

Environmental Measuring Systems

Turistická 5, 621 00 BRNO, Czech Republic, phone/fax +420 541 225 344

Raingauge SR03/SR03V



Main features:

- Dual-chambered tipping bucket assembly
- Precise design
- Corrosion resistant
- Reed switch
- Manufactured by FIEDLER, CZ

Specification:

- Collecting area 500 cm²
- 0.1 mm per pulse (resolution)
- Switch rating: 5 mA; 24 V D.C.
- Heating 24 V D.C., 70 W (SR03V)

www.emsbrno.cz

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Datalogger MicroLog ER



Main features:

- Writes time and date of an event to the memory
- One second resolution
- Contact closure input is ready for easy connection to each tipping bucket raingauge
- Daily automatic self checking
- Watertight case
- Windows[®] software supports easy averaging of pulse numbers in chosen time period

Brief specification:

- 64 kByte non-volatile memory
- 9,000 time records
- Input signal contact closure
- Three AA alkaline batteries
- Battery duration a few years
- IP 55
- 11 x 11 x 6 cm, 0.3 kg

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Raingauge SR03 + MicroLog ER

Installation notes

October 2007

Jiří Kučera – Environmental Measuring Systems Turistická 5 62100 Brno Czech Republic VAT No. CZ480323210 Phone/Fax +420 541 225 344 E-mail: kucera@emsbrno.cz www.emsbrno.cz Rain gauge SR03 with cooperating datalogger MicroLog ER. The cable is used for heating of funel and remote data access. The stailess supporting pole is the part of delivery.



Rain gauge – internal view:



MicroLog ER – internal view:



Data downloading – general file information:

FILE OPERATIONS - MicroLog										
El. yalues Add to file Save setup Read setup Export Eiles Next PrgmCalc Close										
File name: RI0716.hexLast saving at: 2003-07-16 10:18:40Dev. Type: ERMeasuring interval: according eventsDev. Code: RIBatt: 4.1 V										
# Туре	ON/off	Range	Gauge	Description						
1. Events			Weighted event	Precipitation [mm] - SR03/0.1						
RI0716.hex Press F2 for channel edit; [p] to see the parameters of equations.										

Choosing of time interval:

New time inte	erval:	_
🔿 24 h	🔘 15 m	🔘 20 s
🔿 12 h	🔿 12 m	🔘 15 s
🔿 8 h	🔿 10 m	🔘 12 s
🔿 6 h	🔘 6 m	🔘 10 s
🔿 4 h	🔘 5 m	🔘 6 s
🔿 3 h	🔿 4 m	🔘 5 s
🔿 2 h	🔿 3 m	🔿 4 s
🔿 1 h	🔿 2 m	🔿 3 s
🔿 30 m	1 m	🔿 2 s
🔿 20 m	○ 30 s	O original
	Continue	Cancel

Graphical view of selected time subperiod (Mini32 software):



Notes:

- Export to XLS can be done just form this screen for the selected time subperiod.
- There is a possibility to create more files with different time resolution.
- The logger checks its proper operation and writes zero at midnight if there is no reainy events in current day at all. The possible problems (weak batteries for instance) are reported during data dowloading procedure.
- The datalogger memory is backuped with a coin-type lithium battery against data loss in case of battery depletion or replacement.

Datalogger MicroLog ER

Event recorder on the opposite to common dataloggers does not count pulses but it stores the exact time of pulse occurrence. This datalogger is designed mainly for registration of output from tipping bucket raingauges with contact closure output signal.

The datalogger firmware checks each midnight the system operation and stores the result in the data memory. Therefore, the user is sure about the data reliability (in case of long period without rain for instance, when might be some doubts about the proper operation). When a problem appears in a certain day due to power supplying (low battery voltage) or for a hardware failure, the user's attention is pointed to this day during the data conversion.

