MONITORING, DATA LOGGING AND CONTROL SYSTEM MS2+, MS3+, MS4+

APPENDIXES

TO INSTRUCTION MANUAL

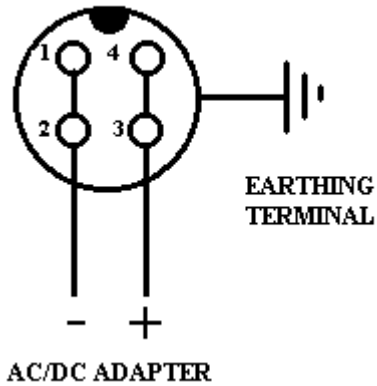
SYSTEM s.r.o.

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APPENDIX 1 Power input of data logger

1. **Wiring of power connector (view of data logger from outside)**

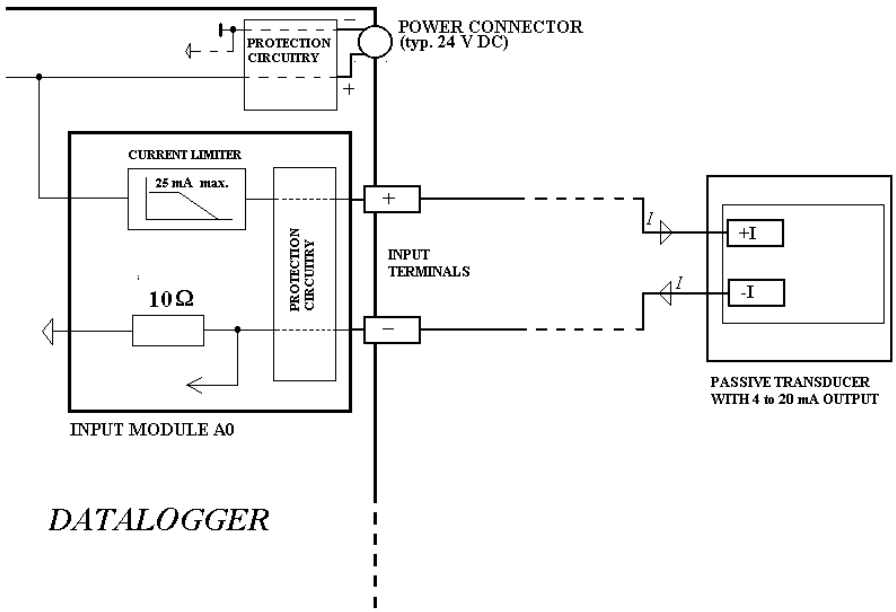


2. **Power input parameters**
   It is possible to power data logger directly from dc voltage source to input for AC/DC adapter. Types MS2+ and MS3+ works with power voltage from 9 to 30V DC, MS4+ with voltage 24 V DC. In case of not using included ac/dc adapter it is necessary to consider in selection of power voltage, if data logger has implemented inputs A0. If there are A0 inputs, it is necessary to find out what power voltage requires the transmitter connected to this input and select data logger power voltage approximately 3V higher then required from transmitter. Current consumption of data logger depends on the type, input modules, operation mode and power voltage (pulse source). Negative pole of power connector is galvanic connected to internal GND of data logger, therefore with inputs (if not galvanic isolated) and with external audio indication.

Approximate current consumption of input for AC/DC adapter			
	Power 9 V	Power 12V	Power 24V
MS2+ without input modules	approx. 150 mA	approx. 120 mA	approx. 80 mA
MS3+ without input modules, all LEDs shine	approx. 250 mA	approx. 200 mA	approx. 110 mA
Input module, galvanic insolated	< 3 mA	< 3 mA	< 3 mA
AC input module, galvanic isolated	approx. 50 mA	approx. 40 mA	approx. 20 mA
Input module A0, short circuited at input	approx. 33 mA	approx. 33 mA	approx. 33 mA
Relay board of MS4+, relays closed	---	---	approx. 300 mA

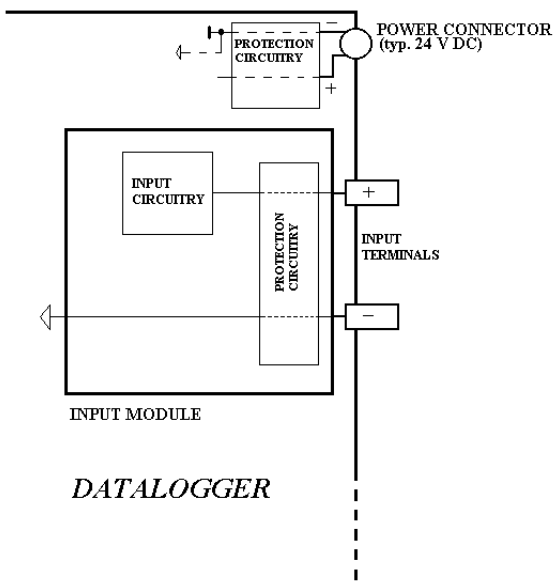
APPENDIX 2 Input circuitry of data logger

1. Input for two-wire connection of passive transducer - type input A0:

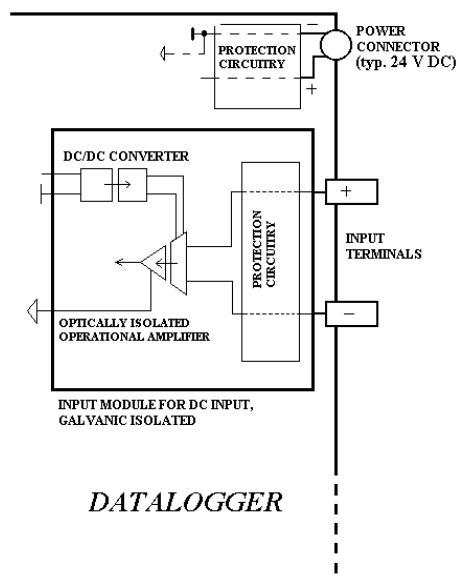


Note: As *passive temperature transducers are applicable e.g. transducers Comet of range P0120, P4121 P4131, P4141, Comet relative humidity transducers and combined transducers temperature + RH.*

