MODBUS CONFIGURATION SOFTWARE FOR GINEERS ELM-07S DECODER

U S E R M A N U A L

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1. General information

The program is intended for quick and easy setup of IEC61107-to-modbus converter ELM-07S. The ModBus map is available from Gineers, but using this software the user of ELM-07 can quickly understand how this device works and how to set it.

Generally, the device itself has two separate interfaces:

- ✓ RS-232 or RS-485 interface for up to 32 meters connected to it (if 485)
- ✓ ModBus RTU and TCP interface for setting and reading data, retrieved from connected meters

Because IEC 62056 is heavy protocol for transmission through ethernet or GPRS connections, the idea of this device is to simplify the user to gather remotely data from electricity meters, having such interface.

In ELM-07 user can program/activate up to 32 different meters. This means that certain registers are associated with EXACT meter by meter serial number. Serial number is 8-digit identification, which should exists for every smart electricity meter.

Furthermore, user can set up to 63 registers to be converted from IEC 62056 protocol to simple modbus values. In IEC 62056 registers are named like this for example:

1.8.0
2.8.0
..
15.8.0
etc.

With software for configuration user can connect register values from IEC 62056 to specific modbus registers. For each meter there is 128 register block, in which are defined meter data of interest. Then user can read certain INPUT register with converted value as a 32-bit integer, corresponding to IEC 62056 register of interest.

Device reads periodically connected and activated meters and updates all values. This period can vary from 2 to 1440 minutes, user reads last read (actual) value through modbus RTU or TCP interface.

Software for setting ELM-07 has two main TAB's:

- setting main parameters like baud, modbus address, readout interval
- activating ModBus devices and setting registers for readout

Main parameters for setting are:

- set readout/update time of Modbus registers
- set ModBus address of ELM-07S
- set ModBus RTU serial port details – speed and parity
- set Modbus TCP settings - IP, Mask and gateway, or just enable DHCP
- set IEC serial port details – speed and parity for reading electricity meters

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Software options for setting meters in modbus are:

- activating particular meter in ELM-07S memory
- setting which register will be read and updated periodically
- write of single or all registers for current meter activated
- reading single or all register for particular meter from ELM-07S
- read all meters data in ELM-07S
- read particular register data
- save configuration and load it at later time

Of course, all described can be accomplished with other software using ModBus map of the device. But it is good to have quick-start and to see capabilities of the device before starting to write your own code.

2. Starting the program

The program is started with double click on the main executable file – "*ELM07.exe*".

3. Main window

The program is divided in two TABs:

- setting main parameters
- setting meters for readout

When logging in the first TAB will be active – main settings of ELM-07. The main look of the program is:

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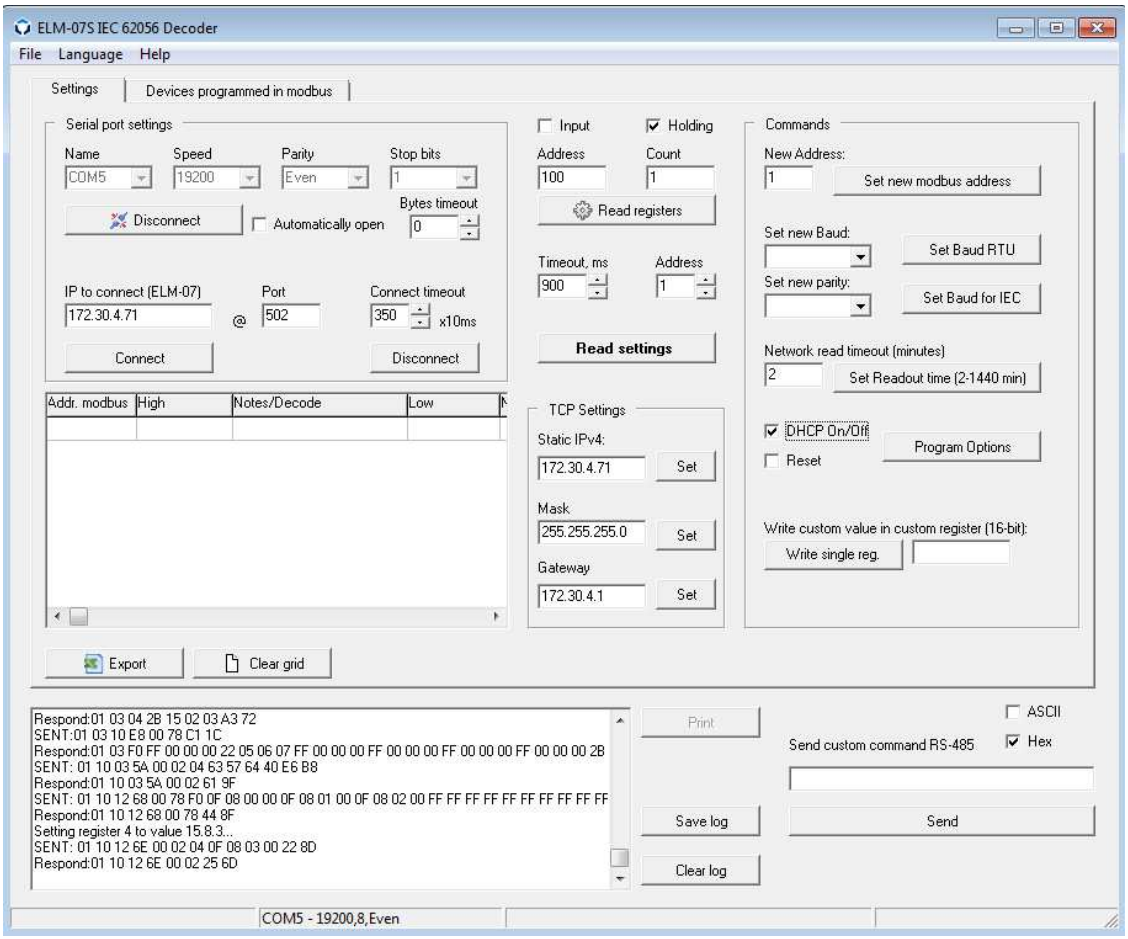

Fig. 1. Main settings window (TAB 'Settings')

From this window user can set serial port settings (ModBus interface) and all general settings, which affect normal work conditions.

3.1. Setting serial port of personal computer/notebook

To read and write to ELM-07 from serial port (modbus rTU) first of all user must set correctly PC serial RS-232/RS-485 port. Serial port settings affect name of the COM port, speed and parity. Possible speeds are from 300 to 115200 bps, with parity (even, odd) or no parity.

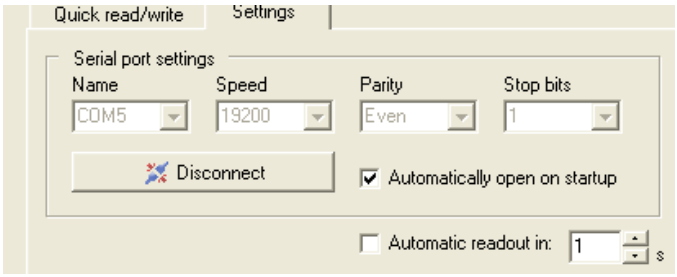

Fig. 2. PC serial port settings

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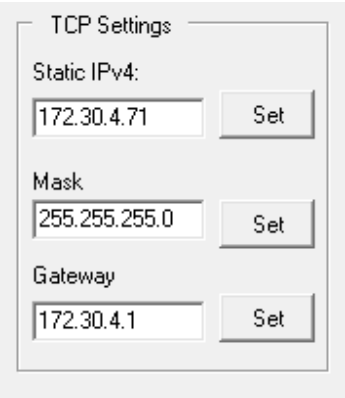
Serial port of PC can be set for automatic opening when program starts. When settings of serial port are gray this notify that the port is open. Program works in mode Master-Slave. This means that program sends command to ModBus interface (reading or writing registers) and then waits for device response. How much time will wait the response can be set in **"Timeout, ms"** property, right to serial port settings. Since ModBus has no special stop byte in the protocol and you can not tell automatically how many registers will be returned user should set this timeout according to speed and reading registers. Something between **600ms** and **1000ms** should be enough for most of the commands.

