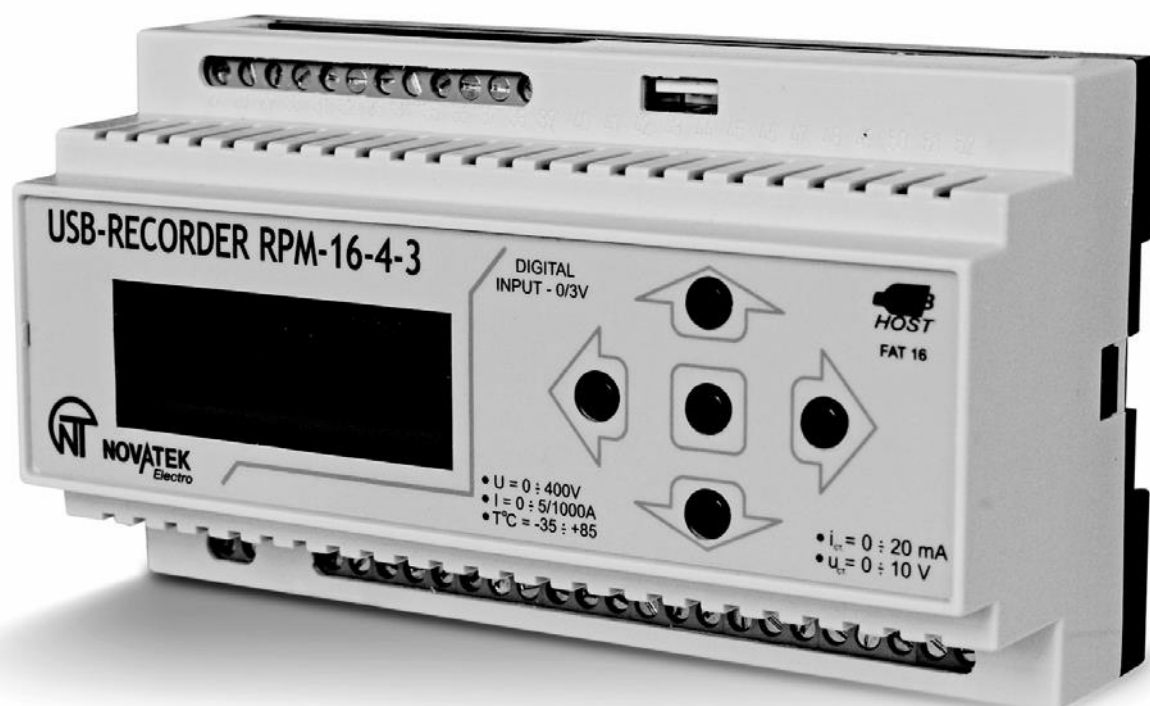


RPM-16-4-3

USB-Flash Drive Recorder

of electrical and technological processes



USERS MANUAL

USB-Flash Drive Recorder of electrical and technological processes **RPM-16-4-3** (here in after **RPM-16-4-3**) is designed to record and store the information on Flash-Drive and transmit the information to the upper level or users PC. This manual contain basic information about the application, principles of operation, calibration and guidelines for the user.

1 GENERAL DESCRIPTION AND OPERATION

1.1. APPLICATION

1.1.1. RPM-16-4-3 designed for the control over the following parameters:

- acting value of AC voltage levels;
- Acting value of AC current values;
- Temperature measurement;
- Receive data from primary transducers with standard voltage or current output;
- Recording of measured values on USB Flash-Drive.

1.2. BASIC TECHNICAL CHARACTERISTICS

Table 1

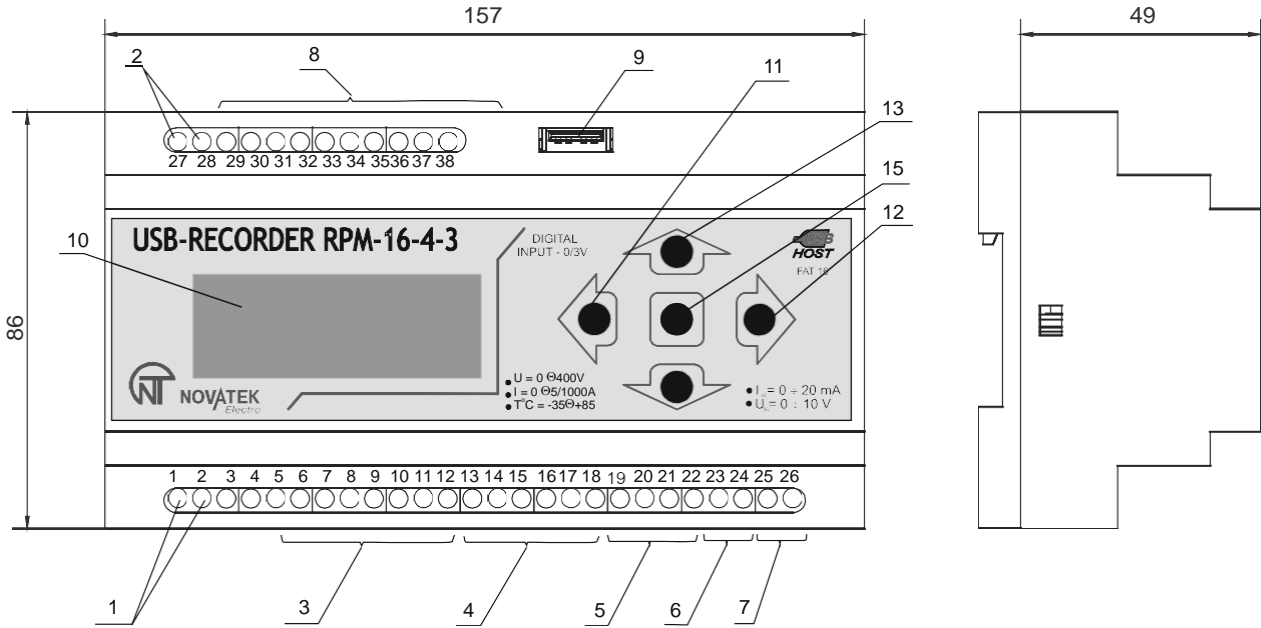
Rated input power supply voltage, V	100 - 265
Reserve power supply voltage, V	AC – 9 ... 15, DC – 9 ... 15
Rated power supply frequency, Hz	45 – 65
Acting AC voltage measurement range, V per phase	from 1 to 400
Acting AC current measurement range, A per phase	from 0 to 1000*
Standard sensor with current output, mA	0...20 or 4...20
Standard sensor with voltage output, V	0...10
Frequency of measured voltage, Hz	45 ... 65
Rated frequency for the current transformers, Hz	50
Temperature measurement range, °C	from –30 to +79
Voltage measurement accuracy, %	2
Current measurement accuracy from maximal significant value, %	3
Accuracy of temperature measurement, %	2
Sampling rate for all sensors, 1/sec	1..3600**
Number of voltage measurement channels	4
Number of current measurement channels	3
Number of temperature measurement channels	2
Number of channels having standard current input	1
Number of channels having standard voltage input	1
Number of digital input channels	5
Type of voltage sensing channels	Differential input
Temperature sensor type	NTC
Current sensor type	Standard current transformer with 5A output.
Type of digital channels	Kindly see Figure 2.24
External storage device	USB-Flash drive
Maximal volume of USB Flash-Drive	2 GByte
File system	FAT-16
Data file storage format	Text file with “txt” extension
Volume/Time ratio for all 16 channels at sampling rate 1/sec	≈ 550 Kb/hour***
Maximal file size TEST_XXX****, MB	16
Built-in clocks accuracy at +25°C, not worse than, sec/day	1
Operational temperature range, °C	from 0 to +55
Storage temperature, °C	from - 30 to +70
Weight, kg	0.5
Outer dimensions, mm	157 x 85 x 55
Mounting using standard 35 mm DIN rail	

* - rated measured current depend on the type of current measuring transformer and could be chosen in the following range: 10; 20; 30; 40; 50; 75; 100; 150; 200; 300; 400; 600; 800; 1000 (see 2.1.3.7.2.).

** - Sampling rate frequency is user defined and may be from 1 to 3600 sec depending on user demands (see section 2.1.3.8.).

*** Depends on the number of selected channels (see section 3.1.4.7.) and Sampling Rate value (see section 2.1.3.8.).

**** XXX – number or text file (see section 2.2.1.).



- 1 – input terminals 220 - 240V AC;
- 2 – input terminals for alternative power supply 9...12V DC;
- 3 – input terminals for voltage monitoring channels;
- 4 – input terminals for current transformers;
- 5 – input terminals for temperature sensors;
- 6 – input terminals for the measuring devices with standard analog input current;
- 7 – input terminals for the measuring devices with standard analog input voltage;
- 8 – input terminals for digital inputs;
- 9 – output USB port;
- 10 – LCD display;
- 11 – LEFT cursor button;
- 12 – RIGHT cursor button;
- 13 – UP cursor button;
- 14 – DOWN cursor button;
- 15 – ENTER button ("OK")

Figure 1.1 – Front panel controls and outer dimensions of RPM-16-4-3

1.2.2. Main controls and outer dimensions are shown on Figure 1.1. Corresponding numbers of channels and contact terminals are shown in **Table 2** below.

