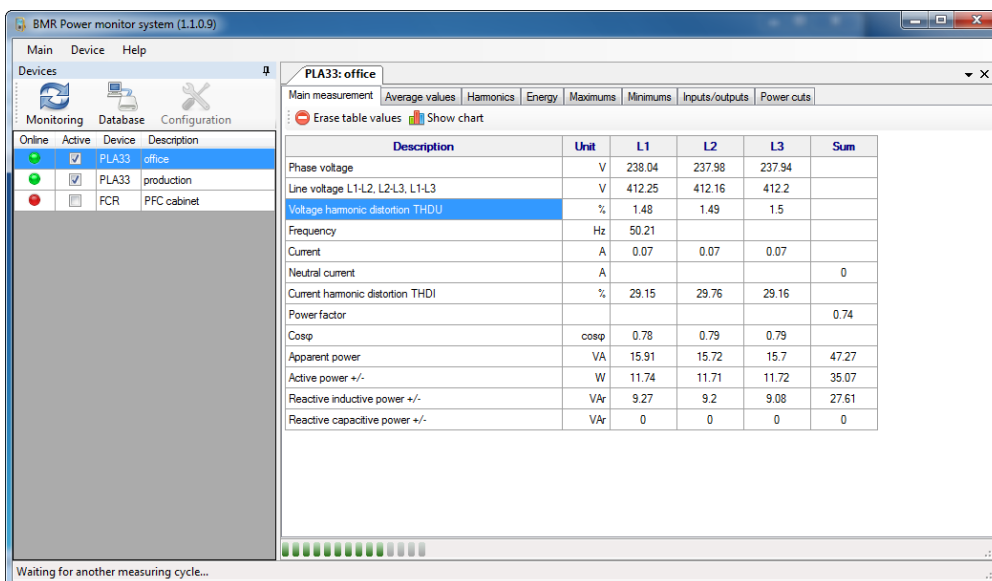




Energy management and monitoring software

Installation and operation instructions



version 1.0

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1. PMS introduction

Software PMS is designed for energy management and monitoring of BMR measuring instruments equipped by RS485 interface.

Software PMS is based on the server-client structure where server part is taking care about communication with measuring instruments, SQL database and client.

1.1. PMS structure

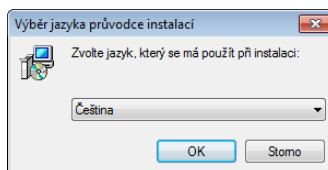
The core of PMS is a server program called PMS service. According to its name it runs as a Windows service and it is automatically started at Windows start. For management and configuration of PMS service there is GUI program which can be started by user. The most visible part and most often operated by user is a PMS client for management of instruments and their monitoring and recorded data evaluation.

1.2. System requirements

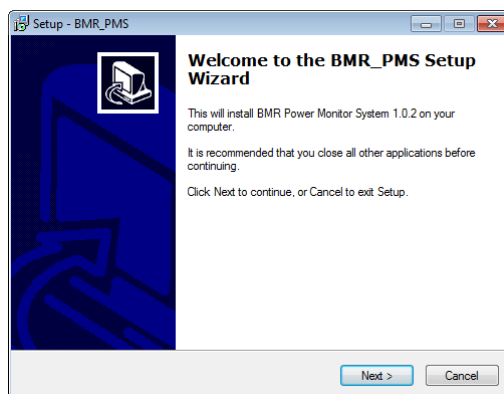
PMS is designed to run on personal computers with operating systems Microsoft Windows XP, Vista and Windows 7. It is necessary that .NET Framework 3.5 or newer is installed at computer. The minimum PC configuration should be Pentium III with 512 MB memory and 200 MB disc space.

2. Installation

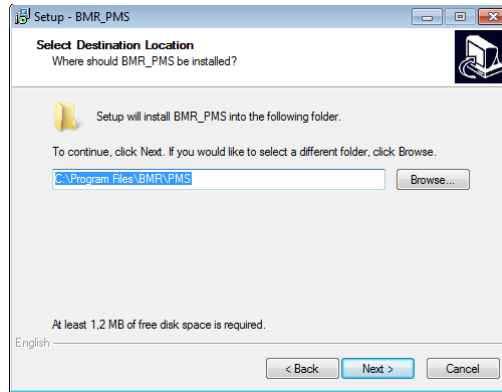
For installation process start, run the file BMR_setupPMS.exe. The installation starts by first dialogue window with language selection.



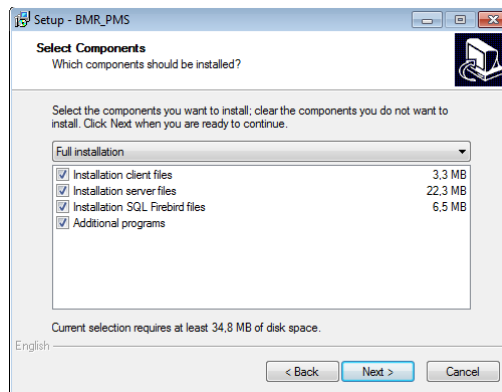
Select the appropriate language used during installation and also for program interface. Introduction window of PMS installation will be already shown in selected language.



In next step set the folder for PMS program files or let by Wizard offered default path.



In next step components of PMS which will be installed on the computer are defined. For installations where the server and client is running at the same computer it is recommended to install all offered components.



PMS software is based on server part and client part. In case that PMS server is running at the server computer it is recommended to install all parts on server as well. After that on the local computer the only client needed files will be installed.

Once the installation type is selected click on button Next for installation process start. It takes several minutes according to selected options.

3. Program start

Program PMS consists from two parts. PMS_server and PMS_client. PMS_server starts automatically as a Windows service and it runs transparently. PMS_server is essential part and it has to run on server or local computer. Once the PMS_server is running the PMS_client part can be started as well. In case that both parts are installed at local computer the communication between PMS_server and PMS_client is already defined. In case that not, follow the chapter related to **network installation**.

3.1. Fast commission

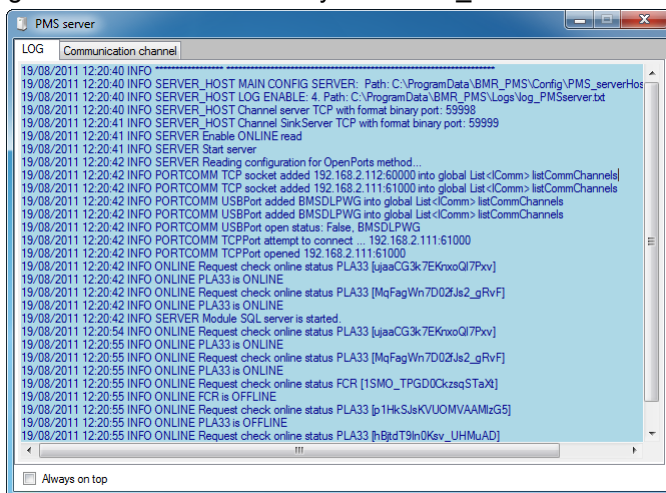
In this chapter are described the minimum steps for program start and operation after installation process.

