ISKRAEMECO Energy Measurement and Management

MT830/MT831

Industrial multi-function meter

Installation manual

Version 1.31, 3.10.2012

Contents

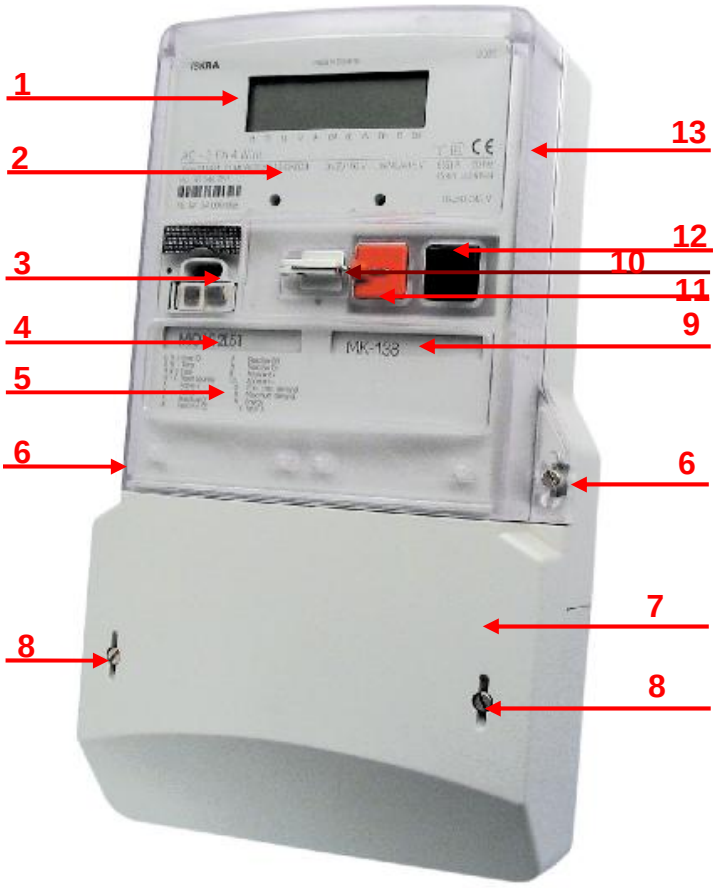
DOCUMENTATION
Technical and programming details on the MT830/MT831 meter can be found in:

- MT830-MT831_ENG V1,1.pdf: Technical description,
- MeterView 4: Users manual.

Note: MT83x meters comply with the current valid FNN instructions "Leitfaden zur Bewertung der Zuverlässigkeit und Messbeständigkeit von Elektrizitätszählern und Zusatzeinrichtungen" from november 2011 and can be installed in photovoltaic and cogeneration systems.

WARNING!
The meter installation must be performed by authorized persons, who are familiar with security against electric current stroke. Feed-through terminals and auxiliary terminals are under voltage that can be lethal!

1. Meter parts



1. LCD display
2. Meter technical data
3. IR optical interface
4. Input/output module mark
5. Legend of displaying registers on LCD
6. Meter cover sealing screw
7. Terminal cover
8. Terminal cover sealing screw
9. Communication module mark
10. RESET key blocking element
11. RESET key
12. DISPLAY key
13. Impulse diode – active and reactive energy
14. Meter cover

Fig. 1: Meter parts

Meter and fixing dimensions comply with the DIN 43857 standard.

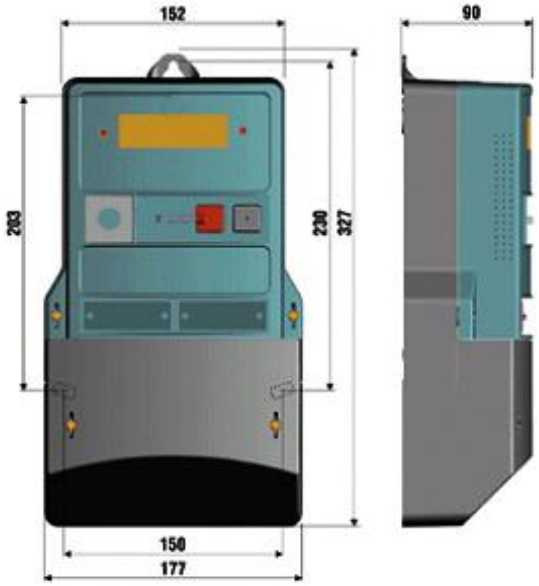


Fig. 2: Dimensions (MT831 meter)

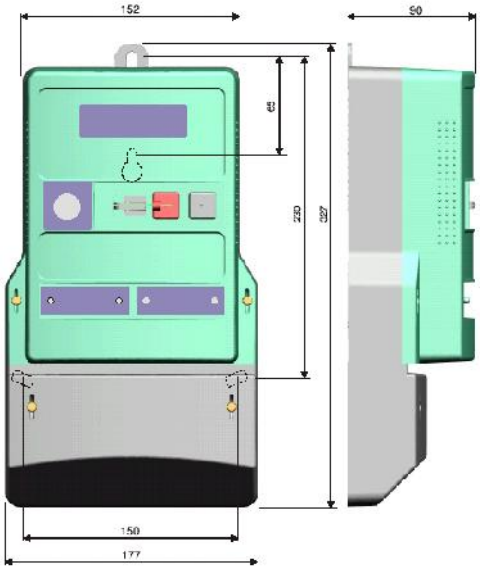


Fig. 3: *Dimensions (MT830 meter)*

A compact plastic casing is made of high quality self-extinguishable materials and is resistant to water and dust (IP53).

Meter terminals

MT830 meter

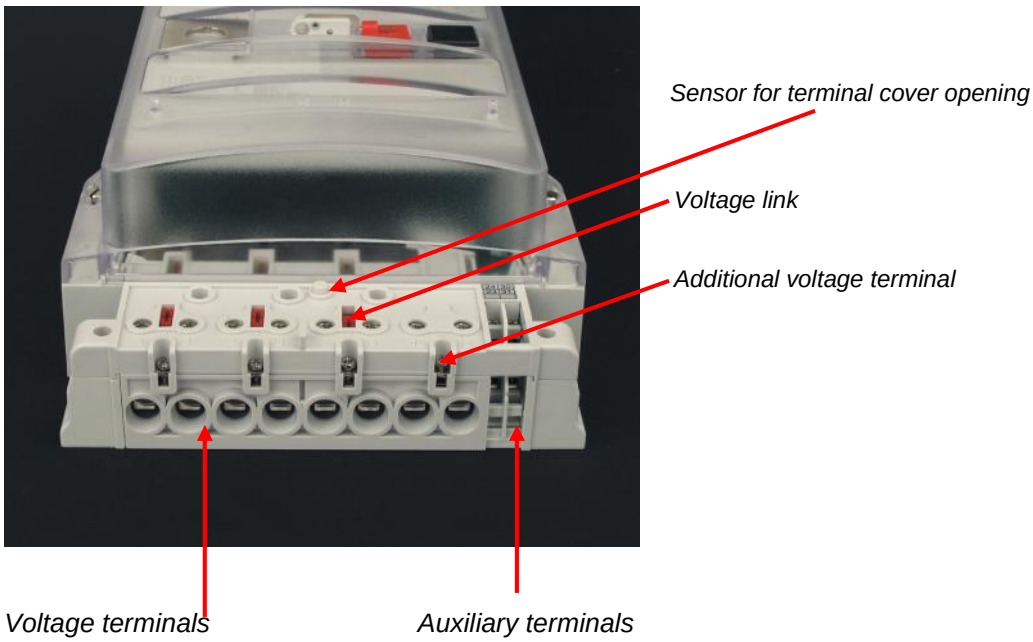


Fig.4: Terminal block – direct connected meter MT830

Closed – opened voltage link:

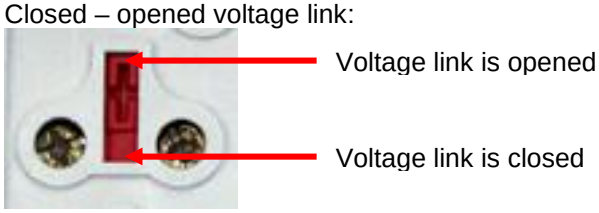


Fig. 5: Voltage link – direct connected meter

There are 6 auxiliary terminals on the meter basic board. They could be defined as inputs (max. 2), outputs (max. 4), communication (CS or RS-232 or RS-485) and external power supply.
To access terminal block remove terminal cover (8, Fig. 1: Meter parts), fixed with two screws (9). Seals from screws must be removed.

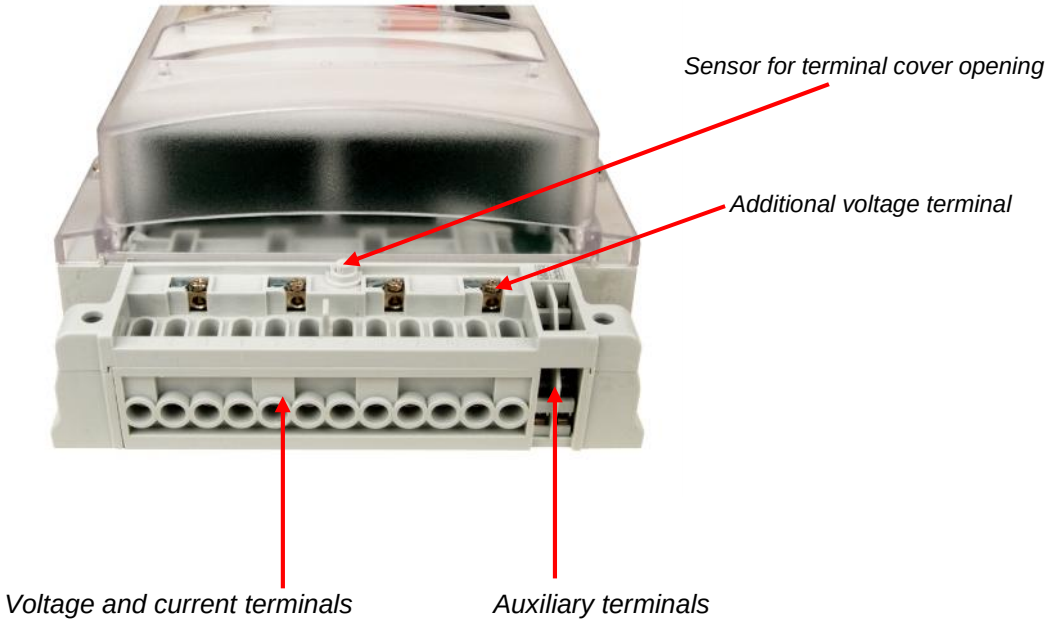


Fig. 6: Terminal block – indirect connected meter MT830

MT831 meter (with input/output and communication module)
There are 6 auxiliary terminals on the meter basic board. They could be defind as inputs (max. 2) and external power supply. Additional inputs and outputs are located in the module.

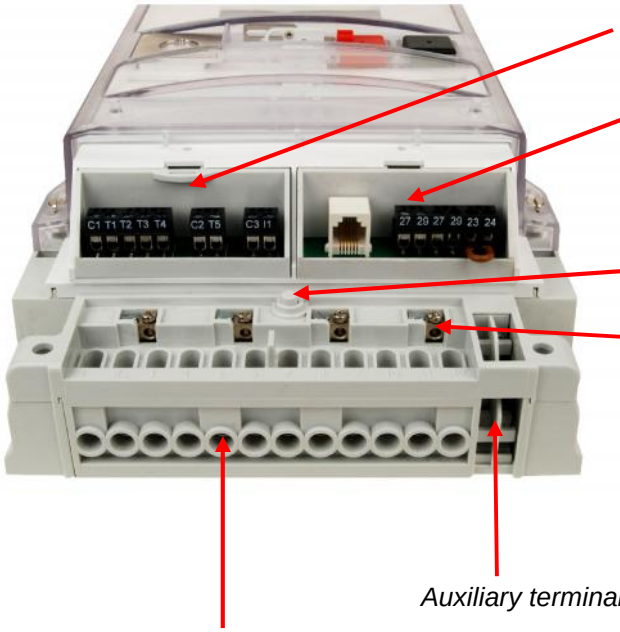


Fig. 7: Terminal block – indirect connected meter MT831

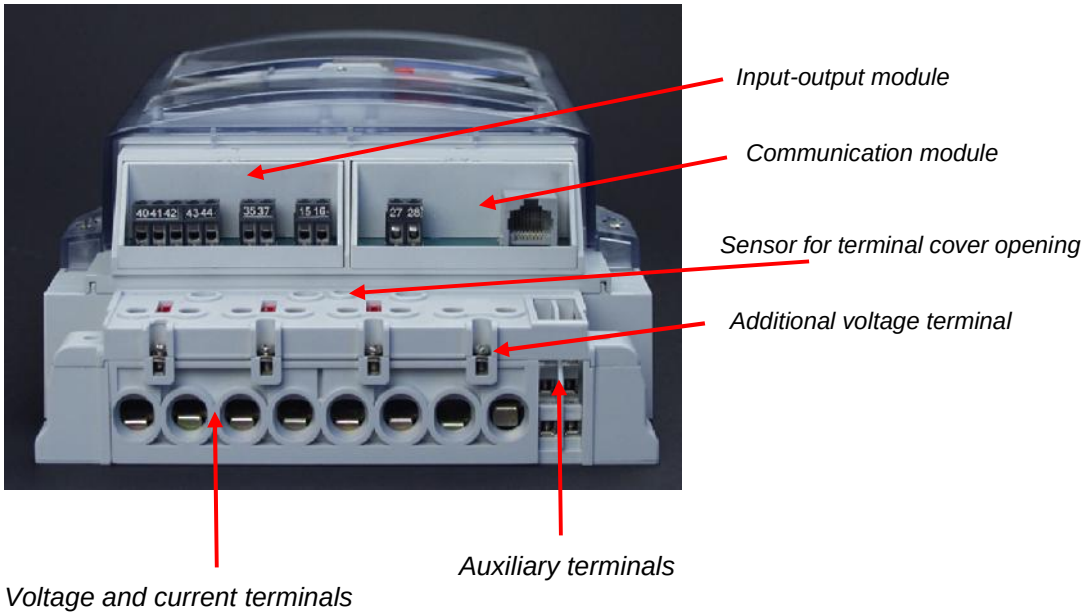


Fig. 8: Terminal block – direct connected meter MT831

Input – Output modules

Regarding the module programming, two versions exists:

- “Factory preprogrammed” modules: terminal function is burned in the module memory, meter automatically acccept the module setting, terminals are denotated according to the VDEW denotation, modules could be reprogrammed only in the factory or with special factory tool – Module Programmator
- “Empty” modules: modules are programmed as empty, terminal function is defined by meter parameters – meter defines the terminal function, terminals are denotated as T1, .. Tn for outputs and I1, In for inputs

When moudule is inserted into the meter, cursor IM must be ON. If it blinks, module is not programmed properly or it is not programmed at all. Module must be sent back to the factory.

Connection diagram for modules is printed on the module itself and on the label, on the bottom side of the terminal cover.
Definition of input terminals – factory programmed input – output module (function is define in the module)

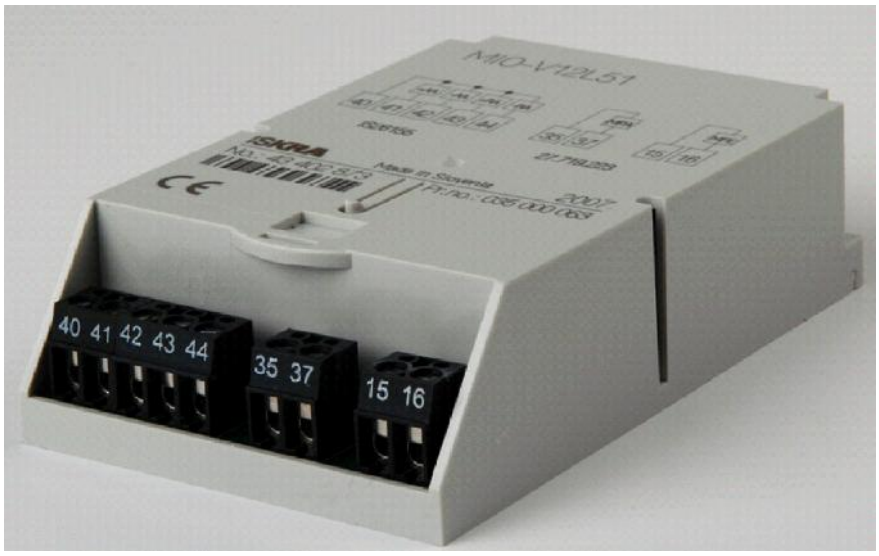


Fig. 9: Factory programmed input -output module

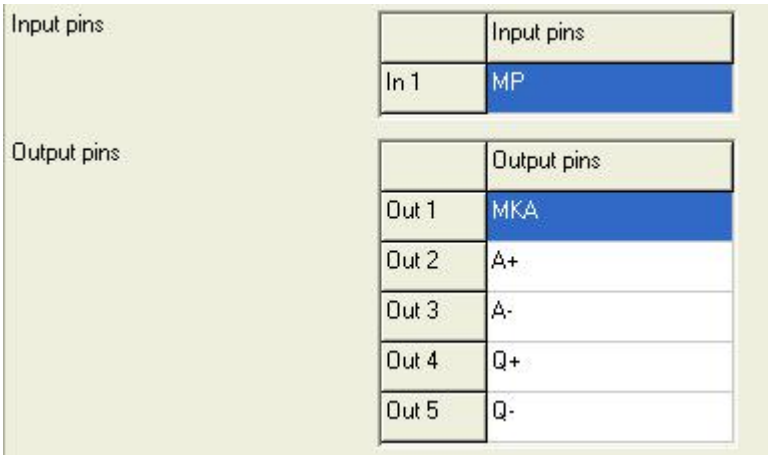
Terminal	Terminal designation	Additional explanation
15	COM	Common terminal for functional inputs
13, 33	TE1/2, TE3/4	Energy tariff input T1 – T4
14, 34	ME1/2, ME3/4	Demand tariff input M1 – M4
16	MPE	External time/measurement period synchronization input
17	MZE	External input for disabling of demand measurement
18	MREa	Input a for external billing reset
19	MREb	Input b for external billing reset
35	COM	Common terminal
36	MKA	Alarm output
37	MPA	Measurement period output
38	ERA+A	Energy flow direction +A
39	ERA+R	Energy flow direction +R
40	COM	Common terminal
41	+AA	Pulse output +A
42	-AA	Pulse output -A
43	+RA	Pulse output +R
44	-RA	Pulse output -R
45	RA1	Pulse output RA1
46	RA2	Pulse output RA2
47	RA3	Pulse output RA3
48	RA4	Pulse output RA4
65	COM	Common terminal
61, 63	TA1/2, TA3/4	Demand tariff outputs T1 – T4
62, 64	MA1/2, MA3/4	Demand tariff outputs M1 – M4
67	MZA	Output for disabled max. demand measurement
68	MRAa	Output for external billing reset a
69	MRAb	Output for external billing reset b

Definition of input terminals – non-programmed input – output module (function is defined by the parameters in the meter)

Fig. 10: Default »non-programmed« input -output module

Terminal	Additional explanation
C1, C2, C3	Common terminal for functional inputs or outputs
I1, I1, I3, I4	Input terminals
T1, …, T8	Output terminals

Function of input (output) terminal is written on the meter connection diagram (sticked on the bottom terminal cover side). It could be also read out with the MeterView program:



Module designation	
MIO-V12L51	1 x input, 4 x OPTOMOS outputs, 1 x OPTOMOS output
MIO-V42L81	4 x input, 4 x OPTOMOS outputs, 4 x OPTOMOS output
MIO-V12L41B11	1 x input, 4 x OPTOMOS outputs, 1 x bistable 5A relay output

Definition of external power supply

Terminal	Terminal designation	Additional explanation
30	50 – 240 V AC/DC	External power supply
31	50 – 240 V AC/DC	External power supply

Communication modules

Regarding the module programming, two versions exists:

- “Factory preprogrammed” modules: communication parameters are burned in the module memory, meter automatically acccept the module setting, modules could be reprogrammed only in the factory or with special factory tool – Module Programmator
- “Empty” modules: modules are programmed as empty, communication parameters could be changed by meter parameters

When moudule is inserted into the meter, cursor CM must be ON. If it blinks, module is not programmed properly or it is not programmed at all. Module must be sent back to the factory.

Each module has two independend communication interfaces:

- primary
- secondary

“Passive” communication modules (modules without modem):

MK-2-3 → RS-232 & RS-485
MK-3-3 → RS-485 & RS-485
MK-1-3 → CS & RS-485

Module designation	Primary interface	Secondary interface
MK-2-3	RS-232	RS-485
MK-3-3	RS-485	RS-485
MK-1-3	Curent loop	RS-485

Primary and secondary communication interfaces are defined by the hardware in the module. Denotation expresess, which interface is primary and which is secondary.

Communication module MK-2-3 (RS-232 & RS-485) :

Primary interface (RS-232) Secondary interface (RS-485)

Meter enables simultaneously reading via the both interfaces at the same time. Secondary communication interface is shared with IR optical interface – when communication runs via optical probe, communication via interface in the module is not possible.

“Active” communication modules (modules with modem):

Module designation	Primary interface	Secondary interface
MK-f37 - 3	PSTN modem +CS+RS-485	RS-485
MK-f39 - 3	ISDN modem +CS+RS-485	RS-485
MK-f3a - 3	GSM/GPRS modem +CS+RS-485 – old version	RS-485
MK-f38a - 3	GSM/GPRS modem +CS+RS-485	RS-485
MK-3e - 3	Ethernet+RS-485	RS-485

Modules composed of primary interface (modem+CS+RS-485 – these two interfaces are intended for multidrop communication) and secondary RS-485 interface.
Meter enables simultaneously reading via the both interfaces at the same time. Secondary communication interface is shared with IR optical interface – when communication runs via optical probe, communication via interface in the module is not possible.

Fig. 12: Communication module

Note: ISKRAEMECO suggest, that primary communication channel on multi-drop meter is used for cascading.

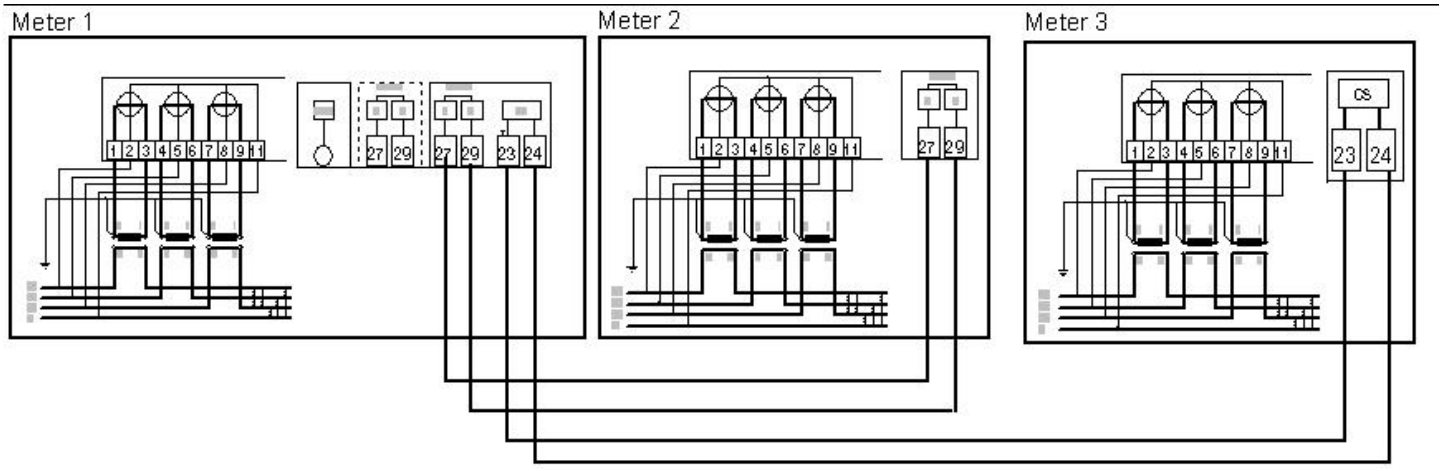


Fig. 13: Example of multidrop connectionwith MK-f38-3 communication module

Front plate

The following data is printed on the meter front plate:

- serial number,
- ownership number,
- type and version designation,
- accuracy,
- year of manufacturing,
- approval mark,
- rated voltage,
- rated and maximum currents,
- rated frequency,
- LED and output pulse constants,
- software version,
- owner’s name or logo,
- bar code,
- code of connection diagram and program number.

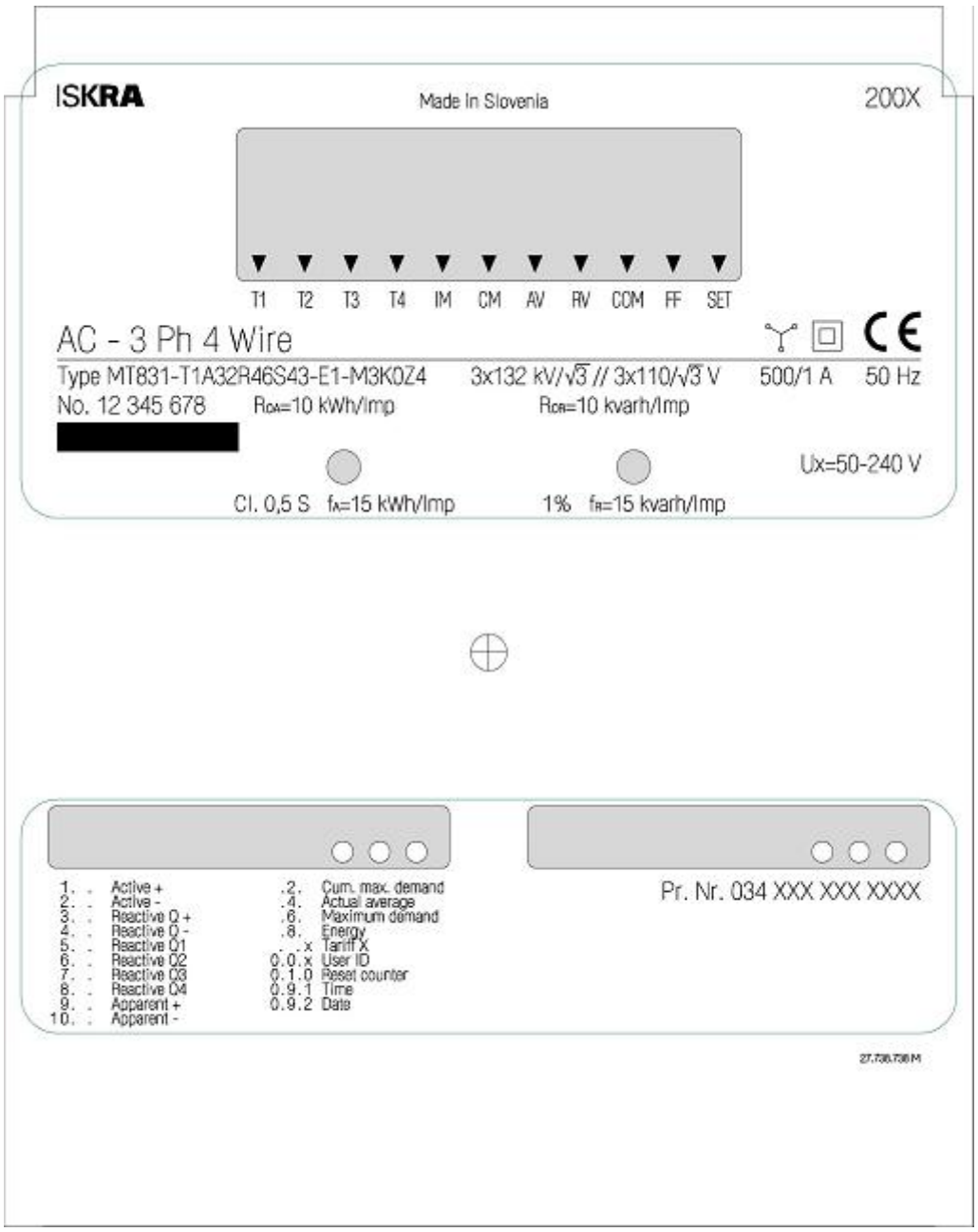


Fig. 14: Front plate (MT831)

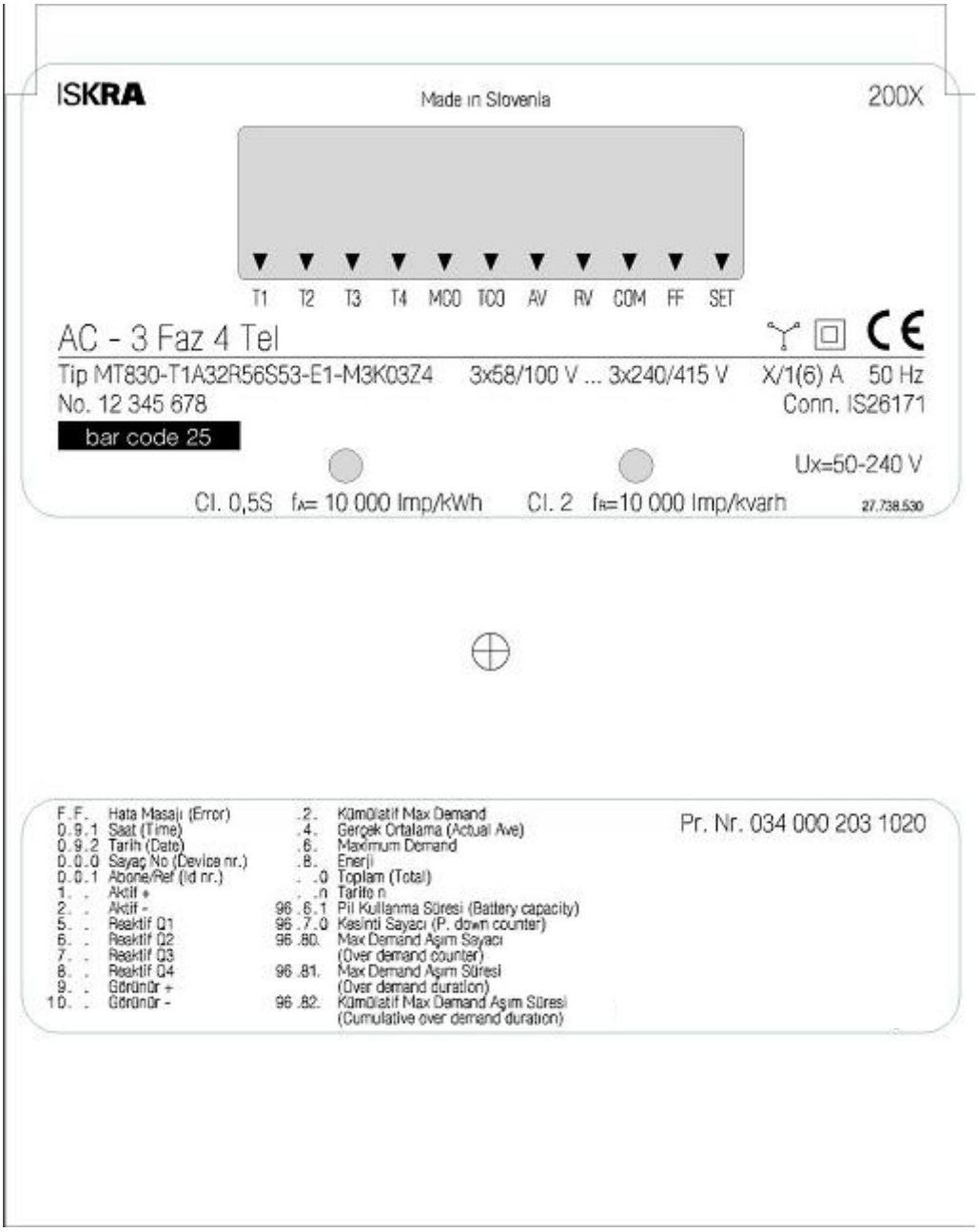


Fig. 15: Front plate (MT830)

Power supply

Meter could be supplied from:

- multi-range internal power supply from main voltages,
- external power supply (50-230 V AC/DC) – on request
- “no power reading option” with SONDA 6 - on request

Fig. 16: Optical-magnetic interface, Iskraemeco SONDA 6, connected to portable computer

“No power reading” – meter is powered via SONDA 6 optical interface. SONDA 6 could be connected to the portable computer – in such case is possible to read meter manually via LCE or reading and programming (parameters and time setting) with MeterView.
SONDA 6 could also be powered via soecial battery pack. In such case it is possible to read meter only manually via LCD.

Fig. 17: Optical-magnetic interface, Iskraemeco SONDA 6, connected tospecial battery pack

2. Installation

To install meter follow next steps:

1 - Adjust hook height to fit installation position of the meter. Sliding hanger enables installation for all fixing dimensions from 165 to 230 mm.

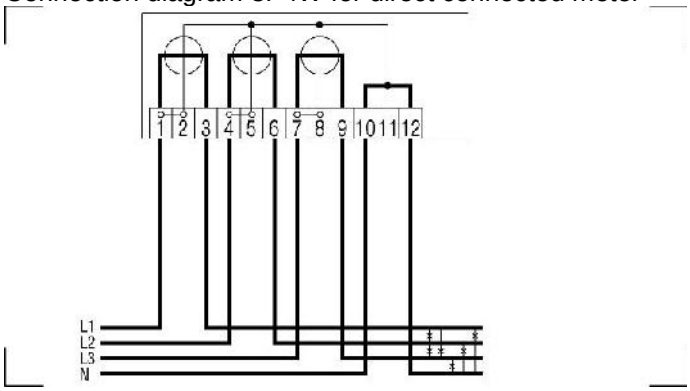
Fig. 18: Adjustable hook at meter back

2 - Fasten the meter to the measuring spot by three screws.

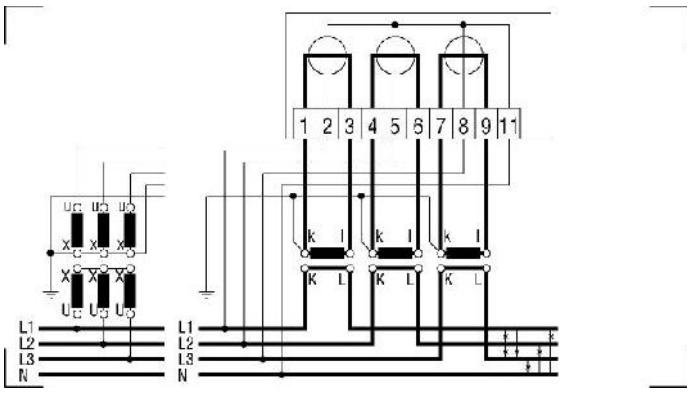
Fig. 19: Screw positions

3 - Connect measuring, input and output circuits and communication cables in conformity with the connection diagram stuck inside the terminal block cover on the meter and modules.