2. Dc inputs, inputs for temperature transducers and resistance measurement

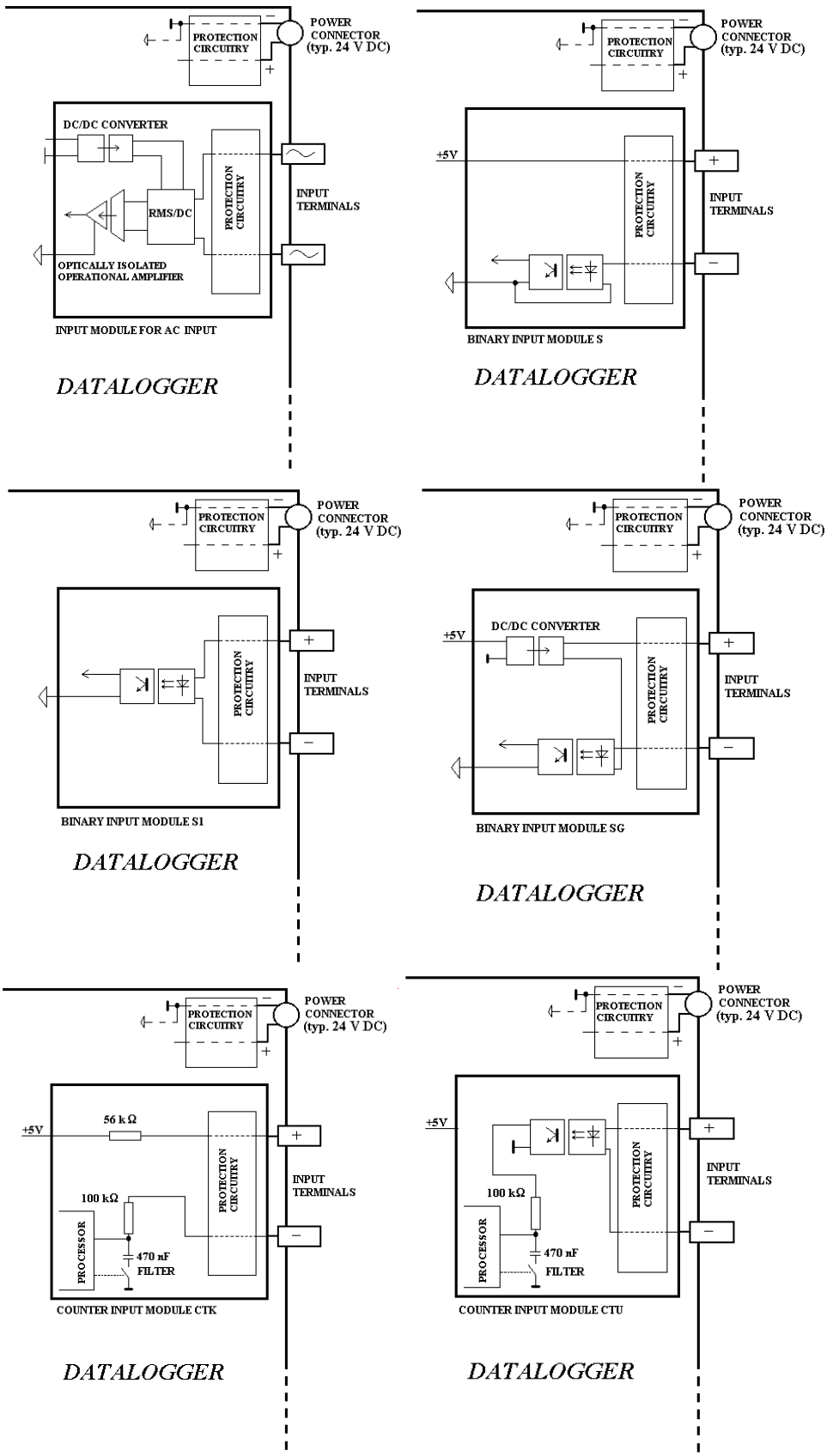


galvanic not isolated input



galvanic isolated input

3. AC inputs, binary inputs and counter inputs



APPENDIX 3 Configuration of RS input

1. Description

Input module is designed for reading values from serial link RS485, from device communicating in ADAM protocol of the Advantech company. It is design for up to 16 measured channels, the real number depends on particular position of this module in data logger, which is always 16 channel at maximum.

Example: *If the RS module is located at channel 6th position, then link RS485 connected to channel 6. serves for channels 6 to 16. Physical positions of input modules for channels 7 to 16 must remain empty. On channels 1 to 5 any input modules can be applied (except for input RS, because only one RS input can be in data logger).*

2. Requirements for input device

Input device should support protocol ADVANTECH, valid range of addresses is 1 to 16 (1 to 10hex.), data format „Engineering units" and check sum. Input device can be single-input or multi-input (up to 8 inputs). Communication speed should be at the range of 1200 Bd, 2400 Bd, 4800 Bd, 9600 Bd or 19200 Bd.

3. Communication protocol

The RS module sends command for reading from input device. Command always contains check sum.

Syntax of command:

A) reading from single-input device

#AA (CRC) (cr) *e.g. #0184(cr), accordingly 23h,30h,31h,38h,34h,0Dh (CRC=23h+30h+31h=84h)*

where

AA .. address of device (01h..10h)

CRC .. check sum

this command is request for data from device at address 01h

use: single-channel device (e.g. 4011,4012,4013,4014D, Comet N485 etc.)

B) reading from multi-input device

#AA(M)(CRC)(cr) *e.g. #032B8 (cr) accordingly 23h,30h,33h,32h,42h,38h,0Dh this command is request for data from device at address 03h from channel 02h*

where

AA .. address of device (01h..0Fh)

M .. number of input of this device

use: poly-channel device (e.g. 4017, Comet NH485 etc.)

After sending command module is switched to reception and waits for response. Maximum duration for waiting is possible to set. After the wait error is reported. Waiting duration for response is adjustable from approximately 28 to 500 ms (see below point 5).

Device response: Module RS supports response format corresponding with "Engineering units" protocol ADVANTECH:

>sxxxx.xxxx(CRC)(cr)

where

s ... sign

x ... digits, maximum number of digits left from decimal point is 11, right from decimal point is 6

(attention to maximum process able number in data logger.. see below)
Note: nor decimal point, nor the sign is required (number is considered as positive)
Example: >+3456.12345(CRC=66)(cr), accordingly
3ch,2bh,33h,34h,35h,36h,2eh,31h,32h,33h,34h,35h,66h.0dh

Examples of valid formats: >23(CRC)(cr)
>-234.67(CRC)(cr)
>+3389(CRC)(cr)

(CRC)... check sum is the sum of all transmitted bytes before the check sum, transmission is converted to ASCII code.

1.1.1.1 Example: >35 transmitted are following bytes: 23h, 33h, 35h
CRC= 23h+33h+35h=8Bh
therefore is sent >358B(cr) i.e. 23h,33h,35h,38h,42h,0Dh
(cr) ... character 0Dh

4. Data logging of data

Data logger communicates with RS module in command-response mode. I.e. when measurement of particular channel is requested the command is passed to module and waits for its execution. Module converts received data to floating point format (single format). Data logger consequently evaluates error messages and in case logging interval has come, measured data is stored.

Decimal point position: setting of decimal point position is user selectable. It is not dependent on the position of decimal point position in read device.

Example: *device responses >+12.52 a number of digits right from decimal point in data logger is set to 3, 12.520 is displayed*

Notice: data logger is able to process maximum number of 32767 without decimal point. Therefore in our example, if 3 digits right from decimal point are set, the highest recorded number is 32.767 (with the exception of Error 1,2 states) ! In case input device sends higher number, data logger reports Error 8.

Error messages: error message are indicated on the data logger LCD and in Display mode. In record there is no information on error type. For detailed specification see paragraph 6 of the basic part of instruction manual.

5. Configuration of RS485 network of input devices

Variability of input devices requires to configure the network of input devices one device after another in accordance with individual requirements of devices. Therefore connect network directly to computer and configure it in proper program.

Requirements:
- address of input device must be at range of 01h.. 10h (1..16).
- communication speed of 1200, 2400, 4800, **9600**, 19200 Bd
- format of data - "Engineering units"
- activated check sum

After completing the configuration connect the RS485 network to data logger input (polarity of terminals matches the label).

Note: *It is recommended to work this way: connect first device, connect its jumper INIT and switch on the power. Set address from allowed range, communication speed, check sum and data format. Switch off the power, disconnect the INIT jumper, add another device, connect its INIT jumper, switch on the power, set suitable address etc.*

6. Configuration of data logger for the RS input

If e.g. the RS module is in position of channel 6, then channels 6 to 16 are reserved for the RS485 network. Data logger is preset from the manufacturer, that channel number corresponds with the address of input device, i.e. in our example data logger is able to read from addresses 06h to 10h, single-channel device in communication speed of 9600 Bd. It is possible to set different configuration by means of the PC program from user menu Setting of input channels. Channels controlled by the RS module have additional page Connected device. Following settings are possible:

Device address (RS485): enter input device address, which will be controlled by this channel of data logger. Valid address is from 1 to 16 decimal.

Multi-channel device: tick this field if connected device measures more quantities (at same address uses protocol syntax accordingly with 3B of this appendix).

Channel number: relevant only for multi-input device. Number is from 0 to 7 (multiplexer, sub-address) accordingly with 3B of this appendix.

