Novatek-Electro RPM-416 Documentation

https://www.overvis.com/docs/uk/rpm-416/

2026-03-30

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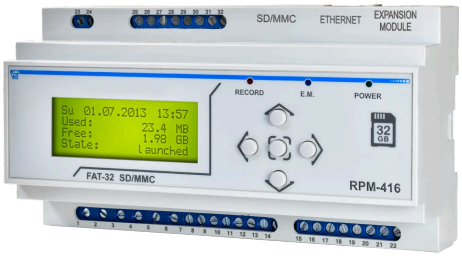
Novatek-Electro RPM-416



RPM-416 — це мікропроцесорний реєстратор даних виробництва NOVATEK-ELECTRO LTD. Призначений для вимірювання, моніторингу та архівування електричних параметрів.

Доступна повна документація

Переглянути всю документацію на одній сторінці – Ідеально для друку або читання офлайн

Ключові особливості

- Багатоканальне вимірювання (напруга, струм, температура, аналогові та дискретні входи)
- Архівування даних на карту пам'яті SD/SDHC (до 32 ГБ)
- Період запису від 1 мс до 3600 с
- Підключення Ethernet (10Base-T/100Base-T)
- Підтримка протоколу Modbus TCP
- Веб-інтерфейс для віддаленої конфігурації
- Інтеграція з хмарою Overvis

Документація

- **Інструкція з експлуатації** – Повні інструкції з експлуатації та конфігурації

Технічна довідка

- **Додаток A: Підключення Ethernet**
- **Додаток B: Підключення до Інтернету**
- **Додаток C: Версії ПЗ**
- **Додаток D: Довідка налаштувань**
- **Додаток E: Регістри Modbus**

Додаткові ресурси

- Сторінка продукту RPM-416 – Повна інформація про продукт та специфікації
- Документація на одній сторінці – Повна документація на одній сторінці для друку
- Повна інструкція RPM-416 (PDF) – Повна інструкція з експлуатації

Підтримка

- **Центр підтримки**: Відвідайте наш Центр підтримки
- **Повідомити про проблему**: Надішліть заявку

RPM-416 Operating Manual

NOVATEK-ELECTRO LTD

Intelligent industrial electronic

MICROPROCESSOR-BASED DATA LOGGER RPM-416

OPERATING MANUAL

Quality control system on the development and production complies with requirements ISO 9001:2015

Dear customer,

Company NOVATEK-ELECTRO LTD. thanks you for purchasing our devices.

You will be able to use properly the device after carefully studying the Operating Manual.

Keep the Operating Manual throughout the service life of the device.

UKRAINE, Odesa — www.novatek-electro.com

> **WARNING**
>
> **DEVICE TERMINALS AND INTERNAL COMPONENTS ARE UNDER POTENTIALLY LETHAL VOLTAGE**
>
> **ALL REQUIREMENTS OF THIS OPERATION MANUAL ARE COMPULSORY TO BE MET!**
>
> **TO ENSURE THE DEVICE SAFE OPERATION IT IS STRICTLY FORBIDDEN THE FOLLOWING:**
>
> - TO CARRY OUT MOUNTING WORKS AND MAINTENANCE WITHOUT DISCONNECTING THE DEVICE FROM THE MAINS
> - TO OPEN AND REPAIR THE DEVICE INDEPENDENTLY
> - TO OPERATE THE DEVICE WITH MECHANICAL DAMAGES OF THE CASE

IT IS NOT ALLOWED WATER PENETRATION ON TERMINALS AND INTERNAL ELEMENTS OF THE DEVICE.

During operation and maintenance the regulatory document requirements must be met, namely:

- Regulations for Operation of Consumer Electrical Installations
- Safety Rules for Operation of Consumer Electrical Installations
- Occupational Safety when in Operation of Electrical Installations

Installation, adjustment and maintenance of the device must be performed by qualified personnel having studied this Operating Manual.

> **Caution**
>
> THE VALUES OF MEASURED SIGNALS CONNECTED TO THE REGISTER INPUT TERMINALS SHOULD NOT EXCEED THOSE SPECIFIED IN THIS MANUAL BECAUSE IT MAY RESULT IN DAMAGE OF INCOMING LINES, DISRUPTION OF CONTACT GROUP AND REGISTER INFLAMMATION.

The data logger connection, setting and maintenance should be made only by authorized personnel who have studied this operating manual.

While repair work, maintenance work, installation work it is necessary to disconnect the data logger and incoming measuring lines from the power supply.

The device is safe for operation under observing the rules of exploitation.

This operation manual is intended for description, principle of work, construction, mode of work and maintenance of the microprocessor-based data logger RPM-416 (further in text as «data logger», «RPM-416» or «device»).

The device meets the requirements of the following:

- EN 60947-1
- EN 60947-6-2
- EN 55011
- EN 61000-4-2

Harmful substances, in more than allowed concentration, are not available.

Terms and Abbreviations

- **Twisted pair** – a pair of isolated signal line wires in cable twisted between themselves for reduction of transmitted signals distortions
- **THDr** – total harmonic distortion, of a signal is a measurement of the harmonic distortion present and is defined as the ratio of the sum of the powers of all harmonic components to the power of the fundamental frequency. THD is used to characterize the linearity of power quality of electric power systems
- **Display** – a symbolic LCD display 4 lines of 20 symbols
- **Cursor** – a screen symbol ◄ ►, showing the current position to which the action will be used
- **Memory card** – a portable flash-memory card SD / MMC, which is used for multiple recording and storage of information in the portable electronic devices
- **EM** – Expansion Module (a device connected to the data logger for expansion of incoming signals range)
- **MM** – Measuring Module (is a part of data logger scheme)
- **PC** – Personal Computer
- **OS** – Operating System
- **On default** – preset parameters values which are used by the data logger until the user explicitly changes them
- **Dry contact** – a terminal which has no galvanic connection with power supply lines and “ground” (for example: mechanical button, hermetic contact, relay contacts, standard and limit switches)
- **CT** – Current Transformer intended for transmitting the signal of measuring information (for example: T-0.66, TOP-066, TSHP-0.66 etc. with accuracy class index 0.5 or 0.5 S)
- **Formatting** – the process of recording in the memory card file system structure (FAT12, FAT16 or FAT32), which makes it possible to use the memory card in operational system for data storage
- **Screen** – full-scale (4 lines with 20 symbols) image output on the display
- **10Base-T** – a standard Ethernet for linking up via twisted pairs with speed 10 Mbit/sec
- **100Base-T** – a standard Ethernet for linking up via twisted pairs with speed 100 Mbit/sec
- **DHCP** – network protocol which enables the devices to receive automatically IP-addresses and other parameters necessary for work in TCP / IP networks
- **Ethernet** – package technology of data transmitting mainly used in computer local networks
- **FTP** – standard protocol of files transmitting in TCP / IP networks
- **Modbus TCP** – open communicational protocol based on “client-server” architecture. It is used for data transmitting in TCP / IP networks
- **MAC** – address used in transmitting via Ethernet for device identification. As a rule it has a global unique denotation
- **RMS** – root mean square value
- **RJ-45** – unified connector used for connection in networks via standard 10Base-T/100Base-T
- **RJ-11** – unified connector used for connection of telephone or communicational equipment
- **Web-interface** – system of user interaction with device via computer browser

1 Purpose

1.1 Device’s Purpose

Data logger RPM-416 is a microprocessor-based device intended for electrical parameters measuring and monitoring on the data logger display as well as data archiving.

The data archiving is made on the removable memory card (SD / MMC), which can be later analyzed by software program RPM-416 Data Analysis (the program can be found on website www.novatek-electro.com), installed on the standard or portable PC. Data files have extension “RDF”.

Data logger RPM-416 has an inbuilt real time clock with power from a lithium-type battery.

RPM-416 can be connected to Ethernet network via standard 10Base-T or 100Base-T. In this case simultaneously with data recording to memory card, the RPM-416 configuration and data transmitting to the PC is possible.

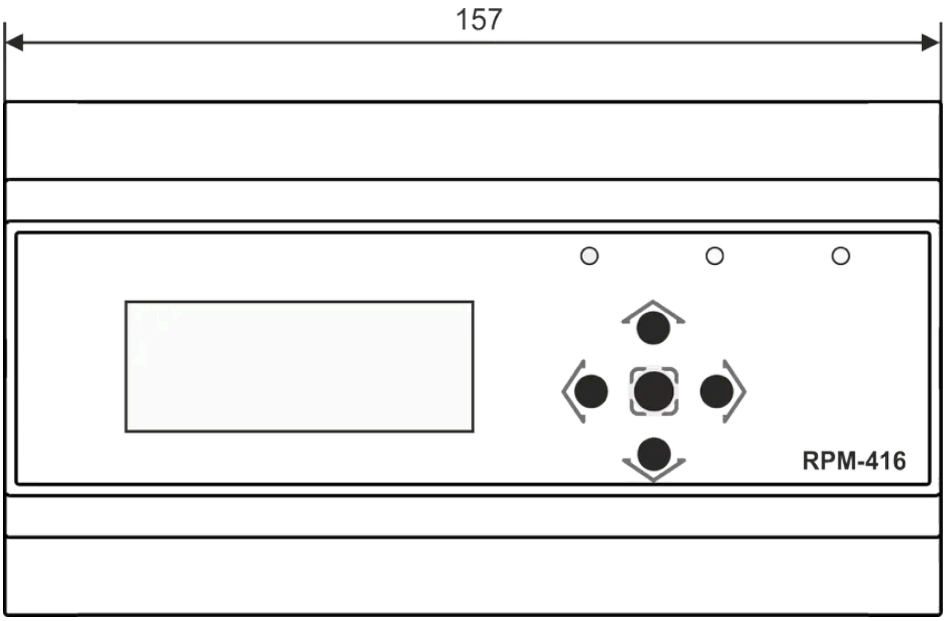
RPM-416 can connect to the system Overvis (monitoring and remote control www.overvis.com).

The main possibilities of the data logger:

- **Multi-channeling** – one data logger is sufficient for all working data receiving from the controlled device
- **Versatility** – the additional modules can be connected to the data logger which makes it possible to expand the range of incoming signals (voltage, current, temperature, discrete inputs, etc.)
- **Galvanic separation** – incoming signals of high voltage and current are galvanic separated from other inputs which ensures easiness of data logger connection
- **High fidelity** – self-control system and data saving algorithm protect against data loss in case of emergency situations (power supply failure)
- **Servicing convenience** – four-lined symbolic display with illuminating enables to adjust the data logger and monitor its work (the values of recorded incoming signals are shown on the display), the keyboard is used for setting and control of the data logger
- **Remote monitoring and configuration** – if the data logger is installed in a hard accessible place with Ethernet connection it can simultaneously with the data recording on the memory card make data transmitting to PC. It enables to make a remote monitoring of the object. The more detailed analysis can be made on the basis of the data stored on the memory card. Web-interface enables via PC browser to make a remote configuration of the data logger without installing any other additional programs. FTP provides remote access to the memory card to retrieve or delete files.

1.2 Controls, Overall and Installation Dimensions

1.2.1 Overall and Installation Dimensions



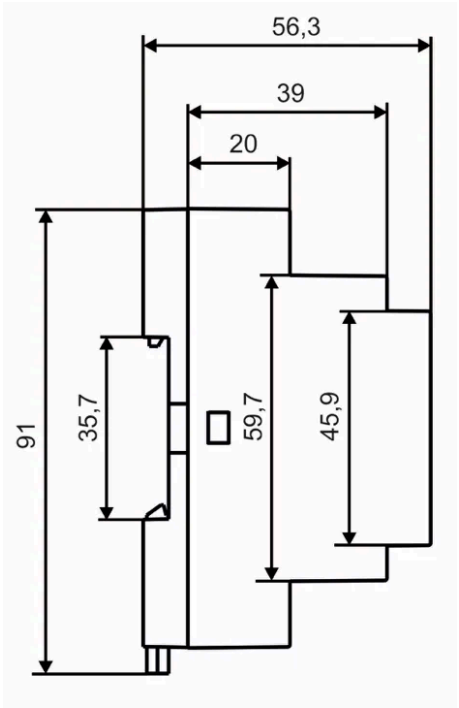
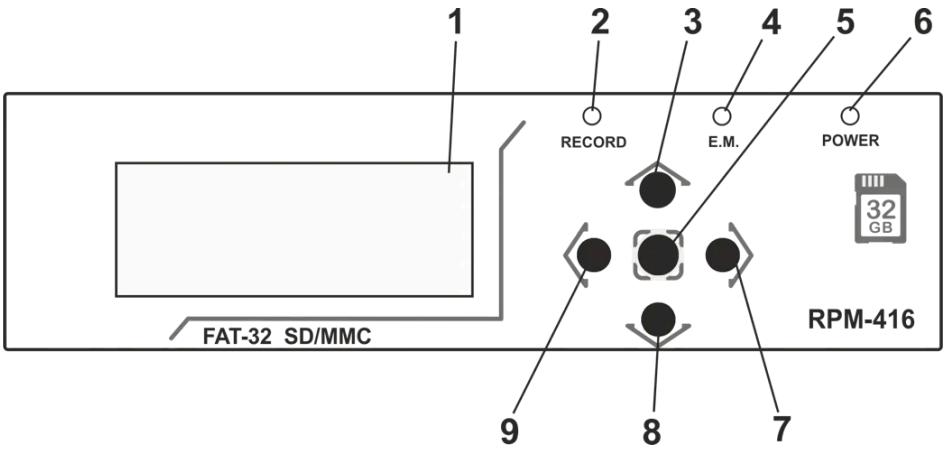


Figure 1.1 – Data logger design with overall and fixing dimensions

1.2.2 Controls

On the data logger front panel there are located the elements of control (five-button keyboard) and indication (LED symbolic display), Fig. 1.2. With the help of the keyboard are made all the settings of the data logger operation parameters and initiation of incoming signals values recording to the memory card. The current values of the data logger operation, the values of incoming signals and data logger state information are shown on the display.



1 – Display (yellow-green indication)

2 – LED indicator **RECORDING** (light on – when the data recording on the memory card is initiated, light off – when the data recording on the memory card is finished, flare up – when the data recording on the memory card is paused, flickering – when there is at least one error in the data logger operation)

3 – Button ▲ (up) is used for moving the indicator upwards or for increasing parameter value

4 – LED indicator **E.M.** (E.M. light on – when at least one expansion module is connected, flickering – when there is data transmitting between expansion modules, light off – when the expansion modules are not connected)

5 – Button ◙ (enter) is used for value entry approval or menu item choice

6 – LED indicator **POWER** (light on – when the power is on, light off – when the power is off)

7 – Button ► (right) is used for moving the indicator to the right

8 – Button ▼ (down) is used for moving the indicator downwards or for decreasing the parameter value

9 – Button ◄ (left) is used for moving the indicator to the left

Figure 1.2 – The data logger controls

1.3 Working Conditions

The data logger RPM-416 is intended for working in the following conditions:

- Ambient temperature: from -20 to +45 °C
- Atmospheric pressure: from 84 to 106.7 kPa
- Relative air humidity (at temperature +25 °C): 30 ... 80%

> ⚠ **ATTENTION**
>
> The device is not intended for operation in the following conditions:
>
> - Significant vibration and shocks
> - High humidity
> - Aggressive environment with content in the air of acids, alkalis, etc., as well as severe contaminations (grease, oil, dust, etc.)

2 Completeness of Set

Delivery set is given in Table 2.1.

Table 2.1 – Delivery Set

Name	Quantity, pcs.
RPM-416	1
External memory storage (memory card)	1
Connection cable with Ethernet network	1
Operating Manual	1
Package	1

3 Technical Specification of RPM-416

3.1 Basic Technical Features

The basic technical features of RPM-416 are shown in Table 3.1.

Table 3.1 – Basic technical features

Item	Value
Nominal operating supply voltage (Un)	230/240 V
Performance capacity voltage (AC/DC)	24 – 265 V
Power-line frequency	45 – 65 Hz
Power consumption (from line ~230 V)	≤ 6.0 W
Power consumption (from power source +24 V)	≤ 2.2 W
Period of data recording to the memory card	0.001 – 3600 s
External memory storage (memory card)	SD (v1.0, v1.1) / SDHC, Class 4, 6, 10

Item	Value
Maximal capacity of external memory card	32 GB
Supported file systems of external memory card	FAT12, FAT16, FAT32
Minimal size of data file	32 KB
Maximal size of data file	512 MB
Size of one block of recorded data (20 parameters)	88 bytes
Error of clock run, at temperature 25 °C	≤ 1 s/day
Connection to Ethernet or PC	10Base-T / 100Base-T
Modbus TCP	yes
Web-interface	yes
FTP	yes
The intent of the device	Digital indication devices
Nominal working mode	continuous
Protection class rating (case / terminal block)	IP40/IP20
Protection class from electric shock	II
Climatic version	NF 3.1 (average and cold zone, indoor)
Pollution level	II
Overvoltage category	II
Isolation nominal voltage	450 V
Nominal impulse withstand voltage	2.5 kV
Cross-section area of connection terminals	0.2 – 2.5 mm²
Terminal screw torque	0.4 N*m
Weight	≤ 0.5 kg
Overall dimensions	91 × 157 × 56.3 mm
Mounting	DIN-rail 35 mm, orientation user-defined

3.2 Input Characteristics

Input characteristics of RPM-416 are shown in Table 3.2. Measurement error is shown in ± % of scale value.

Table 3.2 – Inputs characteristics

Voltage Input (3 channels)

Item	Value
Voltage measuring range	3 – 450 V
Voltage measuring error (for a sine signal)	to 300 V: ± 1%, exceed 300 V: ± 1.5%
Voltage measuring type	RMS / Instant / Peak
Voltage frequency measuring range	25.00 – 70.00 Hz
Voltage frequency measuring error (for sine signal)	± 0.05 Hz
THDr measuring range	0 – 100%
THDr measuring error (if the signal level more than 14% of the range)	± 2%

Current Input (4 channels)

Item	Value
Current measuring range	0.05 – 10.00 A
Current measuring error (for a sine signal)	± 2.5%
Current measuring type	RMS / Instant / Peak
Current sensor type	CT with output 5 A
Supported rating values CT	from 5 to 9999 A
Current frequency measuring range	25.00 – 70.00 Hz
Current frequency measuring error (for sine signal)	± 0.05%
Overload capability 50 A (not often than once a minute)	≤ 0.3 s
THDr measuring range	0 – 100%
THDr measuring error (if the signal level more than 14% of the range)	± 2%

Working Power Input* (3 channels)

Item	Value
Active power measuring range	30 – 200,000,000 W
Reactive power measuring range	30 – 200,000,000 VAr

Item	Value
Gross power measuring range	30 – 200,000,000 VA
Power factor measuring range	0.01 – 1.000 cos ϕ
Power measuring error (for a sine signal)	± 3.5%
Maximum value of active energy scaler	999,999,999 kW*h
Maximum value of reactive energy scaler	999,999,999 kVAr*h

** Power input has no physical connection terminals, the power parameters are calculated on basis of measured values of voltage and current.*

Temperature Input (2 channels)

Item	Value
Temperature sensor type	PTC1000 / PT1000
Temperature measuring range for PTC1000	from -50.0 to +120.0 °C
Temperature measuring range for PT1000	from -50.0 to +250.0 °C
Temperature measuring error	± 1.5 °C

Analog Voltage Input 0–10 V (1 channel)

Item	Value
Voltage measuring range	0.01 – 10.00 V
Voltage measuring error	± 1.0%
Voltage sensor type	0 – 10 V

Analog Current Input 0–20 mA (1 channel)

Item	Value
Current measuring range	0 – 20 mA
Current measuring error	± 1.0%
Current sensor type	0 – 20 mA

Digital Input (4 channels)

Item	Value
Measuring range	closed – opened
Digital signal sensor type	Dry contact
Pulse frequency measurement range	1 – 15,000 pulse/min
Maximum value of pulse scaler	999,999,999

4. Design and Operation Principle

4.1 Design

RPM-416 is constructively made in a plastic case intended for fixing on DIN-rack 35 mm, case dimensions (91×157×56.3 mm) 9 modules of S type. The case is made of crashworthy, self-extinguishing material.

4.2 Operation Principle

The data logger operation principle is based on measuring values from all sensors connected to the data logger inputs, accumulating the data in the data logger internal memory and data recording to the external memory storage – memory card (SD / MMC).

4.3 Real Time Clock

The data logger is equipped with an inbuilt real time clock which is powered (in case of main power failure) from an inbuilt backup power cell – lithium type battery. The power from the backup supply is sufficient for continuous operation of the real time clock during 10 years (at temperature 25 °C). In case of data logger operation at temperatures on the limits of the working range, the working period of the clock decreases.