Sensors to be connected	tipping bucket raingauge – contact
Measured values	time of event occurrence – contact closure
Resolution	1 sec
Data memory	
- size	64 kByte
- number of stored time points	ca 9,000
Accuracy of internal clock	±1 minute per month (-10 to 40 deg.C)
Power supply	three AA alkaline batteries
Power consumption	
- idle	0.02 mA
- close contact – operating	30 mA
Battery life	few years
IP rating	55
Size	11 x 11 x 6 cm
Mounting holes	M3; 73.5 x 73.5 mm distance
Weight	300 g

Specification:

Software: Mini32 universal software running under Windows® 95, 98, 2000, NT, XP. The software assures all necessary operations – system setup, data saving, data processing. It includes the basic statistic features, creates and prints graphs and exports data to different file formats.

Two-year full warranty.

Mini 32



Datalogger software

User's Manual

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1. Introduction

The software supports all models of UNILOG dataloggers and all equipment produced by EMS Brno that use these dataloggers or their modifications. The software assures device setting, data viewing and data transfer to disk file of connected computer via serial line or via GSM or common telephone network. The software is freely available on producer's web site www.emsbrno.cz for all users. However, in future, some options might be available after the registration only.

2. Datalogger UNILOG common features

2.1. Loging data

The process of logging data is driven by the datalogger settings including the intervals of measurement and data storing and the information about the channels which are switched on. The times of measurement and storing in memory can be generally different so the storage of average from more measurements is possible. Both time intervals can be set as the integer fraction of minute, hour or day only (1, 2, 3, 4, 5, 6, 10, 12, ... 60 minutes, 1, 2, 3, ... 24 hrs for example). The averaging/measuring interval ratio has to be an integer, too. The warm-up time (time delay between the excitation and the measurement necessary for some types of sensors for their stabilization before the reading out) can be also set. The time intervals are common for all channels.

The ranges of voltage channels must be set according to the knowledge of sensor outputs. There is no auto-range option available. The recommended ranges are offered for the channels with standard sensors included in the Mini32 gauge library.

Datalogger keeps all necessary setup information in its memory. No configuration files need to be in the computer for datalogger operation. On the other hand, the configuration can be saved to file directly from the datalogger or from any data file for future use.

Note: There is an exception – event recorder MicroLog ER. Instead of values within a certain period, time of events is stored in the datalogger memory. However, the file containing time of events can be easy converted to standard file with regular intervals between records, too.

2.2. Data saving and transformation

The measured electrical values (voltage, current, frequency, number of pulses) or time of events are stored in the memory as the two-byte number (range 0 to 65536). Calculation of engineering values is made according to actual datalogger setup during conversion from downloaded *.hex file to *.dcv format suitable for fast drawing and other file operations (see "File types" bellow).

The conversion to engineering values is made according to the gauge library included in the software or according to a general equation selected from the set

included in the software and parameterized by user. Voltage, temperature, resistance, frequency, number of pulses per measuring interval or interval of averaging can be used as the input for calculation.

The current datalogger setting included in *.hex file is used for conversion. However, in case of wrong original channel setting there is also a possibility to influence the conversion by its preceding editing or by using of another hardware compatible setup file.

2.3. Memory organization

The datalogger memory is organized in circle. That means that if the memory is full, the oldest data are continuously overwriting with the newest ones. All other data remain accessible. The data download does not erase anything from the memory.

Note: Some dataloggers (Minikin) can optionally stop operation when the memory is full.

2.4. Power management

If a dangerously low voltage due to flat batteries occurs during the measurement, the system stops operation until midnight. Than it continues measuring until next low voltage occurrence. This way, (i) a small amount of energy should remain for data download and (ii) the measurement can continue after possible recharging the batteries. The battery voltage level when they should be replaced is indicated by red background color of battery voltage window.

Microloggers like Minikin which are supplied directly from large Lithium battery stops operation in case of low voltage occurrence until the next communication with PC.

All types of dataloggers are well protected against power cut. It is allowed even to remove batteries during the measurement without data loss or damaging the memory structure. However, in such a case the time for system shut down is very limited and there is no time left to set the proper time of next measurement. Consequently, the logger will continue running as late as at midnight (similarly as mentioned above). In such a case the manual reset can be done simply by communication with connected computer in order to continue in measurement just after the replacement of batteries.

In case when it is impossible to access the data due to a serious damage of data structure in the datalogger memory (by lightning etc.), it is always possible to export the whole memory content (hardcopy of memory). Even in the worst case when the program is damaged, the whole memory content can be saved after the uploading the firmware. Take advantage of this possibility for an emergency! Download the hardcopy of memory and send it to producer for free encoding.