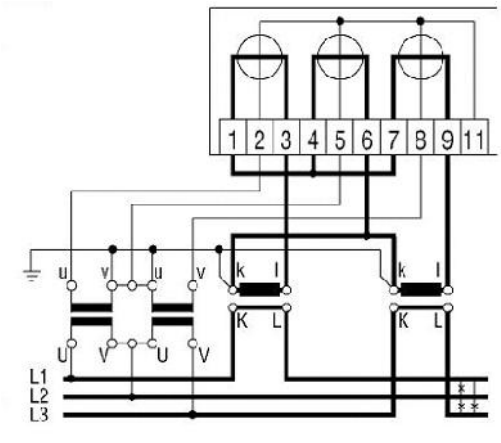
Connection diagram 3P4W for direct connected meter



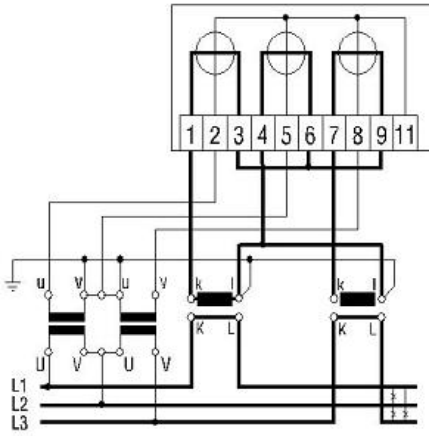
Connection diagram for indirect connected meter (3P4W connection, connection via current and (or) voltage transformer)



Connection diagram for indirect connected meter (3P3W connection – external Aaron, connection via current and voltage transformer)

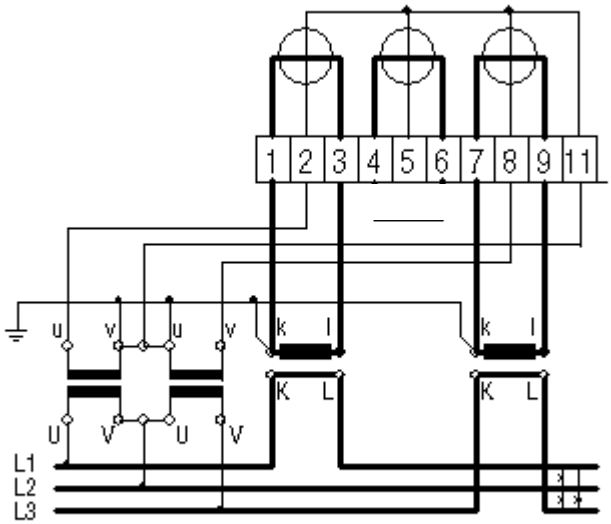


„k" current terminals are grounded



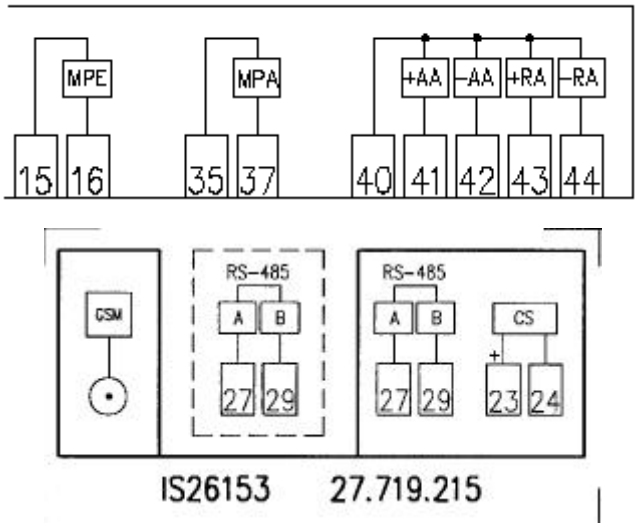
„l" current terminals are grounded

Connection diagram for indirect connected meter (3P3W connection, connection via current and voltage transformer)



Note: Such connection could be used only for maximal nominal voltage 3x100V … 3x230V and with implemented vector registration only!

4. Connect inputs, outputs and communication interfaces.

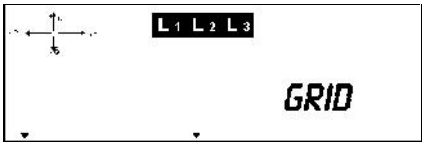


5. Install the terminal block cover and fasten it by two screws. Seal the terminal block cover screws by wire and seal.

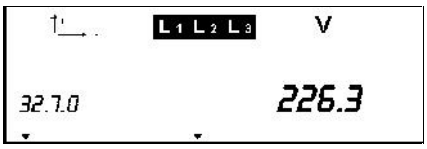
6. If reset key has to be locked, hang up the overhang and lock it up. The overhang hole diameter is 5 mm.

7. Power-up the meter. By connecting to the voltage the light emitting diodes illuminate. After 3s measuring data from the auto-scroll sequence are cyclically shown on the display.

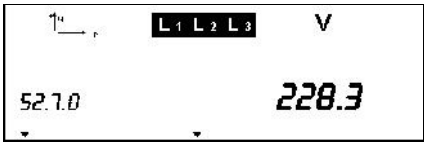
8. Select GRID menu on the meter LCD and check phase voltages, currents, frequency and phase angles:



Menu “GRID”

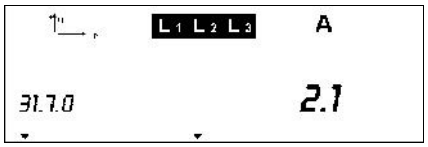


32.7.0 — Voltage - phase L1 226.3 V

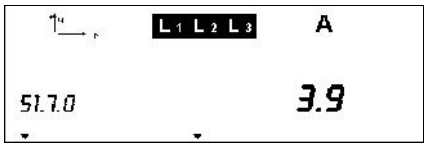


52.7.0 — Voltage - phase L2. 228.3 V

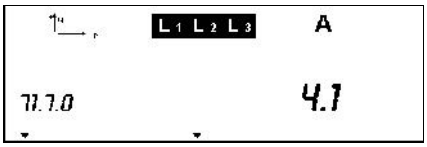
72.7.0 — Voltage - phase L3. 229.7 V



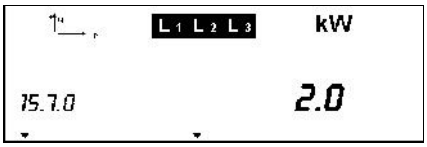
31.7.0 Current - phase L1.
2.1 A



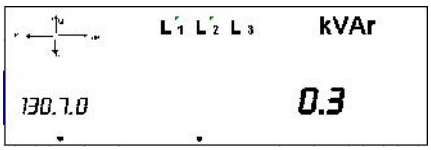
51.7.0 Current - phase L2.
3.9 A



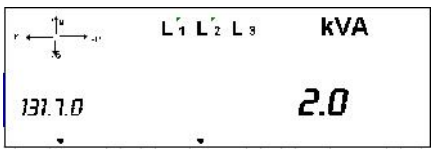
71.7.0 Current - phase L3.
4.1 A



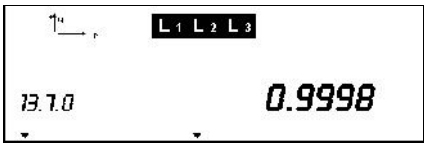
15.7.0 Three phase instantaneous active power (abs(QI+QIV) + (abs(QII+QIII))
2.0 kW



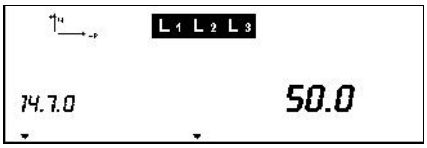
130.7.0 Three phase instantaneous reactive power (abs(QI+QIV) + (abs(QII+QIII))



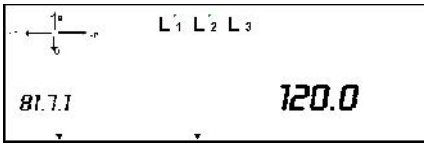
131.7.0 Three phase instantaneous apparent power (abs(QI+QIV) + (abs(QII+QIII))



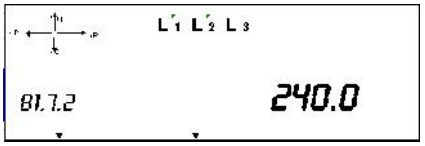
13.7.0 Three phsae instantaneous power factor
0.9998



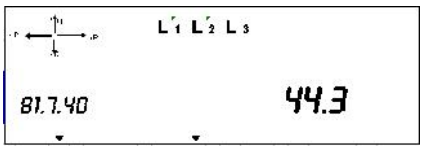
14.7.0 Frequency



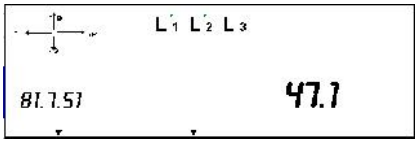
81.7.1 Phase angle between voltage R and voltage S



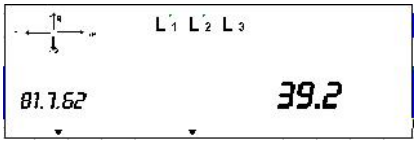
81.7.2 Phase angle between voltage R and voltage T



81.7.40 Phase angle between voltage R and current R



81.7.51 Phase angle between voltage S and current S



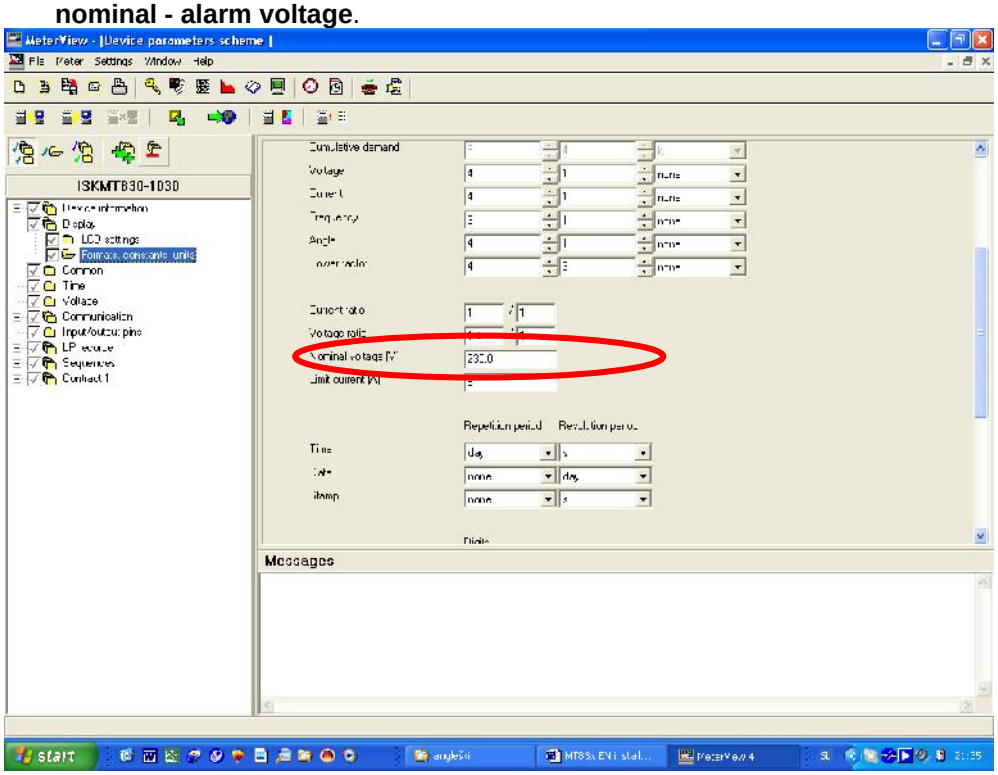
81.7.62 Phase angle between voltage T and current T

3. Checking the meter

Voltages

The meter enables detection and alarming of the presence of phase voltages. Presence of voltage and phase sequence is marked with L1L2L3 characters in the LCD.

- If all three symbols L1L2L3 are displayed, it means that all three phase voltages are present.
- If cursors **L1L2L3** are blinking, phase sequence is not correct (because of natural connection, the reactive energy is also properly measured).
- Any not displayed symbol (L1, L2 or L3) means certain phase voltage is not present ot lower than predifined value Un – 90%
- When one phase voltage is over or under the predefined limits, the AV status starts to blink. In such case check the **nominal - alarm voltage**.



Load

If no load or lower than the meter sensitivity threshold is connected to the meter, the light emitting diodes illuminate permanently, and the power flow direction symbols or quadrant respectively pulse.

If the load is higher than the meter sensitivity threshold, the light emitting diodes pulse with a frequency proportional to the load and the power flow direction symbols and quadrant are shown on the display.

Factory pulse constants settings (values are programmable):

- Direct connected meter
  - 3x230/400V, 5(60)A → 1.000 imp/kWh
  - 3x230/400V, 5(120)A → 500 imp/kWh

- Transformer connected meter
  - 3x57.7/100 …. 3x240/415V, 1(6)A → 10.000 imp/kWh
  - 3x57.7/100 …. 3x240/415V, 5(20)A → 2.000 imp/kWh

4. Meter handling

LCD display on the MT83x meters can present different several of data - menu. It serves by two buttons: **Data** (black key) and **Reset** (red key). Both keys are on the meter front. The reset key can be sealed separately from the meter cover, or a padlock could lock it.

Fig. 20: Meter buttons

Keys, depending on the sequence they were pressed in and how long we kept them pressed, could execute various actions. Such handling with the display, as well as the meter parameters programming is executed by one hand, signifying that no simultaneous pressing of several control elements is required.

The following commands can be executed:

Black key (Data)

- **Short press** ($t_{pressing}$ < 2 s) - we select the next value in the list or the next chapter in the menu
- **Long press** (2 s ≤ $t_{pressing}$ < 5 s) - activates the displayed chapter in the menu or it skips past months data readout
- **Extended press** ($t_{pressing}$ ≥ 5 s) - interrupts data readout in the selected chapter, and returns back to the AUTO display mode

Note: all specified time values are programmable!

Red key (Reset)

- **Short press** ($t_{pressing}$ < 2 s) - goes to next value (when time is setting with buttons), executes meter billing reset (MD reset) - (meter must be in AUTO display mode)
- **Long press** (2 s ≤ $t_{pressing}$ < 5 s) - factory SET mode

Pushbuttons perform next actions:

Activation time	Scroll (**black**)	Reset (**red**)
Short	Move to next	Next value,

	selection	Increase value, Billing reset
Long	Confirm selection	Confirm setting,
Extended	Meter returns back to “Auto” sequence	Factory SET mode

Table 1: Pushbutton actions

5. Display

LCD is designed according to the VDEW requirements.

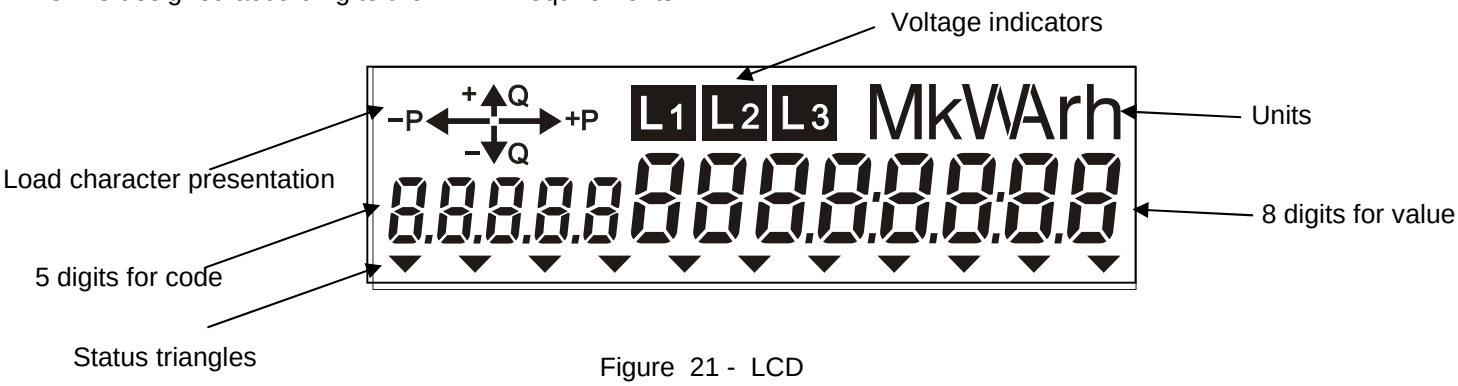


Figure 21 - LCD

The measuring data on an LCD are displayed with eight 7-segment 8 mm x 4 mm high numbers. Displayed data are identified with a five-digit OBIS identification codes (IEC 62056 – 61), 6 mm x 3 mm high numbers. Dimension of LCD (visible area) is 69 mm x 20 mm.

Meter operates in different display modes

- Automatic data circulation → **Auto mode**

Time between two register presentations on the LCD in “Auto” sequence is programmable. For registers identification only 5 digits is used → 9 register previous values could be presented on the LCD (in case, when all energies (demands): A+, A-… S+, S- is presented on the LCD).
Some commands in the meter could be performed only in **Auto mode:**

- billing reset

Additional modes are accessible by the black and red button.
Displaying modes accessible by the **black** one:

- Manual data display – registers → **Std data mode**
- Manual data display– **Load Profile mode** (P.01 and/or P.02 (programmable))
- Manual data display – network parameters (voltage, current, phase angle, ..) → **Grid mode**
- Presentation of the GSM modem parameters → **DiAg mode**

Displaying modes accessible by the **red** button:

- Manual setting of time, date, … → **SET mode**
- Registers presented in Auto mode with enhanced energy registers presentation → **TEST mode**
- Resetting the LCD statuses of meter and terminal cover opening → **Intrusion restart mode**

Format and data units are programmed. Transformer connected meters, displayed values could be presented as primary, semi-primary or secondary values (presentation of line voltage and current are secondary by default).
Besides measuring data, the energy flow direction, presence of phase voltages, display of individual events, meter statuses and alarms can be displayed.

Meters have back-light illumination for easy data reading at metering place with bad light condition. The LCD is illuminated when any pushbutton is pressed. The illumination is switched-off after 3 minutes, if no pushbutton was pressed at that time (illumination time is programmable).

Explanation of the statuses, presented on the LCD:

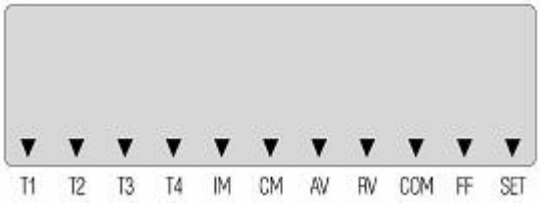


Fig. 22: Meter statuses presented on the LCD

Status **ON**:

T1 – T4	Tariff for energy
M1 – M4	Tariff for demand
IM	Input/output module recognized correctly
CM	Communication module recognized correctly
RV	Reverse flow
COM	Reading of the data via communication
SET	Meter in SET mode
MCO	Meter cover opening
TCO	Terminal cover opening

Status **BLINKING**:

IM	Input/output module is NOT recognized correctly (module is not programmed correctly)
CM	Communication module is NOT recognized correctly (module is not programmed correctly)
AV	Alarm voltage
FF	Fatal error
SET	Meter in TEST mode

Note: the meaning of each status is programmable and defined according to the customer wish!

2.4.2 Power flow direction and quadrant indicator

The active energy flow direction graphic symbol and the reactive energy quadrant are displayed in the left upper angle.

Symbol	Power flow direction and quadrant
ì	Active energy reception (A+)
ê	Active energy transmission (A-)
ë ì **Q1**	Active energy reception (A+) Reactive energy 1st quadrant (Q1)
ê ë **Q2**	Active energy transmission (A-) Reactive energy 2nd quadrant (Q2)
ê í **Q3**	Active energy reception (A+) Reactive energy 3rd quadrant (Q3)
í ì **Q4**	Active energy transmission (A-) Reactive energy 4th quadrant (Q4)
Q1, Q4	Two phases in Q1, one phase in Q4

The displayed symbol shows the active energy flow direction and the reactive energy quadrant. The pulsing symbols show that the load is lower than the meter sensitivity threshold or the load does not exist at all. At the same time, the meter calibration light emitting diodes illuminate without interruption.

Load character can be detected from the arrows indicator; exact values are possible to read from GRID menu.

Note: We don't need any additional equipment to define is meter connected properly or not.

2.4.3 Phase voltages indicator

The phase voltages indicator shows whether each individual phase voltage is present or not.

L1 L2 L3

If all three symbols (**L1**, **L2** and **L3**) are displayed, it means that all three phase voltages are present. Any not displayed symbol (**L1**, **L2** or **L3**) shows this phase voltage failure. If symbols **L1 L2 L3** pulse, it means a wrong phase sequence. In this case it is required to change the cables phase sequence. The phase sequence does not impact on measurement and registration of the active and reactive energy.

Phase L3 is not present

Wrong phase sequence

Display is able to show data automatically or manually with using black button on the top of device. Changing between different groups of data, shown on a display, is realised by pressing this button for short period. Groups, shown on display are: Std data, P.01, Grid, Diag.

Display test

We perform the display test to ascertain whether all segments of the display function. All segments are switched ON by once pressing the black key (Data) in the AUTO display mode.

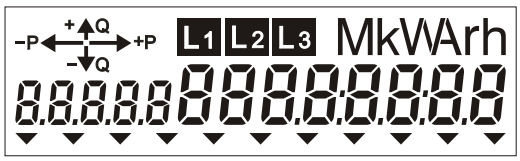


Fig. 23: LCD test activated by one pressing of black button in Auto mode

In the AUTO mode, the display is not illuminated in order to reduce power consumption of the meter. For illumination of the display, press the black key (data) and keep it pressed for less than 2 seconds. The display will remain illuminated for three minutes, unless in the meantime some other key is pressed.

6. Display handling

Display is able to show data automatically or manually with using black butto. Changing between different groups of data, shown on a display, is realised by pressing this button for short period. Groups, shown on display are: Std data, P.01, Grid, Diag.

- **Short press** ($t_{pressing}$ < 2 s)
- **Long press** (2 s ≤ $t_{pressing}$ < 5 s)
- **Extended press** ($t_{pressing}$ ≥ 5 s)

Basic handling with the meter and data readout

Basic handlings with the meter and data readout are shown in the following diagrams of progress.

