Iskra®

Users manual

GB

MiSMART v4.0

February 2015 • Version 1.5

Document change history			
Verzija	**Status / Changes**	**Date**	**Author**
1.0	Initial version	29.8.2012	Dr. Timotej Kodek, Goran Ambrožič
1.1	Screenshot update, added scatistics and quality sections	15.5.2013	Tine Bertoncelj, Dr. Timotej Kodek
1.2	Document review	20.6.2013	Dr. Timotej Kodek
1.3	Final document translation and review	30.10.2013	Dr. Timotej Kodek
1.4	- Multi mrp selection, - virtual locations, - user management, - pqdif export, - alarms update, - german language, - design changes to the conf ident tool.	27.5.2014	Dejan Bulatovič
1.5	- Edit virtual MRP, - topology, - PQ anomaly list, - reload/delete all item, - user access.	23.1.2015	Dejan Bulatovič, Dr. Timotej Kodek

Content

1 MiSMART - a brief description 7
1.1 Normal operation requirements 7
1.2 System access: 8
1.3 MiSMART main navigation window 9
2 MiSMART data monitor 10
2.1 Measurement monitoring module – Measurements 10
2.1.1 Filter (Filter resources view) –Setting up the measurement quantities for display 12
2.1.2 Data nodes – reviewing and interpreting the MRP structure tree 13
2.1.3 Multi MRP selection 15
2.1.4 Measurements – selecting the required measurements for displaying 15
2.1.5 User scenarios – MEASUREMENTS 19
2.2 Alarm monitoring module – Alarms 32
2.2.1 Filter resources view - Setting the measurements for alarm monitoring 32
2.2.2 User scenarios– Alarms 33
2.3 Power quality module – Quality 37
2.3.1 Data nodes – reviewing and interpreting the topological tree 37
2.3.2 User scenarios – Quality 37
3 MiSMART configuration tools - a tool for system configuration 44
3.1 Accessing system Configuration Tools 44
3.2 Configuration tools – main window 45
3.3 Application navigation 46
3.3.1 Switching between MiSMART Data Monitor and MiSMART Configuration Tools 46
3.3.2 Logging off from the Configuration Tools application 46
3.3.3 Switching between application module *Measurement nodes* and *Measurement Idents* 46
3.4 User Management 46
3.4.1 Window navigation 47
3.4.2 Users 47
3.4.3 User access 49
3.4.4 Group functionalities 50
3.5 A tool for editing meter reference points (MRP) – measurement nodes 53
3.5.1 Window appearance 53
3.5.2 General system overview 53
3.5.3 Group of metering nodes - Group node 54
3.5.4 Meter Reference Point (MRP) 55
3.6 Virtual locations 65
3.6.1 Creating a new virtual location 65
3.6.2 Adding existing MRPs into a virtual location 67
3.7 A tool for editing the display of measurement parameters (idents) 72
3.7.1 Window Appearance 73
3.7.2 Creation of measuring quantity node 73
3.7.3 Renaming, deleting and moving measurement groups 73
3.7.4 Renaming measurement groups 73
3.7.5 Deleting measurement groups 74
3.7.6 Moving measurement groups 74
3.7.7 Moving a measurement idents to measurement groups 74
3.7.8 List of measurements in this group 75
3.7.9 Details edit of the individual measurement idents 75

3.7.10 Changing the name and unit of the measurement idents....76
3.7.11 Graphical presentation of measurement idents....76
3.7.12 Recalculating the displayed values - Daily Energy consumption graph....76
4 Setting up measurement instruments to connect into the system by using the MiQEN Setting Studio SW....77
4.1 Ways to set up and communicate to the measurement instruments....77
4.1.1 MMC/SD card....77
4.1.2 USB communication....77
4.1.3 Ethernet communication....77
4.2 Setting the instrument step-by-step....77
4.2.1 Time, time zone, summer/winter time....78
4.2.2 Communication settings for data pushing and measurement instrument time synchronization....78
4.2.3 Settings for measurements and alarms pushing....80
4.3 Activating the pushing mechanism and data transfer logic....81

List of figures:

Figure 1: Login screen....8
Figure 2: MiSMART web application....9
Figure 3: The navigation part of the screen....10
Figure 4: Navigating to the Measurements module....10
Figure 5: The measurements module before choosing the desired measurements for displaying....11
Figure 6: Display windows....11
Figure 7: Filters – choosing measurement quantities for displaying....12
Figure 8: Filters – choosing the timespan....12
Figure 9: Calendar for setting the required date....13
Figure 10: Hierarchy view of all measuring points within the system....14
Figure 11: Topology view....14
Figure 12: Multi MRP selection....15
Figure 13: An example of measurements available for a particular measuring point....16
Figure 14: Available measurements by group for a selected MRP....16
Figure 15: Available measurements for a particular group....16
Figure 16: View Type....17
Figure 17: View Type with all available functions....18
Figure 18: The measurements list table....19
Figure 19: Reload specific measurement....20
Figure 20: A chart showing one measurement....20
Figure 21: A chart with two displayed measurements....21
Figure 22: A table showing one measurement....23
Figure 23: Exporting measurements into Excel....24
Figure 24: An Excel table....24
Figure 25: Server-created PQdif file link....24
Figure 26: Measurements as seen in the PQDiffractor SW package....25
Figure 27: Server-created PQdif folder link....25
Figure 28: Measurements as seen in the PQView SW package....26
Figure 29: Histogram data representation....27
Figure 30: Showing only one measurement in a percentile table....29
Figure 31: Multiple measurements in a percentile table....29

