MEASURING INSTRUMENTS ENERGOMONITORING
EMCounter
Software

Energomonitoring Software Family

Version 4.6

User Manual

2015

CONTENTS

Scope

The EmCounter program (or the Program below) is a PC-oriented software component intended for work with:

- Portable reference standard and power quality analyzer Energomonitor 3.3T1 (EM3.3T1)
- Multifunctional reference standard Energomonitor 3.1KM (EM 3.1KM).

NOTE

According to functions performed by the said Mars-Energo instruments (as applied to testing of electric energy meters), two names - “the EM Device” and “the reference instrument” may be used throughout the manual in reference to the instruments of Energomonitor family without specifying their model name.

The Program makes it possible to:

- read, via serial RS-232 and USB ports, logs of test results, accumulated in the reference instrument
- save logs of test results on the hard disc
- merge logs of test results made for one particular meter (device under test)
- view previously recorded data in a convenient way
- create test reports that can be printed or saved to files on the hard disc
- create and maintain databases of devices under test amd store the databases in files on the hard disk
- export test results to MS Excel

The user interface is designed in a traditional Windows style.

Installation and start

System requirements

The Program software works under operation systems MS Windows 98, 2000, XP, Vista and Windows 7 (32- or 64-bit architecture).

Basic hardware requirements:

- Processor: Pentium 133 or more powerful
- Memory: at least 32MB
- Consumed disc space: At least 20 MB for installation; adequate disc space for logs and output reports
- Video adapter shall be of 1024x768 resolution and 32-bit colour depth
- CD-ROM drive for software installation
- Mouse or compatible pointing device
- At least one port (RS 232 or USB) for data exchange with an EM Device

For a more convenient work with large volumes of data a more powerful computer may be requisite.

Caution! To run the Program correctly under Windows Vista or Windows 7 it is necessary to turn off the **User Account Control** option (UAC). See UAC disabling procedure in Appendices.

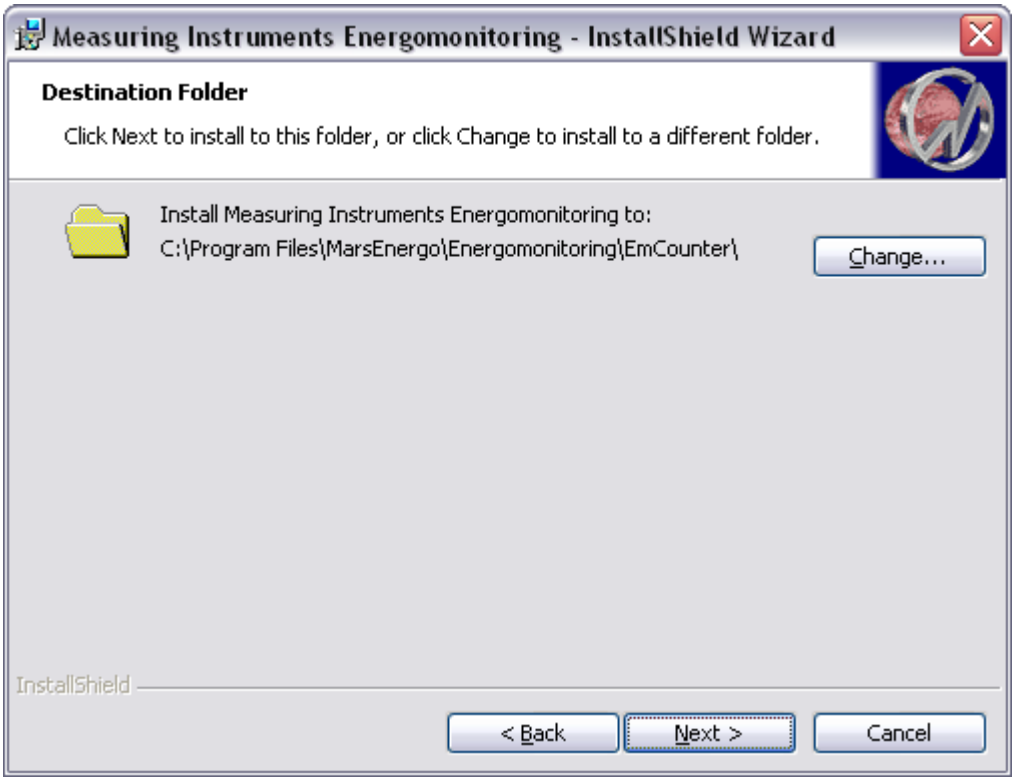
Installation

1. Insert the installation disk into the CD-ROM drive.

2. Close all working Windows applications and launch the file **"setup.exe"** from the installation CD.

3. Follow on-screen instructions of the installation program realized as a "Wizard" where a number of dialog boxes are successively displayed.

During the installation, the user will be prompted for the user’s name, name of organization and for the path to the directory where the software will be installed. By default, this path is “C:\Program Files\MarsEnergo\Energomonitoring\EMCounter\”.



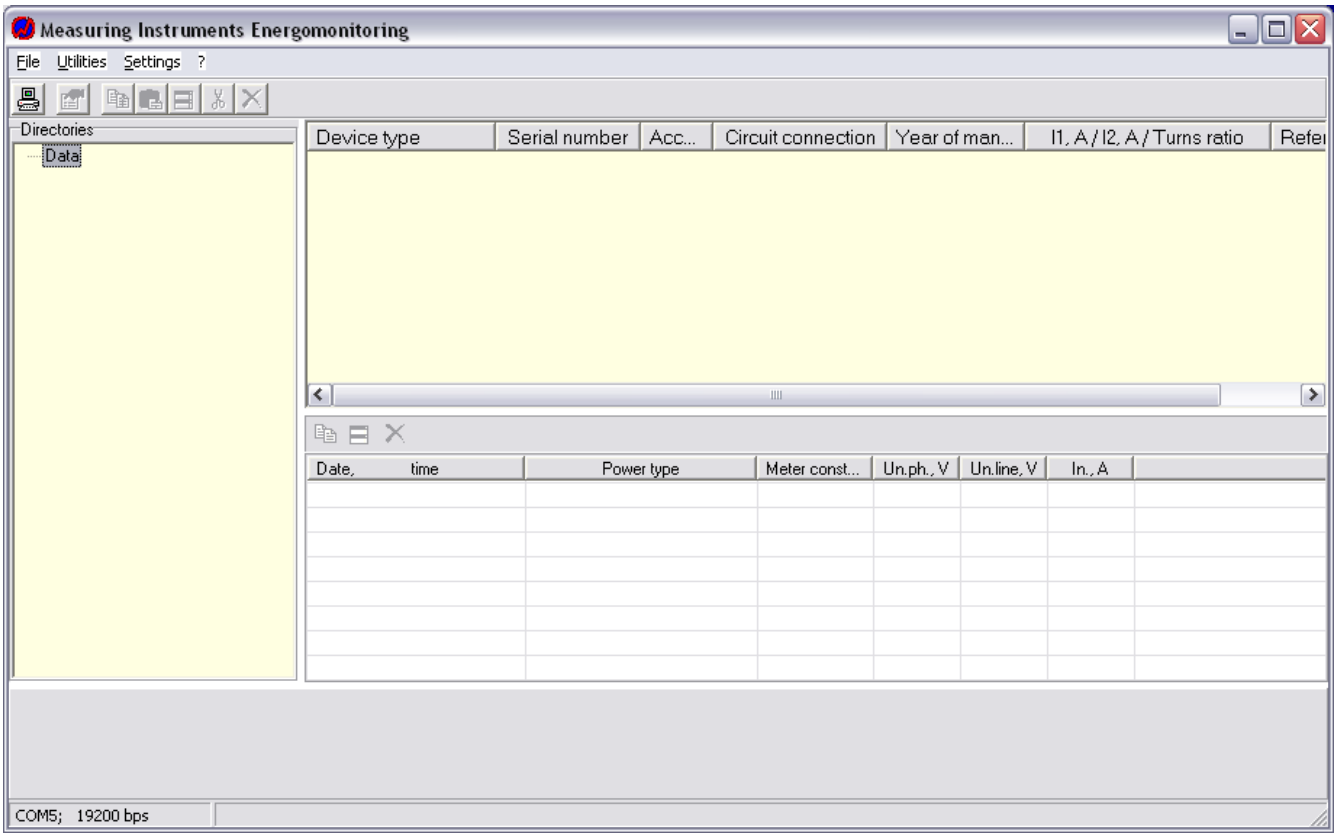
After the installation is finished, its icon will be placed on your desktop, and the similar item will be included in the Start menu.

Start

There are three ways to launch the Program:

- Run “EMCounter.exe” file from the directory where the program was installed;
- Double-click on the icon “EMCounter” on the desktop;
- Select the item “MarsEnergo\Energomonitoring\ EMCounter” in the “Start” menu.

Any of these options will bring you to the main window (pictured below).



De-installation

To remove the Program, open the Windows Control Panel, select “Add/Remove Programs”; choose “EMCounter” and click on the “Remove” button.

The de-installation program performs in Wizard’s style as well.

De-installation procedure **will not** remove the test logs residing in the same directory where the Program was. They will be accessible by the Program in case you reinstall it.

Data Formats

Log Format

One test log may store up to 200 tests, each containing test results of no more than 10 measurements taken by operator during the test. The limit of 200 tests does not depend on the number of measurements in any particular test.

Each test is identified by the device under test (its name and serial number), date and time of the test and type of power measured by the device under test (DUT).

Prior to each test, operator shall enter details of the DUT into the EM Device: year of manufacture, accuracy class, instrument constant, nominal values of current and voltage, turns ratio of current transformers (if tested together with CTs). The connection scheme of the EM Device shall also be specified. The above information will be recorded into the reference instrument as a data block common for all measurements within this particular test. Date and time of each measurement are marked by the reference instrument.

Depending on the connection scheme, the following parameters are recorded for each measurement of the test:

3-phase and 4-wire connection:

1. Voltages over three phases
2. Currents over three phases
3. Three line voltages
4. Power factors over three phases
5. Total active power
6. Total apparent power
7. Total reactive powers calculated by three methods: geometry method, phase-shift method and cross-connection method
8. Measurement error of the DUT
9. Active measurement range of current
10. Active measurement range of voltage

3-phase and 3-wire connection:

1. Currents over three phases
2. Three line voltages
3. Total active power
4. Total apparent power
5. Total reactive powers calculated by three methods: geometry method, phase-shift method and cross-connection method
6. Measurement error of the DUT
7. Active measurement range of current
8. Active measurement range of voltage

Single-phase connection:

1. Phase voltage
2. Phase current
3. Power factor
4. Active power
5. Apparent power
6. Two reactive powers calculated by two methods: geometry method and phase-shift method
7. Measurement error of the DUT
8. Active measurement range of current
9. Active measurement range of voltage

Database Format

As the Program reads test results from the EM Device, it converts them into its internal binary format complementing each test with the data on the EM Device it communicates with.

After conversion, each test is recorded into a separate file with ***.pcn** extension that contains the following information:

1. Log version
2. Type of the EM Device
3. Serial number of the EM Device
4. Test results (uploaded from the EM Device)

The name of each file is generated as a string consisting of the DUT name, its serial number, date and time of the test and type of measured power (identified by a number from 0 to 4). Each parameter in the file name is separated by the symbol "^".

The Program allows several such files to be merged into one provided that all these files contain measurements taken from one and the same DUT. Such a consolidated file may contain unlimited number of measurements.

