

M-box

Datalogger for SM-line Instruments

Firmware vesion 0.90 (preliminary)



1 Datalogger M-box

1.1 General

M-box datalogger (= data recorder) periodically reads actual data from SM-line measuring instruments connected via RS-485 communication link and writes the data onto SD- or MMC memory card. The data can be transferred into the Retis program running on a PC and viewed, archived and further processed.

Standard SD- or MMC-type memory card of capacity up to 2 GB and a real time circuit (RTC) backed up with an inbuilt gold capacitor allow recording of the measurement data. The RTC can be synchronized with a clock synchronization input (minute / quarter-an-hour).

Logged instruments can be connected via galvanically isolated RS-485 communication link.

The datalogger is built in plastic box, designed for installation at a DIN35-bar. The instrument's parameters can be set using an integrated keyboard and display.

Datalogger's firmware can be simply upgraded by inserting a card with new version.

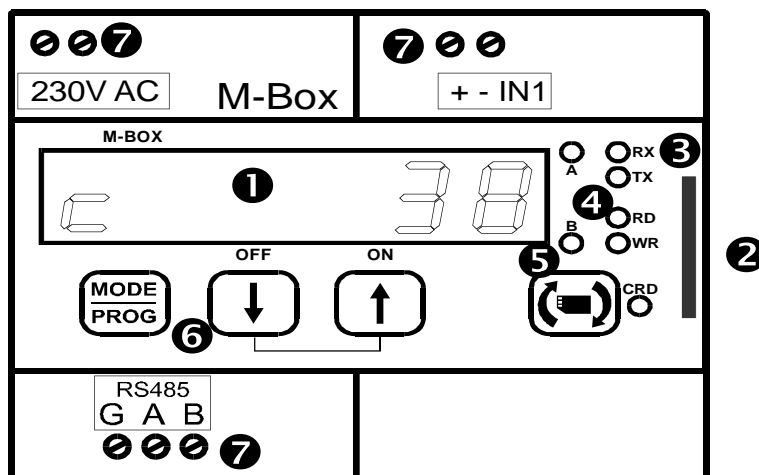
1.2 Firmware Version History

version	released	description
0.90	1/2007	Preliminary version. Supports the SML,SMM,SMN.

1.3 Function

At Fig. 1.1 you see front panel design and terminal layout. Function is described at following table.

Fig. 1.1 : Datalogger



①	Display	6-digit numeric LED-display. The first two digits (green) display shown parameter or message shortcut. Other four digits (red) display parameter value or message meaning.	
②	Card slot	Slot for SD- or MMC- memory card. When inserted, card contacts must be oriented in direction to the display and cut corner down.	
③	LED-diodes yellow	TX	RS-485 serial link transmission
		RX	RS-485 serial link reception
④	LED-diodes green	RD	Reading from memory card
		WR	Writing to memorz card
⑤	LED-diodes red	CRD	Card state. When lit, files structure on it is correct.
		A,B	A – indicate active state on IN1 logic input (time synchronizatiion pulse input). B- not used
⑥	Keys	MODE/PROG	Short push – parameter displayed selection Long push – editation starting and finishing
		↓	Parameter value decreasing (other functions application dependent aplikace)
		↑	Parameter value increasing (other functions application dependent aplikace)
		■ Card	Short push – for safe operation before card ejection. Long push – datalogger restart (for firmware upgrade)
⑦	Terminals	230V AC	Power supply voltage
		A,B,G	Galvanically isolated RS-485 communication link
		+/- IN1	Logic input for time synchronization, isolated

Both actual write pointer of discrete data files and actual date and time can be checked on the display (see table below). You can list through the parameters with short push of the MODE/PROG key. When file write pointer is displayed you can list through the files with the ↑ and ↓ keys.

Parameters Displayed

Symbol	Range	Unit	Description
0÷99	0 ÷ 100	%	Data file actual write pointer. Green number is data file name (corresponds with connected instruments's address). Listing through files with ↑ and ↓ keys.
d	1.1. ÷ 31.12.	Day, month	Actual date
t	0.00 ÷ 23.59	Hour, minute	Actual time

1.4 Connection

Example connection is described in separate chapter at the end of this manual.

1.4.1 Power Supply Voltage

The datalogger requires power supply voltage 230 V AC at 50 or 60 Hz for its operation with input power maximum 5 VA. As there is no fuse inside datalogger, the power supply voltage must be short-circuit protected.