Default settings of ELM-07S device are **19200, Even, 8, 1**.

If user wishes to use Modbus TCP - then there are two options for setting the device:

- set static **IP, Mask and Gateway** for TCP conenction in ELM-07S memory:



or

- turn on **DHCP setting** on:

Standard TCP port for modbus is 502. This can not be set for ELM-07S, it will always wait for connections on port 502.

3.2. Setting general flags

There are several global settings, which affect normal work mode. These are:

- Full readout time – time interval for reading all devices and update information – from 4 minute to 24 hours. This means that on every X minutes ELM-07 will perform read of all meters that are activated in its memory

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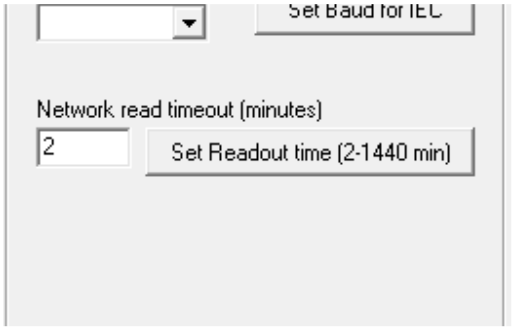

Fig.3. Readout

User should write desired readout interval in MINUTES and then press button ***"Set Readout time (2-1440 min)".***

3.3. Setting ELM-07 interfaces

ModBus address of the device can be changed from **1 to 250**. Modbus and RS-485/RS-232 port settings also can be changed in speed and parity, but keep in mind that RS-232 serial port is always in mode 7 Data Bits. That is due to IEC 61107 specifics - usually meters come with 7-bit interface.

Both ports can be set from **300 to 115200** baud, Parity - **Even, Odd or None.**

4. ModBus window for activating meters

The other TAB is intended for real modbus setting of ELM-07S. In this TAB user can set meters for reading, defining all register from IEC 62056 readout that he needs. Limitations is up to 60 registers for each meter, but this can be overcome by defining same meter as different device (and set different register to be read).

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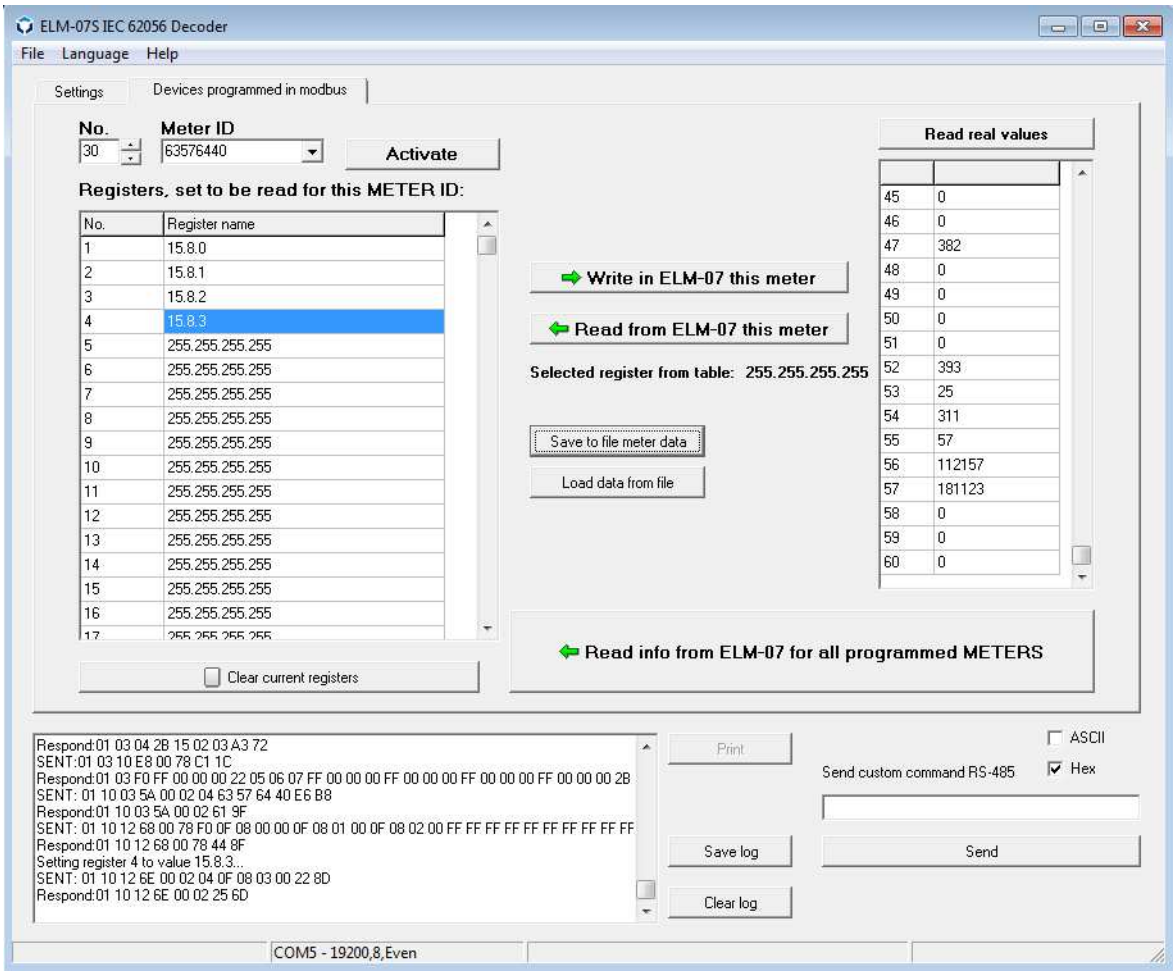