Using the Program

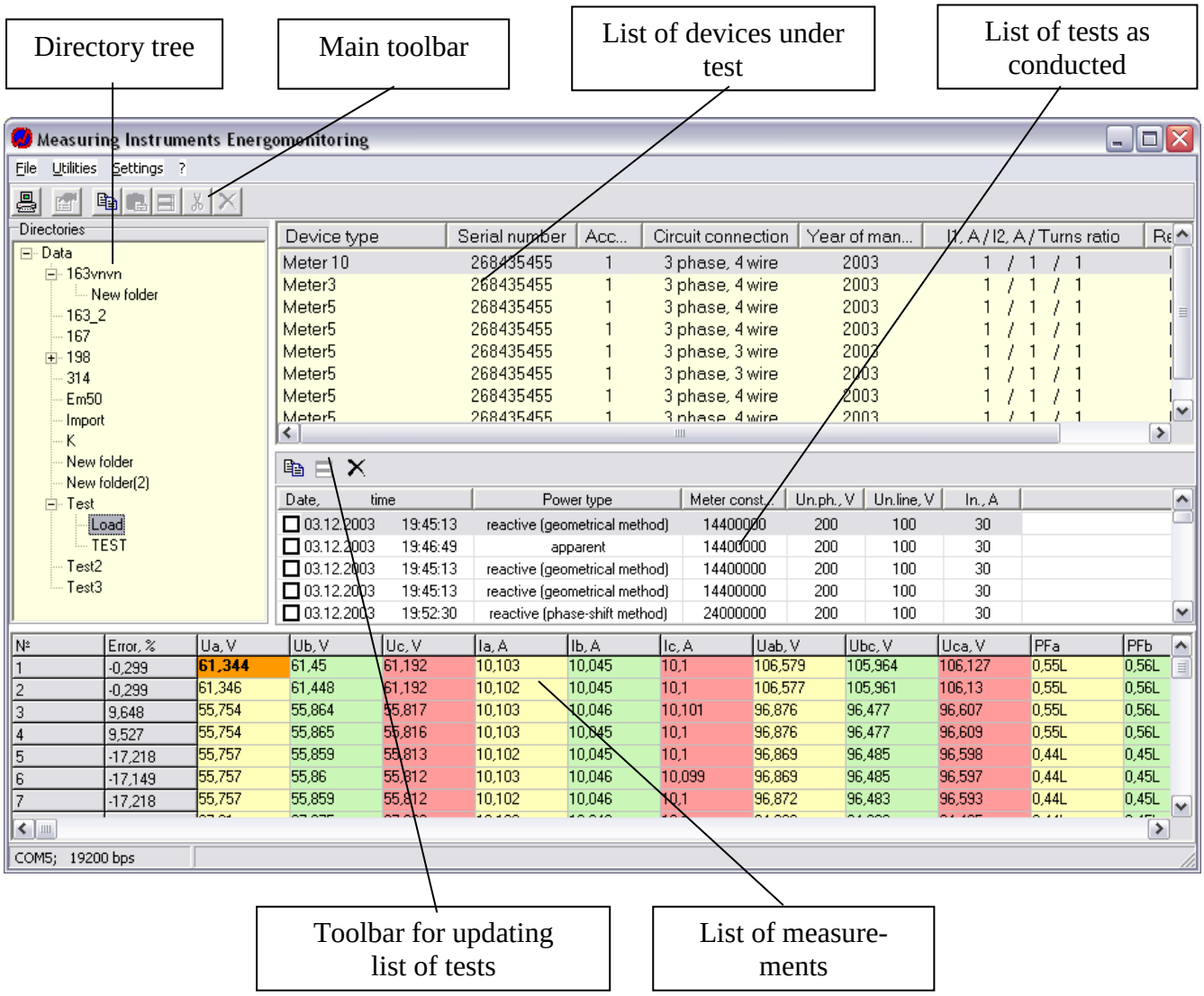
A Windows-based user interface makes it possible to view files with test results.

When the program is launched, it displays its main window according to the settings recorded in the configuration file config.cfg (placed in a directory together with the executable file). If there is no configuration file with settings, the program installs parameters by default.

The configuration file stores the following information: on-screen position and size of the main window, selected serial port and its data exchange rate, columns of the “Measurements” table to be displayed/hidden (separately for each circuit connection type), and order of displaying the columns.

When the user quits the application, the configuration file is updated to contain the settings just used.

Main window



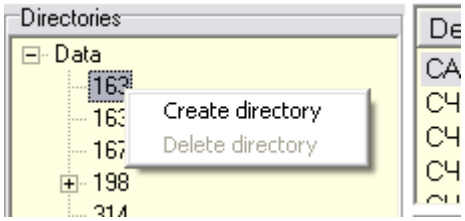
The main window of the program contains the menu bar and toolbars that provide access to all functions of the application. The status bar at the bottom displays an active serial port and data exchange speed. General view of the main window is shown in the Figure.

Viewing results

When the Program is launched, it scans the contents of “Data” root directory and forms a tree reflecting the structure of disc directories with the “Data” root folder on the top. If such a root directory is not detected, it will be created by the Program. Each folder (node) nested within the “Data” directory can contain logs accessible for viewing.

Clicking on the small plus next to the root directory name will expand the folder tree.

A right-click on a node of the tree displays the contextual menu with two options: “Create directory” and “Delete directory” (the options are only applicable to the folder highlighted at the moment).



The command “Create directory” creates an empty directory named “New Folder” (that can be renamed inside the directory selected by the user). The Data directory cannot be renamed. If a directory with the name typed-in for renaming already exists in the parent directory, the program displays a warning message and cancels the rename command.

The command “Delete directory” deletes what is currently highlighted. This is done on the condition that the highlighted directory contains no subordinate files or directories residing on the hard disc. The command is password protected.

On entering an invalid password, the program will display a dialog box shown below.

The Data directory cannot be deleted.

Each time the user selects a directory within the tree, the Program looks through this directory and reads test results from each file of *.pcn type.

Each file originally contains a number of measurements (at least one) acquired during one test and a common data block (containing common data on the DUT and EM Device). The common data block is used to build the list of devices under test.

Device type	Serial number	Acc...	Circuit connection	Year of rele...	I1, A / I2, A / Turns...	Reference st...
Meter 10	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter3	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 3 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 3 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1

If the selected directory is empty, no data is displayed. If an error is found while reading a file, this file will be ignored.

The user can browse through the list and view the results of tests. The following is displayed in tabular form:

- Type (product name of the DUT)
- Its serial number
- Accuracy class
- Circuit connection
- Year of manufacture
- Primary current, secondary current and turns ratio
- Type and serial number of the reference instrument

The list may be sorted (in ascending or descending order) by the name or serial number of the DUT. If product names are identical, the list is sorted by serial numbers. Sorting is started by left-clicking on the column heading. The second click will inverse the sorting order.

For each device highlighted in the list of devices under test, the list of tests performed for this DUT is displayed below.

Date, time	Power type	Meter const...	Un.ph., V	Un.line, V	In., A
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:46:49	apparent	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:52:30	reactive (phase-shift method)	24000000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:52:30	reactive (phase-shift method)	24000000	200	100	30
03.12.2003 19:43:09	reactive (phase-shift method)	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:46:49	apparent	14400000	200	100	30
03.12.2003 19:46:49	apparent	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30
03.12.2003 19:45:13	reactive (geometrical method)	14400000	200	100	30

The table includes the following columns:

- Date and time of the test
- Type of measured power
- Meter (device under test) constant, Imp/KWh

- Nominal phase voltage, V (not displayed for 3-phase 3-wire connection)
- Nominal line voltage (not displayed for single-phase 2-wire connection)
- Nominal phase current, A

For one and the same DUT, test procedures in the list may be performed for different power types; the values of meter constant and nominal current/voltage may also differ.

The list of tests may be sorted (in ascending or descending order) by date/time and power type by left-clicking on the column heading. The second click will inverse the sorting order.

The toolbar above the list of tests provides means for making changes to this list: merge several tables of measurements into one (for one and the same DUT only) or delete the tables.

 — copies measurements of a selected test procedure to the clipboard

 — merges measurements of two tests in one: test results contained in the test previously copied into the clipboard are added to the test results contained in the test currently highlighted in the list of test

 — deletes the test currently selected in the list of tests

To merge measurements of two tests, select the test to be added and copy its contents to the clipboard by clicking on  toolbar button. Then, in the list of tests, select the test to which the copied data will be added and click on  button. A password entry dialog box will pop up.

The command will be executed after entering a valid password.

Any table of measurements modified this way can contain an unlimited number of measurements.

Please note that the “Merge” command is accessible only if the following parameters are indentical for the tests to be merged:

1. Actual power types
2. Meter constants
3. Nominal phase and line voltages
4. Nominal currents

The “Cancel” button allows the user to cancel the command.

You can delete a test from the table of tests under condition that the number of tests in the table is more than 1. The command is password protected.

The lower table in the main window is the list of measurements. When you select a test from the list of tests, the measurements made during this test are displayed in this table.

In case of 3-phase 4-wire connection scheme, the list of measurements contains:

- Relative measurement error of the DUT with its positive or negative sign, %
- Voltages per each phase, V
- Currents per each phase, A
- Three line voltages, V

- Total power factor and per phase power factors with the sign of a load (L or C)
- Phase active powers and total active power, W
- Phase apparent powers and total apparent power, VA
- Three total reactive powers calculated by three methods: geometry method, phase-shift method and cross-connection method, Var
- Active voltage measuring range,
- Active current measuring range, A (with indication of current sensors in use)

№	Error, %	Ua, V	Ub, V	Uc, V	Ia, A	Ib, A	Ic, A	Uab, V	Ubc, V	Uca, V	PFa	PFb	PFc
1	-0,299	**61,344**	61,45	61,192	10,103	10,045	10,1	106,579	105,964	106,127	0,55L	0,56L	0,52L
2	-0,299	61,346	61,448	61,192	10,102	10,045	10,1	106,577	105,961	106,13	0,55L	0,56L	0,52L
3	9,648	55,754	55,864	55,817	10,103	10,046	10,101	96,876	96,477	96,607	0,55L	0,56L	0,52L
4	9,527	55,754	55,865	55,816	10,103	10,045	10,1	96,876	96,477	96,609	0,55L	0,56L	0,52L
5	-17,218	55,757	55,859	55,813	10,102	10,045	10,1	96,869	96,485	96,598	0,44L	0,45L	0,41L
6	-17,149	55,757	55,86	55,812	10,103	10,046	10,099	96,869	96,485	96,597	0,44L	0,45L	0,41L
7	-17,218	55,757	55,859	55,812	10,102	10,046	10,1	96,872	96,483	96,593	0,44L	0,45L	0,41L
8	-17,08	37,21	37,275	37,263	10,102	10,046	10,1	64,638	64,386	64,465	0,44L	0,45L	0,41L

Structure of the list of measurements for 3-phase 3-wire connection:

- Relative measurement error of the DUT with its positive or negative sign, %
- Three line voltages, V
- Currents per each phase, A
- Total power factor and per phase power factors with the sign of a load (L or C)
- Total active power, W
- Total apparent power, VA
- Three total reactive powers calculated by three methods: geometry method, phase-shift method and cross-connection method, Var
- Active voltage measuring range, V
- Active current measuring range, A (with indication of current sensors in use)