2.5. Firmware

Firmware is the program driving the datalogger. This program is subject of continuous development similarly to any computer software. The firmware can be easy

uploaded for system upgrade or in case of its accidental damage. The firmware is hardware sensitive and it is included in each Mini32 software installation (*.dlc files). There are some flags in both computer software and firmware disabling loading of an inappropriate firmware. However, pay attention to upload the appropriate firmware to non-responding loggers!

Note: The firmware upgrade is impossible by dataloggers from Microlog group (Minikin, C8) since the firmware upload needs a special procedure. On the other hand, the firmware is stored in flash-type memory and therefore its damage is practically excluded.

2.6. Programmable switch

Most of datalogger models are equipped with the mechanical switch (relay). This switch is aimed for the control of external systems. The typical use is switching the modem for the remote data transfer in certain time period in selected days in order to save the batteries, switching the external power supply during the measurement process etc. The switch can be programmed in both diurnal and hourly cycles. Up to ten switching periods in hourly or daily cycles can be set and activated in selected hours or days.

3. Mini32 software general description

3.1. System requirement

Minimum hardware configuration: PI 120 MHz, 32 Mbyte RAM, 1 Mbyte HD

Hard Disk Space: At least 3 MB for installation and next about 10 MB for file operations.

Serial communication port Software: Windows 95/98/2000/NT/XP

3.2. Installation

The software Mini32 is available on CD containing all necessary files for installation and on the producer's web site (<u>http://www.emsbrno.cz/plSoftMini.html</u>). The installation is packed in one self-extracting file **mini_instal.exe**. Downloaded file has to unpacked to a temporary directory before installation. Run **setup.exe** file for software installation.

By default, the software will be placed into the directory c:\Program Files\EMSoft\Mini32\ if user does not specify it differently during the installation.

As a part of installation, there are some template data files placed in the directory c:\Program Files\EMSoft\Mini32\Data\.

3.3. Registration

The producer reserves the right to require the registration in future. The registration will make accessible the following advanced options:

printing of images,

variable statistics and regression,

advanced file operations (file chaining, mixing, user defined calculation)

3.4. File types

There are the following relevant file types:

**.hex* file - binary data file downloaded from datalogger to computer including also he full set of setup information. The size is roughly twice the number of stored values. The size of the largest file is slightly less than 500 Kbytes and contains about 220,000 measured values. The default name of *.hex file is created automatically according to the device code and the current date (in actual computer format). For example, the file downloaded on July 23, 2004 from the datalogger named XY is XY_2004_07_23.hex. Of course, the filename can be edited before its storing to the computer.

.vil* file – comes from old sap flow meters and Midi12 dataloggers running the DOS compatible firmware. For the conversion to *.dcv file the year regarding to its oldest values have to be entered.

**.dcv* file - binary data file in format suitable for drawing and other file operations. It contains the full set of setup information and it is usually four times larger than original *.hex file. When directly converted from *.hex file, the default name of *.dcv file keeps the name of original *.hex file (just the extension is changed to "dcv"). When originated from more files in "Mix files" or via "PrgmClc" option, hardware relevant information is omitted but the device codes of source files are included to each channel. Usually, the *.dcv file contains the real engineering values recalculated from the original electrical values, but it can be also converted to electrical values for a special purposes. In such a case, the "#" is added to the file name – "XY_2004_07_23#.dcv" when keeping on mind the last example.

**.hcm* file – it contains the whole datalogger memory content. The measured data as well as the datalogger setting can be earned from this file in case of fatal system failure. By default, the filename is created form the current date (the HCM downloaded at July 23 is saved with filename "0723.hcm").

**.stp* file contains the complete datalogger setup. It can be read on-line from the connected datalogger or off-line exported from any *.hex or directly converted *.dcv file. The setup file can be modified by Mini32 software for future use by any logger of the same model. The template *.stp files available for such a modification are by default placed in program directory ...(Program files)\EMSoft\Mini32\data\.

**.sws* file contains the mechanical switch program - it is common for all datalogger of different types containing that switch.