5. Connection

5.1 Preparing for Connection

- Unpacking the device (we recommend saving the original package throughout the guarantee life period of the device);
- Ensure that the device has no damages after transportation, in case of such refer to supplier or maker;
- Check the completeness of set (see section 2), in case of non-completeness refer to supplier or maker;
- Study User's Manual carefully (**special attention should be paid to the power supply connection diagram of the device**);
- If there are issues concerning device's installation, please refer to the maker by phone indicated in the end of this Manual.

5.2 General Instructions

If the temperature of the device after transportation or storage differs from the environment temperature at which it is expected to operate, then before connection to electric mains keep the device under operating conditions within two hours (because the device elements may have moisture condensation).

> **Danger**
>
> ALL CONNECTIONS MUST BE PERFORMED WHEN THE DEVICE IS DE-ENERGIZED.
>
> Error when performing the installation works may damage the device and connected devices.

To ensure the reliability of electrical connections, one should use flexible (stranded) wires with insulation for a voltage not less than 450 V. Recommended cable cross-sections to measure current is within 1.5 – 2.5 mm², for the rest of connections it is within 0.75 – 2.5 mm². The wire ends should be cleared from insulation for 5±0.5 mm and clamped by a sleeve lug. Fixation of wires should exclude mechanical damages, twisting and abrasion of wires' insulation.

> **Danger**
>
> IT IS NOT ALLOWED TO LEAVE EXPOSED PORTIONS OF WIRE PROTRUDING BEYOND THE REMOVABLE TERMINAL BLOCK.

> **Caution**
>
> For reliable contact it is necessary to perform tightening of screws of removable terminal block with the force specified in Table 3.1.

When reducing the tightening torque, the junction point is heated, terminal block may be melted and wire can burn. If you increase the tightening torque, it is possible to have thread failure of terminal block screws or the compression of the connected wires.

For reduction of electric field influence, the installation of "data logger-sensor" lines should be made as a separate route (or several routes). The routes should be located separately from power cables as well as away from cables which make high frequency and impulse noise. The routes should be planned in such a way that the length of signal lines is minimal.

The connection of expansion modules is made with the help of cable CEM-11-1 (see section 5.4, the cable is supplied along with every expansion module).

The connection of the data logger to Ethernet network is carried out by the cable made according to the standard ANSI EIA TIA 568B (see section 5.5, the cable is supplied along with the data logger).

During use of backup power supply, the connection is made to the same terminals as the main power source. It is necessary to have a scheme ABI (Automatic Backup Input) for switching from the main power source to the backup power supply.

For ensuring continuous data recording, ABI should switch power supply to backup source within a period not more than 0.5 sec.

> **Note**
>
> To improve operational properties of the device, it is recommended to install a fuse (fuse element), or the equivalent for current of 3.15 A in the power supply circuit for RPM-416.

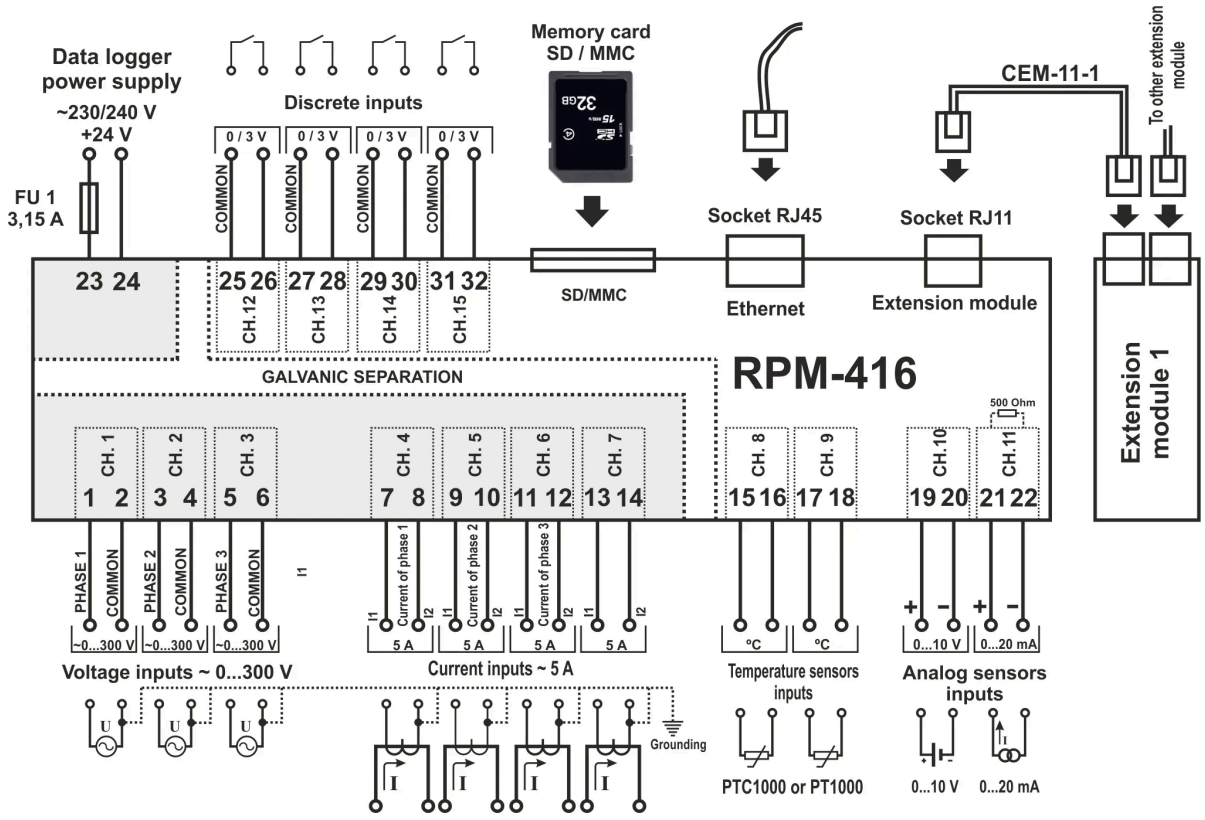
5.3 Connection Diagram

The connection of RPM-416 is made according to the scheme shown in Figure 5.1.

In order to improve safety in the power circuit, it is recommended to install a fuse with nominal value of 3.15 A.

> **Caution**
>
> TERMINALS (23, 24) FOR CONNECTION TO POWER SUPPLY ARE DESIGNED FOR THE MAXIMUM VOLTAGE OF 265 V, AND TERMINALS FOR VOLTAGE MEASUREMENT (1, 2, 3, 4, 5, 6) ARE DESIGNED FOR THE MAXIMUM VOLTAGE OF 450 V. TO AVOID ELECTRICAL INSULATION BREAKDOWN, **DO NOT CONNECT** VOLTAGE SOURCES EXCEEDING THE SPECIFIED VALUES.

> **Danger**
>
> THE DATA LOGGER RPM-416 MEASURES THE CURRENTS IN CHANNELS 4, 5, 6 AND 7 USING ONLY CURRENT TRANSFORMERS WITH STANDARD OUTPUT OF 5 A. CONNECTING CURRENT SOURCES WITHOUT CURRENT TRANSFORMERS WILL LEAD TO FAILURE OF THE RPM-416.



FU1 – The fuse (circuit breaker) for current 3.15 A

Figure 5.1 – Connection diagram of RPM-416

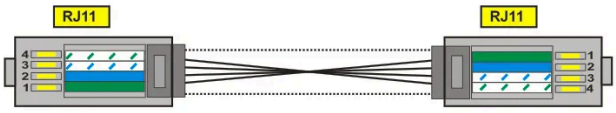
5.4 Connection of Expansion Modules

Up to 4 expansion modules can be connected to the data logger at the same time. At attempt to add more than the specified quantity of modules, the RPM-416 stops perceiving all modules and switches them off.

The expansion modules installation should be carried out with the data logger power being switched off.

The module connection should be made with cable CEM-11-1 (not supplied with the data logger).

The number indication of cable CEM-11-1 terminals is shown in Figure 5.2.



#	Color	Function
1	green	power
2	blue	synchronization
3	white-blue	data
4	white-green	ground

#	Color	Function
1	green	power
2	blue	synchronization
3	white-blue	data
4	white-green	ground

Figure 5.2 – Number indication of cable CEM-11-1

One end of the cable is connected to the socket RJ11 located in the data logger as shown in Figure 5.1, the other end of the cable is connected to the socket RJ11 located in the expansion module.

The connection linkage is made automatically after power input to the data logger.

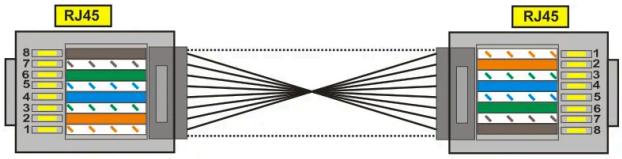
The cable CEM-11-1 is supplied with every expansion module.

> **Danger**
>
> THE CONNECTION OF EXPANSION MODULES SHOULD BE MADE ON THE RIGHT SIDE OF REGISTER CASE AND ONLY VIA CABLE CEM-11-1 (See Fig. 5.1).

5.5 Connection to Ethernet Network

Connection of the RPM-416 to Ethernet network is carried out via the cable made according to the standard ANSI EIA TIA 568B category Cat.3 and higher (supplied with the device).

The numeral indication of such cable is shown in Figure 5.3.



#	Color	Function
1	white-orange	TX+
2	orange	TX-
3	white-green	RX+
4	blue	none
5	white-blue	none
6	green	RX-
7	white-brown	none
8	brown	none

#	Color	Function
1	white-orange	TX+
2	orange	TX-
3	white-green	RX+
4	blue	none
5	white-blue	none
6	green	RX-
7	white-brown	none
8	brown	none

Figure 5.3 – Numeral indication of cable for connection to Ethernet

One end of the cable is connected to the socket RJ45 located in the data logger as shown in Figure 5.1, the other end of the cable is connected to the socket of network adapter located in the PC or other network device.

LED indicators, located near the socket RJ45 indicate:

- **green** – data interchange;
- **yellow** – communication.

For communication connection via Ethernet interface, the data logger and PC should be in the same IP-subnet.

Programming of the RPM-416 while connected to Ethernet network is described in Appendix A.

Programming of the RPM-416 while connected to Internet network is described in Appendix B.

6. Scope of Intended Use

6.1 The Use of Data Logger RPM-416

6.1.1 Initialization

After supply of the power to the data logger, the process of initialization takes place. The LED indicator **POWER** (Fig. 1.2 item 6) lights up and on the display (Fig. 1.2 item 1) there is a message shown in Figure 6.1.

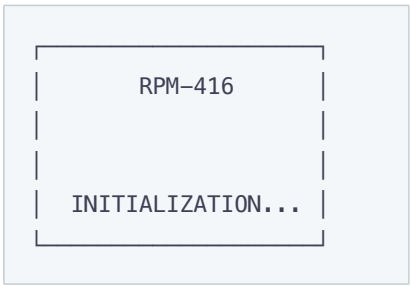
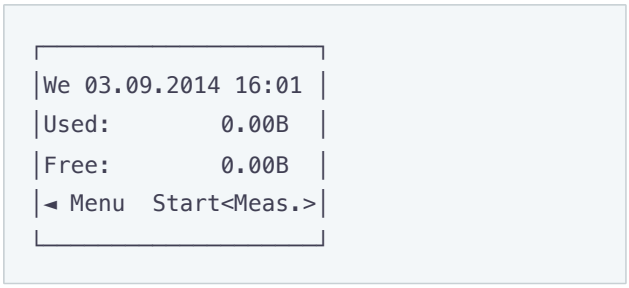


Figure 6.1 – Initialization of Data logger

6.1.2 Main Screen

After completion of initialization, the main screen will be shown on the display. The view depends on whether a memory card is installed or not. Figure 6.2 shows both variants of main screen views.



With memory card

Without memory card

Figure 6.2 – Main screen view (with and without memory card)

In the first line, the current date and time is shown in form of DD dd mm yyyy HH:MM, where:

Symbol	Meaning	Symbol	Meaning
DD	Day of week (Mon, Tue, Wed, Thu, Fri, Sat, Sun)	dd	Date
mm	Month	yyyy	Year
HH	Hours	MM	Minutes

In the second and third lines there is information of occupied and free space on the memory card (“**Used**” – Used space and “**Free**” – free space).

In case there is no memory card installed, the display shows the message “Memory card is not installed”.

In the fourth line, the main menu items of the data logger control are shown. The choice of the menu items is made by buttons ◄ (left) or ► (right) (the selected item is illuminated by indicator ″◄ ►″), confirmation is made by pressing the button ◙ (enter).

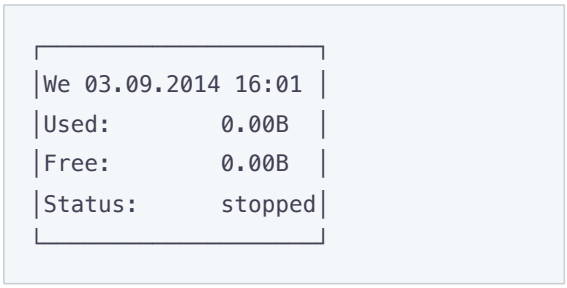
The main menu items of the Data logger:

- “**Menu**” – opens the menu of the data logger control;
- “**Start**” – starts the process of data recording to the memory card;

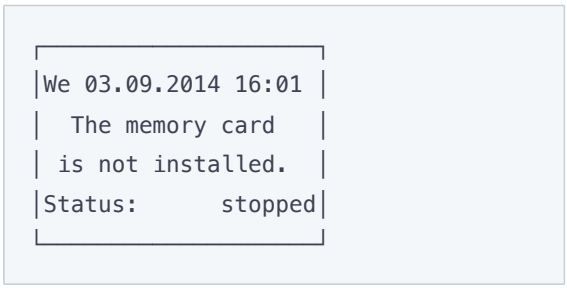
- "**Stop**" – stops the process of data recording to the memory card;
- "**Pause**" – pauses the process of data recording to the memory card;
- "**Cont.**" – resumes the process of data recording to the memory card;
- "**Meas.**" – opens the menu for measured values review.

6.1.3 Main Screen Menu Items Dissimulation

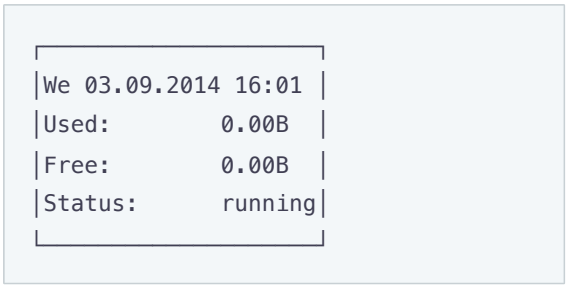
If during 10 seconds no button on the front panel was pressed, the menu items of data logger control will be dissimulated and instead of them there will be shown the current state of the data logger (Fig. 6.3).



With memory card and recording process stopped



Without memory card and recording process stopped



With memory card and recording process started

Figure 6.3 – Variants of main screen of data logger state

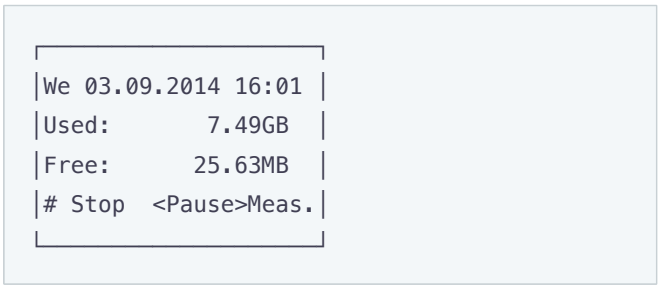
In order to restore the indication of menu items of data logger control, it is enough to press any button on the front panel of the data logger. The indication of the data logger state will be dissimulated and the control menu items will be shown instead (Fig. 6.2).

6.1.4 Starting and Stopping Data Recording

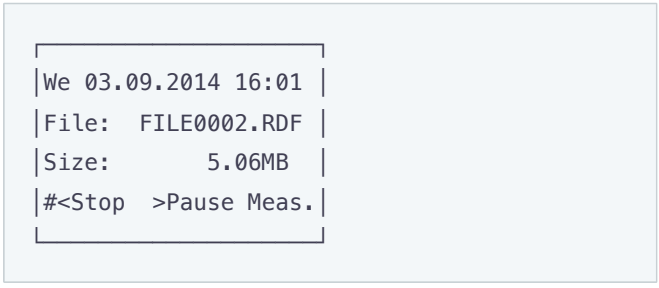
To start the process of data recording to the memory card, select with buttons ◄ (left) or ► (right) the menu item "**Start**", then by pressing the button ◙ (enter) confirm the choice. The data logger display will show a message confirming the beginning of the recording process (Fig. 6.4) and LED indicator **RECORDING** will be on (Fig. 1.2 item 2). After 3 seconds the main screen (Fig. 6.4) will be shown on the data logger display.

On the main screen there will be alternatively shown information of the free and occupied space on the memory card (Fig. 6.4 – Main screen variant 1), as well as the name and size of the last recorded file (Fig. 6.4 – Main screen variant 2).

Message of data recording process start



Main screen (variant 1)



Main screen (variant 2)

Figure 6.4 – Main menu view after start of data recording process

If there are no mistakes in configuration, the data logger creates a new file in the following path "**RPM-416\2014\JUL\03\FILE0001.RDF**", where:

- "**RPM-416**" – data logger core catalogue;
- "**2014**" – sub catalogue with indication of the current year (1980 - 2107);
- "**JUL**" – sub catalogue with indication of the current month (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec);
- "**03**" – sub catalogue with indication of the current date (01 – 31);

- "**FILE0001.RDF**" – the file name with extension "**RDF**" (FILE0001 – FILE9999).

When the file size reaches the user defined limit (32 KB – 512 MB), the data logger automatically creates a new file with the following name "**FILE0002.RDF**". When the file name reaches the maximum ("**FILE9999.RDF**"), the recording process will be terminated and on the data logger display there will be a message about an error shown in Figure 6.5. The LED indicator **RECORDING** (Fig. 1.2, item 2) will start flickering indicating that there is a mistake in the data logger operation.

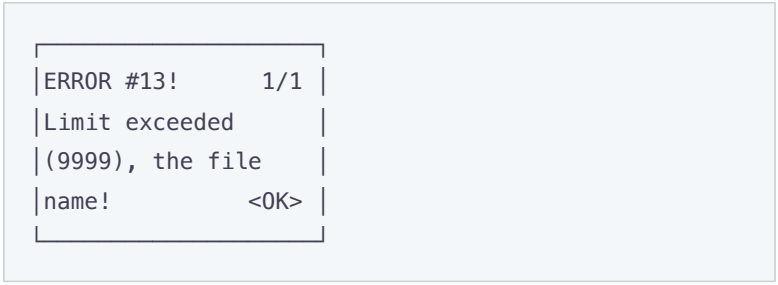


Figure 6.5 – The message about an error when the file name reaches the limit

For confirming the error, press the button ◙ (enter) (Fig. 1.2, item 5). The LED indicator **RECORDING** (Fig. 1.2, item 2) will start flickering indicating that the recording process is paused.

Depending on the recorded readings selected by user (the maximal number of recorded readings at the same time is 20), one data block size being recorded to the memory card for 20 readings is 88 bytes.

The stream of recorded data at discretion 1 ms for 20 readings is:

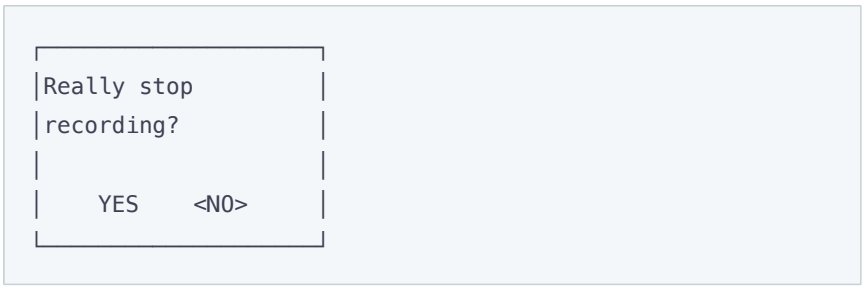
- 88 KB / sec, 5.28 MB / min or 316.8 MB / hour.

The stream of recorded data at discretion 1 s for 20 readings is:

- 88 byte / sec, 5.28 KB / min or 316.8 KB / hour.

To stop the recording process, on the main screen of the data logger (Fig. 6.6) by buttons ◄ (left) or ► (right) select menu item **STOP**, and by button ◙ (enter) confirm the selection. On the display there will be a message in which you need to confirm the stop of the recording process.