№	Error, %	Uab, V	Ubc, V	Uca, V	Ia, A	Ib, A	Ic, A	PF	P, W	S, VA	Q geom., var	Q ph-sh., var	Q cr-cor
1	-8,003	**71,116**	70,715	70,819	10,102	10,046	10,1	0,44L	556,697	1240,81	1108,918	1120,62	1105,07
2	-8,003	71,117	70,717	70,819	10,102	10,046	10,101	0,44L	556,72	1240,856	1108,957	1120,645	1105,1
3	0,502	106,54	106,045	106,077	10,102	10,046	10,1	0,12L	229,115	1859,743	1845,576	1860,941	1839,48
4	0,401	106,543	106,05	106,082	10,102	10,046	10,1	0,12L	229,096	1859,823	1845,659	1861,01	1839,58
5	-1,185	106,542	106,047	106,078	5,054	5,02	5,044	0,1L	98,227	929,674	924,471	928,654	921,746
6	-0,793	106,543	106,05	106,079	5,054	5,021	5,044	0,1L	98,221	929,666	924,463	928,65	921,827
7	-8,592	106,577	105,962	106,125	5,054	5,022	5,044	0,5L	465,108	929,476	804,736	809,79	802,663
8	-8,674	106,577	105,959	106,124	5,054	5,021	5,044	0,5L	465,09	929,439	804,703	809,756	802,623

Structure of the list of measurements for single-phase connection:

- Relative measurement error of the DUT with its positive or negative sign, %
- Phase voltage, V
- Phase current, A
- Power factor with the sign of a load (L or C)
- Active power, W
- Apparent power, VA
- Reactive powers calculated by geometry and phase-shift methods, Var
- Active voltage measuring range, V
- Active current measuring range, A (with indication of current sensors in use)

№	Error, %	Ua, V	Ia, A	PF	P, W	S, VA	Q geom., var	Q ph-sh., var	U range, V	I range, A
1	37,361	**61,345**	10,085	-0,91C	-567,982	618,73	245,403	245,342	100	10 T
2	37,55	61,344	10,085	-0,91C	-567,915	618,676	245,424	245,337	100	10 T
3	50,149	61,337	10,085	-0,99C	-618,406	618,593	15,182	14,187	100	10 T
4	50,149	61,338	10,085	-0,99C	-618,436	618,622	15,168	14,183	100	10 T
5	-65,846	61,309	10,085	-0,23C	-145,84	618,339	600,894	600,859	100	10 T
6	-38,725	61,346	10,085	0,39L	247,317	618,717	567,137	567,13	100	10 T
7	8,93	61,328	10,085	0,71L	444,81	618,532	429,797	429,807	100	10 T
8	9,049	61,329	10,085	0,71L	444,83	618,551	429,804	429,828	100	10 T

Along with test results, the list of measurements contains data calculated by the program. The columns are coloured as follows:

- Yellow —phase A parameters
- Green —phase B parameters and nominal values of voltage and current measurement ranges activated in the reference instrument
- Red — phase C parameters
- Blue —Parameters calculated as a sum

You can drag the columns to a required position and select the columns to be displayed. These options are applied independently to the tables relating to different connection schemes. Columns can be rearranged by left-clicking on their headings and dragging them to desired positions. To select the parameters to be displayed, enable the “Displayed parameters” option from the “Setting” menu, or invoke the contextual menu by right-clicking on the list of measurements. All these settings will be saved to the configuration file and retained on the next startup.

Buttons  on the main toolbar makes it possible to copy, move, or merge test log files (files with test results).

 — copies test data from a log file selected in the list to the clipboard. The data will be available for the “paste”, “move” or “merge” commands. Selection of the directory with no log files in it will disable this command.

 — pastes the log file stored in the clipboard into the selected directory. This command becomes accessible only when the user performed the copy command by clicking on  .

 — merges the log file copied to the clipboard with the selected one. The command is not accessible when focus is not set on the list of devices under test, or the clipboard contains no log files copied in it.

 — moves the log file highlighted in the list to a new directory. The command is not accessible, when focus is not set on the list of devices under test.

 — deletes the log file selected from the list of tests. The command is not accessible when focus is not set on the list of devices under test, or the clipboard contains no log files copied in it.

To copy a DUT, select the desired record in the list of devices under test, and click on  to copy it to the clipboard. Then select a destination directory in the tree and click on  to paste the file into the required location. The program will save the copy to the destination directory and add the corresponding record to the list.

To move a DUT, select the desired record in the list of devices under test and click on  . Then select a desired destination directory in the tree and click on  to paste the copy into the required location. The program will save the copy to the destination directory and add the corresponding record to the list.

The deletion command is initiated by clicking  . The selected log file will be deleted from its directory, and the corresponding record removed from the list after entering a valid password in the corresponding dialog box.

The “Merge” command adds tests stored in one file to the tests stored in other file. To merge two files, copy the source file to the clipboard by clicking on , place the cursor on the target file in the list of devices under test and click on . A password entry dialog box will pop up.

The command will be executed after entering a valid password. The target file will be complemented with the tests taken from the original file. Mark the “Delete original files” checkbox, if required.

Please note that the “Merge” command is accessible only if the following parameters are indentical for the files to be merged:

1. Reference instruments (types and serial numbers)
2. Serial numbers of the devices under test
3. Accuracy classes of the devices under test
4. Circuit connection types
5. Primary currents of the devices under test
6. Secondary currents of the devices under test

Years of manufacture and types (product names) of devices under test may differ. The number of devices under test merged in one file is unlimited.

The list of tests can be represented as a MS Excel spreadsheet (see export to MS Excel).

— used to read logs from the reference instrument (duplicated by the “Read from device” command in the “File” menu).

— used to generate test reports (duplicated by the “New report” command in the “File” menu).

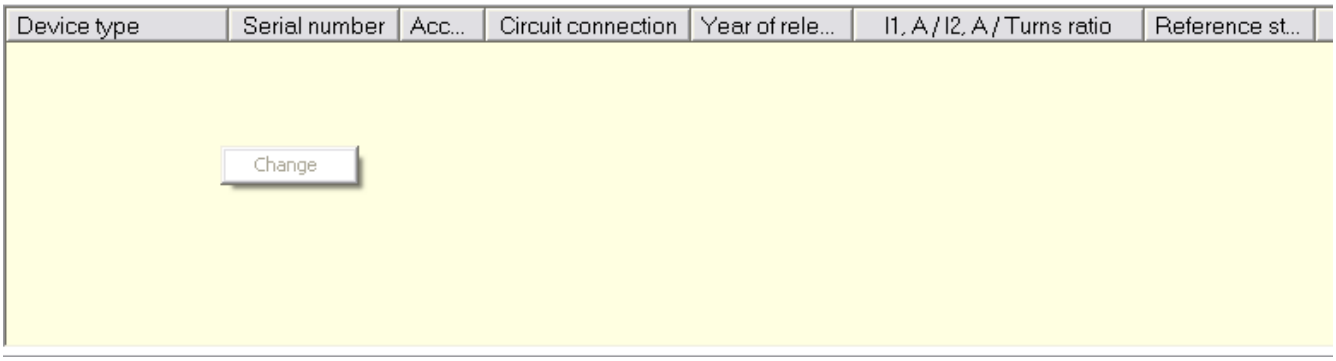
Updating details of devices under test

After uploading test logs onto a PC, the Program makes it possible to correct the contents of some fields identifying particular device under test. The procedure begins from highlighting the desired test record in the main window where all tests are represented. Then the contextual menu with an item “Change” is popped up by right-clicking on it.

Device type	Serial number	Acc...	Circuit connection	Year of rele...	I1, A / I2, A / Turns...	Reference st...
Meter 10	2	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter3	2	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 3 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 3 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1
Meter5	268435455	1	3 phase, 4 wire	2003	1 / 1 / 1	EM 3-3 1

Change

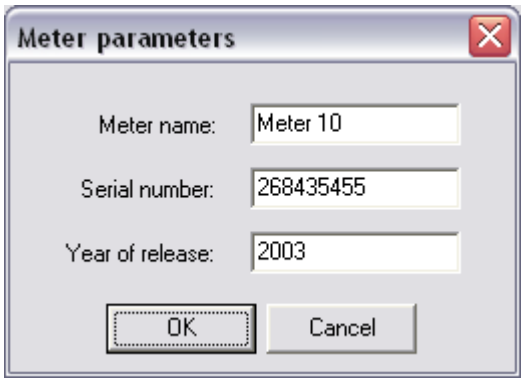
This menu item will not be accessible unless the table contains at least one test:



The “Change” command is password protected:

Failure to enter a valid password when requested will result in the error message and termination of the command:

If the user enters a valid password, the Program responds by opening another dialog window with the parameters identifying the selected DUT:

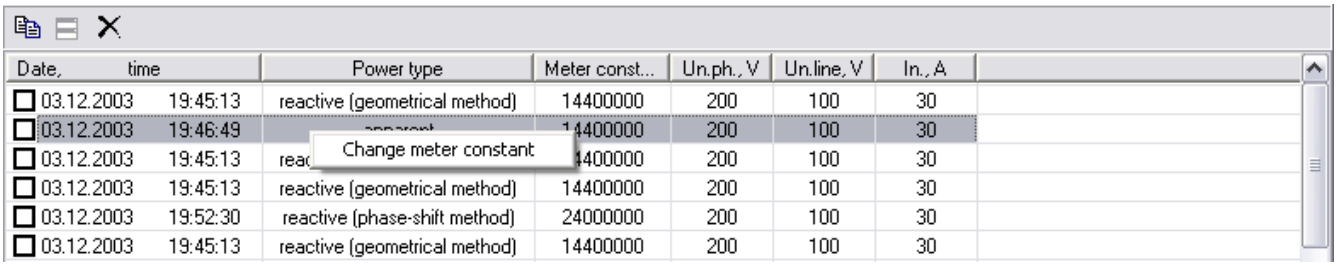


The following parameters can be modified:

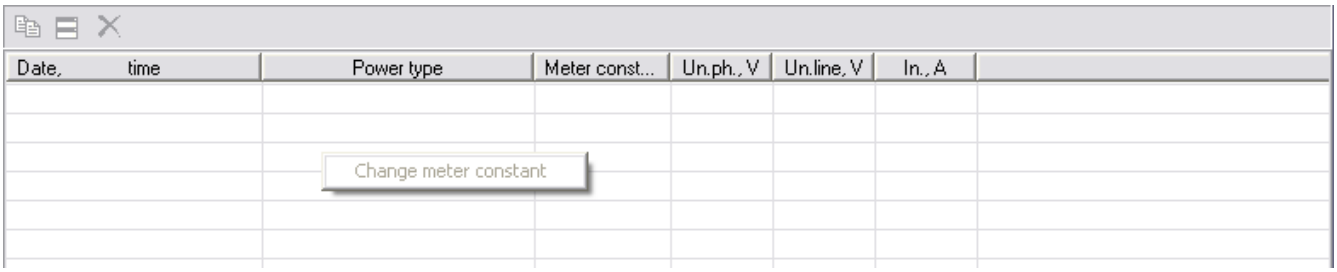
- Meter name (up to 14 characters);
- Its serial number (up to 16 in length) alphanumerical characters are allowed;
- Year of manufacture.

Parameters are changed by updating contents of the fields as desired and clicking “OK” for confirmation. New values will be displayed in the list. Clicking “Cancel” leaves all fields intact.