**.dlc* file contains the firmware relevant to certain datalogger model. For firmware upgrade or rescue, these files are necessary. They are by default placed in the folder ...(Program files)\EMSoft\Mini32\firmware\.

**.stv* file contains a variable statistics (Min, Max, Mean, Std. deviation, of all variables).

**.bmp* file contains exported chart in 256-color bitmap format

*.xls; *.wk1; *.dat file etc. - data exported to files of other formats

**.dde* file contains the variables description of the corresponding *.dat file in text format.

**.clc* file contains the program for advanced data processing (user defined calculation)

**.stg* file contains the graph setting for fast return to last layout configuration

**.log* file contains important information concerning the file conversion (mainly for Event Recorder)

There are also some special characters added by default to filenames. If user does not change them before saving, they help to understand the file history:

% - the file structure has been changed using a procedure changing the time interval between lines or the whole time period of measurement)

& - file with sap flow values after passing the baseline subtraction procedure

@ - file originated as product of user defined calculation

- file converted to *.dcv format without considering the gauge setup - electrical values only

3.5. Export to another software

The program currently supports the export from *.dcv files to following formats:

ASCII text file

Excel file

Lotus 1-2-3 *.wk1 file

The new files can be exported from the file information screen and from any graphic screen.

3.5.1. ASCII text file (space delimited)

The exported file has extension *.dat). The time format is arranged in form "vvvv-mm-dd hh:mm:ss"

and it cannot be changed by the export procedure.

Deleted or generally missing values in data file have to be represented by a string or number in order to keep the sequential file structure. The default missing value is by default represented with -1.1+e38 but it can be edited in appropriate windows.

The variable description can be included in data file as the first row and/or a separate data description file can be created (*.dde).

3.5.2. Excel file

This way of export needs Microsoft Excel program installed in the same computer since the export routine uses some Excel components. After exporting, the Excel file remains opened.

3.5.3. Lotus 1-2-3 - *.wk1 file

This file type is compatible with most of spreadsheet applications (Borland Quattro Pro, Lotus Smart Suite, Microsoft Excel etc.). The variable description is written in first row.

4. Program main menu description

When started, the main screen appears with function buttons in two columns. Left column contains the buttons regarding to the product of the measurement - data and files, the right one includes those ones needed for device configuration. When pushed, each button opens the window with next options while the previous window is closed. Windows are generally optimized for XGA (1024x768 pixels) resolution. Both mouse and keyboard support all commands and editing windows excluding the pop-up menu in graphics. Mostly each button shows its "hint" which appears in separate yellow window and in status line (window bottom) when activated by mouse cursor. Sometimes, they contain different information for better understanding the matter.

Communication process precedes the opening of the "Data" or "Configuration" option. During this process, the setup information is read by the computer and then displayed on screen. Because the actually running measurement cannot be canceled by the communication, more attempts (done automatically up to twelve times) might be needed for the datalogger response. Moreover, there are up to three short blocks to be transferred, so it can take some time when the very short measuring interval (in seconds) is set.

Some options not allowed for unauthorized persons are protected with password. The password can be introduced during the datalogger initialization or even later. It must contain four characters - numbers or letters. The password protects change of configuration and operation with memory against incompetent use. Do not forget the password! When you do it, ask producer for temporarily valid substitution.

If a low voltage occurred since the last computer session, this information is displayed between the communication sequences and reset after confirmation.

5. Brief program structure description

DATA - see measured values. It needs on line connection. The main options/buttons are as follows:

Note – provides the writing a note to datalogger memory

Actual values reading - the measurement of instant values just after pressing any key. However, this action starts an extraordinary measurement that may overlap the time when the averaged values should be stored in memory and consequently may cause the lost of the measurement in last averaging interval. Interference with the communication or with instant values reading is still more crucial for counting channels where the total pulse number per measuring interval is required. If the expected time of measurement is omitted, the values of both previous and next measurements are substituted by missing values. So use this option mainly in case of long measurement intervals if you need to get the actual values immediately, otherwise use On-line drawing.