Figure 32: Percentile parameter displaying....29
Figure 33:A table showing all available load symmetry measurements from a selected measurement point....30
Figure 34: Phase load symmetry displayed as a pie-chart....31
Figure 35: The peak power within the selected time period....32
Figure 36: Navigating to the alarm monitoring module....32
Figure 37: Filters – choosing relevant measurements....32
Figure 38: Selecting alarm view type....33
Figure 39: A chronological table showing alarms....33
Figure 40: Alarms - paging control....33
Figure 41: Sorting by a particular column....34
Figure 42: Showing general alarm data in bar chart form....34
Figure 43: Displaying data as a pie-chart....35
Figure 44: Alarm table....35
Figure 45: Bar charts depicting the number of alarms by type at all meter points....36
Figure 46: A table of active alarms showing only alarms for one MRP....36
Figure 47: Pager table control....36
Figure 48: Changing the alphabetical and number sorting....36
Figure 49: Accessing the power quality module....37
Figure 50: A topological tree showing all meter points with attached power quality analyzing instruments....37
Figure 51: Complete system quality overview by meter point....38
Figure 52: A table with monitoring state indices....38
Figure 53: Selected time period reports for one meter point....39
Figure 54: EN50160 compliant report for a selected meter point....39
Figure 55: A list of anomalies of type “Flicker pst”....40
Figure 56: Aggregated power quality table by week....41
Figure 57: Timespan control....41
Figure 58: List of all anomalies for a particular report....42
Figure 59: List of all anomalies....42
Figure 60: List of all anomalies – sort by meter point....43
Figure 61: List of all anomalies – sort by PQ parameter....43
Figure 62: System login....44
Figure 63: Configuration tools - main window....45
Figure 64: Navigation through the MiSMART system....46
Figure 65: Application navigation buttons....46
Figure 66: Logging off from the system....46
Figure 67: Application module navigation buttons....46
Figure 68: User Management....47
Figure 69: Add user account....48
Figure 70: Group functionalities....48
Figure 71: Users table....48
Figure 72: Searching for a user....48
Figure 73: Editing an existing users' account....49
Figure 74: User access configuration window....49
Figure 75: User access configuration window – User select....50
Figure 76: User access configuration window – Add/remove meter group access....50
Figure 77: Group functionalities....50
Figure 78: Creating new group functionality....51
Figure 79: Editing a group functionality....52
Figure 80: The MRP structure tree....53
Figure 81: General system overview....53
Figure 82: Creating group nodes....54
Figure 83: Renaming group nodes....54
Figure 84: Deleting group nodes....55

Figure 85: Moving group nodes 55
Figure 86: Creating an MRP 56
Figure 87: Renaming meter reference point 56
Figure 88: Moving an MRP 56
Figure 89: Measurement instrument status....57
Figure 90: Measurement instrument status....58
Figure 91: Measurement instrument status....58
Figure 92: Measurement instrument status if data pushin is delayed....59
Figure 93: Measurement instrument status if no data is received 59
Figure 94: MRP setup window....60
Figure 95: No data sources attached to MRP 60
Figure 96: List of all measurement instruments 61
Figure 97:Approval of setup....61
Figure 98: Detaching an instrument from an MRP 62
Figure 99: Received data table showing last measurements which are up to date 63
Figure 100: Received data table showing last measurements which are not up to date....63
Figure 101: A chronological list of all alarms at a selected MRP 64
Figure 102: Setting planned and unplanned alarms at an MRP 65
Figure 103: Add description for planed alarm dialog box 65
Figure 104: Creating a new virtual location....66
Figure 105: Virtual location....66
Figure 106: Settings related to a virtual location 66
Figure 107: Virtual location status 66
Figure 108: Configuring a meter reference point....67
Figure 109: MRPs to be added to a virtual location 67
Figure 110: Adding an existing MRP into a virtual location 67
Figure 111: A new virtual measurement 68
Figure 112: A new virtual measurement – Measurement....68
Figure 113: A new virtual measurement – Formula 69
Figure 114: Select an MRP....69
Figure 115: Select a measurement....70
Figure 116: Selecting the addition operator 70
Figure 117: Existing virtual measurements....70
Figure 118: Edit virtual measurement....71
Figure 119: Edit virtual measurement formula 71
Figure 120: Measurement idents....72
Figure 121: List of MRP's with this measurement 72
Figure 122: Details edit idents 75
Figure 123: Edit idents name and unit description 76
Figure 124: Time related settings 78
Figure 125: Communication settings 79
Figure 126: Automatic time synchronization 79
Figure 127: Setting up measurement pushing parameters 80
Figure 128: Alarm pushing configuration 81
Figure129: Instrument pushing activation (shown for measurement recorder)....81

1 MiSMART - a brief description

MiSMART represents a software solution which is part of a broader group of Iskra Sistemi solutions for centralized data collection from various measurement instruments with the principal aim of monitoring power quality of the electrical power grid. At the same time the system is also meant to be used for remote logging of utility consumption installed on counters with pulse outputs. (e.g. gas, water consumption or consumption of other reagents) MiSMARTv3.0 represents the third improved system version and is primarily intended for use in the electrical distribution business vertical.