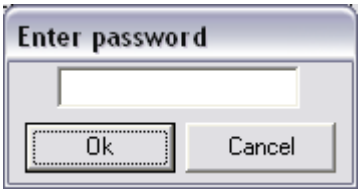
To change meter constant, select the device under test from the list, then select the test record associated with this DUT, and right-click on it to invoke the corresponding contextual menu.



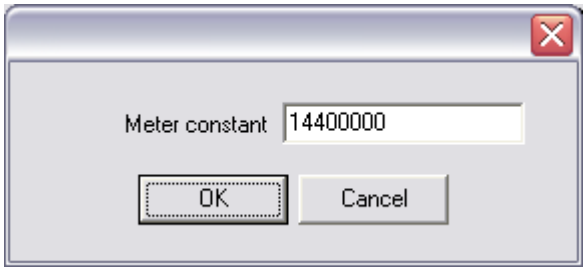
The option is inaccessible, if the list of tests is empty.



The “Change meter constant” command is password protected.



If you enter a valid password, the Program will display the window shown below.



The field may contain up to 9 digits.

Press OK to save a new value in the memory, or “Cancel” to close the window without saving changes.

Updated parameters of the DUT will be recorded in the same test file without changing its name.

Main menu

The main menu bar includes the following options:

- File
- Utilities

- Settings
- Help

"File" menu

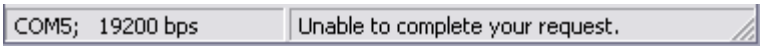
Commands under the "File" menu:
- Read from Device
- New Report
- Load Report
- Exit

Read from Device

The option is used to read test logs from the EM Device (duplicated by  toolbar button).
Test logs are uploaded via RS-232 or USB serial interfaces.
In case of RS-232 communication, the user must:
- Connect RS-232 port of the EM Device to the corresponding serial port of the computer
- In the main menu of the EM Device, select "Data Exchange with PC" → "Exchange via RS-232"
- In the main menu of the EM Device, select "Settings" → "Data Exchange speed" and set the communication speed as desired.

In case of USB, the things to do are as follows:
- Install the communication cord between two USB ports
- In the main menu of the EM Device, select "Data Exchange with PC" → "Exchange via USB".

The communication state is displayed in the status bar. In case of connection failure, the following message will be displayed in the status bar:



If there are no test procedures stored in the reference instrument, the status bar will contain the following:

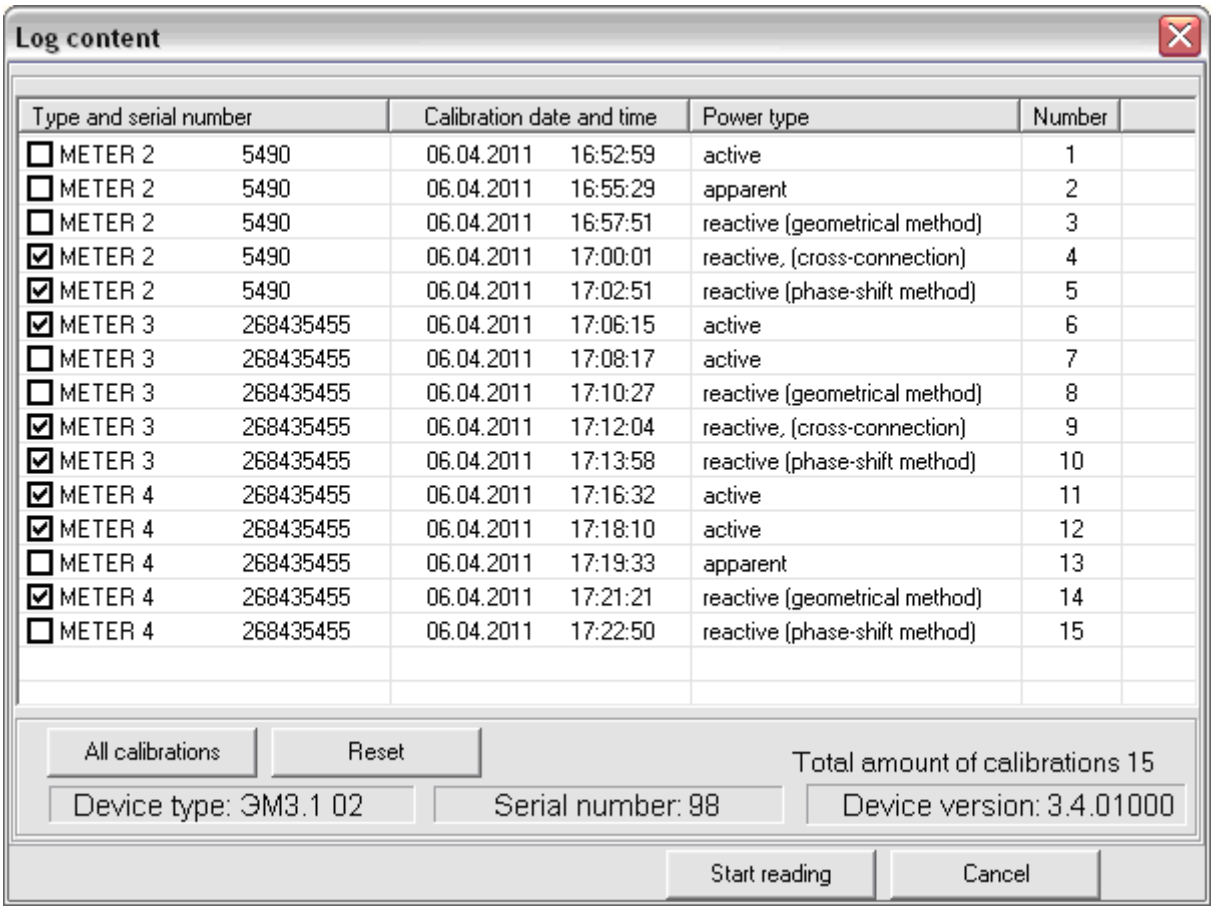
Caution! When USB connection between an EM Device and PC is established for the first time, the operating system of the PC will request installation of USB driver. Install the driver from the CD included in the delivery package of the EM Device.

Caution! The Program supports just one USB connection between an EM Device and PC. To avoid connection failure, make sure all other EM devices are disconnected from the PC.

If connection between the devices is established, the Program will automatically detect the EM Device connected to it. Registration check is made when the product name, serial number and firmware version of the EM Device are identified by the Program. If the serial number is not registered with the Program, the user is prompted to perform the registration. Failure to register the EM Device quits the communication.

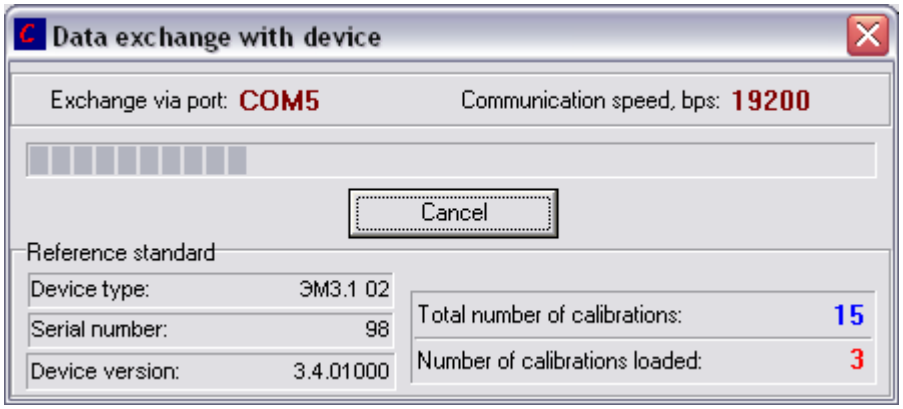
If the EM Device passes registration check, the Program opens the list of logs stored in the internal memory. The log is presented as a table with the following columns:

- Type and serial number of the reference instrument
- Date and time of the test
- Measured power type
- Sequential number of the test as it is logged in the memory of the EM Device.



The user may select the logs to be uploaded by placing corresponding check marks. The “Mark all” button is used to select all logs from the list. The “Reset” button removes all check marks already in place. The “Cancel” button closes the window and terminates data exchange.

In the window pictured below, the Program identifies the EM Device communicating with it and displays progress bar for the user to monitor data exchange.



By clicking “Cancel” the user can terminate data exchange already in progress, and the logs already loaded will be lost at this point.

Having been successfully read from the EM Device, each test selected by the user is saved on the PC disk as a *.pcn file where asterisk stands for the unique name generated by the Program. The files are saved to the folder currently highlighted in the directory tree. Then the logs are available for viewing.

If no logs were recorded in the EM Device, the list of logs appears empty on the screen.

New Report

The option makes it possible to create a test report for the device under test selected in the list of test records (duplicated by  toolbar button). Each report may contain up to10 measurement tables. Test procedures selected for the report are marked with ☑.

Date,	time	Power type	Meter const...	Un.ph., V	Un.line, V	In., A
☑ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☑ 03.12.2003	19:46:49	apparent	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☑ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☑ 03.12.2003	19:52:30	reactive (phase-shift method)	24000000	200	100	30
☑ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☐ 03.12.2003	19:52:30	reactive (phase-shift method)	24000000	200	100	30
☐ 03.12.2003	19:43:09	reactive (phase-shift method)	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☐ 03.12.2003	19:46:49	apparent	14400000	200	100	30
☐ 03.12.2003	19:46:49	apparent	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30
☐ 03.12.2003	19:45:13	reactive (geometrical method)	14400000	200	100	30

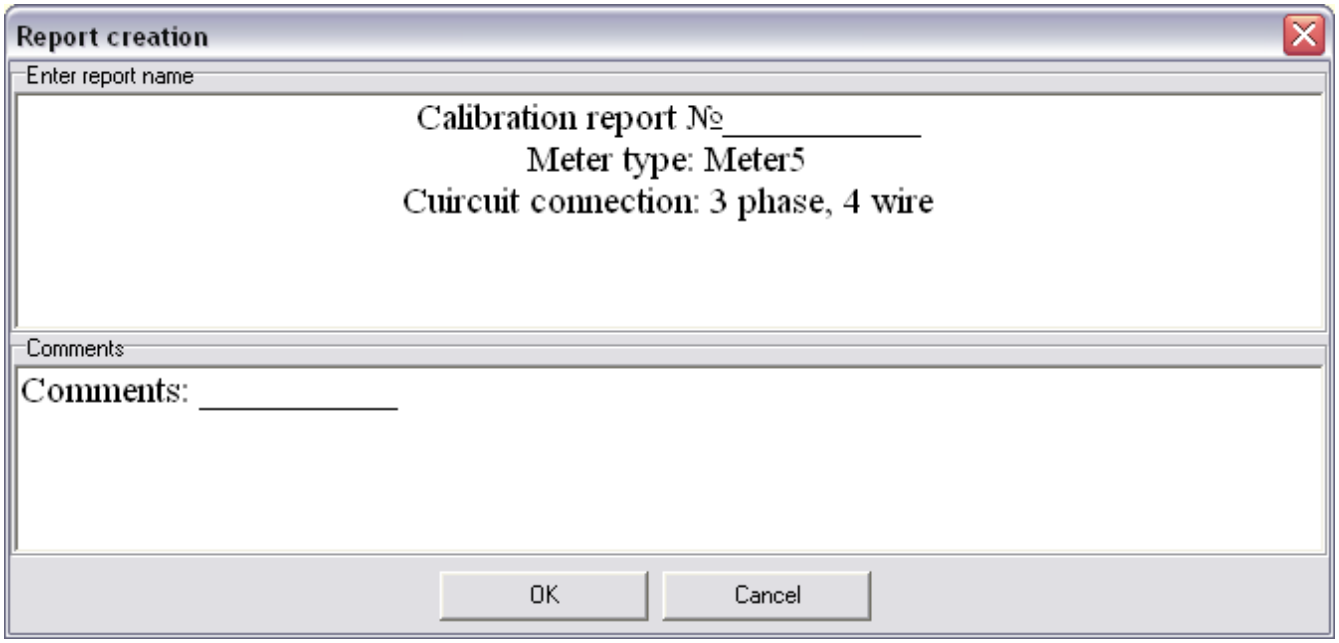
Please take into consideration the cases when the “New report” option is denied:

1. The highlighted directory is empty (if so, the list of devices under test and list of tests are empty, and the list of measurements is not displayed)
2. The list of tests recorded for the selected DUT has more than 10 records, and none of them marked
3. More than 10 records are marked in the list of tests

If, for the selected DUT, the list of tests contains less than 10 records, the created test report contains records marked by the user.