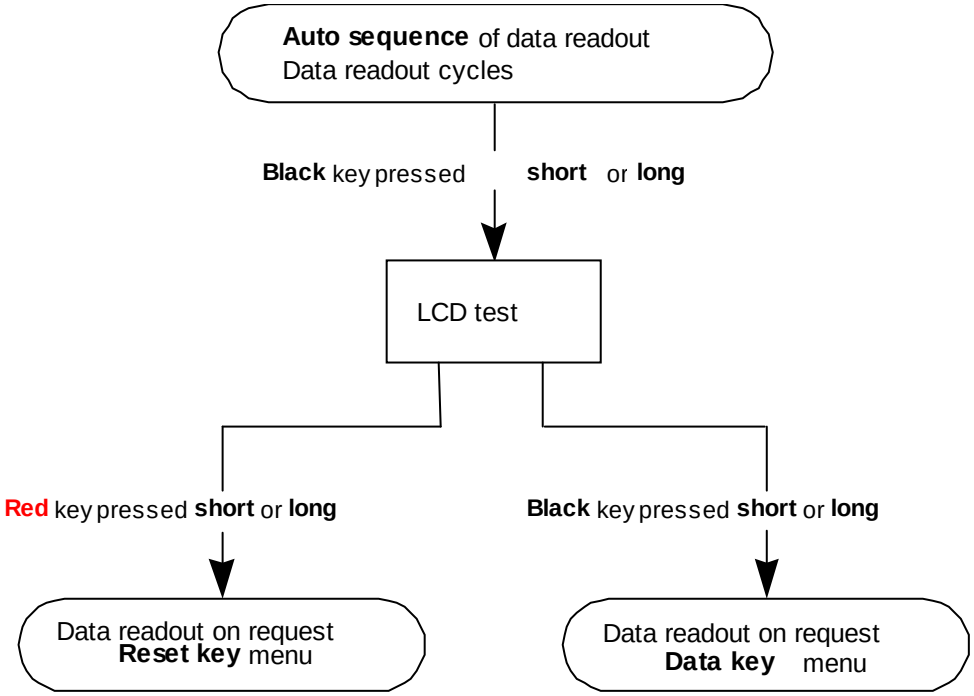


Figure 24: Diagram of data readout mode changing progress

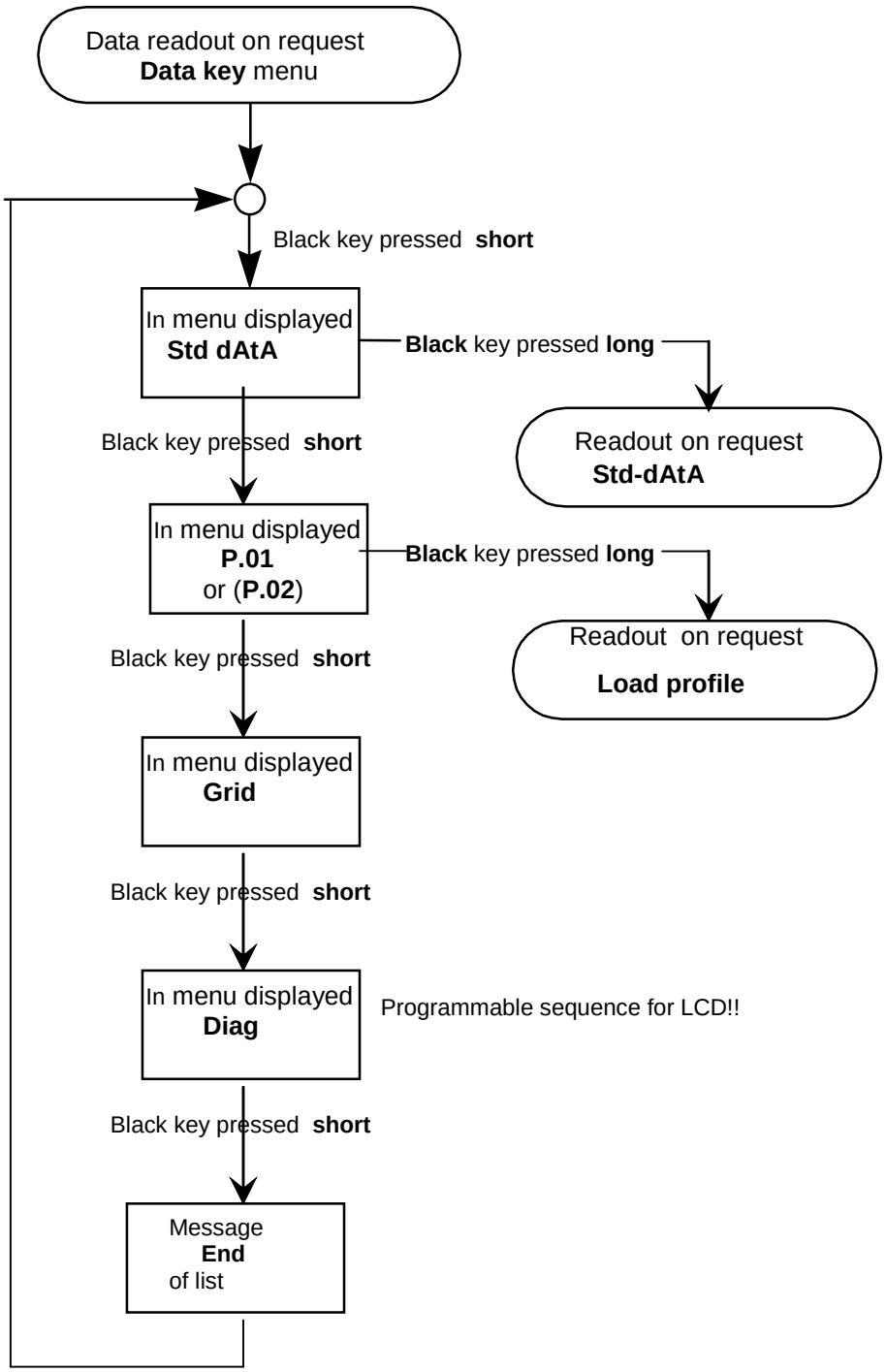


Figure 25: Diagram of data lists selection progress in the Data key menu

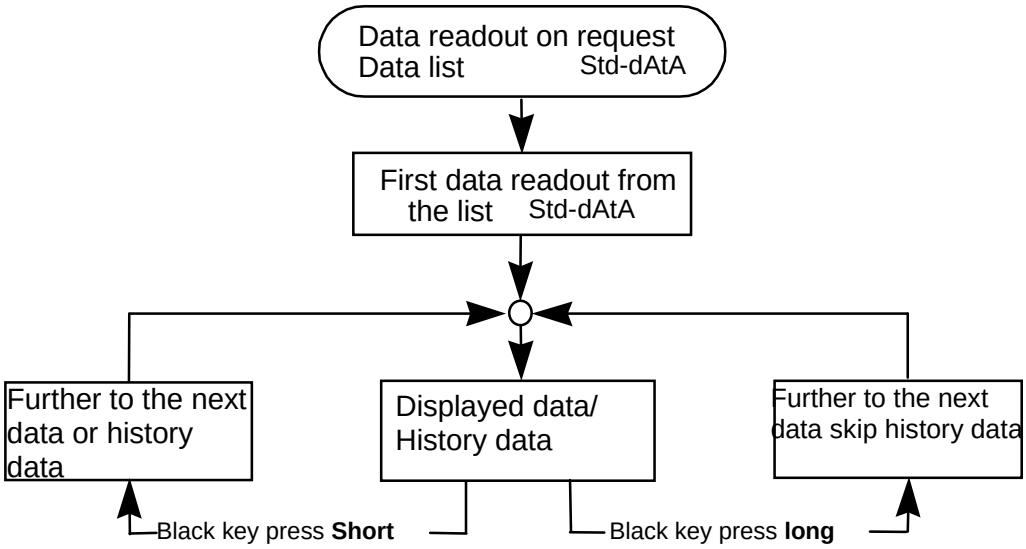


Figure 26: Diagram of data readout progress from the Standard data list

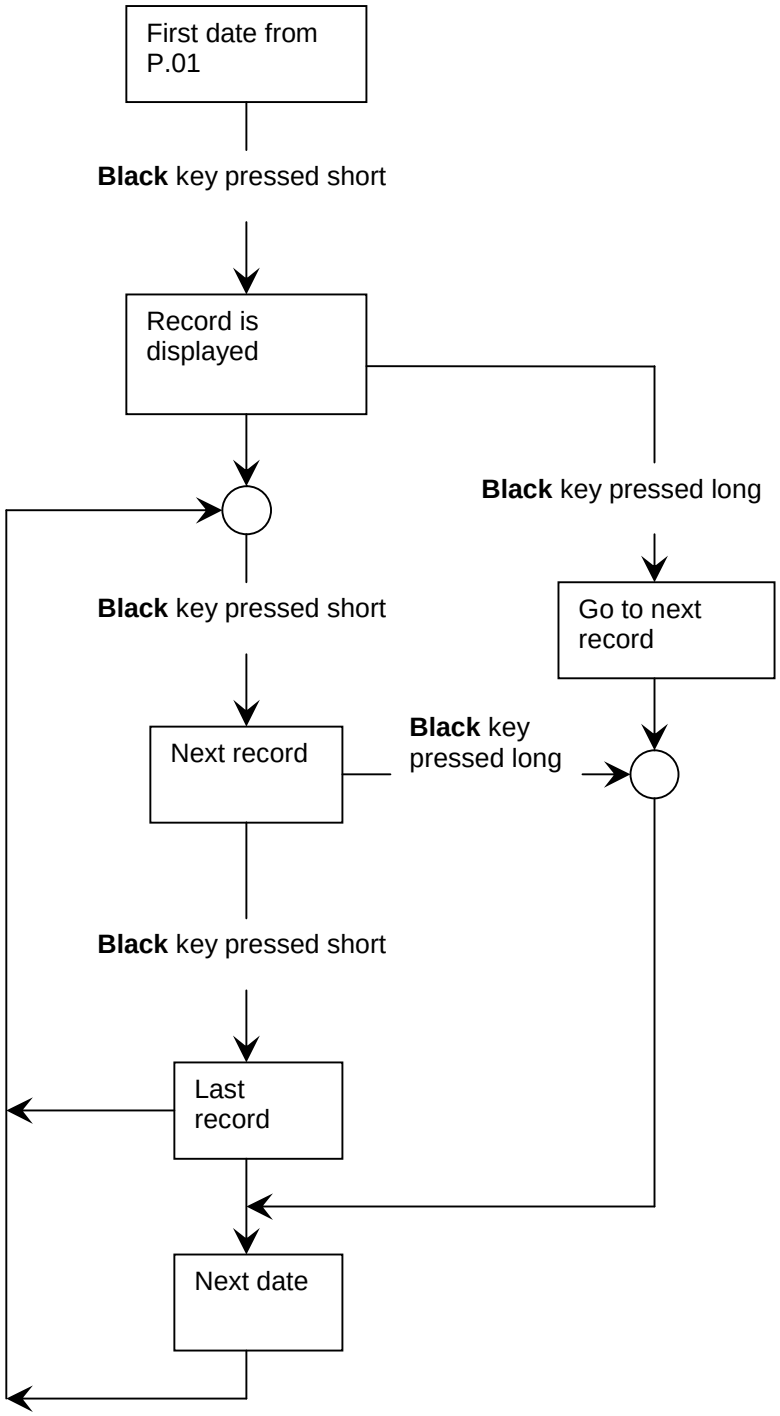


Figure 27: Diagram of data readout progress from the Load-profile list

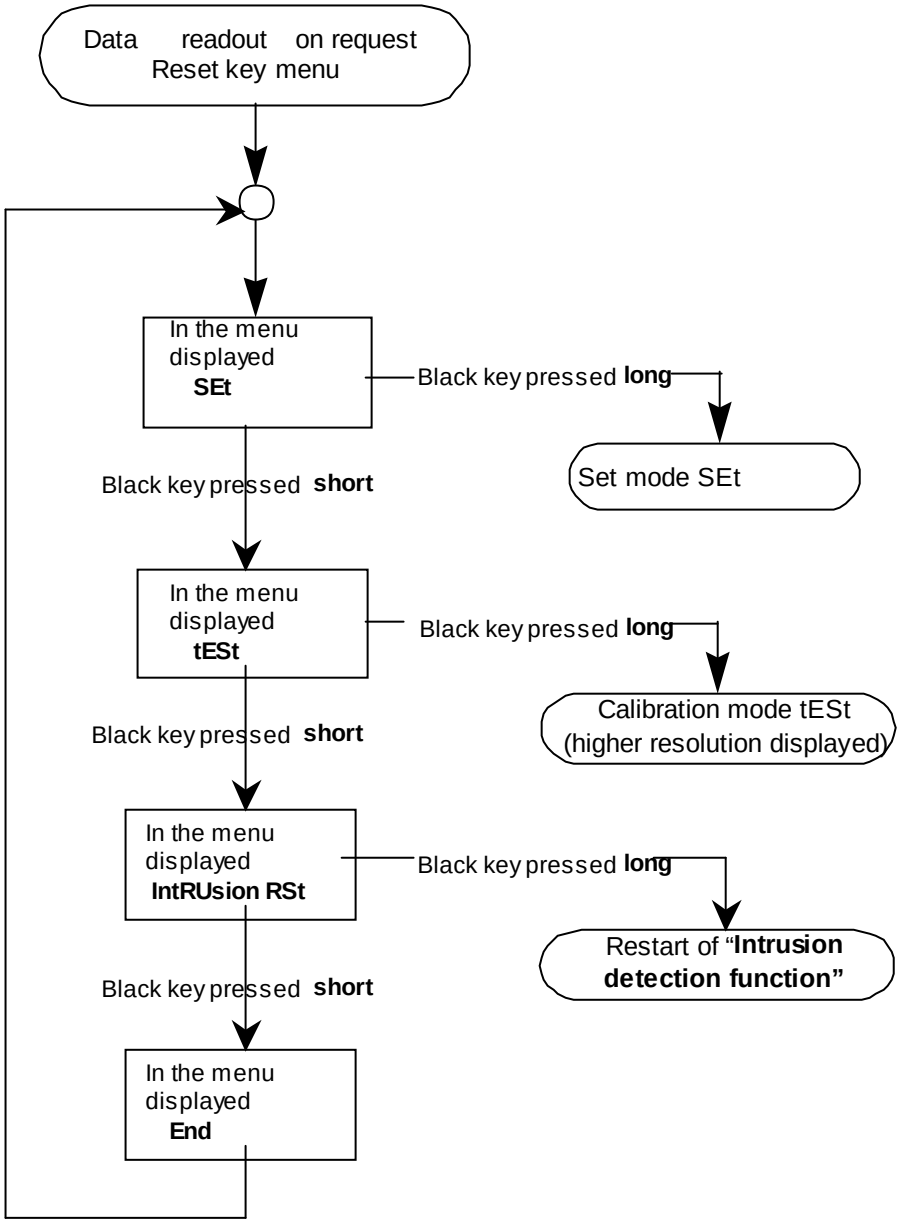


Figure 28: Diagram of options selection progress in the Reset key menu

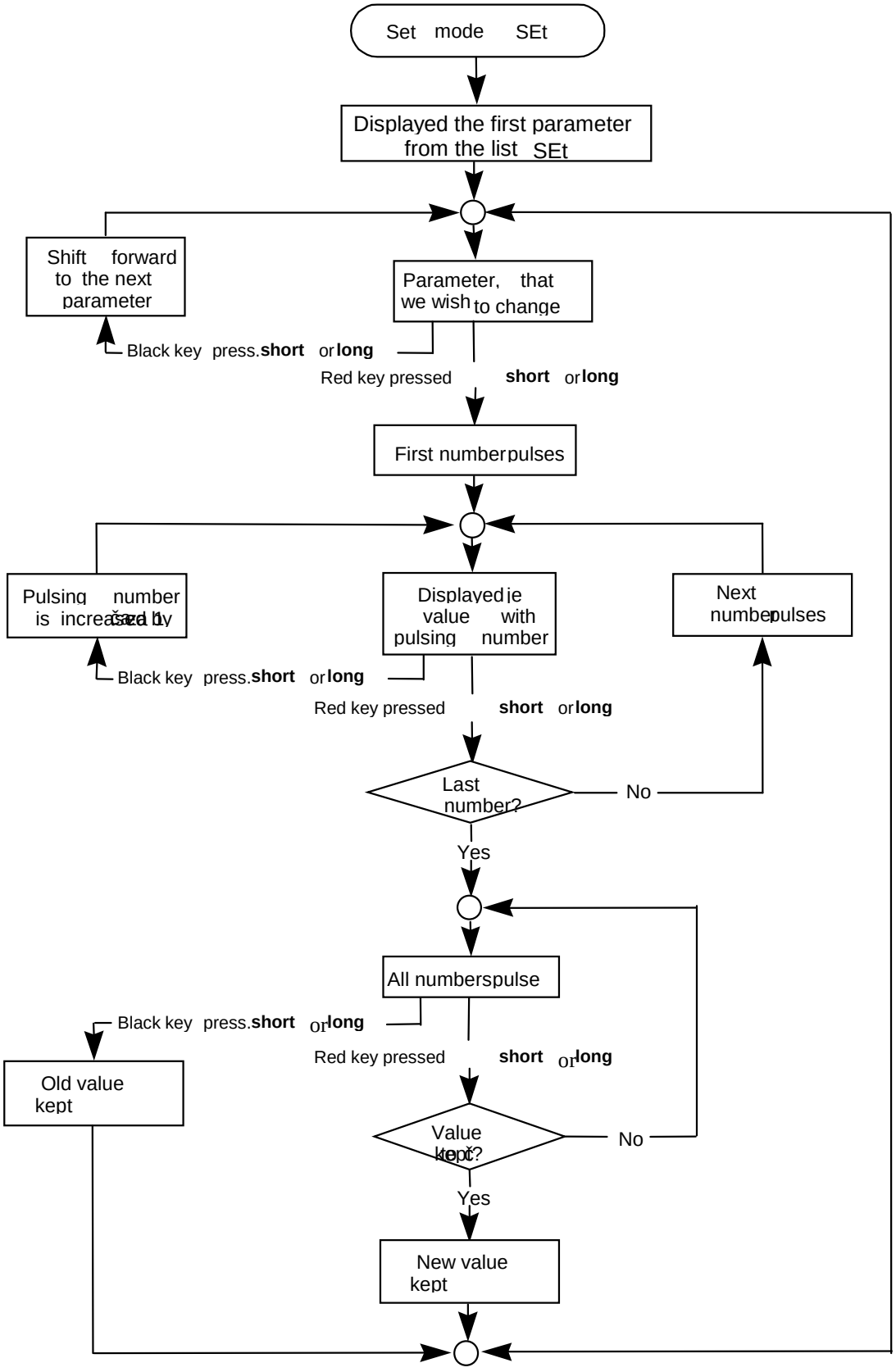


Figure 29: Diagram of parameters setting progress by keys in the Set mode

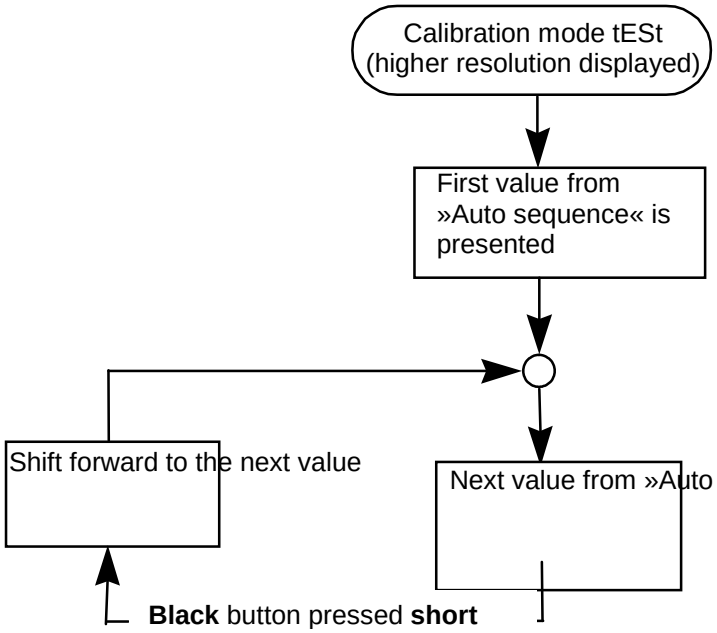
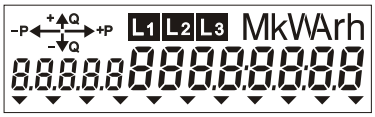


Figure 30: Diagram of progress in the Test calibration mode

Menus on the display

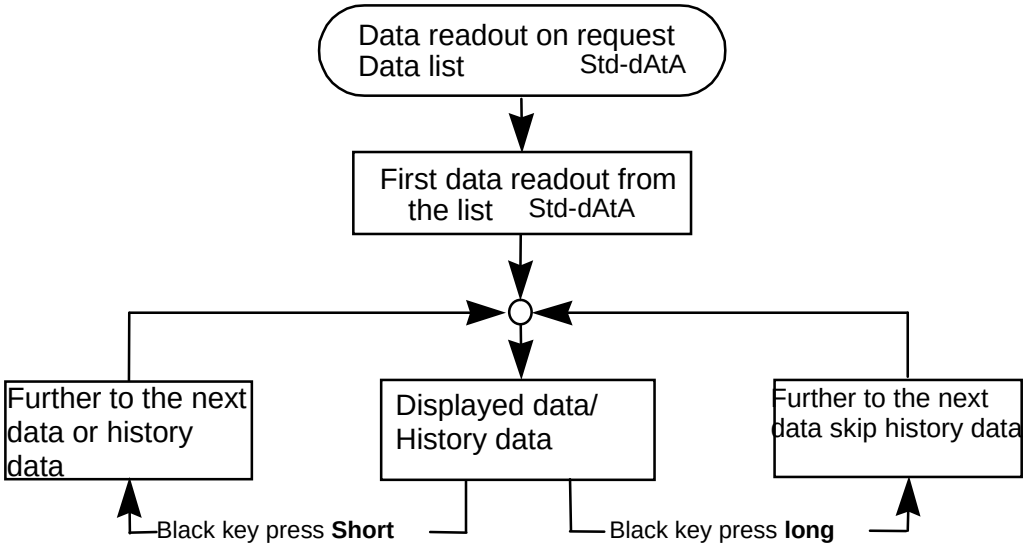
6.1.1 Auto menu and Std dAtA display

When the meter is connected to the network voltage, LCD test appears on the LCD.



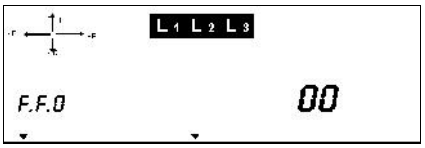
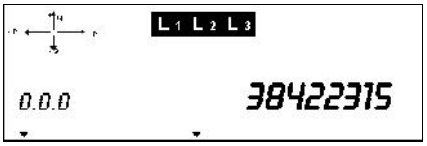
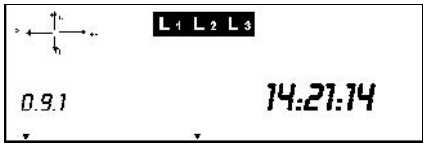
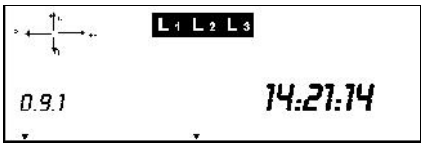
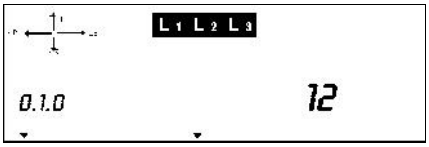
LCD test

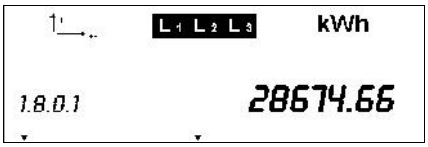
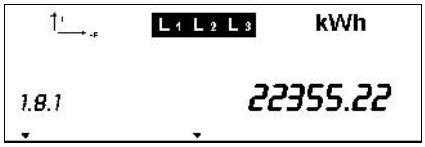
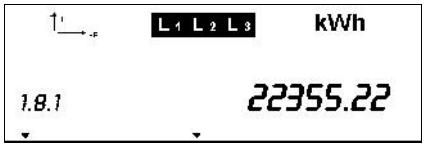
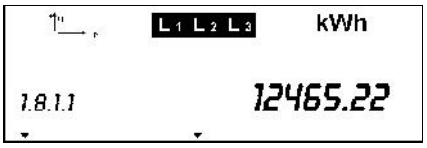
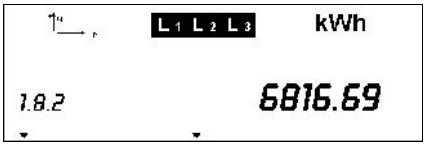
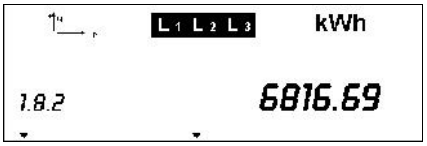
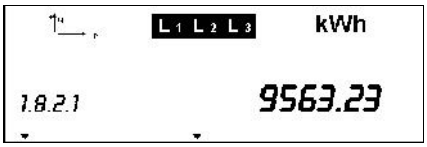
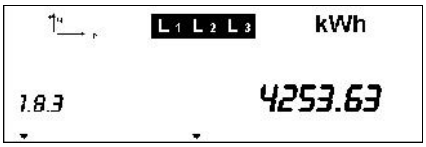
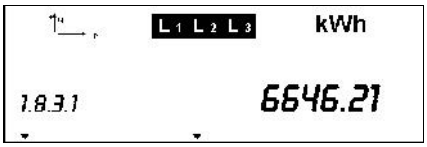
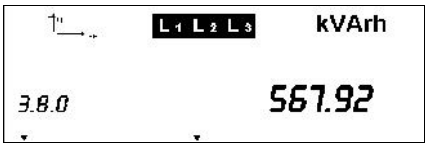
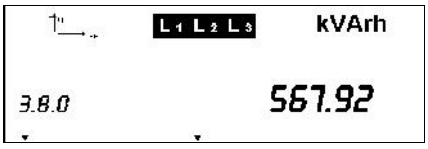
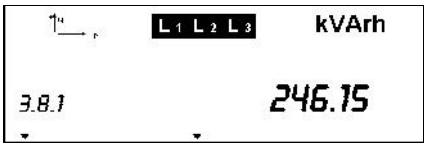
After that, the readout shows data from the AUTO collection. Data to be displayed in the AUTO mode can be selected by a customer when ordering meters and could be entered (reprogrammed) during the process of meter (parameter) programming. Data are cyclically displayed on the screen in ten-second intervals (interval is programmable). In the AUTO mode, the display is not illuminated.

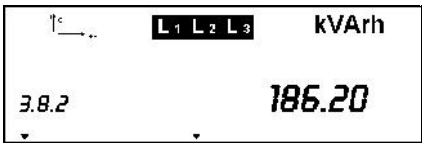


The list of data on request, Std-dAtA, contains registers defined by customer or standard factory setting. Data on request from the Std-dAtA list appear on the display until the black key is pressed (long press) or until the time equal to measurement period elapses. In order to allow the next value to appear, press the black key (data) again and keep it pressed for less than 2 seconds. OBIS (or special) code of history data records has on its right side an additional one (two)-digit number indicating the month for which the read out data is valid (1 - to the number indicating previous month, 2 - to the number indicating two months ago). In order to skip readout of history data records (measurement data for previous months) keep the black key pressed longer than 2 and less than 5 seconds. If the black key (data) is not pressed during the measurement period, the display returns to the AUTO mode.

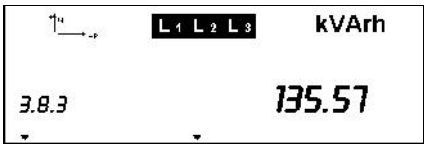
Note: register list, presented for Auto and Std dAtA mode is programmable

Auto mode	Std dAtA mode	Register	Explanation
		Menu “Std dAtA”	
		F.F.0	Fatal error (00 , no error)
		0.0.0	Device address (38422315)
		0.9.1	Time 14:21:14 (hours, minutes, seconds) Format: hh:mm:ss
		0.9.2	Date 7th , November 2007 (year, month , day) Format: yy-mm-dd or dd-mm-yy
		0.1.0	Reset numbers 12
		1.8.0	Active energy import (A+), total 33425.54 kWh

		1.8.0.1	Active energy import (A+), total – one months ago 28674.66 kWh
		1.8.1	Active energy import (A+), tariff T1 22355,22 kWh
		1.8.1.1	Active energy import (A+), tariff T1 - one month ago 12465,22 kWh
		1.8.2	Active energy import (A+), tariff T2 06816,69 kWh
		1.8.2.1	Active energy import (A+), tariff T2 – one months ago 09563,23 kWh
		1.8.3	Active energy import (A+), tariff T3. 04253.63 kWh
		1.8.3.1	Active energy import (A+), tariff T3 – one months ago 06646.21 kWh
		3.8.0	Reactive energy import (R+), total 00567,92 kVArh
		3.8.1	Reactive energy import (R+), tariff T1. 00246,15 kVArh

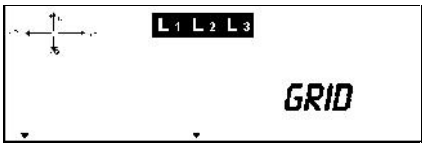


3.8.2 Reactive energy import (R+), tariff T2
00186,20 kVArh

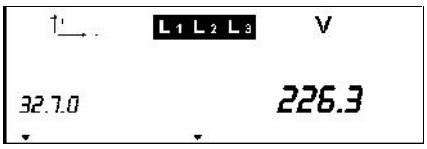


3.8.3 Reactive energy import (R+), tariff T3
00567,92 kVArh

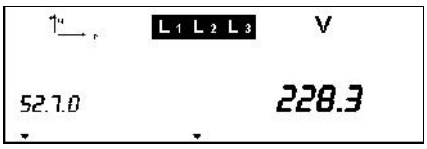
6.1.2 GRID menu



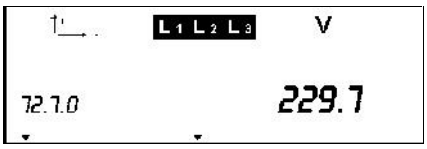
Menu “GRID”



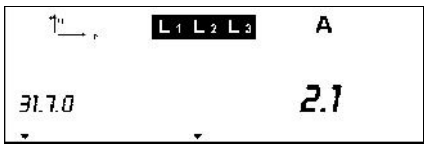
32.7.0 Voltage - phase L1
226.3 V



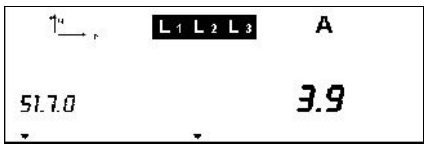
52.7.0 Voltage - phase L2.
228.3 V



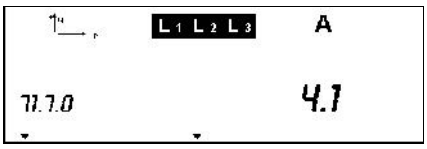
72.7.0 Voltage - phase L3.
229.7 V



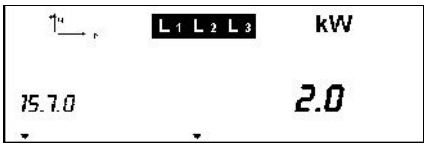
31.7.0 Current - phase L1.
2.1 A



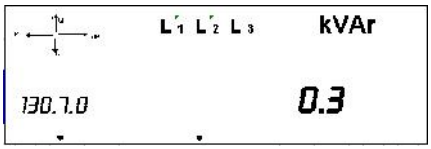
51.7.0 Current - phase L2.
3.9 A



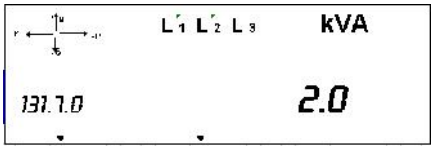
71.7.0 Current - phase L3.
4.1 A



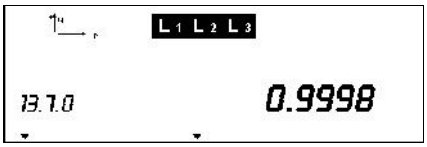
15.7.0 Three phase instantaneous active power (abs(QI+QIV) + (abs(QII+QIII))
2.0 kW



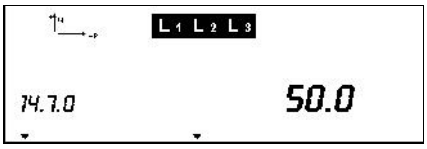
130.7.0 Three phase instantaneous reactive power (abs(QI+QIV) + (abs(QII+QIII))



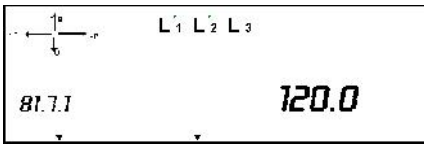
131.7.0 Three phase instantaneous apparent power (abs(QI+QIV) + (abs(QII+QIII))



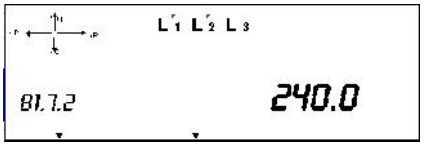
13.7.0 Three phsae instantaneous power factor
0.9998



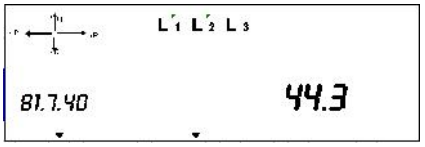
14.7.0 Frequency



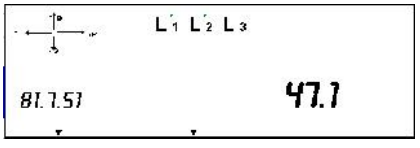
81.7.1 Phase angle between voltage R and voltage S



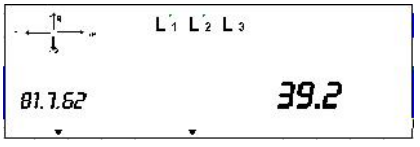
81.7.2 Phase angle between voltage R and voltage T



81.7.40 Phase angle between voltage R and current R

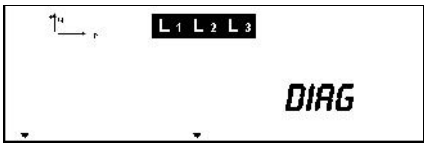


81.7.51 Phase angle between voltage S and current S

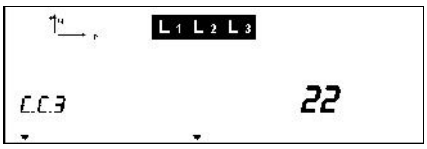


81.7.62 Phase angle between voltage T and current T

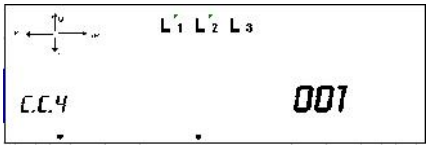
6.1.3 DIAG menu (for GSM modem only)



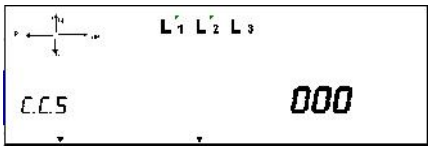
Menu “DIAG”



C.C.3 GSM signal level



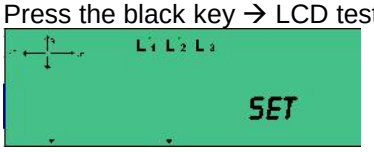
C.C.4 Operator code



C.C.5 Error code

7. Setup meter time setup by pushbuttons

With the Reset (red key) and Data (black key) key we can change certain meter parameters, e.g. time, date, etc.
Remove the seal from the red key (Reset), i.e. unlock the overhang and pull pin to the left to release the key.
Press the black key → LCD test appears on the display, than press the red key once.



The message showing that the meter will go in the SET mode.

If you want to use the keys to change the meter parameters, press the black key (Data) and hold it pressed it for more than two but less than five seconds. The display will show the first data from the list of data you can set in the SET mode (factory setting time and date). If you want to change the displayed data, press the red key (Reset) and hold it pressed until the first character on the display starts pulsing. Otherwise, press the black key (Data) to display the next group of data from the Set list.

0.9.1 Setting the time (format hh:mm).

In the first segment of the display, a number and a cursor will pulse. If you want to change the first value, press the black key (Data). The pulsing value will be increased by one. Continue pressing the black key until you reach the desired value. Press the red key (Reset) to enter the new value into the registers. At the same time, the cursor will move right to the next segment.

The second value starts pulsing. If you want to change the second value, press the black key until you reach the desired value and then confirm it with the red key (Reset). Otherwise, press the red key to move the cursor right to the next segment. After the last value has been changed and the change has been confirmed with the red key, all numbers start pulsing.

If you want to store the changed value in the register memory, press the red key (Reset). Otherwise, press the black key to keep the old value. The display will now show the next group of data from the Set list.

After you have finished changing the parameters, push the pin to the right to block the red key and seal it, i.e. cover it with the overhang and lock it and press the black button for more than 5 seconds to go out of the SET mode.

8. GSM/GPRS communication module MK – f38a –3

Connector for FME antenna

»Secondary« - independent RS-485 interface

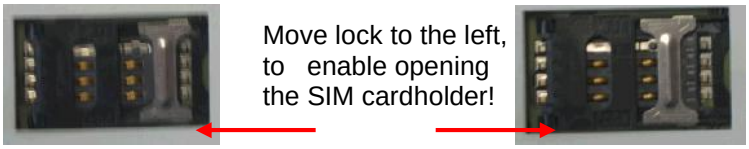
RS-485 and CS communication interface, for multi drop – cascading (CS must be shortcut)

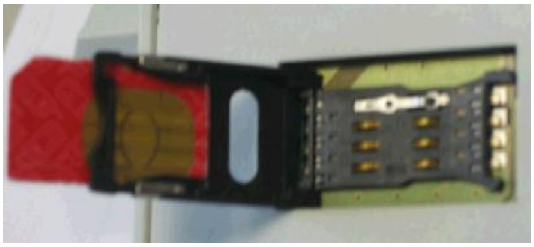
SIM card holder

Installation of the SIM card (SIM card must be enabled for data transfer)

1. Remove the GSM/GPRS modem from the meter

2. SIM card must be without PIN code (IP address must be known – related to the SIM card – not public)
3. Insert the SIM card into the SIM cardholder



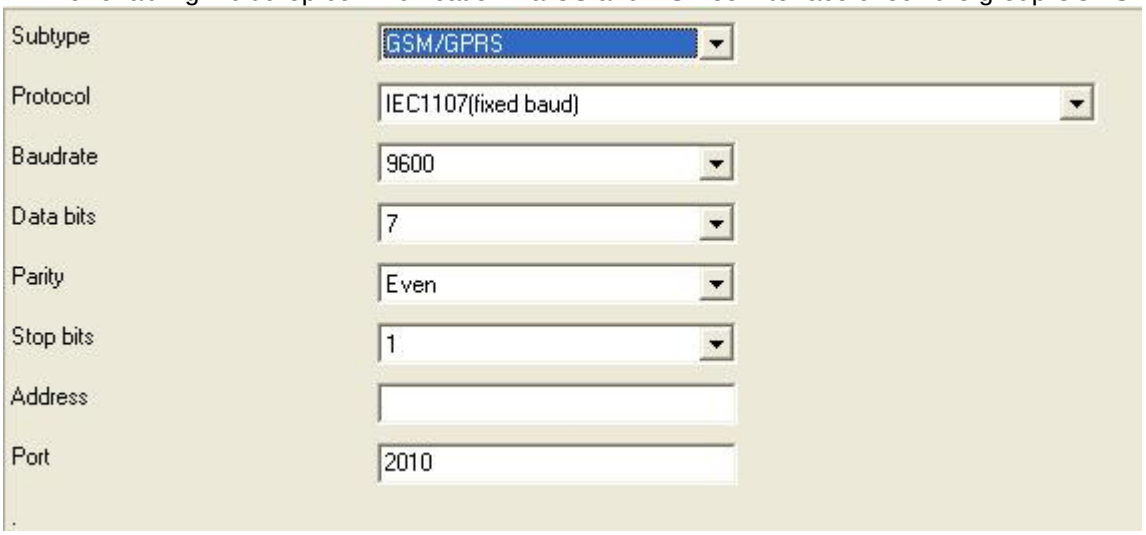


4. Insert GSM/GPRS module back into the meter

5. Connect antenna into the modem

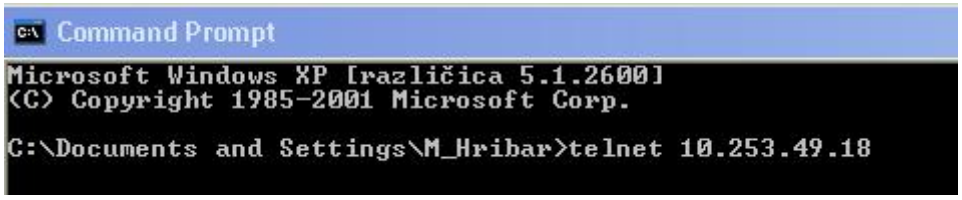
6. Write APN, username and password into the meter (via optical probe)

7. For enabling multidrop communication via CS and RS-485 interface check the group CONSERETH settings.

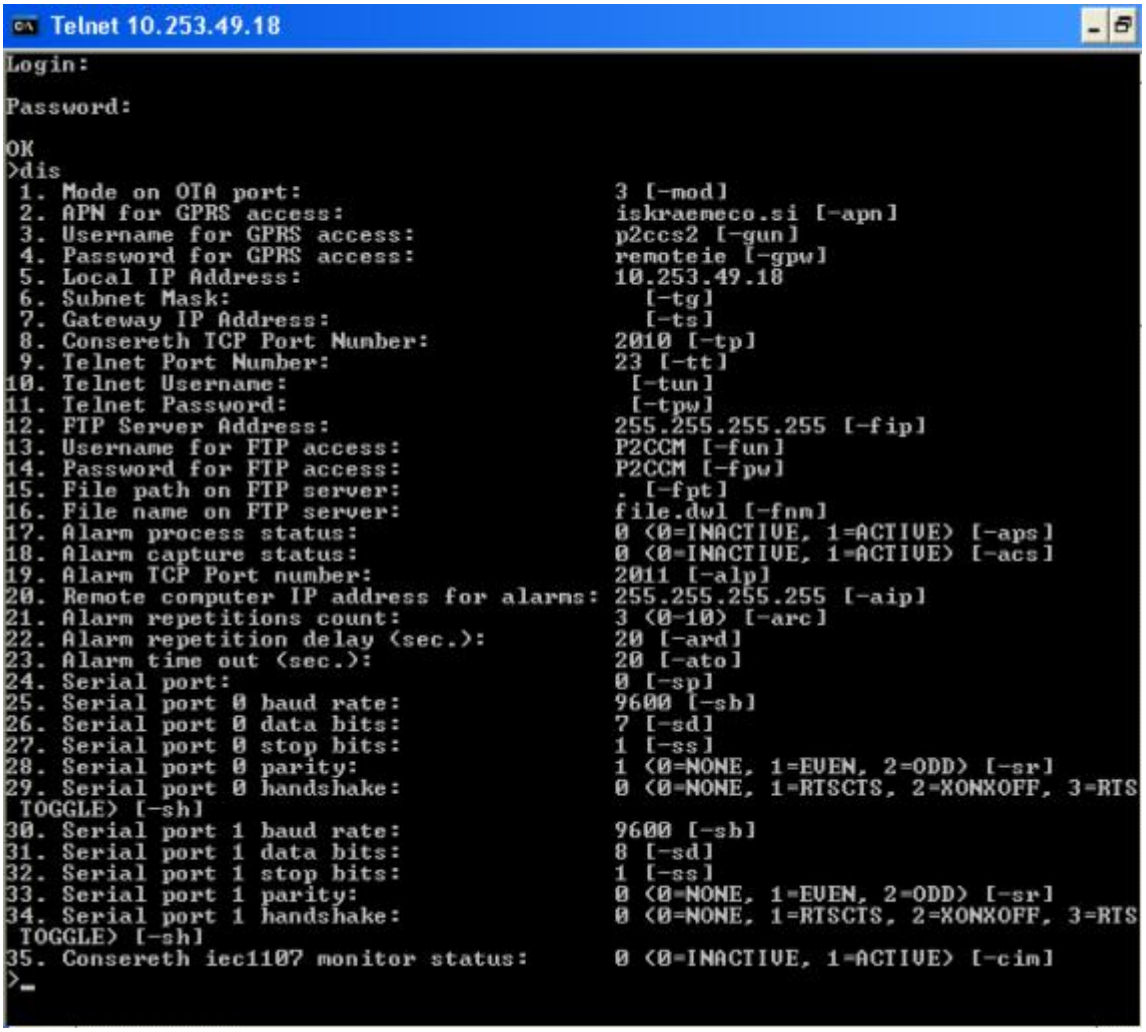


8. Check if module is logged in the GPRS network → Command prompt

Command → telnet <IP address> →



Command → dis



Telnet commands:

Command	***Description***
telnet <IP>	Connection to the module
dis	Parameter list
core	Core version
fwident	FW Version
hw	HW version of Wavecom modem
modem	Modem state
reset	Activate 3 minutes postponed module reset
imei	Modem's IMEI number
upgcomm	FW upgrade
quit	Save settings and close Telnet connection
debug_i	Send additional module information
set	Parameter change (see parameter description)

Parameter	*Description*	*Command line*
-tt	Set Telnet gate number	`set –tt <tcp_port_num>`
-tun	Set Telnet Username (Max. length = 9)	`set –tun <username>`
-tpw	Set Telnet password (Max. length = 9)	`set –tpw <password>`
dis	Phonebook	`phonebook dis`
add	Add phone number into the phonebook	`phonebook add <phone#> <restriction>`
del	Delete phonebook – selected index	`phonebook del <index>`
delall	Delete all phonebook	`phonebook delall`
gsr	Set restrictions for the specified phone numbers	`phonebook gsr <restriction>`
-apn	Set APN (max. length = 40)	`set –apn <gprs_apn>`
-gun	Set user name (max. length = 20)	`set –gun <username>`
-gpw	Set password N (max. length = 20)	`set –gpw <password>`
-tp	Set TCP gate number	`set –tp <tcp_port_num>`
-sp	Activate serial port	`set –sp <serial_port_num>`
-sb	Baud rate	`set –sb <baud_rate>`
-sd	Data bits (7 or 8)	`set –sd <data_bits>`
-ss	Stop bit (0 or 1)	`set –ss <stop_bits>`
-sr	Parity (0-none, 1-even, 2-odd)	`set –sr <parity>`
-sh	Handshake (0-none, 1-RTS/CTS, 2-Xon/Xoff, 3-RTS toggle)	`set –sh <handshake>`
-cim	Set IEC 62056-21 monitor status (0-inactive, 1-active) – read only	
-fip	Set IP address for FTP server	`set –fip <ip_address>`
-fun	Set username for FTP access	`set –fun <username>`
-fpw	Set password for FTP access	`set –fpw <password>`
-fpt	Set file path on the FTP server	`set –fpt <file_path>`

-fnm	Set file name on the FTP server	`Set –fnm <file_name>`

9. Meter reading with MeterView

The basic procedure for using Meter View communications is as below. Each of the steps is explained in detail in the following sections.