Since the instrument does not have its own main switch, it is necessary to include a disconnecting device in the power supply circuit (power switch — see installation wiring diagram in separate chapter). It must be located right at the instrument and easy to reach by the operator. The equipment disconnecting device must be marked as such. A circuit breaker for nominal current of 1 amp makes a suitable disconnecting device, its function and positions, however, must be clearly marked (marks “0” and “I”, respectively, in accordance with EN 610 10–1).

1.4.2 RS-485 Communication Link

The datalogger's RS-485 link interface uses signals A, B (=data signals) and G (ground of communication link). The interface allows connecting up to 32 instruments at a distance up to about 1 kilometer. Recommended cable is shielded twisted metallic double pair.

It can be sufficient to interconnect data signals A and B only if communication cable length of several meters and at not-demanding environments.

At demanding environments and at communication distances of a few tens of meters and longer the RS-485 line requires impedance termination of the final nodes by installing terminating resistors. Terminating resistors matching the cable's wave impedance (usually hundreds of Ohms, for example 330R) are connected between terminals A and B.

If the communication cable is hundreds of meters long or in environment with electromagnetic noise it is suitable to use a shielded cable. The shielding connects to terminal G and to the PE (protection earth) wire at one point of the cable.

1.4.3 Real Time Synchronization Input IN1

The inbuilt RTC is controlled by crystal oscillator. As the oscillator accuracy is limited, the real time deviation of up to several minutes at long records can occur. To avoid it, external time synchronization can be used.

The input is optically isolated and is connected at terminals IN+ and IN–. The synchronization active signal is voltage (external) in range 5 ÷ 30 V DC.

The synchronization pulse must be at least 40 ms wide. The instrument sets the inbuilt real time circuit (if the function is selected) to the nearest minute at each detection of a synchronization pulse. The synchronization pulses can be minutely, quarter–an–hourly or hourly.

1.5 Datalogger Manipulation

To start datalogging, it is necessary :

- to check or to set datalogger number
- to check or to set datalogger real date and time
- to insert memory card previously preset for appropriate logging inside Retis program

1.5.1 Datalogger Parameters

To entry parameter editation mode, press MODE/PROG key long. As the editation can be password protected, characters „-“ are displayed first and the datalogger requires password typing. For the time being this function is disabled – go on with pressing MODE/PROG key.

As the parameters are arranged in two branches, „sign-post“ indicated with „s“-character appears first (see table below). With ↑ and ↓ keys you can select either „d-t“ submenu containing real date and time information, or „CONF“ submenu with other parameters.

By following pressing of MODE/PROG key you can list through selected branch. Values of the parameters can be edited with ↑ and ↓ keys.

To cancel editing, press MODE/PROG key long again. The editation is cancelled automatically after approx. 30 seconds interval without any key pressing.

Symbol	Range	Unit	Description
s	d-t CONF	-	„sign-post“ (submenu selection) d-t... date/time, CONF- configuration
„d-t“ submenu			
ho	0 ÷ 23	hour	actual time
mi	0 ÷ 59	minute	
se	0 ÷ 59	second	
dA	1 ÷ 31	day	actual date
mo	1 ÷ 12	month	
YE	2000 ÷ 2099	year	actual year
ud	Mo ÷ Su	-	day of week – not editable
„CONF“ submenu			
id	1 ÷ 9999	-	datalogger number
Eb	on / off	-	beeper enable – error states indication
FP	0.01 ÷ 0.99	s	minimum time sync. pulse signal length

1.5.1.1 Datalogger Number

Datalogger periodically reads data from connected instruments and creates records according so called control file on the card. One of parameters of the control file there is *datalogger number*, that specifies the datalogger, the card is preset for.

After insertion the card into a datalogger, the datalogger checks if the inserted card is designated for it – if the datalogger number (preset inside datalogger) doesn't match

the datalogger number in the control file on the card, the datalogger refuses the card and doesn't start any logging.

Therefore it is necessary to preset datalogger number correctly.

If the datalogger number is preset to 0, no number check is done and the datalogger accepts any card.

1.5.1.2 Datalogger Date/Time

Datalogger date/time can be set in the way described above.

At power-off, the RTC operation is backed up by a capacitor for approx. 5 days.

WARNING : It is necessary to preset standard time always, no daylight saving time !!!

1.5.2 Record Starting

After datalogger number and data/time is preset correctly, it is possible to start logging. Simply insert the card into the datalogger's slot (the card must be correctly preset by Retis program, see appropriate chapter below).