1. Start PMS_server (in case that it is not started at Windows start) and then PMS_client.
2. Turn PMS to service mode "Main/Service mode". See chapter 4
3. Open the dialog window communication interface "Device/Communication interface" and add and define the new communication interface. See chapter 4.1
4. Add new device "Device/New device" and set correct communication interface and serial network ID number. The device has to be enabled as an active.
5. End the service mode. PMS is ready for monitoring of selected instrument now.

3.2. Server

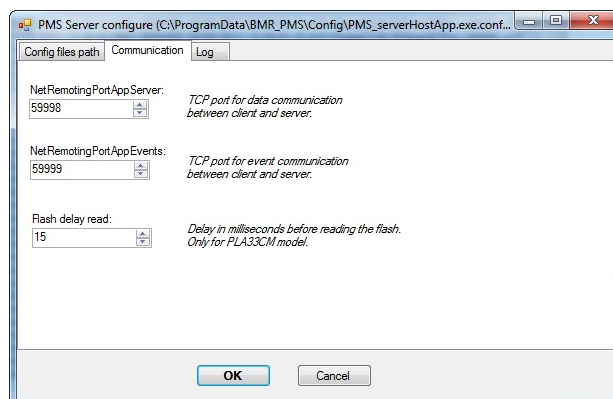
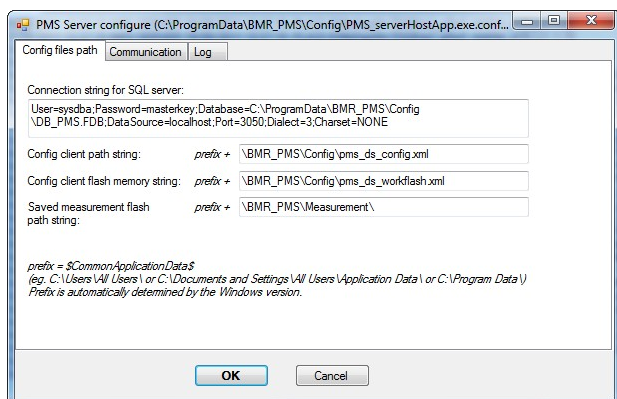
3.2.1. Server start

PMS_server normally starts automatically at the Windows operating system start. In case that the automatic start option was not enabled during installation it is necessary start PMS_server from Start menu.

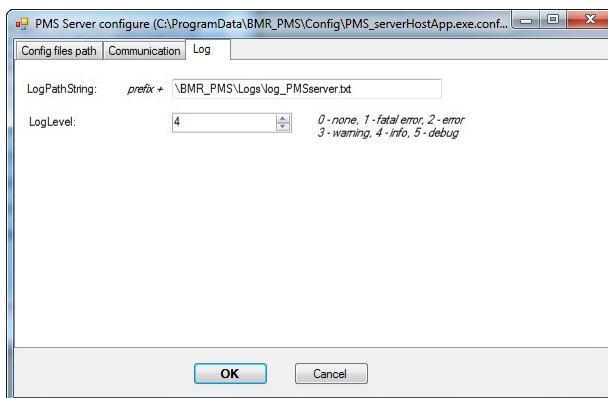


3.2.2. Configuration

In the context menu of PMS_server there is an option “Configure” the PMS_server. The window with three cards with several configuration option will open.



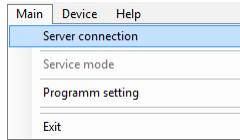
In the third card there are settings related to operating status and debug information such as path of log file and level of provided information.



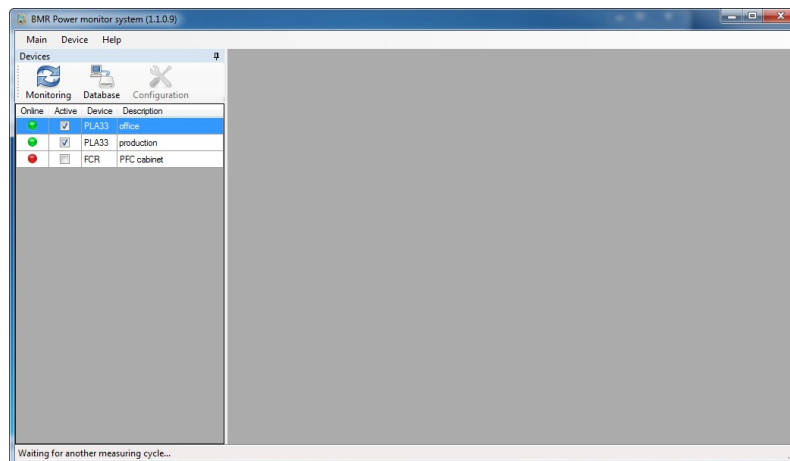
3.3. Client

3.3.1. Client start

PMS_client can be started from Windows Start menu. After program is running it is necessary manage connection of PMS_client to the PMS_server. In the program main menu click on the Server connection to establish communication between the server and client.



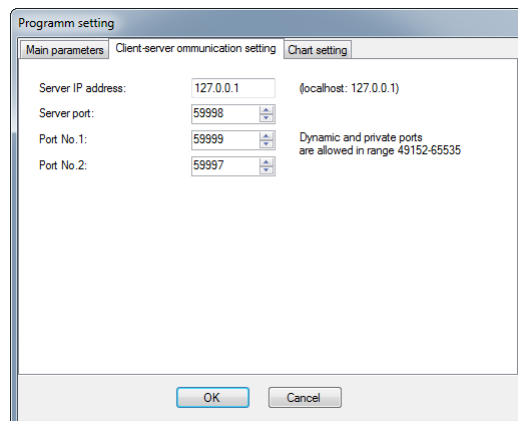
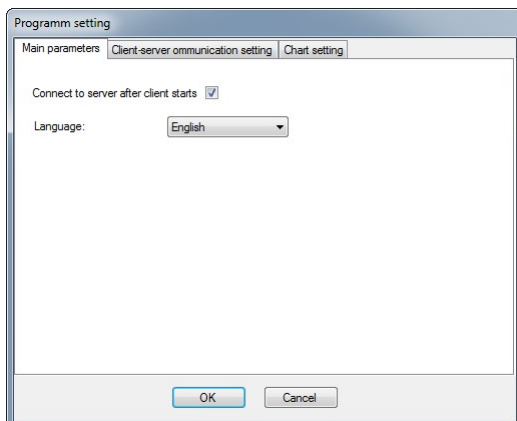
PMS_client program window is divided to the two columns. In the left column the list of instruments and their status is located. In the right column the particular information such as monitoring and database with graphs, tables is shown.