Table 2

Channel №	Type of channel	Terminals
0	Voltage monitoring	5, 6
1	Voltage monitoring	7, 8
2	Voltage monitoring	9, 10
3	Voltage monitoring	11, 12
4	Current monitoring	13, 14
5	Current monitoring	15, 16
6	Current monitoring	17, 18
7	Temperature measurement	19, 20
8	Temperature measurement	21, 22
9	Primary transducer with standard current input	23, 24
10	Primary transducer with standard voltage input	25, 26
11	Digital channel	29, 30
12	Digital channel	31, 32
13	Digital channel	33, 34
14	Digital channel	35, 36
15	Digital channel	37, 38

1.3. PACKAGE CONTENTS

The **RPM-16-4-3** is supplied in the following standard set:

USB-Flash Drive Recorder RPM-16-4-3	- 1 piece
USB-Flash Drive	- 1 piece
Software program Reg_RPM installation file	- on USB Flash-Drive
Users manual	- 1 piece
Package	- 1 piece

1.4. OPERATION

RPM-16-4-3 is 16 Channel recording system to collect and store information on external USB Flash-Drive. This device has fire-resistant plastic case and mounted onto standard DIN rail.

Main operation principle is reading the measurements data from all input sensors and channels and collecting this information in the internal memory and writing it on the external USB Flash Drive. Information is being stored in the form of text file (*.txt) and it's possible to view data using the software program Reg_RPM. Instructions to work with the original software Reg_RPM you may find at the Appendix A.

1.5. MARKING AND PACKING

On the front panel of the product there is company registered company trade mark and the names of the functional buttons and corresponding numbers of the input contact terminals. Every **RPM-16-4-3** is tested at the factory and individually packed in carton enclosure for safe storage and transportation.

2. OPERATION AND USAGE

2.1. Main functions and general application

2.1.1. Safety precautions

ATTENTION!!! Connection of sensors or any other wiring operations must necessarily be performed on fully deenergized device (on cold state).

2.1.2. Basic functions of RPM-16-4-3 recorder:

a) Measurements and monitoring of:

- Voltage;
- Currents;
- Temperature;
- Other measured parameters from meters with standard analog input;

b) Visual control of measured values;

c) Data recording onto external USB-Flash drive.

2.1.3. Start-up preparation

2.1.3.1. Connect the Power supply cord with plug must be connected to terminals **1, 2**. If necessary connect alternative reserve power supply wires to terminals **27, 28** (see Figure 1.1).

2.1.3.2. Connect all necessary sensors and input signal wires.

2.1.3.3. Turn **ON** the **PRM-16-4-3** – on LCD display will appear initial timing information and menu (Figure2.1.)

```
18:33:34 10.07.2007
<SET> CHANGE REC
```

Figure 2.1 – Initial information on the LCD display after first turn **ON**.

In upper line current time (hours : minutes : seconds) and date are shown.

In lower line there are menu tabs: “**SET**” – switch to settings menu, “**CHNG**” – change parameter, “**REC**” – start recording.

If one of those tags “**SET**” “**CHNG**” “**REC**” is taken into <...>, then by pressing “**ENTER**” button **RPM-16-4-3** will switch to the selected operation mode.

To move cursor use buttons: “◀” – LEFT and “▶” - RIGHT.

2.1.3.4. To switch to settings mode “**SET**” it's necessary using “◀” and “▶” buttons to select Tag “**SET**” and press “**ENTER**” button. Then on LCD display will appear settings menu (Figure 2.2):

In settings menu is possible to change the following parameters:

- Channels;
- Time;
- Date;

- Sensors sampling rate;
- Indication;
- Protection from unsanctioned record stop;
- Settings after turning **OFF** the power supply.

SETTINGS:
 <CHANNELS>
 DATE
 TIME EXIT

Figure 2.2 – “SETTINGS” mode

To select the desired operation mode use buttons “▲” or “▼”, to enter the menu press “ENTER” button. To exit from this mode it’s necessary by pressing button “▶” to move cursor to “EXIT” and then press “ENTER” button.

2.1.3.5. To enter the “TIME” setting mode it’s necessary by pressing “▲” and “▼” buttons to move cursor and select “TIME” tag – then press “ENTER”. On the LCD display must appear the following menu (please see Figure 2.3 below).

< 12 hr >
 37 min
 11 sec
 OK CANCEL

Figure 2.3 – Time setting mode

To change current time press buttons “▲” or “▼” and select hours (hr); minutes (min) and seconds (sec). To increase or decrease the selected value press buttons “◀” and “▶”. To exit without saving select with cursor “CANCEL” and press “ENTER”. To exit and save the adjusted time select with cursor “OK” tag and press “ENTER”.

2.1.3.6. To change the date press “▲” and “▼” buttons and select “DATE” from the main menu – then press “ENTER”. On display will appear date setting menu (please see Figure 2.4 below).

< 7 >
 MAY
 2007y
 OK CANCEL

Figure 2.4 – Date setting mode

To set the date press “▲” and “▼” buttons and select parameter to be modified: day (number); month (month name) and year. To change the parameter press “◀” or “▶” buttons. To exit without saving select with cursor “CANCEL” and press “ENTER”. To exit and save the adjusted time select with cursor “OK” tag and press “ENTER”.

2.1.3.7. To enter the mode of channel settings press buttons “▲” or “▼” to put cursor on tag “CHANNEL” – then press “ENTER” button and you will see the menu (please see Figure 2.5 below):

0k<EN> SELECT
 1k DIS CHANNEL:
 2k EN
 3k EN OK CANCEL

Figure 2.5 - Channel settings mode

To enable or disable channels use “▲” and “▼” buttons and select the required channel to enable or disable – then with the use of “◀” and “▶” buttons select the channel state <EN> - **channel enabled** or <DIS> - **channel disabled**. Then press “ENTER” button to save the changes.

To exit without saving select <CANCEL> and press “ENTER”. To save and exit select <OK> and press “ENTER”.

2.1.3.7.1. Current channel, temperature channel and channel for primary transduced standard voltage or current input signals have their own set of parameters and adjustments. To enter into menu of additional settings for each of the channel use “▲” and “▼” buttons and select the required channel. To the right of the current channels 4,5,6 number there is “I” symbol. (kindly see Figure 2.6)

4k EN <l> SELECT
 5k DIS I CHANNEL:
 6k EN I
 7k EN t OK CANCEL

Figure 2.6 - Indication of Channel settings mode.

2.1.3.7.2. Using “◀” and “▶” buttons move cursor on the symbol <I> then press “ENTER” button. For example indication of Channel 5 will look like shown on the Figure 2.7. below:

```
CHANNEL 5
<Rated Current 100A>
OK
CANCEL
```

Figure 2.7 – Indication of additional settings for Current Channels

CHANNEL 5 – is number of channel, «Rated Cur» – means that this is Current monitoring channel, «Rated Cyr 100A» – means that rated current is 100A. To select another rated current value from the range 10; 20; 30; 40; 50; 75; 100; 150; 200; 300; 400; 600; 800 or 1000A use buttons “◀” and “▶”. To save the new value and exit select <OK> and press “ENTER”. To exit without saving – select <CANCEL> and press “ENTER”.

2.1.3.7.3 Indication for the channels from primary transducers with standard current input. Kindly see the example which is shown on the **Figure 2.8.** below:

```
CHN 10 ST.IN.CUR.
0...20 mA
<OK>
CANCEL
```

Figure 2.8 - Indication of additional channel settings for the channel from primary transducer with standard current input.

Where «CHN 10» – number of channel 10, «ST. IN. CUR.» – type of the channel – primary transducer with standard input current, «0...20 mA» – sensor with output 0..20 mA (to select another sensor with output 4..20 mA use buttons “◀” and “▶”). To save the new value and exit select <OK> and press “ENTER”. To exit without saving – select <CANCEL> and press “ENTER”.

2.1.3.8. Adjustment of the sampling rate for the sensors. To enter this mode select the tag “SAMPL RATE” and press “ENTER”. Example of indication is shown below on **Figure 2.9.:**

```
SAMPLING RATE
<0001> second
OK
CANCEL
```

Figure 2.9 – Adjustment of the sampling rate for the sensors.

Where in upper line is shown the operation mode (SAMPLING RATE). Second line “<0001> second” – sampling rate 1 per second. Sampling rate could be user defined in the range 1-3600 per second. To change the sampling rate use buttons “◀” and “▶”. To save the new value and exit select <OK> and press “ENTER”. To exit without saving – select <CANCEL> and press “ENTER”. Default factory sampling rate is 1 per second.