1. Set the communication parameters.

2. Set the correct password, if the operation requires a password.

3. Read or program the device.

If you wish to create a scheme (changing the parameters) , then the procedure is:

1. Select the device for which you want to create a scheme.

2. Define the parameters

3. Save to disk or write to device.

Reading the meter via optical probe in the meter

Set up the:

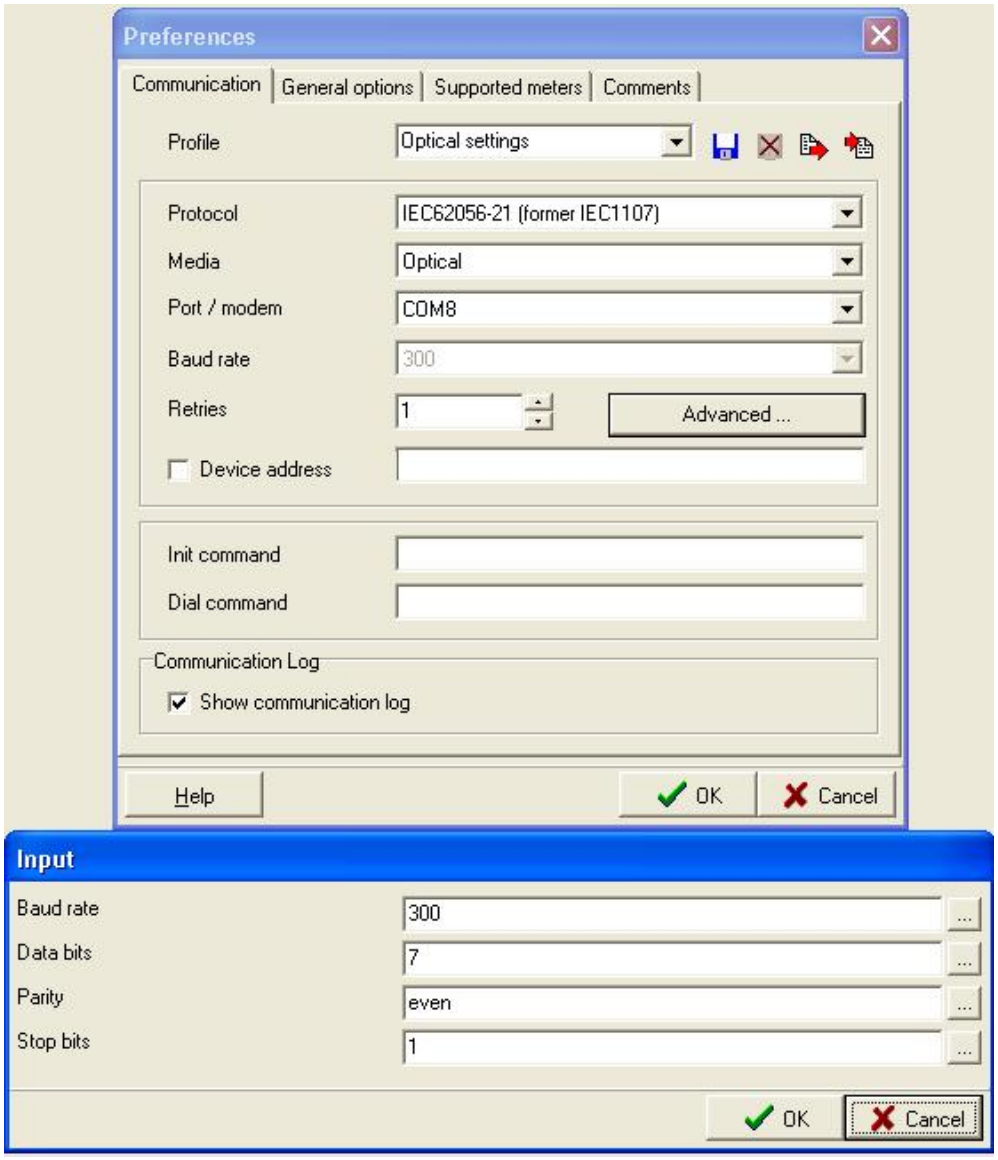
- Protocol → IEC6256-21 (former IEC1107)
- Media → Optical
- Port/modem → appropriate COM port in your computer
- Retries → 1

With click to 

, select:

- Baud rate → 300
- Data bits → 7
- Parity → even
- Stop bits → 1

Device address is not obligatory.



Reading the meter via RS-232 or RS-485 or current loop communication interface in the meter

Set up the:

- Protocol → IEC6256-21 (former IEC1107)
- Media → RS-232/Current loop
- Port/modem → appropriate COM port in your computer
- Retries → 1

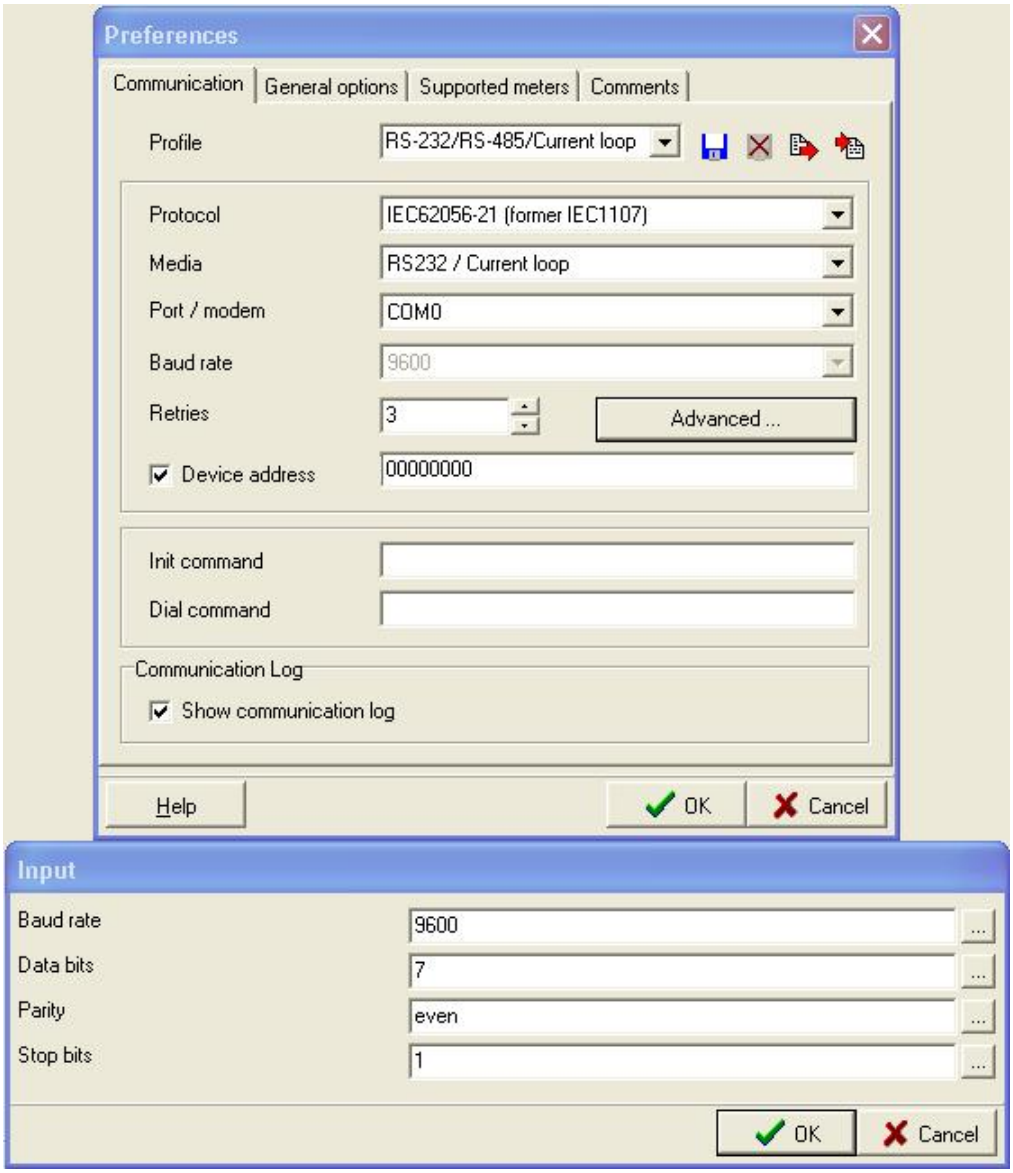
With click to 

, select:

- Baud rate → 9600 (or select baud rate in the meter)
- Data bits → 7
- Parity → even
- Stop bits → 1
- Device address → it is on the meter front plate or read value in from the 0.0.0 register
    - **Obligatory** for RS-485 and current loop interface (RS-485 and current loop interface in the MT83x meter is defined as “multidrop” interface, reading the meter with “device address is obligatory)
    - **Not obligatory** for RS-232 interface

Tip 1: How to check if Rx, Tx and GND terminals are connected properly? The voltage between Rx –GND and Tx-GND must be around 9V.

Tip 2: When you connect meter to modem → connect Rx – Rx and Tx – Tx and when you connect meter to computer → connect Rx – Tx and Tx – Rx.



Reading the meter via GSM or PSTN or ISDN modem in the meter – selection "Standard modem"

Set up the:

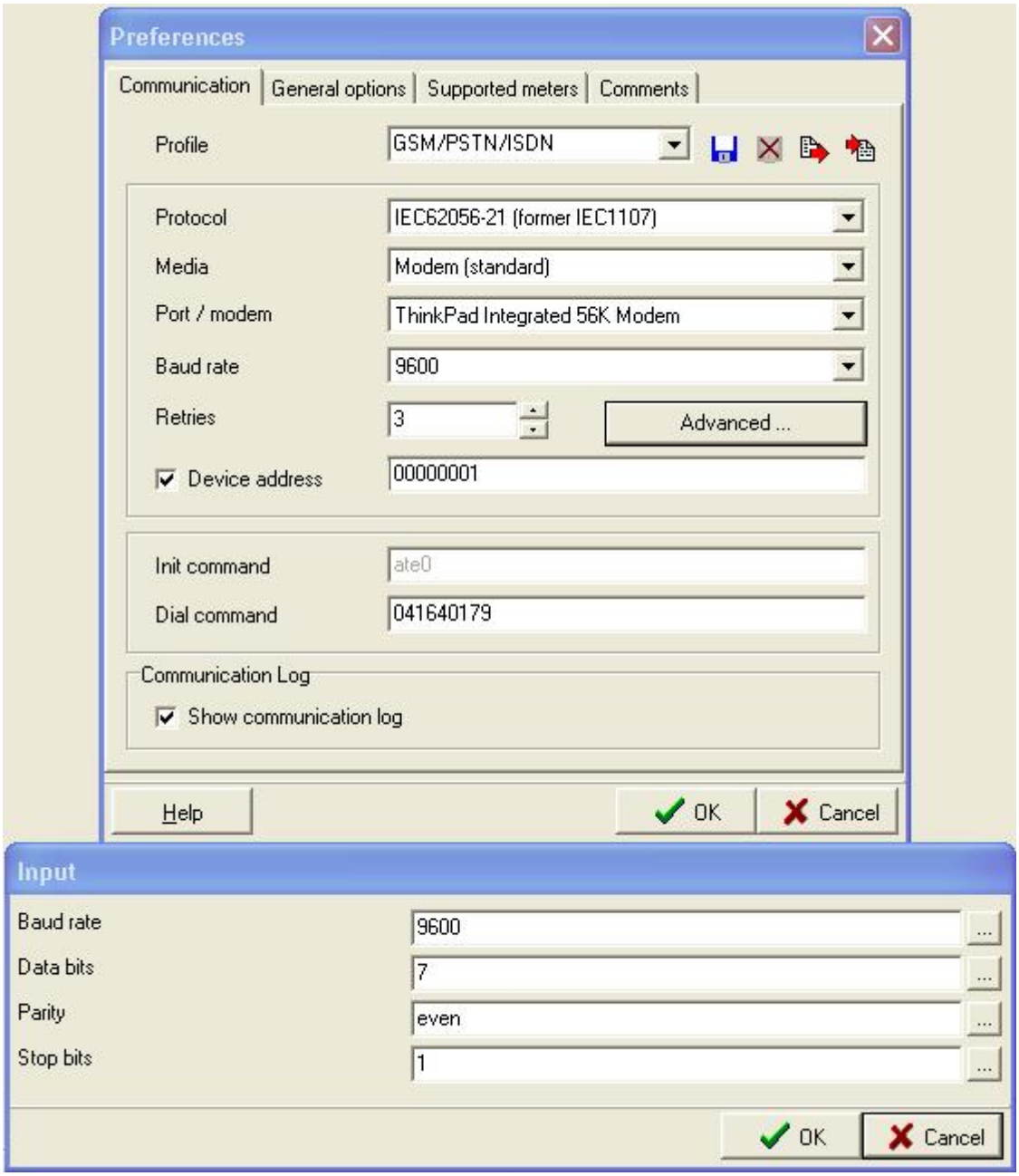
- Protocol → IEC6256-21 (former IEC1107)
- Media → Modem (standard)
- Port/modem → select appropriate modem, which is installed under windows system
- Retries → 1

With click to Advanced ..., select:

- Baud rate → 9600 (or select baud rate in the meter)
- Data bits → 7
- Parity → even
- Stop bits → 1

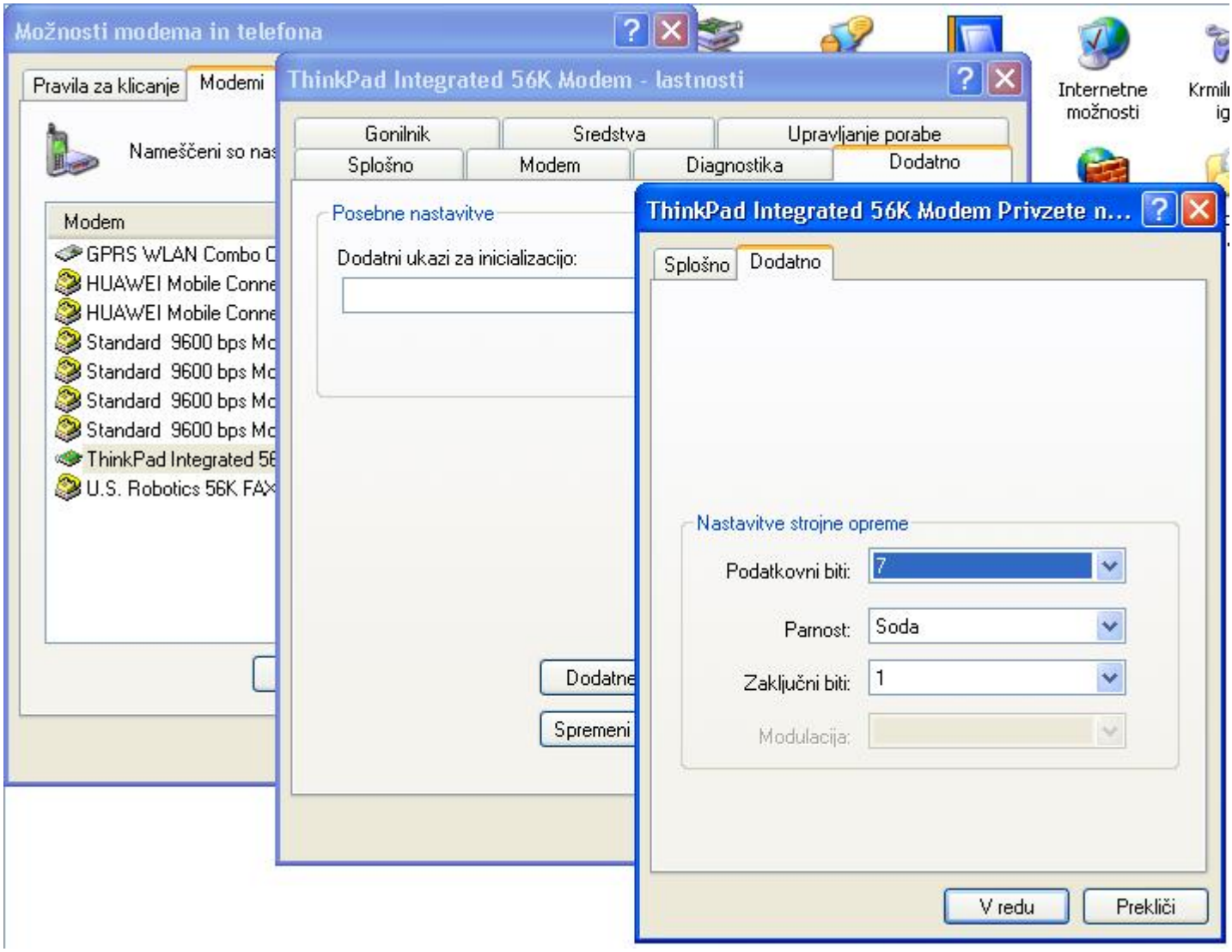
All these data are related to the meter's communication interface setting. Settings in the meter and in the modem must be same.

- Device address → it is on the meter front plate or read value in from the 0.0.0 register
  - **Obligatory** – if more then one meter is connected to the GSM/PSTN/ISDN module
- Dial command → write phone number



Note: Computer modem settings and meter modem settings must be the same.
Note: Modem settings could be checked – changed under:

→ Control panel ( **) → Phone and Modem option (**  **)**



Note: Meter connected to ISDN modem can be read out only via ISDN modem!

Reading the meter via GSM or PSTN or ISDN modem in the meter – selection "Custom modem"

Set up the:

- Protocol → IEC6256-21 (former IEC1107)
- Media → Modem (custom)
- Port/modem → select COM port on the computer, where modem is connected
- Retries → 1

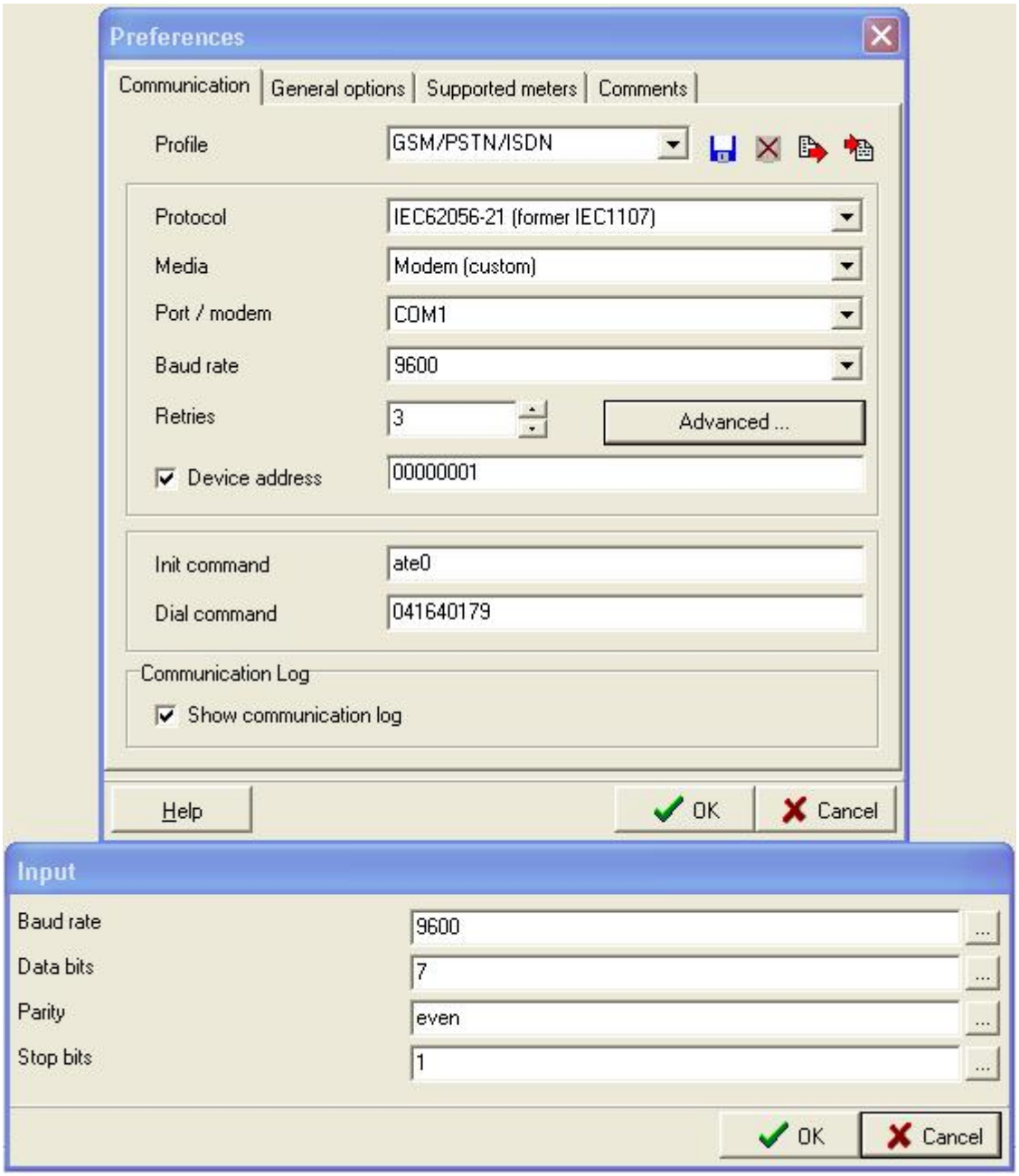
With click to 

, select:

- Baud rate → 9600 (or select baud rate in the meter)
- Data bits → 7
- Parity → even
- Stop bits → 1

All these data are related to the meter's communication interface setting. Settings in the meter and in the modem must be same.

- Device address → it is on the meter front plate or read value in from the 0.0.0 register
  - **Obligatory**– if more then one meter is connected to the GSM/PSTN/ISDN module
- Init command → write appropriate AT command to program your modem properly
- Dial command → write phone number



Reading the meter via Ethernet – transparent or consereth type

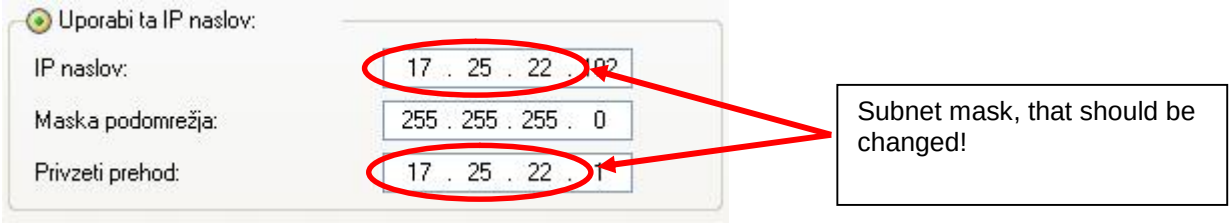
Transparent or consereth type is programmable.

9.6.1Setup the IP number in the Ethernet module – consereth type

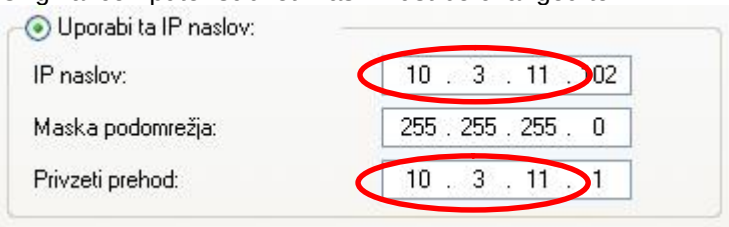
Ethernet module parameters could be read out with Telenet server. Personal computer and module must be connected with “crossover” LAN cable.

1. Set the computer IP address in the same subnet as the consereth module

Example:



Original computer subnet mask must be changed to



Connect the LAN cable (crossover) to module and computer and read/change parameters.
Default (factory) settings (could be read out via Telnet by utilising > telnet IP number > command:

> Username : user
> Password : ** (user)**

```
C:\Documents and Settings\M_Hribar>telnet 10.3.11.119
Connecting To 10.3.11.119...
```

```
Consereth Telnet Server
-----------------------
> Username : uusseerr

> Password : u*s*e*r*
**
USAGE:
 > [COMMAND] -[PARAMETER] [VALUE]
 Commands : set, display, exit
>
```

```
 1. Local IP Add.:    10.2.6.187       [-tm]
 2. Gateway IP Add.:  10.2.6.1         [-tg]
 3. Subnet Mask:      255.255.255.0    [-ts]
 4. TCP Port num.:    2000     [-tp]
 5. Telnet Port num.: 23       [-tt]
 6. Serial Port:      0        [-sp]
 7. Serial Baud Rate: 9600     [-sb]
 8. Data Bits:        7 bits   [-sd]
 9. Stop Bits:        1 bits   [-ss]
 10. Parity Bits:     1 (0 = NONE, 1 = EVEN, 2 = ODD)  [-sr]
 11. Handshake:       0 (0=NONE, 1=RTSCTS, 2=XONXOFF, 3=RTS TOGGLE) [-sh]
 12. MAC Address:     0-1-2-3-4-5
 13. SwSignature:     8D-8-29-80
 14. Change Username (4 SignMax):'user' [-pu]
 15. Change Password (4 SignMax):'****' [-pp]
 16. Change Transfer Mode: 1    (0 = Consereth, 1 = transparent) [-pr]
```

Username and password are by default settings the same → »user«'.
Telnet server requests username (printed out), then also password (not printed out).
After setting the username and password, menu is listed out (lines 1 to 15).
Each parameter could be changed with command SET.

Example:

Set –tm 10.2.6.186 setting of IP module address

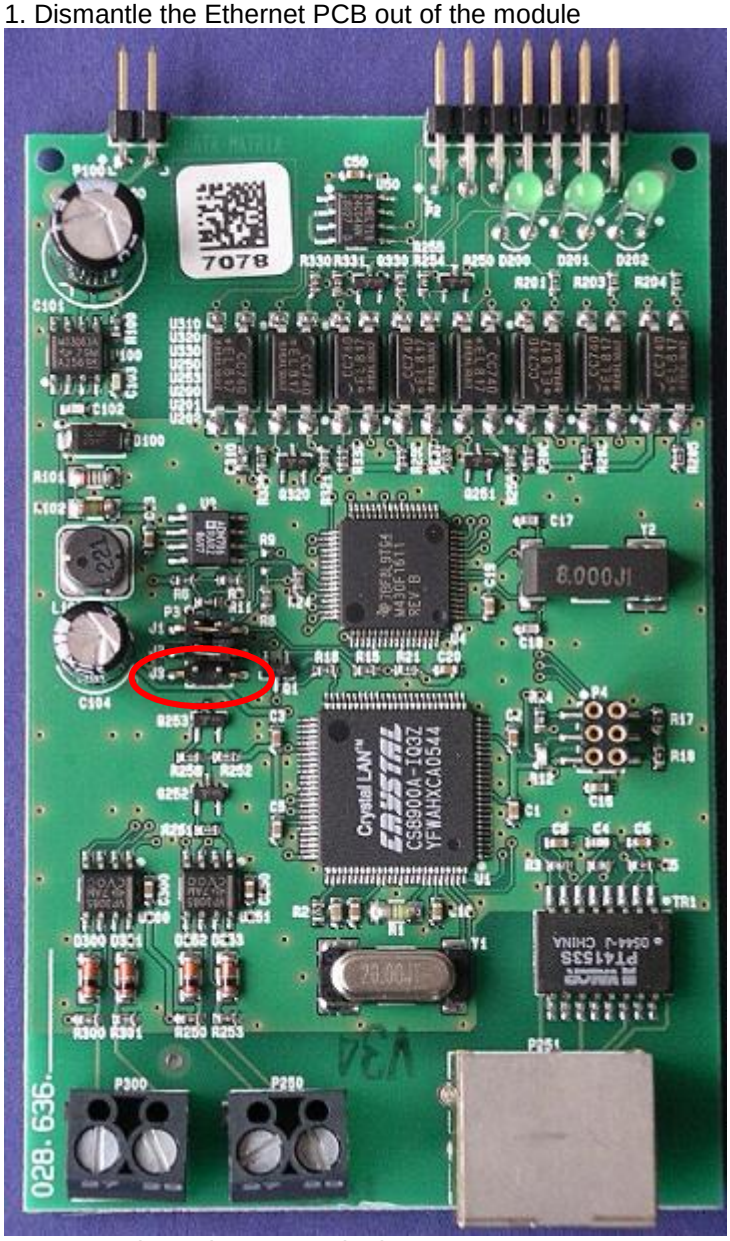
Set –tg 10.2.6.1 setting of gateway IP address

Set –pr 0 setting Consereth module type

9.1.1.1. Reset of module parameters to " default"

In case, that module parameters are lost and we don't know the module parameters, it is possible to set up the original – factory settings.

1. Dismantle the Ethernet PCB out of the module



1. Make a shortcut on the jumper J3
2. Insert the module for 10 seconds into the meter – module accepts the default (factory) settings.
3. Remove module from the meter
4. Remove jumper J3.
5. Put Ethernet PCB back to the module.

Reading the meter via Ethernet module – transparent type

Set up the:

- Protocol → IEC 62056-21 (former 1107)
- Media → Consereth (TCP-IP)
- Retries → 1

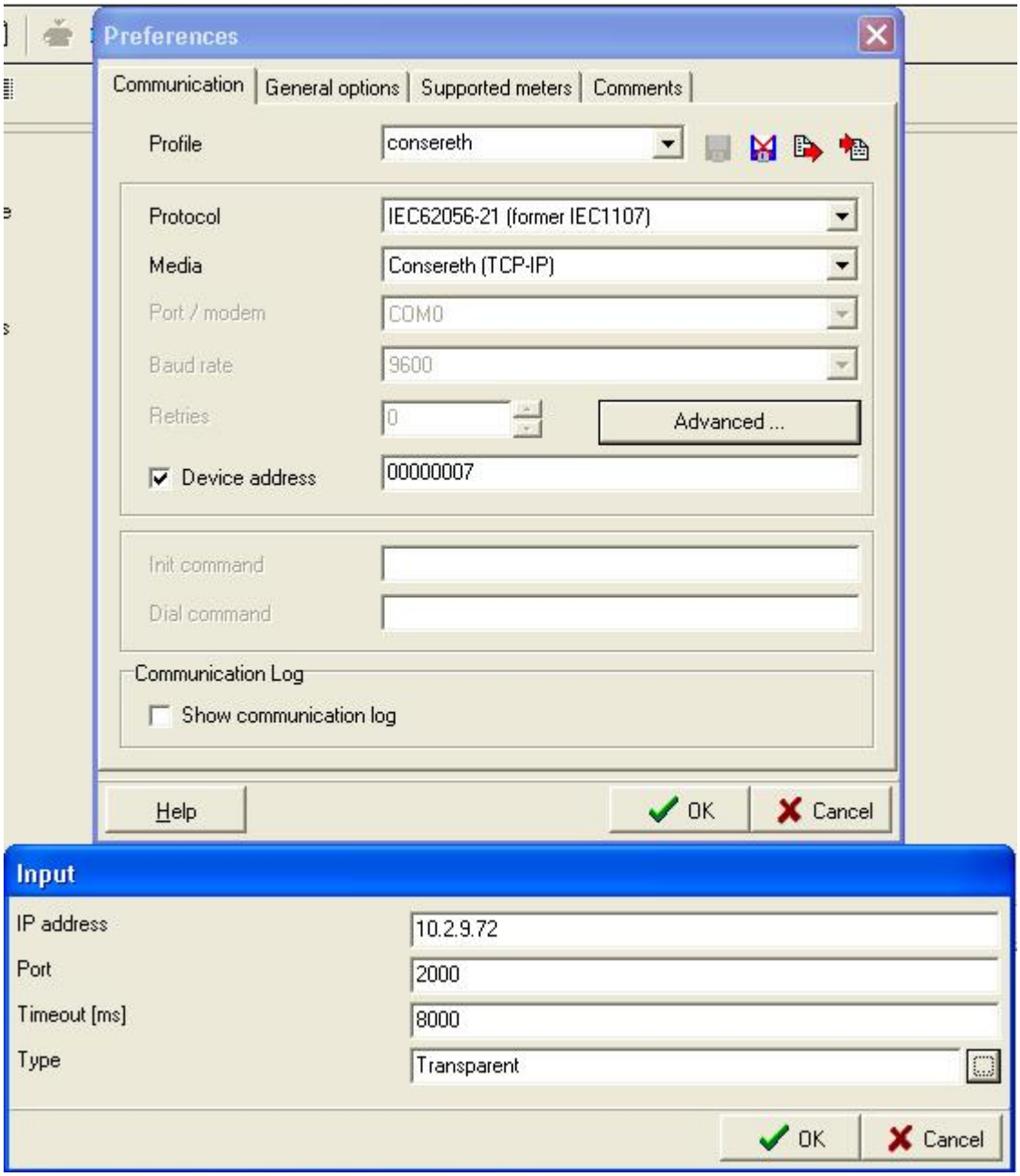
With click to 

, select:

- IP address → IP address, to which the module is connected
- Port → Port programmed in the Ethernet module
- Type → Transparent

Note: Serial communication settings must be the same for the meter and the Ethernet modem.

- Device address → it is on the meter front plate or read value in from the 0.0.0 register
  - **Obligatory** – if more then one meter is connected to the Ethernet module



Reading the meter via Ethernet module - Consereth type:
Set up the:

- Protocol → IEC 62056-21 (former IEC1107)
- Media → Consereth (TCP-IP)
- Retries → 1

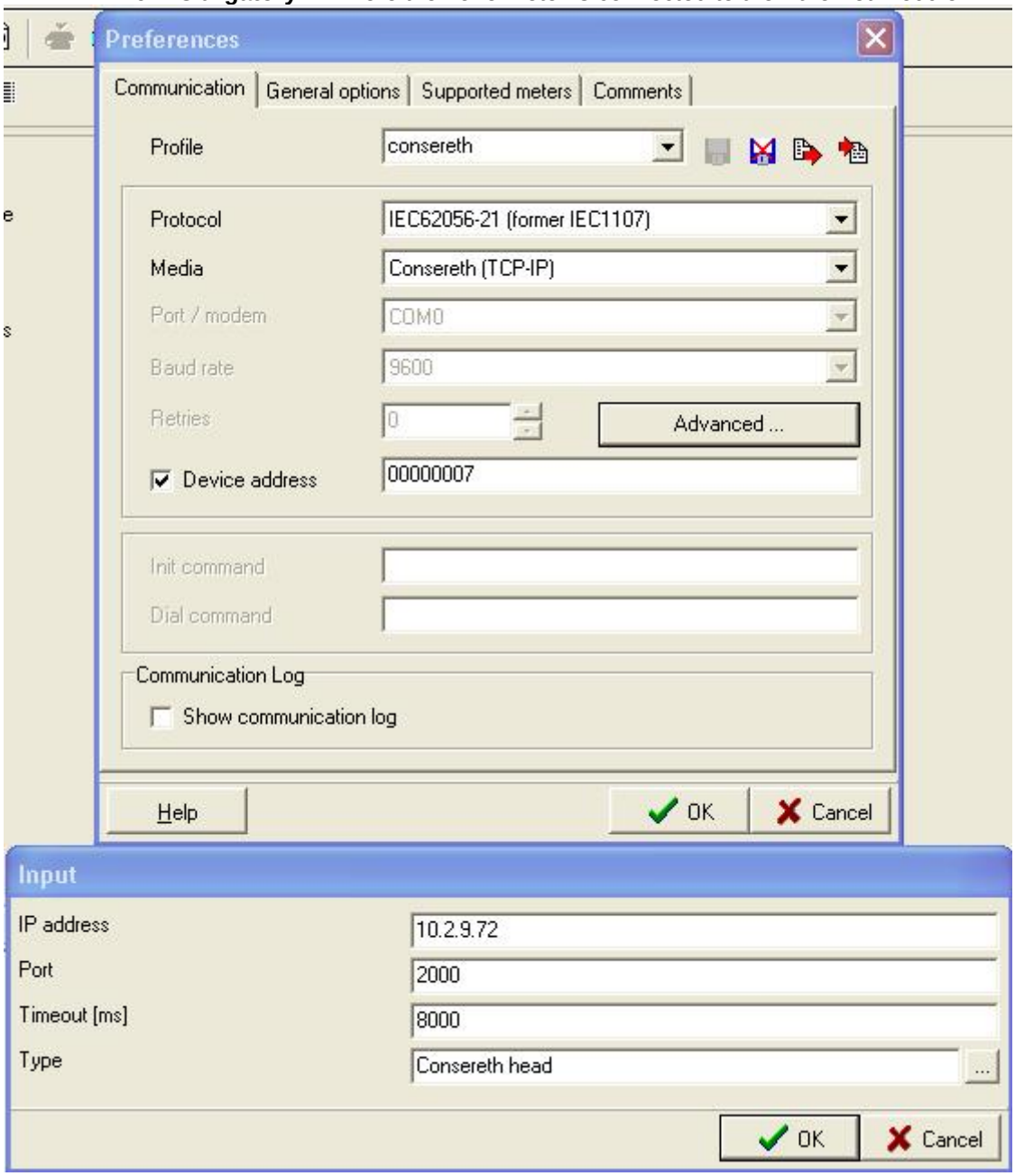
With click to 

, select:

- IP address → IP address, to which the module is connected
- Port → Port programmed in the Ethernet module
- Type → Consereth head

Note: Serial communication settings must be the same for the meter and the Ethernet modem.