Main screen



Screen of confirming the recording process stop "Yes" / "No"

Figure 6.6 – View of main screen and screen of confirming the recording process stop

For confirming the recording process stop, select by buttons ◄ (left) or ► (right) indicator position "**YES**", and by button ◙ (enter) confirm the selection. The data logger will stop recording data to the memory card, the LED indicator **RECORDING** (Fig. 1.2, item 2) will light off and the display will look as shown in Figure 6.2 (with memory card).

After locating the indicator in position "**NO**", the data logger will continue recording and there will be on the display the main screen resulted in Figure 6.6.

If during the recording the memory card is full and has no free space, then depending on the selected type of recording ("**Until memory**" or "**The ring**"):

"Until memory" – there will be a message about an error on the display (resulted in Figure 6.7), and the recording automatically stops.

Figure 6.7 – A message about an error when there is no free space on the memory card

"The ring" – there will be a message on the display about the deleting of old files (resulted in Figure 6.8). The data logger makes searching and deleting the old files in order to free some space on the memory card for creating a new file.

```
┌────────────────────┐
│We 03.09.2014 16:20 │
│Removing old files  │
│Free:      20.15MB  │
│# Stop <Pause>Meas. │
└────────────────────┘
```

Figure 6.8 – A screen of old files deleting

> **Note**
>
> During old files deleting, the data recording to the memory card pauses and after freeing the available space for a new file, the recording starts automatically.

6.1.5 Data Recording at Event

RPM-416 can make data recording at event (this mode is described in the Setting of Event Recording Mode section).

If the data recording at event is switched on, the values measured by the data logger are continuously being recorded in temporary buffer storage with a user defined periodic sequence (parameter "**Discreteness**" at default is **1 ms**). Maximal length of temporary buffer storage is 1480 recordings.

The buffer storage is sequential data, where the reading is performed from "beginning" and recording is made to "end". When the buffer is full, the data deleting is performed from "beginning" and the new data is located in "end".

In RPM-416 there are five available sources of events, every of which can be set individually to any of the data logger inputs.

Until the event happens, the data logger continuously checks the measured values with the up and down limits specified by the user during the event setting. If the measured value is higher (up limit) or lower (down limit), the event is generated.

After the event happens, the data recording is performed in three stages, as shown in Figure 6.9.

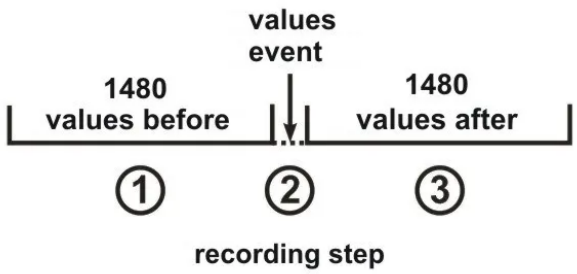


Figure 6.9 – Data recording at event (stages)

At the first stage, the values accumulated in the temporal buffer storage are recorded.

At the second stage, the value generated the event is recorded.

At the third stage, after event changed values are recorded.

After completion of all stages of recording, the data logger goes to stand-by mode waiting for a new event.

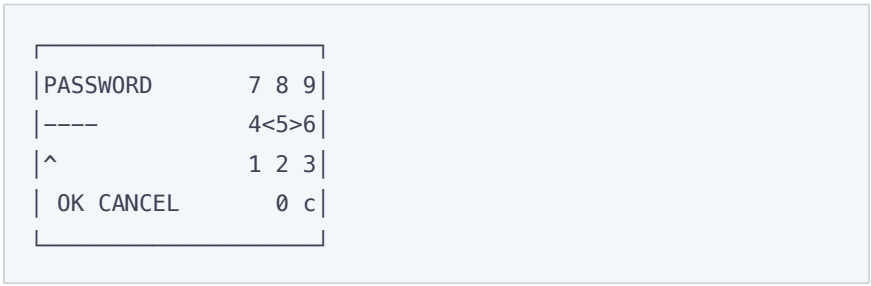
The number of values recorded before and after the event is set by parameters "**Points before**" and "**Points after**" in the menu of events setting (see Setting of Event Recording Time).

If the limit of the event is set for a single recording ("**ONCE**", see Setting of Upper and Lower Thresholds), then there will be no generating of the next event if the measured value is lower (up level) or higher (down level) of specified limits.

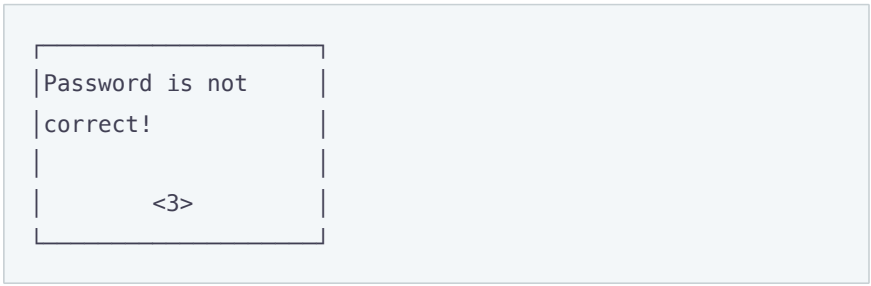
If the event limit is set on continuous recording ("**LONG**", see Setting of Upper and Lower Thresholds), then after the event happens the data recording will continue, until the measured value is higher (up level) or lower (down level) of specified limits.

6.1.6 The Main Menu of the Data Logger

For entering the data logger main menu: on the main screen by buttons ◄ (left) or ► (right) select item "**MENU/МЕНЮ**", and by button ◙ (enter) confirm the selection. If the password was set before, the data logger asks to enter the password (Fig. 6.10 Screen of password entering).



Screen of password entering



Message about an error of password entering

Figure 6.10 – Screen of password entering and screen of an error of password entering

The password entering is carried out in the following manner: by buttons ◄ (left), ► (right), ▲ (up) and ▼ (down) make the selection of one digit of password (the selected digit is illuminated by cursor), and by button ◙ (enter) confirm the selection.

Sign "**^**" indicates the digit which is selected at the moment.

To delete one digit of the password, set a cursor in position "**c**" (for example in case of error selection).

After completion of password selection, set a cursor in position “**OK**” and press the button ◙ (enter). If the password is not correct, there will be a message about the mistake on the display as shown in Fig. 6.10.

If the password is correct or if the password was deactivated by the user, there will be a list of main menu available items on the display of the data logger.

The screen of the data logger main menu is shown in Figure 6.11.

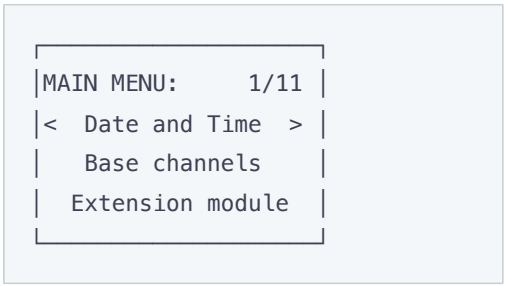


Figure 6.11 – Screen of the data logger main menu

The selection of the menu items is made by buttons ▲ (up) or ▼ (down), the confirmation of the selection is made by button ◙ (enter).

To escape from the main menu, press the button ◄ (left). If there were made changes in settings, the data logger asks to save them by the message on the display shown in Figure 6.12. Otherwise on the data logger display there will be the main screen (Fig. 6.2).

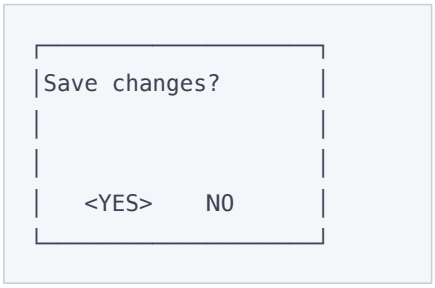


Figure 6.12 – Screen of saving the changes

To confirm the saving, by button ◄ (left) locate the cursor in position “**YES**” and press the button ◙ (enter). The data logger makes saving of the settings in nonvolatile memory and the display will show the main menu (Fig. 6.2).

To cancel the saving of the settings, by button ► (right) put the cursor in position “**NO**” and press the button ◙ (enter). The data logger will load the settings from the nonvolatile memory and the display will show the main menu (Fig. 6.2).

The full list of items of the main menu is described in Chapter 7 “The setting of the data logger RPM-416”.

> **Note**
>
> The item “MENU” of the main screen (Fig. 6.2) is available when the data recording to the memory card is stopped. To stop the recording process, follow the procedure described in item 6.1.4.

6.1.7 The Review of Measured Values

To review the measured values: on the main screen by buttons ◄ (left) or ► (right) select item “**Measuring**”, and by the button ◙ (enter) confirm the selection. The display shows the first of a list of available channels and the measured values.

The screen of measured values for channel 1 is shown in Figure 6.13.

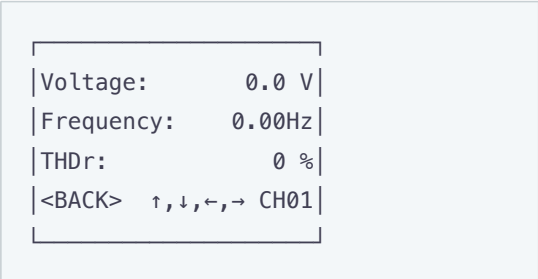


Figure 6.13 – Screen of measured values for channel 1

The first three lines display measured values available for this channel.

The fourth line displays the menu item “BACK” navigation direction symbols and channel number (“CH01”).

Shifting to the next open channel is made by pressing the button ◄ (left) or ► (right), and by buttons ▲ (up) or ▼ (down) you can scroll through the list of available measuring.

To escape from the screen of measured values, press the button ◙ (enter). The display will go to initial view (Fig. 6.4 – Main screen).

Table 6.1 – The list of channels with corresponding names of measured values

Ch.	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
1	Voltage RMS, V	Frequency, Hz	THDr, %	Peak + voltage, V	Peak - voltage, V	Instantaneous voltage, V
2	Voltage RMS, V	Frequency, Hz	THDr, %	Peak + voltage, V	Peak - voltage, V	Instantaneous voltage, V
3	Voltage RMS, V	Frequency, Hz	THDr, %	Peak + voltage, V	Peak - voltage, V	Instantaneous voltage, V
4	Current RMS, A	Frequency, Hz	THDr, %	Peak + current, A	Peak - current, A	Instantaneous current, A
5	Current RMS, A	Frequency, Hz	THDr, %	Peak + current, A	Peak - current, A	Instantaneous current, A
6	Current RMS, A	Frequency, Hz	THDr, %	Peak + current, A	Peak - current, A	Instantaneous current, A
7	Current RMS, A	Frequency, Hz	THDr, %	Peak + current, A	Peak - current, A	Instantaneous current, A
8	Temperature, °C	—	—	—	—	—

Ch.	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
9	Temperature, °C	—	—	—	—	—
10	Analog voltage, V	User's Value	—	—	—	—
11	Analog current, mA	User's Value	—	—	—	—
12	Digital input	Frequency, Pulse×min	Pulse Scaler	—	—	—
13	Digital input	Frequency, Pulse×min	Pulse Scaler	—	—	—
14	Digital input	Frequency, Pulse×min	Pulse Scaler	—	—	—
15	Digital input	Frequency, Pulse×min	Pulse Scaler	—	—	—
16	Active power, W	Reactive power, var	Full power, VA	Power factor, cos ϕ	Active Energy Scaler, kW×h	Reactive Energy Scaler, kVAr×h
17	Active power, W	Reactive power, var	Full power, VA	Power factor, cos ϕ	Active Energy Scaler, kW×h	Reactive Energy Scaler, kVAr×h
18	Active power, W	Reactive power, var	Full power, VA	Power factor, cos ϕ	Active Energy Scaler, kW×h	Reactive Energy Scaler, kVAr×h
19	Line voltage AB, V	Line voltage BC, V	Line voltage CA, V	Negative sequence voltage, V	Positive sequence voltage, V	Zero sequence voltage, V
20-40	Values depend on connected expansion modules	—	—	—	—	—

Note

Channels 16, 17, 18 and 19 do not have a physical connection of the terminals, their values are calculated from the measured values of the respective current and voltage:

- Channel 16 = Channel 1 and Channel 4
- Channel 17 = Channel 2 and Channel 5
- Channel 18 = Channel 3 and Channel 6
- Channel 19 = Channel 1, Channel 2 and Channel 3

6.1.8 Error Message Confirmation

In the process of the data logger work there can happen different errors (real time clock error, data exchange failure, settings failure etc.).

The total list of possible errors is presented in Table 6.2.

If an error takes place, it is shown on the display of the data logger. The LED indicator **RECORD** begins to blink.

The error message will be on the display until all errors are confirmed.

Screen with an error message is shown in Figure 6.14.

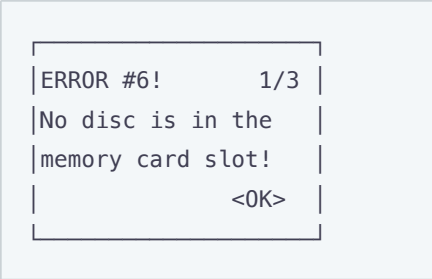


Figure 6.14 – Screen with an error message

In the first line there is a description of error and its code "**ERROR # 6!**". As well in the first line there is a current number of error and total quantity of errors "**1/3**".

In the second, third and fourth lines there is an error text.

By buttons ▲ (up) and ▼ (down) you can scroll the list of errors and by button ◙ (enter) you can confirm the current error.

If all the errors are confirmed by user but the data logger continues to state the active errors, the LED indicator **RECORD** continues to flicker. After 20 seconds the data logger will again show the active errors on the display.

If there are no active errors and the user confirmed all the errors, LED indicator **RECORD** lights off – in case the recording is stopped, lights on – in case the recording continues, or flickers – in case the recording is paused.

Table 6.2 – Total list of possible errors of the data logger

Error code	Error message	Troubleshooting method
#1	Failure is detected real-time clock	Set the date and time.
#2	No connection with ADC!	Switch off and switch on again the data logger.
#3	No connection to MM!	Switch off and switch on again the data logger.
#4	No connection with EM!	Switch off and switch on again the data logger.
#5	No connection with ROM!	Switch off and switch on again the data logger.

Error code	Error message	Troubleshooting method
#6	No disc is in the memory card slot!	Insert the memory card in slot of the data logger.
#7	Disk is write protected!	Deactivate the recording protection on the memory card.
#8	Unable to initialize the disk!	Switch off and switch on again the data logger. Take out and insert the memory card. Replace the memory card.
#9	Unable to connect to the disk!	Switch off and switch on again the data logger. Take out and insert the memory card. Replace the memory card.
#10	Memory card is full!	Delete the files which are not used on the memory card. Use recording mode “Circling”. Replace the memory card.
#11	Unable to read data from the disk!	Switch off and switch on again the data logger. Take out and insert the memory card. Format the memory card. Replace the memory card.
#12	Unable to create or open a directory RDF!	Switch off and switch on again the data logger. Take out and insert the memory card. Format the memory card. Replace the memory card.
#13	Limit exceeded (9999), the file name!	Delete the file from current directory. Replace the memory card.
#14	Unable to get the list of files!	Switch off and switch on again the data logger. Take out and insert the memory card. Format the memory card. Replace the memory card.
#15	Cannot create file!	Switch off and switch on again the data logger. Take out and insert the memory card. Format the memory card. Replace the memory card.
#16	Unable to write to file!	Switch off and switch on again the data logger. Take out and insert the memory card. Format the memory card. Replace the memory card.
#17	Damaged settings in the flash memory!	Reset the settings of the data logger to factory settings. Reset the data logger.
#18	Unable to save settings to flash memory!	Switch off and switch on again the data logger. Reset the data logger.
#19	Damage the calibration in flash memory!	The data logger should be calibrated. This procedure can be performed only at the manufacturer plant.
#20	Memory overflow	Switch off and switch on again the data logger.
#21-#32	Unknown error!	The reserved errors codes. Switch off and switch on again the data logger.

Critical errors (require data logger restart): `NMI_HANDLER`, `HARDFAULT_HANDLER`, `MEMMANAGE_HANDLER`, `BUSFAULT_HANDLER`, `USAGEFAULT_HANDLER`, `STACK_OVERFLOW`, `LCD_Init`, `SETTINGS_Init`, `TIM2_Config`, `ETH_Config`, `SPI1_Config`, `SPI3_Con`

`fig`, `ADC1_Config`, `USART2_Config`, `NVIC_Config`, `BUTTON_Init`, `DIGINP_Init`, `SD_Init`, `SRAM_Init`, `RTC_Init`, `ADCM_Init`, `USART2_Init`, `Modules_Init`, `TCPStack_Init`, `OVERVIS_Init`, `HTTP_Init`, `MODBUS_Init`, `FTP_Init`, `TWRITE_Create`, `TCOLL_Create`, `TGUI_Create`, `TGKeep_Create`

6.2 Use of HTTP Server (Web-interface)

For access to Web-interface of the data logger, a PC with an installed Web-browser is required.

In the Web-browser, enter the IP-address of the data logger (factory setting **192.168.0.2**) and press the button to access this address.

On the PC screen there will be a welcome page of the data logger RPM-416 with offer to enter the password (factory setting "**admin**").

After the password entering and pressing the button "**Enter**", if the password is correct, there will be the main screen of the data logger. If the password is not correct, there will be a password error message on the PC display.

On the main screen you can monitor the current state of the data logger, make settings, control and restart.

After resetting RPM-416, press the button "**Save setting**". The entered settings will be checked. In case there are no errors in the setting parameters, they will be saved in nonvolatile memory of the data logger. In case there are some errors in the setting parameters, they will not be saved.

After the completion of the work with Web-interface, press the button "**Exit**". The main page will be closed and the welcome and password page will be opened.

If there is no activity of the user during 5 minutes (this period is specified by the user, see Setting of HTTP Connection Timeout), the data logger automatically closes the communication. In this case it is necessary to enter IP-address of the data logger and password again.

> **Note**
>
> If the address parameters in Ethernet network (MAC-address, IP-address or DHCP setting) were changed then in response to pressing the button "**Restart**", Web-browser may not load the page. It happens because Web-browser requests to the old address of the data logger. In this case it is necessary to restart the connection.

> **Caution**
>
> The RPM-416 has restriction of number of simultaneously connected clients to Web-interface (**not more than five**). All connections exceeding the limit will be automatically closed.

6.3 Use of Modbus TCP Server

Connection protocol Modbus TCP enables connecting the data logger to the network organized by standard Ethernet. The use of the data logger in network enables to perform the following operations:

- data receiving in SCADA systems;
- programming the data logger via PC (by program RPM-416 Data Analysis);
- remote control of the data logger.

While connecting to the data logger, the access to the command registry and recording function is blocked (reading function is not blocked). To unblock the access to the command data logger and recording function, write in registries 51-63 the modbus password in ASCII symbols (factory default “**admin**”). In unused registries, there should be written zero values (0x0000).

In case the modbus password is correct, the data logger will unlock the access to the command registry and recording function.

The data logger control is carried out via the command registry (see Modbus Registers Reference).

After completing data logger resetting, carry out the command of recording in the nonvolatile memory (0x472C). For the changes to take place, the data logger should be restarted (0xF2C5).

If the functions of recording and register of commands are not used for a long period of time, block the access to them by writing in registries 51-63 values differing from the modbus password (for example, 0).

If there is no data exchange for 60 seconds (time is set by the user, see Setting of Modbus TCP Connection Timeout), the data logger automatically breaks the connection with the client.

In the data logger, all values with a decimal point are converted to whole numbers. That’s why while processing the data, it is necessary to use additional mathematic operations.

To the request of reading the value with a dot (for example, **1.000**) the data logger will return the whole number value **1000**, for adjusting to the correct format it is necessary to divide the number by 1000.

Before recording the value with a dot (for example, **1.000**) it is necessary to bring the value to the whole number by multiplying by 1000, then make recording of the value in the data logger.

The coefficient of changing to whole number is defined by the number of digits after the dot (1.0 – 10; 1.00 – 100; 1.000 - 1000).

The types of parameters and their names are given in the Parameter Types table.

The list of supported Modbus functions is in the Supported Functions table.

The command registry address is in the Command Registry section.

Addresses of additional registries are in the System Registries section.

Addresses of the registers of the measured parameters of the base channels are given in the Base Channel Registers section.

Register addresses for expansion modules are in the Expansion Module Registers section.

Addresses of programmable parameters are in the Programmable Parameters section.