The card needs to be inserted into the slot with the cut corner oriented down. If the datalogger accepts it, it starts logging data according control file on the card and stores the data into the preset data files on the card.

Correct operation can be checked on the panel. The yellow LEDs TX and RX indicate communication on the link. The green LEDs RD and WR indicate operation with the card. The red LED CRD indicates card detection. At correct function, both the TX and the RX LEDs flashes periodically at actuation interval and the RD and WR flashes sometime. The CRD should be lit permanently.

Error states are indicated with error messages (see table below), optionally with beeper too.

Error Messages

Messageí	Meaning
ErCard	Card misses or wrong
ErFAT	Card file structure uncorrect
ErFile	Some files on the card missing or uncorrect
ErFrag	Data files are fragmented
ErCon	Link communication error
ErEEP	Configuration EEPROM CRC error
ER Id	Card number doesn't match the datalogger one
Er Dev	Different instrument type connected

1.5.3 Record Stopping

To transfer logged data from datalogger to a PC, it is necessary to eject the card and

to read it by Retis program.

Push the CRD key shortly. The CRD LED starts flashing. During approx. 10 seconds eject the card from the slot. If you let it inside the slot, the datalogger goes on logging automatically during the interval specified.

Insert the card into appropriate PC drive (or card reader) and read the data with the Retis program (see description further below).

After the reading, if no new logging task is written onto the card (card content stays unchanged), it is possible to return it into the datalogger and the logging will go on.

If a card with new setting of logging is inserted, the datalogger starts new logging task according the control file on the card.

1.5.4 Datalogger Firmware Upgrade

Datalogger firmware can be updated via memory card.

Copy new datalogger firmware version (Flash.bin file) onto the card and start defragmentation process. Then insert the card into the datalogger and push CRD key long (or switch power supply off and on). After the first two messages, all LEDs starts flashing and new firmware version is copied into the datalogger.

At the case displayed, the program found the card as logical drive „G“ and read and displayed datalogger setting on the card. If it finds no card, it chooses logical drive „A“ - it is necessary to check proper connection of the card at such case.

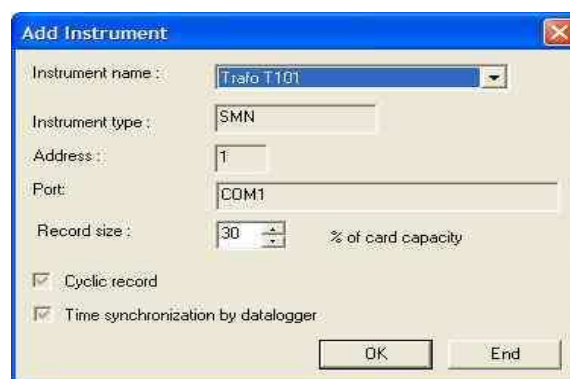
Now it is necessary to correct the shown setting as desired and to write it back on the card. Discrete items meanings are as follows :

- *Card path* – character, identifying logical drive on the PC
- *Datalogger No.* - datalogger number, for which the current setting is designated for. The setting will be processed by a datalogger with the same preset number only.
- *Card No.* - memory card number, for user identification only. No influence on datalogger operation.
- *Actuation period* – interval of periodical reading and recording of data in seconds. When set it is necessary to take in account number of logged instruments, communication link rate and its quality. Recommendation: the period value in seconds should not be shorter than number of instruments logged.
- *Communication rate* – rate of communication between datalogger and logged instruments in bits per second
- *Card capacity* – size of memory on the card which is reserved for data recording. Not editable, for information only.
- *Name* – recording setting name, for user orientation purposes.
- *Logged instruments* – list of instruments, that will be logged.

If the *Actuation period* is set too short, datalogger couldn't catch to read data from all logged instruments during the period set. In such case, data dropouts can occur in records.

You can add instruments to be logged into the list with *Add Instrument* button. Following window is displayed :

Fig. 2.2 : Add Instrument



Select the instrument to be logged first. The instrument can be selected from *Instrument List* (see General Description of the Retis Program) according its name. That means that all instruments to be logged need to be added into the *Instrument List* first.