- Device address → it is on the meter front plate or read value in from the 0.0.0 register
    - o **Obligatory** – if more then one meter is connected to the Ethernet module



Reading the meter via GPRS modem in the meter

Set up the:

- Protocol → IEC 62056-21 (former IEC1107)
- Media → Consereth (TCP-IP)
- Retries → 1

With click to 

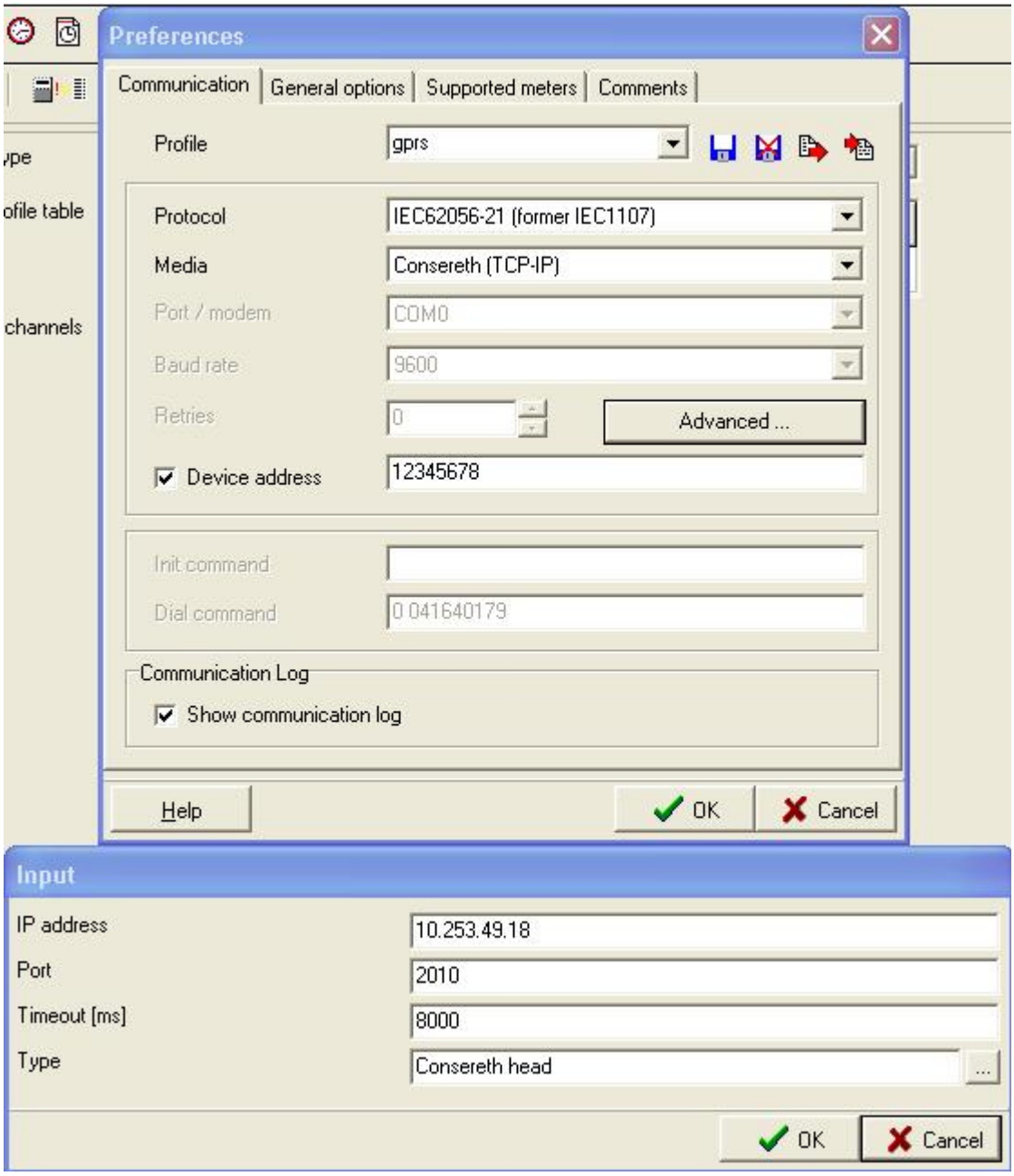
, select:

- IP address → IP address, to which the module is connected
- Port → Port programmed in the Ethernet module
- Type → Consereth head

Note: Serial communication settings must be the same for the meter and the GPRS modem.

- Device address → it is on the meter front plate or read value in from the 0.0.0 register

- **Obligatory** – if more then one meter is connected to the Ethernet module



10. GPRS network connection setting in Windows XP system

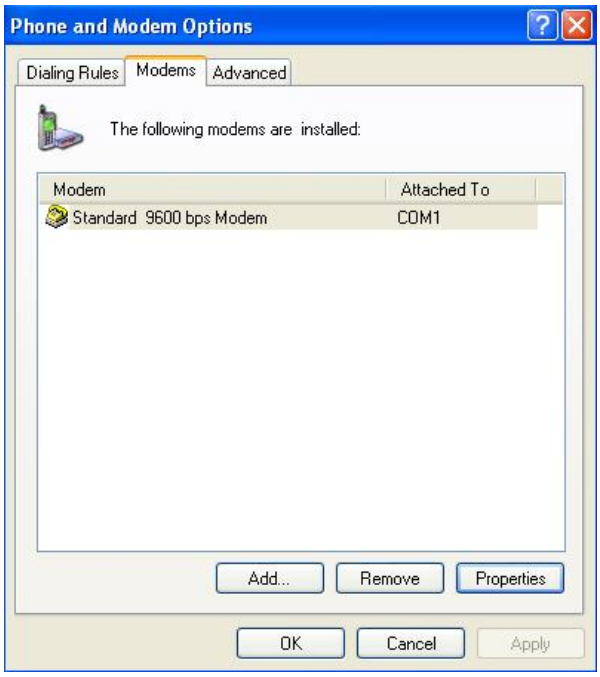
In case that connection to GPRS network is via LAN interface, no additional setting is needed.

General Packet Radio Service (GPRS) is service that enables data transfer via mobile phone network (GSM). GPRS enables service, that is known as "always on" data connection for GSM mobile phones. It enables faster WEB searching and data transmission and also faster access to online services, like WAP and email. The major benefit → only transmitted data are charged, connection time is not charged.
For connection into the GPRS network APN (Access Point Node), username and password must be known. These data are published by mobile provider.

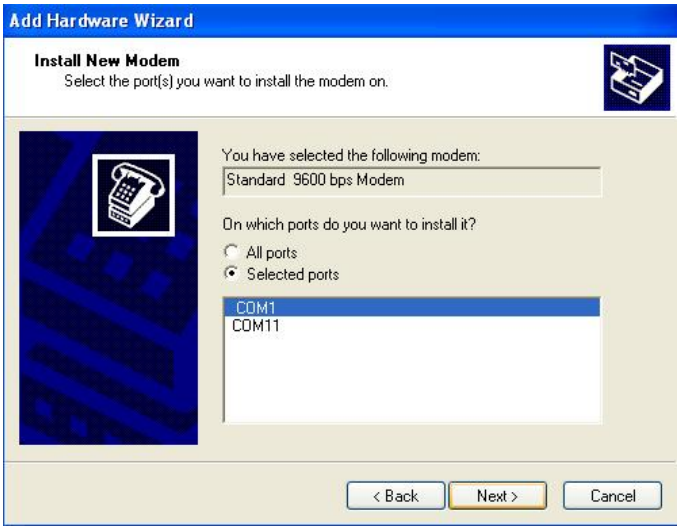
Instalation and modem settings:

Start → Settings → Control Panel → Printers and Other Hardware → Phone and Modem Options

Modems → Add



Select: *Don't detect my modem; I will select it from a list*
Select: *Standard 9600 bps Modem* and select communication port, where modem is connected, for example:.: *COM 1*

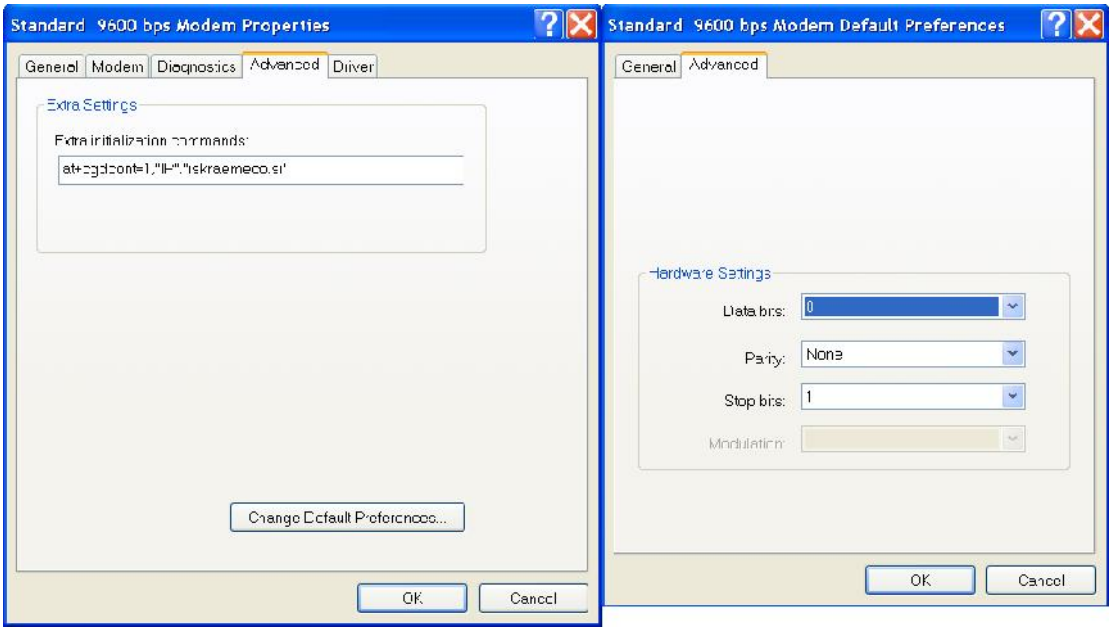


Select installed modem, then press button *Properties.* In the window *Advanced* write:

at+cgdcont=1,"IP","iskraemeco.si" → where Iskraemeco.si is test APN

In window *Diagnostic → Query Modem chech the modem response.*.

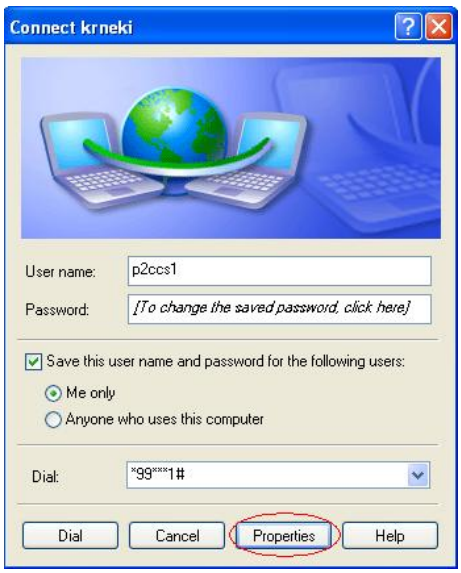
Check the modem settings, by pressing Change *Default Preferences*…



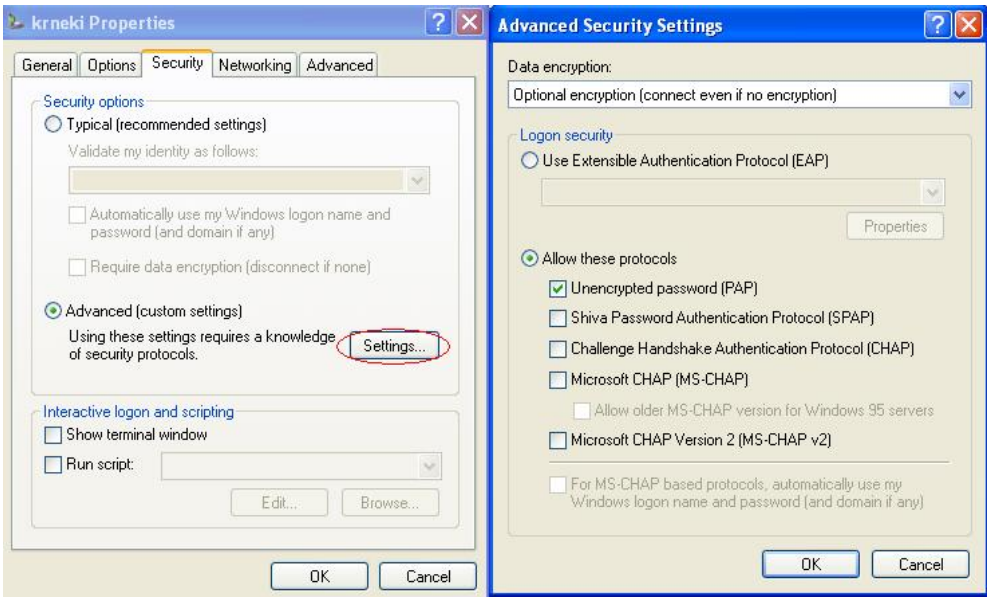
Creation of GPRS connection on the computer:

Start → Settings → Control Panel → . Network Connections → Create a new connection → Connect to the internet → Set up my connection manually → Connect using a dial-up modem → select modem → nominate the connection, for example.: *GPRS test connection* → phone number: **99***1#*

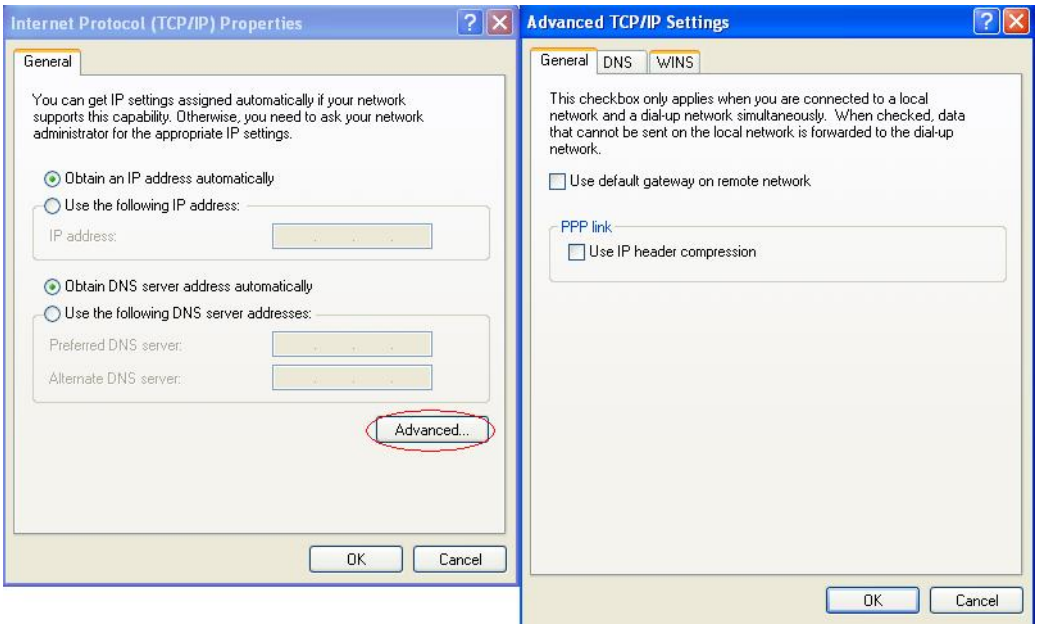
Write: user name: *XXXXX* and password: *remoteie*
When connection is created, set up the preferences:



Properties → *Security* → select *Advanced (Custom settings)* and press *Settings* → select only *Unencrypted password (PAP)*

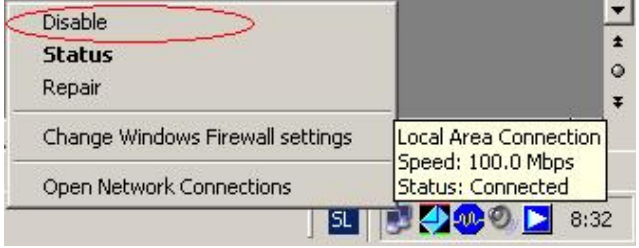


Under *Networking* select *Internet Protocol (TCP/IP)* and press *Properties* → *Advanced*
→ Switch off both options: *Use default gateway on remote network* and *Use IP header compression*



In Window *Advanced* must be *Windows Firewall* switched off or enabled with exception – only this connection.

When you make are new connection to GPRS network, is preferred to disable local area connection.

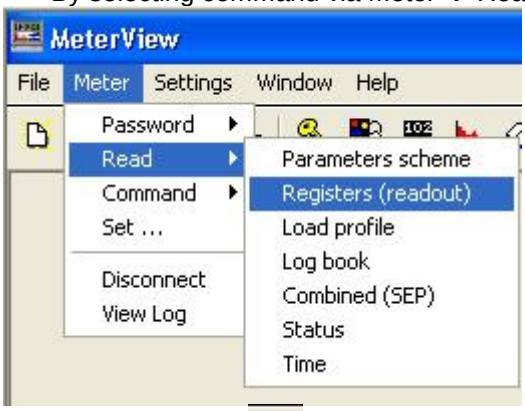


11. Meter data reading with MeterViev

Data read out reading

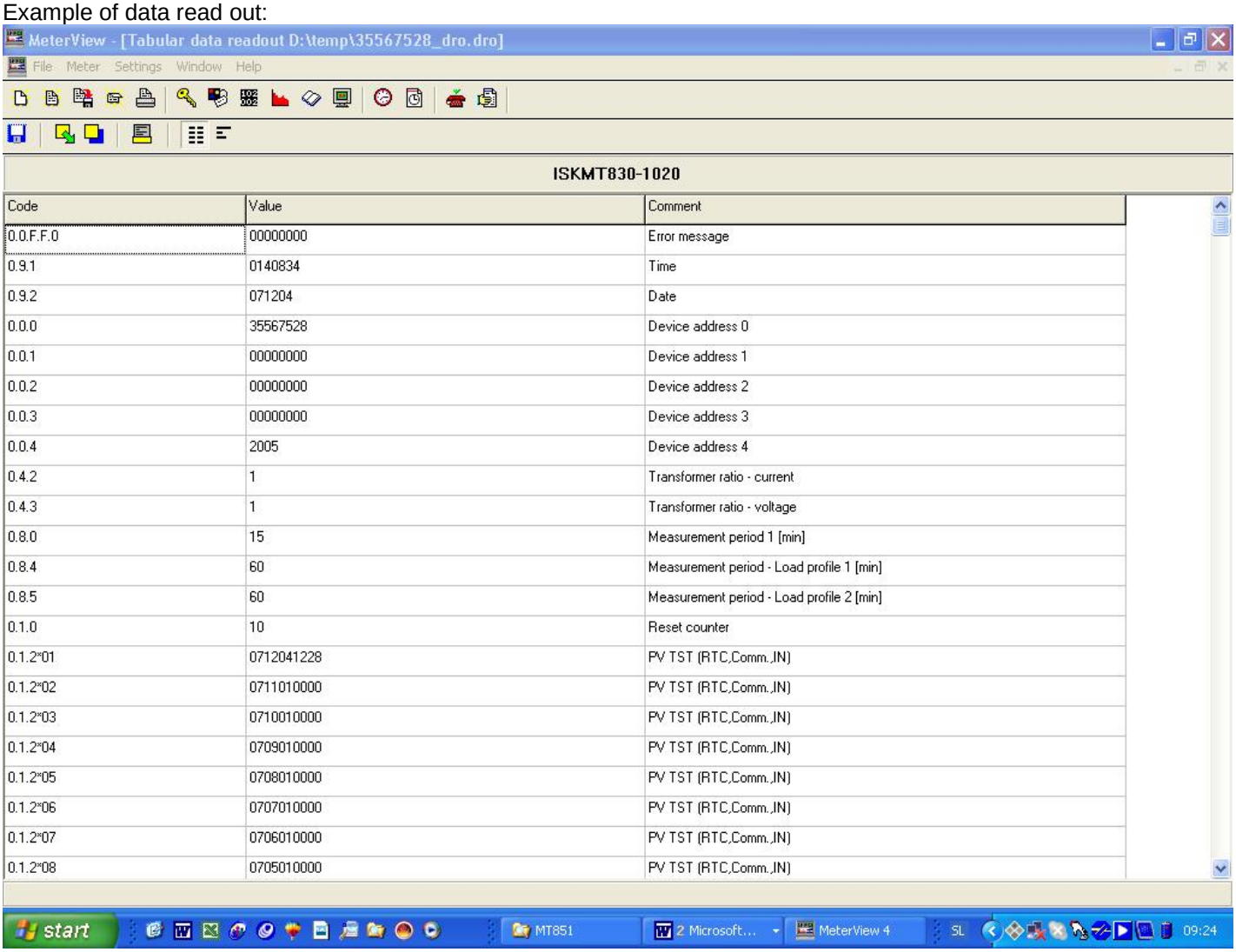
Data read out → meter sends data, w hich are defined for meter “Readout sequences”.
Reading coud be started on two different ways:

- By selecting command via Meter → Read → Registers (readout)



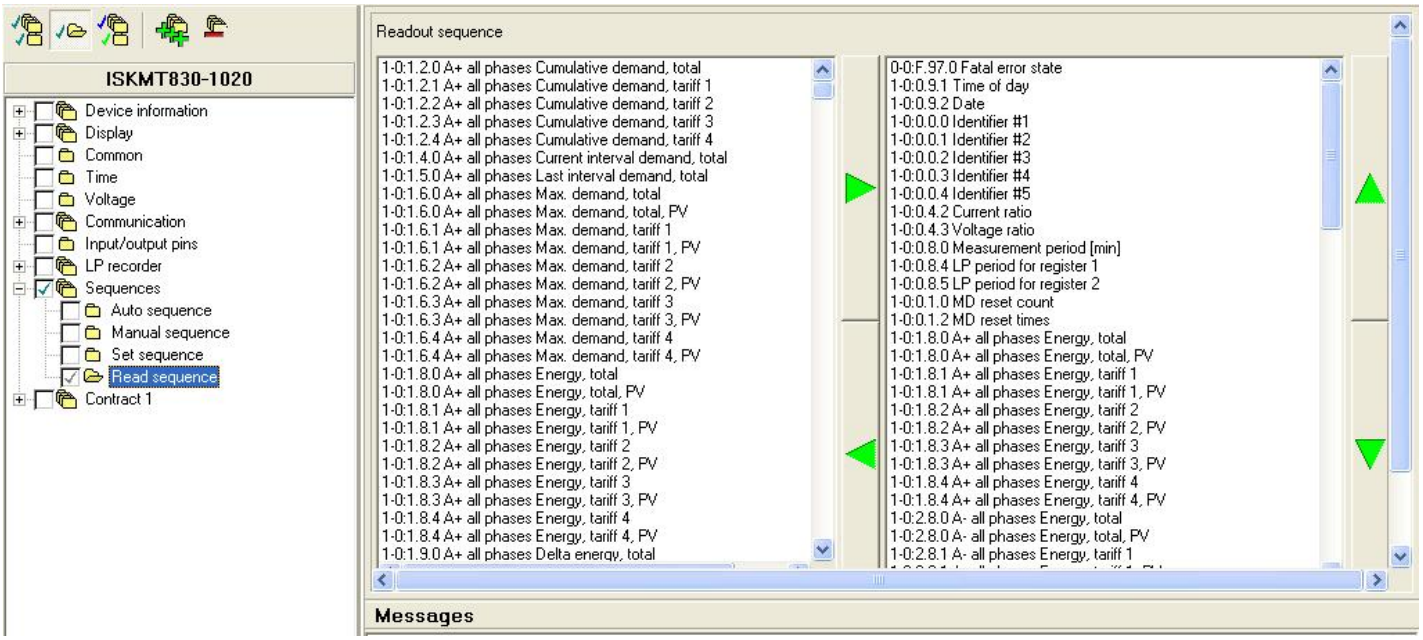
- By clicking icon 

Data read out reading could not be protected with password.
Example of data read out:



Code	Value	Comment
0.0.F.F.0	00000000	Error message
0.9.1	0140834	Time
0.9.2	071204	Date
0.0.0	35567528	Device address 0
0.0.1	00000000	Device address 1
0.0.2	00000000	Device address 2
0.0.3	00000000	Device address 3
0.0.4	2005	Device address 4
0.4.2	1	Transformer ratio - current
0.4.3	1	Transformer ratio - voltage
0.8.0	15	Measurement period 1 [min]
0.8.4	60	Measurement period - Load profile 1 [min]
0.8.5	60	Measurement period - Load profile 2 [min]
0.1.0	10	Reset counter
0.1.2*01	0712041228	PV TST (RTC,Comm.,IN)
0.1.2*02	0711010000	PV TST (RTC,Comm.,IN)
0.1.2*03	0710010000	PV TST (RTC,Comm.,IN)
0.1.2*04	0709010000	PV TST (RTC,Comm.,IN)
0.1.2*05	0708010000	PV TST (RTC,Comm.,IN)
0.1.2*06	0707010000	PV TST (RTC,Comm.,IN)
0.1.2*07	0706010000	PV TST (RTC,Comm.,IN)
0.1.2*08	0705010000	PV TST (RTC,Comm.,IN)

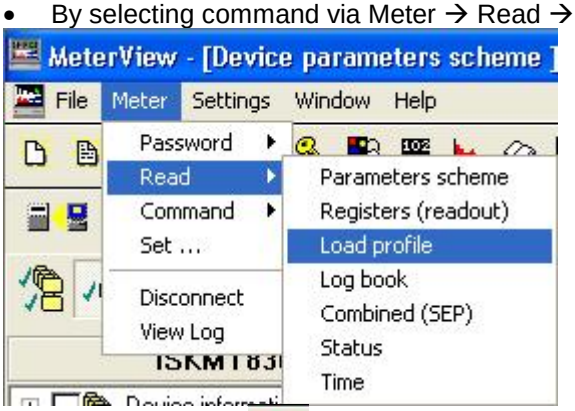
Registers, which are presented by data read out are defined in “Read sequence”.



Load profile reading

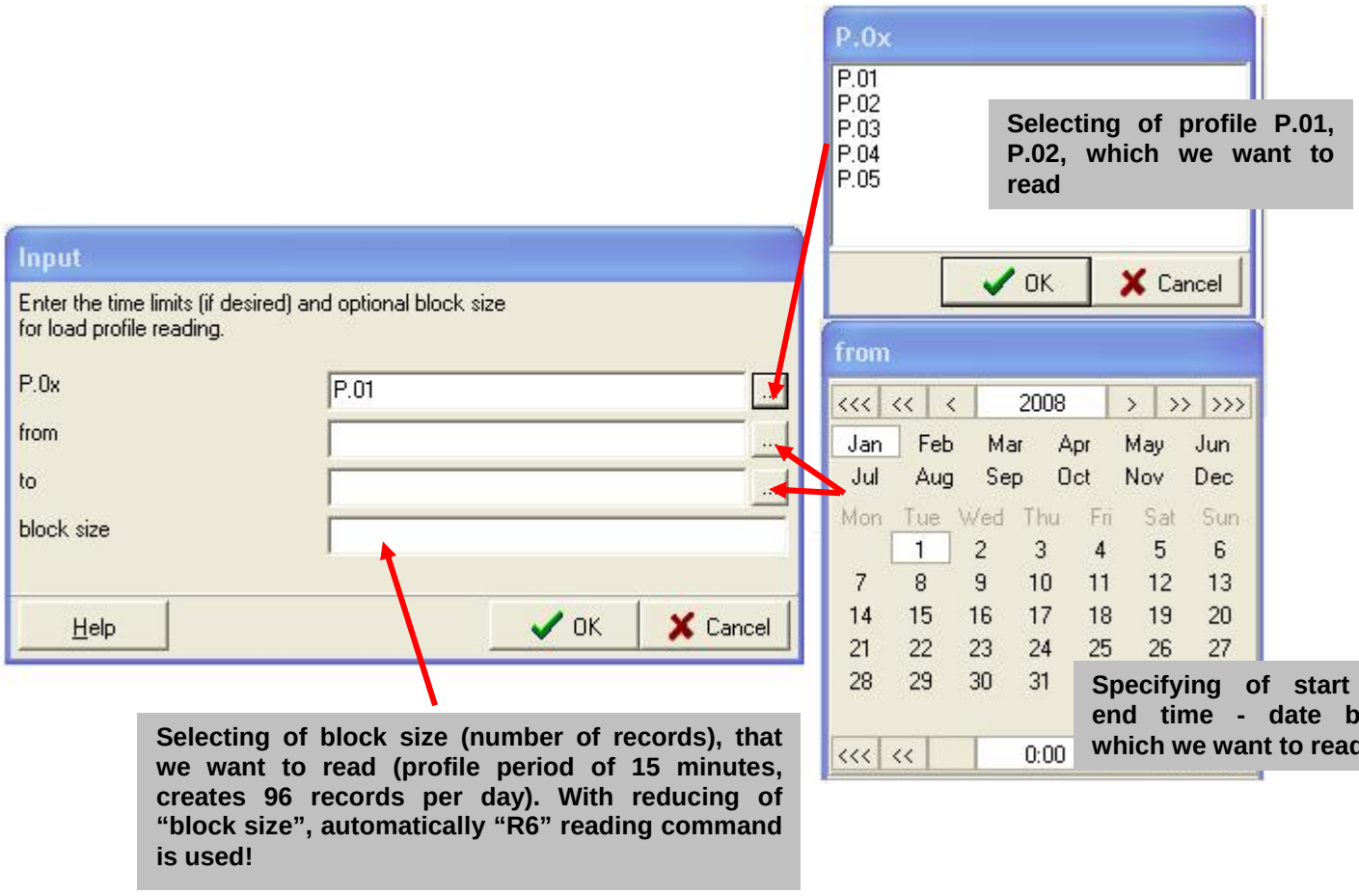
Load profile reading coud be started on two different ways:

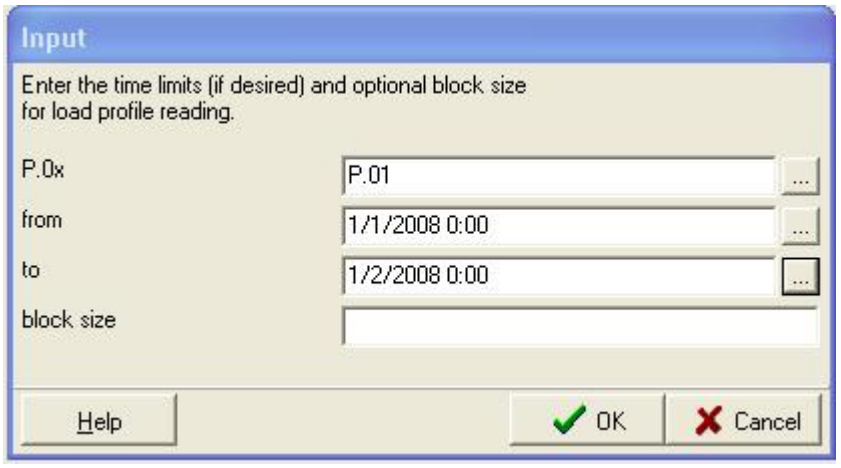
- By selecting command via Meter → Read → Load profile



- By clicking icon 

Load profile reading could be protected with password (protection is defined in the meter firmware and is requested by custemer specification).


P.0x
P.01
P.02
P.03
P.04
P.05
OK
Cancel
Selecting of profile P.01, P.02, which we want to read
Input
Enter the time limits (if desired) and optional block size for load profile reading.
P.0x
P.01
from
to
block size
Help
OK
Cancel
from
2008
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mon
Tue
Wed
Thu
Fri
Sat
Sun
0:00
Specifying of start and end time - date block, which we want to read
Selecting of block size (number of records), that we want to read (profile period of 15 minutes, creates 96 records per day). With reducing of "block size", automatically "R6" reading command is used!

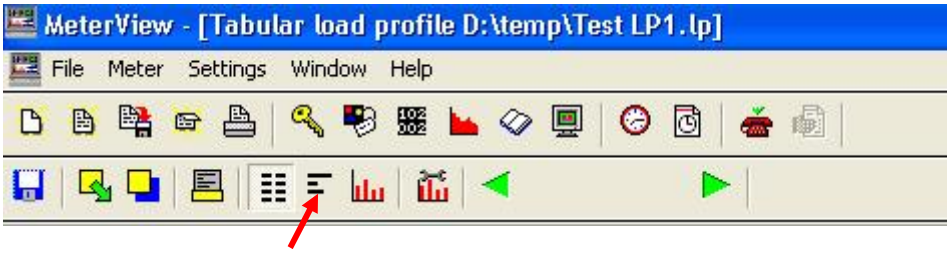

Input
Enter the time limits (if desired) and optional block size for load profile reading.
P.0x
P.01
from
1/1/2008 0:00
to
1/2/2008 0:00
block size
Help
OK
Cancel

Result:

ISKMT860-1007							
Time	Status	1.5 [kW]	2.5 [kW]	5.5 [kvar]	6.5 [kvar]	7.5 [kvar]	8.5 [kvar]
1/12/2007 9:30:00	00000000	0.1636	0	0.1144	0	0	0
1/12/2007 9:45:00	00000000	0.152	0	0.1104	0	0	0
1/12/2007 10:00:00	00000000	0.1388	0	0.1056	0	0	0
1/12/2007 10:15:00	00000000	0.152	0	0.11	0	0	0
1/12/2007 10:30:00	00000000	0.1552	0	0.1108	0	0	0
1/12/2007 10:45:00	00000000	0.1628	0	0.1172	0	0	0
1/12/2007 11:00:00	00000000	0.1548	0	0.1128	0	0	0
1/12/2007 11:15:00	00000000	0.1368	0	0.1036	0	0	0
1/12/2007 11:30:00	00000000	0.1536	0	0.1108	0	0	0
1/12/2007 11:45:00	00000000	0.1536	0	0.1068	0	0	0
1/12/2007 12:00:00	00000000	0.1468	0	0.108	0	0	0
1/12/2007 12:15:00	00000000	0.1484	0	0.1112	0	0	0
1/12/2007 12:30:00	00000000	0.1424	0	0.1024	0	0	0
1/12/2007 12:45:00	00000000	0.1436	0	0.1108	0	0	0
1/12/2007 13:00:00	00000000	0.1472	0	0.1124	0	0	0
1/12/2007 13:15:00	00000000	0.144	0	0.106	0	0	0
1/12/2007 13:30:00	00000000	0.1356	0	0.0976	0	0	0
1/12/2007 13:45:00	00000000	0.1376	0	0.1012	0	0	0
1/12/2007 14:00:00	00000000	0.134	0	0.098	0	0	0
1/12/2007 14:15:00	00000000	0.1272	0	0.0924	0	0	0
1/12/2007 14:30:00	00000000	0.1204	0	0.0884	0	0	0
1/12/2007 14:45:00	00000000	0.1176	0	0.088	0	0	0

Button	***Function***
	Selects graphical mode for displaying the data.
	Opens the graphing options. This button is only available when the data is viewed in graphical mode.
	Presentation of load profile in tabulated form
	Presentation of load profile as raw data
	These buttons are only available when viewing the data in graphical mode one day at a time. The left arrow moves backward and the right arrow moves forward one day at a time.