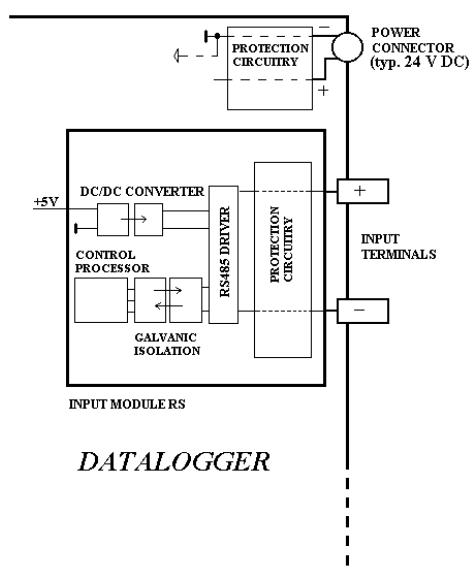
Maximum waiting time: specifies the maximum time for data logger to wait for response from input device. Error is reported after specified duration. Duration is possible to set up to 500ms. Too short duration can cause, device will not response in time, too long duration prolongs measurement in case transmitter does not response (it is switched off, removed etc). Considering compatibility with analog channels it is useful, device reliably responses to approximately 100 ms. In selection of logging interval 1 second consider, whether measured data can be actual.

Baud rate: enter speed through the RS485 link for RS input module. The speed should be identical for all devices connected to the RS485 network (its modification is transferred to all pages for setting of the RS input).

Example: Dual channel temperature and relative humidity transducer NH485 (address is set to 2, speed 9600Bd) is connected to RS input at the position of data logger channel 6. Requirement is to measure temperature on channel 8 and RH on channel 9. In the PC program set address device 2 at channel 8, tick field Multi-channel and enter Number of input channel 0 (reading of temperature). Set communication speed to 9600Bd, maximum waiting duration to 200ms. On channel 9 set address device 2, tick field Multi-channel and enter Number of input channel 1 (reading of relative humidity, maximum waiting duration to 200ms). Save this configuration.

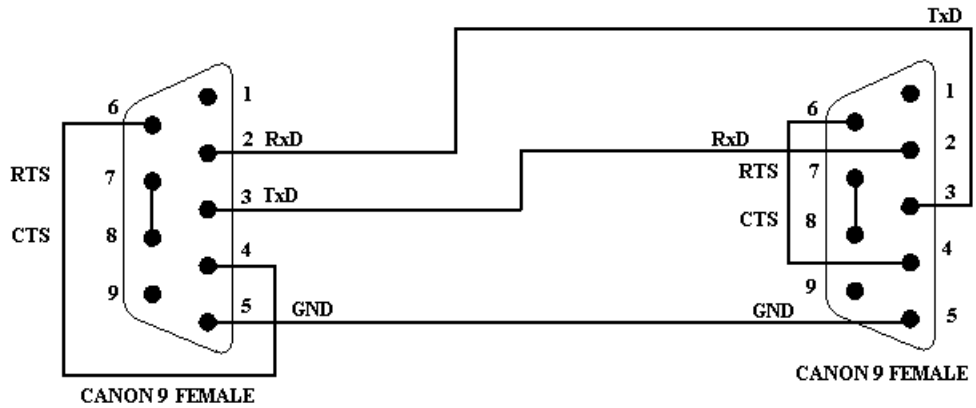
After configuration channels of module RS act identically as analog channels, therefore it is possible to enter description, decimal point position, user calibration, alarms etc.

7. Block diagram of RS module



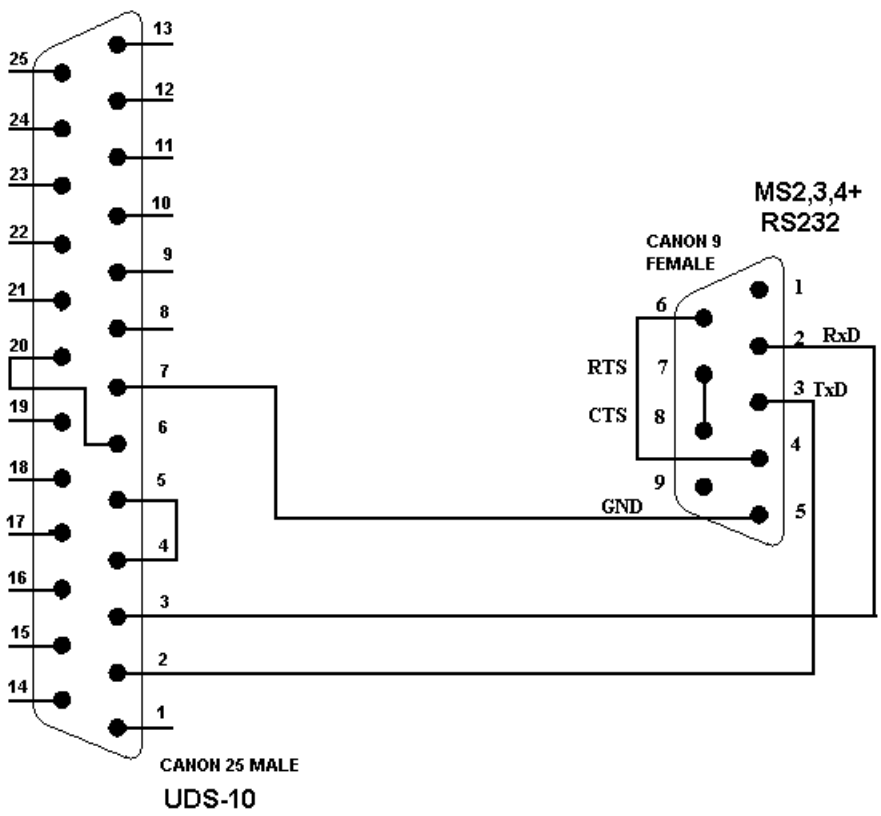
APPENDIX_4_Interconnection cable for RS232 serial interface

D4.1. Wiring of RS232 communication cable



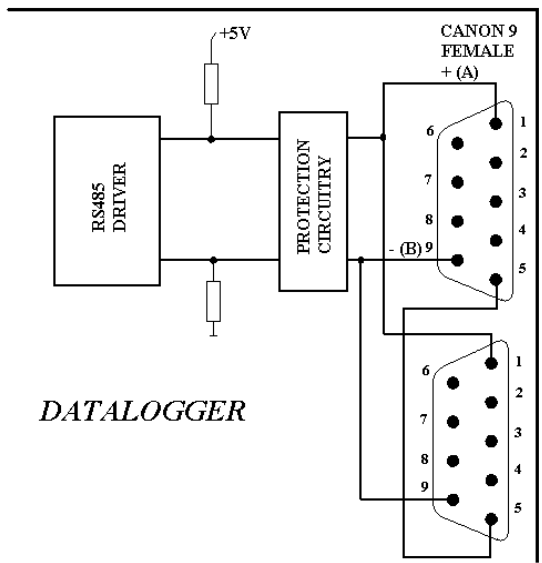
This communication cable serves for direct connection between data logger and the computer. In case computer is equipped with Canon 25 pins connector at communication port, use proper adapter (ordinary accessory of computers). This cable is not design for connection of data logger with external modem.

D4.2. Wiring of interconnection cable between data logger and RS232/Ethernet converter UDS100



D4.3. Output circuitry of data logger for interface RS485

Data logger is equipped with a pair of Canon 9 female connectors – marked RS485. Both connectors are wired in parallel to enable easy connection of another data logger. Pinu 1 is + (A) and pin 9 is – (B) of RS485 interface (connect shielding to pin 5 – shielding is connected only to adjacent connector)..