3.3.2. Client setting

For the displaying the monitoring or database information it is necessary select the instrument in the left column and click on particular button for monitoring or database.

PMS_client can be also configured for various behaviour such as language, automatic server connection etc. Click on “Main/Program setting” to open the configuration window.



For automatic start select such option in the first card. The gui language can be changed as well and will be used from next start of PMS_client.

Second card offers setting related to communication between client and server. It is recommended do not change it.

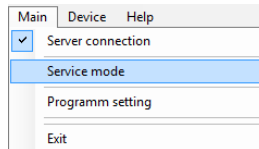
3.3.3. Service mode entering

For definition of communication interfaces and devices monitored by PMS it is necessary enter the service mode. Click on the “Main/Service mode” switches the PMS client to service mode. Communication between the server and

recording to sql database will be terminated until the service mode is finished. For more information see chapter Service mode.

4. Service mode

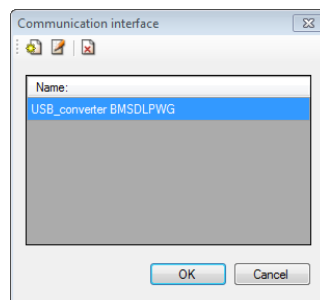
For configuration of communication interfaces, device drivers it is necessary turn PMS into the Service mode. In the Main menu select the option Service mode. PMS will close all running windows and in the program window will remain only the left device column. In the "Device" menu parameters will be highlighted and ready to be used for configuration purposes. When the configuration is finished it is important close the Service mode and let PMS turn into normal operation regime.



4.1. Communication interface

Before adding the devices into the PMS professional software it is necessary define communication interface or interfaces of RS485 networks.

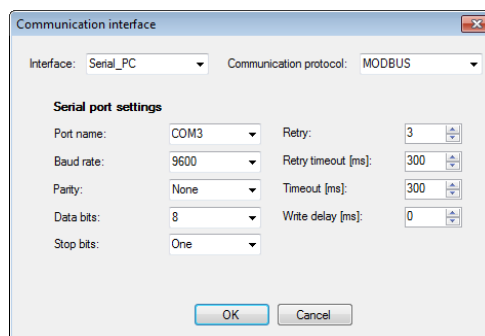
Start configuration of communication interface by click "Device/Communication" interface in the Main menu. Following window will appear.



By click on the icon "New communication interface" the new converter can be add and set. Icon "Edit communication interface" allows to modify existing converter settings. By icon "Remove communication interface" the converter can be removed from the PMS professional software.

4.1.1. RS485/RS232 converter

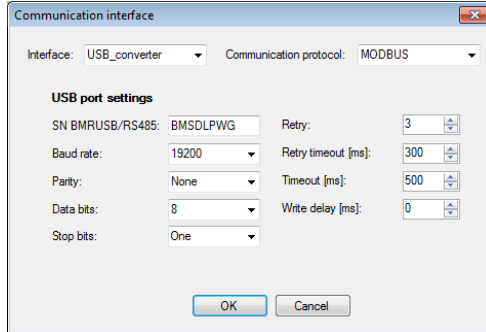
RS485/232 converter is connected to serial port (COM) of PC. After connection to the PC it appears on the system and it is identified by number behind the COM. For example COM3. Baud rate defines the communication speed on RS485 side between instruments and converter.



For devices with internal memory like PLA33CM it is necessary to set Timeout to 600 ms or higher to assure correct communication during flash memory measurement start.

4.1.2. RS485/USB converter

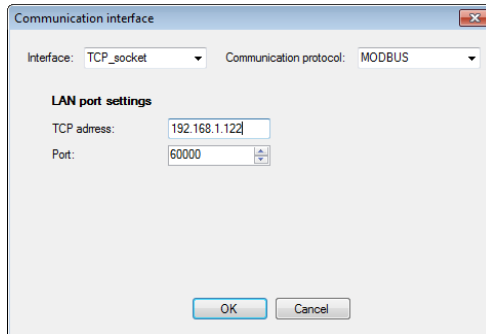
USB converter is uniquely identified by serial number placed on back side of converter. This serial number has to be written to box named SN BMRUSB/RS485. Baud rate defines the communication speed of the RS485 bus. For correct work of BMR USB485 converter it is necessary installed FTDi driver. It can be installed during the installation process of PMS itself or later.



For devices with internal memory like PLA33CM it is necessary to set Timeout to 500 or higher ms to assure correct communication during flash memory measurement start.

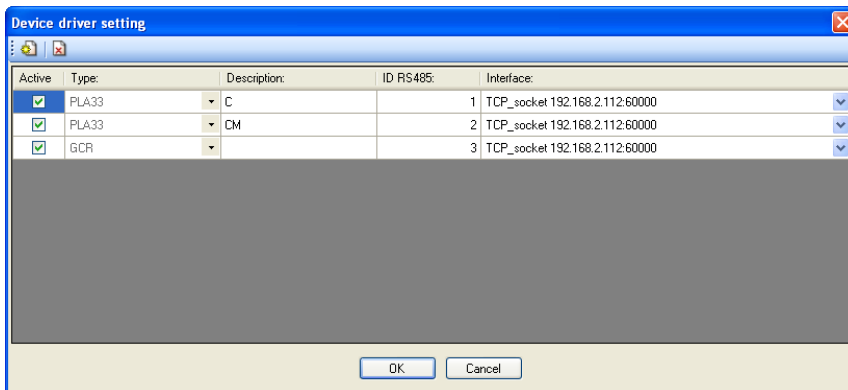
4.1.3. RS485/LAN and RS485/Wifi converters

Setting for RS485/Lan and RS485/Wifi converter is the same. Both converters are using TCP address and PMS professional access them directly at that address. Set to the dialog box named TCP address the IP address of the converter and port number where the software will listen for the communication.



4.2. Adding device to the system

For correct work the driver of existing device in the monitoring system must be defined. Click on the /Device/Edit device in the Main menu will open following window.