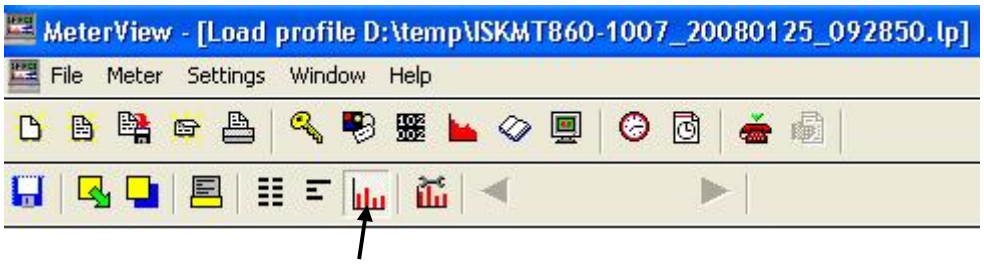
Presented as raw data:

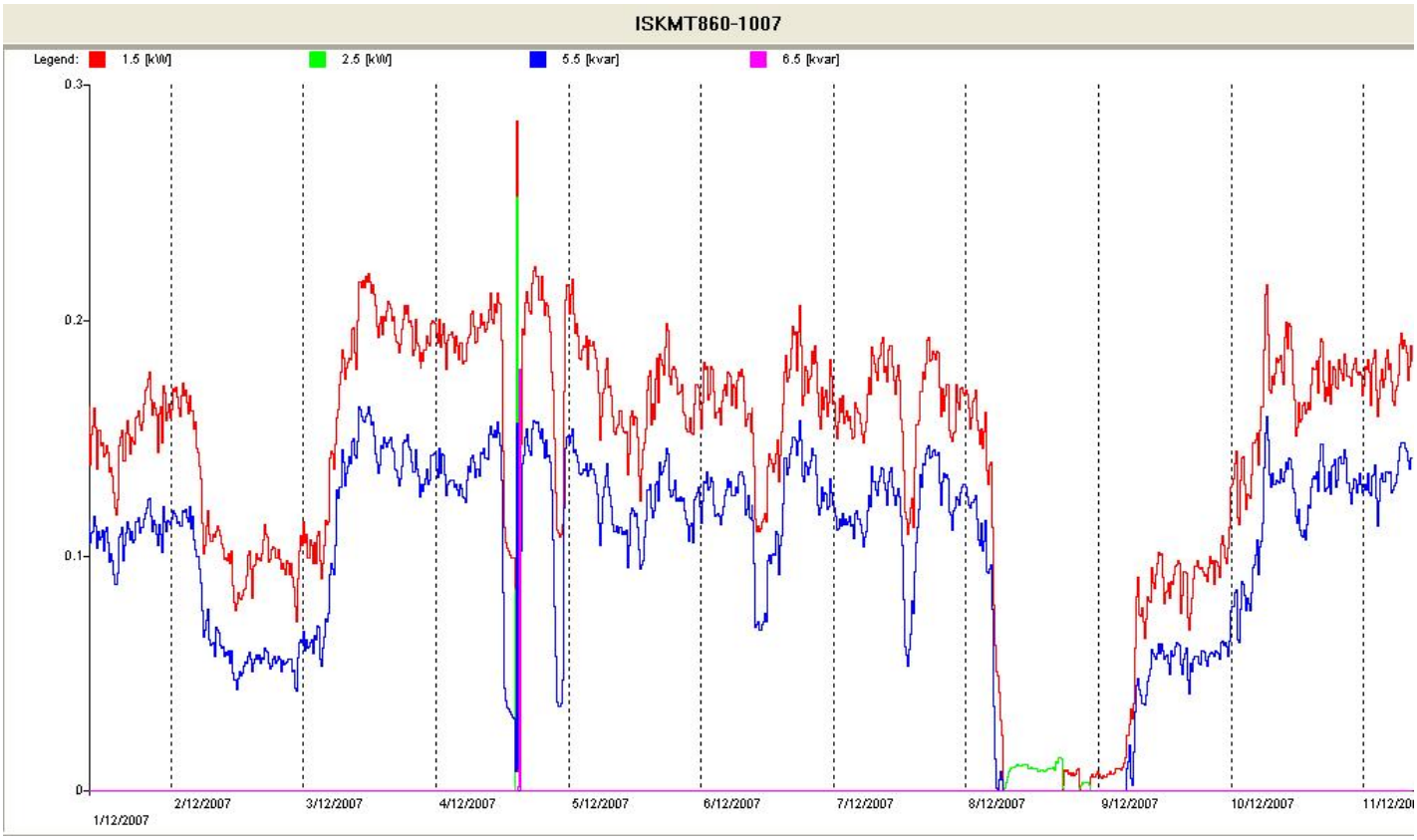


P.01(0712010930)(00)(15)(6)
(1.5)(kW)(2.5)(kW)(5.5)(kvar)(6.5)(kvar)
(7.5)(kvar)(8.5)(kvar)
(0.1636)(0.0000)(0.1144)(0.0000)(0.0000)(0.0000)
(0.1520)(0.0000)(0.1104)(0.0000)(0.0000)(0.0000)
(0.1388)(0.0000)(0.1056)(0.0000)(0.0000)(0.0000)

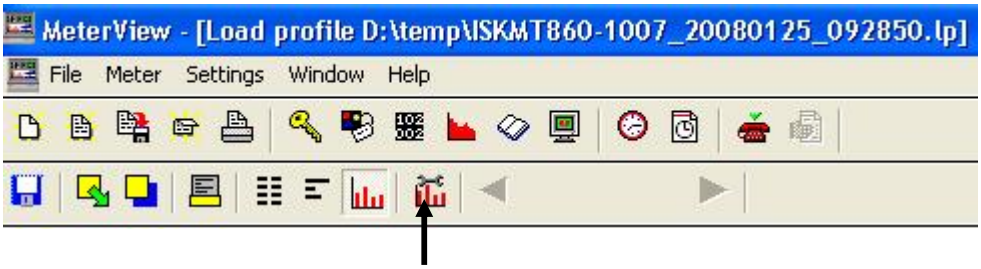
(0.1520)(0.0000)(0.1100)(0.0000)(0.0000)(0.0000)
(0.1552)(0.0000)(0.1108)(0.0000)(0.0000)(0.0000)
(0.1628)(0.0000)(0.1172)(0.0000)(0.0000)(0.0000)
(0.1548)(0.0000)(0.1128)(0.0000)(0.0000)(0.0000)
(0.1368)(0.0000)(0.1036)(0.0000)(0.0000)(0.0000)
(0.1536)(0.0000)(0.1108)(0.0000)(0.0000)(0.0000)
(0.1536)(0.0000)(0.1068)(0.0000)(0.0000)(0.0000)
(0.1468)(0.0000)(0.1080)(0.0000)(0.0000)(0.0000)
(0.1484)(0.0000)(0.1112)(0.0000)(0.0000)(0.0000)
(0.1424)(0.0000)(0.1024)(0.0000)(0.0000)(0.0000)
(0.1436)(0.0000)(0.1108)(0.0000)(0.0000)(0.0000)
(0.1472)(0.0000)(0.1124)(0.0000)(0.0000)(0.0000)
(0.1440)(0.0000)(0.1060)(0.0000)(0.0000)(0.0000)
(0.1356)(0.0000)(0.0976)(0.0000)(0.0000)(0.0000)
(0.1376)(0.0000)(0.1012)(0.0000)(0.0000)(0.0000)
(0.1340)(0.0000)(0.0980)(0.0000)(0.0000)(0.0000)
(0.1272)(0.0000)(0.0924)(0.0000)(0.0000)(0.0000)
(0.1204)(0.0000)(0.0884)(0.0000)(0.0000)(0.0000)
(0.1176)(0.0000)(0.0880)(0.0000)(0.0000)(0.0000)
(0.1240)(0.0000)(0.0928)(0.0000)(0.0000)(0.0000)
(0.1472)(0.0000)(0.1080)(0.0000)(0.0000)(0.0000)
(0.1508)(0.0000)(0.1092)(0.0000)(0.0000)(0.0000)
(0.1536)(0.0000)(0.1124)(0.0000)(0.0000)(0.0000)
(0.1408)(0.0000)(0.0984)(0.0000)(0.0000)(0.0000)
(0.1404)(0.0000)(0.1048)(0.0000)(0.0000)(0.0000)
(0.1524)(0.0000)(0.1100)(0.0000)(0.0000)(0.0000)
(0.1576)(0.0000)(0.1148)(0.0000)(0.0000)(0.0000)
(0.1516)(0.0000)(0.1116)(0.0000)(0.0000)(0.0000)
(0.1436)(0.0000)(0.1072)(0.0000)(0.0000)(0.0000)
(0.1508)(0.0000)(0.1104)(0.0000)(0.0000)(0.0000)
(0.1488)(0.0000)(0.1060)(0.0000)(0.0000)(0.0000)
(0.1476)(0.0000)(0.1068)(0.0000)(0.0000)(0.0000)

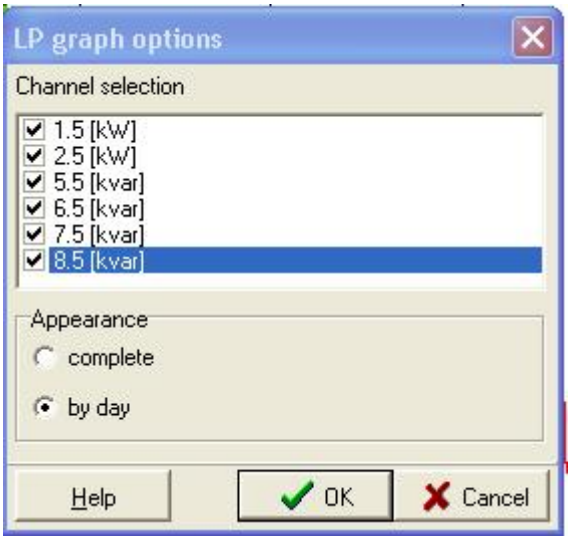
Presented as graph:

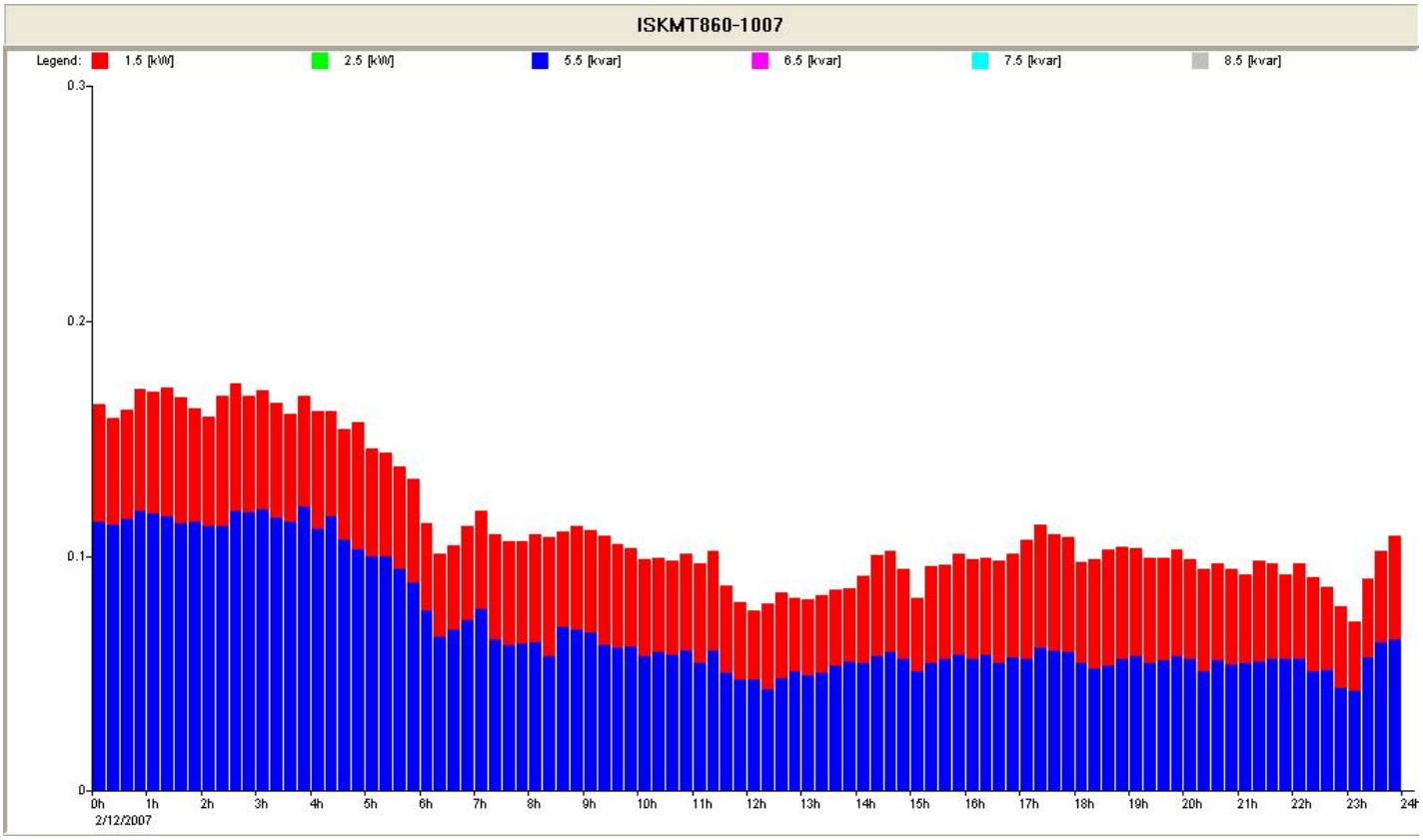




Presented as »bar« graph:





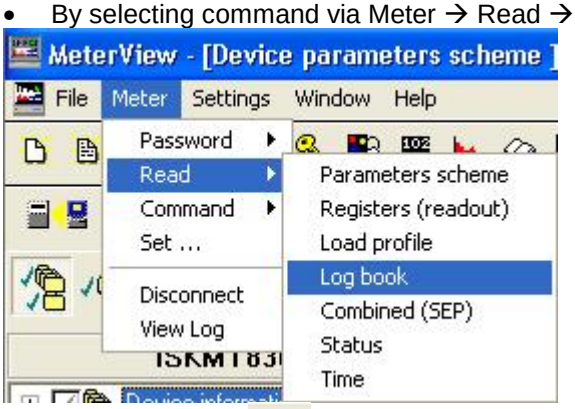


Log book reading

The log book is a list of events, each with a time stamp, that have occurred since the log book was last cleared. The following events are logged.

Log book reading coud be started on two different ways:

- By selecting command via Meter → Read → Log book

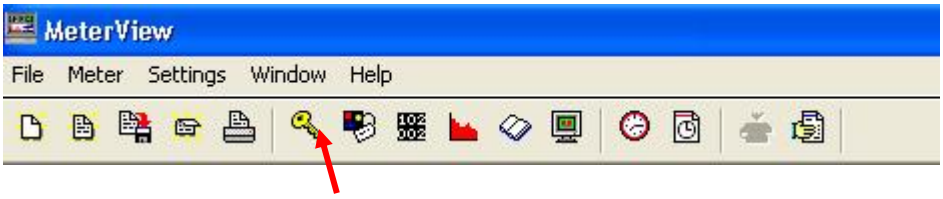


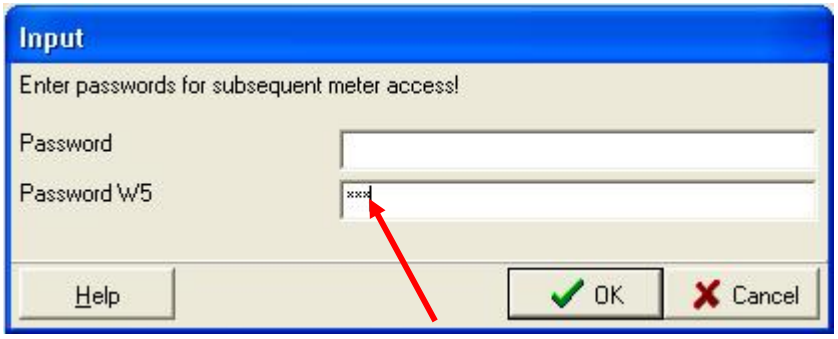
- By clicking icon 

Setting time and date with MeterView

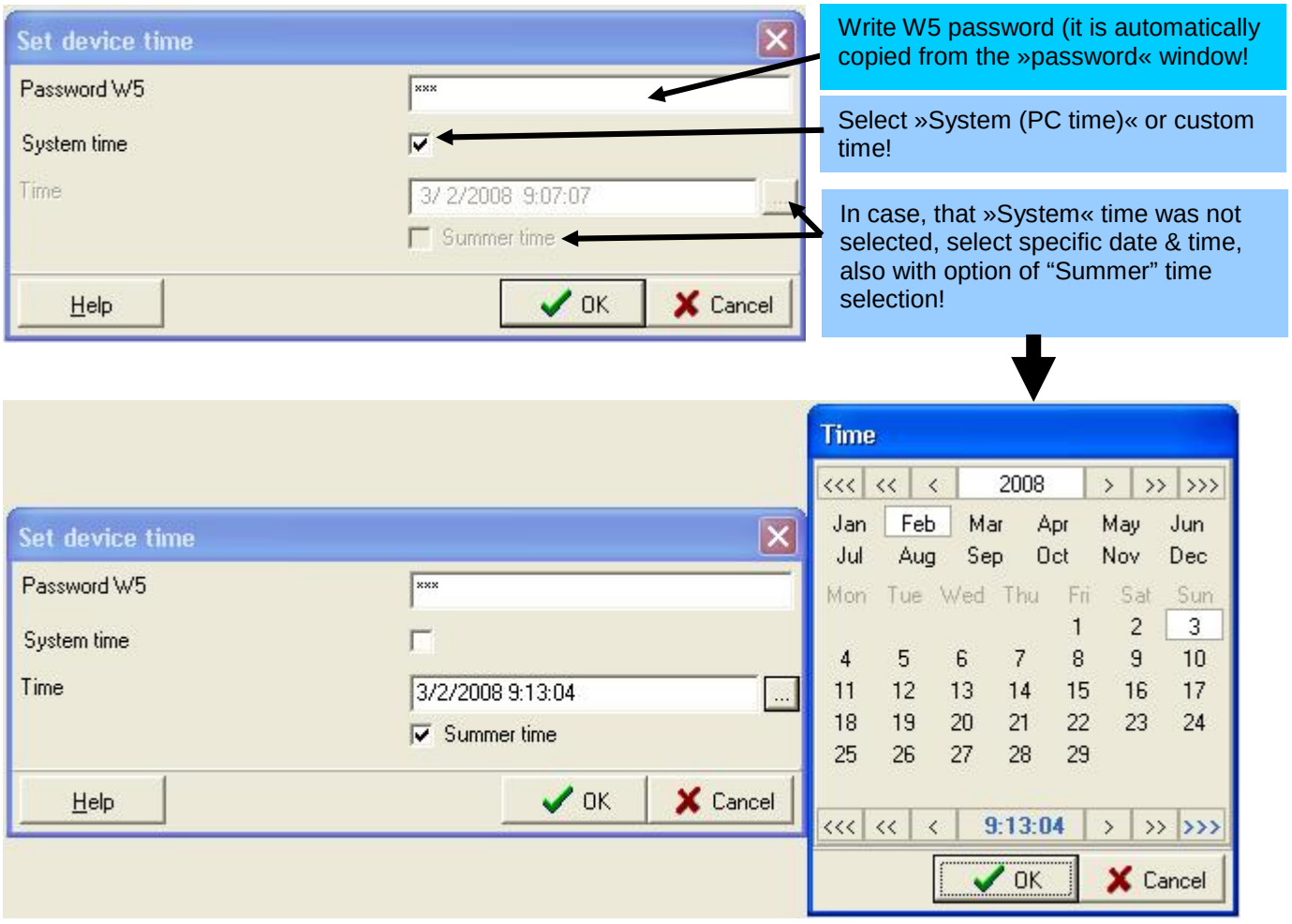
11.3.1 With command W5

Time setting with W5 command is protected with W5 password.
Write password for W5 command:



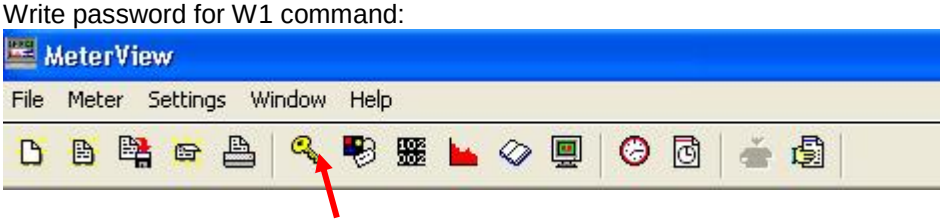


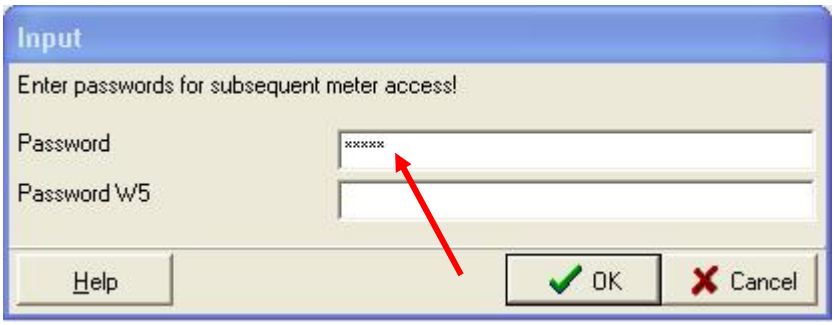
or write password direct in the window, prepared for time selection → 



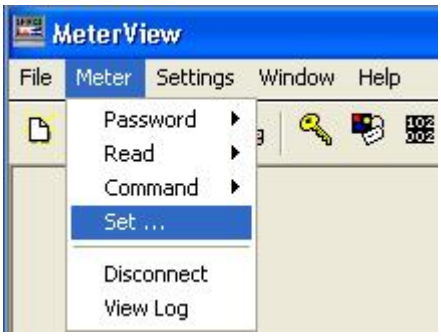
11.3.2 With command W1

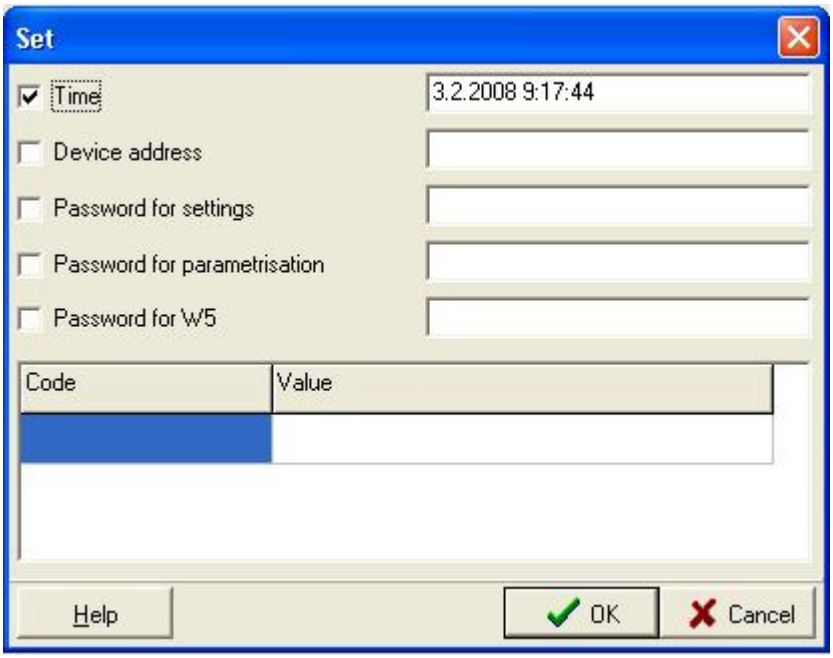
Time setting with W1 command is protected with password, for programming the meter.
Write password for W1 command:





Select →





Note: Only "System" time could be selected!

Programming the meter MT83x

11.5.1 Entering the Password

MT83x meters have up to four different protections level (which password level is implemented in the meter, depends on customer request):

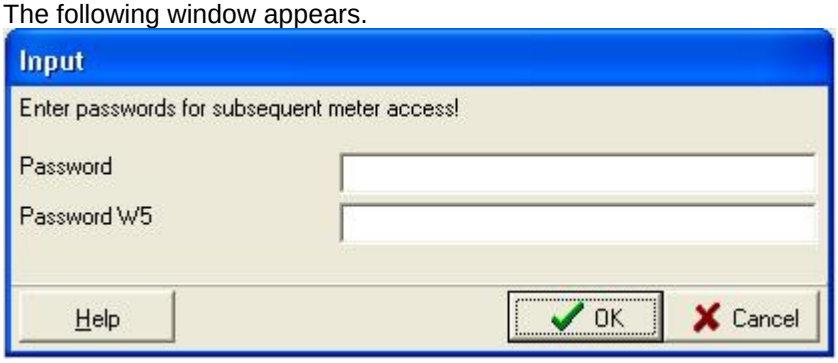
- Password for reading the data (raeding of load profile data, log book data, registers reading, parameter reading)
- Password for programming the meter parameters
- Password W5 for time setting
- PARAM button (located under meter cover) – the highest protection

Parameters in the meter could be protected with password for programming or PARAM button. If there is no customer request for specific parameter protection level, factory set up is used. Protection for each parameter is defined and burned in the meter firmware.

From the main window, select Meter ►Password►Enter Password.

or click on the icon  .

The following window appears.



Meter View password-entry window.

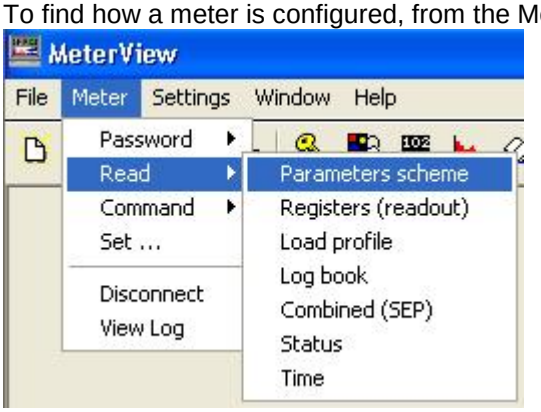
Enter the passwords that will be used to access protected registers in the meter. This table summarises which password is required for which operation.

Operation	***Required Password***
Reading the registers	No password required
Reading the load profile data	No password required or password for reading or password for programming (depends on customer request)
Reading the log book	No password required or password for reading or password for programming (depends on customer request)
Reading the SEP (Combined) data	No password required or password for reading or password for programming (depends on customer request)
Writing a new scheme (parameters)	Password for programming or PARAM button
Setting the time	Password for programming or password W5 or PARAM button
Reset of log book data	Password for programming or PARAM button
Reset of load-profile data	Password for programming or PARAM button

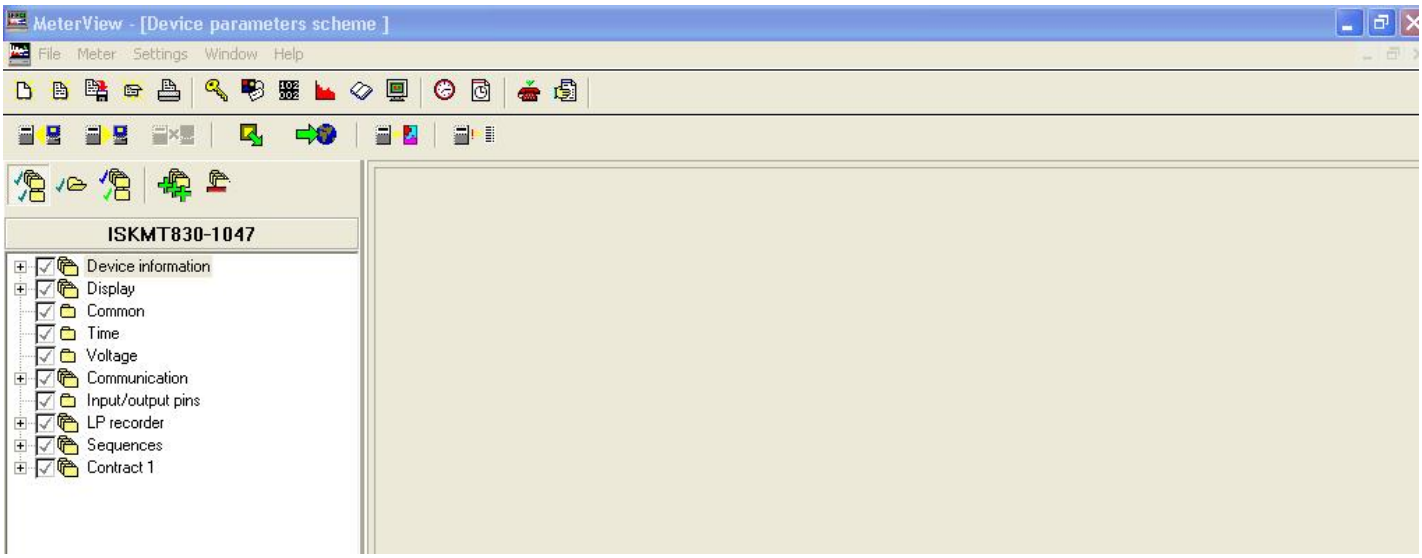
Summary of password protection

11.5.2 Reading the Parameters

Check that no password is entered using the steps described in section *Entering the Password*.
To find how a meter is configured, from the Meter View main menu select Meter ►Read ►Parameters scheme.



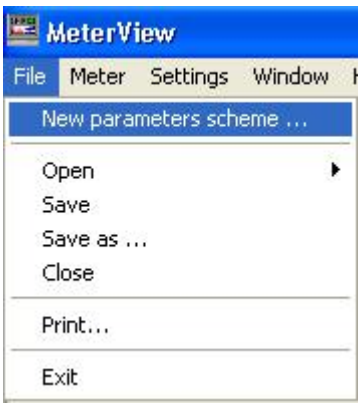
The device parameters window appears, and the main window status bar indicates communications activity.
When the communications are complete, the following window appears.

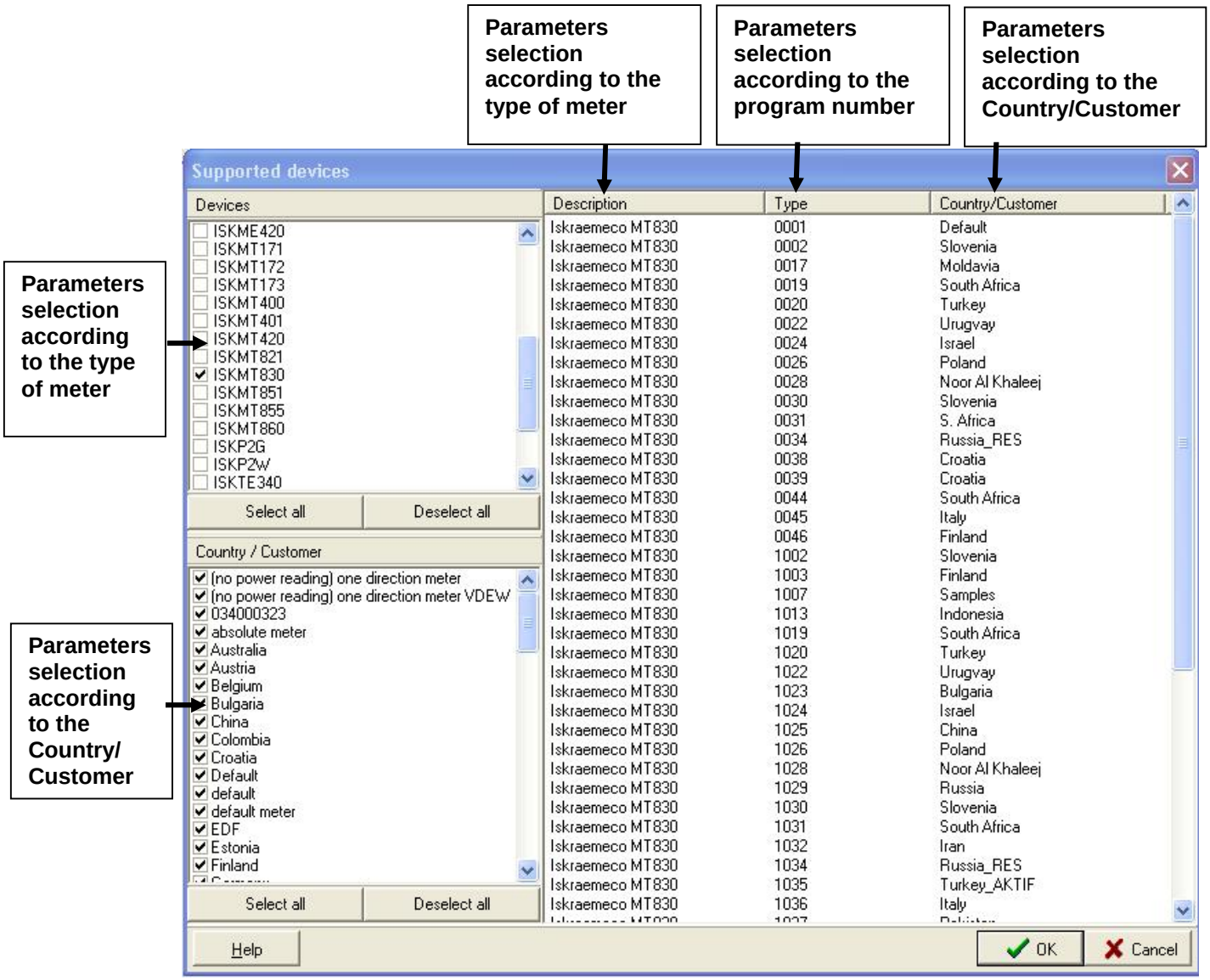


Meter View's Device Parameters window

There are more parameters available than can be displayed on one window, so parameters are divided into pages called "Groups". You can select the group that you wish to view using the Group drop-down list on the toolbar.

Parameters for the specific program number (saved in the MeterView base – factory settigs)) could also be opened directly from MeterView list:





Select appropriate programme number and parameter window will automatically appear.

The functions of the other buttons on the toolbar are summarised in the following table.

Button	***Function***

Button	Function
	Saves the scheme to a file, thus creating a new scheme from existing parameters in a meter. You are prompted to choose to save all the groups, just the currently displayed group or a free selection of groups. This button is the same a selecting File ► Save As.... As with most Windows applications, once you've saved the work, you can use File ► Save to save to the same file.
	Prints the scheme as a report. Just like save function, you can print all the groups, just the currently displayed group or a free selection of groups.
	Writes the currently selected parameters to any connected meter using the password selected in the password window. (The Meter ► Password ► Enter Password option from the main menu is still available when the parameters window is displayed.) You can use this function to copy the scheme from one meter to another. **Note: Change ONLY parameters of one group at the same time!!!**
	Reads parameters from a connected meter into the current set. You can read all the groups, just the currently displayed group or a free selection of groups.
	Aborts a communications session in progress. Available only when communications are active.
	Exports the data to a .ncs (this file is a list of IEC 62056 - 21 commands for use with another Iskraemeco software product called MeterRead)or .cix file (this file is a list of IEC 62056 - 21 commands for use with another Iskraemeco software product called Meter View Light)
	Creates or loads a parameter patch. A parameter patch is a small subset of one parameter page. You can use this feature, for example, to export a frequently used tariff. This tariff can then be imported into future schemes that you create thus saving you time.
	Compares the current parameters with those from either a file or the default.

The lower part of the Device Parameters window is used to display information such as errors in entered values as you changes the parameters.

11.5.3 Writting the Parameters

Parameters could be protected with two different levels:

- Password – low level
- PARAM button - high level (PARAM button is located under meter cover)

Location of the PARAM button

Procedure to change the parameters in the meter:

2. Set appropriate password (password or PARAM button)
3. Read the parameters in the meter or open parameters from the MeterView data base
4. Adopt the parameters according the request.
5. Set appropriate password (password or PARAM button)
6. Set up the communication settings in the MeterView
7. Write parameters

Note: Write only group of parameters that you want to change, not all of them!