If none of the records is marked, the report will include all of them.

Before generating a report, the program will display the window where you can specify the report name and comments. When opened, the window contains the name and comments previously entered by the user.



The following common data will appear in the report:

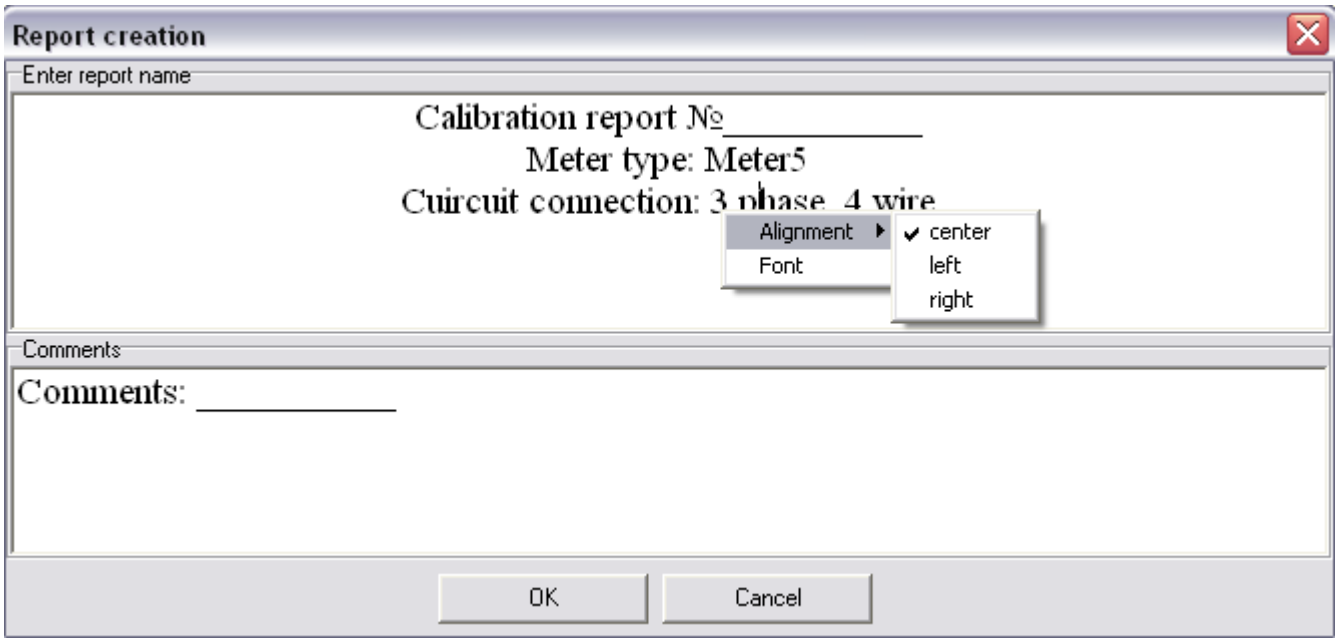
About the DUT:

- Device-under-test type
- Its serial number
- Year of manufacture
- Accuracy class
- Circuit connection

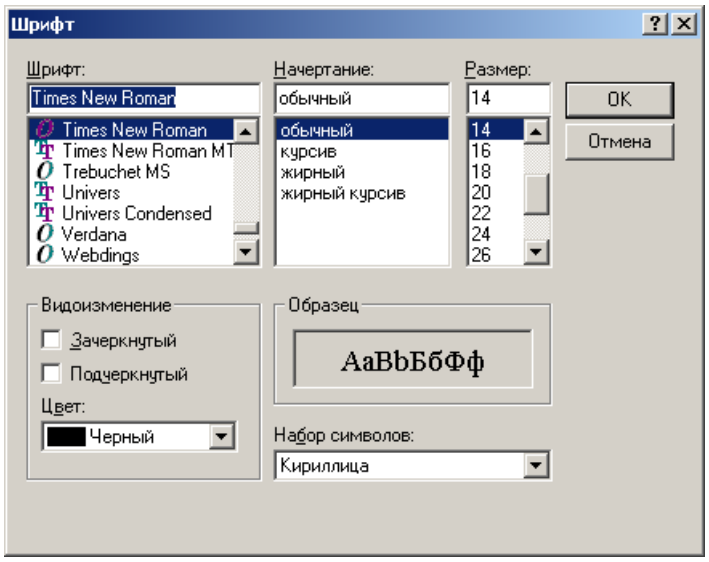
About the test:

- Power type
- Meter constant
- Nominal values of voltage and current
- Table with test results
- Date and time of testing

Right-clicking on the report heading shows the contextual menu for specifying the desired font and alignment (left, right or central). The comments can be edited in a similar way



On selecting the font option, a standard font dialog box will be displayed.



Settings defined in this window will be applied to the area highlighted within the text block. Clicking the “Cancel” button leaves unchanged all current font settings.

The “New report” dialog window makes it possible to quit report generation by clicking the “Cancel” button. By clicking “OK”, the test report is generated as specified.

Test results are represented in the report as pictured below:

Three-phase 4-wire connection

№	Voltage, V			Current, A			Power factor			Q geom, Var	Error, %
	A	B	C	A	B	C	A	B	C		
1	61,34	61,45	61,19	10,10	10,04	10,10	0,55L	0,56L	0,52L	1552,788	-0,299
2	61,34	61,44	61,19	10,10	10,04	10,10	0,55L	0,56L	0,52L	1552,718	-0,299
3	55,75	55,86	55,81	10,10	10,04	10,10	0,55L	0,56L	0,52L	1412,174	9,6481
4	55,75	55,86	55,81	10,10	10,04	10,10	0,55L	0,56L	0,52L	1412,141	9,5275
5	55,75	55,85	55,81	10,10	10,04	10,10	0,44L	0,45L	0,41L	1513,976	-17,21
6	55,75	55,86	55,81	10,10	10,04	10,09	0,44L	0,45L	0,41L	1513,971	-17,14
7	55,75	55,85	55,81	10,10	10,04	10,10	0,44L	0,45L	0,41L	1514,000	-17,21
8	37,21	37,27	37,26	10,10	10,04	10,10	0,44L	0,45L	0,41L	1010,265	-17,08
9	37,20	37,27	37,26	10,10	10,04	10,10	0,44L	0,45L	0,41L	1010,298	-17,08

The table contains: phase voltages, currents and power factors, total power of the actual type and calculated meter error.

Three phase 3-wire connection

№	Voltage, V			Current, A			Total power factor	P, W	Error, %
	AB	BC	CA	A	B	C			
1	71,11	70,71	70,81	10,10	10,04	10,10	0,44L	556,6971	-8,003
2	71,11	70,71	70,81	10,10	10,04	10,10	0,44L	556,7205	-8,003
3	106,5	106,0	106,0	10,10	10,04	10,10	0,12L	229,1152	0,5020
4	106,5	106,0	106,0	10,10	10,04	10,10	0,12L	229,0964	0,4013
5	106,5	106,0	106,0	5,054	5,020	5,044	0,1L	98,22755	-1,185
6	106,5	106,0	106,0	5,054	5,021	5,044	0,1L	98,22120	-0,793
7	106,5	105,9	106,1	5,054	5,022	5,044	0,5L	465,1089	-8,592
8	106,5	105,9	106,1	5,054	5,021	5,044	0,5L	465,0908	-8,674

The table contains: line voltages, phase currents, total power factor, total power of the actual type and calculated meter error.

Single-phase 2-wire connection

№	Voltage, V	Cur., A	Power factor	S, VA	Error, %
1	219,9	5,008	0,99L	1101,519	-0,198
2	219,9	5,008	0,99L	1101,525	-0,198
3	219,9	5,008	0,99L	1101,565	-0,198
4	219,9	5,008	0,99L	1101,562	-0,198
5	219,9	5,008	0,99L	1101,517	-0,299
6	219,9	5,008	0,99L	1101,511	-0,198
7	219,9	5,008	0,99L	1101,558	-0,198
8	219,9	5,007	0,99L	1101,512	-0,198
9	219,9	5,008	0,99L	1101,548	-0,198
10	219,9	5,007	0,99L	1101,516	-0,198

The table contains: phase voltage, phase current, power factor, power of the actual type and calculated meter error.

The footer section contains information about the reference instrument, values of primary current, secondary current and turns ratio (if the DUT was tested together with CTs) and the date of report creation.

Examples of test reports for various circuit connections are given in the Appendix.

The user can print (or save as a file) any test report generated by the Program. The test report window contains a toolbar.

Toolbar functions are as follows:

 — buttons used to change screen view of the report

 — buttons used to page the report: to the first page, to the previous page, to the next page, and to the last page respectively

 — this button opens the printer settings window

 — this one prints the report

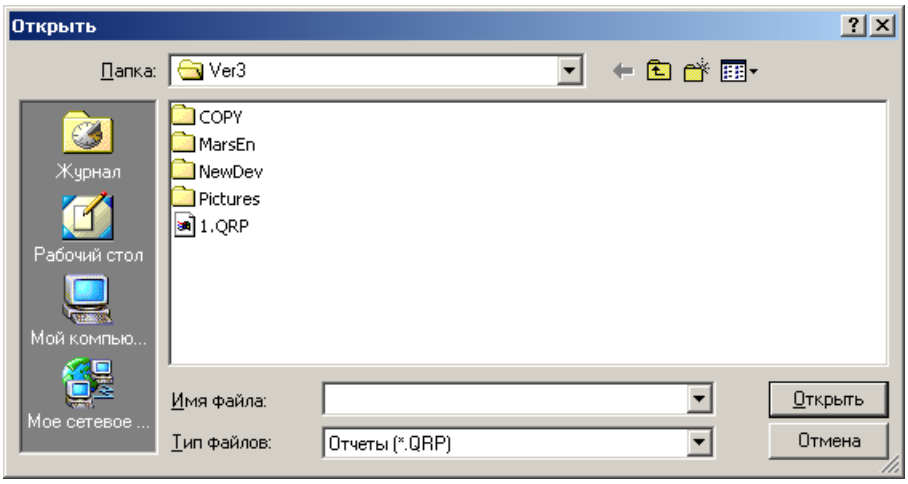
 — saves the report as a file

 — loads the report from a file

— closes the window

Load Report

The command opens test reports previously created and stored on the hard disk. The program brings up a standard “File open” dialog box.