Click on the new to add the new device and following window will open.



Select the appropriate instrument from the list and confirm by pressing the button OK. Then the device will be added to the list. Now it is necessary to define the ID of device in RS485 bus and communication interface used for connection to PC. Once it is done confirm setting by click on button OK.

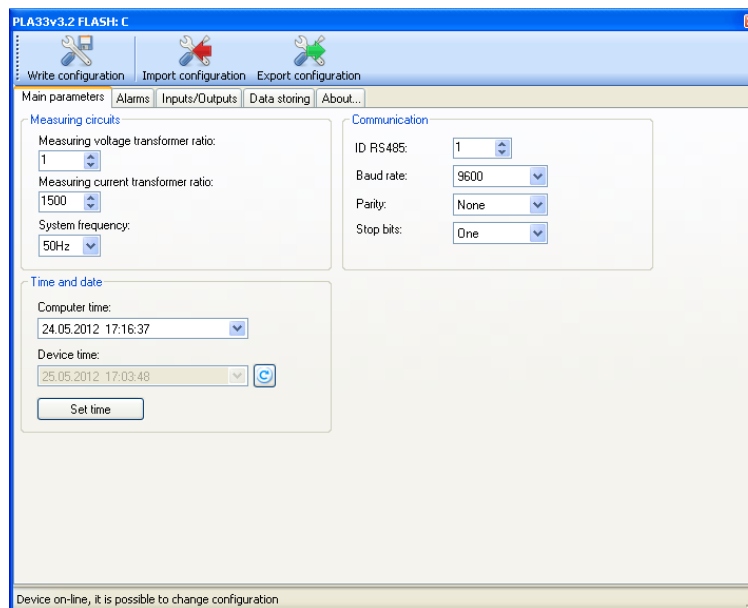
It is now recommended to exit the service mode for activating the all settings and enter it again.

4.3. Device configuration

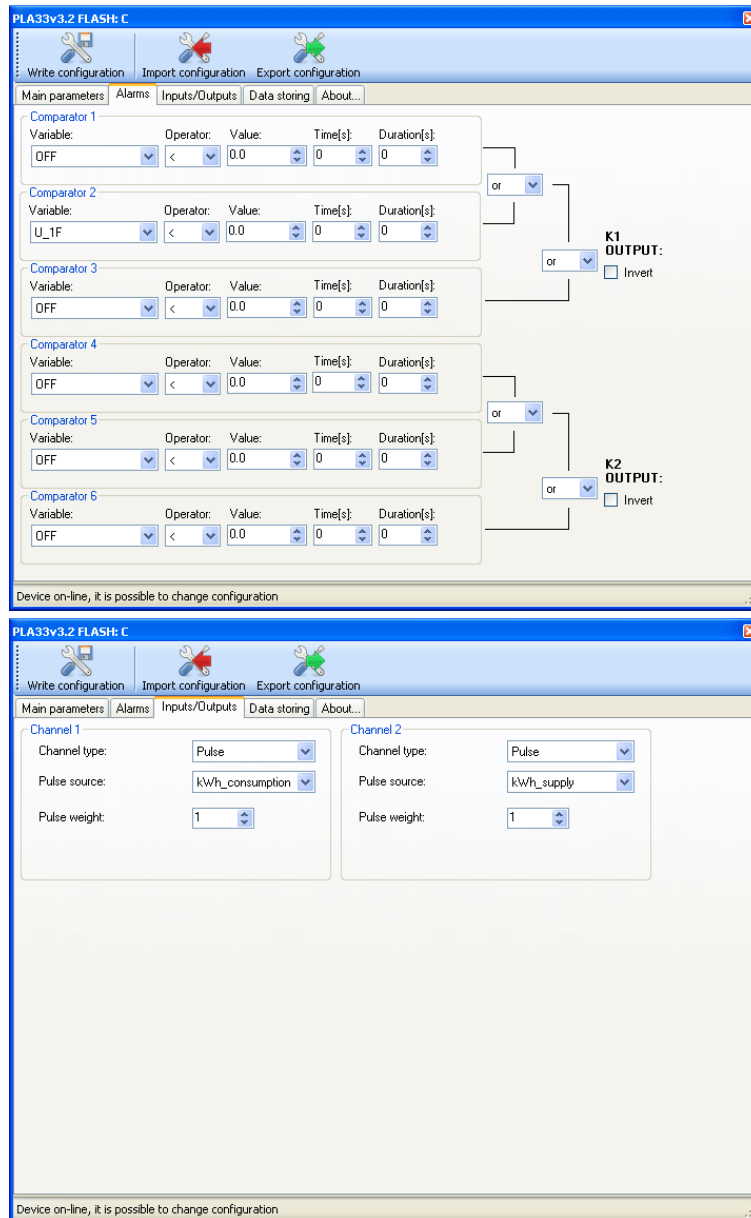
By PMS professional software it is possible also configure device itself. Selecting the device in the left device column and click on the icon "Configuration" will open window with configuration options for chosen device.

4.3.1. PLA33C and PLA33CM

First contents strip is used for setting of main parameters like measuring transformer ratios, system frequency, time and parameters of communication interface.

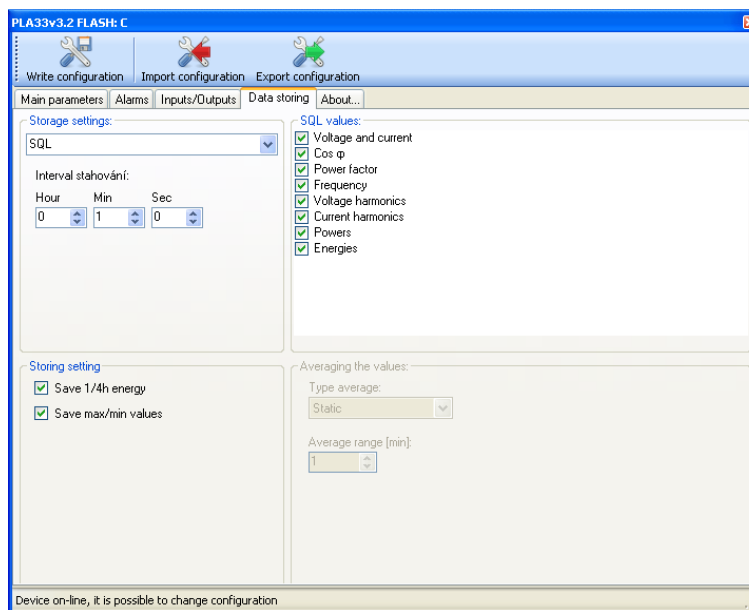


PLA33 has alarm output based on three comparators with logic function bond. Every comparator can be set independently on others and compare different variables.