2.1.3.9. To switch to the mode of the indication settings use buttons “▲” or “▼” and select with cursor <INDICATION> tag then press “ENTER” (kindly see **Figure 2.10.**). In this mode user may set the sequence of the channels for measurement. If user didn't change the channel measuring sequence – then RPM-16-4-3 will perform recording in the sequence from 0 to 15 one by one. To change the sequence of channels it's necessary to put cursor on the desired channel and press “ENTER” button. Then using buttons “◀” or “▶” change the sequence order. Then press “ENTER” again. To save the new value and exit select <OK> and press “ENTER”. To exit without saving – select <CANCEL> and press “ENTER”.

```
1CHN <<p2>>
2CHN p3
3CHN p1
4CHN p4
```

Figure 2.10 – Indication

2.1.3.10. Mode of Protection from unsanctioned record stop was made to avoid occasional stop of the recording. When this mode is active then it's possible to stop the record only with entering 3 digits password. This mode is disabled by default factory settings. To activate the protection mode press “▲” or “▼” and select tag “PROTECTION” then press “ENTER”. Kindly see **Figure 2.1.** for details.

```
1 2 3 PASSWORD
4 <5> 6 ---
7 8 9
0      OK CANCEL
```

Figure 2.11 – Indication of the mode “Protection from unsanctioned record stop”

On display you may see numbers from 0 to 9. To select the required number use buttons “▲”, “▼”, “◀” or “▶”. To confirm the entry of required number press “ENTER”. After the entry of all 3 digits of the code select <OK> tag on display using cursor and press “ENTER”. LCD display will indicate as shown on Figure 2.12, where just entered password will be shown (for example 111) and tags below “YES” “NO”. User must select to use block and save the password or not. Select the required variant <YES> or <NO> and press ENTER.

```
ENABLE PASSWORD PROTECTION
FROM UNSANCTIONED ACCESS?
password 111
<YES>    NO
```

Figure 2.12

2.1.3.11. The power supply turn OFF

If during the record there was power shortage, power was off or it was a system error – then the user may select one of the following after the power returns back

1. Automatically start the record with users settings;
2. Record will start only on the users command.

Indication of this mode is shown on Figure 2.13 below. If select <YES> then recording will start automatically, if <NO> then the record will start only on users command. By default settings record will start automatically.

```
On power turn ON
Record must start
automatically?
<YES>    NO
```

Figure 2.13

2.1.3.12. Preparation of data-storage device (flash drive) for the use.

After setting the time and date and after programming all the channels it is necessary to prepare USB-Flash drive for the use. Plug in the USB-Flash drive to the PC and make the formatting of the drive in **FAT-16** system. For Windows system open folder “My Computer” and click left mouse button so select the drive that you just plugged into the PC. Then click right button of the mouse and select “Format” (Figure 2.14).

Then on the monitor must appear the formatting window (Figure 2.15)

Select file system FAT (FAT-16) and press **Start** button.

USB Flash-drive is ready for the operation with the recorder **RPM-16-4-3**.

Plug in the USB Flash-drive into the corresponding socket on the front panel of the **RPM-16-4-3** (See point 7 on Figure 1.1). Now device is ready for operation and recording.

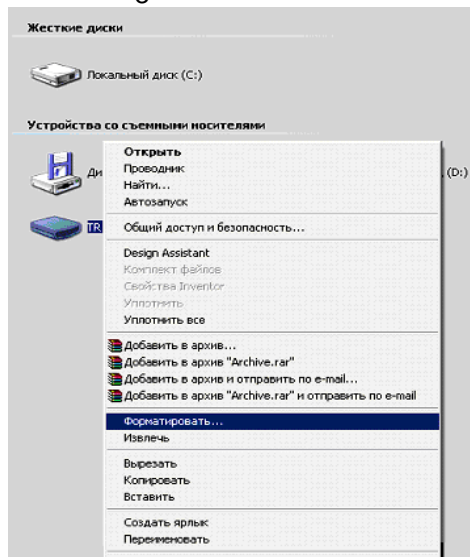


Figure 2.14

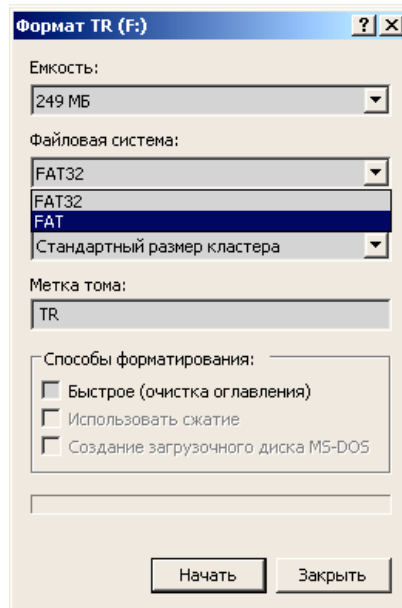


Figure 2.15

2.2. THE USE OF RPM-16-4-3

2.2.1. To start the record it's necessary to select <START> tag and press **ENTER** button. On display it will appear "INITIALIZATION" message (kindly see *Figure 2.16* below):

INITIALIZATION...

Figure 2.16 – Indication of Initialization

During the initialization **RPM-16-4-3** makes the configuration of the USB Flash-drive. If during configuring there was some error – then the LCD will show one of the following messages:

"NO DRIVE" – Flash Drive is not plugged into the **RPM-16-4-3** (*Figure 2.17*);

NO DRIVE

Figure 2.17 - Indication of Initialization process

"DEVICE ERROR " (*Figure 2.18*) – unknown error.

DEVICE ERROR

Figure 2.18 - Indication of Initialization process

If there are no errors in configuring and initialization then **RPM-16-4-3** make folder in root directory with the name "NOVATEK_". In the folder "NOVATEK_" there will be made 2 text files "SYSTEM" and "TEST_0".

“SYSTEM” file contain information about recorder.

File “TEST_0” – is the first file which is made at the start of record. When the file size will reach 16 Mb volume RPM-16-4-3- will automatically create next file “TEST_1” and will continue with the same way further up to the file “TEST_128”. File “TEST_128” – is the last one file that the recorder may create. After the initialization the record will start and LCD display will show the following information: (Figure 2.19).

10:57 STATE: RECORD
WRITTEN: 277504B
FREE: 1013847552B
<CHANGE> PAUSE STOP

Figure 2.19 – Indication after the record started

2.2.2. Record

During recording process there are possible 2 variants of the recording display:

2.2.1.1 Main mode (Figure 2.18), when current record state is being displayed on the LCD – “RECORD” or “PAUSE” (is shown in the upper line);

«WRITTEN» - total volume of written data (second line of display);

«FREE» - shows the free volume left on drive for writing (third line of display).

In this operation mode it’s possible to stop the record by selecting tag <PAUSE> and pressing ENTER button. Then on LCD will appear confirmation message “DO YOU REALLY WANT TO PAUSE THE RECORD?” (Figure 2.20) . Using cursor select <YES> or <NO> and press ENTER to confirm the record pause. To resume the record select “START” and confirm it by pressing ENTER.

DO YOU REALLY WANT
TO PAUSE THE RECORD?
YES <NO>

Figure 2.20

If pressing button “STOP” on LCD display will appear the following message “DO YOU REALLY WANT TO STOP THE RECORD?” (Figure 2.21) and user must select the required option <YES> or <CANCEL> then press ENTER to confirm.

DO YOU REALLY WANT
TO STOP THE RECORD?
YES <NO>

Figure 2.21

On the next time you start the record after pressing “START” button RPM-16-4-3 will create new text file with name TEST, in the folder “NOVATEK_”.

2.2.1.2. Measurement mode – this mode of operation allows to view current values of the registered parameters for each of the channels.

To switch to this mode it’s necessary to select tag <CHNG> and press ENTER button (Figure 2.18). Indication of this mode is shown on Figure 2.22 below:

0CHN=220V >W 11:17
1CHN=232V W: 512kB
2CHN=217V F:1012MB
<BACK>

Figure 2.22 – Measurement mode indication

To view the parameters on required channels use buttons “▲” or “▼”.

It’s possible to view the parameters from 3 channels simultaneously.

In upper line is being shown current time and mode of operation. Current mode of operation is displayed in the following way:

- 1) “> R” – record.
- 2) “> P” – pause.

In the second line to the right is shown the volume of written data onto the flash drive. “W” letter means “Written”.

In 3rd line to the right is shown “F” – free space on the drive.

In lower line there is <BACK> tag that is used to return back to the main operation mode.

If during record there is no more free space on the drive – then RPM-16-4-3 shows the following message on display (*Figure 2.23*).

**THERE IS NO
FREE SPACE ON THE DRIVE**

Figure 2.23

2.2.1.3. View data records

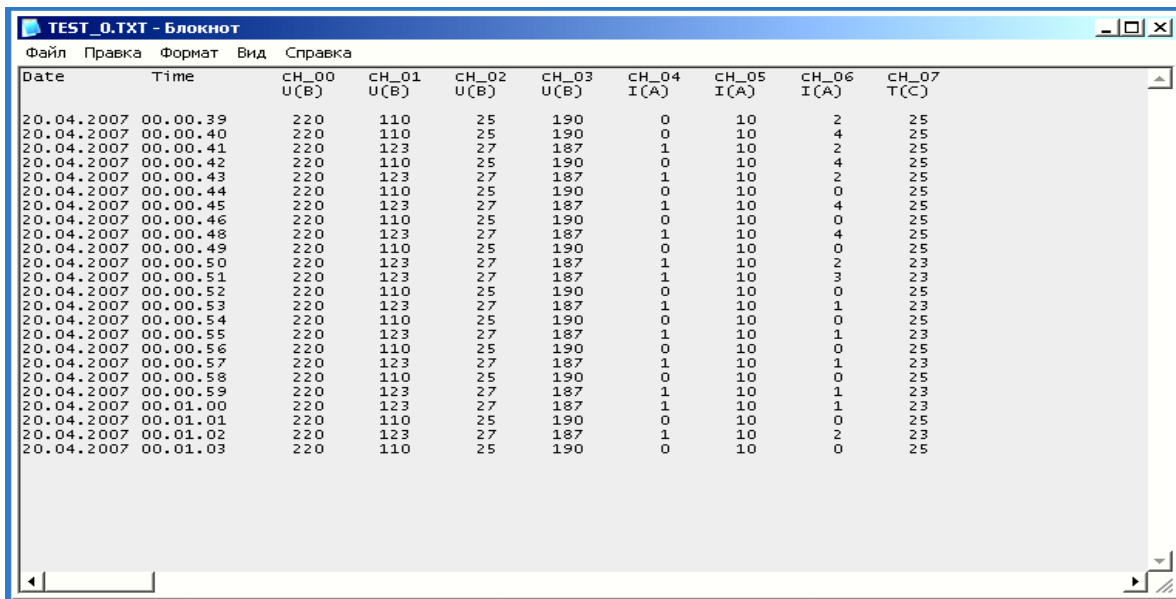
To view the data it's necessary to stop the record.