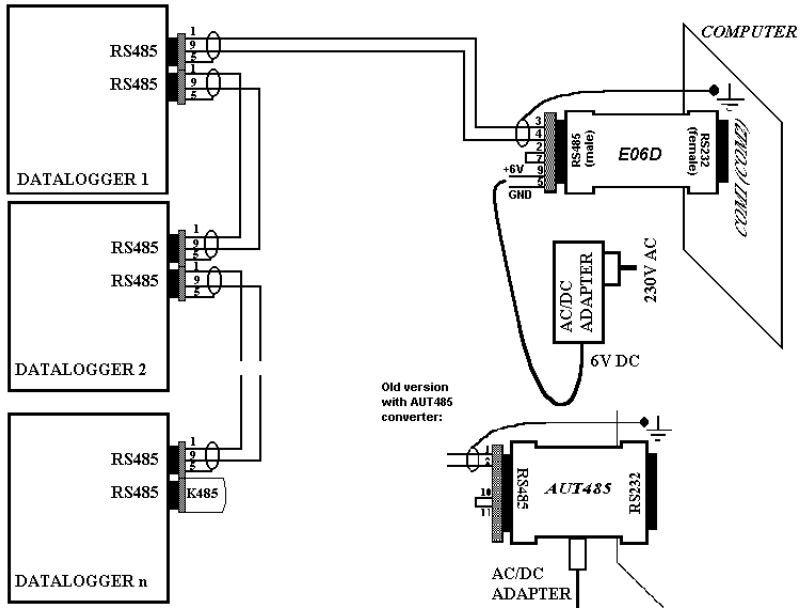
D4.4 Method of connection of data loggers to RS485

It is recommended to use external converter RS485/RS232 with automatic transmission direction control to connect RS485 link to the computer. Recommended type is E06D powered from ac/dc adapter 6V DC. Connect converter directly or by means of reduction to communication serial port COM of computer. Connect link from data logger with correct polarity (pins 3 and 4) to RS485 side and connect **pins 2 and 7 to each other** (it corresponds to setting of time constant of automatic converter switching for 115200 Bd speed - with this setting there are no problems generally in communication at lower speed). It is also necessary to connect ac/dc adapter 230V/6V DC to converter and power mains.

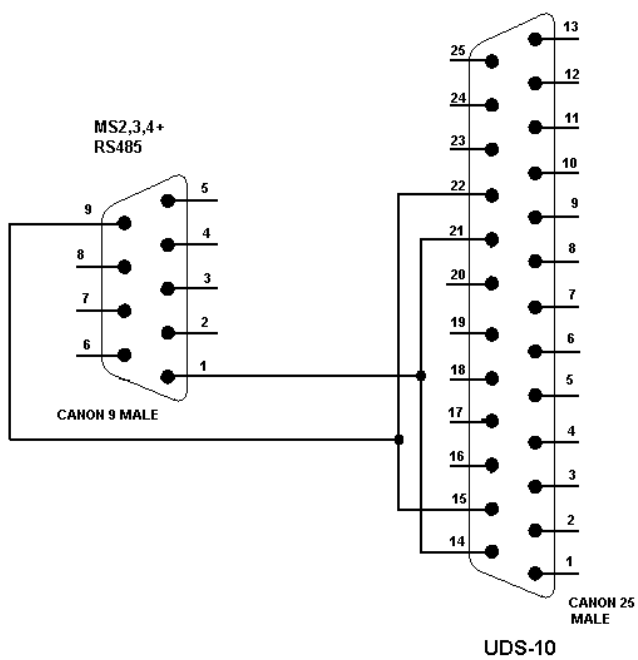
Lead is realized by twisted two-wire cable with nominal impedance 100 Ω, loop resistor maximum 240 Ω, maximum 98 Ω/km, maximum capacity 65 pF/m, crosstalk between pairs –40 dB/150 kHz. Lead should be in one line, i.e. no tree or star structure. Termination resistor should be at the end. Wire marking of several manufacturers: „+“ corresponds to „A“ and „-“ corresponds to „B“. Connect cable shielding to each other, do not connect shielding to transducers, if transducer has no shielding terminal galvanic isolated from communication and measuring circuitry, including metal parts of the case.

Note: for shorter distances different network topology can be tolerated. Termination resistor is a matter of question. Due to signal reflection its impedance should be identical to sum of impedance of parallel combination of input resistors of all devices connected to network. Mostly fixed value of 120 Ω is recommended. In some cases it can worsen network parameters, because voltage levels are lower and consequently network immunity against interference is lower. Other sources recommend termination resistor up to 1 kΩ.. For shorter distances in some cases it is possible not to use any termination resistor.

Example of the connection:



D4.5 <u>Wiring of connection cable between data logger and converter RS485/Ethernet UDS100</u>



APPENDIX_5 Configuration of data logger with external modem

There are two applicable ways to connect data logger to telephone network (land line or GSM):

A) modem is controlled by the data logger - connect data logger to computer via RS232 link by means of the delivered cable. Switch ON data logger and enter mode of configuration setting. Set interface RS232-modem and enter configuration chain for modem (it consists of AT statements). It is recommended to use preset chains for modem for land line and for GSM modem (these chains contain below statements for "manual" modem setting). Then connect via modems, install the drivers for modem at computer side (if needed) and set communication in the PC (enter telephone number, COM port etc.). Try to communicate - see below point 4 *Function verification.*

B) modem is set "manually" by the user

Instructions for "manual" communication setting by means of modems:

1. Configuration of data logger´s communication interface

Connect data logger via RS232 link to the computer (included cable), switch on and run user PC program. Choose selection *RS232- modem* from *Configuration menu.*

2. Configuration of external modem at data logger side

Connect modem to computer by a cable, which is the accessory of the modem, plug in the ac/dc adapter and switch ON the modem. Run *HyperTerminal* program on your computer (it is located in *Accessory - Communication).* After its running a request of creation of new connection appears. Cancel this request. In menu *File - Parameters* choose in item *Connect by means of* selection *Directly to port COM1* (respectively COM2, if modem is connected to communication port COM2). Choose selection *Configuration* at the same window and set parameters *Number of bits per second* to 19200, *Number of data bits* to 8, *Parity*: no, *Stop-bits*: 1, *Flow control*: hardware. Confirm both windows to return to terminal. Here enter command **AT (cr)** (i.e. enter in upper case letters AT and press the Enter key). Modem must response: **OK.**

2.1 Setting of modem for land line

Now it is necessary to configure modem itself in the way modem after reception must "hung-up" (disconnect the call) and cancel the control of the DTR-DSR loop. This can be done as follows:

a) **AT&Y0** cr (selection of user template 0)

b) **ATS0=1** cr (modem „hang-up after the call")

c) **ATS23=060** cr (communication speed 19200 Bd)

d) **AT&D1** cr (cancel of testing DTR-DSR loop)

e) **AT&W0** cr (saving of active configuration to profile 0)

Now modem is configured and can be switched OFF. Modem responds **OK** to each commands.
Notice: *Be careful not to send to modem AT command in other communication speed. It could cause modem reconfiguration.*
Note: *The above description was verified with modems Microcom DeskPorte 56k Voice, ASKEY V 1456 VQE R-1 and ORIGO FM-56DT.*

2.2. Setting of GSM modem - SIM card used in GSM modem must be set not to require PIN after switching ON th emodem power. Modem should be set to automatically pick up the call and to enter data mode immediately.

Example for GSM modem WAVECOM WMOD2B:

a) AT+CICB=0 (automatic jump to data mode)
b) ATS0=1 (automatic call pick-up after first ring)
c) AT&W (configuration writing to EEPROM memory).

Logger should be set to 9600Bd communication speed, because the above modem type is not able to communicate faster.

3. Configuration of modem at computer side

Connect modem (if external) to the computer by an accessory cable of modem and switch on the power. Switch on the computer or restart it. In case modem is not installed, system Windows could run installation wizard. A CD included in delivery of modem is required. The following steps presume modem is installed correctly.