Fig. 5. ModBus window

Every meter in memory of ELM-07S has particular number from 1 to 32. This is important since every meter depending on his number has EXACT space in modbus map for his data.

For every meter user should do the following:

- activate the meter by writing and sending his ID number to ELM-07;
- define which registers from IEC/DLMS are needed for the readout

ID of the meter is always (and should be) 8-digit number. This is written in ELM-07S as 2 x 16-bit registers - i.e. 4 BCD bytes. Each meter has space in modbus memory register area for 128 registers - 63 x IEC 62056 can be defined, each 2 registers (4 bytes). Details on modbus space can be seen in modbus map of the device, which we provide with each device.

Each IEC register is written in manner "X.X.X.X" where "X" in general case is a digit (but not always). For example, Total Active Energy register is 1.8.0.

So, if you want to read "1.8.0" register then you should do the following:

- first activate meter you want to read:
  - select meter number in modbus map (field **"No."**)

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- type Meter serial number in field **"Meter ID"**
- press button **"Activate"**

- define register you want to read:
  - type manually in the grid a register you want to read - for example, if you want to be first register read and decode, then in first row of the table write "1.8.0"
  - click right mouse button and select ***"Write in ELM-07"***

If you want what is set for exact register in ELM-07 - again press right mouse button and select ***"Read from ELM-07".***