On-line drawing - measured values appear on the screen in regular measuring intervals. Compared to the previous option, the regular measurement is not disturbed. The measurement can be followed in graphic form on the screen by pressing the button "Draw" (becomes available after two first measurements done in the On-line regime) and exported as the image or data files. Drawing in terms of electrical values is possible after the checking of appropriate box.

FILES - operation with data files on the computer disk. Off-line work. This option is mainly used for drawing the measured variables, statistical calculations (including regression analysis), export to files in different formats and creating pictures in bitmap format. If a *.hex file is opened, conversion to *.dcv format is offered.

Add to file - allows appending to an older file with the similar setting in order to create the file containing data of the entire period of measurement.

Save setup - creates the *.stp file with actual datalogger configuration for next using.

Mix files - makes possible to connect more files with different variables to a new one (weather data from different sites for instance). Mixing is allowed also by files with different time intervals between records.

Export – allows creating the next files with different structure (time intervals, time period) or export to another format file. New file with MIN, MAX, AVG, ... variables can be calculated in this option, too.

Drawing - opens graphic module completed with statistic and many other special options (User defined view saving, reading notes, printing, drawing vertical profiles etc.)

PrgmCalc - accesses user defined calculation. An internal programming language allows writing simple programs for calculation of new variables based on measured values. Calculated variables are saved in new file that is not directly linked to datalogger configuration, of course (hardware independent file).

DOWNLOAD – performs downloading of chosen amount of data, converting into the *.dcv file and drawing.

CONFIGURATION – on-line setup the channels, measuring intervals, initialize the datalogger, clear memory, read/write of setup file. Switching the datalogger operation; device code and time intervals can be set directly in the main configuration screen. Operation with memory and import/export of setup *.stp files needs to push "More >>" button.

Put, Get - sends setting to datalogger or read it from it

Note – provides the writing a note to datalogger memory

Save setup, read setup – saves the current setting to file or read them from file

Switch - opens the separate window for switch programming

More >> - activates next buttons for advanced settings

Initialize – initializes the datalogger before the first use or before the new job. The memory is erased, factory setting and system time introduced. A password can be set during this operation. Yet, the current setting can be preserved in needed.

RAM clear – erases the whole memory content

HCM – hardcopy of memory. Performs the saving of the whole memory content to file. It is the very important option in emergency when the data structure is damaged and its conversion to *;dcv file is impossible.

Password – changes, introduces or removes the password protecting configuration against incompetent users.

OFF-LINE EDIT - off line preparing of measurement configuration including the switch programming. Editing of older files or creating new ones using default setup placed in ...Mini32\data\ directory. It is similar to on-line "Configuration" option. Also the files containing user defined calculation programs (*.clc) can be edited here.

FIRMWARE - the datalogger system can be upgraded or rescued by uploading the correct firmware. The VV/VX datalogger model change can be done by firmware change, too.

RS Line – when more system is connected with one serial line (via on GSM modem for instance), a special line multiplexer have to be used. This button opens a window operates this multiplexer.

Comm Port – opens a window containing the setting of communication with dataloggers via serial line, GSM modem, DECT radio transmission or IrDA interface.

ABOUT - displays the software information that includes software version, supported systems, current paths etc.

Palm - activates a module for transferring data files downloaded to handheld PDA to PC computer

EXIT - end of program.

Working directory on the bottom of the screen shows the last used data directory. The arrow opens list of last ten directories used for working with data files. Selecting of one of these directories will set the current directory. The button alongside allows choosing another directory that is not listed here.

6. How to do...

6.1. Routine data download and checking

[DownLoad] - type number of days you want to transfer – confirm or edit *.hex file name – confirm or edit *.dcv file name – select variables for drawing - [Draw]. Use right mouse click to activate pop up menu. Check [up/dn Browse] for browsing through single variables. [Close]...

Associated option – data erasing, printing chart, regression, variable statistics, user defined view...

Note: By event recorder MicroLog ER additional question appears before the conversion to *.dcv file, It concerns the time interval of converted file in which the events are summarized. When "original" one is chosen, the file will contain just lines corresponding with the time of events. Otherwise, the *.dcv file will have regular time intervals with the sum of events in each line.