By selecting the instrument, other logging parameters preset in the *Instrument List* are

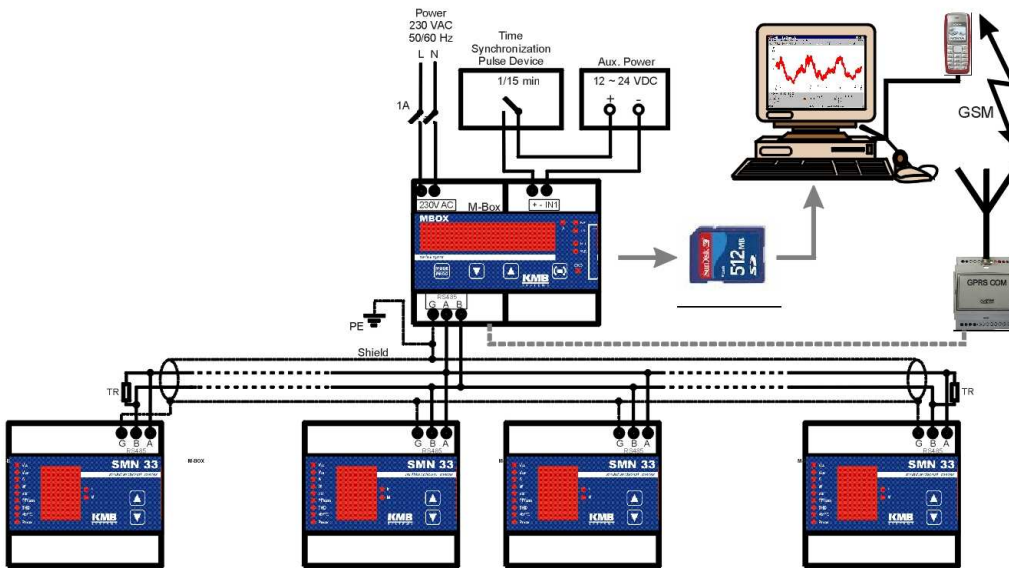
Especially if a card with logged data is read at another PC than it was written at, some of instruments (or their settings) logged with the card can miss in *Instrument List* of the second PC. In such case strings „? ? ?“ appear in instrument name field in *Logged instruments* list and appropriate data cannot be read.

To read logged data, it is necessary to select new instrument name for each such item with *Edit instrument* function. To do it, it can require to add the instrument into the *Instrument List* first.

As soon as all instruments in the Logged Instruments list have correct name, start reading logged data from the card with *Read data* button. All records are read and archived and archive files are displayed.

Except data records, it is possible to read recorded maximum of average 3-phase active power (at SMN instruments only) including its time stamp and date/time of last clearing by *Read Pmax* button.

3 Connection Example



4 Technical parameters

Panel	6 digits, 7 LEDs, 4 keys, beeper
RTC	backup interval 5 days (typical value), max. deviation +/- 5 seconds/day
Input IN1 (time sync)	1 x isolated, passive. Active signal range 5 ÷ 30V DC, input resistance 1 kOhm. Mimimum synchronization pulse length 40 ms
Seriál link	RS485, isolated, max. rate 115 kBd
Dimensions	58 * 90 *58 mm
Mass	600g
Power supply	230V AC +10/-15 %, 50/60 Hz, max. 5 VA
Protection	IP20

5 Maintenance, Service

Maintenance

Datalogger M-box does not require any maintenance within their operation. For reliable operation you only have to comply with the operating conditions specified and prevent mechanical damage to the instrument.

Service

In case of the product's breakdown, you have to return it to the supplier at their address.

supplier:

manufacturer:

KMB systems, s.r.o.

559 Dr. M. Horákové

460 06, Liberec 7

Czech Republic

website: www.kmb.cz

The product must be packed properly to prevent damage in transit. Description of the problem or its symptoms must be sent along with the product. If warranty repair is claimed, the warranty certificate must be sent in too. If repair beyond warranty is required, a written order must be included.

Warranty Certificate

Warranty period of 24 months from the date of purchase, maximum 30 months from the date of dispatch from manufacturer's warehouse however, is provided for the instrument. Problems in the warranty period, provably because of faulty workmanship, design or inconvenient material, will be repaired free of charge by the manufacturer or an authorized servicing organization.

The warranty ceases even within the warranty period if the user makes unauthorized modifications or changes to the instrument, connects it to out-of-range quantities, if the instrument got damaged in out-of-specs falls or by improper handling or if it has been operated in contradiction with the technical specifications presented.

type of product: Datalogger M-box..... serial number

date of dispatch: final quality inspection:

manufacturer's seal:

date of purchase: supplier's seal:

