5.2004	6:10:20	24,5	26,2	-1,6
31	5.5.2004	6:10:30	24,5	26,3	-1,7
32	5.5.2004	6:10:40	24,5	26,3	-1,8
33	5.5.2004	6:10:50	24,5	26,4	-1,8
34	5.5.2004	6:11:00	24,5	26,5	-1,9
35	5.5.2004	6:11:10	24,5	26,6	-2,0
36	5.5.2004	6:11:20	24,5	26,6	-2,1
37	5.5.2004	6:11:30	24,6	26,7	-2,1
38	5.5.2004	6:11:40	24,6	26,7	-2,1
39	5.5.2004	6:11:50	24,6	26,8	-2,2
40	5.5.2004	6:12:00	24,7	26,8	-2,2
41	5.5.2004	6:12:10	24,7	26,9	-2,2
42	5.5.2004	6:12:20	24,7	26,9	-2,2

Start WinPhone Microsoft Word Program for dataloggers 7:52

Pic. No. 3B

Click on the fourth button in the upper left part to get the graphic form of the temperature courses. Click on the ninth button in the upper left part as shown on pic. No. 2 (magnifier) to get graph cut out for reading the pasteurization units just from the chosen cut-out. After choosing the cut-out for calculation of pasteurization units, click on the button PU in the upper right part. The window looking like on pic. No.3A for setting parameters of pasteurization units calculation appears.



Pic. No. 3A

Change the beginning and the end of the time interval for pasteurization units calculation in the section "Choice of time interval" if required. The sensor for pasteurization units calculation is chosen in the section "Temperature". Leave sensor Temperature 1 here because it is the only sensor measuring temperature in the bottle. The constants for pasteurization units calculation can be set in the section "Constants". Leave the values set as: t_r : 60, Z : 6,9444 and τ_r : 1 **minute**. After parameters setting click on OK. The window as shown on pic. No.4 or No. 5 appears.

6. Sensors calibration of the pasteurization monitor

General conditions for calibration:

- Instrument should have proper power (low battery is indicated).
- The state of the connectors has to be checked (with the instrument with external probe)
- Instrument should have properly set the real time clock

General conditions of calibration:

- The state of the connectors has to be checked (with the instrument with external probe)
- The instrument should have well adjusted clocks of the real time
- During calibration insert the instrument with running record into the calibration box generating corrending temperature. Choice of the calibration box and working etalon should correspond to indicated accuracy of the controlled instrument.

- Calibrate at the points which cover fully measurement range in use. Temperature generating by calibration box cannot exceed the measurement range of the controlled instrument.
- Calibration box should be equipped with the suitable etalon to control the right value of the controlled quantity. Etalon accuracy should be (if possible) at least 3x better than accuracy of the controlled instrument. Etalon should be located at the proper place in the chamber (considering inhomogeneity of the generated field) and has to be metrologically linked to valid higher etalons.
- Air flow should be from 0,5 to 1 m/s in the chamber
- Calibration box settling time must be known or easy detectable e.g. by etalon. Calibration is settled if calibrated value does not change and the air inside the box is at same temperature as walls of the box. No condensation and no influence from thermal radiation should exist.
- The right etalon reading should be taken after necessary time needed to settle of calibrated instrument. Settling time of the instrument starts after calibration box is settled at required value. Response time of calibrated instrument is specified in instruction manual as t_{90} . Necessary time needed for calibration is three times longer than t_{90} . After that time instrument reading approaches to 100% of real value.
- It is recommended to write down the time of reading of real value for consequent evaluation of the calibrated logger record.

Guide to adjust the pasteurization monitor

Adjustment means action resulting in setting instrument to state, when its actual measurement accuracy is identical or better than measurement accuracy specified in instruction manual. For adjustment of instruments measuring temperature and relative humidity special equipment for constant temperature and relative humidity generation is needed – a calibration box. Instrument adjustment is performed by placing of adjusted instrument to calibration box and by consequent assignment of recorded values to etalon reading by means of the PC software.

Adjustment of inputs for voltage or current measurement is performed by connection of instrument under test to precision source (etalon) and by consequent assignment of recorded values to etalon reading by means of the PC software.

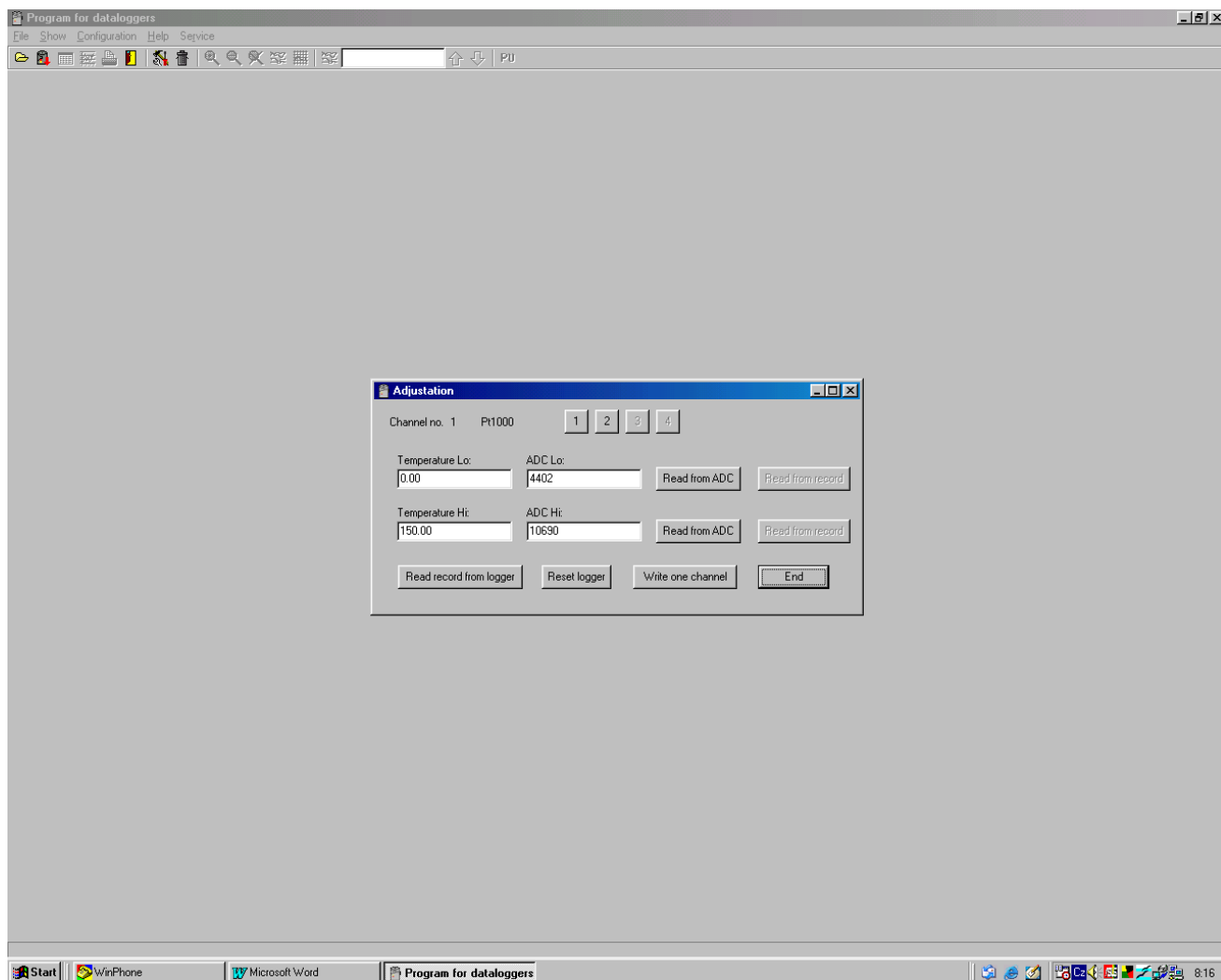
General adjustment conditions

- Adjustment bears on calibration and that is why all condition for instrument calibration must be abided, as described above.
- Input quantities are always adjusted at two points, as much distant as possible from each other at the required measurement range.
- Each irresponsible entering of adjustment mode (from the PC software) can cause overwriting of actual calibration constants and resulting in instrument inability to measure correctly.
- Every time after instrument adjustment it is necessary to verify the calibration – see Calibration procedure above.
- The inner clock measurement accuracy of the real time is impossible to set and all the instrument with higher than acceptable error have to be sent for repair

Adjustment procedure:

- Usual included free software enables to adjust of the data loggers. It is necessary to run the software with parameter */kalibrace* – e.g. click on the *Start* button, select item *Run...* Then *Browse..* and select program *LOGGER.EXE* on your disk (default location is in *Program files/I-CUBE/Logger*), mark it by mouse and click on *Open*. Type to field *Open:* to the very end of path (behind the sign of quotation) type space mark, then parameter */kalibrace* and click on *OK*. Program could have now a new menu item *Service*.
- Set 1 minute logging interval and check the internal real time clock. Adjusted channels must be ON. At the same time logging must be ON. It is recommended to erase the instrument memory before adjustment.
- The switched on pasteurization monitor has to be connected by means off COM ADAPTER with PC (yellow LED winks with the interval 10 sec) and place the pasteurization monitor into the calibration box
- Place the etalon into the calibration box
- Close the calibration box and start its operation.

- After settling of calibrating box at required value for lower adjustment point wait for specified time for settling of the adjusted instrument – see General conditions for calibration.
- When calibrated instrument is settled write down the etalon reading and start the logger program with parameter code and gap and then */kalibrace*
- Select *Service* item from menu and then *Adjustment*, the window as shown on pic. No.6. Choose the channel to adjust (channel No.1 is probe in the bottle and channel No. 2 is the probe for sprinkling water)
- Type to window Temperature Lo temperature value read from etalon
- Then fill window *ADC_ Lo* with proper quantity values from etalon by clicking to corresponding button *Read from AD*
- Then click on the button Record of one Channel then button End to save the data into the memory
- Use the same procedure to adjust the low point the other channel
- Set calibration box to generation of upper value of adjustment point and wait again for settling of the calibration box and consequently for settling of adjusted instrument.
- After storing of both values start logger program with space parameter and then adjustment
- Click Service button and then on Adjustment button
- Window (as shown on pic. No. 6) appears, choose the channel you to adjust (channel No.1 is probe in the bottle and channel No. 2 is the probe for sprinkling water)
- Type to window Temperature Hi temperature value read from etalon
- Then fill window *ADC_ Hi* with proper quantity values from etalon by clicking to corresponding button *Read from AD*
- Then click on the button Record of one Channel then button End to save the data into the memory
- Use the same procedure to adjust the Hi point the low channel
- After adjustment verify again measurement accuracy of the instrument according to Calibration procedure above.



Pic.6

7. Service

Reading on the display in usual operation (logger switched ON)



After switching ON the logger all LCD symbols are displayed for checking the display.

Then actual date and time in logger is displayed for approximately 4 s.



Consequently reading of estimated remaining battery capacity for approximately 2 s is displayed (values 0 to 100%). It is valid if logger is operated at temperature from -5 to +35°C. If logger is operated often outside of the above temperature range battery life can be reduced to 75%, i.e. if displayed remaining battery capacity drops below 25%, it is recommended to replace the battery.



If display is switched ON, actual reading of measured values is displayed - channel 1 temperature (°C 1) at the LCD upper line, channel 2 temperature (°C 2) at the LCD lower line. Symbol LOG indicates data logging in progress – if it blinks, data memory is filled up to more than 90%.



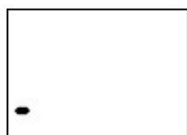
Other measured or calculated values are displayed always after 5 seconds. Instrument now displays channel 1 temperature (°C 1) and temperature difference between channels (lower line "DIF"). $T_{DIF} = T1 - T2$



Switched ON logger permanently (with 10 s interval) updates memory of minimum and maximum values. If displaying of MIN/MAX values is selected, minimum measured value is displayed at the LCD lower line (indicated by symbol MIN) and then similarly maximum measured value (indicated by symbol MAX). Upper line always indicates actual temperature. Notice: if alarm is active, no MIN/MAX reading is displayed.

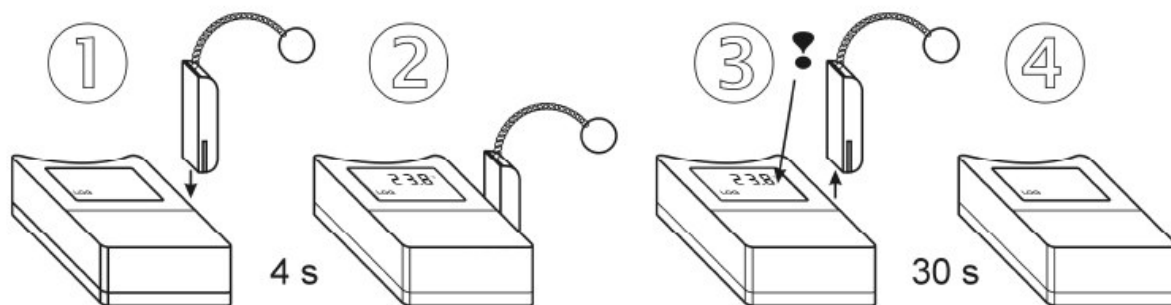


If display is switched OFF, all above readings are displayed up to estimated remaining battery capacity and then display goes out. If logger is switched ON symbol LOG is displayed (it blinks if memory occupation is higher than 90%).



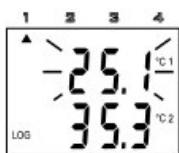
If display is OFF and logger is in mode when record runs only when alarm is active, the LOG symbol is replaced by adjacent symbol "-" (hyphen). It appears in case, all measured values are inside of adjusted alarm limits and data logging therefore does not run. Displayed symbol indicates logger is ON.

If information on actual measured values is needed, it is possible anytime to display reading display by means of the magnet (only if communication adapter is not connected permanently). Plug magnet into guide slots from logger front side for approximately 4 s and wait till reading on the display appears. If logger has enabled the function switch OFF by magnet, resp. MIN/MAX memory clear by magnet, do not remove magnet from guide slots before decimal point symbol goes out – logger would be switched OFF, resp. MIN/MAX memory would be cleared! Display reading initialized by magnet goes out automatically after 30 s. Remove magnet from slots anytime during actual reading is ON or later.



Alarm indication on the display

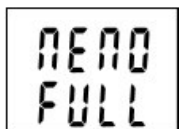
It is necessary to enable alarm function from the PC and set for each quantity lower and upper limit. If measured value is inside of set limits, alarm of proper quantity is not active. If value of measured quantity gets outside of set limits, alarm of proper quantity is active and it is indicated on the display. It is possible to select "memory alarm mode" when alarm is indicated permanently up to reset from the PC.



Active alarm is indicated (if display is ON) by blinking of the value of proper quantity on the display and arrow symbol appears at the LCD upper side at the same time. Arrow 1 indicates active alarm for channel 1 temperature, arrow 2 for channel 2 temperature and arrow 4 for temperature difference.

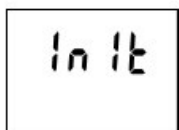
Notice: if logger is operated at low temperature (below approximately -5°C), alarm indication by blinking can be indistinct. Indication by arrows works correctly.

Messages displayed on the LCD beyond usual operation

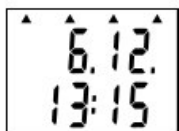


If measured value is out of the measurable or displayable range numeric reading is replaced by hyphens.

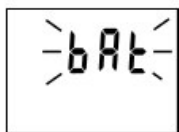
If memory is totally full filled in non-cyclic logging mode, logger is switched OFF and message MEMO FULL appears on the LCD. It appears also if logger is operated with switched OFF display.



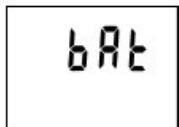
New initialization of logger can occur in switching ON the logger (immediately after displaying of all LCD segments for checking) e.g. after replacement of totally discharged battery for new one. State is indicated by INIT reading. It can be displayed for about 12 s.



If battery voltage drop occurred since last internal clock setting below critical limit or battery disconnection for longer period than approximately 30 s, after display switch ON (during date and time display) all four arrows appears as warning to check or set it again from the computer. However all logger functions work without limitation.



If reading BAT is displayed periodically on LCD upper line (for 1 s with 10 s interval), the end of estimated battery life is coming – however logger functions are not limited. Replace battery as soon as possible!



If reading BAT is displayed permanently, battery voltage is low and logger is not possible to switch ON. If logger was switched ON before it, data logging is stopped and logger is switched OFF. Communication with computer can temporarily work. Replace battery as soon as possible!

Battery replacement

Low battery is indicated on the display by blinking of reading "BAT". It can be displayed permanently, if battery voltage is too low. Replace the battery for new one. If logger is operated often in temperature below -5°C or over +35°C and PC program indicates remaining battery capacity below 25% it is also recommended to replace the battery. Applied is Lithium battery 3.6 V, size AA. Battery is located under logger lid.

Warning: near battery fragile glass reed contact is located – be careful not to damage it. Be careful in battery replacement!

Replacement procedure:

- switch off the logger by the PC program or by magnet (if low battery allows)
- unscrew four corner screws and remove the lid
- remove old battery by pulling the glued tape
- insert new battery **respecting the correct polarity** (see symbols + and – near battery holder). If you connect new battery up to 30 s, all logger settings remain unchanged. In the opposite case check by means of PC program all settings, especially the real time clock in logger. **Attention, inserted battery with incorrect polarity causes logger damage!**
- put the lid back again and screw four screws. Be careful to have the rubber sealing properly in the slot and tighten the screws properly to ensure the water resistance of the instrument.
- connect logger to the computer and **write to it the information on battery replacement** (menu Configuration/Battery replacement). This step is necessary to evaluate properly the remaining battery capacity.
-

Old battery or logger itself (after its life) is necessary to liquidate ecologically!

Service is provided by the manufacturer:

1-CUBE s.r.o.

Hamry 3567, 580 01 Havl.Brod, Czech Republic

tel.+420-569-433620, fax. +420-569-422144

e-mail: 1-cube@1-cube.com, www.1-cube.com