Report files (*.qrp) are opened by the Program.

Exit

The “Exit” command closes the application (current settings are saved in the configuration file config.cfg).

“Utilities” menu

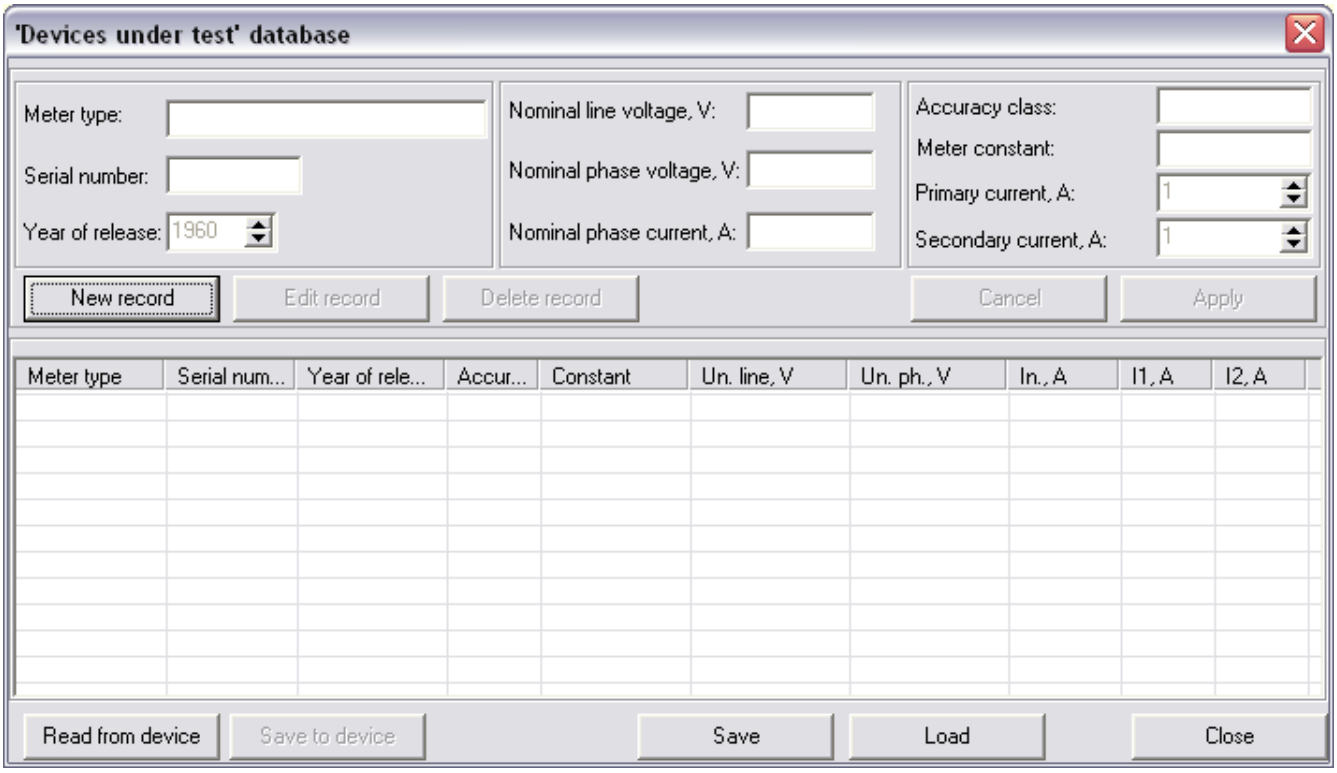
The menu has five options:

- To manage databases of devices under test:
  - Create
  - Load from device
  - Load from file
- Export to MS Excel

Create

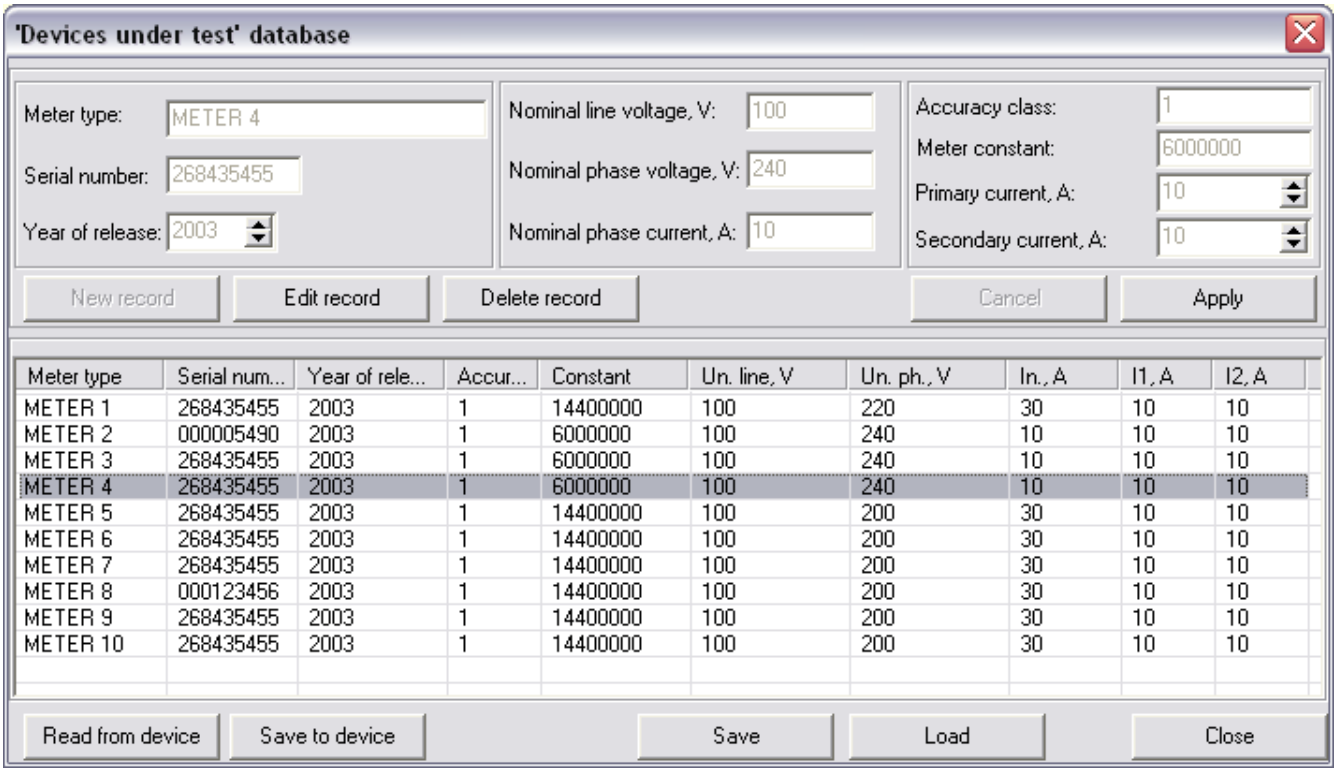
The command opens the “Devices under test database” window where the user can create a new database for the meters of a certain type. To create a new data record, click on the “New record” button, enter meter data into the fields and click “Apply” The new record will appear in the table.

One database cannot contain more than 10 records. Once created, it can be saved as a file on the hard disk, then reloaded and edited as required. The database can be recorded into the EM Device connected to it, provided that it contains as many as 10 records.



Load from device

The command reads an existing database from the reference instrument and displays it in tabular form. The command will be rejected unless the serial number of the EM Device communicating with the Program is properly registered



Load from file

The option makes it possible to load an existing database previously saved as a file. The “Load” button in the “Devices under test database” window duplicates the command. The selected (*.bdc) file is opened in a standard Windows “Open file” dialog box.

Maintaining database

The window displays a table with the list of meters. Its columns are arranged to display.

- Device-under-test type
- Serial number
- Year of manufacture
- Accuracy class
- Device-under-test constant
- Nominal line voltage
- Nominal phase voltage
- Nominal current
- Primary current
- Secondary current

Entry fields in the upper part of the window correspond to the columns of the table and duplicate the characteristics of the DUT currently selected in the table. Through these fields the user can enter or modify parameters of the meter under review.

The “New record” button starts the procedure of creating a new data record. After filling in the data fields and clicking on “Apply”, you will see a new record in the list. Clicking “Cancel” in the edit mode terminates data entry and restores the display mode. Please note that a database can contain no more than 10 objects in it.

The “Edit record” button is used to edit the previously created record selected from the list. On clicking the “Apply” button, the parameters will be updated. Click on “Cancel” to ignore the changes and exit the mode.

The record can also be modified by double clicking on the corresponding item in the devices-under-test list.

Requirements for data in the entry fields:

- Meter type: up to 14 characters that are automatically converted into uppercase; Latin or Cyrillic letters; digits [0 – 9], plus “+”, minus “–“, underscore “_”, brackets “( )”, dot “.”, and space are allowed
- Serial number: numerals up to 9 digits in length
- Year of manufacture: specified within the range of 1960 to the current year
- Nominal voltage and current: decimal numbers from 0 to 999.8
- Accuracy class: decimal numbers from 0 to 9.99
- Meter constant: maximum 8 digits (0 to 9)
- Primary current: 1 to 4095
- Secondary current: 1 to 15

The “Apply” button becomes inactive after entering data not complying with the above requirements.

The database must not contain identical records (each record must differ by the value of at least one parameter). Otherwise, the following dialog box will appear on clicking the “Apply” button:

The “Delete record” button deletes the selected record from the database upon confirmation.

The “Read from device” button duplicates the same option in the “File” menu.

The “Save to device” button records a newly created database into the EM Device connected to it, provided that it contains as many as 10 records. The command is password protected.

The “Save” button records the “Device under test” database into a file on the hard disk (in this case the number of records in the database is unlimited).

Export to MS Excel

The command extracts test results and meter data from the currently selected test record and converts them into MS Excel format.

If none of test records are opened, the “Export to MS Excel” command is inaccessible.

If export fails, the Program issues the appropriate error message.