Select **<STOP>** tag and press **ENTER**. If to unplug the USB Flash drive incorrectly without stopping the record in advance there is a risk to lose all the written data.

If to remove the drive during recording process then on the display will appear "NO DRIVE" (*Figure 2.16*). In this case plug the drive back into the RPM-16-4-3 and stop the record as described above.

Recorded data is possible to view using PC with the text file software for example Wordpad in Windows. Data format is shown on *Figure 2.24*:

2.2.1.4 General scheme for the sensors connection is shown on the *Figure 2.25*.



Date	Time	CH_00 U(V)	CH_01 U(V)	CH_02 U(V)	CH_03 U(V)	CH_04 I(A)	CH_05 I(A)	CH_06 I(A)	CH_07 T(C)
20.04.2007	00.00.39	220	110	25	190	0	10	2	25
20.04.2007	00.00.40	220	110	25	190	0	10	4	25
20.04.2007	00.00.41	220	123	27	187	1	10	2	25
20.04.2007	00.00.42	220	110	25	190	0	10	4	25
20.04.2007	00.00.43	220	123	27	187	1	10	2	25
20.04.2007	00.00.44	220	110	25	190	0	10	0	25
20.04.2007	00.00.45	220	123	27	187	1	10	4	25
20.04.2007	00.00.46	220	110	25	190	0	10	0	25
20.04.2007	00.00.48	220	123	27	187	1	10	4	25
20.04.2007	00.00.49	220	110	25	190	0	10	0	25
20.04.2007	00.00.50	220	123	27	187	1	10	2	23
20.04.2007	00.00.51	220	123	27	187	1	10	3	23
20.04.2007	00.00.52	220	110	25	190	0	10	0	25
20.04.2007	00.00.53	220	123	27	187	1	10	1	23
20.04.2007	00.00.54	220	110	25	190	0	10	0	25
20.04.2007	00.00.55	220	123	27	187	1	10	1	23
20.04.2007	00.00.56	220	110	25	190	0	10	0	25
20.04.2007	00.00.57	220	123	27	187	1	10	1	23
20.04.2007	00.00.58	220	110	25	190	0	10	0	25
20.04.2007	00.00.59	220	123	27	187	1	10	1	23
20.04.2007	00.01.00	220	123	27	187	1	10	1	23
20.04.2007	00.01.01	220	110	25	190	0	10	0	25
20.04.2007	00.01.02	220	123	27	187	1	10	2	23
20.04.2007	00.01.03	220	110	25	190	0	10	0	25

Figure 2.24 – Text File format for the measured data

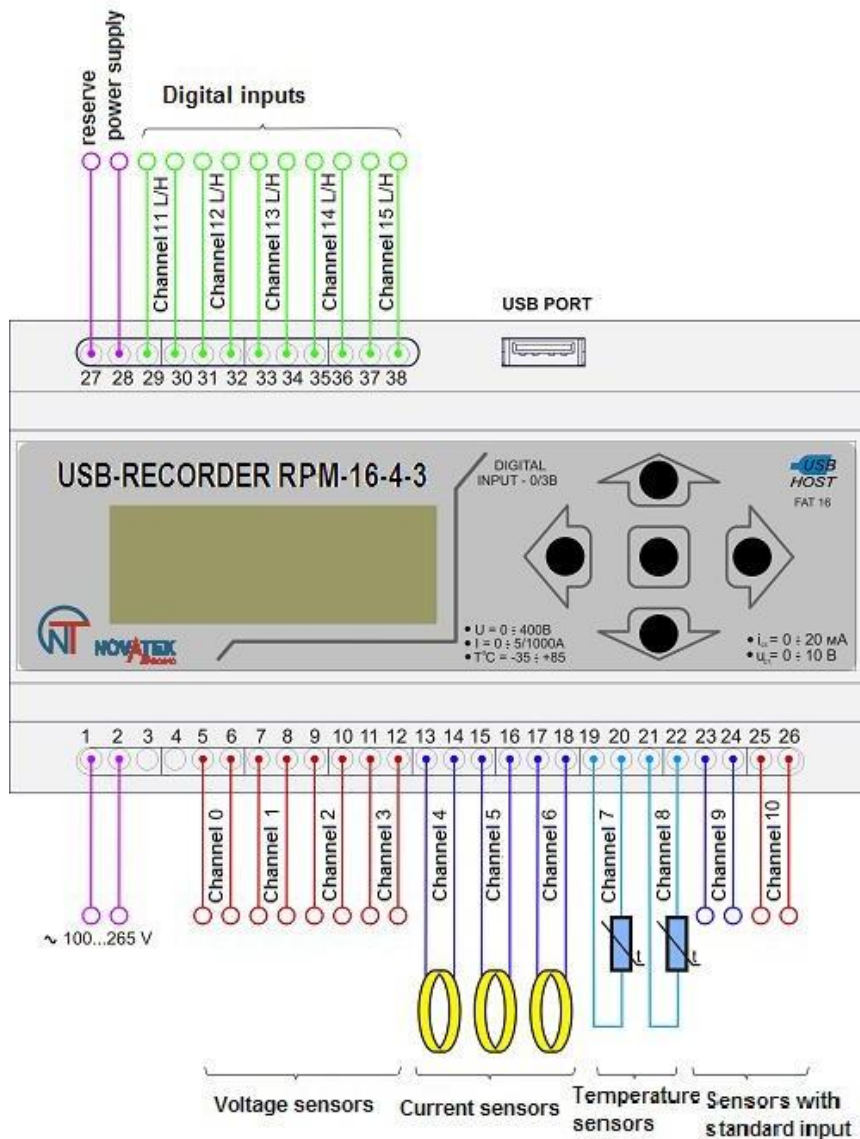


Figure 2.25 – Sensors connection diagram

2.2.1.5. One of the examples how digital input is being used shown on the *Figure 2.26*. To the **terminals 31, 32** (Channel 13) are connected relay contacts. To **terminal 31** from **RPM-16-4-3** there is connected 10 kOhms resistor and power supply of +5V DC is given through it. To the **terminal 32** neutral wire is connected. **RPM-16-4-3** will read logic value (if $< 0,5V$ – then it's logical zero and all the other cases it's logical 1) on **terminal 31**.

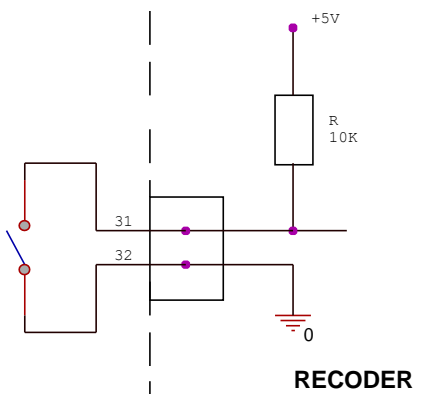


Figure 2.26 – Digital input connection example

NOTES - If the sensor is not connected to selected channel or one of the sensor wires is not connected – then measured values for this channel may have any random value.

3 TECHNICAL MAINTENANCE

Device doesn't require any special treatment or other operations except regular dust removal from the case with the use of soft fabric.

3.1 CALIBRATION COMMENTS

On connection or replacement of NTC type temperature sensors it's necessary to perform the calibration of the corresponding channel. Calibration is done by summing the calibration constant and measured real temperature. For the calibration of temperature channels you will need reference thermometer of 0,1°C accuracy. Calibration is made in the "SETTINGS" mode – during the record calibration is not possible.

3.2. CALIBRATION

3.2.1. Connect NTC sensor to the corresponding channel;

3.2.2. Turn on the reference thermometer.

Sensor and the reference thermometer should be kept as close to each other as possible.

3.2.3. To equilibrate the sensors wait at least 15 minutes.

3.2.4. Switch to "SETTINGS" then select tag "CHANNELS" and press ENTER button. Using "▲" and "▼" buttons select the required temperature channel 7 or 8, using button "▶" select tag <t> and press ENTER.

Now it's possible to make the calibration of the temperature channel (*Figure 3.1*).

Calibration Channel 7

< +0.7 > +25 *C

SAVE

CANCEL

Figure 3.1 - Temperature sensor calibration

In the upper line is shown that you are in calibration mode for the channel 7.

«+0.7» – correction coefficient +0.7;

«+25 *C» – temperature value measured by **RPM-16-4-3**;

«SAVE» – save and exit;

«CANCEL» - exit without saving

3.2.5. To calculate the value of correction coefficient it's necessary to subtract from the value measured by reference thermometer – the value measured by **RPM-16-4-3**

$$\text{Correction coefficient} = \text{Reference thermometer value} - \text{Temperature measured by RPM-16-4-3}$$

3.2.6. To change the value of Correction coefficient use buttons "◀" or "▶". Correction coefficient you may adjust in the range – 9.9 to +9.9.

3.2.7. To save the settings and exit to main menu select <SAVE> tag and press ENTER; to exit without saving select <CANCEL> and press ENTER button.

4 TRANSPORTATION AND STORAGE

Transportation in manufacturers packing could be made by any type of transport in accordance to rules and safety regulations stated for forwarders.

On transportation, handling and during the storage product must be safely protected from drops, mechanical vibrations, beats and high humidity.

RPM-16-4-3 must be stored in the factory packing in the dry rooms with ambient temperature in the range from -30 to +70 °C. Atmosphere pressure of 0,1 MPa and relative air humidity not more than 80%.