4. Function verification

Let modem connected to computer (if external) and connect phone line to its LINE input. Connect second modem configured in accordance with point 2 to data logger to the RS232 connector RS232. Use cable, which is the accessory of modem(!). Connect second phone line to the LINE connector of this modem. Switch on modem and data logger. Run user program for data logger. Define *New Communication Device* in menu *Configuration – Setting of communication –* select modem and set its parameters. Select *New Data Logger* at the lower part of the window and enter desired telephone number. Number of repetition is the number of trials to communicate. Confirm window and try to read configuration. After confirmation modems start to communicate and required data from logger is downloaded.

5. Trouble shooting

If communication via modems does not work and data logger itself communicates with computer, first check the proper connections and settings. Pay attention to the cables, which should be the original ones to modems (included cable to data logger serves only for direct connection between computer and data logger. If alls seems correct try to test communication between two computers. Modem, which was at data logger side connect to computer 1 and run *HyperTerminal* identically as point 2. Connect modem originally connected to your computer to computer 2 (it supposed it is installed) and run *HyperTerminal* as well. Here establish new connection with phone number of link connected to first modem. By means of instruction manual of modem try to create two-direction connection in speed of 19200 Bd. If it is successful note that for correct function with data logger deactivated DTR-DSR loop is necessary. Save configuration to the modem.

6. Connection of phone dialer

If a phone dialer is connected at the same time with modem, then connect its output link to the PHONE input in modem at data logger side. In this case logger communication with the PC has the priority. I.e. if alarm is activated during logger communication with the PC and the line is thus occupied, then phone dialer cannot activate the connection and deliver the alarm report. If phone dialer would be connected to the contrary (line-dialer-modem) then in situation of activated alarm and simultaneous communication with the PC, communication would break and he dialer would try to deliver alarm message.

APPENDIX 6: Influence of cable resistance to measurement accuracy with RTD sensors

In case inputs J (Ni1000), K (Pt100) or K1 (Pt1000) are installed and RTD probe is connected, then non zero cable resistance causes additional measurement error, which is added to real temperature. This error depends on cable cross-section, its length and sensor type. If it is known correction is enabled by recalculation of input channels.

Added error for copper wire (two wires) at temperature 23°C:

Cable cross-section [mm2]	0,22	0,34	0,50	1,00	1,50	2,00	2,50
Cable length [m]	Added error for Ni1000/6180ppm [°C]						
1	0,02	0,01	0,01	0,00	0,00	0,00	0,00
2	0,04	0,03	0,02	0,01	0,00	0,00	0,00
5	0,12	0,07	0,05	0,02	0,01	0,01	0,01
10	0,24	0,15	0,10	0,05	0,03	0,02	0,02
15	0,36	0,23	0,16	0,08	0,05	0,04	0,03
Cable length [m]	Added error for Pt100/3850ppm [°C]						
1	0,36	0,24	0,16	0,08	0,05	0,04	0,03
2	0,73	0,47	0,32	0,16	0,11	0,08	0,06
5	1,82	1,18	0,80	0,40	0,27	0,20	0,16
10	3,64	2,36	1,60	0,80	0,53	0,40	0,32
15	5,47	3,54	2,40	1,20	0,80	0,60	0,48
Cable length [m]	Added error for Pt1000/3850ppm [°C]						
1	0,04	0,02	0,02	0,01	0,01	0,00	0,00
2	0,07	0,05	0,03	0,02	0,01	0,01	0,01
5	0,18	0,12	0,08	0,04	0,03	0,02	0,02
10	0,36	0,24	0,16	0,08	0,05	0,04	0,03
15	0,55	0,35	0,24	0,12	0,08	0,06	0,05

Added error for copper wire (two wires) at temperature 100°C:

Cable cross-section [mm2]	0,22	0,34	0,50	1,00	1,50	2,00	2,50
Cable length [m]	Added error for Ni1000/6180ppm [°C]						
1	0,02	0,01	0,01	0,00	0,00	0,00	0,00
2	0,04	0,02	0,02	0,01	0,00	0,00	0,00
5	0,10	0,06	0,04	0,02	0,01	0,01	0,01
10	0,20	0,13	0,09	0,04	0,03	0,02	0,02
15	0,30	0,20	0,13	0,06	0,04	0,03	0,02
Cable length [m]	Added error for Pt100/3850ppm [°C]						
1	0,37	0,24	0,16	0,08	0,05	0,04	0,03
2	0,75	0,48	0,33	0,16	0,11	0,08	0,07
5	1,86	1,21	0,82	0,41	0,27	0,21	0,16
10	3,73	2,41	1,64	0,82	0,55	0,41	0,33
15	5,60	3,62	2,46	1,23	0,82	0,62	0,49
Cable length [m]	Added error for Pt1000/3850ppm [°C]						
1	0,04	0,02	0,02	0,01	0,01	0,00	0,00
2	0,07	0,05	0,03	0,02	0,01	0,01	0,01
5	0,19	0,12	0,08	0,04	0,03	0,02	0,02
10	0,37	0,24	0,16	0,08	0,05	0,04	0,03
15	0,56	0,36	0,25	0,12	0,08	0,06	0,05

APPENDIX 7: Selected error messages of data logger

Error number	MEANING
1	A/D converter is at lower limitation (input quantity – is below lower limit of module range)
2	A/D converter is at upper limitation (input quantity – is over upper limit of module range)
3	RS input module did not receive response from connected device in adjusted time
10	counter module does not contain valid data
130	input module was not found
137	counter value is not possible to display (it contains more than 10 digits) – only display error
160-177	corruption of configuration areas of data logger
178	installed different type of module
179	upgrade of input module was not performed
187-188	unauthorized access (non valid password)
189	error of measurement of thermocouple cold junction

APPENDIX 8: Support of reception and sending of SMS messages

Data logger enables to respond to SMS query and sending SMS alarm messages.

Hardware requirements:

- data logger with FW version 2.0 and higher
- GSM modem connected to data logger, modem must support PDU SMS format and its SIM card must have stored SCA number (Service Center Address)

There are the following connection modes:

a) modem is connected to main RS232 interface – used in case, modem is used both for data and SMS communication (data logger is at distant place without PC). Advantage is a simple connection, disadvantage can be potentially possible short dropouts in communication with master PC in time, when data logger contacts the modem. Lower transmission speed can be another disadvantage. Data logger tests requests for reception/sending of SMS messages each two minutes. If data communication runs (download of record values, change of configuration, the Display mode), then SMS processing is backed away to 2 minutes after last data communication with data logger. In this mode data transfer has higher priority than SMS message. It is not recommended to monitor the data logger in the Display mode permanently.

b) modem is connected to main RS232 interface of data logger and the PC is connected to RS485 interface of data logger. Data logger is set to RS232 (not to RS232-modem). In this case data logger connects the modem, if there was at least two minutes delay in communication with the PC. During communication with modem data logger does not response to queries from the PC till the end of transaction with GSM modem (at the moment RS485 is set to sending and reception from the PC is blocked and thus the possibility of data collision).

Data logger function is verified with GSM modem Wavecom WMOD2.

Format of received SMS messages:

PDU format, support of 7 bit, 8 bit a 16 bit coding without compression, telephone number in international/national format, ISDN/telephone numbering plan, maximum 15 characters of telephone number, maximum length of text message 64 characters, message can contain UHD of 36 character maximum length, TP-PID= 00h (Short Message Type 0). If those parameters are matched, message is accepted and decoded by data logger, i.e. UDH block is removed, text is converted to capital letters and compared with predefined strings: **Info, Alarm, Ch1 to Ch16**. In case valid string was received (no matter if capital/lower-case letters), data logger sends proper response and received message is cleared from modem. If received SMS message is not valid it is cleared from modem without sending any response.

Format of sent SMS messages:

PDU format, 7 bit coding without compression, telephone number in international format maximum length 15 characters, Validity period: 3 days, with all messages except response to request **Info** one SMS is sent of maximum 160 characters. In response to request **Info** sequence of one to four SMS messages is sent (depending on configuration of data logger), maximum length is 152 characters for a message. Messages contain UDH with code for linking to one long SMS on mobile telephones, which support linking of SMS together. For proper function **it is necessary** to have telephone number SCA (Service Center Address) stored on SIM card of the modem.