Test results are represented as follows:

General information:

Date, time	Device type	Serial numbe	Accuracy class	Circuit connecti	Year of rel	Turns ratio	Power type	Meter consta	Unom., V	Inom., A
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30
03.12.2003 19:45	Meter 10	268435455	1	3 phase, 4 wire	2003	1	reactive (geometric	14400000	200	30

Measurement results:

№	Error, %	Ua, V	Ub, V	Uc, V	Ia, A	Ib, A	Ic, A	Uab, V	Ubc, V	Uca, V	PFa	PFb	PFc
1	-0,299	61,344	61,45	61,192	10,103	10,045	10,1	106,579	105,964	106,127	0,55L	0,56L	0,52L
2	-0,299	61,346	61,448	61,192	10,102	10,045	10,1	106,577	105,961	106,13	0,55L	0,56L	0,52L
3	9,648	55,754	55,864	55,817	10,103	10,046	10,101	96,876	96,477	96,607	0,55L	0,56L	0,52L
4	9,527	55,754	55,865	55,816	10,103	10,045	10,1	96,876	96,477	96,609	0,55L	0,56L	0,52L
5	-17,218	55,757	55,859	55,813	10,102	10,045	10,1	96,869	96,485	96,598	0,44L	0,45L	0,41L
6	-17,149	55,757	55,86	55,812	10,103	10,046	10,099	96,869	96,485	96,597	0,44L	0,45L	0,41L
7	-17,218	55,757	55,859	55,812	10,102	10,046	10,1	96,872	96,483	96,593	0,44L	0,45L	0,41L
8	-17,08	37,21	37,275	37,263	10,102	10,046	10,1	64,638	64,386	64,465	0,44L	0,45L	0,41L
9	-17,08	37,209	37,274	37,264	10,103	10,046	10,1	64,634	64,386	64,466	0,44L	0,45L	0,41L

“Settings” menu

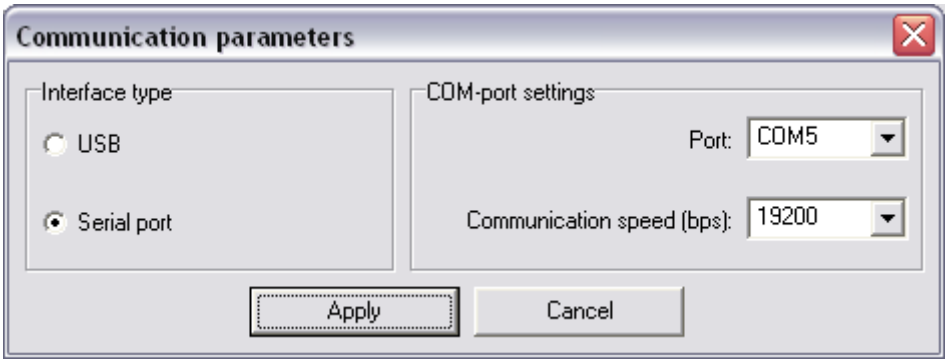
The menu has four options:

- Communication parameters
- Displayed parameters
- Password changing
- Language

Communication parameters

The command opens a dialog box where data exchange between the Program and EM Device connected to it can be configured.

The box is opened with the settings taken by the Program (on its launch) from the configuration file.



To establish RS-232 communication, select the “RS-232” radio button, and then select a PC serial port (e.g., COM1) and its data rate from the drop-down lists. Both the Program and EM Device support four values: 9600, 19200, 38400, 115200 bits per second.

Alternatively, the “USB” radio button may be set on to initiate USB communication. This will disable the panel with RS-232 settings.

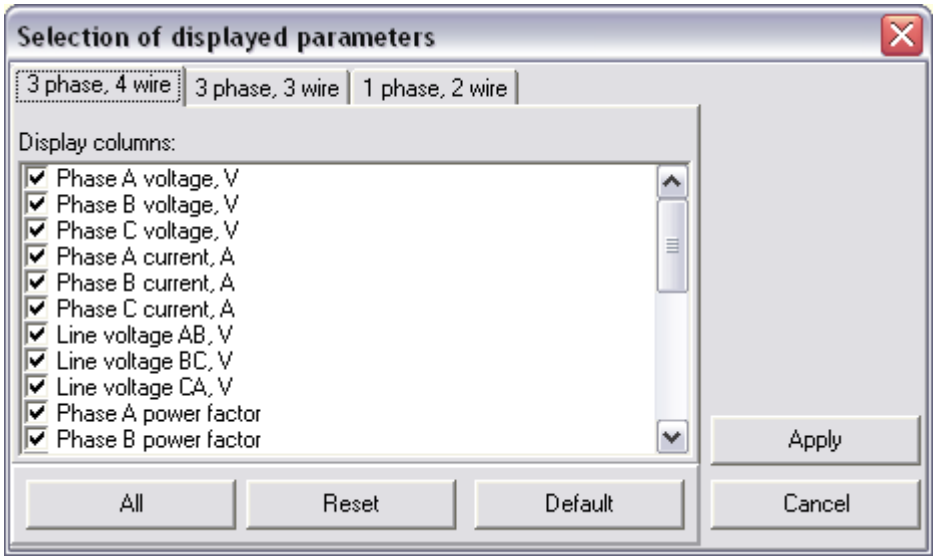
The “Apply” and “Cancel” buttons are used to confirm and save the parameters or leave them unchanged.

Current communication settings are displayed in the status bar of the main window.

On closing the application, the settings are saved in the configuration file.

Displayed parameters

The command opens the “Selection of displayed parameters” dialog box where the user can select the parameters to be displayed depending on the circuit connection scheme. The function can also be accessed by right-clicking on the “Measurements” table. The dialog box contains three tabs, each one for a certain connection type.



The “All” button is used to mark all options. The “Reset” button unchecks all checkboxes.

Clicking on the “Default” button will bring up the default set of parameters to be displayed, which are as follows:

For three phase 3-wire connection:

- Phase voltages
- Phase currents
- Power factors per each phase
- Total powers of all types

For other connection schemes, the default set includes all of the parameters except voltage and current measurement ranges.

The “All”, “Reset”, and “Default” buttons are applied to the selected connection scheme only.

The marked parameters are displayed on clicking the “Apply” button. On clicking “Cancel” the changes are ignored.

The number and order of displaying the parameters will be retained at the next startup.

Password changing

The option makes it possible to change an active password. The default password is an empty string (the Program is launched on pressing the “Enter” key). Later, the user may remain this password unchanged, or enable password protection. The password must contain 8 characters or less.

To change the password, enter your current password into the upper field, and then enter your new password twice to complete the “New password” and “Repeat password” fields. If you fail to enter the password strings correctly, the program displays a prompt to make another attempt.

The “Cancel” button closes the window without saving changes.

Language

The language currently selected for the user interface is displayed with a checkmark against it.

“?” menu

The menu includes options:

- Help
- About...

Help

“Help” opens the EMCounter User manual in pdf format. Adobe Acrobat Reader 5.0 or higher will be needed to read the file.

About...

The command opens a window containing brief information about the Program.

Appendices

Test reports

Calibration report №_____
Meter type: Meter5
Cuircuit connection: 3 phase, 4 wire

Meter type: Meter3

Serial number: 268435455

Year of release: 2003

Accuracy class: 1

Circuit connection: 3-phase 4-wire

Reactive power (phase-shift method)

Meter constant: 14400000

Nominal phase voltage, V: 200

Nominal line voltage, V: 100

Nominal current, A: 30

№	Voltage, V			Current, A			Power factor			Q ph-sh, Var	Error, %
	A	B	C	A	B	C	A	B	C		
1	61,34	61,45	61,19	10,10	10,04	10,10	0,63L	0,64L	0,61L	1439,086	23,760
2	61,35	61,44	61,18	10,10	10,04	10,10	0,41L	0,42L	0,39L	1689,164	-30,36
3	40,94	40,99	40,83	10,10	10,04	10,10	0,41L	0,42L	0,39L	1126,975	-30,31
4	40,94	40,99	40,83	10,10	10,04	10,10	0,41L	0,42L	0,39L	1126,975	-30,31
5	40,94	41,00	40,84	10,10	10,04	10,09	0,51L	0,52L	0,49L	1062,061	-8,508
6	40,94	41,00	40,84	10,10	10,04	10,10	0,51L	0,52L	0,49L	1062,045	-8,592
7	40,93	41,00	40,84	10,10	10,04	10,10	0,55L	0,56L	0,52L	1035,853	-0,198
8	40,93	41,00	40,84	10,10	10,04	10,10	0,55L	0,56L	0,52L	1035,872	-0,207
9	61,34	61,44	61,19	10,10	10,04	10,10	0,55L	0,56L	0,52L	1552,789	-12,53

Calibration date: 03.12.2003

11.04.2011

Comments: _____

Reference standard EM 3-3, serial number 1

Calibration report №_____
Meter type: Meter5
Cuircuit connection: 3 phase, 3 wire

Meter type: Meter5

Serial number: 268435455

Year of release: 2003

Accuracy class: 1

Circuit connection: 3-phase 3-wire

Active power

Meter constant: 24000000

Nominal line voltage, V: 100

Nominal current, A: 30

№	Voltage, V			Current, A			Total power factor	P, W	Error, %
	AB	BC	CA	A	B	C			
1	71,11	70,71	70,81	10,10	10,04	10,10	0,44L	556,6971	-8,003
2	71,11	70,71	70,81	10,10	10,04	10,10	0,44L	556,7205	-8,003
3	106,5	106,0	106,0	10,10	10,04	10,10	0,12L	229,1152	0,5020
4	106,5	106,0	106,0	10,10	10,04	10,10	0,12L	229,0964	0,4013
5	106,5	106,0	106,0	5,054	5,020	5,044	0,1L	98,22755	-1,185
6	106,5	106,0	106,0	5,054	5,021	5,044	0,1L	98,22120	-0,793
7	106,5	105,9	106,1	5,054	5,022	5,044	0,5L	465,1089	-8,592
8	106,5	105,9	106,1	5,054	5,021	5,044	0,5L	465,0908	-8,674

Calibration date: 03.12.2003

11.04.2011

Comments: _____

Reference standard EM 3-3, serial number 1

Page 1 of 1

Calibration report №_____
Meter type: Meter5
Cuircuit connection: 1 phase, 2 wire

Meter type: METER 3

Serial number: 268435455

Year of release: 2003

Accuracy class: 1

Active power

Meter constant: 14400000

Nominal phase voltage, V: 200

Nominal current, A: 30

№	Voltage, V	Cur., A	Power factor	P, W	Error, %
1	61,30	10,08	-0,33C	-208,271	46,412
2	61,31	10,08	-0,33C	-208,321	46,626
3	61,30	10,08	-0,53C	-328,255	48,147
4	61,32	10,08	-0,76C	-474,296	49,252
5	61,32	10,08	-0,76C	-474,340	49,252

Calibration date: 03.12.2003
11.04.2011

Comments: _____

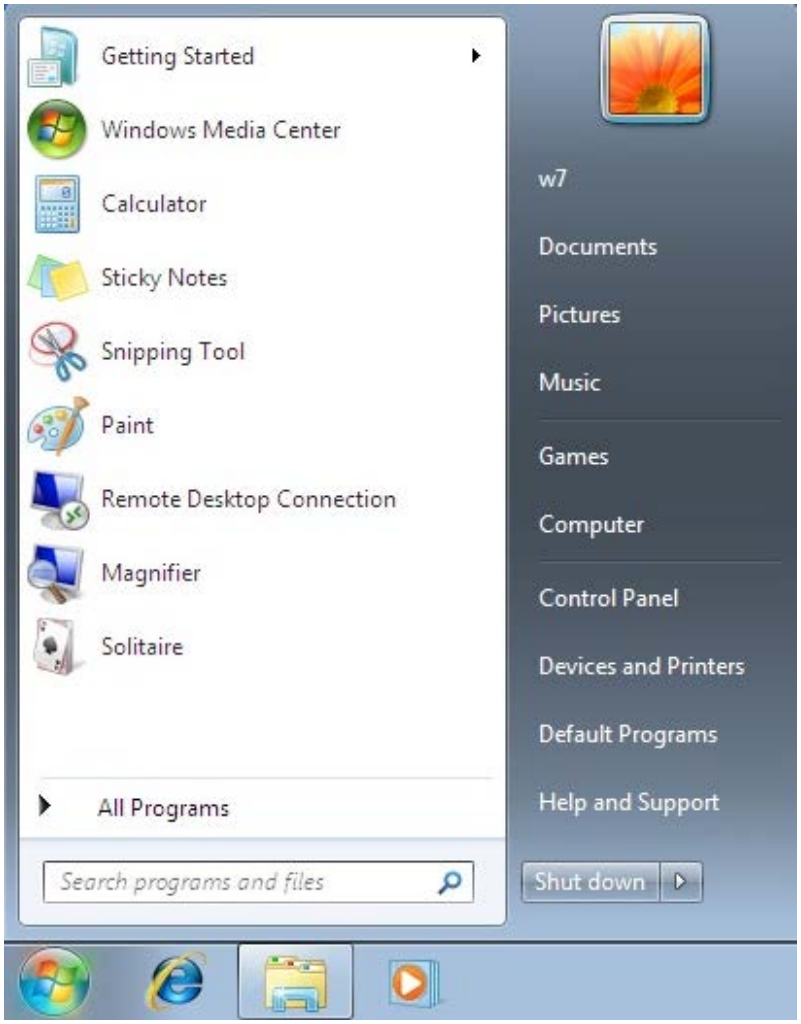
Reference standard EM 3-3, serial number 1 Page 1 of 2