The aim of this manual is to show how the system is used. The system comprises two different applications:

- ***MiSMART data monitor*** – for monitoring and simple manipulation of data transmitted from devices within the grid. This part is normally available to all users and consists of the following modules:
  - *Measurement reviewing and their displaying by meter point in graphic and table form,*
  - *Alarm reviewing enabling displaying of alarms at various meter points in table form,*
  - *Quality reviewing which enables power quality analysis in graphic and table form in accordance with the EN50160 standard,*
  - *Measurement and alarm system statistical analysis.*

- ***MiSMART configuration tools*** – is a tool for settings configuration within the MiSMART system and is primarily meant for system administrators. A particular system administrator can be using the data monitor application at the same time. This application consists of 2 modules:
  - *Measurement nodes, enabling creating of an organizational structure seen in tree topology view which consists of groups (nodes) and meter points where instruments are attached. This module enables functions such as attaching and configuring instruments to meter points, monitoring basic instrument diagnostics, monitoring meter point change history, basic data monitoring (measurements and alarms) and some basic meter point statistics,*
  - *Measurement Idents, enabling simple grouping of measurement quantities within the system. Apart from this, measurement descriptions, units, chart types and simple data operations can also be defined.*

1.1 Normal operation requirements

MiSMART operates as a web based application from a web browser. For optimal user experience it is recommended to use the latest version of any modern web browser.

The following limitations regarding web browsers are known at this point:

- Internet Explorer 9 or newer
- Firefox 3.5 or newer

The recommended screen resolution should be at least1280x1024.

1.2 System access:

Application can be accessed by using the Internet Explorer, Mozilla Firefox, Chrome, Safari or Opera web browser. The user experience is the same in any of these browsers. All screens in this manual were produced with the Firefox browser.

To access the application please entered a proper URL into the browser which has been given to you by your system administrator.

After entering the URL the login screen appears:

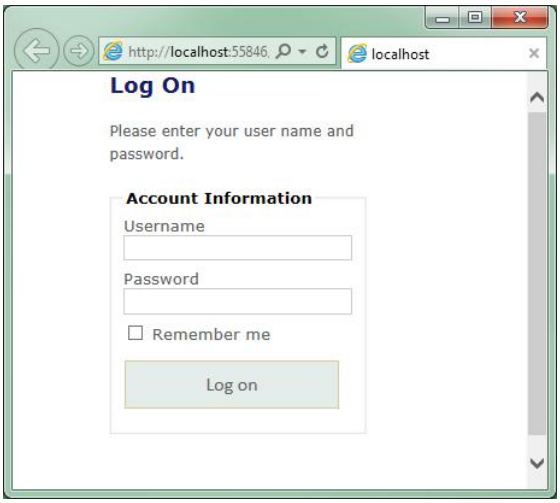


Figure 1: Login screen

The username in entered into the *Username* field and the password next to the *Password* field. Please confirm the login by *Log On.*

Important:
The login credentials should be received from the system administrator. Please report any credential issues to her/him.

1.3 MiSMART main navigation window

After logging in successfully the main navigation window appears. On top two main navigation buttons are located. The first is *Configuration Tools*, which is intended for MiSMART administrators who can change various system settings. The other button is *DataMonitor* enabling users to monitor instrument data.