Besides, the log file is always created during conversion of *.hex files coming from event recorder. This file contains specific information concerning the data logging history. The file can be saved after conversion. a. Refer to MicroLog ER manual for details.

6.2. Data chaining (*.dcv files)

Supposing a *.dcv file is opened, file information screen is visible.

[Add to file] - [Older file] - choose older file - follow the screen commands and information. Check the status of box regarding to creating the new file. Think twice whether to continue or not when receiving the warning concerning different setting!

Note: When files are overlapped, the values of older file are preferred by default.

6.3. Mixing on or more files with different variables to one file

Supposing a *.dcv file is opened, setup screen is visible.

[Mix file] – look for file(s) that should be mixed – [Adjust] – set new file properties. Check the interpolation interval after changing the line spacing in new file – [Connect] – [Next] – continue to graphics.

Note: Interval of interpolation is the maximal time when the interpolated values are calculated. If the time interval between the neighboring values a source file is larger than this value, the missing values are introduced in corresponding lines of the new file. On the other hand, if the line spacing in new file is much larger than that in source files, the neighboring values are used for calculation (or the values of the same time are taken) and those which are not used for interpolation purpose are simply omitted.

6.4. See data in the file

*.hex file (not yet converted to *.dcv)

[Files] - choose the file - [Next] - [Draw] - right click for pop up menu - [Close].

Please note the possibility to edit the datalogger setting before the conversion to *.dcv file type (before you push "Next"). Push F2 for activating the edit mode (channel ready for edit is marked with red line) or double click on the appropriate line (white cells) to open the edit window. Or, push "Read setup" button in order to get another setup that should be used for conversion.

Note that the required configuration can be picked up also from a *.hex or *.dcv file.

*.dcv file

[Files] - choose the file - [Drawing] - choose variables - [Draw] - right click for pop up menu - [Close]... or

[Files] - choose the file - [Drawing] - [Last view] - right click for pop up menu - [Close]... when you have to see the graphics in the same layout as it was last time closed.

Note you can edit data description in *.dcv file!

6.5. See actual values

[Data] - [Act. values] - repeat more time or [Close].

or

[On-line] for continuous reading. After two readings – [Draw] – choose variables – [Draw] – use right mouse click for pop-up menu - [Close] - [Off] - [Close].

Checking of "el.values" box will display the electrical values in graphics.

Note: The actual values reading can cause the lost of regular measurement!

6.6. Export *.dcv file to another software

[Files] - choose the *.dcv file - [Export] - choose format - check appropriate boxes or buttons and eventually change the missing value symbol (do not delete it when converting to text file!) - [Go] - confirm or edit filename - [Close]

6.7. Calculation of hourly/daily averages/totals

[Files] - choose a *.dcv file - [Export] - [Mean values] – [Next] choose between mean and total in certain channels – [Adjustment] – set margins and time period – [OK] - [Go] - confirm or edit filename - [Drawing] – select variables – [Draw] - use right mouse click for pop-up menu – [Close]...

Note 1: Be careful to calculate TOTALS when the variable units do not correspond with interval of measurement! For instance – daily total of sap flow in terms of kg/hr measured in ten minutes interval will be six times larger than the reality!

Note 2: During the process, average/total from all values inside the new time period is calculated and assigned to its end. Consequently, a time shift with respect to original file is introduced.

6.8. Calculation statistical variables (MIN, MAX, AVG etc.) in new time interval.

[Files] - choose a *.dcv file - [Export] - [Statistics] – [Next]. Fill in the table assigning demanded calculation to variables. [Adjustment] – set margins and time period in new file – [OK] - [Go] - confirm or edit filename - [Drawing] – select variables – [Draw] - use right mouse click for pop-up menu – [Close]...

Note 1: Be careful to calculate TOTALS when the variable units do not correspond with interval of measurement! For instance – daily sum of sap flow in terms of kg/hr measured in ten minutes interval will be six times larger than the reality!

Note 2: During the process, calculated values in new file are assigned to the end of new time interval. Consequently, a time shift with respect to original file is introduced.

6.9. Change (correction) the datalogger time (and password)

In order to avoid the mess in data file, the datalogger has to be initialized. Save all data before this operation, convert the file and look at it for sure.