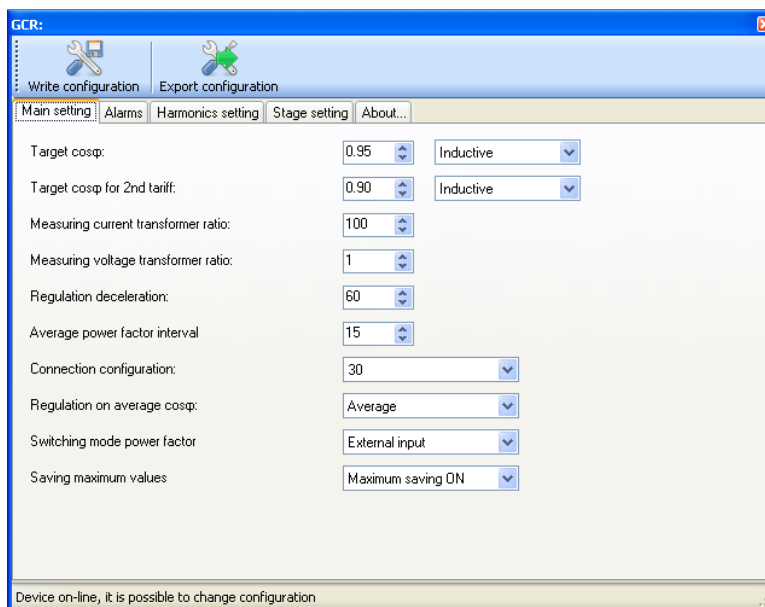
In the third contents strip it is possible to adjust behaviour of input / outputs. Output can behave as digital input or output, controlled by PC or as an alarm output or pulse output. Rules for setting as an alarm output are set in above described window.

Pulse output can be linked to one of six PLA33 energy meters. For pulse output it is necessary to define the pulse weight which is set in Wh.

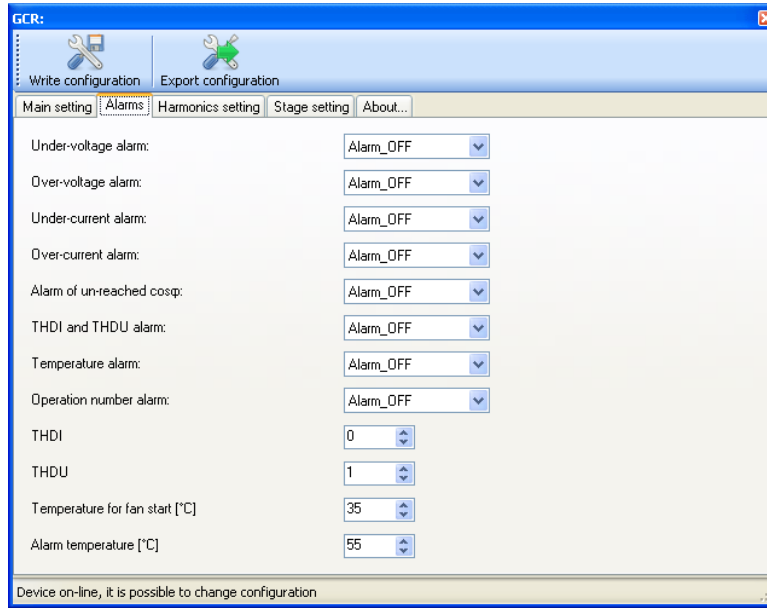


4.3.2. FCR06/12 and GCR06/12 device configuration

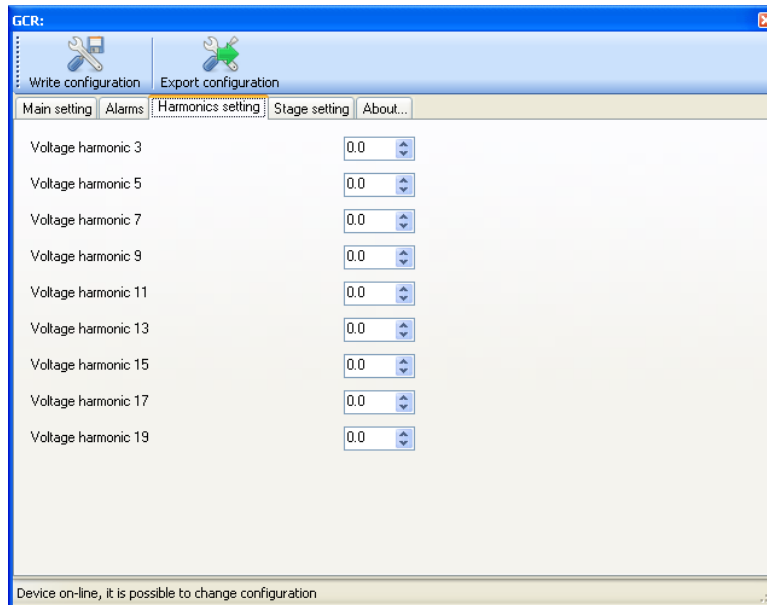
First contents strip contains the general setting of FCR06/12 controller such as targeted $\cos\phi$, current and voltage transformer ratio, system frequency a regulation method. Before device configuration study device instruction manual for understanding appropriate settings.



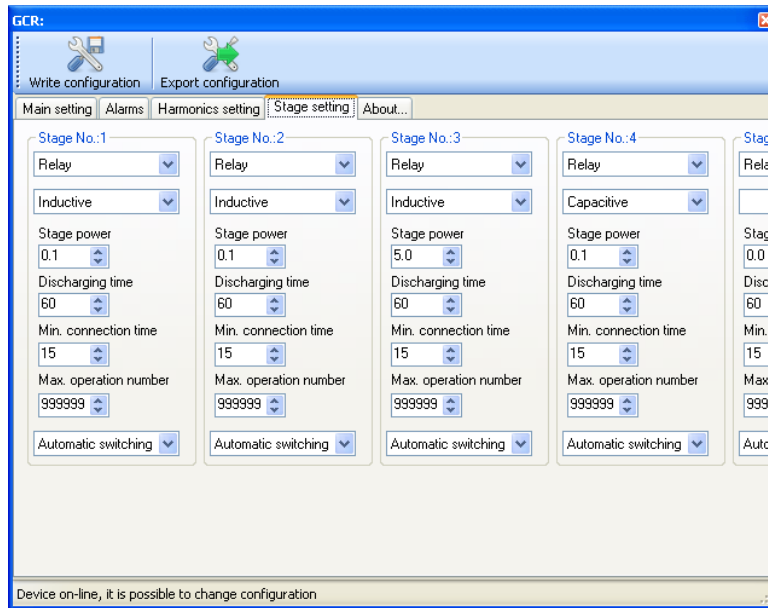
Second contents strip offers alarm even specification. Before adjusting the alarm study be sure about using it.