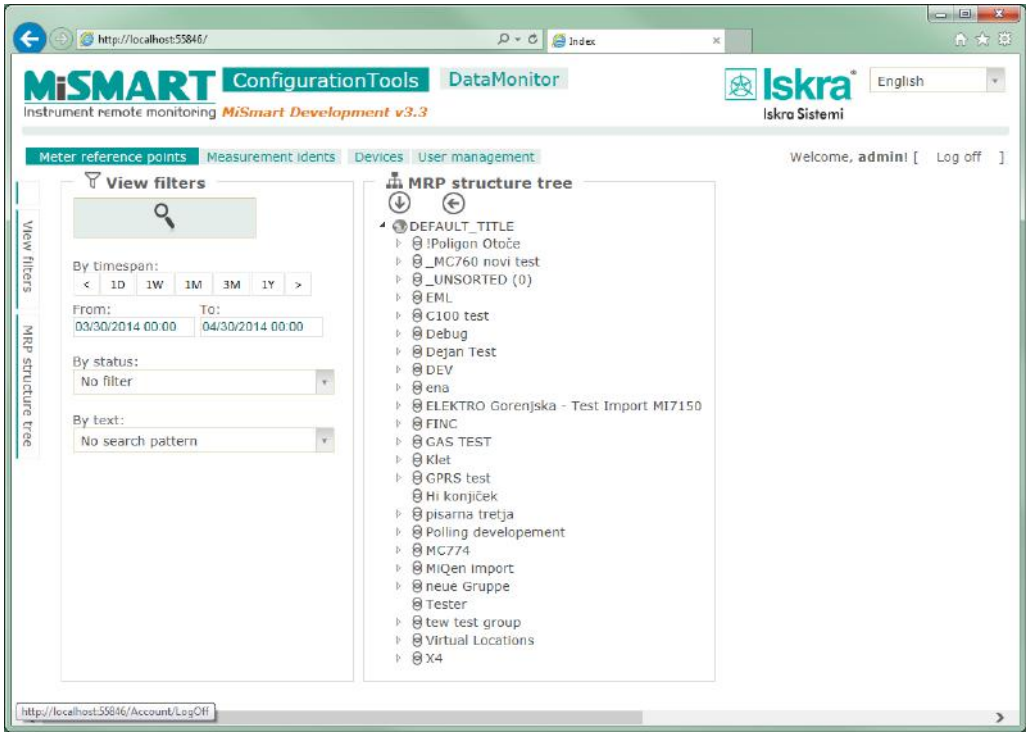


Figure 2: MiSMART web application

2 MiSMART data monitor

The MiSMART DataMonitor application enables reviewing of data which are sent by all supported network attached devices. It consists of the following content modules:

- Measurement monitoring - *Measurements*
- Alarm monitoring - *Alarms*
- Quality monitoring- *Quality*

The current navigation point can be determined from the upper part of the screen showing which application and which content module is currently selected.

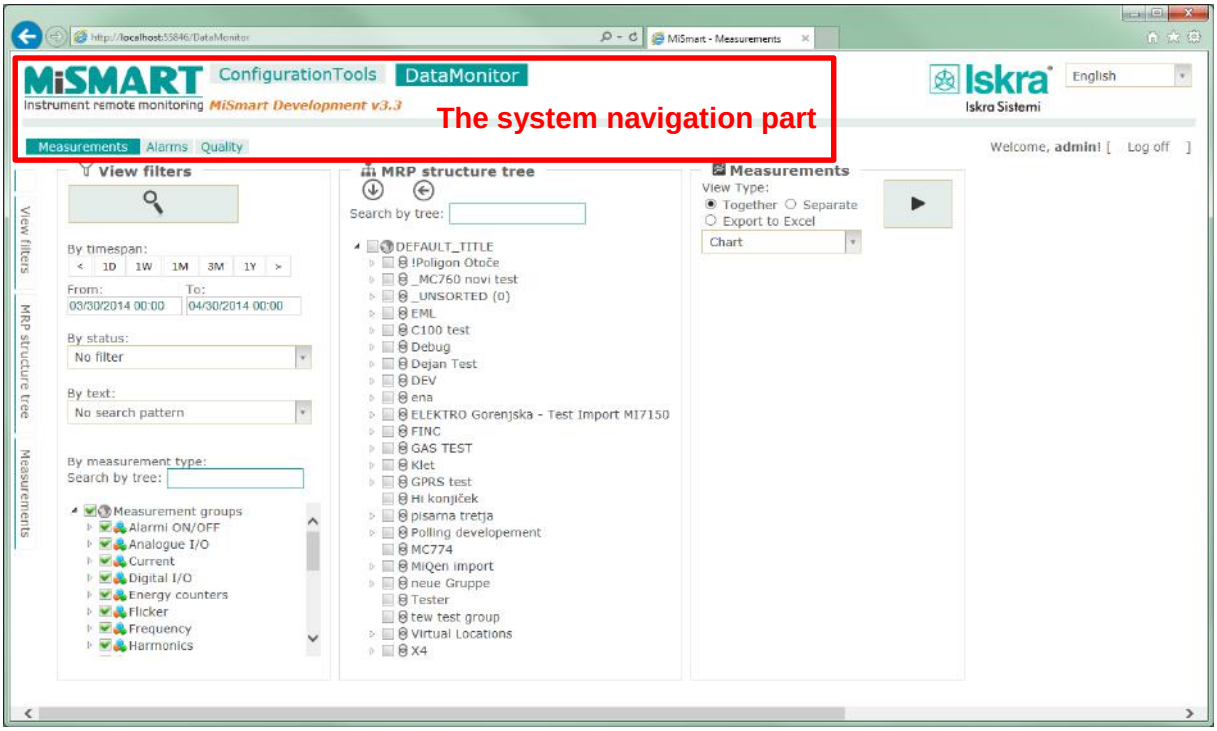


Figure 3: The navigation part of the screen

In the following chapters the use of all available modules will be explained.

2.1 Measurement monitoring module – Measurements

After clicking the *DataMonitor* button the measurements module for monitoring and reviewing measurement data is displayed.