3. WARRANTY PACKAGE

Where upon device should be write off as obsolete.

Novatek-Electro Ltd. company warrants a trouble-free operation of the RPM-16-4-3 device within 3 years from the date of sale, on condition that following terms are provided:

- the proper connection;
- the safety of the inspection quality control department seal;
- The integrity of the case, no traces of opening, cracks, spalls etc.

Post warranty service of the device is provided by Novatek-Electro Ltd. per independent agreement.

APPENDIX A – THE USE OF REG_RPM SOFTWARE

Programm Recorder RPM 16-4-3 is designed for the processing and analysis of the information obtained by the USB-flash drive recorder.

Using this software it's easy to arrange graph view of the data written and registered.

A.1 Installation of the programm Reg_RPM.

Run the file Setup_RegView(2_1).exe, and on display you will see window (Figure A.1). In the shown tag select the language of installation.

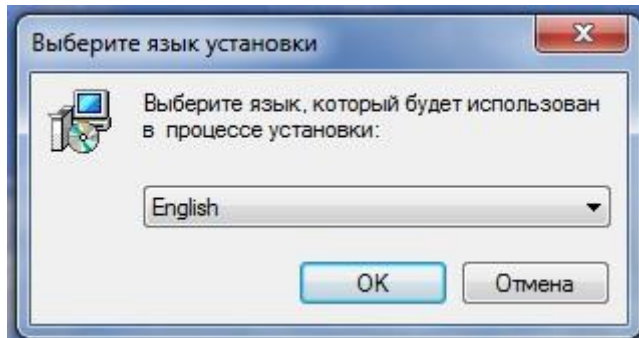


Figure A.1

A.2 Then the installation wizard will install the software to your PC (Figures A.2... A.11).