[Configuration] - [More>>] - [Initialize] - check box "keep current setup" - enter new password if needed - edit time if necessary – verify following check windows -[Less<<] - check the setting - [Close] Do not use the summer clock time for initializing to avoid a discrepancy in time axis!

6.10. Change password

[Configuration] - [More>>] - [Password] - type password - [Less<<] - [Close]

Note that the password has to contain four characters. No space is allowed. Ask producer for temporarily valid password substitution in case you forget the original password.

6.11. Start a new measurement:

Datalogger can be configured in both on-line and off-line-mode. In both ways, an already existing file can be used as the base for editing.

6.11.1. On-line setting

there is already a file with similar setting

[Configuration] – [Read setup] - find the file containing required configuration – continue in configuration if necessary : Activate edit mode (i) by direct double click on a line or (ii) press F2, choose channel with arrows, press F2 again to open the "Channel setting" window - edit channel properties – [Apply] – [Close].

Continue with next channels - [Save setup] - [Close].

Set the device code and time intervals.

Push [Put] to send configuration to datalogger.

completely new job

Activate edit mode (i) by direct double click on a line or (ii) press F2, choose channel with arrows, press F2 again to open the "Channel setting" window - edit channel properties – [Apply] – [Close].

Continue with next channels - [Save setup] - [Close].

Set the device code and time intervals.

Push [Put] to send configuration to datalogger.

6.11.2. Off-line setting

[Off-line edit] – [Configuration files] - open relevant or default (located in EXE directory) *.hex, *.dcv or *.stp file.

Activate edit mode (i) by direct double click on a line or (ii) press F2, choose channel with arrows, press F2 again to open the "Channel setting" window - edit channel properties – [Apply] – [Close].

Continue with next channels - [Save setup] - [Close].

Set the device code and time intervals.

Push [Save setup] to save configuration to file. Setup file is now ready for use.

Later, when the datalogger is available: Connect computer to datalogger

[Configuration] - [Read Setup] - [Put] - [More >>] - [Initialize] - choose "keep current configuration" – enter (and remember!) password if needed - change time of initialization if it does not fit to computer time – confirm carefully checking windows – initializiton process - [Less <<] - [Close]

[Data] - [Act. values] or [On-line] - check measured values

6.12. Switch programming

[Configuration] – [Switch] – choose diurnal or hourly cycle – write program – check the "Output switch active" box – [Put] – [Close].

Note the switch program does not make a part of setup file and it must be saved separately in the *.sws file or programmed on-line. Also, it is kept during the initialize when the box "keep current configuration" is checked. The of-line switch programming can be done in [Off-line edit] - [Switch programming files] – option similarly as by setup files.

7. What to do when...

7.1. There is no response to communication attempt:

Despite of good cable and batteries, the logger looks dead. The datalogger is broken or the firmware is damaged. Nevertheless, there are probably still some valuable data in datalogger memory. The only way is to upload the new firmware and save the whole memory content for possible data rescue.

[Firmware] - wait for 12 attempts or abort it earlier. Than, follow the screen commands. Accept the offer to make hardcopy of memory. Make sure you have chosen the right *.dlc file that fits to your datalogger model! The users of older sap flow systems (made before 1998) should ask producer for proper firmware specification (*.dlc filename) according to the equipment serial number.

The datalogger is now initialized; set up the measurement again following a way described above. Check the measurement.

Send the *.hcm file to the producer for free encoding.

If the firmware upload is impossible, the datalogger is probably broken (if the cable and power supplying is surely O.K.).

7.2. The message "File structure error unrecoverable by software." appears:

It could happen as consequence of an influence of lightning or similar external factors as well as hardware trouble - the data structure in memory is damaged somehow. You might try to download the data again for sure but the probability of wrong data transfer is rather low. If it did not help, the datalogger must be initialized; the hardcopy of memory should be saved to file.

[Configuration] - [More >>] - [HCM] - the whole memory content will be exported to the file - [Initialize] - check box "keep current setup" – confirm the password - edit time if necessary - [Less <<] - check the setting - [Close]

[Data] - [Act. values] - check measured values

Send the downloaded *.hex file and *.hcm file to the producer for free encoding.