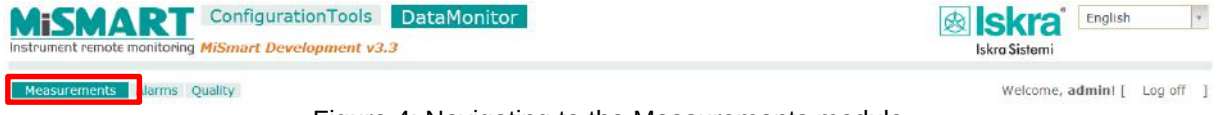


Figure 4: Navigating to the Measurements module

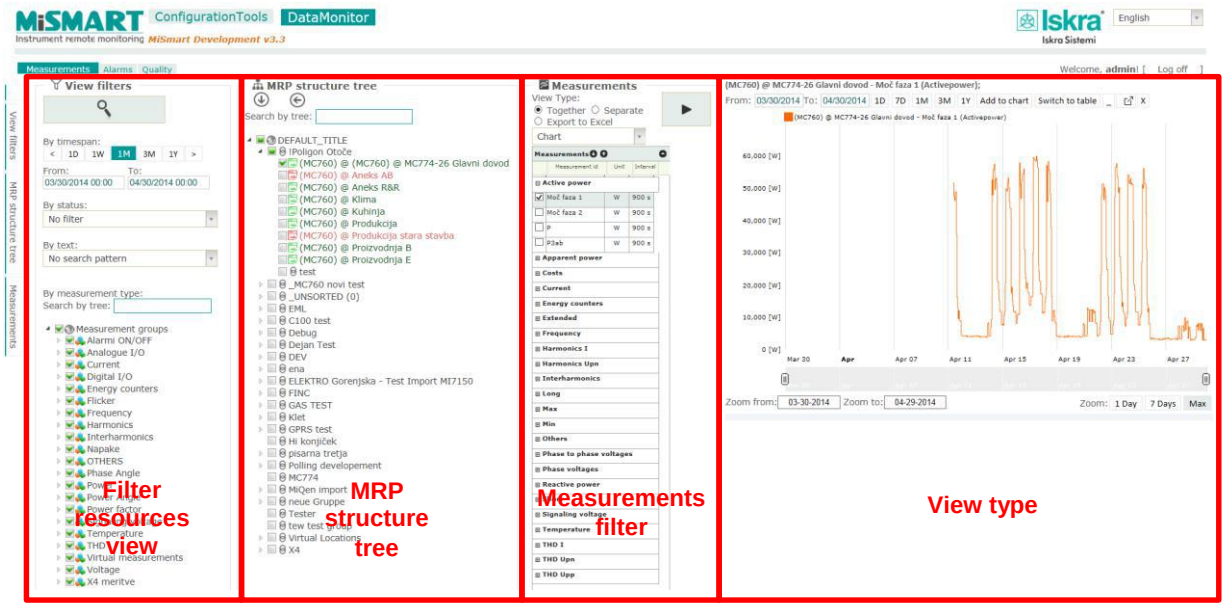


Figure 5: The measurements module before choosing the desired measurements for displaying

The three left-most views in the upper figure (filters, structure tree and measurements) can also be seen from a tab-separated ribbon at the left side of the screen. These can be show nor hidden either by clicking on the upper tab (e.g. View filters) or from the tab-separated ribbon on the left side. The currently hidden views are colored in red as in the case below where the »View filters« tab is hidden from view:

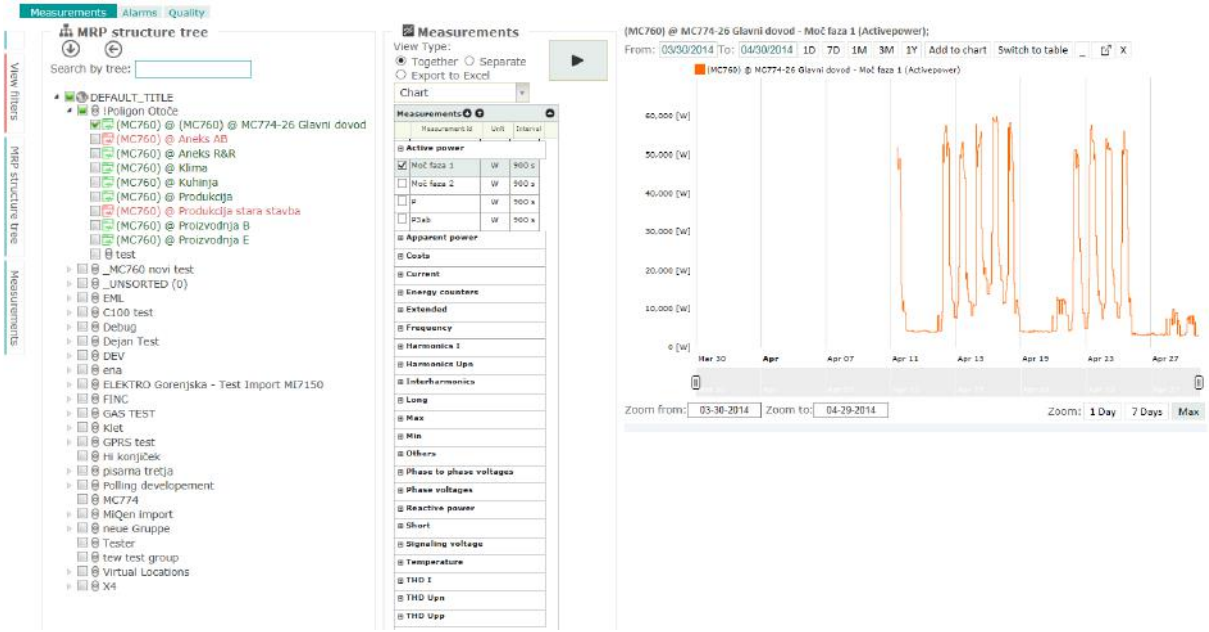


Figure 6: Display windows

It is important to properly define which measurements will be viewed in the display window. At the left-most side the filtering criteria are first defined, after this a desired measurement point from the structure tree is selected, after which a suitable measurement quantity from this point can be selected for displaying.

Every one of the four segments is accurately described below.

2.1.1 Filter (Filter resources view) –Setting up the measurement quantities for display

In the left part of the screen the filtering section appears which refreshes the tree structure on the right side upon pressing the button. The filter enables filtering data according to date, certain predefined filters and text searching.

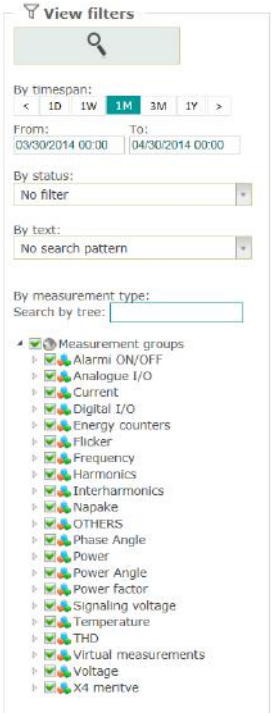


Figure 7: Filters – choosing measurement quantities for displaying

The lowermost filter part is intended for filtering out meter points with only the selected measurement quantities. Upon clicking *Available measurements groups* a list of all quantities which are configured within the system are displayed (to see how they are configured please see chapter Configuration Tools/Measurement idents). Every one of the quantities can be expanded and selected/deselected upon request.

Important:

Upon changing quantities for displaying the topological tree structure – data nodes at the right is NOT refreshed automatically. It is only refreshed with the requested quantities after clicking on the icon. A reload indicator can appear for a short period of time.

2.1.1.1 Filter (Filter resources view) – setting up the timespan for displaying data

In the upper part of the *Filter resources view*, a suitable timespan for displaying data can be configured:

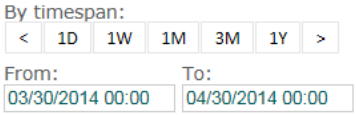


Figure 8: Filters – choosing the timespan

✓ ***Important:***

After logging into the system both dates are read from a cookie which if available on the current computer makes the start and end timestamps the same as they were when the user last used the system.

By directly entering the date into the text field 03/30/2014 00:00 or by clicking into this date entry field a calendar appears where a required date and hour can be set.

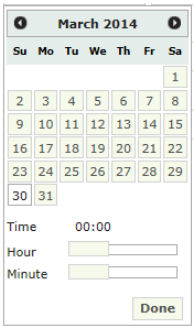


Figure 9: Calendar for setting the required date

At the topmost part of the calendar there are sliders to change the month with days, hours and minutes underneath. The requested time which is set through the slider mechanism below is shown next to the Time tag. To set the system current time the user can select the *Now* option and to confirm the date selection *Done* is pressed.

By clicking the shortcut icons < 1D 1W 1M 3M 1Y > a period of 1 day (1D), last 7 days (7D), last one month (1M), last 3 months (3M) and last year (1Y) as an offset from the currently set *End Timestamp* is selected. The corresponding arrows can also be used to add or subtract the currently entered timespan.

✓ ***Important:***

When changing the timespan the Data nodes tree is NOT reloaded automatically. It is refreshed upon request after pressing the 🔍 *button. A reloading icon may appear when this happens.*

2.1.2 Data nodes – reviewing and interpreting the MRP structure tree

The hierarchy view tree in the Data nodes view shows the grid distribution configuration as a logical tree of groups and MRPs (To see how they are configured please see chapter Configuration Tools/Measurement nodes):

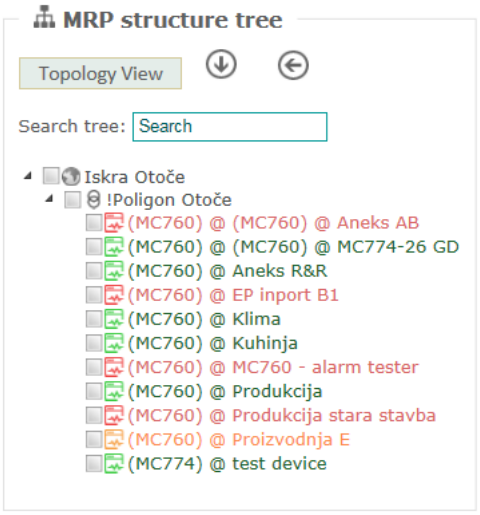
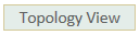