Figure A.2

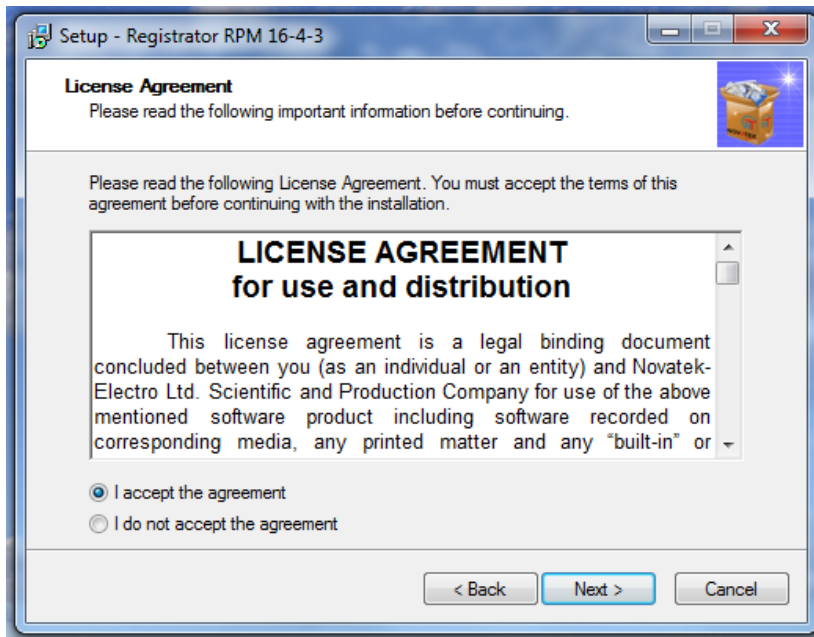


Figure A.3

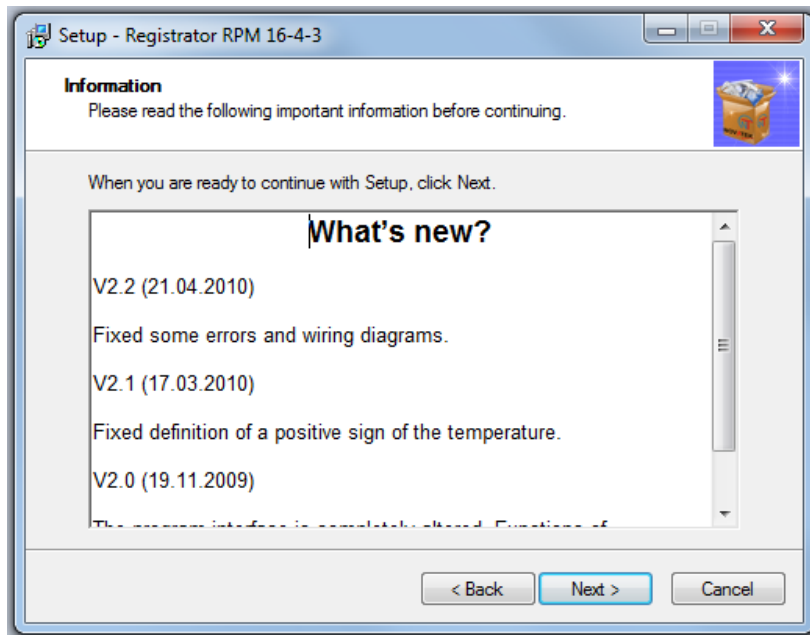


Figure A.4

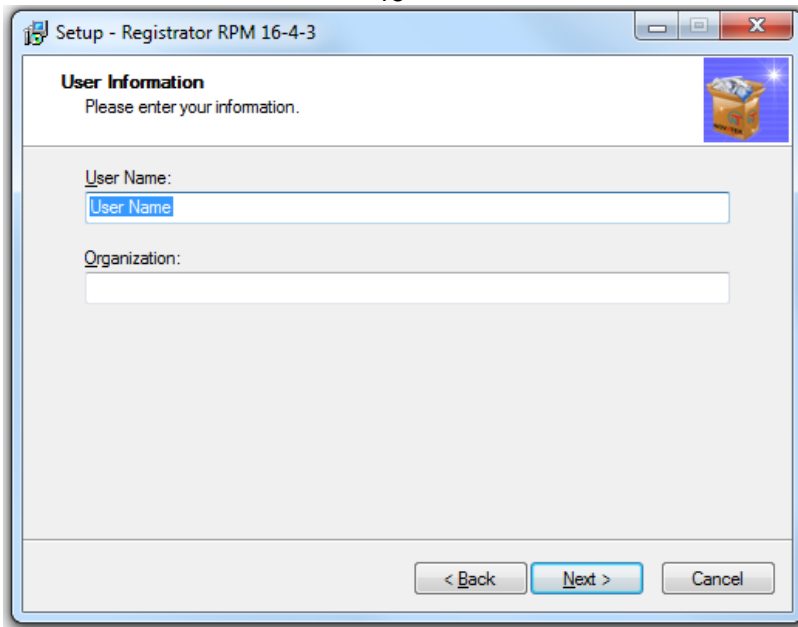


Figure A.5

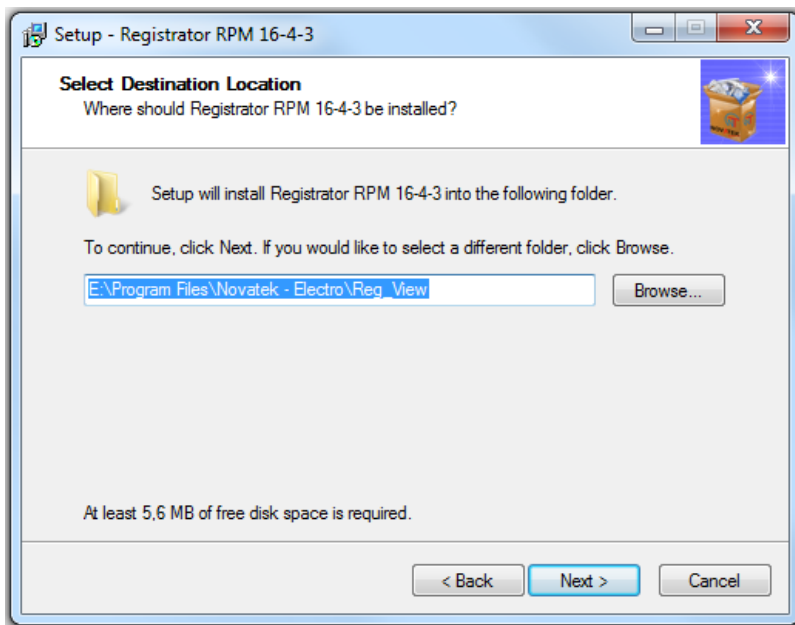


Figure A.6

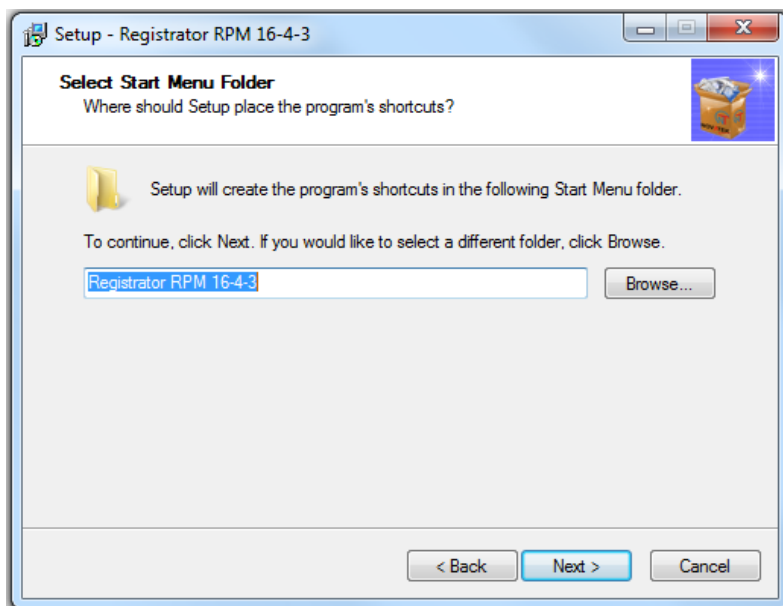


Figure A.7

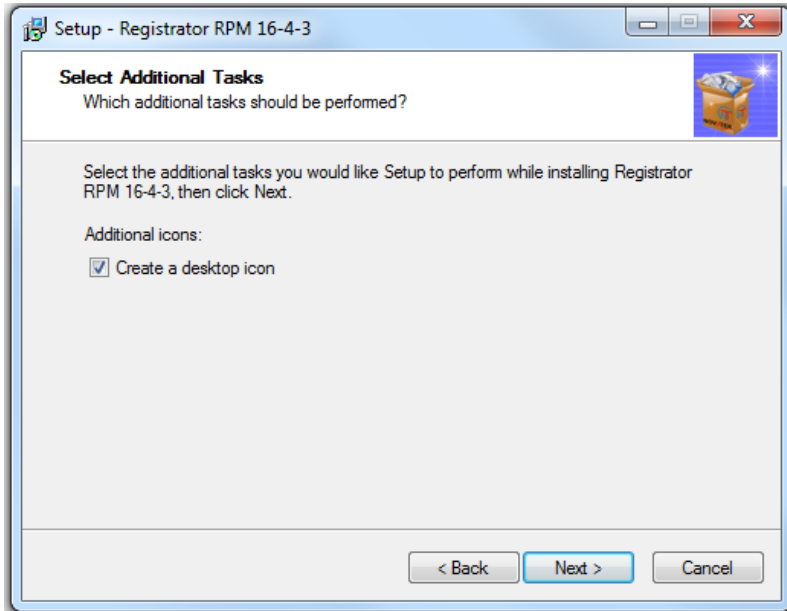


Figure A.8

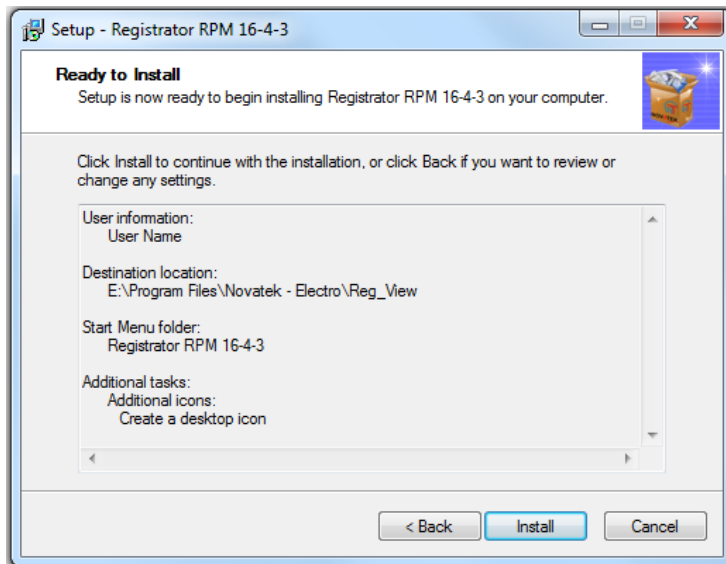


Figure A.9



Figure A.10

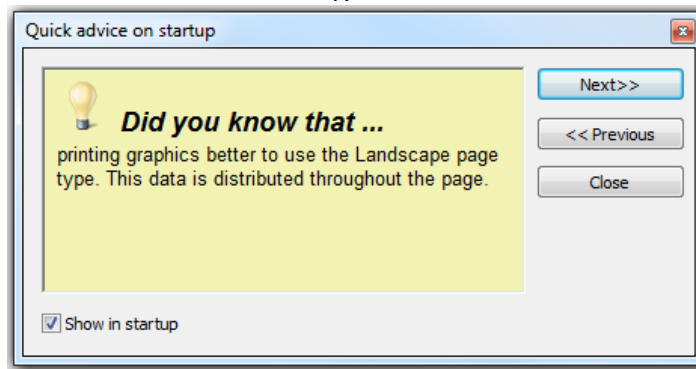


Figure A.11

Main program window is shown on Figure A.12

In upper part of the screen you can see main menu showing some of the buttons. Below the control panel you can see 2 tags – this is data display window. First tag show the information on the files and the second contain graphical chart information.

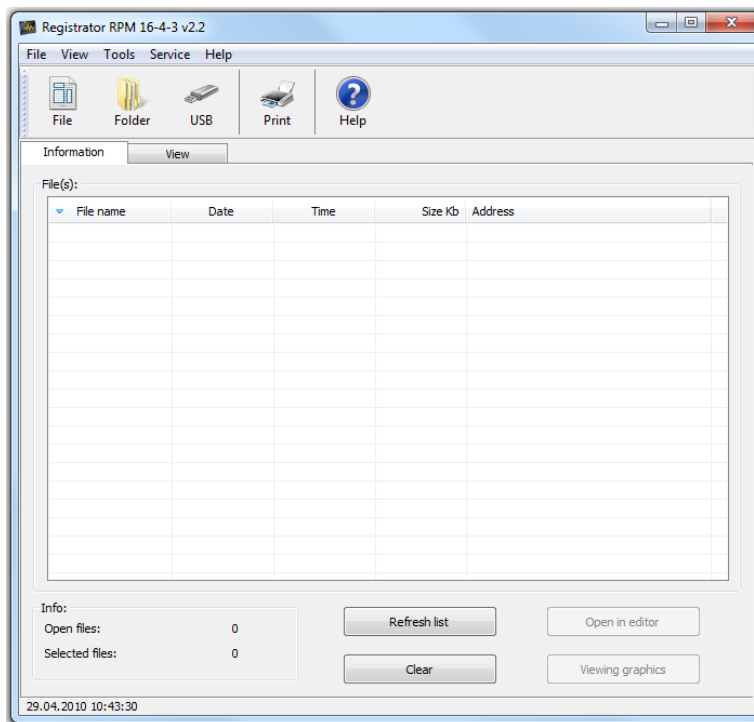


Figure A.12

A.2.1 Main menu

Main program menu comprises nearly all functions of the program which could be run with single click on one of the menu buttons.:

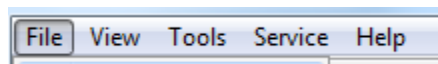


Figure A.13

Menu contains all basic variants which are arranged in submenu: **FILE:**

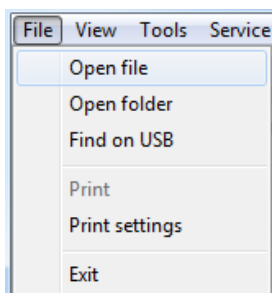


Figure A.14

- «Open file» - open one or several files;
- «Open folder» - search file in specified folder;
- «USB Autolocate» - search files on connected USB data medium;
- «Print» - send diagram to print;
- «Print settings» - Open dialog print settings;
- «Exit» - Close the program Logger RPM 16-4-3.

View:

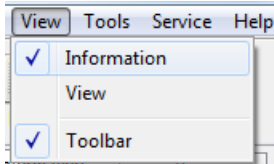


Figure A.15

- «Information» - switch to information tab card;
- «View» - switch to diagram tab card;
- «Toolbar» - ON or OFF toolbar.

Instruments:

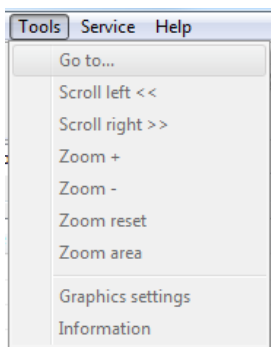


Figure A.16

- «Go to...» - open dialog of call date;
- «Scroll left» - сдвигает график влево на несколько пунктов;
- «Scroll right» - сдвигает график вправо на несколько пунктов;
- «Zoom +» - increase diagram;
- «Zoom -» - reduce diagram;
- «Reset zoom» - reset all zoom and shift on default;
- «Zoom area» - zoom concerned user area;
- «Graphics settings» - open dialog graphic settings;
- «Information» - open information dialog, display information on selected channels

Help:

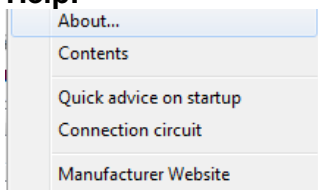


Figure A.17






- «About program» - open dialog program description;
- «Content» - type out current help topic;
- «Quick advise on startup» - open dialog of advices;
- «Connection curcuit» - show connection scheme of connection logger RPM 16-4-3;
- «Manufacturer Website» - come to manufacturer website **www.novatek-electro.com**.