Answers from the meter:

- Done! → Parameter was changed successfully
- Access denied! → Protection level doesn't open the parameter lock, wrong protection level or wrong password
- Failed! → Parameter doesn't exist in the meter

12. MT83x meter parameters

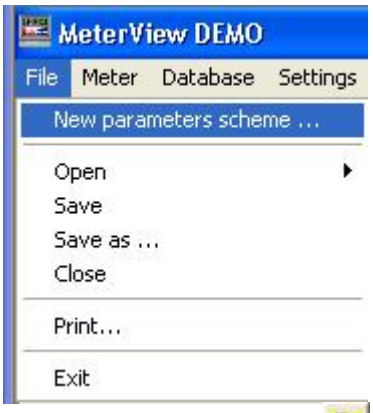
Parameters in MT83x meter can be protected with three different levels:

- Password for reading
- Password for programming
- PARAM button (located under meter cover)

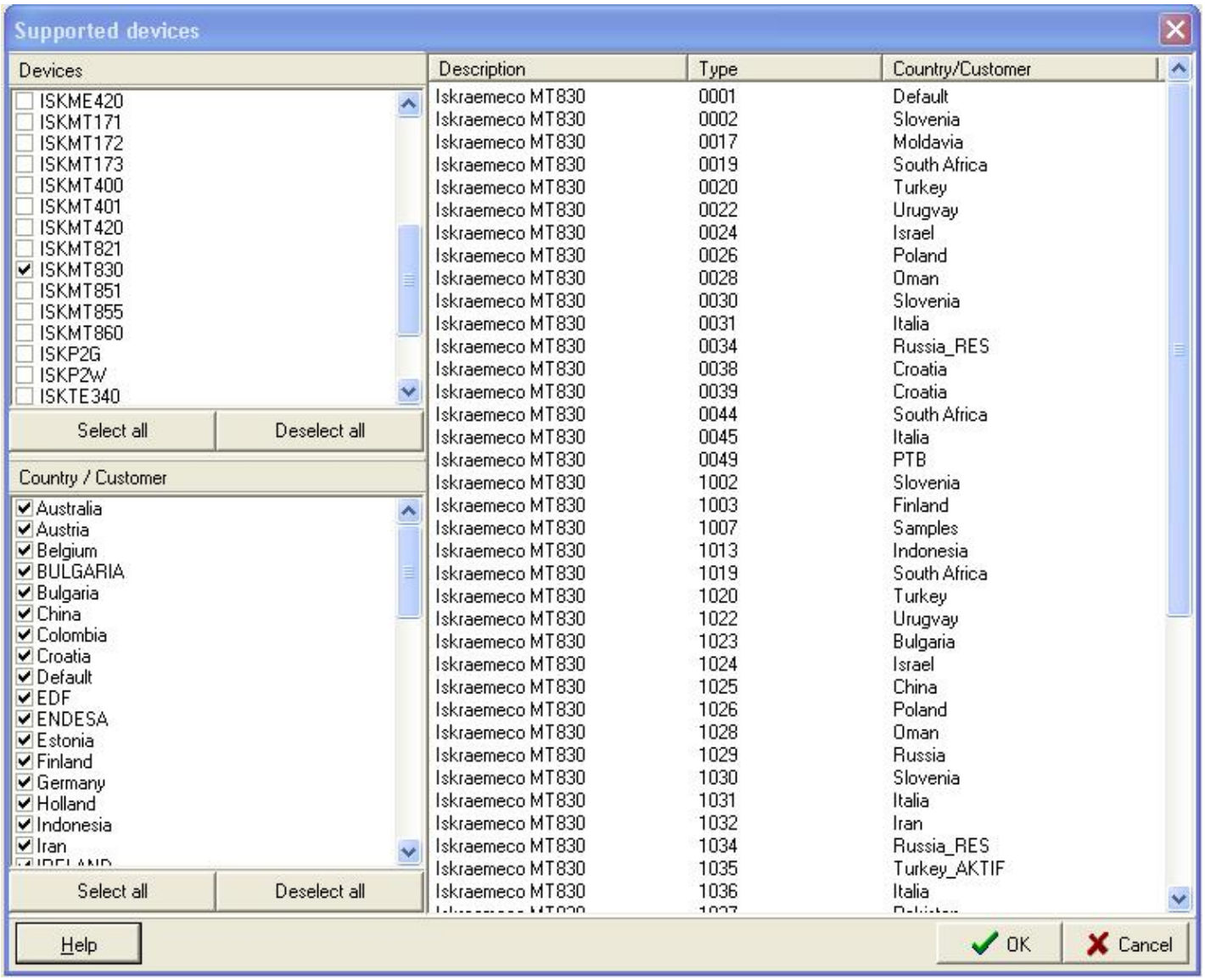
12.1 Open the existing parameters from the Meter View

Parameters in the Meter View data base are set up by the meter type, customer (or country) and can differ from the parameters that are stored in the meter. For viewing the parameters stored in a meter, we recommend the reading the parameters. See capture "11.5.2 Reading the Parameters".

To create a new scheme for the MT83x meter, from Meter View's main menu select File ► New Parameters scheme...



Alternatively, you can click  , the leftmost button on the main window toolbar.
The following window will appear.



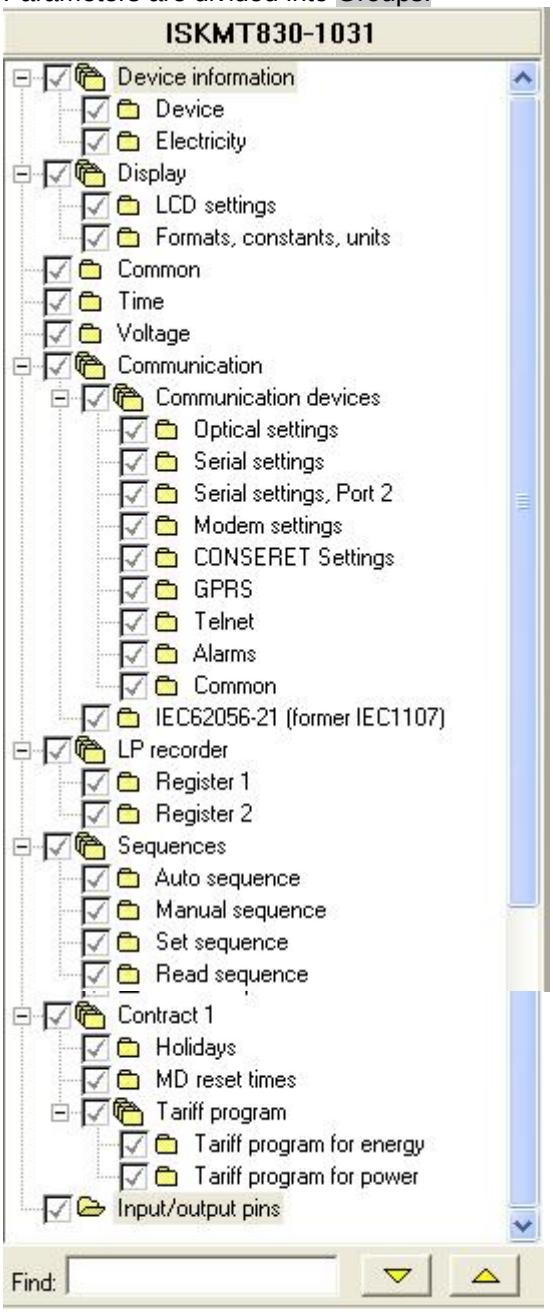
List of MT83x devices supported by Meter View

Scroll down the extensive list to find the entry that represents the entry for your meter; perhaps the highlighted entry in the above screen-shot.
Tip: *If you're not sure of your meter's exact model code, but you have an example meter available, try reading its parameters. The exact model code is displayed at the top of the parameters window.*

Click OK when you have selected the meter you wish to configure.

Note: Parameters that are available in Meter View can differ from one version of Meter View to another, according to customer requests. In this manual, only the most common parameters are described.

Parameters are divided into Groups:



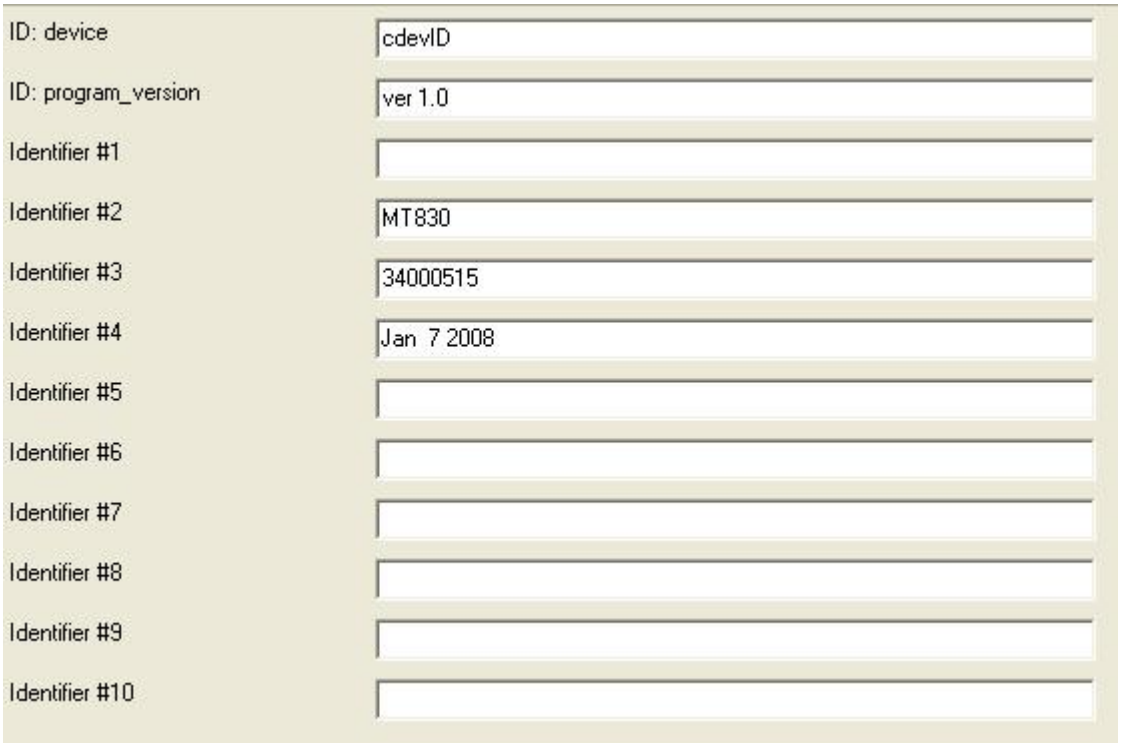
Note: parameters presented contained in the meter, could be different as presented bellow. They are dependent on the functions, which are implemented in the meter and also reading protection level (on customer request, some parameters are not visible).

12.2.2 Group → Device information

Group Device information contains identification numbers of the meter. It is divided into Device identifiers and electricity identifiers

12.2.2.1 Device information → Device

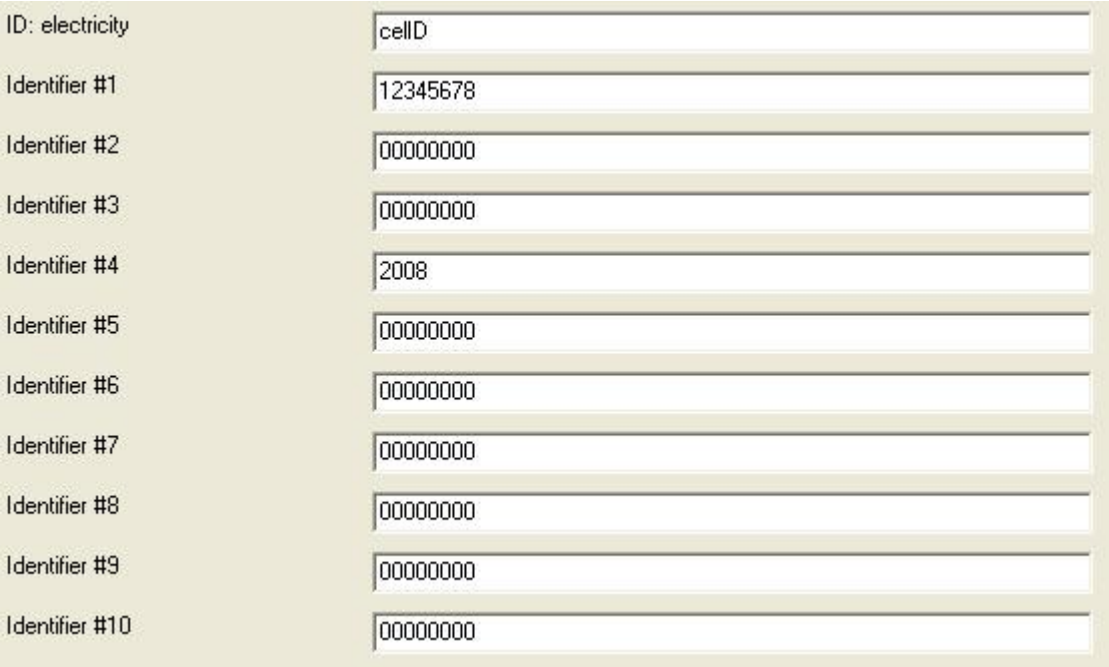
Device identifiers are related to the factory specific identifications.



ID: device (0.0.96.1.255) → contains complete device identifications
ID : program_version (1.0.0.2.0) → meter program version
Identifier #1 (0.0.96.1.0) → factory number
Identifier #2 (0.0.96.1.1) → meter identification
Identifier #3 (0.0.96.1.2) → software package, related to the ISKRAEMECO production data base
Identifier #4 (0.0.96.1.3) → date of creaition of the firmware
Identifier #5 (0.0.96.1.4) → production year
Identifier #6 (0.0.96.1.5) → reserved value
Identifier #7 (0.0.96.1.6) → reserved value
Identifier #8 (0.0.96.1.7) → reserved value
Identifier #9 (0.0.96.1.8) → reserved value
Identifier #10 (0.0.96.1.9) → meter's calibration date

12.2.2.2 Device information → Electricity

Device identifiers are related to the factory specific identifications. Parameters, except ID: electricity, are protected with password.



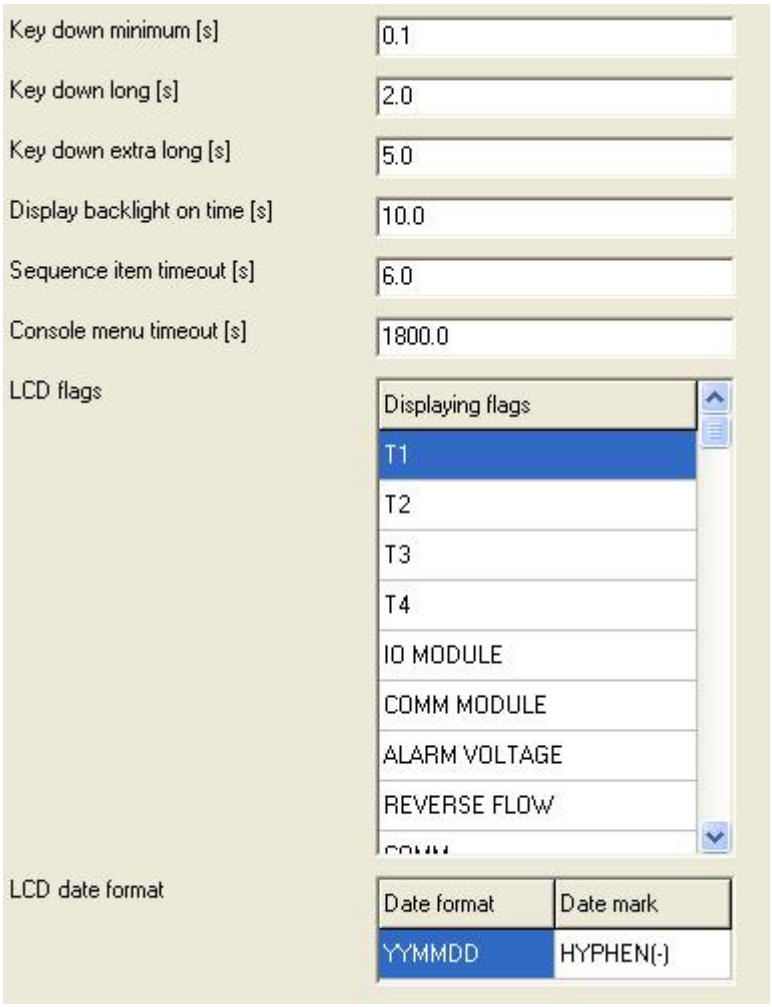
ID: electricity (1.0.0.0.255) → contains complete electricity identifications
Identifier #1 (1.0.0.0.0) → device address, register value is automatically copied into 0.0.128.4.7 register
Identifier #2 (1.0.0.0.1) → reserved value for customer identification
Identifier #3 (1.0.0.0.2) → reserved value for customer identification
Identifier #4 (1.0.0.0.3) → production year
Identifier #5 (1.0.0.0.4) → reserved value for customer identification
Identifier #6 (1.0.0.0.5) → reserved value for customer identification
Identifier #7 (1.0.0.0.6) → reserved value for customer identification
Identifier #8 (1.0.0.0.7) → reserved value for customer identification
Identifier #9 (1.0.0.0.8) → reserved value for customer identification
Identifier #10 (1.0.0.0.9) → reserved value for customer identification

12.2.3 Group → Display

Group Display consists of the parameters, which are related to the display parameters and register presentation, current and voltage ratio, ……

12.2.3.1 Display → LCD settings

Group consists of the following parameters:



Key down minimum [s] (0.0.128.0.1) → minimum duration for activation of "short button press"
Key down long [s] (0.0.128.0.2) → minimum duration for activation of "long button press"
Key down extra long [s] (0.0.128.0.3) → minimum duration for activation of "extra long button press"
Display backlight on time [s] (0.0.128.0.5) → definition of LCD backlight time
Sequence item timeout [s] (0.0.128.0.6) → definition of sequence item time out – time for rolling the register in Auto sequence mode
Console menu time out [s] (0.0.128.0.84) → definition of console menu time out – in this time, meter automatically goes into Auto sequence
LCD flags (0.0.128.5.1) → status meanings on the LCD (flag meaning is burned on the front plate)

NONE – status is not active

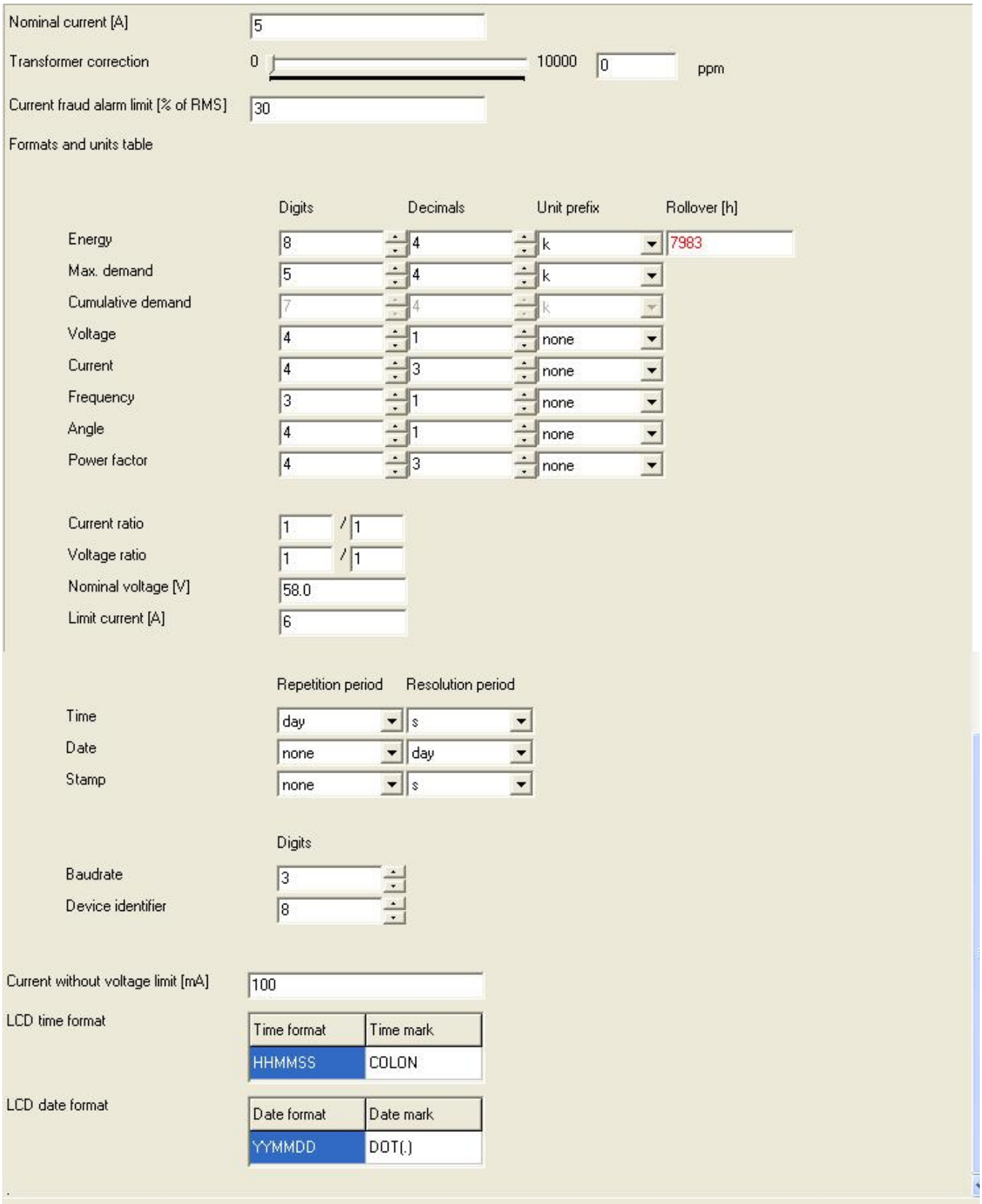
Status	**Status ON**	**Status BLINKS**
T1 … T8	tariff for energy	-
M1 … M8	tariff for demand	-
RCR1 .. RCR4		
ERROR		
COMM	meter is in communication mode	-
DST		
INTERNAL TARIFF		
IO MODULE	MIO module is recognised by the meter	MIO module is not recognised by the meter (module is not programmed properly)
COMM MODULE	MK module is recognised by the meter	MK module is not recognised by the meter (module is not programmed properly)
MAIN COVER	Meter cover is opened	-
TERMINAL COVER	Terminal cover is opened	-
FRAUD	Fraud conditions exists on the meter	-
DRO		

FF	-	Fatal error occurs on the meter
SET	Meter in SET mode	
TEST	Meter in TEST mode	
RTC	Internal tariff is controlled by internal meter clock	
RS		
MEAS IDLE		
PHASE ORDER	Voltage phase sequence is not OK	
REVERSE FLOW		Current in one phase is inverted
R IMPORT		
S IMPORT		
T IMPORT		
CRITICAL ALARM		
NON CRITICAL ALARM		
BATTERY ALARM	Internal Li battery should be replaced	-
ALARM VOLTAGE	-	At least one phase missing or is over/under specified limits
CURRENT WITHOUT VOLTAGE R	Current without voltage state on phase R	
CURRENT WITHOUT VOLTAGE S	Current without voltage state on phase S	
CURRENT WITHOUT VOLTAGE T	Current without voltage state on phase T	

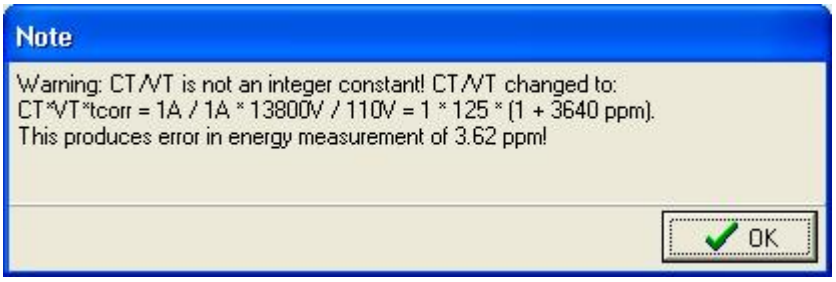
LCD date format (0.0.128.5.3) → Definition of the date format, presented on the LCD →YYMMDD or YYYYMMDD or DDMMYY and Date mark → SPACE or UNDERSCORE (_) or HYPEN (-) mark.

YY or YYYY → year presentation
MM → month's presentation
DD → day presentation

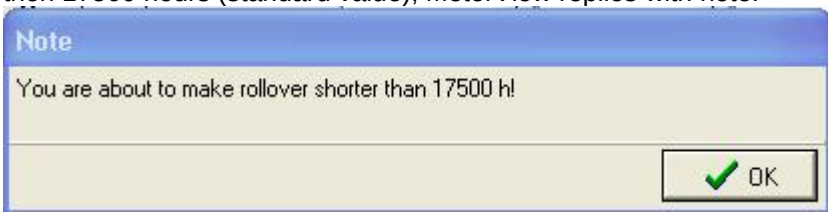
12.2.3.2 Display → Formats, constants, units



Nominal current [A] (0.0.128.0.8)– definition of meter's nominal current → 5A or 1A
Transformer correction [ppm] (0.0.128.0.12)**-** transformer correction factor up to + 10000 ppm. It is used also for implementation of non- integer CT & VT values.
For example: VT ratio is 13800V / 110V = 125,4545454545



Current fraud alarm limit [% of RMS] (0.0.128.0.71)**–** in case, that meter is eqquipped with neutral measurment system
Formats and units table (0.0.128.3.1)**–** definition of formats and units for energy, demand, cumulative demand, voltage, current, frequency, angle, power factor. Format for demand is adopted automatically regarding the **maximum current** and **nominal voltage.** Related to these two values "rollover" time for energy registers is automatically calculated (time needed, that meter register goes from 00000000 to 99999999) . In case, that "rollover time" is shorter then 17500 hours (standard value), MeterView replies with note:



and rollover time is red coloured.

All other formats must be adopted manually.

Formats and units for presented data:

	Digits	Decimals	Unit prefix	Rollover
Energy	**number of digits (8)**	**number of decimals (4)**	none / k / M	**7389 h**
Example:			**2345. 7653kWh**	

Rollover time: if meter is connected to voltage 58V and current is 6A, then meter register will go in 7398h from 0000.0000 kWh to 9999.9999 kWh and then back to 0000.0000 kWh. Rollover time is only informational value and doesn't affect to other parameters.

Max. Demand	**number of digits (5)**	**number of decimals (4)**	none / k / M	
Example:			**1.4564 kW**	
Cum. Demand	**number of digits (5)**	**number of decimals (4)**	none / k / M	
Voltage	**number of digits (4)**	**number of decimals (1)**	none / k / M	
Example:			**058.3 V**	
Current	**number of digits (4)**	**number of decimals (3)**	none / k / M	

Example: **0.583 A**

Frequency **number of digits (3)** **number of decimals (1)** none k M

Example: **50.0 Hz**

Angle **number of digits (4)** **number of decimals (1)** none k M

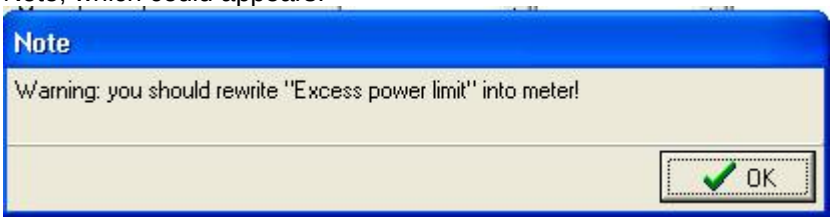
Example: **120.0**

Power factor **number of digits (4)** **number of decimals (3)** none k M

Example: **0,833**

Current ratio (0.0.128.0.11)**-** current transformer ratio. Example : CT ratio is inserted like 100/5, but value 20 is written into and read out from the meter. When CT ration is written into the meter, meter automatically multiplies all energy and register values with inserted CT ration. Current is presented as secondary value by default. Primary current presentation must be done manually, by writing appropriate register.
Voltage ratio (0.0.128.0.10)– voltage transformer ratio. Example : VT ratio is inserted like 13800/100, but value 128 is written into and read out from the meter. When VT ration is written into the meter, meter automatically multiplies all energy and register values with inserted VT ration. Voltage is presented as secondary value by default.Primary voltage presentation must be done manually, by writing appropriate register.
Nominal voltage (0.0.128.0.7)**–** nominal voltage on the measurement place, to which is meter connected, It is used also as **Alarm voltage**, used for detecting over / under voltages.
Limit current (0.0.128.0.9) – current value, used only for calculation of "roll over" time for energy registers presentation

Note, which could appears:



Information, that you use excess demand function in the meter, should check the "Excess power limit", because of eventual change of CT and VT ratio.

Time
Date
Stamp

Baud rate
Device identifier

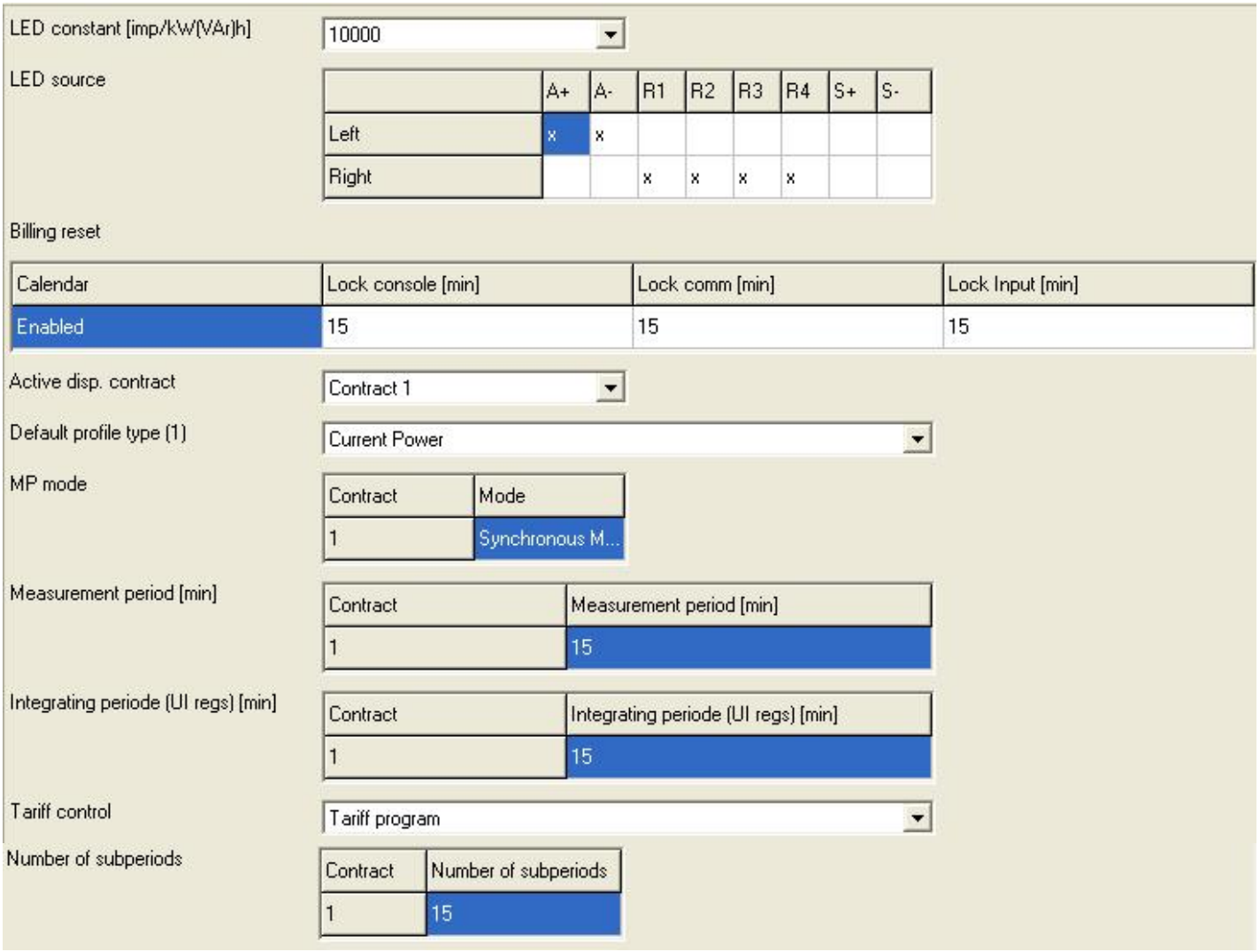
Current without voltage [mA] (0.0.128.0.119) → definition of the minimum current that flows through the meter and voltage is not present (voltage is disconnected or voltage fuse is broken – fraud detection). Such condition is registered in meter's Log Book or presented via Alarm Output (MKA) – optional function in the meter

LCD time format (0.0.128.0.154) → definition of time format presented on LCD → HH MM SS or HH MM. Default value HH MM SS.
HH – hour
MM – minute
SS - second

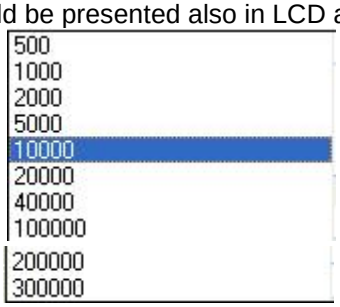
LCD date format (0.0.128.0.152) → definition of date format presented on LCD → YYYY MM DD or DD MM YYYY or YY MM DD or DD MM YY. Default value YY MM DD.
YYYY or YY – year

MM – month
DD - day

12.2.4 Common



LED constant [imp/kW(VAr)h) (0.0.128.0.13) → LED constant, presented as imp/kWh/kvarh/kVAh. Default value for multi range meter is 10.000 imp/kWh/kvarh/kVAh. LED constant could be presented also in LCD and parameter change is written in Technical Log Book – optional function. Possible values:

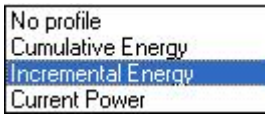


LED source (0.0.128.0.14) → definition of the energy sources, forward to the LED diode. Default value: left LED → active energy (all four quadrants), right LED → reactive energy (all four quadrants). Other combinations on request.

Billing reset (0.0.128.0.20) → enabling or disabling billing calendar (automatically billing reset)
→ blockade of billing reset performed via the red button (console)
→ blockade of billing reset performed via communication interface (comm)
→ blockade of billing reset performed via billing reset inputs MRA and MRB (Input)
Values could be set from 1 minute to 65534 minutes. In case, that 65535 blockade is written into the meter, manual billing reset is disabled.