With messages sent due to creation of alarm or critical state, after SMS is sent all alarm states in data logger are stored. If no change in alarms appears, another message is not sent. If alarm stops to be active and appears again, message is sent. If alarm at another channel appears, message is sent again (If it is allowed by the user). If critical error state for sending SMS appeared

(defined delay expired) and before sending of thid SMS appeared new critical states, the states are included into the SMS. It is always recommended to set suitable hysteresis and alarm delay.

Detailed description of SMS content:

1. **Information on data logger**

is sent if SMS with text **Info** was received. Then SMS contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- state of memory occupation
- for each channel:
  - channel name
  - measured value
  - physical unit
  - state of alarms

Total number of sent SMS messages is 1 to 4 depending on configuration of data logger. Messages contain information intended for linking together at the recipient to one long SMS.

2. **State of alarms**

is sent if SMS with text **Alarm** was received
or
if at some channel appeared new alarm and is required its report by SMS. Message contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- list of channels, where Alarm 1 appeared
- list of channels, where Alarm 2 appeared

3. **Information on particular channel**

is sent if SMS with text **Chn** (where n is channel number 1 to 16). Message contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- state of memory occupation
- information on specified channel:
  - channel name
  - measured value
  - physical unit
  - state of alarms

4. **Message on creation of critical state**

is sent if critical error state in data logger appeared and SMS report is required.
Message contains:

- text WARNING!
- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)

actual list of critical states in data logger (selftest error, configuration, measurement, overrun of adjusted limit, fulfilling of memory)

APPENDIX 9: Setting of communication with data logger via Ethernet

Setting procedure depend on type of applied communication device. General steps are described below. Examples describe data logger equipped with optional built-in Ethernet interface or external converter *UDS-100 (UDS-10) from Lantronix.*

Procedure:

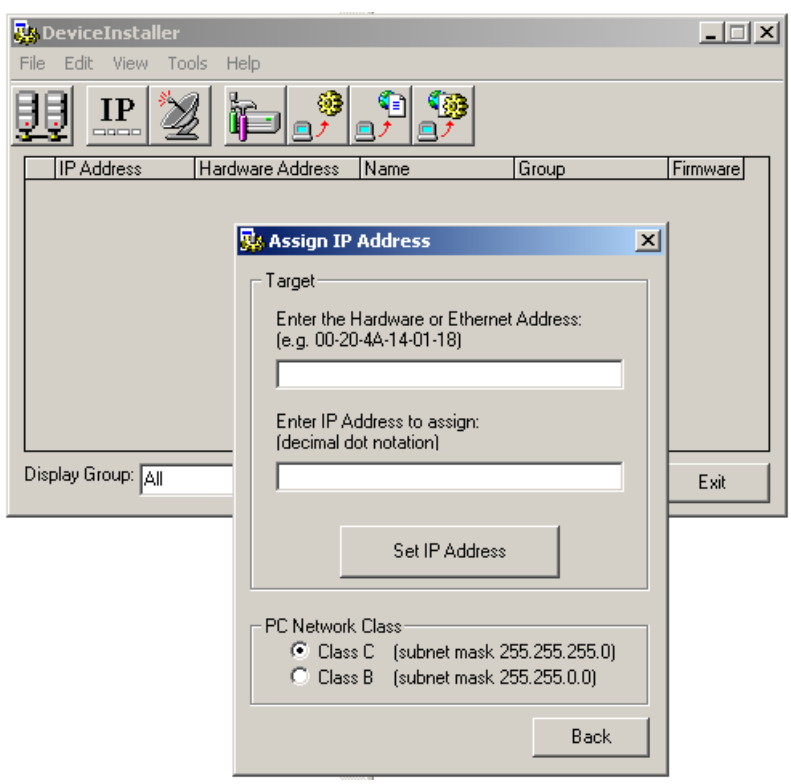
1. Find MAC address of converter or data logger (if equipped with optional Ethernet interface), address generally is specified on a label.

   Example of MAC address: 00-20-4A-80-F2-FB

2. Get free IP address from network administrator.
   Example of IP address: 194.170.2.152

3. Connect data logger to Ethernet network (directly or via converter) and switch of the power
4. Run program enabling to a*ssign* IP address and a*ssign* it.

Example: Install and run program DeviceInstaller.exe (available on installation CD with SW for data logger or at Lantronix website), in Menu Tools-Assign IP Address (or click on icon IP) enter proper MAC address from HW and assigned IP address from network administrator. Store to device (Set IP Address). Click on first icon (or File-Search) and window opens, where search the network. If your device is found, storing of IP address is OK. Cancel the window (Save). Click on line with found device and window Device Management appears (also enabled by Tools-Device Manager), select Web Configuration.



5. Setting of parameters of Ethernet interface for data logger - the interface must be configured to same parameters as data logger (same communication speed, 1 start bit, 1 stop bit, without parity).

Example: in application Internet Explorer (necessary to have installed Java script), wait for reading of www pages of this device.

Enter to bookmark Port Properties:

- *Serial protocol: RS232, if data logger contains built-in Ethernet interface or data logger is connected to converter UDS-100 (UDS-10) via RS232 interface of data logger*
  RS485-2 wire, if converter is connected to RS485 interface of one or more data loggers
- *Speed – communication speed, must be the same, as adjusted on data logger itself (for MS3+ and MS4+ is enabled to find in menu of data logger)*
- *Character Size: 8*
- *Parity: None*
- *Stopbit: 1*
- *Flow Control: None*
- *UDP Datagram Mode: Disable*
- *Remote IP Address: the same, as used before*
- *Local Port: 10001*
- *Disconnect Mode: Ignore DTR*
- *Other items: Disable*

Finally save the configuration to the device (Update Settings) and exit Internet Explorer and Device Installer.

6. Run user program for data logger and create in menu Configuration-Setting communication new communication device (Simple serial or Net serial depending on the way data logger is connected). Here select the name for communication device, IP address of device and port number (10001).

Note: It is possible to connect to data logger remotely via Internet, local network administrator makes other needed settings.

APPENDIX 10: Setting of communication with data logger via USB

This procedure describes necessary steps, if data logger is equipped with built-in USB interface or works with external converter FTDI US232 Converter Cable, ASIX UCAB232.

Procedure:

1. Connect data logger to USB port of computer and switch ON the power
2. Insert installation disk with user SW for data logger to CD drive
3. Operational system would recognize connection of new hardware and run installation wizard
4. If you are invited to automatic installation during installation, do not perform installation, but install driver, located on inserted CD.
5. If operational system Windows XP will report at some step, that compatibility with system Windows XP was not verified, select item Continue (Do not end up installation!).
6. In case installation was ended up early or improper driver was selected, it is necessary disconnect USB device from the computer, then run program ftdiunin.exe from the CD to uninstalled performed changes and then again connect USB device a run new installation of driver.
7. Correctly installed driver in system creates virtual COM port. Set communication with data logger in its user SW (Configuration – Setting communication) to this COM port.

Note: in case several devices with virtual COM port are used at one PC, situation can appear when after data logger connection to USB port different virtual COM port number is installed than was used in user SW. In this case it is necessary to enter menu Configuration- Setting communication again and select valid COM port in Communication device part.

APPENDIX 11: Setting of client administration and passwords

This APPENDIX describes security of data logger MS+ against illegal access. This issue is applied in following levels:

- Encryption of transferred data in communication with data logger
- Protection against illegal access to program and limitation of its functionality in accordance with setting of user rights
- Protection against illegal access to setting of data logger and limitation of configuration options in accordance with setting user rights.