> ⚠ **Caution**
>
> The data logger has restriction of number of simultaneously connected clients to Modbus TCP (**not more than five**). All connections exceeding the limit will be automatically closed.

For the complete Modbus register map including supported functions, command codes, parameter types, system registries, and channel addresses, see Appendix E: Modbus Registers Reference.

6.4 Use of FTP Server

File transfer protocol FTP uses the double connection. One channel is a control channel through which the commands from the data logger come in and responses go out (default TCP-port 21), and via the second channel comes data communication (TCP-port is defined by the data logger by random choice).

Use of FTP protocol enables via TCP-networks to receive remote files recorded by the data logger on the memory card.

Files receiving is carried out with the help of program “RPM-416 Data Analysis” or any other software which supports file receiving via FTP.

In the data logger, server FTP operates in passive mode (waiting for the client’s connection).

At connection to the data logger via FTP it is necessary to write the name of the user “**ftp**” and password (factory default “**admin**”).

Supported FTP commands:

- **ABOR** – Abort the file transmitting
- **CDUP** – Change the directory upward
- **CWD** – Change the directory
- **DELE** – Delete file
- **LIST** – Restore the list of current directory files
- **MKD** – Make directory
- **MODE** – Sets the transfer mode (“S” – Stream)
- **NLST** – Restore the list of current directory files in brief format
- **NOOP** – No operation (is used for timeout reset)
- **PASS** – Password for the server
- **PASV** – Enter in passive mode and restore address of connection
- **PORT** – Specifies an address and port to which the server should connect
- **PWD** – Restore the current directory
- **QUIT** – Switch off
- **REIN** – Re-initialize the connection
- **RETR** – Download the file (before RETR operation there should be a command PASV)
- **RMD** – Remove a directory
- **STOR** – Accept data and store data as a file at the server site
- **STRU** – Set file transfer structure (“F” – file)
- **SYST** – Return the system type (UNIX)
- **TYPE** – Define the type of file transmitting (“I” – binary)
- **USER** – User’s name for input on the server

If there is no data exchange during 300 seconds (time period can be set by the user, see Setting of FTP Connection Timeout), the data logger automatically breaks the connection with a client.

> **Caution**
>
> The data logger has restriction of number of simultaneously connected FTP clients (**not more than two**). All connections exceeding the limit will be automatically closed.

6.5 Use of Overvis Client

Overvis is a system for monitoring, visualization and remote control of technological processes.

Overvis enables:

- to read the data from the instruments, including with the recording system;
- to perform 24-hour cyclical readout of data;
- to save the data automatically in its own database;
- to display the data in the convenient form;
- to receive alarm reports in the form of SMS or E-Mail.

More detailed information can be found at the official website www.overvis.com.

Overvis system acts as a collection server of data from the recording system and other devices connected simultaneously, and it provides access to data in real time only with the permission of the owner of the recording system.

Factory settings of the recording system are prepared to connect to the server of Overvis, in this case the Overvis client in the recording system is disabled and should be enabled manually by the user.

To connect the recording system to the system of Overvis it is required:

1. Configure the recording system to access the internet
2. Enable Overvis Client
3. In the Overvis settings, make sure that there is connection to the server and the activation code is received
4. Using the instructions at Overvis website, connect to the recording system with the activation code

> **Note**
>
> When you connect the register to Overvis system for the first time, Overvis activation settings indicate that connection is activated. To ensure safety one should select RESET item, to remove the device from Overvis system. Thus, it guarantees that the register connected is to be used by users possessing rights.

6.6 Inserting and Pulling Out of the Memory Card

Insert the memory card in the slot situated on the side wall of the data logger, as shown in Figure 5.1 and press it till there is a click.

In order to pull the memory card out, press it till a click and release it – the memory card will go out from the slot about 3-5 mm, after that you can pull it out.

During inserting and pulling out of the memory card do not use much effort.

> **Danger**
>
> Do not pull out the memory card during data recording to the data logger – it can result in recorded data loss. The procedure of safety pulling out of the memory card is described in Safe Removal of Memory Card.

6.7 RPM-416 Data Analysis Software Installation

For proper work of the software on the computer there should be installed Operational System Windows Vista or Windows 7/8/10/11. The installation is initiated by starting the installation file "**rpm416da_setup.exe**" (not included in the supply scope). After starting of the installation, the program performs the installation guided by the instructions of installation master. If the previous version of the program has been already installed on the computer it should be deleted before a new installation.

The latest version of the program is available on the web site https://novatek-electro.com in section "Software".

To delete the program, you should use Windows master of installation and deleting.

> **Note**
>
> For Windows Vista, 7/8/10/11 the program must be performed with administrator rights.

6.8 Installation and Connection of Software for Memory Card-Reader

The procedure and installation of software for memory cards reading depends on the model and manufacturer of the device. All installation instructions are provided in the card reader manual.

6.9 Review of the Recorded Data

Pull out the memory card from the data logger (pulling out of the memory card is described in item 6.6) and insert it in the card reader on the PC.

Review and analysis of the data is carried out with program software "**RPM-416 Data Analysis**" installed on the PC (installation of the software is described in item 6.7).

Program "**RPM-416 Data Analysis**" enables to make the analyses of data, to compare it (in form of numeral information or diagrams) and output the results of the analysis for printing. The program can also perform a remote configuration of the data logger and monitor its operation in real time mode via protocol Modbus TCP.

7. Setting of the Data Logger RPM-416

The description of settings is based on the factory parameters settings.

The parameters are saved in the nonvolatile memory (period of storage is not less than 10 years).

For restoring the main menu of the RPM-416, perform the actions described in the Main Menu of the Data Logger section.

Main Menu Items

Menu Item	Description
Date and Time	For setting the date and time
Base Channels	For setting the base channels (inputs of the data logger)
Exp. modules	For setting the expansion modules
Display	For setting the display
Record of data	For setting the data recording to the memory card
Record of events	For setting the events
Memory card	For setting the memory card
Network	For setting Ethernet interface
Password	For setting the access restriction to the data logger
General settings	Allows you to perform additional actions with settings
Device version	For information about the version of the data logger

The selection of the menu items is performed by buttons ▲ (up) or ▼ (down) (the selected item is underlined by the cursor), confirmation of the selection is made by pressing the button ◙ (enter).

For escape from the menu, press the button ◄ (left).

For detailed settings information, please see Appendix D: Settings Reference.

8. Maintenance

8.1 Safety Precautions

> **Danger**
>
> THE TERMINALS AND THE RPM-416 INTERNAL ELEMENTS CONTAIN POTENTIALLY LETHAL VOLTAGE.
>
> DURING MAINTENANCE IT IS NECESSARY TO DISABLE THE DATA LOGGER AND CONNECTED DEVICES FROM THE MAINS.

8.2 Qualified Personnel

Maintenance of the device must be performed by qualified service personnel.

8.3 Maintenance Frequency

Recommended frequency of maintenance is every six months.

8.4 Maintenance Procedure

1. Check the connection reliability of the wires, if necessary, clamp with the force specified in Table 3.1.

2. Visually check the integrity of the housing. In case of detection of cracks and damages, remove the device from service and send for repair.
3. If necessary, wipe the front panel and the device housing with a cloth.

> **Caution**
>
> Do not use abrasives and solvents for cleaning.

9. Service Life and Manufacturer Warranty

9.1 Service Life

The lifetime of the data logger is **10 years**. Upon expiration of the service life, contact the manufacturer.

9.2 Shelf Life

Shelf life is **3 years**.

9.3 Warranty Period

Warranty period of the RPM-416 operation is **5 years** from the date of sale.

During the warranty period of operation (in the case of failure of the data logger) the manufacturer is responsible for free repair of the device.

> **Caution**
>
> IF THE DEVICE HAS BEEN OPERATED IN VIOLATION OF THE REQUIREMENTS OF THIS MANUAL, BUYER WILL FORFEIT THE RIGHT TO WARRANTY SERVICE.

9.4 Warranty Service Location

Warranty service is performed at the place of purchase or by the manufacturer of the device.

9.5 Post-Warranty Service

Post-warranty service of the data logger is performed by the manufacturer at current rates.

9.6 Repair Shipping

Before sending for repair, the data logger should be packed in the original or other packaging excluding mechanical damage.

> **Note**
>
> Please indicate the reason for return in the notice of faults field when returning the device or when submitting for warranty or post-warranty service.

10. Transportation and Storage

The data logger in the original package is permitted to be transported and stored at the temperature from **-45°C to +60°C** and relative humidity of **80%**.

Manufacturer Information

“Novatek-Electro” Ltd.

Website: www.novatek-electro.com

Address: 59, Mykhailo Boltenko (Admiral Lazarev) str., Odesa, Ukraine, 65007

Phone:

- +38 (067) 565 37 68
- +38 (050) 359 39 11
- +38 (063) 301 30 40

Appendices

- Appendix A: Ethernet Connection — Connection to Ethernet network
- Appendix B: Internet Connection — Connection to Internet
- Appendix C: Software Versions — Software version history
- Appendix D: Settings Reference — Detailed settings guide
- Appendix E: Modbus Registers — Complete Modbus register reference

Appendix A: Connection of the Data Logger to Ethernet

> ⚠ **Caution**
>
> The connection of the data logger to Ethernet network requires the interlink compliance of settings of all connected devices. Connection to the network of an incorrectly adjusted data logger may result in communication failure, as well as on other devices in the network. As a rule, the connection to the network of more than 2 interconnected devices should be performed only by qualified personnel (network administrator).

A.1 IP-addressing

At communication of the device via Ethernet network over TCP/IP protocol, in order to distinguish the data transmitter and recipient, every device uses a special setting of IP-addressing.

The device keeps in memory:

- Its own unique IP-address within one subnet (four bytes recorded as four integral numbers in range 0-255, separated by dots)
- Subnet mask, which is the same for all devices in the subnet (written similarly to IP-address)
- IP-address gateway, which is used for communication with other networks

Subnet Configuration Rules

For correct communication of the devices in the subnet, observe the following provisions:

1. **Subnet Mask**: Should be the same for all devices in that sub network. As a rule, in small local sub networks, the mask **255.255.255.0** is used. The mask begins with a group of bits set in 1, followed by the group of bits set in 0.

2. **Network Address**: Group of bits in IP-addresses of devices which are set in mask to 1 are similar and represent the address of subnet. For mask 255.255.255.0 in local subnets, addresses beginning with **192.168.0.x** are most commonly used.

3. **Host Address**: Group of bits in IP-addresses of devices which are set in mask to 0 is unique for every device within one sub network.

Gateway Configuration

In most cases, a new device (for example, a router) which is connected to network already has connection with other networks. Often the addresses **192.168.0.1**, **192.168.0.100** or **192.168.0.101** are reserved for it. In this case, other devices in the network receive IP-Address of this device as a gateway address.

Indication of this address is not obligatory for communication between devices in the subnet and is used only for communication of devices of one subnet with devices in other subnets.

Factory Settings

Table A.1 - Factory IP Settings

Parameter	Value
IP-address	192.168.0.2
Subnet mask	255.255.255.0
Gateway	192.168.0.1

For the data logger communication with a client-device (and any other devices in the same subnet), the mask **255.255.255.0** and addresses starting with **192.168.0.x** are used. The fourth byte of address can be any value in range 1–255, except 2.

In case of indirect connection (between RPM-416 and client-device), and in a network with several devices, the address cannot be equal to any of the addresses of other devices in the subnet.

A.2 Setting of Client-Device

Setting of addressing of client-device should be performed according to the documentation of this device and the software used in it.

Example: Windows 7/8/10/11 Configuration

To configure a personal computer (PC) with Windows for direct connection to RPM-416 with factory settings:

1. Enter into OS with profile of administrator
2. Select **Start → Control Panel**
3. Select category **Network and Internet**
4. Open item **Network and Sharing Center**
5. In the list of tasks (on the left of panel) select **Change adapter settings**

In the opened screen of connections, select the adapter which addressing should be changed. Many computers have only one adapter, which will be shown in this screen.

6. Right-click on the icon of the selected adapter, in the appeared menu select **Properties**
7. In the opened screen, in the list of connection components select **Internet Protocol Version 4 (TCP/IPv4)**
8. Make sure that component is activated (marked by checkbox in the list)
9. Press the button **Properties**

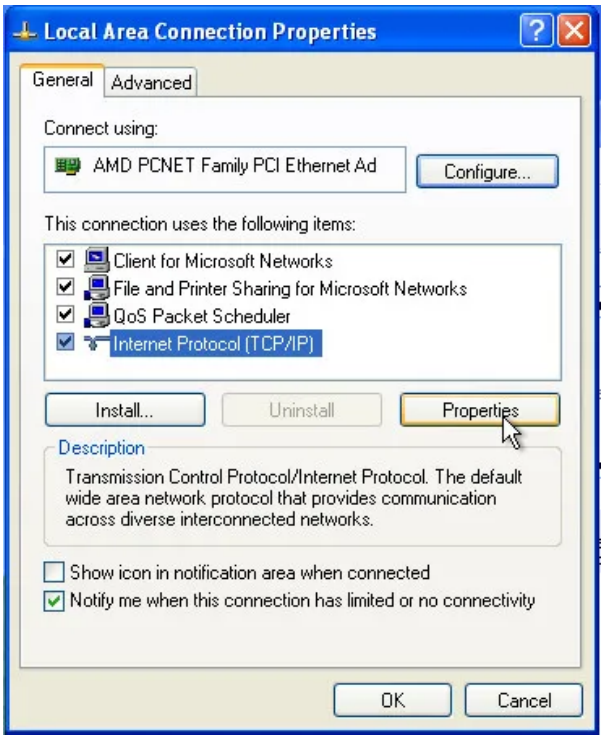


Fig. A.1 – Example of connection properties screen in Windows

10. Select the option **Use the following IP address**
11. In field **IP-Address** enter an address in range **192.168.0.1–192.168.0.255** (except 192.168.0.2, which is used by the data logger)
12. In field **Subnet mask** enter **255.255.255.0**
13. Leave the fields **Default gateway**, **Preferred DNS server**, **Alternate DNS server** blank
14. Press **OK** to close the window of protocol setting
15. Press **OK** to close the window of adapter setting

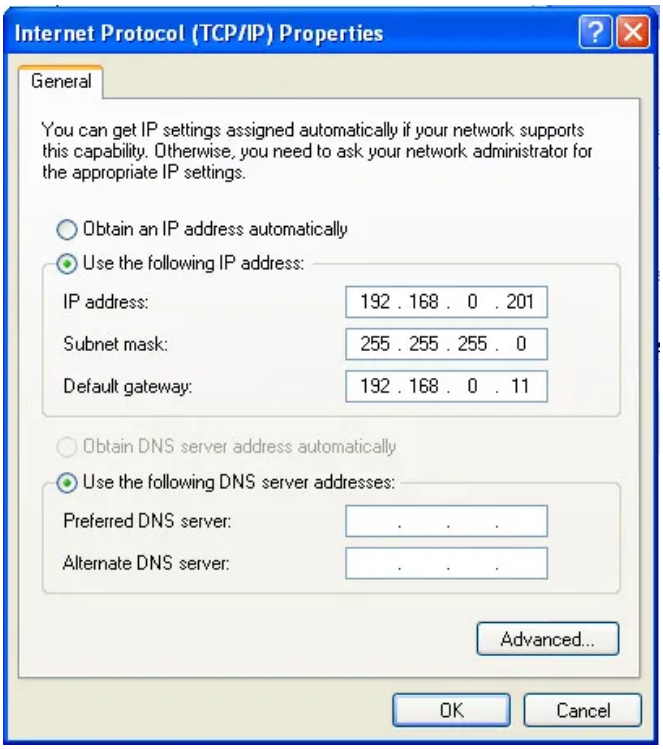


Fig. A.2 – Example of protocol TCP/IPv4 properties screen in Windows

After completing these steps, your PC should be able to communicate with the RPM-416 data logger.

Appendix B: Connection of the Data Logger to Internet

> **Danger**
>
> It is strongly recommended that connection of the data logger to Internet is carried out under supervision of the system administrator of the local network or a representative of the internet provider.

Requirements for Internet Connection

For connection of the data logger to Internet, use the following recommendations:

1. **Obtain a dedicated line** with a static IP-address from internet provider (further referred to as “provider”)
2. **Inform the provider** about the MAC-address of the data logger

> **Caution**
>
> The direct connection of the data logger to the provider’s cable is not recommended.

Router Configuration

At connection of the data logger via a router (routing gateway):

1. Connect the provider’s cable to the router’s **WAN** slot (usually with a color indication without number, depending on the router manufacturer the indication can differ – see the router documentation)
2. Use the Ethernet cable supplied with the data logger for connection of the data logger to the router
3. Guided by the router manual, adjust the router for connection to Internet network according to the provider’s recommendations
4. In the router settings, switch on the **port forwarding** of incoming packages to the IP-Address of the data logger (factory setting – **192.168.0.2**)

Accessing the Data Logger Remotely

At addressing the data logger in Internet network, you should use the IP-Address obtained from the provider (your static public IP address).

Common ports used by RPM-416:

- **HTTP (Web-interface):** Port 80 (default)
- **Modbus TCP:** Port 502 (default)
- **FTP:** Port 21 (default)

Configure your router to forward these ports to the data logger’s internal IP address (192.168.0.2).

Security Considerations

> **Danger**
>
> The integrated in RPM-416 security access features are not intended against malicious network attacks (especially the attacks whose purpose is blocking the access to the device).
>
> You should secure the connection of the data logger to Internet network by standard means of protection (for example, Firewall).

Security Recommendations

1. **Change default passwords** – Update the default “admin” password to a strong, unique password
2. **Use a firewall** – Configure your router’s firewall to only allow connections from known IP addresses
3. **VPN connection** – Consider using a VPN for remote access instead of direct internet exposure
4. **Regular monitoring** – Monitor access logs for suspicious activity
5. **Keep firmware updated** – Install firmware updates when available

Appendix C: RPM-416 Software Version History

This appendix provides a complete history of firmware versions for the RPM-416 Data Logger.

Version History

Version	Date	Description
v2.6	14/03/2025	Increased transformation factor for channels 4,5,6,7 from 2000 to 9999. Optimized speed for the data acquisition task.
v2.5	07/02/2025	Fixed incorrect scaling of channel 11 in the Web-interface.
v2.4	05/08/2024	Fixed incorrect user offset for temperature channel 2. Fixed inverted menu for channels 12, 13, 14, 15.
v2.3	19/01/2024	Resetting user settings (pressing the UP and DOWN buttons) has been moved. Added a delay after inserting a disk (to stabilize the power supply).
v2.2	31/05/2023	Added Ethernet reboot function if Link is out of service for more than 60 seconds. Input event values are normalized (example: 255.0 V, 12.44 A).
v2.1	02/05/2023	Fixed the calculation of the power value.
v2.0	02/05/2023	Fixed and optimized SPI IO. Added new code for FTP server. Optimized graphical interface. Fixed 1920→1480 points and SRAM 1 and 2 sizes. Optimized memory usage. ARP timer resolution changed from 5 to 1 second. Added Modbus server timeout checking using the timestamp in absolute value. Ethernet DMA has been optimized. Fixed algorithm for saving settings and calibration. Fixed PHY and ETH synchronization.
v1.9	28/07/2022	Optimized for the new GD32F107VCT6 MCU. Fixed blocking of flash memory after writing. Fixed reading data via SPI.
v1.8	27/10/2020	Data recording loss at maximum speed (1ms) is fixed.
v1.7	08/04/2019	Casual reset of the device in mode of sitting is corrected.
v1.6	21/12/2018	Formatting of the memory card is corrected.

Version	Date	Description
v1.5	03/08/2018	The event counter has been added when the power was applied to the device, as well as the time of recording the last event (registers 23:24 and 25:26). Added the ability to save (load) all settings to a memory card. Changed the scaling of analog channels (10 and 11), now it is necessary to set the input and output range of values. The FatFs file system library has been updated to version 13b. Improved the password entry screen. Corrected the error #5 when recording events in the ring mode. Optimized the SPI frequency to support slower cards. Time synchronization with PC has been optimized. Optimized the display of measured values on the front panel. Optimized the algorithm for determining the Ethernet cable connection. Corrected a critical error that caused the device to reboot. General system performance improvements.
v1.4	11/04/2017	Line voltage measurement has been added (channel 19). Corrected the scaling of analog signals (channels 10 and 11). Improved the time correction to 99.9 s per day. Fixed hang-up of Ethernet DMA when pinging the device in large packets of 65,500 bytes.
v1.3	21/07/2016	Added scaling of analog signals for channels 10 and 11. Electric power meters have been added. Counters of discrete signals have been added. Added the ability to change the password from the front panel (Modbus, Ftp, Http). Modbus network identifier has been added. Corrected the removal of old files in the write mode by the ring.
v1.2	28/07/2015	Added measurements: harmonics of voltage and current, peak values of voltages and current. Added the support for expansion modules. Added the ability to connect to the server Overvis. Completely rewritten protocols: Modbus, Ftp and Http. Improved the correction of the real-time clock.
v1.1	12/11/2014	The folder names have been corrected when working with FTP. Minor corrections.
v1.0	30/08/2014	The first version of the software.