A.2.2 Control board

Control board doubles menu option and shown at file A.18:



Figure A.18

-  File Double menu option "Open file"
-  Folder Double menu option "Open folder"
-  USB Double menu option "USB Autolocate"
-  Print Double menu option "Print"
-  Help Double menu option "Content"

A.2.3 Display space of data

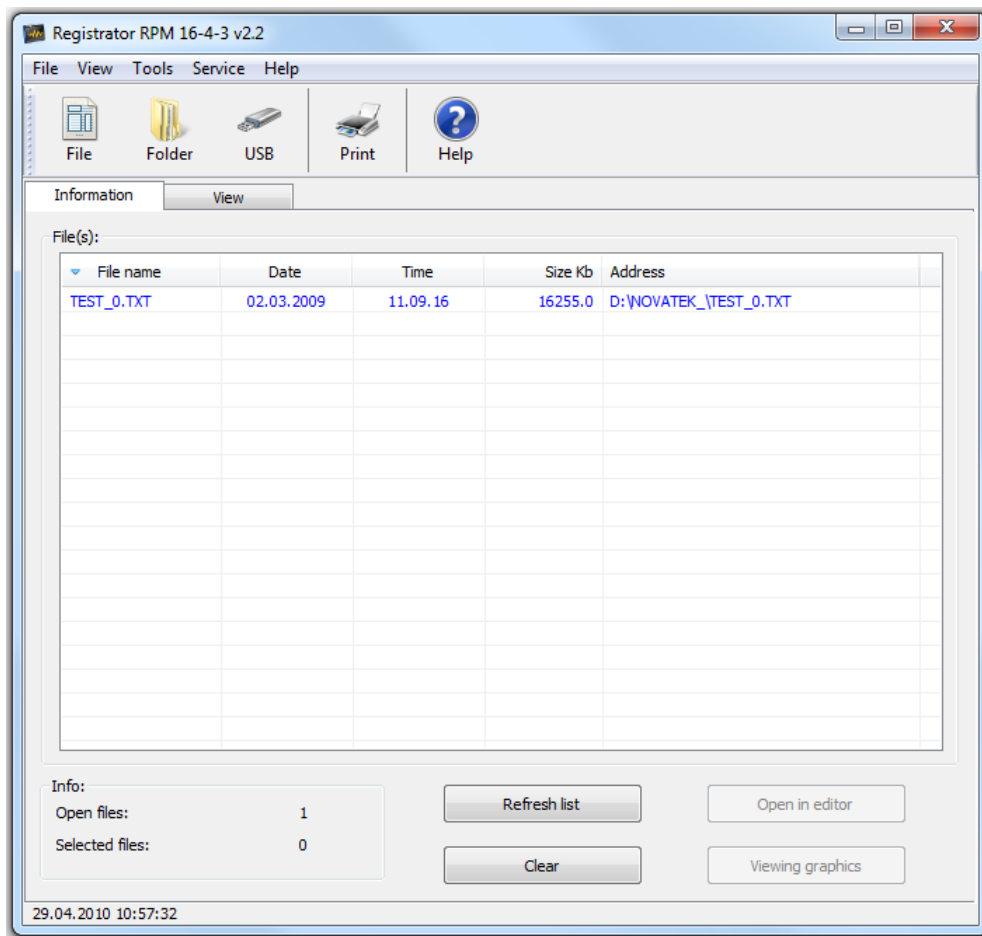


Figure A.19

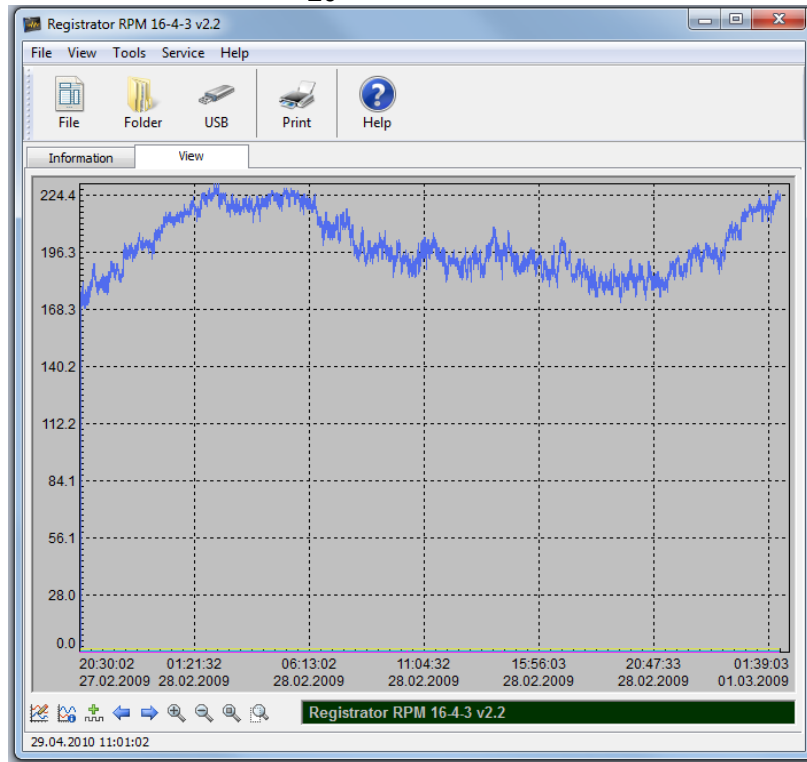


Figure A.20

A.3 Separate necessary file for displaying, the program starts to analyse it (need several seconds) After analysing the information is shown: date and time of starting recording, date and time of finishing recording and number of recorded channels (*Figure A.19*).

A.3.1 Program settings

Window of program settings opens using menu option -Service -> Adjustments. Visual environment of window is shown at the picture:

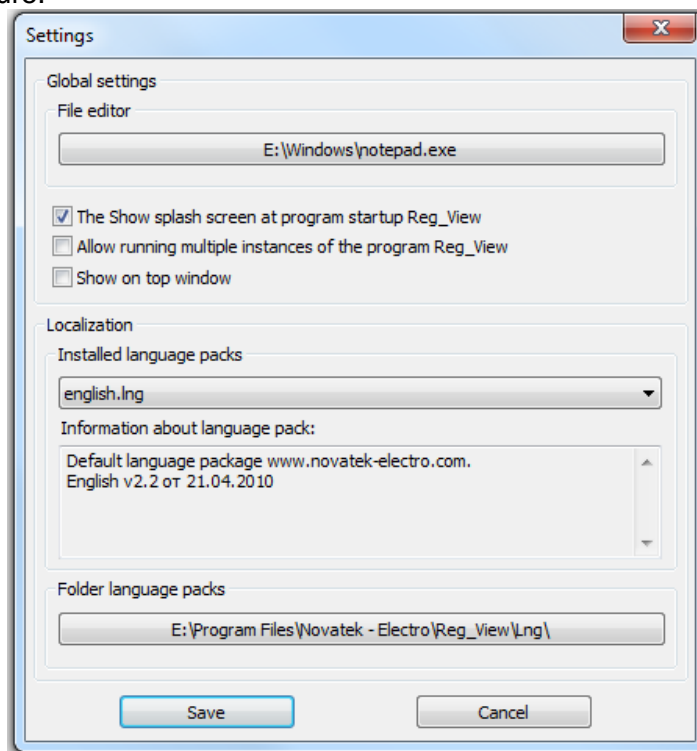


Figure A.20

A.3.2 Open file (s)

This parameter available from panel board or from main menu (**File -> Open file**) After activation of this menu option the window of choosing file will be open:

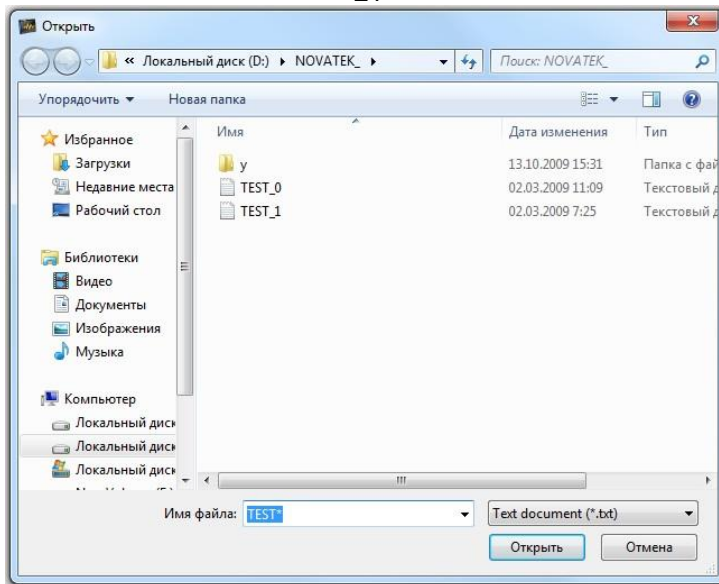


Figure A.21

In this window necessary indicate the required files and press the button “**Open**”, for exit- press the button “cancel”. If the button “**Open**” was pressed the required file will be add to main list of files.:

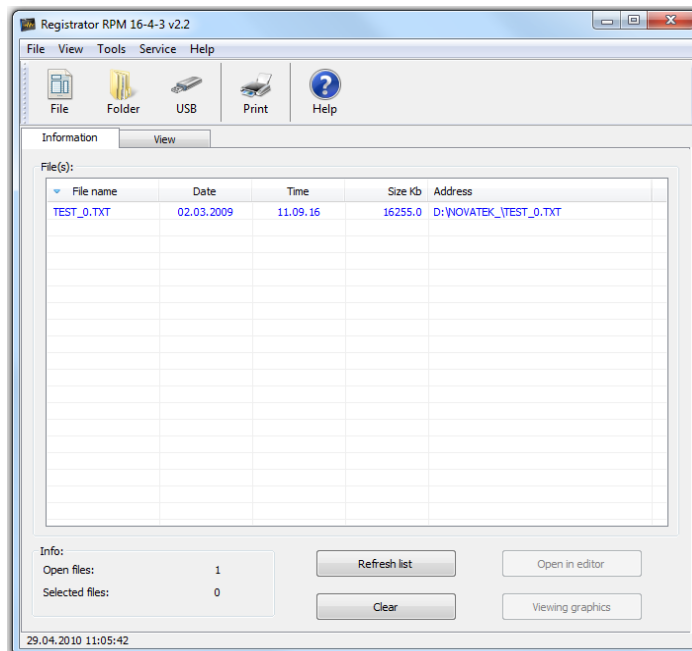


Figure A.22

A.3.3 Open folder

This parameter is available from panel board or from main menu (**File ->Open folder**) After activation of this menu option will be open the window of catalog