Figure 10: Hierarchy view of all measuring points within the system

Clicking 

icon, switches the MRP structure tree from hierarchy view to topology view which provides a topology insight into the system:

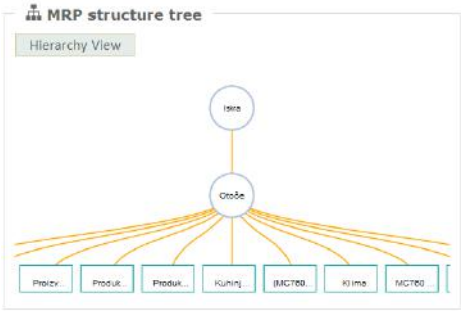
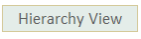


Figure 11: Topology view

(If the topology tree isn't displayed entirely, you can navigate through it by left clicking and holding on the blank spot and dragging tree to desired direction)

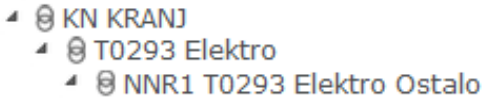
Clicking 

icon, switches back to hierarchy view.

Inside the both tree types two icon types can be found (for each view):

-

/ - An icon denoting a group with a corresponding name. The group represents a logical node with no devices attached. There can be an arbitrary number of groups and their hierarchical levels are defined within the system. A typical user scenario would be a location-based topological structure such as the one below:



-

/

- An icon denoting a measuring point (MRP) with a corresponding name to which a certain number of measurements is attached in the database. To every measuring point up to one or no measuring instruments can be attached at a certain point in time. The configuration of this can be done through Configuration Tools (see chapter (Configuration Tools/Measurement nodes).

When clicking on a particular measuring point all historic measurement data which is available at this measuring point is displayed.

To easier manage the opening and closing of the structure tree the icons can be used where the left icon expands the tree structure and the right icon collapses it relative to the currently selected node.

Under these icons there is a search field Search by tree: through which searching through the MRP structure tree can be done more effectively.

✓ ***Important:***

A meter point is not directly connected to a particular instrument but represents some sort of a point where measuring equipment can be attached. At every meter point only one or no devices can be attached at a certain moment. The measuring point hence includes historic data from all instruments which have ever been attached to this point in the past even if some instruments may no longer be operational.

2.1.3 Multi MRP selection

In the MRP tree structure multiple Meter Reference Points (MRPs) can be selected at the same time. The resulting group of measurements (within the measurements view) is an intersection of all measurements on the currently selected MRPs.

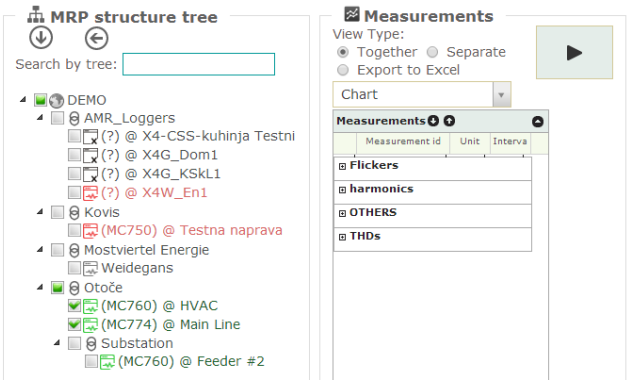


Figure 12: Multi MRP selection

In the upper figure two MRPs were selected. Within the Measurements view (Measurements) only measurements which are common to both selected MRPs are shown.

2.1.4 Measurements – selecting the required measurements for displaying

After selecting a certain measuring point (MRP) from the topology tree a list of all corresponding measurement historic data which is available in the database is displayed.

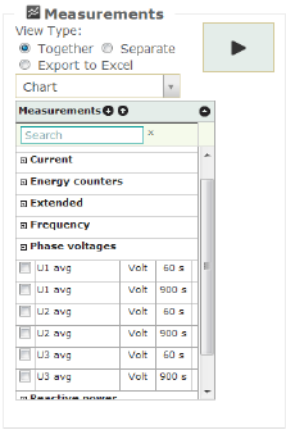


Figure 13: An example of measurements available for a particular measuring point

By clicking on icon, all measurements within each particular group can be accessed.

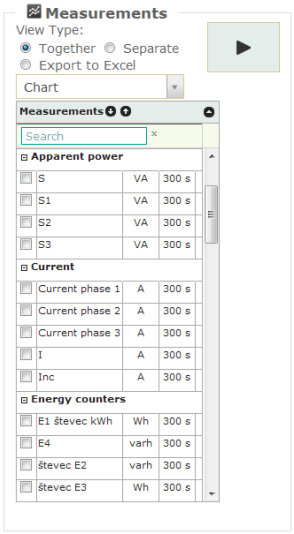


Figure 14: Available measurements by group for a selected MRP

You can return to the group-based view by clicking the icon.

By clicking on the icon measurements from every particular group can be accessed.