Checking Your Firmware Version

To check the current firmware version of your RPM-416:

1. Navigate to **Menu → Device version** on the front panel display
2. Or read Modbus register 1 (firmware version)
3. Or check the **Device version** section in the Web-interface

Firmware Updates

For information about updating your RPM-416 firmware, please contact NOVATEK-ELECTRO technical support.

> **Note**
>
> Always backup your settings before performing a firmware update. Some updates may reset configuration parameters to factory defaults.

Appendix D: RPM-416 Settings Reference

This appendix provides complete instructions for configuring all settings of the RPM-416 Data Logger.

The description of settings is based on the factory parameter settings. Parameters are saved in nonvolatile memory (storage period is not less than 10 years).

For restoring the main menu of the RPM-416, perform the actions described in the Main Menu of the Data Logger section of the Operating Manual.

Main Menu Items

Menu Item	Description
Date and Time	For setting the date and time
Base Channels	For setting the base channels (inputs of the data logger)
Exp. modules	For setting the expansion modules
Display	For setting the display
Record of data	For setting the data recording to the memory card
Record of events	For setting the events
Memory card	For setting the memory card
Network	For setting Ethernet interface
Password	For setting the access restriction to the data logger
General settings	Allows you to perform additional actions with settings
Device version	For information about the version of the data logger

The selection of menu items is performed by buttons ▲ (up) or ▼ (down) (the selected item is underlined by the cursor), confirmation of the selection is made by pressing the button ◙ (enter).

To exit the menu, press the button ◄ (left).

D.1 Setting of Date and Time (“Date and Time”)

For setting the date and time it is necessary: in the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item “**Date and time**”, confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be the list of available menu items for setting the date and time:

- “**Date**” – menu item for setting the date;

- “**Time**” – menu item for setting the time.

By buttons ▲ (up) or ▼ (down) make the selection of the corresponding menu item, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.1.1 Setting of Date (“Date”)

At selection of this item on the display of the data logger there will be a screen of the date setting, resulted in the Figure D.1.1.

Figure D.1.1 – Screen of date setting

On this screen the date is resulted in format “DDD dd.mm.yyyy”, where:

Code	Meaning
DDD	Day of week: Mo (Monday), Tu (Tuesday), We (Wednesday), Th (Thursday), Fr (Friday), Sa (Saturday), Su (Sunday)
dd	Date (from 1 to 31)
mm	Month (from 1 to 12)
yyyy	Year (from 1980 to 2107)

By buttons ◄ (left), ► (right), ▲ (up) and ▼ (down) make a selection of the necessary parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion it is necessary to press again the button ◙ (enter) – to escape from the mode of setting and saving of the changed parameter. The parameter stops blinking.

In case of necessity repeat the same procedure with other parameters.

To restore the previous menu, it is necessary by button ▼ (down) select the position “**BACK**” and press the button ◙ (enter).

D.1.2 Setting of Time (“Time”)

At selection of this item on the display of the data logger there will be a screen of the time setting, resulted in the Figure D.1.2.

Figure D.1.2 – Screen of time setting

On this screen the time is resulted in format “HH:MM:SS CC”, where:

Code	Meaning
HH	Hours (from 0 to 23)
MM	Minutes (from 0 to 59)
SS	Seconds (from 0 to 59)
CC	Correction sec/day (from -99.9 to +99.9)

> ⚠ **Caution**
>
> Incorrect time correction can lead to a temporary error of up to ±2 ms per second during data recording.

By buttons ◄ (left), ► (right), ▲ (up) and ▼ (down) make a selection of the parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and saving of the changed parameter. The parameter stops blinking.

In case of necessity, repeat the same procedure with other parameters.

To restore the previous menu, it is necessary by button ▼ (down) select the position “**BACK**” and press the button ◙ (enter).

D.2 Setting of Base Channels (“Base Channels”)

The data logger – is a multichannel device, which has different inputs (voltage, current, temperature, discrete inputs etc.) requiring individual setting.

For channels setting it is necessary in the main menu by buttons ▲ (up) or ▼ (down) select the item “**Channels**”, confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be the list of available channels:

Channel	Description
Channel 1 (2 and 3)	Voltage channels
Channel 4 (5, 6 and 7)	Current channels
Channel 8 (9)	Temperature channels
Channel 10	Analog voltage 0-10 V
Channel 11	Analog current 0-20 mA
Channel 12 (13, 14 and 15)	Discrete signal channels
Channel 16 (17 and 18)	Power channels

By buttons ▲ (up) or ▼ (down) make selection of necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.2.1 Setting of Voltage Channel (“Channel 1” (2 and 3))

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of voltage:

- “**Information**” – menu item with a brief information and description;
- “**Voltage sensor**” – menu item for setting the coefficient of voltage transfer (with voltage transformers switched on).

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Setting of Voltage Sensor (“Voltage sensor”)

At selection of this item on the display of the data logger there will be the screen of setting of voltage conversion ratio, resulted in the Figure D.2.1.

Figure D.2.1 – Screen of setting of voltage conversion ratio

On this screen you can set the voltage conversion ratio from **1.0** to **5000.0**.

By button ▲ (up) select the parameter "**1.0**" (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.2.2 Setting of Current Channel ("Channel 4" (5, 6 and 7))

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of current:

- "**Information**" – menu item with a brief description;
- "**Current sensor**" – a menu item for setting the current transformer nominal.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Setting of Current Sensor ("Current sensor")

At selection of this item on the display of the data logger there will be the screen of setting of current transformer rated, resulted in the Figure D.2.2.

Figure D.2.2 – Screen of setting of current transformer rated

On this screen you can set the rated of used current transformer from the following row from **5 A to 9999 A**.

By button ▲ (up) select the parameter "**Rated**" (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.2.3 Setting of Temperature Channel ("Channel 8" (9))

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of temperature:

- "**Information**" – menu item with a brief description;
- "**Temperature sensor**" – a menu item for setting the type of sensor and for making correction of the temperature.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Setting of Temperature Sensor ("Temperature sensor")

At selection of this item on the display of the data logger there will be a screen of setting of temperature sensor, resulted in the Figure D.2.3.

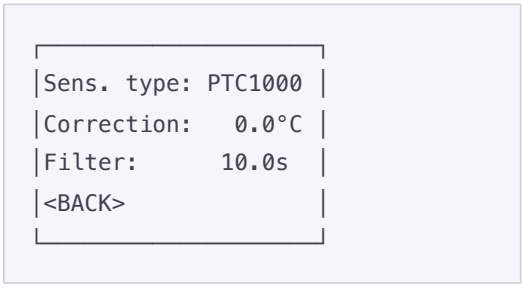


Figure D.2.3 – Screen of temperature sensor setting

On this screen you can set:

- Type of sensor: **PTC1000** or **PT1000**
- Temperature calibration: from **-9.9 °C to +9.9 °C**
- Temperature filter: from **0.0 sec** (disabled) to **10.0 sec**

Temperature Calibration Procedure:

After connection (or replacement) of temperature sensor, it should be calibrated. The calibration consists of summing the correcting coefficient and measured temperature. You will need a calibration thermometer with grade not less than 0.1 °C.

The sensor of calibration thermometer and sensor of calibrated channel should be located as close to each other as possible.

The correcting coefficient is calculated by the following formula:

Tcc = Tct – Ttmr, where:

- Tcc – value of correcting coefficient, °C
- Tct – temperature value of calibration thermometer, °C
- Ttmr – temperature value measured by the data logger, °C

During calculation, wait about 5 minutes for stabilization of temperature values.

D.2.4 Setting of Analog Voltage 0-10 V Channel (“Channel 10”)

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of analog voltage 0-10 V:

- “**Information**” – menu item with a brief description;
- “**Voltage sensor**” – a menu item for setting the type of analog voltage sensor.
- “**Scaling**” – menu item, that allows to set analogue voltage sensor scaling.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Setting of Analog Voltage Sensor (“Voltage sensor”)

At selection of this item on the display of the data logger there will be a screen of setting the analog voltage sensor 0-10 V, resulted in the Figure D.2.4.

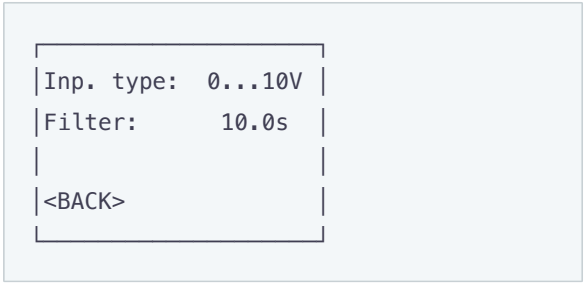


Figure D.2.4 – Screen of setting the analog voltage sensor

On this screen you can set the type of used sensor: **0...10 V** or **SCALE**.

Analog voltage filter range from **0.0 sec** (disabled) to **10.0 sec**.

By buttons ▲ (up) or ▼ (down) select the necessary parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Analog Voltage Sensor Scaling ("Scaling")

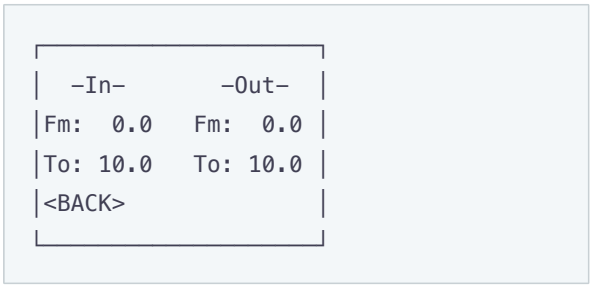


Figure D.2.5 – Analog Voltage Sensor Scale Setting Screen

On this screen, you can set the input voltage value of the sensor from **0.0** to **10.0** V and the final scale value from **-999.9** to **999.9**.

Via arrow keys ▲ (up) or ▼ (down) select required parameter (the selected parameter is highlighted by the cursor).

To edit parameter, one should:

- press ◙ (enter) key, the parameter starts to flash;
- via arrow keys ▲ (up) or ▼ (down) change the parameter value;
- after changing the value press ◙ (enter) button again to exit edit mode and save the value set, the parameter stops to flash.

To return to the previous menu via ▼ (down) arrow button set the cursor in "**BACK**" position and press ◙ (enter) button.

D.2.5 Setting of Analog Current 0-20 mA Channel ("Channel 11")

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of analog current 0-20 mA:

- "**Information**" – menu item with a brief description;
- "**Sensor of current**" – a menu item for setting the type of analog current sensor.
- "**Scaling**" – menu item, that allows to set analogue current sensor scaling.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Setting of Analog Current Sensor ("Current sensor")

At selection of this item on the display of the data logger there will be a screen of setting the analog current sensor 0-20 mA, resulted in the Figure D.2.6.

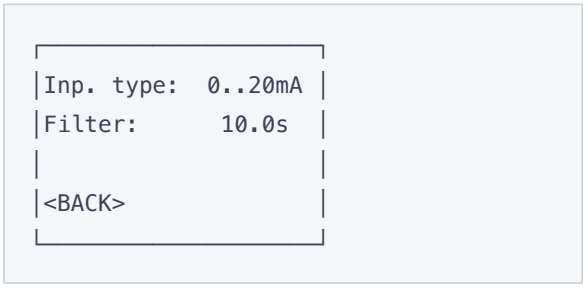


Figure D.2.6 – Screen of setting the analog current sensor

On this screen you can set the type of used sensor: **0...20 mA** or **SCALE**.

Analog current filter range from **0.0 sec** (disabled) to **10.0 sec**.

By buttons ▲ (up) or ▼ (down) select the necessary parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of the parameter. After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Analog Current Sensor Scaling ("Scaling")

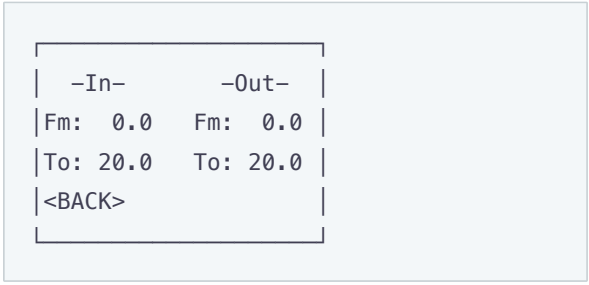


Figure D.2.7 – Analog Current Sensor Scale Setting Screen

On this screen, you can set the input value of the sensor current from **0.0** to **20.0** mA and the final scale value from **-999.9** to **999.9**.

Via arrow button ▲ (up) or ▼ (down) select required parameter (the selected parameter is highlighted by the cursor).

To edit parameter, one should:

- press ◙ (ENTER) button, the parameter starts to flash;
- via arrow buttons ▲ (up) or ▼ (down) change the parameter value;
- after changing the value press ◙ (enter) button again to exit edit mode and save the value set, the parameter stops to flash.

To return to the previous menu via ▼ (down) arrow button set the cursor in "RETURN" position and press ◙ (enter) button.

D.2.6 Setting of Discrete Signal Channel (“Channel 12” (13, 14 and 15))

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of discrete signal:

- “**Information**” – menu item with a brief description;
- “**Signal inversion**” – menu item, that allows to set the signal inversion;
- “**Signal capture**” – menu item, that allows to set the signal capture method.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Signal Inversion Setting (“Signal inversion”)

At selection of this item on the display of the data logger there will be a screen of setting of the type of signal inversion setting, resulted in the Figure D.2.8.

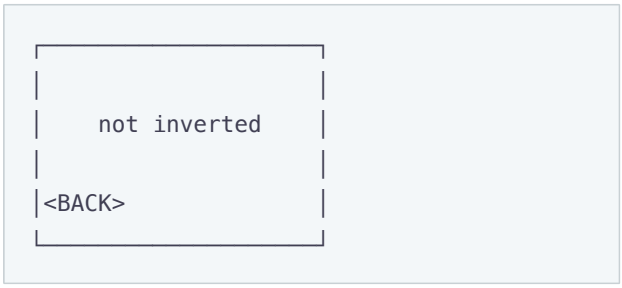


Figure D.2.8 – Screen of setting of the type of signal inversion

On this screen you can set a type of signal inversion: **not inverted** or **inverted**.

By button ▲ (up) select the parameter “**not inverted**” (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the type of discrete signal.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Signal Capture Method Setting (“Signal capture”)

Figure D.2.9 – Signal Capture Method Setting Screen

On this screen you can set the signal capture method: “**by fallout**” or “**by front**”.

Via ▲(up) arrow button select “**by fallout**” parameter (the selected parameter is highlighted by the cursor).

By pressing ◙ (enter) button change the digital signal type.

To return to the previous menu via ▼ (down) arrow key set the cursor in “RETURN” position and press ◙ (enter) button.

D.2.7 Setting of Power Channel (“Channel 16” (17 and 18))

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the channel of power:

- “**Information**” – a menu item with a brief description;
- “**Scalers reset**” – menu item, that allows to reset active and reactive energy scalers.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.3 Expansion Modules (“Exp. modules”)

When you select this menu item on the display of the recording system the screen will be displayed with the list of available menu options for configuring expansion modules:

- “**On/Off**” – menu item allows you to enable or disable the expansion modules;
- “**Module 1**” (2, 3 and 4) – menu item that allows you to configure the appropriate expansion module.

Using buttons ▲ (up) or ▼ (down) make the selection of the corresponding menu item, confirm the selection by pressing the button ◙ (enter).

To return to the previous menu, press the button ◄ (left).

D.3.1 Turning Power On and Off for Expansion Modules (“On/Off”)

When you select this menu item on the display of the recording system the screen displays on and off for expansion modules shown in Fig. D.3.1.

Figure D.3.1 – Screen for expansion modules on and off

On this screen you can enable or disable expansion modules: **Modules Off** or **Modules On**.

Using the button ▲ (up) select the parameter “**Modules Off**” (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of expansion modules.

To return to the previous menu, pressing the button ▼ (down) set the cursor to “**BACK**” and press the button ◙ (enter).

D.3.2 Expansion Module Setting (“Module 1” (2, 3 and 4))

When you select this menu item on the display of the recording system the screen displays the settings for expansion module shown in Fig. D.3.2.

Figure D.3.2 – Screen for expansion module settings

On this screen you can set the model of the connected expansion module:

- **OFF** – the expansion module is off
- **MP-01** – the module MP-01 is on

Using the button ▲ (up) set the cursor in the position “**OFF**” (the selected parameter is highlighted by the cursor).

To edit parameter, you should press the button ◙ (enter), the selected parameter will blink.

Using buttons ▲ (up) or ▼ (down), change the parameter value.

After the value change it is necessary to press again the button ◙ (enter) – to exit the edit mode and save the value entered. The parameter stops blinking.

To return to the previous menu, pressing the button ▼ (down) set the cursor to “**BACK**” and press the button ◙ (enter).

D.4 Setting of Display (“Display”)

For setting of the display, it is necessary in the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item “**Display**”, confirm the selection by pressing the button ◙ (enter). On the display of the data logger, there will be a list of available items for display setting:

- “**Backlight settings**” – a menu item for setting the backlight mode of the display.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of the menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.4.1 Setting of Display Backlight Mode (“Backlight settings”)

At selection of this item on the display of the data logger there will be a screen of setting the display backlight mode, resulted in the Figure D.4.1.

Figure D.4.1 – Screen of setting of display backlight mode

On this screen you can set the display illuminating mode:

- **Off** – backlight always off
- **On continuously** – backlight always on
- **Off after 30 sec** – backlight turns off after 30 seconds of inactivity

By button ▲ (up) select the parameter "**Off after 30sec**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the backlight mode of display.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.5 Setting of Record of Data Mode ("Record of data")

For setting the mode of data recording it is necessary in the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item "**Record of data**", confirm the selection by pressing the button ◙ (enter). On the display there will be a screen with a list of available items for setting the modes of data recording:

- "**Record type**" – a menu item for setting the type of data recording;
- "**Recording period**" – a menu item for setting the period of data recording;
- "**File size**" – a menu item for setting the size of recoded file;
- "**Choice of data**" – a menu item for setting the measuring values for recording.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.5.1 Setting of Data Recording Type ("Record type")

At selection of this item on the display of the data logger there will be a screen of setting the type of recording, resulted in the Figure D.5.1.

Figure D.5.1 – Screen of setting the type of recording

On this screen you can set the type of data recording:

- **Until memory** – recording stops when memory is full
- **The ring** – oldest data is overwritten when memory is full

By button ▲ (up) select the parameter "**Until memory**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the type of data recording.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.5.2 Setting of Recording Period ("Recording period")

At selection of this item on the display of the data logger there will be a screen of setting the period of data recording, resulted in Figure D.5.2.

Figure D.5.2 – Screen of setting the period of data recording

On this screen you can set the period of data recording from **1 ms** to **60 min**.

By button ▲ (up) select the parameter "**1 sec**" (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the period of data recording.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

> **Note**
>
> Short period of data recording results in quick consumption of free space on the memory card. It is recommended to set short period of recording only when measuring fast-running processes.

D.5.3 Setting of Data File Size (“File size”)

At selection of this item on the display of the data logger there will be a screen of setting the size of data file, resulted in Figure D.5.3.

Figure D.5.3 – Screen of setting the size of data file

On this screen you can set the size of data file from **32 KB** to **512 MB**.

By button ▲ (up) select the parameter “**16 MB**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the size value of data file.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

D.5.4 Selection of Recorded Data (“Choice of data”)

At selection of this item on the display of the data logger there will be a screen of setting the recorded data, resulted in Figure D.5.4. Recorded data represents the single block consisting of 20 cells (of measured values).

Figure D.5.4 – Screen of setting the recorded data

Where:

- "**1/20**" – number of selected cell (1 of 20)
- "**1:**, **2:**, **3:**" – order number of cell (from 1 to 20)
- "**c01/VoltRMS L1**" – name of value (Channel 1 – RMS voltage)

By buttons ▲ (up) or ▼ (down) select the number of cell (selected cell is highlighted by the cursor).

To edit the box, press the button ◙ (enter), on the display of the data logger there will be the list of measured values, as resulted in Figure D.5.5.