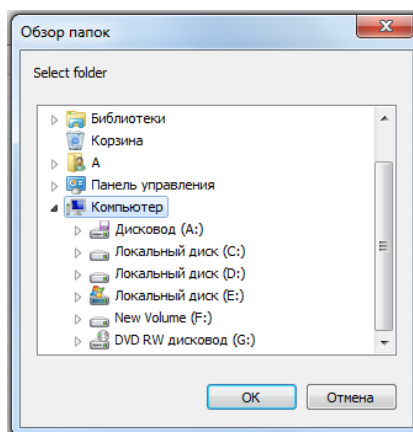


Figure A.23

In this window necessary show the for scanning and press the button “OK”, for exit necessary to press button “Cancel”

If the button “OK” was pressed, the program starts look for the files in mentioned folder and add them to main list:

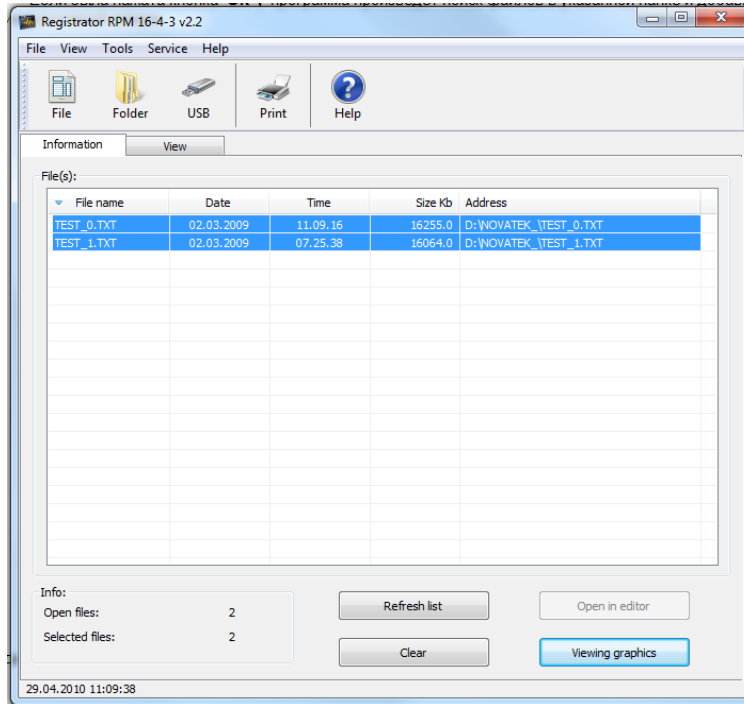


Figure A.24

If the catalog has a lot of files for scanning the dialog window will appear with require to wait.

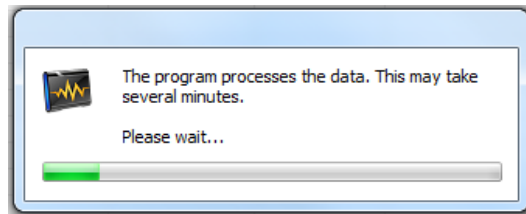


Figure A.25

A.3.4 USB autolocate

This parameter is available from panel board or from Main menu (**File -> USB autolocate**)

Connect USB to PC. Make sure that device is up you can, можно start USB Autolocate . After activation of this menu option the program will start searching files on all connected information USB flesh drives. During of time searching will appear the window with request - Wait:

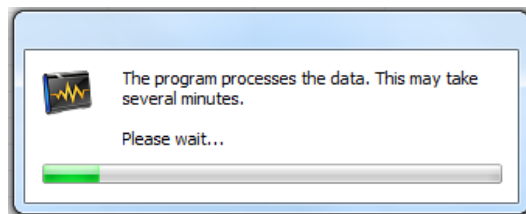
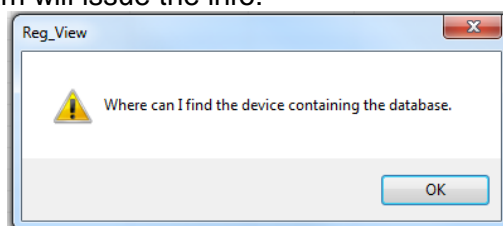


Figure A.26

On completing searching the files will be add to main list (Figure A.24).

IF USB device is out – the program will issue the info:



A.4 Graphic review

When the files were opened necessary to choose files for scrolling. Keep hold push button “**Ctrl**” on the keyboard, left mouse button mark necessary files .

After this selection the button “Look graphic” receiving status of activity . (Figure A.22).

After pressing of this button the program analyses file and open the tabbed page in case of mistake failure. (Figure A.19).










If the file is defected - the program gives the message about mistake.

A.4.1 Panel of instruments:

Duplicate menu item Instruments.



Figure A.28

-  - Open dialog of graphic adjustments.
-  - Display information concerning of each channel.
-  - Open the dialog of migration to meant data.
-  - Displace graphic to the left on several points.
-  - Displace graphic to the right on several points.
-  - Zoom + graphic
-  - Zoom - graphic.
-  - Return graphic to original size. (Discharge all modes zoom + and -).
-  - Activate cursor of users zoom. Allow increase the zone marked by user.

A.4.2 Graphic settings

The window of graphic settings is opening by menu option **Instruments -> Graphic settings**. Visual environment as shown on the file:

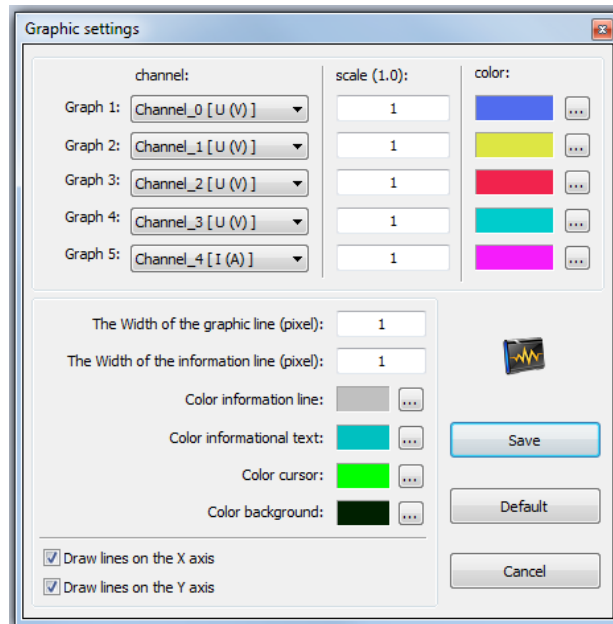


Figure A.29

The program has possibility to set only 5 synchronously review channels.

Scale parameter point at which value necessary to change implications to build graphic. (For example the value 0.1 indicate which graphic necessary to diminish to tenfold).

Checkbox «**Display lines XY**» point if draw on the graphic lines tick divisions.

For saving changes necessary press button "**Save**";

For repair default setting necessary press button “**By Default**”;

A.4.3. Print

To print graphic necessary choose menu point **File -> Print**. If the file was not opened before, this menu option will not be active.

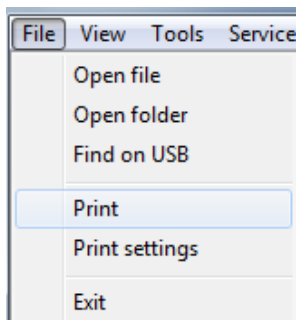


Figure A.30

After activation this menu point will be opened the window menu point. Depending of set drivers and type of operating system, the print window can be different form. For example:

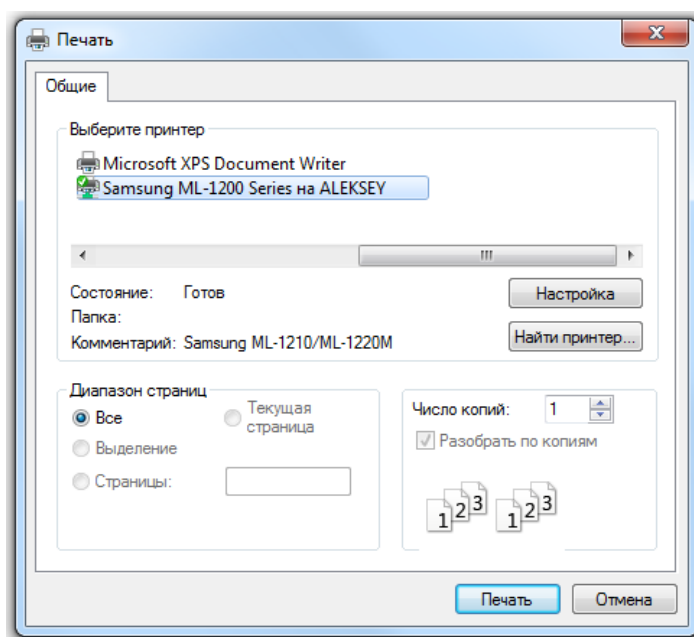


Figure A.31

In this window necessary to show type of print.

The knob “**Setting**” can show additional print option. For more detailed information refer to manual of printer.

For data sending necessary to press knob “Print”, for exit press knob “**Cancel**”.

Recommendation : the portrait better put landscape.