1. Encryption of data in communication with data logger

is a way of protection of transferred data between computer and data logger by means of client specified password. The reason is protection against interception of transferred data via cable links or intranet/internet, that could be decoded based on available documentation of communication protocol of data logger.

Encryption of communication data and password for data logger is activated in setting of data logger in bookmark "Common setting" in section "Communication interface of data logger" see appendix 1.

In options of program in bookmark „Users and passwords" in section „Password for data encryption" (see appendix 2) is possible to set way to enter password for encryption of communication:

- Password will be permanently stored in the computer
  At first opening of communication with data logger client is invited to enter password. Password is stored and used further in communication with data logger even after re-run of the program
- Password will be memorized only to the end of application
  After running the program and opening of communication with data logger client is invited to enter password, which is memorized only during program run and after exiting program is no longer valid.

2. Administration of clients

List of authorized clients for access to program or to setting of data logger and their rights is possible to set in program options in section „User list", see appendix 2.

„User list" can contain up to 16 clients with the following parameters:
„User name" – unique user name for access to account
„Password" – password for access to account
„Name and surname" – name and surname of client
„Description" – description of user account

„Group membership“ – membership in group of clients

- „User with limited privileges“ – access to SW and HW protected functions is enabled to define except for rights to administrate the clients.
- „Administrator“ – member of this group has unlimited access to SW and HW protected functions including administration of clients.

„SW protected functions“ – are functions accessible by client in work with program in itself
„HW protected functions“ – are functions accessible by client in work with data logger

„Create new password“ – entering of new password of client
„Export“ – exports list of clients to the file
„Import“ – reads list of clients from the file
List of clients stored to the file is possible to use for transfer of clients between program installations on more computers or for theirs back-up. Always store this file to a ***safe place***.

3. Protection against illegal access to program and limitation of its functionality in accordance with setting user rights

limits access to program and its „SW protected functions“ only to clients defined in section „User list“, in accordance with their rights. It is activated in program options in bookmark „Users and passwords“ in section „Password protection“, see appendix 2.

If „Password protection“ is activated, after program run client is invited to login to his user account defined in „User list“.

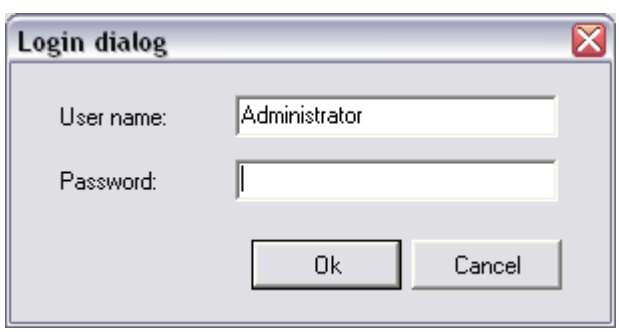


Figure 1 „Login dialog“

The way to authorize client in access to „SW and HW protected functions“ is set program options in bookmark „Users and passwords“ in section „How to execute login dialog“

- At application startup only
  User account client is logged in after program run will be used automatically to authorize access to „SW and HW protected functions“, i.e. without the need to authorize again in „Login dialog“.
  It is a lower protection grade, not protecting running program against misuse of the third party.
- Before every protected function
  After running of any „SW and HW protected function“ client must authorize again in „Login dialog“ to his user account in „User list“.
  It is a higher protection grade, protecting local access to program functions anytime, i.e. even in case when currently logged-in client let program running and leave his computer.

„SW protected functions“ are the following:

- „Setting of program options“ – setting of program options as Folders, Display and Automatic data download.
- „Setting of communication“ – setting of communication devices and data loggers.
- „Clear display statistics“ – erasing of statistic data of active data logger in Display on bookmark display.
- „Clear alarms“ – erasing of alarm of active data logger on bookmark „alarms“.
- „Delete event viewer messages“ – erasing of messages in event viewer.

Access rights of client to those functions are defined in his user account. Logout of current client is enabled by selection „User Logout …“ from menu File.

4. Protection against illegal access to setting of data logger and limitation of configuration options in accordance with adjusted user rights

Limits access to setting and „HW protected functions“ only for clients defined in „User list“ stored in data logger in accordance with their rights. Way of definition of „User list“ for data logger is specified by setting „Use same security setting and user list for all data loggers“ on bookmark „Users and passwords“ in section „Security setting and user administration“, see appendix 2.

„Use same security setting and user list for all data loggers“ has the following meaning

- Enabled – defines „User list“ for all available data logger identically based on „User list“ for program and gives notice to client with administrator rights to the need of update of „User list“ in data logger, see figure 2.

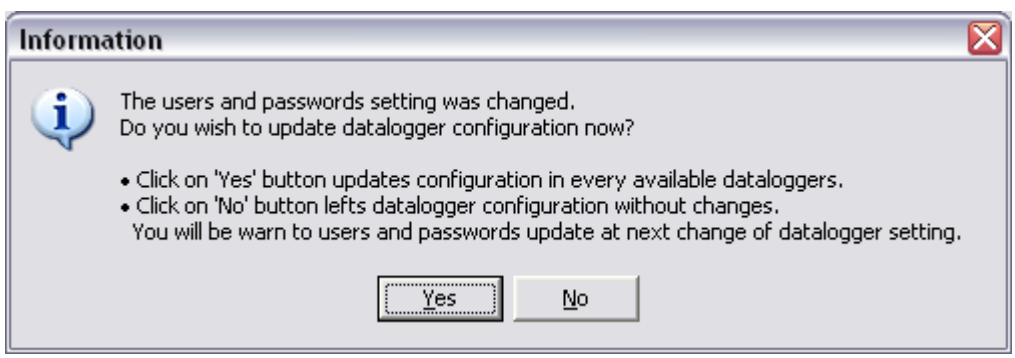


Figure 2: Prompt to update „User list“ stored in available data loggers

In case data logger does not contain any client in its configuration program gives notice to the need to activate „Communication data encryption by password“, see above and invites to enter the password, see figure 3.



Figure 3: Invitation to enter necessary password for encryption of communication data

In dialog setting of data logger at bookmark “Common setting” in section “Communication interface data logger“ is then enabled „Protection of access to HW functions“, but prohibited editing of clients stored in data logger by „Users and passwords“ button see appendix 1.

Manual update of „User list“ stored in data logger from „User list“ for program is then enabled by selection “Update users and passwords in data logger“ from menu Configuration.

- Prohibited – definition of „User list“ stored in data logger is independent from „User list“ - for program it is necessary to define it in each data logger itself. Is activated by selection „Protection of access to HW functions“ and it is defined in dialog under „Users and passwords“ button, see figure 4.

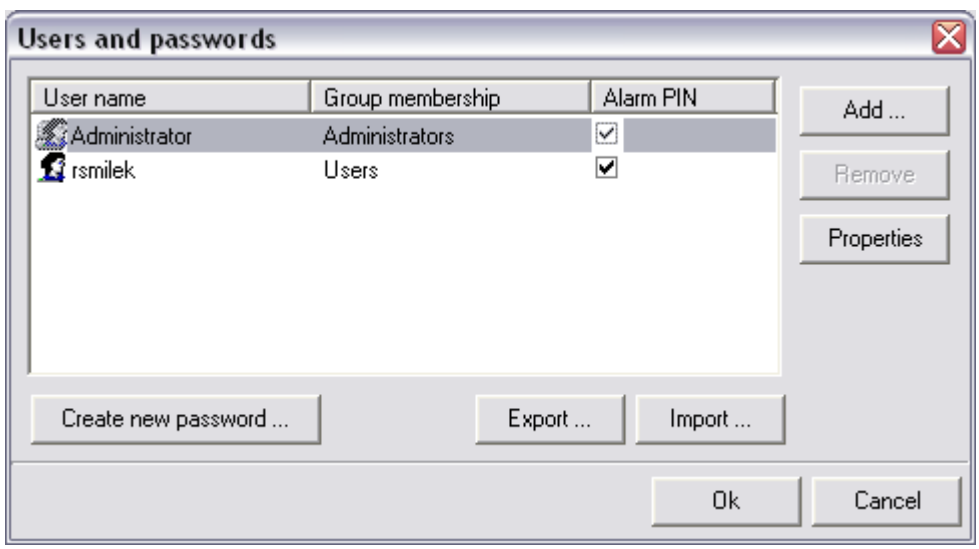


Figure 4 Dialog for editing of „Users and passwords“ stored in data logger

Manual update of “Update users and passwords in data logger“ from menu Configuration is disabled in this mode.