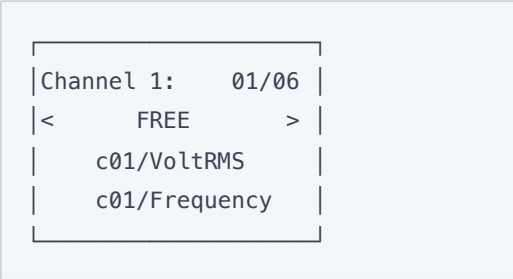


Figure D.5.5 – Screen of the list of measured values

Where:

- "**Channel 1**" – channel number
- "**01/06**" – channel value number (1 of 6 for this channel)
- "**<FREE>**" – empty value
- "**c01/VoltRMS**" – name of the value (Channel 1 – RMS Voltage)

Shifting to the next available channel is performed by pressing the button ◄ (left) or ► (right), and by buttons ▲ (up) or ▼ (down) you can scroll the list of available measuring.

The total list of measured values is described in the Review of Measured Values section (Table 6.1) of the Operating Manual.

If the value "**<FREE>**" is selected – the cell is marked as free and will not be recorded to the memory card.

To confirm the selection, it is necessary to press the button ◙ (enter), the display will return to initial state (Fig. D.5.4).

To escape from the menu "**Choice of data**", press the button ◄ (left).

D.6 Setting of Event Recording Mode ("Record of event")

For setting the modes of data recording at event it is necessary in the main menu of the data logger by buttons ▲ (up) or ▼(down) select the item "**Record of event**", confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be the screen with a list of available items for setting the modes of recording at event:

- "**On/Off**" – a menu item for switching on and off the data recording at event;
- "**Recording time**" – a menu item for setting the time of event recording;

- "**Discreteness**" – a menu item for setting the frequency of discretion of events;
- "**Event 1**" (2, 3, 4 and 5) – a menu item for setting the event at which the data recording will start.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.6.1 Switching On and Off Event Recording ("On/Off")

At selection of this item on the display of the data logger there will be a screen of switching on and switching off the data recording at event, resulted in Figure D.6.1.

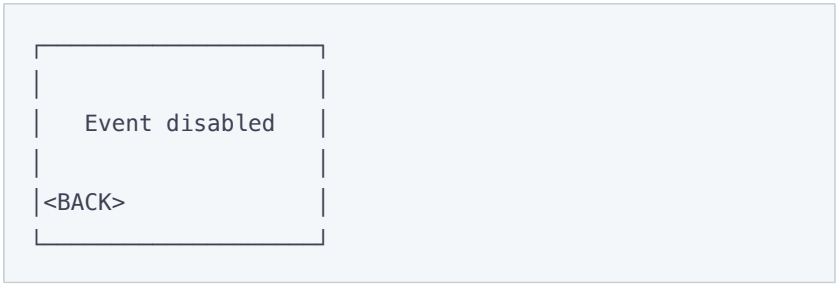


Figure D.6.1 – Screen of switching on and switching off the event for data recording

On this screen you can switch on or off data recording at event: **Event enabled** or **Event disabled**.

By button ▲ (up) select the parameter "**Event disabled**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of data recording at event.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

> **Note**
> If the period of data recording is set less than 10 ms, events will be automatically switched off due to futility. To switch on the event, set the period of data recording equal to or greater than 10 ms.

D.6.2 Setting of Event Recording Time ("Recording time")

At selection of this item on the display of the data logger there will be a screen of setting the time of data recording at event, resulted in Figure D.6.2.

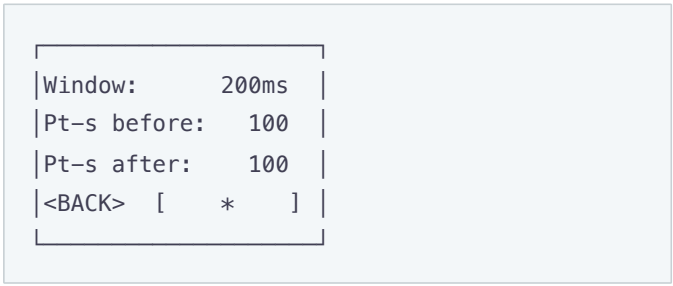


Figure D.6.2 – Screen of setting the time of data recording at event

On this screen you can set the number of points of recording before the event "**Pt-s before**" in range from **0** to **1480**, and number of points of recording after the event "**Pt-s after**" in range from **0** to **1480**.

By buttons ▲ (up) or ▼ (down) select the necessary parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of parameter.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

The "**Window**" indicator shows the total time interval that will be recorded at event occurrence. This interval is calculated based on the sum of number of points before the event "**100**" and number of points after the event "**100**", multiplied by discreteness of data recording "**1 ms**" (see Setting of Event Recording Discreteness).

To simplify the time perception there is an indicator in the right low corner which shows the common time interval "**200 ms**" in the square brackets **[ ]**, and the moment of event occurrence, represented by an arrow down ↓.

D.6.3 Setting of Event Recording Discreteness ("Discreteness")

At selection of this item on the display of the data logger there will be a screen for setting the discreteness of data recording at event, resulted in Figure D.6.3.

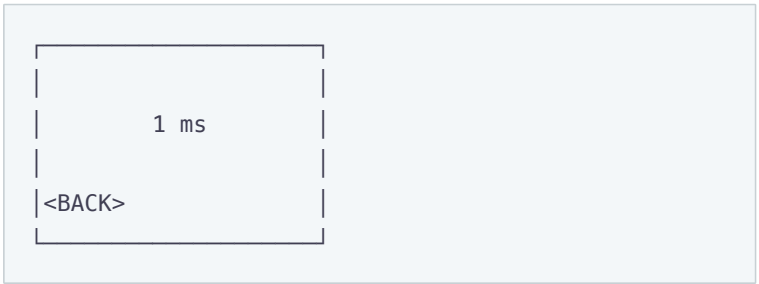


Figure D.6.3 – Screen of setting the discreteness of data recording at event

On this screen you can set the discreteness of recording from **1 ms** to **1000 ms**.

By buttons ▲ (up) or ▼ (down) select the parameter "**1 ms**" (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of parameter.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.6.4 Setting of Event ("Event 1" (2, 3, 4 and 5))

At selection of this item on the display of the data logger there will be a screen of setting the event:

- "**Source**" – a menu item for selection of source of event;
- "**Upper threshold**" – a menu item for setting the value of upper threshold;
- "**Lower threshold**" – a menu item for setting the value of lower threshold.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

> **Note**
> For setting the up or down thresholds it is necessary to select the source of event, otherwise these items will not be available.

Selecting the Event Source ("Source")

At selection of this item on the display of the data logger there will be a list of measured values, as resulted in Figure D.6.4.

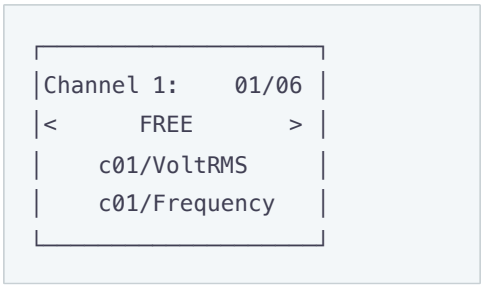


Figure D.6.4 – Screen of list of measured values

Where:

- "**Channel 1**" – number of channels
- "**01/06**" – value number of channel (1 of 6 for this channel)
- "**<FREE>**" – empty value
- "**c01/VoltRMS**" – name of the value (Channel 1 – RMS Voltage)

Shifting to the next available channel is performed by pressing the button ◄ (left) or ► (right), and by buttons ▲ (up) or ▼ (down) you can scroll the list of available measuring.

The total list of measured values is described in the Review of Measured Values section (Table 6.1) of the Operating Manual.

If the value "**<FREE>**" is selected – the cell is marked as free and will not be recorded on the memory card.

To confirm the selection and return to previous menu it is necessary to press the button ◙ (enter).

Setting of Upper and Lower Thresholds ("Upper threshold" and "Lower threshold")

At selection of this item on the display of the data logger there will be a screen of setting the Upper threshold and Lower threshold of events, resulted in Figure D.6.5.

Figure D.6.5 – Screen of setting the Upper and Lower thresholds of event

On this screen you can set:

- Threshold state ("**OFF**", "**ONCE**" or "**LONG**");
- Threshold value ("**5.0 V**" interval of values depends on the used source);
- Time ("**10 ms**" from **1 ms** to **60 sec**), after that period the event will take place provided the measured value exceeds the thresholds set by the user.

By button ▲ (up) select the necessary parameter "**1 sec**" (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of parameter.

For setting the value of threshold, by buttons ◄ (left) or ► (right) change the grade of value (Fig. D.6.6), which is located in the right low corner of the screen.

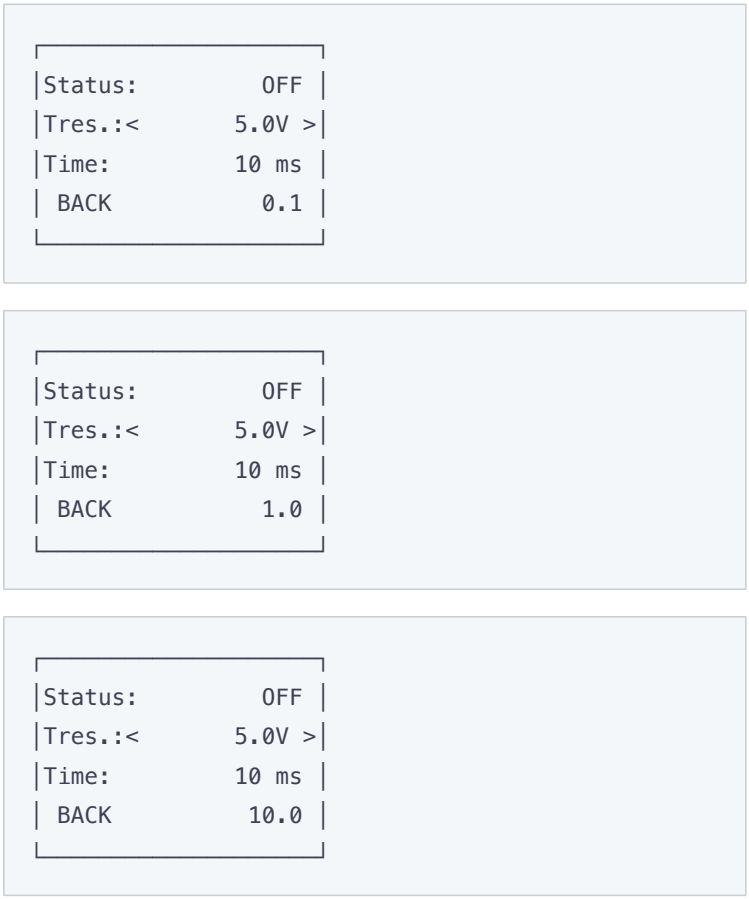


Figure D.6.6 – Screen of setting the value of threshold (steps 0.1, 1.0, 10.0)

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

D.7 Setting of Memory Card ("Memory card")

For setting the memory card it is necessary in the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item "**Memory card**", confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be a screen with a list of available items for setting the memory card:

- "**Information**" – a menu item with brief information about the memory card;
- "**Remove card**" – a menu item for safety removing out of the memory card;
- "**Format**" – a menu item for formatting the memory card.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.7.1 Brief Information About the Memory Card (“Information”)

At selection of this item on the display of the data logger there will be brief information about the memory card. Example of such information screen is presented in Figure D.7.1.

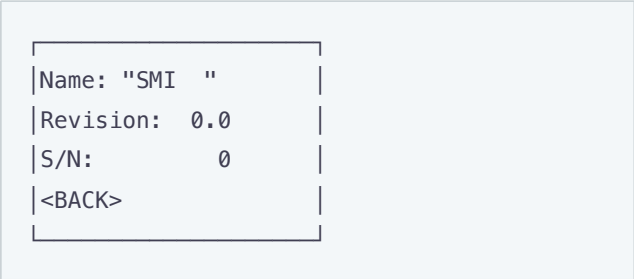


Figure D.7.1 – Brief information about the installed memory card

By buttons ▲ (up) or ▼ (down) you can scroll the reviewed information.

To restore the previous menu, press the button ◙ (enter).

D.7.2 Safe Removal of Memory Card (“Remove card”)

The item “**Remove card**” enables to spot the data recording on the memory card before its pulling out from the data logger.

After the data recording process is stopped there will be a message on the display, resulted in Figure D.7.2.

Now you can safely pull out the memory card from the data logger.

To restore the previous menu, press the button ◙ (enter).

Figure D.7.2 – Screen of confirmation of data recording termination

Now you can safely pull out the memory card from the data logger.

> **Danger**
>
> Always use this menu item before pulling out the memory card! Pulling out the memory card during the process of data recording can result in data loss.

D.7.3 Formatting of Memory Card (“Format”)

At selection of this item on the display of the data logger there will be a warning message about data loss after formatting (Fig. D.7.3).

Figure D.7.3 – Screen with a warning message and confirmation of formatting

To confirm the process of formatting it is necessary by button ◄ (left) locate the cursor in position "**YES**" and press the button ◙ (enter).

To cancel the process of formatting it is necessary by button ► (right) locate the cursor in position "**NO**" and press the button ◙ (enter). The process of formatting will be canceled and the data logger returns to the previous item.

> **Danger**
>
> While formatting is in progress, DO NOT switch off the power and make NO operations with the data logger until formatting is finished.

After completion of formatting there will be a message on the display of the data logger (Fig. D.7.4). If during the formatting there are errors, there will be a message on the display about an error and impossibility of memory card formatting (Fig. D.7.4).

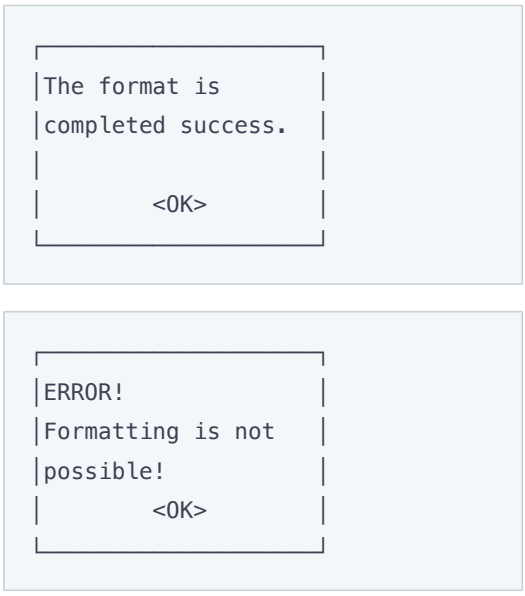


Figure D.7.4 – Possible screens of formatting results

For confirmation and restore of the previous menu, press the button ◙ (enter).

> **Danger**
>
> THE MEMORY CARD FORMATTING WILL CAUSE THE LOSS OF ALL INFORMATION (WITHOUT POSSIBILITY TO RESTORE IT).

D.8 Setting of Ethernet Network (“Network”)

For setting Ethernet network, it is necessary in the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item “**Network**”, confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be a screen with a list of available items for setting Ethernet interface:

- “**Modbus TCP**” – a menu item for setting of Modbus TCP server;
- “**HTTP**” – a menu item for setting Web-server;
- “**FTP**” – a menu item for setting Ftp-server;
- “**Overvis**” – a menu item, for setting the Overvis client;
- “**TCP / IP**” – a menu item for setting the Ethernet main parameters.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.8.1 Setting of Modbus TCP Server (“Modbus TCP”)

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the Modbus TCP server:

- “**State**” – a menu item for view current state server;
- “**On / Off**” – a menu item for switching on and switching off the server;
- “**Identifier**” – menu item, that allows to set the device identifier;
- “**Port**” – a menu item for setting the port for connection to server;
- “**Timeout**” – a menu item for setting the timeout of connection;
- “**Reset password**” – a menu item for resetting the password of access to Modbus TCP.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

> **Note**
>
> The change of password is possible only via RPM-416 Data Analysis software, Web interface of the data logger, or Modbus TCP.
>
> These parameters will become operative only after saving settings and restarting the data logger.

Switching On and Off Modbus TCP Server

At selection of this item on the display of the data logger there will be a screen of switching on and switching off of Modbus TCP server, resulted in Figure D.8.1.

Figure D.8.1 – Screen of switching on and switching off of Modbus TCP server

On this screen you can set the state of Modbus TCP server: "**Modbus disabled**" or "**Modbus enabled**".

By button ▲ (up) select the parameter "**Modbus disabled**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of the server.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Device Identifier Setting ("Identifier")

When selecting this menu item, the register's display shows the screen of device identifier setting, given in the Fig. D.8.2.

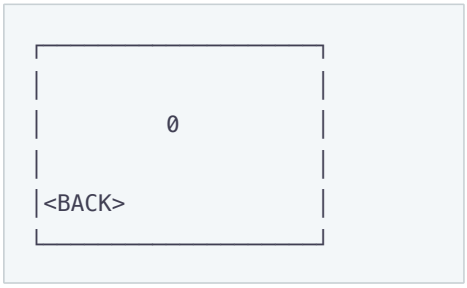


Figure D.8.2 – Device Identifier Setting Screen

On this screen you can set the device identifier from **0** to **255**.

Via ▲ (up) arrow button select "**0**" parameter (the selected parameter is highlighted by the cursor).

To edit parameter, one should:

- press ◙ (enter) button, the parameter starts to flash;
- via arrow buttons ▲ (up) or ▼ (down) change port number;
- after changing the value press ◙ (enter) button again to exit edit mode and save value set, the parameter stops to flash;
- to return to the previous menu via ▼ (down) arrow button set the cursor in "RETURN" position and press ◙ (enter).

> **Note**
>
> If the identifier value is 0, RPM-416 ignores the UID line check in Modbus protocol.

Setting of Connection Port (“Port”)

At selection of this item on the display of the data logger there will be a screen of setting the port of connection to Modbus TCP server, resulted in Figure D.8.3.

Figure D.8.3 – Screen of setting the port of connection to server

On this screen you can set the number of ports for connection to Modbus TCP server from **1** to **65535**. Default: **502**.

By button ▲ (up) select the parameter “**502**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the number of ports.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Setting of Connection Timeout (“Timeout”)

At selection of this item on the display of the data logger there will be a screen of setting the timeout of connection to Modbus TCP server, resulted in the Figure D.8.4.

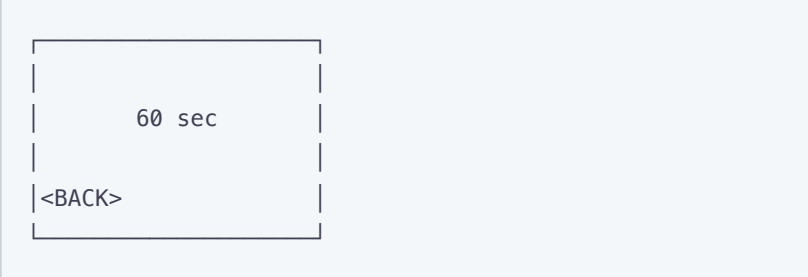


Figure D.8.4 – Screen of setting the timeout of connection to Modbus TCP server

On this screen you can set the timeout of connection to Modbus TCP server from **60 sec** to **3600 sec**.

By button ▲ (up) select the parameter “**60 sec**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of timeout.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Change Password to Access Modbus TCP (“Change password”)

When selecting this menu item, the register’s display shows the message, requiring to confirm password change to access Modbus TCP (Fig. D.8.5).

```
┌────────────────────┐
│Do you really want  │
│to reset the        │
│password MODBUS?    │
│   YES     <NO>     │
└────────────────────┘
```

Figure D.8.5 – Modbus TCP Password Change Confirmation Screen

To confirm password change, use ◄ (left) to set cursor in “**YES**” position and press ◙ (enter). Enter new password, set the cursor in “**OK**” position and press ◙ (enter).

To cancel, set cursor in “**NO**” position and press ◙ (enter).

D.8.2 Setting of HTTP Server (“HTTP”)

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting the Web-server:

- “**State**” – a menu item for view current state server;
- “**On / Off**” – a menu item for switching on and switching off the server;
- “**Port**” – a menu item for setting the port for connection to server;
- “**Timeout**” – a menu item for setting the timeout of connection;
- “**Change password**” – menu item, that allows to change the password.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

> **Note**
>
> These parameters will become operative only after saving settings and restarting the data logger.

Switching On and Off HTTP Server

Figure D.8.6 – Screen of Switching on and switching off the Web-server

On this screen you can set the state of Web-server: “**HTTP disabled**” or “**HTTP enabled**”.