Turning off UAC option

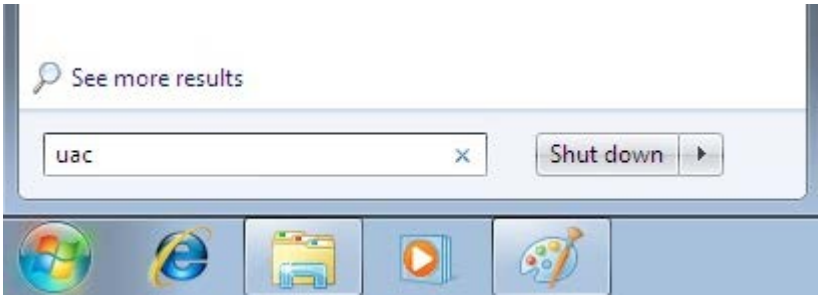
To correctly run the program under Windows Vista and Windows 7 (x86 и x64), it is necessary to turn off Windows UAC (User Account Control) option.

To do it, proceed as follows:

1. Run your operation system as Administrator.
2. Click on Windows “Start” button to open the list of programs installed.

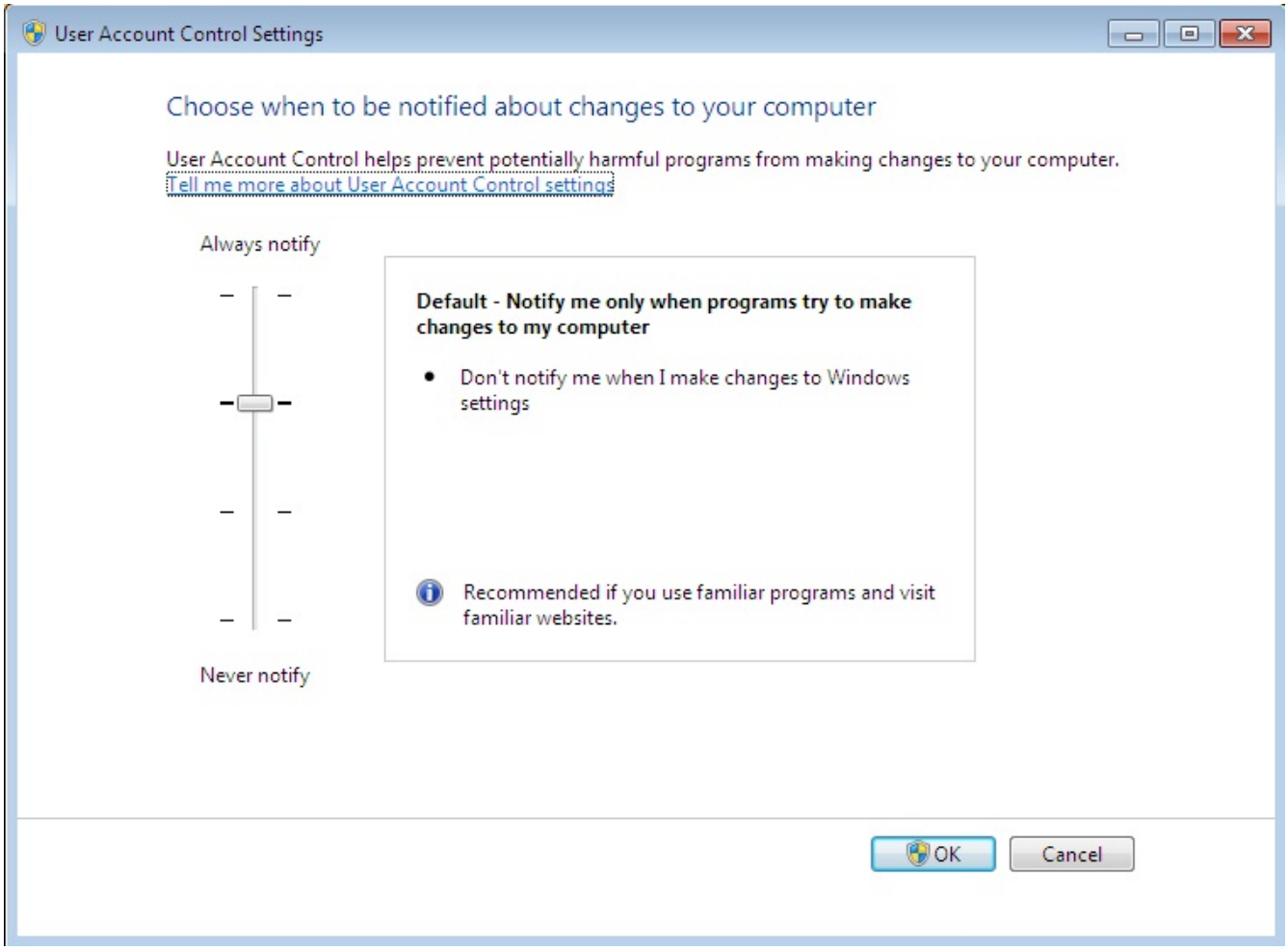


3. To launch User Account Control manager, type in “uac” command (without quotes) in the “Search programs and files” field (under the “All programs” option) and click on “Change User Account Control settings” when it appears.
   Another way to launch UAC manager is to select “Control Panel” → “User Accounts” → “Change User Account Control settings” from the Start menu.

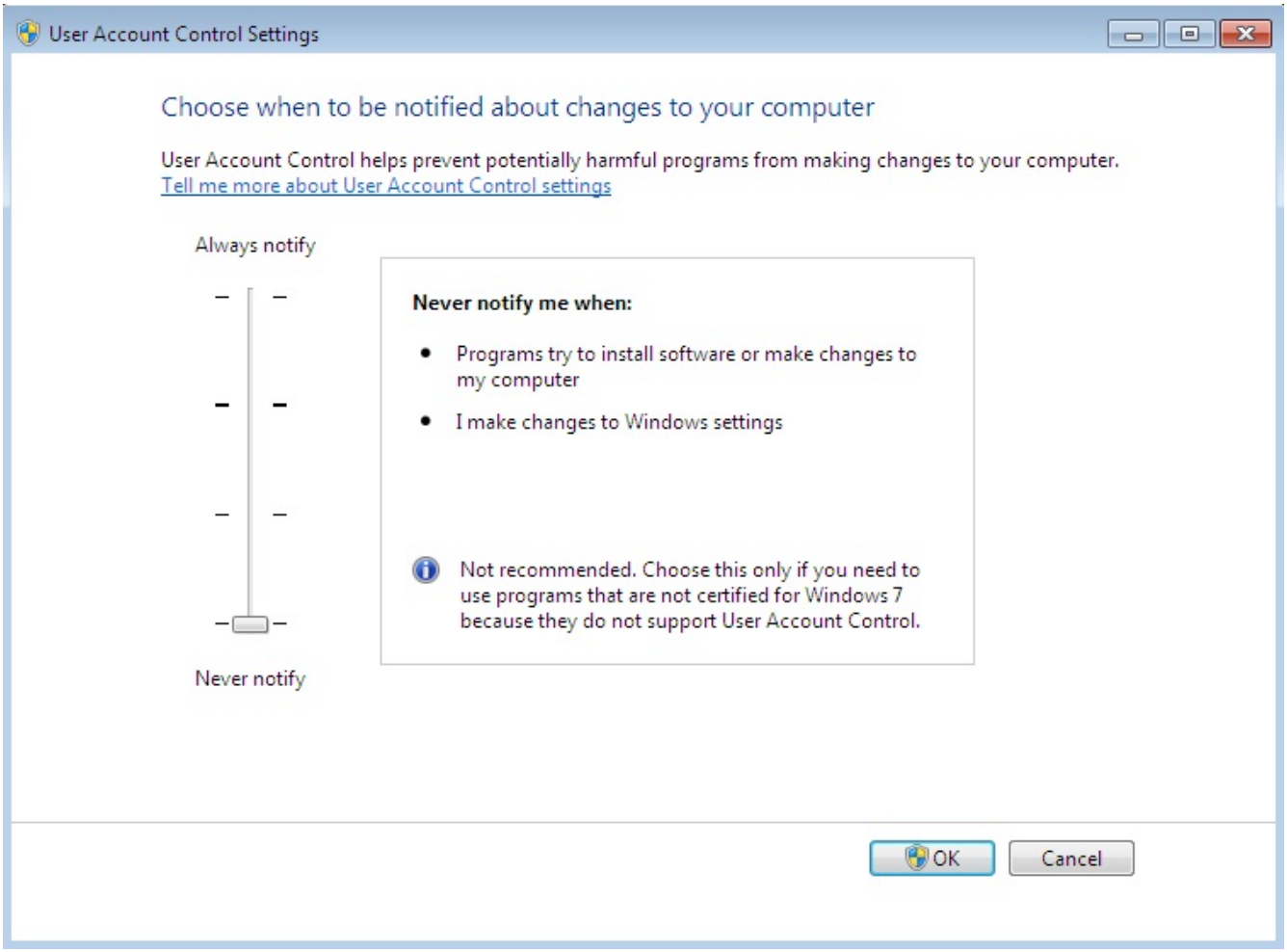


Press “Enter” when ready.

4. The OS will open the User Account Control Settings dialog box. The scrollbar thumb shows the security level active at the moment.



5. To disable the security control function, drag the scrollbar thumb to the lowermost position. This authorizes the user to change Windows System Parameters.



6. Save the changes by pressing “OK”. The User Account Control Settings dialog box will be closed.
7. Restart the computer to enable the changes.

Technical support

Should any questions arise while installing or using the program, try first of all to find the answers in the documentation available. Commonly faced problems may well be solved by visiting Technical Support section of our Web site www.mars-energo.com.

Should you still need help after reviewing all of the available materials, contact us by E-mail mail@mars-energo.ru or by phone: +7 (812) 327-2111. We would greatly appreciate your providing our Technical Support group with the following information:

- Contact person (Name and Surname)
- Company's name
- Phone (fax, e-mail)
- Software version number (see the menu ?/About)
- Name and serial number of the reference instrument
- Description of the problem, including the complete text of error message (if there was any)
- Type of your PC
- Windows OS version
- Other information that you consider to be important.

OOO Mars-Energo
Address: V.O. 13 Line, 6–8, office 41H, St. Petersburg, Russia, 199034
Tel/Fax: 812 327-21-11
Tel/Fax: 812 309-03-56
E-mail: mail@mars-energo.ru
www.mars-energo.ru