„HW protected functions“ of program are configuration functions for data logger. Access rights of client are defined in its user account. There are the following functions:

- „Download of record, erasing of memory, reset of counter inputs“

„Data logger setting“ – item from menu Configuration.

- „Alarm confirmation by PIN“ – PIN client for alarm cancel from keyboard of data logger or from program by selection of item „Deactivate internal acoustics or ALARM OUT signalization“ from menu Configuration. The necessity to enter PIN is defined by selection „PIN protection“ in setting of data logger at bookmark „Common setting“ in section „Confirmation of alarm signalization“

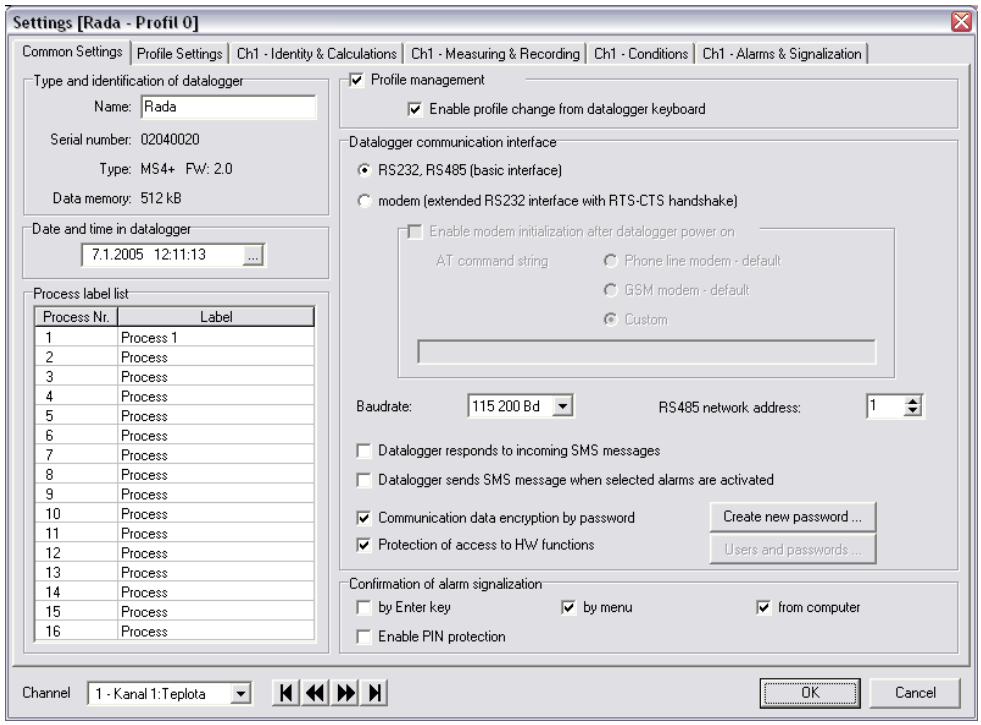
5. Administration of clients

From the above results the following:

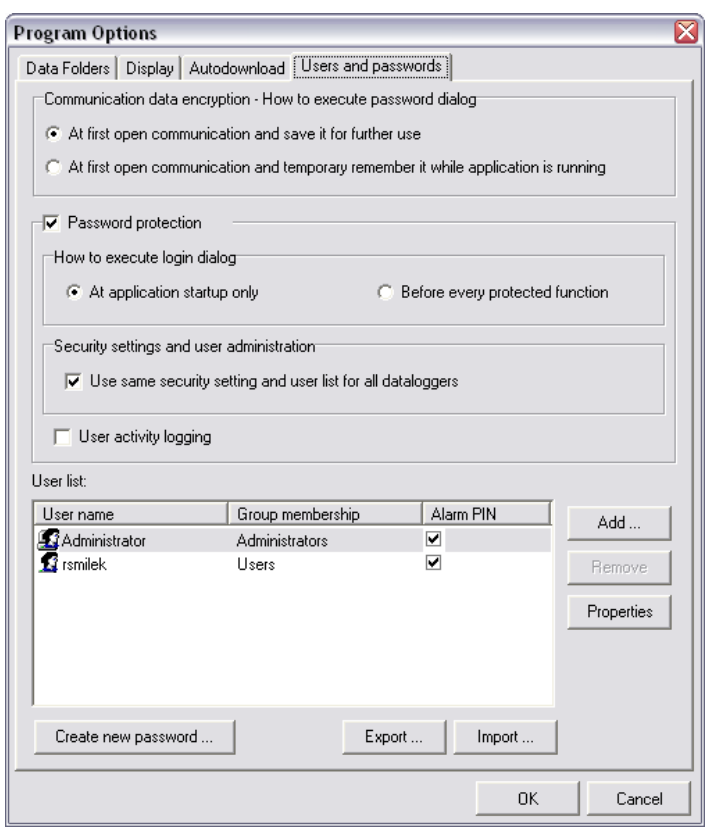
- Administration of clients and passwords in program is activated by selection „Password protection“ at bookmark „Users and passwords“ from menu program.
- Define available clients and theirs parameters in section „User list“ an the same bookmark - see paragraph 2 Administration of client. Editing of „User list“ is enabled only to client with rights of administrator.
- Critical for work on administration of clients is the selection of its mode, thus „Use same security setting and user list for all data loggers“ in section „Security setting and user administration“ at the same bookmark, see paragraph 4 Protection against illegal access to setting of data logger and limitation configuration of capability in accordance with setting of user rights.
  Note, there will be always two lists of clients - one stored in program and one stored in data logger.
  Selection mode „Use same security setting and user list for all data loggers“ determines the way to create and administer the client list in data logger.
  If this mode is active then program defines client list stored in data logger based on list of clients stored in program, i.e. as „User list“ at bookmark „Users and passwords“ in program options. ***Then program user is responsible*** for client list update in data logger by confirmation of the dialog from figure 2 or manually by selection “Update users and passwords in data logger“ from menu Configuration. Thus „Users and passwords“ button in section „Data logger communication interface“ becomes inactive in setting of data logger, see appendix 2.
  With favor it is possible to use this mode in smaller monitoring systems i.e. one control computer and several data loggers with maximum of 16 clients.

  If this mode inactive, then list of clients stored in program is independent from list of clients stored in data logger and program does not supervises its updating. List of clients stored in data logger is activated by selection „Protection of access to HW functions“ then defines in dialog under „Users and passwords“ button in setting of data logger, see appendix 1, figure 4.
  With favor it is possible to use this mode in larger monitoring systems i.e. several control computers and more networked data loggers with many clients. Here it is possible to divide clients to smaller groups (maximum of 15 clients) and define theirs access to data logger groups (by means of export and import of client list to the file) and at the same time to keep centralized administration by one administrator.
- Allowance of administration of clients requires allowance of encryption data in communication with data logger, see paragraph 1. Allowance of encryption must be specified before first storing of the client list to data logger.
- Deactivation of administration of clients is performed by switching off the selection „Password protection“ at bookmark „Users and passwords“ in program options, see appendix 2 and by switching off the selection „Protection of access to HW functions“ in section „Data logger communication interface“ in setting of data logger, see appendix 1.

Appendix:



Appendix 1 – Setting of data logger, bookmark Common setting



Appendix 2 – Program Options, bookmark Users and passwords