By button ▲ (up) select the parameter “**HTTP disabled**” (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of the server.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Setting of Connection Port (“Port”)

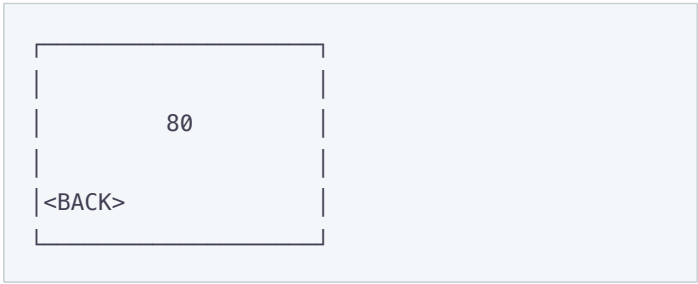


Figure D.8.7 – Screen of setting the port of connection to Web-server

On this screen you can set the number of ports for connection to Web-server from **1** to **65535**. Default: **80**.

By button ▲ (up) select the parameter “**80**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the number of ports.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Setting of Connection Timeout (“Timeout”)

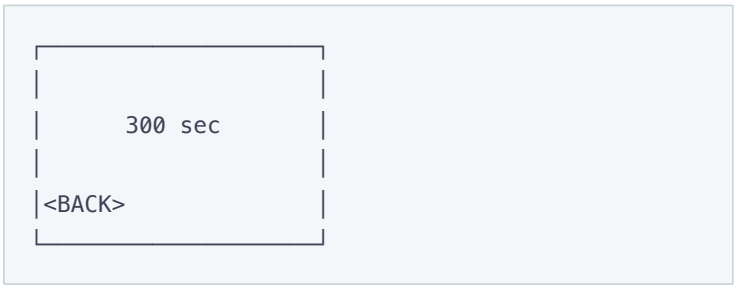


Figure D.8.8 – Screen of setting the timeout of connection to Web-server

On this screen you can set the timeout of connection to Web-server from **60 sec** to **3600 sec**. Default: **300 sec**.

By button ▲ (up) select the parameter “**300 sec**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of timeout.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Change Password to Access HTTP Server (“Change password”)

Figure D.8.9 – HTTP Server Password Change Confirmation Screen

To confirm password change via ◄ (LEFT) arrow button set the cursor in “YES” position and press ◙ (ENTER) button. The register’s display shows the password input dialogue.

Enter new password, set the cursor in “**OK**” position and press ◙ (ENTER) button.

To cancel password change via ► (RIGHT) arrow button set the cursor in “NO” position and press ◙ (ENTER) button. The password change is not made, the register returns to the previous menu item.

D.8.3 Setting of FTP Server

At selection of this item on the display of the data logger there will be a screen with a list of available items for setting of FTP server:

- "**State**" – a menu item for view current state server;
- "**On / Off**" – a menu item for switching on and switching off the server;
- "**Port**" – a menu item for setting the port for connection to server;
- "**Timeout**" – a menu item for setting the timeout of connection;
- "**Reset password**" – a menu item for resetting the password of access to server.

By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

> **Note**
> These parameters will become operative only after saving settings and restarting the data logger.

Switching On and Off FTP Server

Figure D.8.10 – Screen of switching on and switching off of FTP server

On this screen you can set the state of FTP server: "**FTP disabled**" or "**FTP enabled**".

By button ▲ (up) select the parameter "**FTP disabled**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of the server.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Setting of Connection Port ("Port")

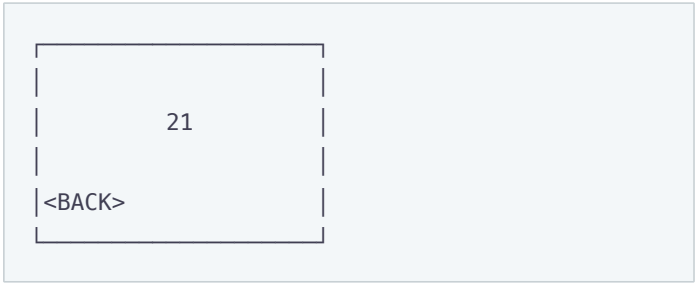


Figure D.8.11 – Screen of setting the port of connection to FTP server

On this screen you can set the number of ports for connection to FTP server from **1** to **65535**. Default: **21**.

By button ▲ (up) select the parameter “**21**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the number of ports.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Setting of Connection Timeout (“Timeout”)

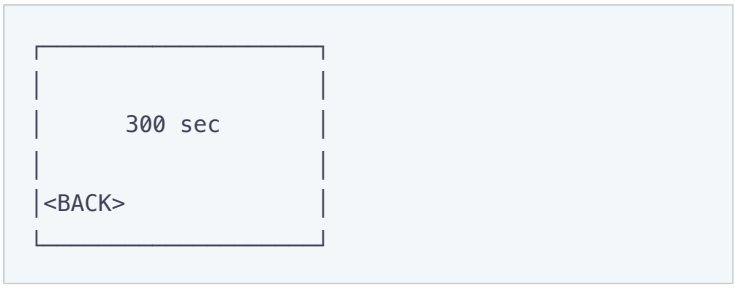


Figure D.8.12 – Screen of setting the timeout of connection to FTP server

On this screen you can set the timeout of connection to FTP server from **60 sec** to **3600 sec**. Default: **300 sec**.

By button ▲ (up) select the parameter “**300 sec**” (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of timeout.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position “**BACK**” and press the button ◙ (enter).

Reset Password of Access to FTP Server (“Reset password”)

Figure D.8.13 – Screen of confirmation for FTP server password reset

For password reset it is necessary by button ◄ (left) locate the cursor in position “**YES**” and press the button ◙ (enter). The register’s display shows the password input dialogue.

Enter new password, set the cursor in “**OK**” position and press ◙ (enter) button.

To cancel password change via ► (right) arrow button set the cursor in “**NO**” position and press ◙ (enter) button. The password change is not made, the register returns to the previous menu item.

D.8.4 Overvis Client Setting

When you select this menu item on the display of the recording system the screen will be displayed with the list of available menu options for Overvis Client setting:

- “**Status**” – menu item that allows you to see the current connection status;
- “**On / Off**” – menu item allows you to enable or disable the client;
- “**Port**” – menu item that allows you to specify the port for connection to the server;
- “**Timeout**” – menu item that allows you to set the timeout of the connection;
- “**Activation**” – menu item that allows you to activate the connection.

Using the buttons ▲ (up) or ▼ (down) make the selection of the corresponding menu item, confirm the selection by pressing the button ◙ (enter).

To return to the previous menu, press the button ◄ (left).

> **Note**
> These settings will take effect only after saving the settings and restarting the data logger.

Turning On and Off Overvis Client

Figure D.8.14 – Screen for Overvis Client on and off

On this screen you can set the status for Overvis client: “**Overvis OFF**” or “**Overvis ON**”.

Using the button ▲ (up) select the parameter “**Overvis OFF**” (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the status of the server.

To return to the previous menu, pressing the button ▼ (down) set the cursor to “**BACK**” and press the button ◙ (enter).

Setting of Connection Port (“Port”)

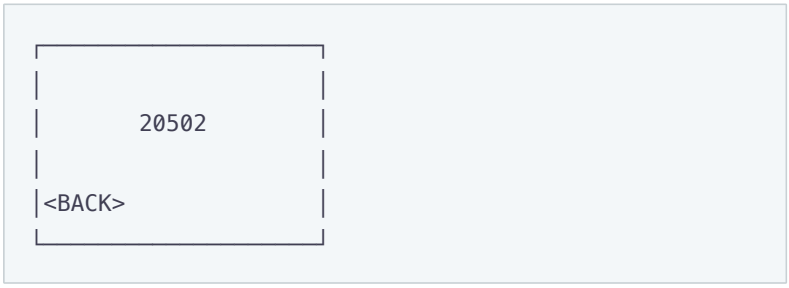


Figure D.8.15 – Screen for settings of the port for connection to Overvis server

On this screen you can set the port number to connect to Overvis server from **1** to **65535**. Default: **20502**.

Using the button ▲ (up) select the parameter "**20502**" (the selected parameter is highlighted by the cursor).

To edit the parameter, you should press the button ◙ (enter), the selected parameter will blink.

Using the buttons ▲ (up) or ▼ (down) change the port number.

After the value change it is necessary to press again the button ◙ (enter) – to exit the edit mode and save the value entered. The parameter stops blinking.

To return to the previous menu, pressing the button ▼ (down) set the cursor to "**BACK**" and press the button ◙ (enter).

Setting of Connection Timeout ("Timeout")

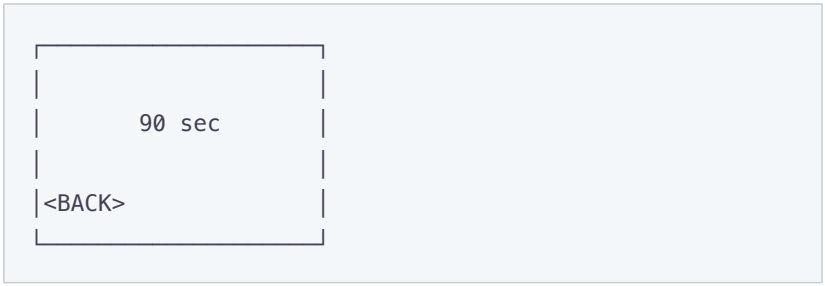


Figure D.8.16 – Screen for settings of the timeout for connection to Overvis server

On this screen you can set the timeout of connection to Overvis server from **20 sec** to **3600 sec**. Default: **90 sec**.

Using the button ▲ (up) select the parameter "**90 sec**" (the selected parameter is highlighted by the cursor).

To edit the parameter, you should press the button ◙ (enter), the selected parameter will blink.

Using the buttons ▲ (up) or ▼ (down) change the timeout value.

After the value change it is necessary to press again the button ◙ (enter) – to exit the edit mode and save the value entered. The parameter stops blinking.

To return to the previous menu, pressing the button ▼ (down) set the cursor to "**BACK**" and press the button ◙ (enter).

Activation of Connection to Overvis Server ("Activation")

Figure D.8.17 – Screen for activation of connection to Overvis server

If the connection to Overvis server is activated, instead of the activation code the inscription "**Already activated**" appears.

To cancel the activation, it is necessary using the button ► (right) to set the cursor to "**RESET**" and press the button ◙ (enter). This will cancel the activation of connection to Overvis server.

D.8.5 Setting of Main Ethernet Parameters ("TCP/IP")

At selection of this item on the display of the data logger there will be a screen of setting the main parameters of Ethernet:

- "**State**" – a menu item showing the current state of Ethernet;
- "**IPv4 config**" – a menu item for setting of IPv4;
- "**DNS config**" – a menu item for setting of DNS;
- "**DHCP config**" – a menu item for setting of DHCP.

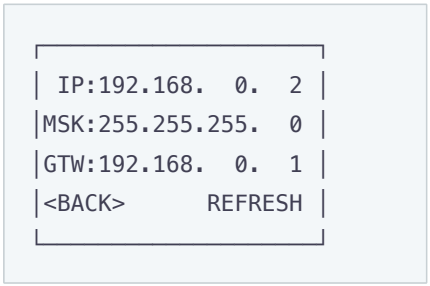
By buttons ▲ (up) or ▼ (down) make a selection of the necessary item of menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Review of Ethernet Connection State ("State")

This menu item shows the current state of network connection:

- "**IP**" – IP address
- "**MSK**" – Mask
- "**GTW**" – Gateway
- "**HCP**" – DHCP address
- "**DNS**" – DNS address



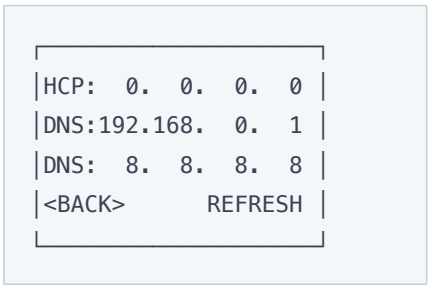


Figure D.8.18 – Screen of connection state

Use ▲ (up) or ▼ (down) to switch between screens.

If network cable is not connected or connection failed, the message "**Network cable is not connected**" will be displayed.

For reconnection of the data logger it is necessary by button ► (right) locate the cursor in position "**UPDATE**" and press the button ◙ (enter). The result of reconnection will be shown on the display of the data logger.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Setting of IP-Address ("IP config")

Setting of IP-address means setting 3 basic parameters for work in Ethernet networks:

- **IP:** – IP-Address of the data logger (unique network address, e.g., "192.168.0.2")
- **MSK:** – Subnet mask (e.g., "255.255.255.0")
- **GTW:** – Main gateway (e.g., "192.168.0.1")

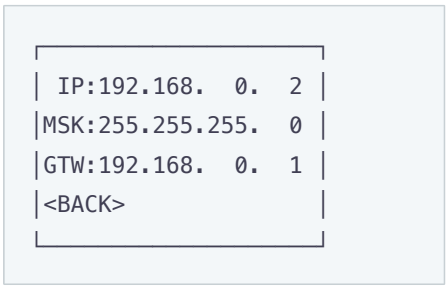


Figure D.8.19 – Screen of IP-address setting

By buttons ▲ (up), ▼ (down), ◄ (left) or ► (right) select the necessary parameter (the selected parameter is highlighted by the cursor).

For starting the changes in the parameter, it is necessary to press the button ◙ (enter), the selected parameter starts to blink.

By buttons ▲ (up) or ▼ (down) change the value of parameter in range from **0** to **255**.

After completion of change it is necessary to press the button ◙ (enter) again – to escape from the mode of setting and for saving of the changed parameter. The parameter stops blinking.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

Setting of DNS Addresses ("DNS setting")

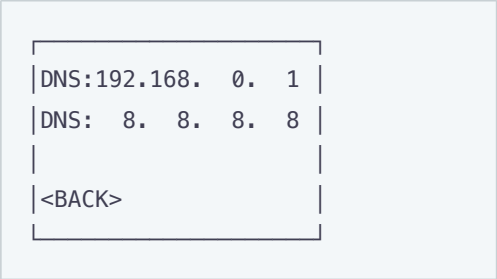


Figure D.8.20 – Screen for DNS addresses setting

Using the buttons ▲ (up), ▼ (down), ◄ (left) or ► (right) select the required parameter (the selected parameter is highlighted by the cursor).

To edit the parameter, you should press the button ◙ (enter), the selected parameter will blink.

Using the buttons ▲ (up) or ▼ (down) change the parameter value in the range from **0** to **255**.

After the value change it is necessary to press again the button ◙ (enter) – to exit the edit mode and save the value entered. The parameter stops blinking.

To return to the previous menu, pressing the button ▼ (down) set the cursor to "**BACK**" and press the button ◙ (enter).

Setting of DHCP ("DHCP config")

At selection of this item on the display of the data logger there will be a screen of setting DHCP:

- "**On / Off**" – a menu item for switching on and switching off the use of DHCP;

By buttons ▲ (up) or ▼ (down) select the necessary item, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

Switching On and Off DHCP ("On / Off")

Switching on of DHCP enables to avoid the hand setting of Ethernet parameters and reduces the number of mistakes. DHCP protocol is used in most of TCP/IP networks.

Figure D.8.21 – Screen of switching on and switching off of DHCP

On this screen you can set the state of DHCP: "**DHCP disabled**" or "**DHCP enabled**".

By button ▲ (up) select the parameter "**DHCP disabled**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of DHCP.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

> **Danger**
>
> Switching on or switching off DHCP totally resets the setting of IP-address.

D.9 Setting of Access Restriction ("Password")

The access password is used for protection from unauthorized termination of data recording on the memory card or changing of parameters of the data logger.

The switching on and switching off of password protection is performed with the help of the main menu item "**Password**".

In the main menu of the data logger by buttons ▲ (up) or ▼ (down) select the item "**Password**", confirm the selection by pressing the button ◙ (enter). On the display of the data logger there will be a screen with a list of available items of the menu for setting the password protection:

- "**On / Off**" – a menu item for activating or deactivating the password protection;
- "**Change**" – a menu item for changing the password value.

By buttons ▲ (up) or ▼ (down) select the necessary item of the menu, confirm the selection by pressing the button ◙ (enter).

To restore the previous menu, press the button ◄ (left).

D.9.1 Switching On and Off Password Protection ("On / Off")

Figure D.9.1 – Screen of switching on and switching off of the Password Protection

On this screen you can set the state of password protection: "**Password disabled**" or "**Password enabled**".

By button ▲ (up) select the parameter "**Password disabled**" (the selected parameter is highlighted by the cursor).

By pressing the button ◙ (enter) change the state of the password protection.

To restore the previous menu, it is necessary by button ▼ (down) locate the cursor in position "**BACK**" and press the button ◙ (enter).

> **Note**
>
> The switching off of password protection does not cover the Modbus TCP server. At data exchange the server always checks the access password.

D.9.2 Changing Password Value ("Change")

At selection of this item on the display of the data logger there will be a message asking for confirmation of password changing. Example of such screen is resulted in the Figure D.9.2.

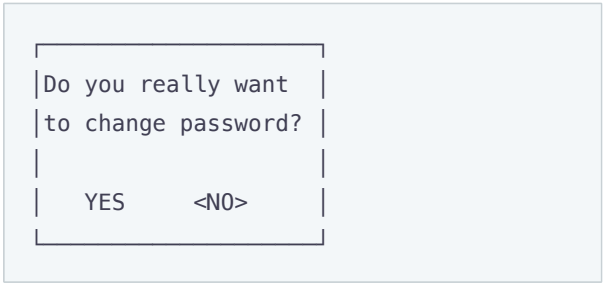


Figure D.9.2 – Screen of confirmation of password changing

For confirmation of the password changing it is necessary by button ◄ (left) locate the cursor in position "**YES**" and press the button ◙ (enter). On the display of the data logger there will be a screen of a new password input (Fig. D.9.3).

To cancel the password input it is necessary by button ► (right) locate the cursor in position "**NO**" and press the button ◙ (enter). The data logger will return to the previous item of the menu.

Figure D.9.3 – Screen of password input

Password input procedure:

1. Use buttons ◄ (left), ► (right), ▲ (up) and ▼ (down) to select one character of the password (the selected character is highlighted by the cursor)
2. Press ◙ (enter) to confirm each character

A flashing "**_**" sign indicates which password position is being entered.

- To delete one character, set cursor in "**Del**" position and press ◙ (enter)
- To change character register, set cursor in "**Regs**" (Register) position and press ◙ (enter)
- To change character page, set cursor in "**Lang**" (Language) position and press ◙ (enter)

After completion, locate cursor in position "**OK**" and press ◙ (enter).

D.10 General Settings ("General settings")

When this menu item is selected, the screen with the following list of menu items will be displayed on the recorder display:

- "**Save to Card**" – a menu item that allows you to save all the settings of the data logger to the memory card;
- "**Download from Card**" – a menu item that allows you to download all the settings of the data logger from the memory card;
- "**Reset settings**" – a menu item that allows you to reset all data logger settings to their factory settings.

Press the ▲ (UP) or ▼ (DOWN) buttons to select the desired menu item and confirm the selection by pressing the ◙ (ENTER). To return to the previous menu, press the ◄ (LEFT) button.

D.10.1 Save All Settings to Memory Card ("Save to Card")

If this menu item is selected, a message will be displayed on the data logger display, which will require confirmation of this operation (Fig. D.10.1).

Figure D.10.1 – Screen of confirmation of saving settings

To confirm that the settings are saved, use the ◄ (LEFT) button to move the cursor to the "**YES**" position and press the ◙ (ENTER) button. In this case, if a password was set, the data logger will prompt you to enter it.

If the password is entered correctly, the data logger will save all settings to the memory card and the message shown in Fig. D.10.2 will be displayed.

Figure D.10.2 – Saving all settings is completed

To cancel saving all settings, press the ► (RIGHT) button to move the cursor to the "**NO**" position and press the ◙ (ENTER) button. The recorder will return to the previous menu item.

To confirm the message, press the ◙ (ENTER) button. In this case, the recorder will return to the menu item ("General settings").

D.10.2 Loading All Settings from Memory Card ("Download from Card")

If this menu item is selected, a message will be displayed on the data logger display, which will require confirmation of this operation (Fig. D.10.3).

Figure D.10.3 – Screen of confirmation of the settings download

To confirm that the settings are loaded, use the ◄ (LEFT) button to move the cursor to the "**YES**" position and press the ◙ (ENTER) button. In this case, if a password was set, the recorder will prompt you to enter it.

If the password is entered correctly, the data logger will load all settings from the memory card and the message shown in Fig. D.10.4 will be displayed.

Figure D.10.4 – All settings are downloaded

To cancel the download of all settings, press the ► (RIGHT) button to move the cursor to the "**NO**" position and press the ◙ (ENTER) button. The data logger will return to the previous menu item.

To confirm the message, press the ◙ (ENTER) button. In this case, the data logger will return to the menu item ("General settings").