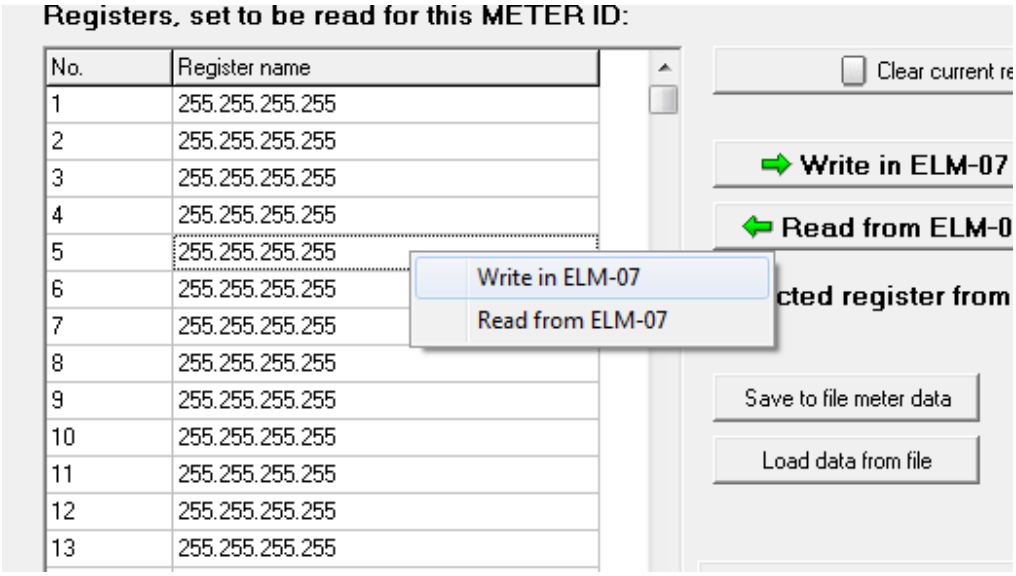

Fig. 6. Popup menu - read/write one register

It is possible to read from or write to ELM-07 all 60 registers for particular meter at once - this is done with buttons on the right side:

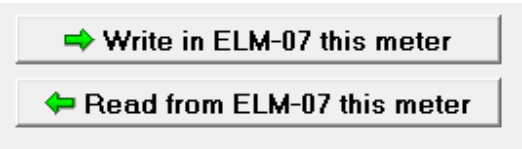

Fig. 7. Reading whole block of registers for a meter

There is also an option to read whole memory set from ELM-07S. Have in mind that doing this will clear ALL current meter and register setting in the program that you have been typing before that.

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5. Log and additional tools

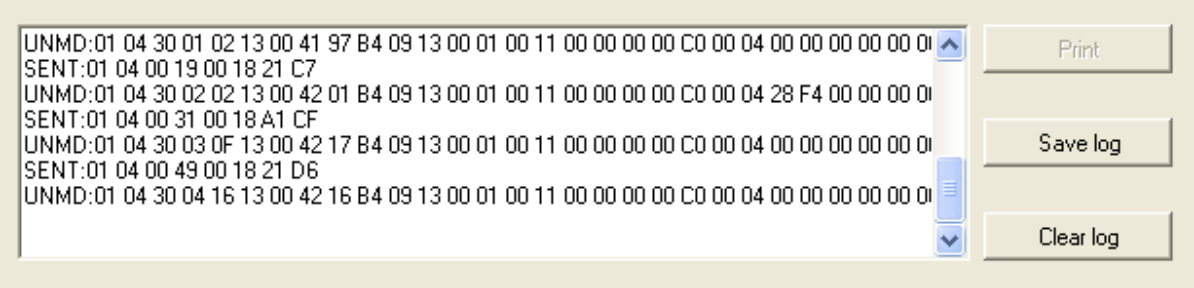

Fig. 9. Log window and direct write to serial port

Here user can see log window and direct write to the serial port. In the log window every operation is notified and also responds from the ModBus interface. This log can be saved, cleared or printed (print is disabled for now). On the right side user can send custom commands to desired device. There are two options for sending command:

- ASCII – sends the command as plain text, written in the box
- HEX – sends the command in hex values. For that purpose commands should be send in a manner of 'xx' with spaces between every byte.

For this device particularly all commands should be in ModBus protocol manner, so ASCII is not useful here.

The user must have in mind that he will see the respond in the log window in the same way he sends a command, in other words in hex or ASCII

6. Help

This menu contains two options:
About – shows information about the program

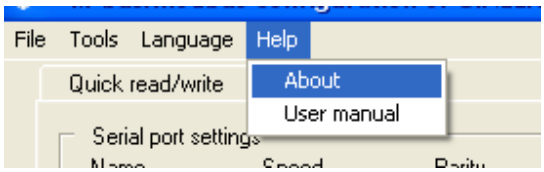

Fig. 10. Help

User manual – starts this user manual

7. Contacts

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If any questions, suggestions or troubles using this program, please write to support@gineers.com or ivan@gineers.com