Harmonics setting is available at third contents strip. Adjust harmonic level for particular voltage harmonics and THDI is active only in case that appropriate alarm is enabled.



Another contents strip defines the stage setting.

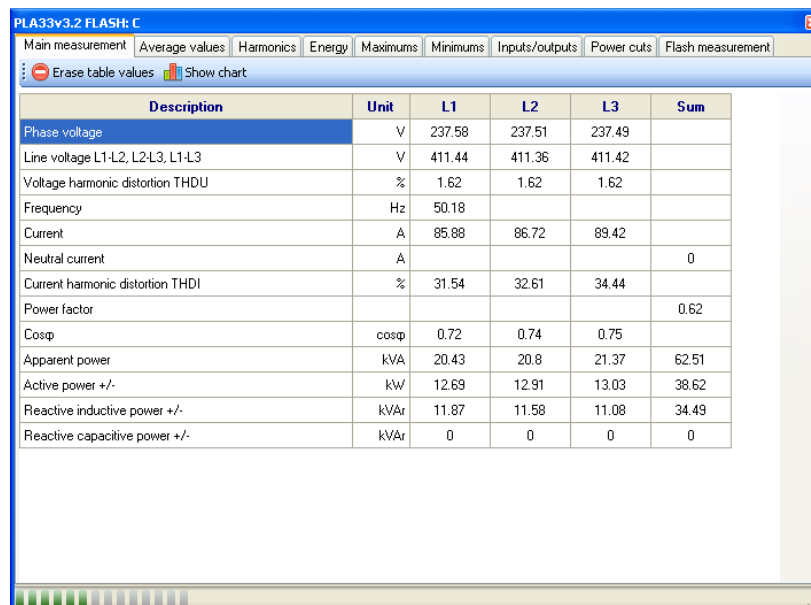


5. Monitoring

PMS software is prepared for on-line monitoring purposes also. Choosing requested device and clicking the button “Monitoring” new sub-window will open in the right part of PMS_client.

5.1. PLA33C

Main measurement contents strip contains most important measurements such as voltage, current, power factor and powers. By default the all parameters are selected so immediately after opening the values are filled into the table.



| Description | Unit | L1 | L2 | L3 | Sum |
|----------------------------------|------|--------|--------|--------|-------|
| Phase voltage | V | 237.58 | 237.51 | 237.49 | |
| Line voltage L1-L2, L2-L3, L1-L3 | V | 411.44 | 411.36 | 411.42 | |
| Voltage harmonic distortion THDU | % | 1.62 | 1.62 | 1.62 | |
| Frequency | Hz | 50.18 | | | |
| Current | A | 85.88 | 86.72 | 89.42 | |
| Neutral current | A | | | | 0 |
| Current harmonic distortion THDI | % | 31.54 | 32.61 | 34.44 | |
| Power factor | | | | | 0.62 |
| Cosp | cosp | 0.72 | 0.74 | 0.75 | |
| Apparent power | kVA | 20.43 | 20.8 | 21.37 | 62.51 |
| Active power +/- | kW | 12.69 | 12.91 | 13.03 | 38.62 |
| Reactive inductive power +/- | kVAr | 11.87 | 11.58 | 11.08 | 34.49 |
| Reactive capacitive power +/- | kVAr | 0 | 0 | 0 | 0 |

For displaying the graph of on-line measured value, select the requested parameter and click on the icon “Show chart”.

PLA33v3.2 FLASH: C

Main measurement | **Average values** | Harmonics | Energy | Maximums | Minimums | Inputs/outputs | Power cuts | Flash measurement

Eraser table values

| Description | Unit | L1 | L2 | L3 | Sum |
|----------------------------------|------|-------|-------|-------|-------|
| Average current | A | 85.68 | 87.35 | 89.53 | |
| Active average power consumption | kW | | | | 38.91 |
| Active average power supply | kW | | | | 0 |
| Total average apparent power | kVA | | | | 62.74 |

Type average: Static

Average range [min]: 1

PLA33v3.2 FLASH: C

Main measurement | Average values | **Harmonics** | Energy | Maximums | Minimums | Inputs/outputs | Power cuts | Flash measurement

Eraser table values | Show voltage harmonics chart | Show current harmonics chart

| Description | Unit | L1 | L2 | L3 |
|---------------------|------|-------|-------|-------|
| Voltage harmonic 3 | % | 0.42 | 0.42 | 0.41 |
| Voltage harmonic 5 | % | 2.21 | 2.21 | 2.2 |
| Voltage harmonic 7 | % | 0.57 | 0.56 | 0.56 |
| Voltage harmonic 9 | % | 0.32 | 0.3 | 0.3 |
| Voltage harmonic 11 | % | 0.48 | 0.48 | 0.48 |
| Voltage harmonic 13 | % | 0.32 | 0.33 | 0.32 |
| Voltage harmonic 15 | % | 0.04 | 0.05 | 0.04 |
| Voltage harmonic 17 | % | 0.08 | 0.09 | 0.1 |
| Voltage harmonic 19 | % | 0.07 | 0.06 | 0.06 |
| Current harmonic 3 | % | 25.92 | 27.18 | 30.47 |
| Current harmonic 5 | % | 6.82 | 10.49 | 13.16 |
| Current harmonic 7 | % | 8.14 | 7.23 | 6.73 |
| Current harmonic 9 | % | 2.09 | 1.73 | 1.81 |
| Current harmonic 11 | % | 2.22 | 2.03 | 1.67 |
| Current harmonic 13 | % | 3.48 | 2.31 | 3.19 |
| Current harmonic 15 | % | 1.97 | 2.27 | 1.7 |
| Current harmonic 17 | % | 2.67 | 2.1 | 2.65 |
| Current harmonic 19 | % | 2.25 | 2.09 | 3.12 |

5.1.1. Power cuts table

PLA33C and PLA33CM is recording the power cuts of the supply voltage. In the card "Power cuts" click on on the button "Refresh power cuts table" to display recorded supply voltage power cuts.