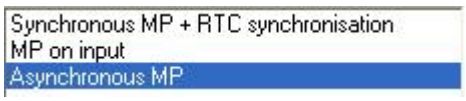
Active disp. Contract (0.0.128.0.21) → definition of presented contract on the LCD (Contract 1 or contract 2). Default value is Contract 1

Default profile type (1) (0.0.128.0.22) → type of profile P.01 →



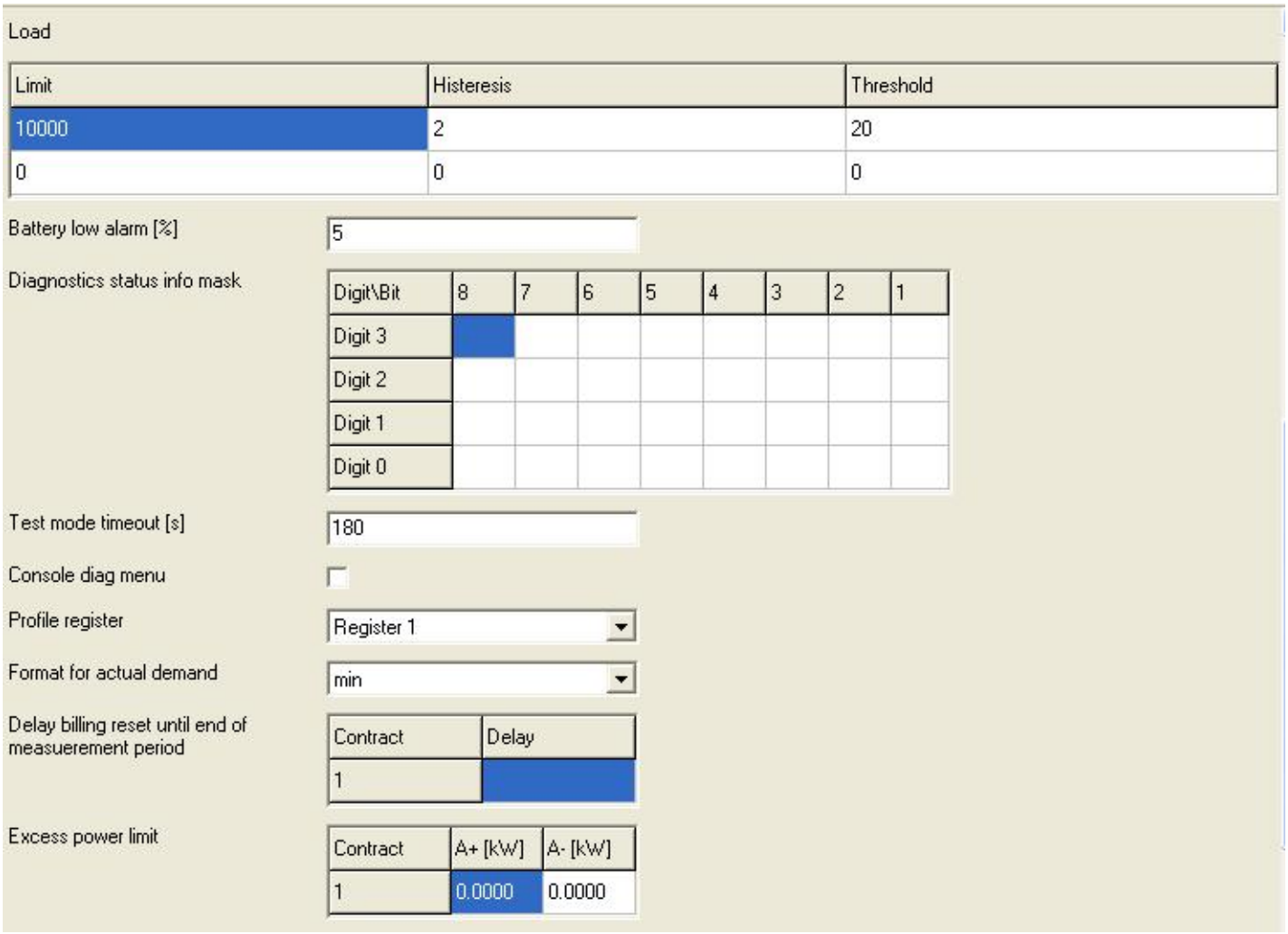
→ No profile → disabling of profile
→ Cumulative energy (1.8, 2.8, ..) → registers states are written in the profile
→ Incremental energy (1.9, 2.9, .) → Increments of energy registered in the load profile period are written into the profile
→ current power (1.5, 2.5, ..) → Power registered in the load profile period is written into the profile

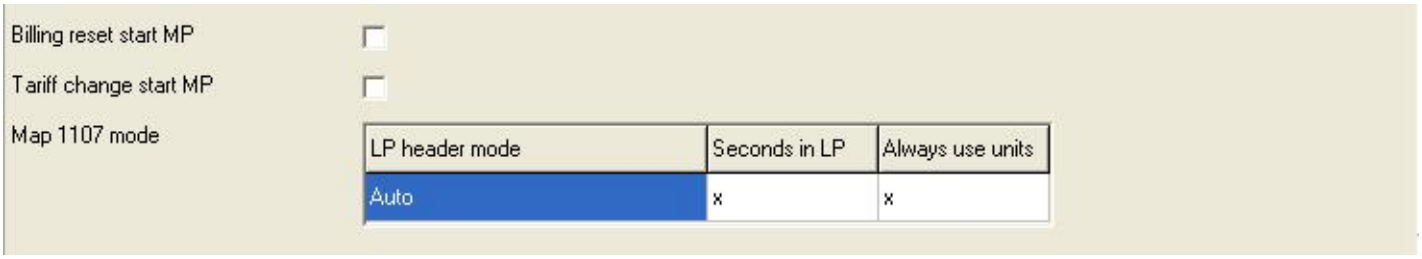
MP mode (0.0.128.0.118) → measurement period mode definition :



→ Synchronous MP + RTC synchronisation : block measurment period mode and RTC synchronisation via MPE input
→ MP on input: measurement period is controlled via MPE input
→ Asynchronous MP: sliding measurement period

Note: definition of block or sliding measurement period is related to the firmware configuration. If measurement period is defined in the firmware as “Synchronous MP”, then is not possible to have in the same meter sliding period.



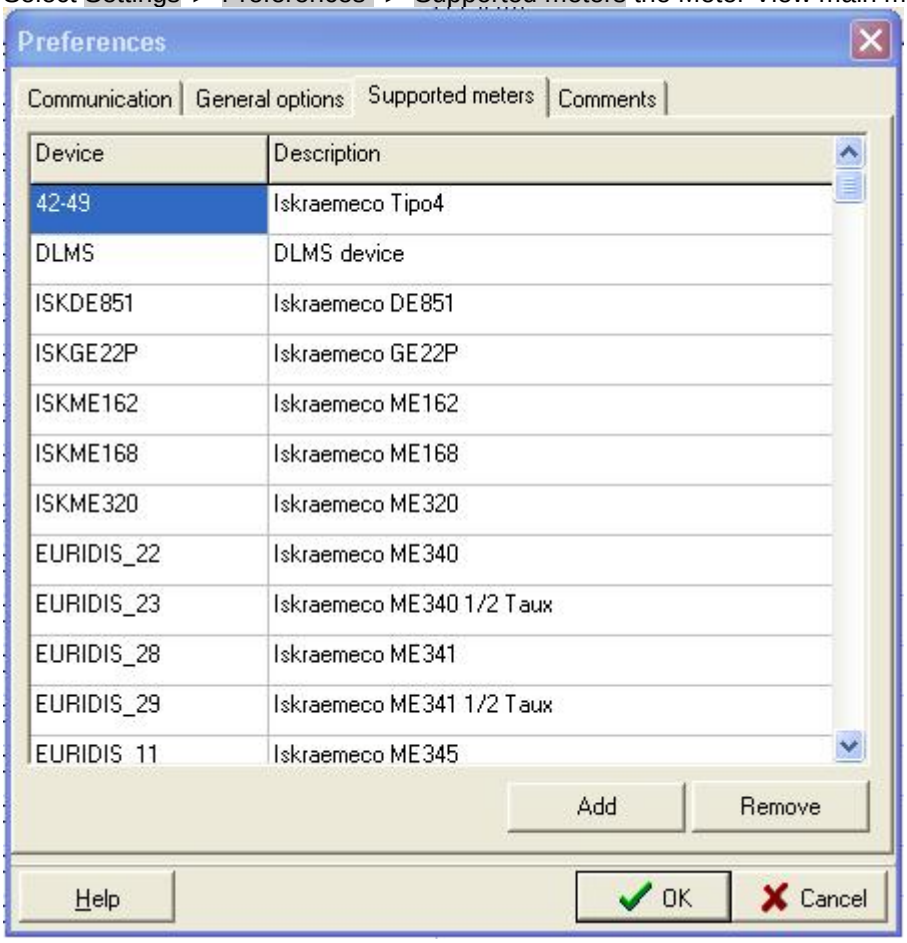


13. Adding support for new meters

If meter Program Number is not supported in MeterView, the following window appears.

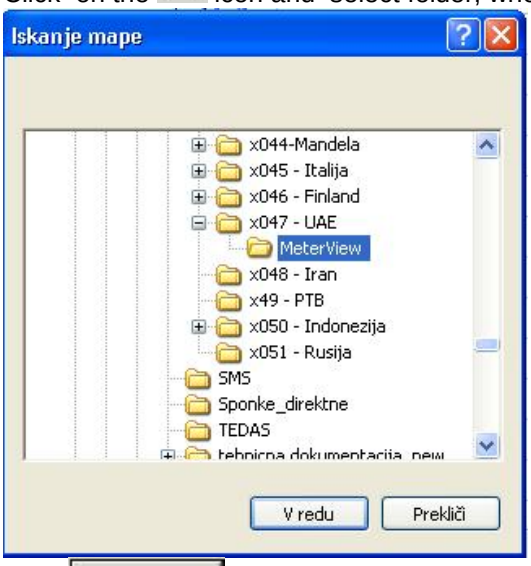
In this case, the meter producer will prepare DEVICE.INF, (the floppy disk with necessary files is normally added to the delivered meters). If the files are in ZIP form, first unzip them to your choice of folder; for example C:\TEMP.

Example: supporting the 3100189v Program version in Meter View:
Select Settings ► Preferences ► Supported meters the Meter View main menu. The following window appears.



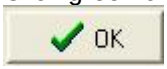
Select Add and the following window appears.

Click on the ... icon and select folder, where you have copied the files:

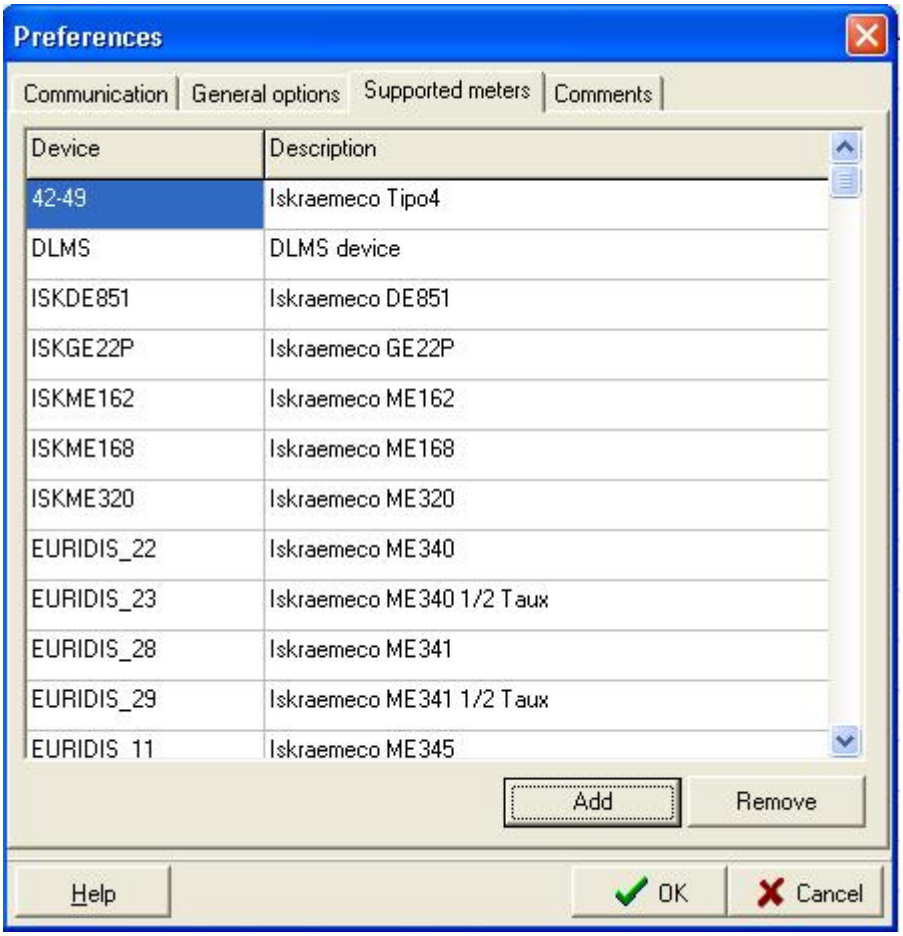


Click OK:

Click green check mark OK:



And another green arrow:



At the end you can check if the requested program number is supported in the Meter View.

14. Installation of SONDA 5 USB driver

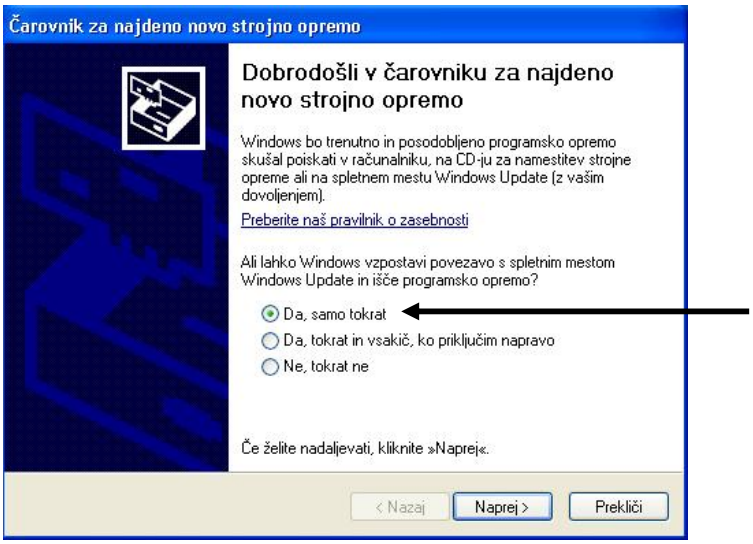
Before using SONDA 5 USB, driver must insalled to the computer. From the responsible Iskraemeco sales support, you need to receive driver for SONDA 5 USB.

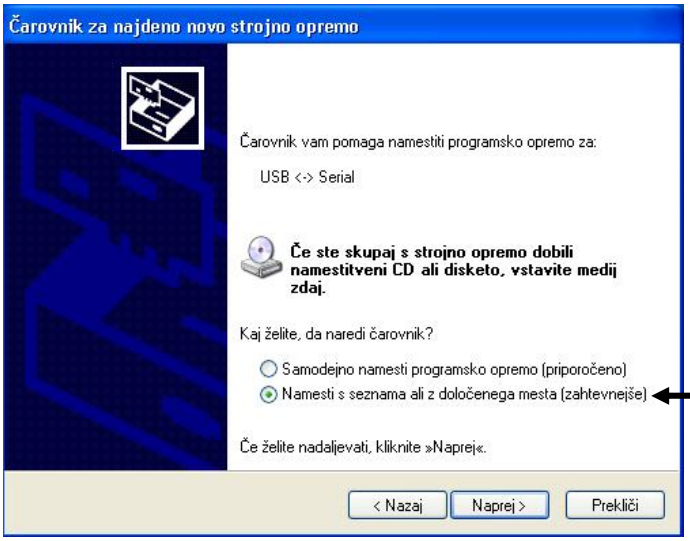
1. Copy this files to folder in your computer.

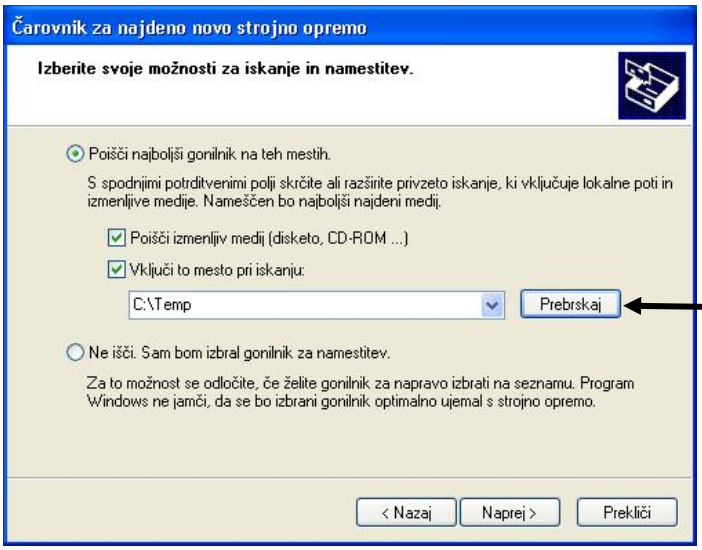
FTSERMOU.VXD	10 KB	Virtual device driver	10/04/2003 15:00
FTSENUM.VXD	8 KB	Virtual device driver	17/12/2003 17:38
FTCOMMS.VXD	24 KB	Virtual device driver	17/12/2003 17:38
FTSERIAL.SYS	69 KB	System file	17/12/2003 17:38
ftser2k.sys	57 KB	System file	20/04/2004 10:05
FTSENUM.SYS	25 KB	System file	17/12/2003 17:38
ftdibus.sys	24 KB	System file	20/04/2004 10:04
FTSERMOU.INF	2 KB	Podatki o namestitvi	30/10/2003 17:12
FTDIPORT.INF	5 KB	Podatki o namestitvi	16/04/2004 16:11
FTDIBUS.INF	4 KB	Podatki o namestitvi	16/04/2004 16:12
FTDIBUS_OPTIONS.rtf	4 KB	Obogateno besedilo...	19/01/2004 12:53
2154 Release Info.DOC	9 KB	Microsoft Wordov d...	20/04/2004 10:06
905 Release Info.DOC	6 KB	Microsoft Wordov d...	20/04/2004 10:07
ftsermou.cat	10 KB	Katalog varnosti	11/06/2004 19:12
ftdiport.cat	11 KB	Katalog varnosti	11/06/2004 19:16
ftdibus.cat	11 KB	Katalog varnosti	11/06/2004 19:15
README.TXT	2 KB	Dokument z besedilom	16/04/2004 15:47
FTDIUNIN.INI	1 KB	Configuration Settings	10/04/2003 15:00
FTDIUN2K.INI	1 KB	Configuration Settings	10/04/2003 15:00
FTSERUI.DLL	23 KB	Application Extension	20/05/2003 14:04
ftserui2.dll	51 KB	Application Extension	14/04/2004 13:32
FTLang.dll	36 KB	Application Extension	16/04/2004 15:15
FTDIUNIN.EXE	405 KB	Application	10/04/2003 15:00
COMPORT.PDF	6 KB	Adobe Acrobat Doc...	10/04/2003 15:00

2. Connect SONDA 5 USB to appropriate port in your computer and follow the procedure.

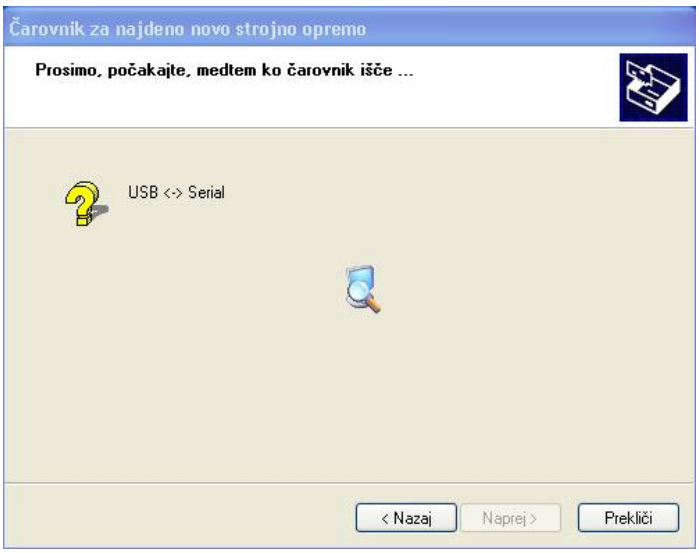
Installation of USB serial converter:

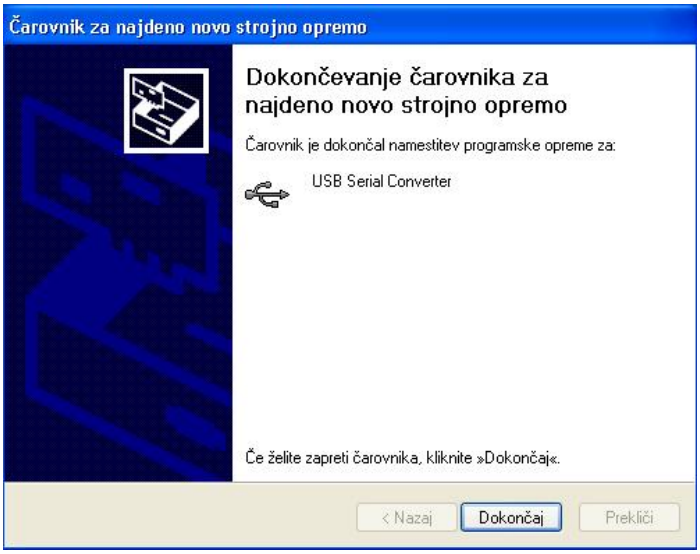




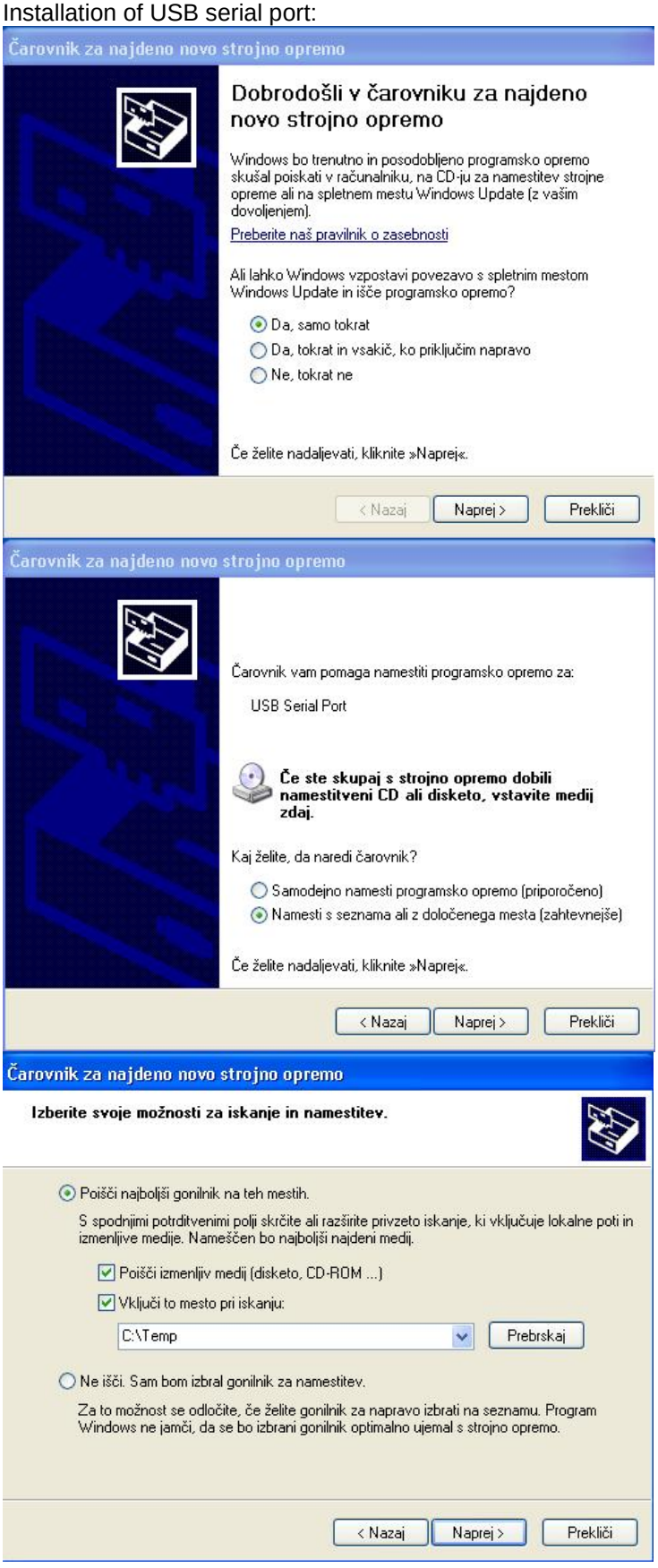


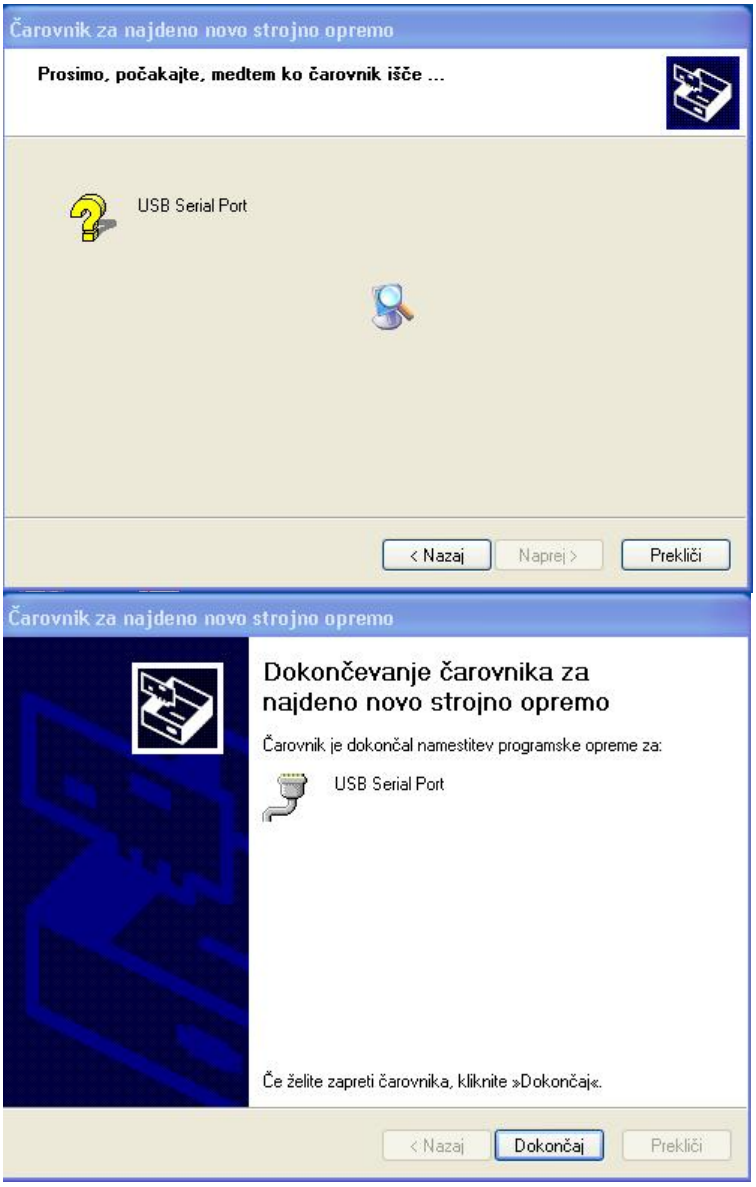
Select folder, where driver was copied in step 1.




Čarovnik za najdeno novo strojno opremo
Dokončevanje čarovnika za najdeno novo strojno opremo
Čarovnik je dokončal namestitev programske opreme za:
USB Serial Converter
Če želite zapreti čarovnika, kliknite »Dokončaj«.
< Nazaj
Dokončaj
Prekliči

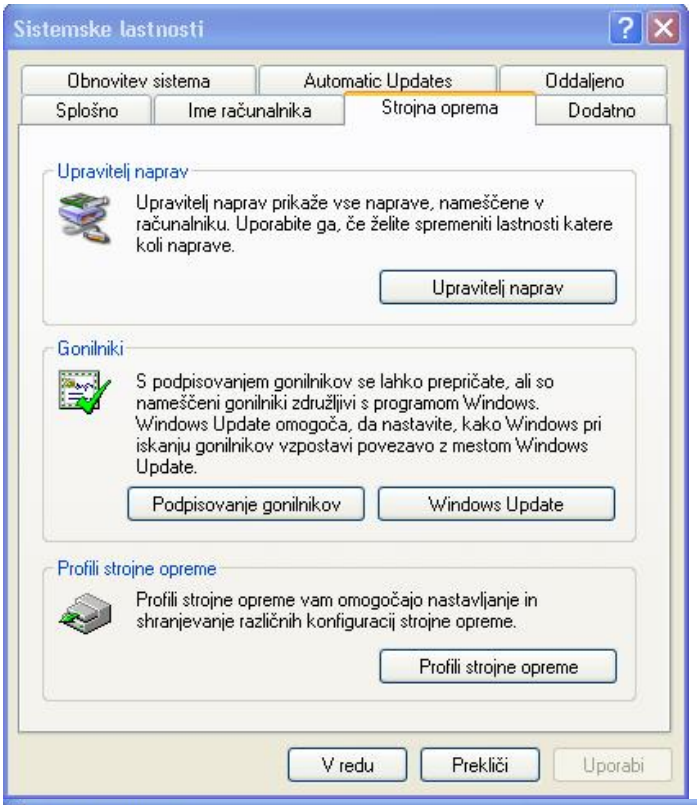
Installation of USB serial port:

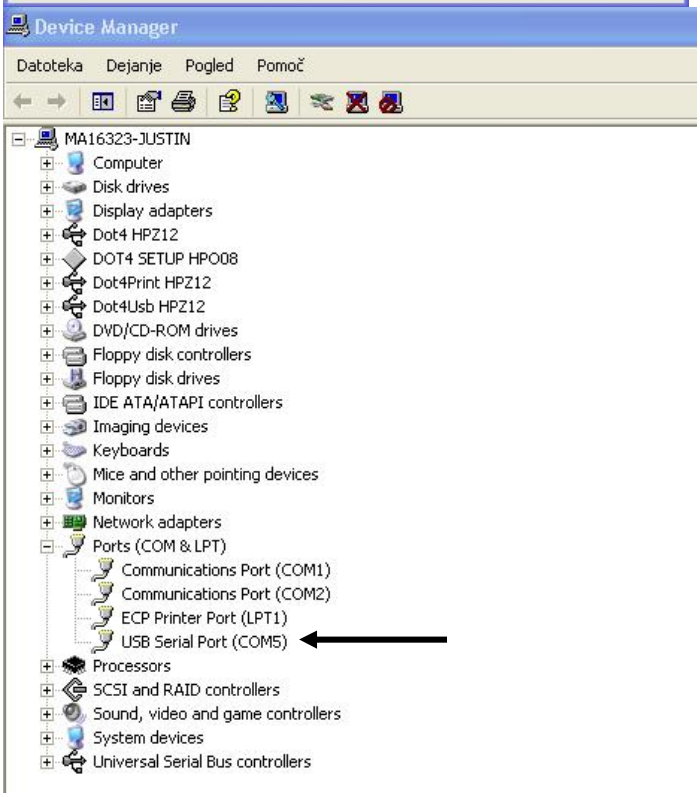




Sonda 5 USB is ready for use. It is possible to check in the Windows system – serial port number:

Go to Control panel → select System


Sistemske lastnosti
Obnovitev sistema
Automatic Updates
Oddaljeno
Splošno
Ime računalnika
Strojna oprema
Dodatno
Upravitelj naprav
Upravitelj naprav prikaže vse naprave, nameščene v računalniku. Uporabite ga, če želite spremeniti lastnosti katere koli naprave.
Upravitelj naprav
Gonilniki
S podpisovanjem gonilnikov se lahko prepričate, ali so nameščeni gonilniki združljivi s programom Windows. Windows Update omogoča, da nastavite, kako Windows pri iskanju gonilnikov vzpostavi povezavo z mestom Windows Update.
Podpisovanje gonilnikov
Windows Update
Profili strojne opreme
Profili strojne opreme vam omogočajo nastavljanje in shranjevanje različnih konfiguracij strojne opreme.
Profili strojne opreme
V redu
Prekliči
Uporabi


Device Manager
Datoteka
Dejanje
Pogled
Pomoč
MA16323-JUSTIN
Computer
Disk drives
Display adapters
Dot4 HPZ12
DOT4 SETUP HPO08
Dot4Print HPZ12
Dot4Usb HPZ12
DVD/CD-ROM drives
Floppy disk controllers
Floppy disk drives
IDE ATA/ATAPI controllers
Imaging devices
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Communications Port (COM1)
Communications Port (COM2)
ECP Printer Port (LPT1)
USB Serial Port (COM5)
Processors
SCSI and RAID controllers
Sound, video and game controllers
System devices
Universal Serial Bus controllers

15. Technical data

Accuracy class	
Active energy	A or B or C (EN 50470 - 3) Class 2 or 1 (IEC 62053-21) Class 0.5S (IEC 62053-22)
Reactive energy	Classes 2, 3 (IEC 62053-23), calibrated up to 1%
Apparent energy	Class 2 or 3, calibrated up to 1%
Voltages (V)	
Voltage range	3 x 57.7/100V ... 3 x 240/415V 3x100V … 3x415V (3P3W - external Aaron connection) 3x100V … 3x230V (3P3W connection) 0.8 - 1.15 U_n
Reference frequency	50 Hz ±5 % or 60Hz ±5 %
Currents (A)	
Direct connection	0.25 – 5(120)A, (Class A or B)
Indirect connection	0.01 – 1(6)A, (Class A or B or C) 0.01 – 1(10)A, (Class A or B or C) 0.05 – 5(6)A, (Class A or B or C) 0.01 – 5(10)A, (Class A or B or C) 0.05 – 5(20)A, (Class A or B or C)
Start up current	0.002In for class A or B (EN 50470 - 3) 0.002In for class 2 or 1 (EN 62053 - 21) 0.001In for class C (EN 50470 - 3) 0.001In for class 0.5S (EN 62053 - 21)
Short-circuit	30 Imax for direct connected 20 Imax for indirect connected
Outputs	
Type	PHOTO-MOS voltage-free relay
Contact	Make or break contact
Permitted load	25 VA (100 mA, 275 V AC)
Pulse length	From 20 ms to 240 ms (adjustable in steps by 20 ms)
Transmission distance	Up to 1 km
Inputs	
Voltage level	100 – 240 V AC ON: $U \geq 80$ V OFF: $U < 20$ V
Current consumption	< 2 mA @ 50V < 10 mA @ 240V

Self consumption of circuit	< 0,1 VA / phase
Self consumption of voltage circuits	0.5 W / 1.1 VA (self consumption of voltage circuits, when meter is supplied from the measuring voltages) 0.2 W / 0.4 VA (self consumption of voltage circuits, when meter is supplied from the external voltage) 1.1 W / 3.7 VA (self consumption of the external power supply, when meter is supplied from the external voltage) max. 2.5 W / 3 VA (GSM module)
Communication IR CS RS232 RS485 Protocols	 Max. 9600 Baud IEC62056-21 (62056-21) Max. 9600 Baud, passive, CL0 in compliance with DIN 66348, Part 1. Max. 9600 Baud Max. 9600 Baud 62056-21 mode C with or without a password.
LED output	Impulse frequency ≤ 40 Hz Impulse length approx. 8 ms
Real time clock Accuracy Back-up power supply	 Crystal: 6 ppm = ≤ ±3 min./year (at T_{op}= +25°C) Super-Cap: 0.1F and Li-battery
External power supply	50 - 240 V AC/DC
EMC Electrostatic discharge VF magnetic field Transient test Insulation strength Impulse voltage	 15 kV (IEC 60801-2) 10 V/m (IEC 60801-3) 4 kV (IEC 60801-4) 4 kV_{rms}, 50 Hz, 1 min 6 kV, 1.2/50 µs
Temperature ranges Operation Storing	 -25°C ... +70°C -40°C ... +80°C
Humidity	> 95%
Terminals (diameter)	CT connection: 5 mm (2 screws per terminal) Direct connection: 9.5 mm (one screw per terminal)
Dimensions	327 x 177 x 90 mm
Mass	Approx. 1.4 kg

Iskraemeco d.d., Energy Measurement and Management
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