D.10.3 Reset All Settings to Factory Settings ("Reset settings")

If this menu item is selected, a message will be displayed on the data logger display, which will require confirmation of this operation (Fig. D.10.5).

Figure D.10.5 – Screen of confirmation of the settings reset

To confirm resetting all settings to the factory settings, use the ◄ (LEFT) button to move the cursor to the "**YES**" position and press the ◙ (ENTER) button. In this case, if a password was set, the data logger will prompt you to enter it.

If the password is entered correctly, the data logger will reset all settings to the factory settings and the message shown in Fig. D.10.6 will be displayed.

Figure D.10.6 – Reset of all settings is completed

To cancel the reset of all settings, press the ► (RIGHT) button to place the cursor in the "**NO**" position and press the ◙ (ENTER) button. The data logger will return to the previous menu item.

To confirm the message, press the ◙ (ENTER) button. In this case, the data logger will return to the menu item ("General settings").

> ⚠ **Caution**
>
> In case the data logger has an activated password protection and the password value was lost, the reset of all settings to factory defaults can be performed as follows: switch on the power supply to the data logger and keep pressing two buttons UP and DOWN until the reset confirmation screen appears.

Note: At resetting all settings to factory defaults, the following are also reset:

- Protection password (password value "**1234**", password protection is deactivated)
- Password of Modbus TCP (password value "**admin**")
- Password of Web-server (password value "**admin**")
- Password of FTP server (password value "**admin**")
- Time correction (value **0.0**)

D.11 Review of Software Version ("Device version")

This item shows information about the software of the data logger.

Figure D.11.1 – Version of the data logger software

The screen shows:

In the first line, there is the name of the data logger "**RPM-416**".

The second line shows the hardware and software version of the device: "**1.3 / 1.5**", where:

- **1.3** – the hardware version of the device;
- **1.5** – software version.

In the third line, there is a unique identification number of the data logger (MAC).

To restore the previous menu, press the button ◙ (enter).

Appendix E: Modbus Registers Reference

This appendix provides the complete Modbus register map for the RPM-416 Data Logger.

Connection Information

- **Protocol:** Modbus TCP
- **Default IP Address:** 192.168.0.2
- **Default Password:** admin
- **Maximum simultaneous connections:** 5
- **Connection timeout:** 60 seconds (configurable)

Supported Functions

Function (hex)	Purpose	Remark
0x03	Reading of one or several registries	Maximum 125
0x06	Recording of one value in the register	—
0x10	Recording of one or several values in the registries	Maximum 123

Data Types

Notation	Description
UINT	16-bit unsigned integer
ULONG	32-bit unsigned integer (2 registers)
Address “N”	Single 16-bit value
Address “N-M”	Range of 16-bit values
Address “N:M”	32-bit value across two registers

Command Registry (Address 50)

Command Code	Description
0xF2C5	Data logger restart
0x77A6	Start recording
0x5606	Stop recording
0x5596	All errors reset

Command Code	Description
0x472C	Record settings in nonvolatile memory
0xD357	Load settings from nonvolatile memory
0x3010	Energy scalers reset (phase 1, channel 16)
0x3011	Energy scalers reset (phase 2, channel 17)
0x3012	Energy scalers reset (phase 3, channel 18)
0x3020	Pulse scalers reset (channel 12)
0x3021	Pulse scalers reset (channel 13)
0x3022	Pulse scalers reset (channel 14)
0x3023	Pulse scalers reset (channel 15)

Password Registry (Addresses 51-63)

To unlock write access to the data logger:

1. Write the correct password in ASCII symbols to registries 51-63
2. In unused registries, write zero values (0x0000)
3. Supported characters: A-Z, a-z, 0-9
4. Factory default password: “admin”

To block write access:

- Write any incorrect value (e.g., 0) to registries 51-63

System Registries

Address	Name	Type	Access	Description
0	Identifier	UINT	RD	Device identifier (value 14 for RPM-416)
1	Firmware version	UINT	RD	bit 15-8: major, bit 7-0: minor (e.g., 2.6)
2-7	MAC address	UINT×6	RD	MAC address bytes
8:9	State registry	ULONG	RD	See State Registry Bits below
10:11	Error registry	ULONG	RD	See Error Registry Bits below
12:13	Memory card capacity	ULONG	RD	Multiply by 512 for bytes
14:15	Free space	ULONG	RD	Multiply by 512 for bytes
16	File identifier	UINT	RD	Current file ID (0-9999)

Address	Name	Type	Access	Description
17:18	File size	ULONG	RD	Current file size in bytes
19:20	Operation time	ULONG	RD	Seconds since power on
21:22	System time	ULONG	WR/RD	Seconds since 01.01.1980
23:24	Last event time	ULONG	RD	Seconds since 01.01.1980
25:26	Event counter	ULONG	RD	Events since power on

State Registry Bits (Address 8:9)

Bit	Description
0	0: no errors, 1: errors present
1	0: recording stopped, 1: recording started
3	0: no disc in slot, 1: disc present
4	0: card not initialized, 1: card initialized
5	0: FAT not ready, 1: FAT ready
6	0: file closed, 1: file open
7	0: recording finished, 1: recording in process
8	File deleting in process
9	File synchronization needed
10	Expansion module 1 connected
11	Expansion module 2 connected
12	Expansion module 3 connected
13	Expansion module 4 connected
14	Overvis connected

Error Registry Bits (Address 10:11)

Bit	Description
0	Real time clock failure
1	No access to AD converter

Bit	Description
2	No access to MI
3	No access to MR
4	No access to RAM
5	No disc in card slot
6	Disc is write protected
7	Disc initialization impossible
8	Disc connection impossible
9	No free space on disc
10	Data reading from disc impossible
11	Directory cannot be created/opened
12	File name limit (9999) exceeded
13	Files list not available
14	File cannot be created
15	Recording to file impossible
16	Settings failure in flash memory
17	Settings cannot be saved to flash
18	Calibration failure in flash memory
19	Memory overflow

Base Channel Registers

Each channel has multiple measured values. The structure for each value is:

- Value type (UINT) - indicates the parameter type
- Value (ULONG) - the measured value

Parameter Types

Type	Name	Unit	Resolution
1	Voltage RMS	V	0.1
2	Voltage Instantaneous	V	0.1

Type	Name	Unit	Resolution
3	Peak + voltage	V	0.1
4	Peak - voltage	V	0.1
5	Current RMS	A	0.01
6	Current Instantaneous	A	0.01
7	Peak + current	A	0.01
8	Peak - current	A	0.01
9	Frequency	Hz	0.01
10	THDr	%	1
11	Temperature	°C	0.1
12	Analog voltage 0-10V	V	0.01
13	Analog current 0-20mA	mA	0.01
14	Digital input (ON/OFF)	—	1
15	Full power	VA	0.1
16	Active power	W	0.1
17	Reactive power	Var	0.1
18	Power factor (cos ϕ)	—	0.001
19	Active Energy Scaler	kW×h	0.1
20	Reactive Energy Scaler	kVAr×h	0.1
21	User's Value	—	0.01
22	Pulse Frequency	Pulse×min	0.1
23	Pulse Scaler	—	1
24	Line voltage AB	V	0.1
25	Line voltage BC	V	0.1
26	Line voltage CA	V	0.1
27	Negative sequence voltage	V	0.1
28	Positive sequence voltage	V	0.1

Type	Name	Unit	Resolution
29	Zero sequence voltage	V	0.1

Channel 1 - Voltage L1 (Addresses 100-117)

Value	Parameter	Type Address	Value Address
1	Voltage RMS L1	100	101:102
2	Voltage frequency L1	103	104:105
3	Voltage THDr L1	106	107:108
4	Peak + voltage L1	109	110:111
5	Peak - voltage L1	112	113:114
6	Instantaneous voltage L1	115	116:117

Channel 2 - Voltage L2 (Addresses 118-135)

Value	Parameter	Type Address	Value Address
1	Voltage RMS L2	118	119:120
2	Voltage frequency L2	121	122:123
3	Voltage THDr L2	124	125:126
4	Peak + voltage L2	127	128:129
5	Peak - voltage L2	130	131:132
6	Instantaneous voltage L2	133	134:135

Channel 3 - Voltage L3 (Addresses 136-153)

Value	Parameter	Type Address	Value Address
1	Voltage RMS L3	136	137:138
2	Voltage frequency L3	139	140:141
3	Voltage THDr L3	142	143:144
4	Peak + voltage L3	145	146:147
5	Peak - voltage L3	148	149:150
6	Instantaneous voltage L3	151	152:153

Channel 4 - Current L1 (Addresses 154-171)

Value	Parameter	Type Address	Value Address
1	Current RMS L1	154	155:156
2	Current frequency L1	157	158:159
3	Current THDr L1	160	161:162
4	Peak + current L1	163	164:165
5	Peak - current L1	166	167:168
6	Instantaneous current L1	169	170:171

Channel 5 - Current L2 (Addresses 172-189)

Value	Parameter	Type Address	Value Address
1	Current RMS L2	172	173:174
2	Current frequency L2	175	176:177
3	Current THDr L2	178	179:180
4	Peak + current L2	181	182:183
5	Peak - current L2	184	185:186
6	Instantaneous current L2	187	188:189

Channel 6 - Current L3 (Addresses 190-207)

Value	Parameter	Type Address	Value Address
1	Current RMS L3	190	191:192
2	Current frequency L3	193	194:195
3	Current THDr L3	196	197:198
4	Peak + current L3	199	200:201
5	Peak - current L3	202	203:204
6	Instantaneous current L3	205	206:207

Channel 7 - Current (Addresses 208-225)

Value	Parameter	Type Address	Value Address
1	Current RMS	208	209:210
2	Current frequency	211	212:213
3	Current THDr	214	215:216
4	Peak + current	217	218:219
5	Peak - current	220	221:222
6	Instantaneous current	223	224:225

Channel 8 - Temperature (Addresses 226-243)

Value	Parameter	Type Address	Value Address
1	Temperature	226	227:228
2-6	Reserved	229-243	—

Channel 9 - Temperature (Addresses 244-261)

Value	Parameter	Type Address	Value Address
1	Temperature	244	245:246
2-6	Reserved	247-261	—

Channel 10 - Analog Voltage 0-10V (Addresses 262-279)

Value	Parameter	Type Address	Value Address
1	Analog voltage 0-10V	262	263:264
2	User's Value	265	266:267
3-6	Reserved	268-279	—

Channel 11 - Analog Current 0-20mA (Addresses 280-297)

Value	Parameter	Type Address	Value Address
1	Analog current 0-20mA	280	281:282
2	User's Value	283	284:285
3-6	Reserved	286-297	—

Channels 12-15 - Digital Inputs (Addresses 298-369)

Each digital input channel has the following structure:

Value	Parameter	Description
1	Digital input	ON/OFF state
2	Pulse frequency	Pulses per minute
3	Pulse scaler	Accumulated pulses
4-6	Reserved	—

Channel 12: Addresses 298-315
Channel 13: Addresses 316-333
Channel 14: Addresses 334-351
Channel 15: Addresses 352-369

Channels 16-18 - Power (Calculated)

These channels do not have physical connections. Values are calculated from:

- Channel 16 = Channel 1 (Voltage L1) × Channel 4 (Current L1)
- Channel 17 = Channel 2 (Voltage L2) × Channel 5 (Current L2)
- Channel 18 = Channel 3 (Voltage L3) × Channel 6 (Current L3)

Each power channel has the following values:

Value	Parameter
1	Active power (W)
2	Reactive power (Var)
3	Full power (VA)
4	Power factor (cos ϕ)
5	Active Energy Scaler (kW×h)
6	Reactive Energy Scaler (kVAr×h)

Channel 19 - Line Voltages (Calculated)

This channel is calculated from Channels 1, 2, and 3:

Value	Parameter
1	Line voltage AB
2	Line voltage BC

Value	Parameter
3	Line voltage CA
4	Negative sequence voltage
5	Positive sequence voltage
6	Zero sequence voltage

Expansion Module Registers

Up to 4 expansion modules can be connected, providing additional channels 20-40.

The register addresses for expansion modules follow the same structure as base channels, starting from address 370.

Each expansion module can add up to 5 additional channels, depending on the module type.

Programmable Parameters

These registers allow configuration of the data logger via Modbus TCP.

Time and Sensor Settings

Name	Value Range	Default	Type	Address
Time correction, s/day	-99.9 ... +99.9	0.0	INT	2000
Voltage sensor coefficient L1 (Ch. 1)	1.0 ... 5000.0	1.0	UINT	2001
Voltage sensor coefficient L2 (Ch. 2)	1.0 ... 5000.0	1.0	UINT	2002
Voltage sensor coefficient L3 (Ch. 3)	1.0 ... 5000.0	1.0	UINT	2003
Nominal CT L1 (Ch. 4), A	5 ... 9999	5	UINT	2004
Nominal CT L2 (Ch. 5), A	5 ... 9999	5	UINT	2005
Nominal CT L3 (Ch. 6), A	5 ... 9999	5	UINT	2006
Nominal CT (Ch. 7), A	5 ... 9999	5	UINT	2007
Temperature correction (Ch. 8), °C	-9.9 ... +9.9	0.0	INT	2008
Temperature correction (Ch. 9), °C	-9.9 ... +9.9	0.0	INT	2009
Temperature sensor type (Ch. 8)	0...1	1	UINT	2010
Temperature sensor type (Ch. 9)	0...1	1	UINT	2011
Temperature filter (Ch. 8), s	0.0 ... 10.0	1.5	UINT	2012
Temperature filter (Ch. 9), s	0.0 ... 10.0	1.5	UINT	2013

Temperature sensor type: 0 = PTC1000, 1 = PT1000

Analog Input Settings

Name	Value Range	Default	Type	Address
Analog voltage sensor type (Ch. 10)	0...1	0	UINT	2014
Analog voltage sensor filter (Ch. 10), s	0.0 ... 10.0	1.5	UINT	2015
Analog current sensor type (Ch. 11)	0...1	0	UINT	2016
Analog current sensor filter (Ch. 11), s	0.0 ... 10.0	1.5	UINT	2017

Analog sensor type: 0 = Direct (0-10V or 0-20mA), 1 = Scale

Analog Voltage Scale (Channel 10)

Name	Value Range	Default	Type	Address
Input value, V, from	0.00 ... 10.00	0.00	UINT	2214
Input value, V, to	0.00 ... 10.00	10.00	UINT	2215
Output value, from	-999.9 ... 0	0.0	INT	2216
Output value, to	0 ... 999.9	10.0	INT	2217

Analog Current Scale (Channel 11)

Name	Value Range	Default	Type	Address
Input value, mA, from	0.00 ... 20.00	0.00	UINT	2218
Input value, mA, to	0.00 ... 20.00	20.00	UINT	2219
Output value, from	-999.9 ... 0	0.0	INT	2220
Output value, to	0 ... 999.9	20.0	INT	2221

Discrete Input Settings

Name	Value Range	Default	Type	Address
Discrete input type (Ch. 12)	0...1	0	UINT	2018
Discrete input type (Ch. 13)	0...1	0	UINT	2019
Discrete input type (Ch. 14)	0...1	0	UINT	2020
Discrete input type (Ch. 15)	0...1	0	UINT	2021

Name	Value Range	Default	Type	Address
Digital signal capture (Ch. 12)	0...1	1	UINT	2206
Digital signal capture (Ch. 13)	0...1	1	UINT	2207
Digital signal capture (Ch. 14)	0...1	1	UINT	2208
Digital signal capture (Ch. 15)	0...1	1	UINT	2209

Discrete input type: 0 = Not inverted, 1 = Inverted

Digital signal capture: 0 = By fallout, 1 = By front

Event Settings

Each event (1-5) has the following parameters:

Name	Value Range	Default	Type	Addresses (Events 1-5)
Up limit mode	0...2	0	UINT	2022, 2023, 2024, 2025, 2026
Down limit mode	0...2	0	UINT	2027, 2028, 2029, 2030, 2031
Up limit value	—	0	LONG	2032:2033, 2034:2035, 2036:2037, 2038:2039, 2040:2041
Down limit value	—	0	LONG	2042:2043, 2044:2045, 2046:2047, 2048:2049, 2050:2051
Up limit time, ms	1ms...60s	10	UINT	2052, 2053, 2054, 2055, 2056
Down limit time, ms	1ms...60s	10	UINT	2057, 2058, 2059, 2060, 2061
Value source	—	4294967295	ULONG	2062:2063, 2064:2065, 2066:2067, 2068:2069, 2070:2071

Limit mode: 0 = Off, 1 = Momentary, 2 = Continued

Value source format (ULONG):

- bit 31-24: channel number (0-17)
- bit 23-16: value number (0-5)
- bit 15-0: value type (0-18)

Display Settings

Name	Value Range	Default	Type	Address
Display illuminating mode	0...2	2	UINT	2072

Display mode: 0 = Off, 1 = Always on, 2 = Off in 30 sec

Data Recording Settings

Name	Value Range	Default	Type	Address
Source of data to be written 1-20	—	4294967295	ULONG	2073:2074 to 2111:2112
Write period, ms	1ms...60m	1000	ULONG	2113:2114
File size, byte	32kB...512MB	32768	ULONG	2115:2116
Write type	0...1	0	UINT	2117
Write event	0...1	0	UINT	2118
Points before event	0...1920	100	UINT	2119
Points after event	0...1920	100	UINT	2120
Discreteness event writing, ms	1ms...1000ms	1	UINT	2121

Write type: 0 = Until memory, 1 = Ring buffer

Write event: 0 = Disabled, 1 = Enabled

Data source format (same as event value source).

Security Settings

Name	Value Range	Default	Type	Address
Password protection	0...1	0	UINT	2122
Access password (6 chars ASCII)	A-Z, a-z, 0-9	″1234″	STR	2123-2128

Password protection: 0 = Disabled, 1 = Enabled

Expansion Module Settings

Name	Value Range	Default	Type	Address
Expansion modules	0...1	0	UINT	2129
Type of module 1	0...1	0	UINT	2130
Type of module 2	0...1	0	UINT	2131

Name	Value Range	Default	Type	Address
Type of module 3	0...1	0	UINT	2132
Type of module 4	0...1	0	UINT	2133

Expansion modules: 0 = Disabled, 1 = Enabled

Network Settings

Name	Value Range	Default	Type	Address
DHCP	0...1	0	UINT	2134
IP address	—	192.168.0.2	ULONG	2135:2136
Subnet mask	—	255.255.255.0	ULONG	2137:2138
Main gateway	—	192.168.0.1	ULONG	2139:2140
DNS server 1	—	192.168.0.1	ULONG	2141:2142
DNS server 2	—	8.8.8.8	ULONG	2143:2144

DHCP: 0 = Disabled, 1 = Enabled

Modbus TCP Settings

Name	Value Range	Default	Type	Address
Modbus TCP server	0...1	1	UINT	2145
Modbus TCP port	1...65535	502	UINT	2146
Modbus UID	0...255	0	UINT	2205
Modbus TCP timeout, s	60...3600	60	UINT	2147
Modbus password (13 chars ASCII)	A-Z, a-z, 0-9	"admin"	STR	2148-2160

Modbus TCP server: 0 = Disabled, 1 = Enabled

HTTP Server Settings

Name	Value Range	Default	Type	Address
HTTP server	0...1	1	UINT	2164
HTTP port	1...65535	80	UINT	2165
HTTP timeout, s	60...3600	300	UINT	2166

Name	Value Range	Default	Type	Address
HTTP password (13 chars ASCII)	A-Z, a-z, 0-9	″admin″	STR	2167-2179

HTTP server: 0 = Disabled, 1 = Enabled

FTP Server Settings

Name	Value Range	Default	Type	Address
FTP server	0...1	0	UINT	2183
FTP port	1...65535	21	UINT	2184
FTP timeout, s	60...3600	300	UINT	2185
FTP password (13 chars ASCII)	A-Z, a-z, 0-9	″admin″	STR	2186-2198

FTP server: 0 = Disabled, 1 = Enabled

Overvis Client Settings

Name	Value Range	Default	Type	Address
Overvis client	0...1	0	UINT	2202
Overvis port	1...65535	20502	UINT	2203
Overvis timeout, s	60...3600	90	UINT	2204

Overvis client: 0 = Disabled, 1 = Enabled

Value Conversion

All values with decimal points are converted to integers. Use the resolution factor from the Parameter Types table to convert back to real values.

Example:

- Reading Voltage RMS returns 2301
- Resolution is 0.1
- Actual value = 2301 × 0.1 = 230.1 V

Example:

- Writing a power factor of 0.95
- Resolution is 0.001
- Value to write = 0.95 ÷ 0.001 = 950