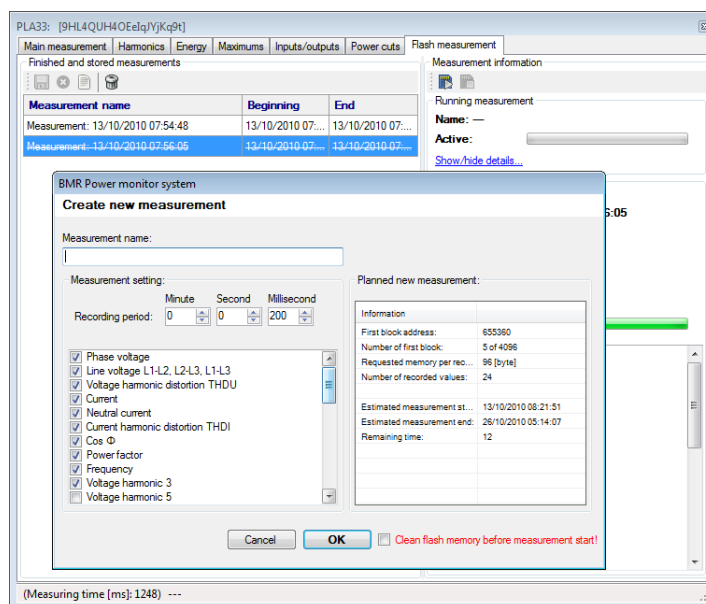
| Beginning | End | Duration |
|------------------|------------------|------------|
| 13/05/2012 10:47 | 13/05/2012 11:37 | 00:49:56 |
| 13/05/2012 10:39 | 13/05/2012 10:46 | 00:07:13 |
| 08/05/2012 09:29 | 08/05/2012 09:29 | 00:00:02 |
| 26/04/2012 18:03 | 27/04/2012 09:03 | 15:00:35 |
| 26/04/2012 12:24 | 26/04/2012 12:24 | 00:00:03 |
| 25/04/2012 18:07 | 26/04/2012 09:02 | 14:55:36 |
| 24/04/2012 18:25 | 25/04/2012 09:04 | 14:38:42 |
| 24/04/2012 12:04 | 24/04/2012 12:04 | 00:00:05 |
| 23/04/2012 18:11 | 24/04/2012 09:02 | 14:51:06 |
| 23/04/2012 18:10 | 23/04/2012 18:11 | 00:00:17 |
| 03/01/2000 23:20 | 03/01/2000 23:21 | 00:00:44 |
| 03/01/2000 23:11 | 03/01/2000 23:14 | 00:02:39 |
| 03/01/2000 22:24 | 03/01/2000 22:25 | 00:00:55 |
| 03/01/2000 06:06 | 03/01/2000 22:24 | 16:18:00 |
| 03/01/2000 05:02 | 03/01/2000 05:18 | 00:15:43 |
| 01/01/2000 00:11 | 03/01/2000 04:50 | 2:04:38:55 |

5.2. PLA33CM

Device PLA33CM has built-in flash memory for recording the measured parameters and status of energy meters (load profile). In this chapter the operation with internal memory is described.

5.2.1. Measurement recording to internal flash memory

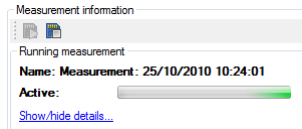
Measurement is started by pressing the button . New window with measurement settings will appear. The name, recording period and measured parameters can be defined either. It is possible to record up to 10 parameters together.



Important

If the measurement is not start correctly there is no information about running measurement in right column. Check the converter setting time out which must be at least 600ms.

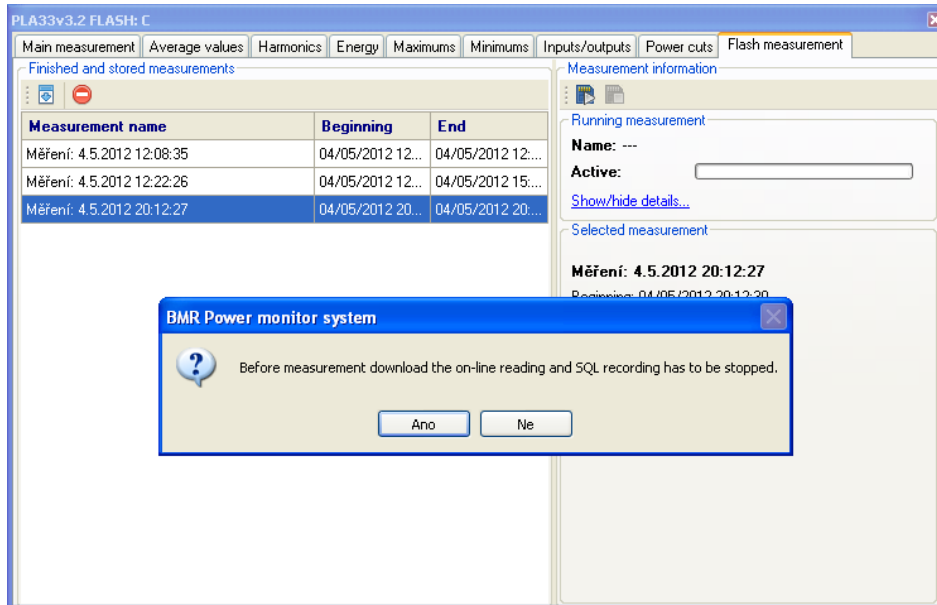
If the measurement is running the right status column identifies in the section "Running measurement" details about progressing recording. To stop measurement click on the icon in the right column "Measurement information".



Dialogue window with possible actions will appear on the screen and by selecting the action “Finish measurement” will stop measurement and create the flag in the list of “Finished and stored measurements” for later measurement download.

5.2.2. Measurement download from the device

Once the measurement to device flash memory is finished it is necessary to download it to PC. Downloaded measurement is stored in sql database. For to download the measurement select the measurement from the list of measurements on the left part of window and click icon download.



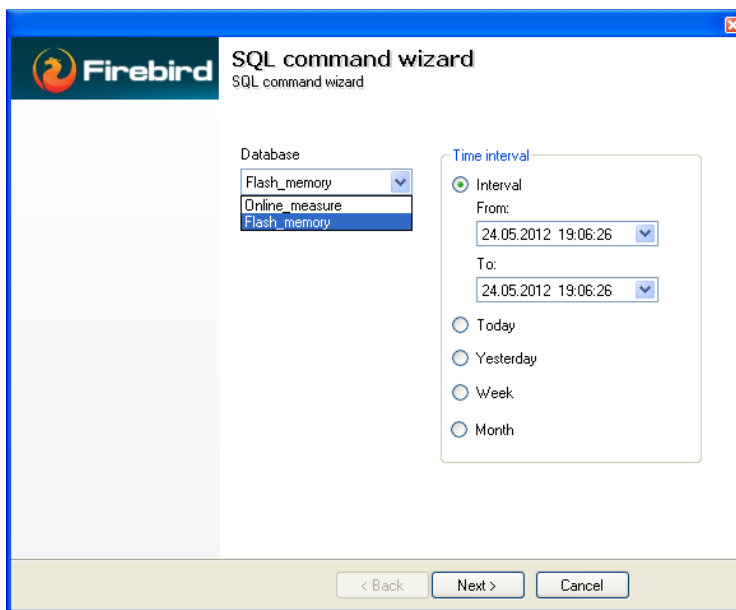
Once the flash measurement is downloaded it is stored in sql database and can be accessed by dialogue for displaying the database values.

6. Displaying of stored data from database

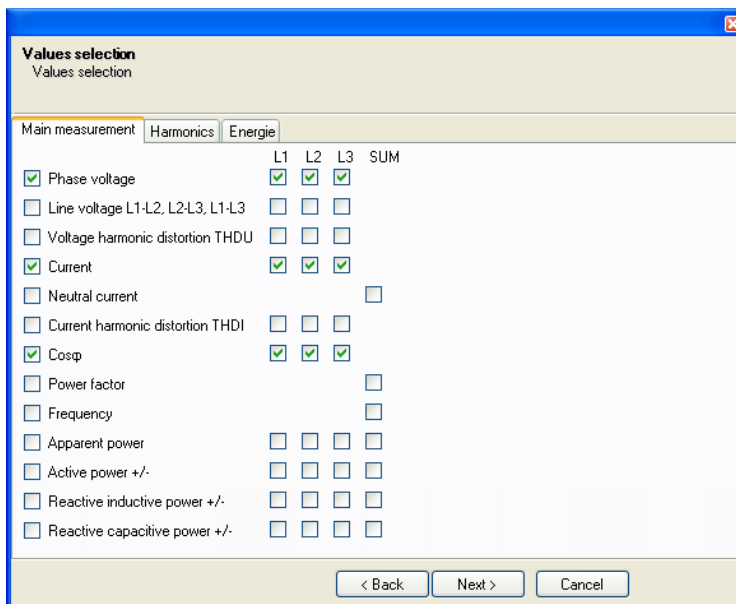
Data stored in database is possible to show in tables and graphs. For opening the dialog select the device from the list on the left side window and click on the icon database. Device window will appear in the main part of PMS client program.

By click on the icon Load SQL the following dialog will open.

Chose the source of measured data. For measurements downloaded from device flash memory select “Flash memory” and for periodically recorded data from device select “Online measure”. Define the interval for to show stored data and click button next.



Next step is selection of variables for displaying in table and graph. This window can differ according to device.



After choosing requested variables click button next and confirm your request. Window with table of selected parameters in the interval will be shown.

PLA33v3.2 FLASH: C

Load SQL Delete data

Database table Database chart

Result

| RECORD_DATETIME | VOLT_L1 | VOLT_L2 | VOLT_L3 | CURR_L1 | CURR_L2 | CURR_L3 | COS_L1 | CO |
|---------------------|---------|---------|---------|---------|---------|---------|--------|-----|
| 04/05/2012 12:22:28 | 239.43 | 239.31 | 239.42 | 5.90 | 5.91 | 6.02 | 0.75 | 0.7 |
| 04/05/2012 12:22:29 | 239.21 | 239.07 | 239.21 | 5.88 | 5.86 | 5.93 | 0.74 | 0.7 |
| 04/05/2012 12:22:30 | 239.51 | 239.35 | 239.50 | 5.90 | 5.97 | 6.09 | 0.74 | 0.7 |
| 04/05/2012 12:22:31 | 239.37 | 239.22 | 239.38 | 5.90 | 5.95 | 6.12 | 0.74 | 0.7 |
| 04/05/2012 12:22:32 | 239.32 | 239.14 | 239.30 | 5.92 | 5.99 | 6.06 | 0.74 | 0.7 |
| 04/05/2012 12:22:33 | 239.27 | 239.16 | 239.31 | 5.88 | 5.93 | 6.00 | 0.74 | 0.7 |
| 04/05/2012 12:22:34 | 239.40 | 239.27 | 239.42 | 5.85 | 5.94 | 6.06 | 0.74 | 0.7 |
| 04/05/2012 12:22:35 | 239.36 | 239.18 | 239.39 | 5.84 | 5.94 | 6.02 | 0.74 | 0.7 |
| 04/05/2012 12:22:36 | 239.54 | 239.33 | 239.50 | 5.88 | 5.91 | 6.01 | 0.74 | 0.7 |
| 04/05/2012 12:22:37 | 239.49 | 239.32 | 239.47 | 5.80 | 5.89 | 6.04 | 0.74 | 0.7 |
| 04/05/2012 12:22:38 | 239.44 | 239.24 | 239.41 | 5.79 | 5.87 | 5.98 | 0.75 | 0.7 |
| 04/05/2012 12:22:39 | 239.44 | 239.26 | 239.40 | 5.84 | 5.87 | 6.01 | 0.75 | 0.7 |
| 04/05/2012 12:22:40 | 239.31 | 239.14 | 239.28 | 5.86 | 5.92 | 6.06 | 0.75 | 0.7 |
| 04/05/2012 12:22:41 | 239.08 | 238.92 | 239.05 | 5.85 | 5.94 | 6.07 | 0.76 | 0.7 |
| 04/05/2012 12:22:42 | 239.07 | 238.87 | 239.02 | 5.89 | 5.95 | 6.11 | 0.76 | 0.7 |
| 04/05/2012 12:22:43 | 239.03 | 238.92 | 239.03 | 5.89 | 5.96 | 6.09 | 0.75 | 0.7 |
| 04/05/2012 12:22:44 | 239.06 | 238.94 | 239.03 | 5.87 | 5.93 | 6.06 | 0.75 | 0.7 |
| 04/05/2012 12:22:45 | 239.05 | 238.92 | 239.06 | 5.91 | 5.98 | 6.10 | 0.75 | 0.7 |
| 04/05/2012 12:22:46 | 238.96 | 238.82 | 238.95 | 5.91 | 5.99 | 6.14 | 0.76 | 0.7 |
| 04/05/2012 12:22:47 | 239.18 | 239.06 | 239.22 | 5.91 | 6.01 | 6.09 | 0.75 | 0.7 |

For changing the graph to table and back click on the card labels Database table or Database chart.