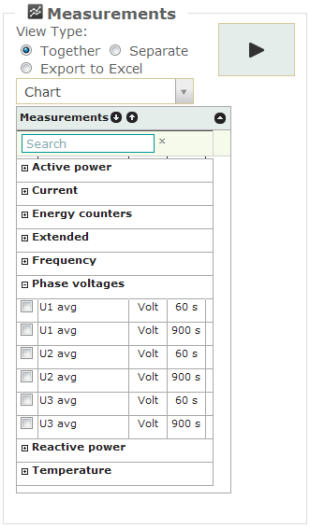


Figure 15: Available measurements for a particular group

A measurement group is then collapsed by clicking on ⊟.

Specific measurements can be found via search window Search.

The measurements view is divided into two parts. The upper part is the View Type selection part where the data display form is determined whereas the lower part consists of the measurement list table. The list table can be hidden or shown by subsequently pressing the icon at the top right corner of the selector table.

2.1.4.1 View Type

In ViewType the data display form can be determined.

The Chart selection charts the selected measurements as either a line or a bar plot (depending on how a selected measurement is configured to be displayed).

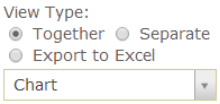


Figure 16: View Type

When chart or Excel for are selected the data can be displayed together or separately by choosing options *Together* or *Separate*.

By clicking on the dropdown menu Chart within view type all available view types can be seen:

- ***View Type***
  - *Chart*
  - *Table*
- ***Pqdif***
  - *Pqdif file*
  - *Pqdif folder*
- ***Statistical options***
  - *Histogram*
  - *Procentile*
  - *Phase load*
  - *Peak power*

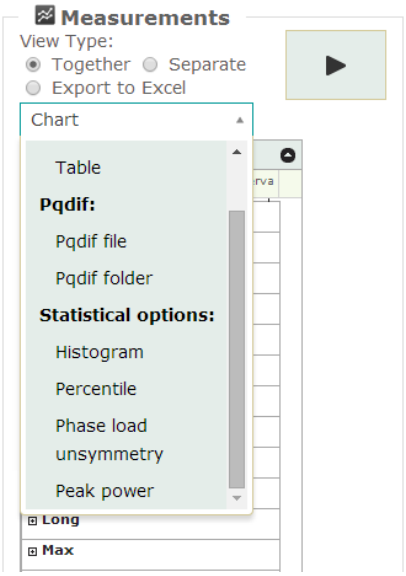


Figure 17: View Type with all available functions

All these view type options are further explained in the next sections.

2.1.4.2 Measurements list table

A table of all historic measurements is displayed in the measurements list table. Clicking on any table header enables sorting data according to that particular column. The table columns have the following meanings:

- ***Measurement Id*** – measurement name for displaying
- ***Unit*** – measurement unit for displaying
- ***Interval***– the time interval within which a certain measurement is evaluated on the instrument side and sent to the server

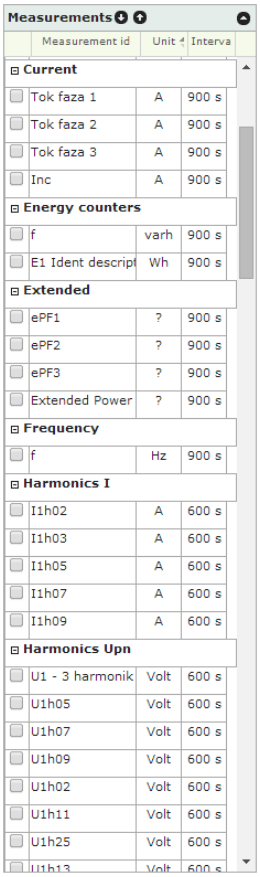


Figure 18: The measurements list table

A particular measurement is selected for displaying by clicking on a line or selecting an empty checkbox ☐ at the beginning of the line. More than one measurement can be selected by selecting a required number of lines. All selected measurements can then be displayed as a chart, as a table or in excel by clicking on an action icon ▶.

Displaying data at the right side of the application in display view can now be arbitrarily composed by displaying measurement data from many selected measuring points. Apart from creating new charts data plots can also be added to existing charts as it will be described later.

✓ ***Important:***

If an interval for a particular measurement quantity is short this may result in longer loading of charts since the data quantity may be far larger.

2.1.5 User scenarios – MEASUREMENTS

Every one of the available display forms will be described in the following sections.

2.1.5.1 Viewing measurements – Reload/Delete all items

Reload all items – enables you to reload measurements (in all forms) that have been previously displayed. These measurements have previously been closed due to different reasons such as:

- switching between tabs (example: measurements – alarms - quality),
- browser restart,
- browser refresh.

To reload all items simply click Reload all items icon and all closed measurements will be reopened.

To reopen a specific measurement display, hover over Reload all items icon and below the icona list of all previously closed measurement displays will appear:

Figure 19: Reload specific measurement

Select measurement you would like to reopen and click on it.

Delete all items – clicking Delete all items deletes all measurements saved under Reload all items.

2.1.5.2 Viewing measurements in graphic form

After selecting a measurement from the measurements table list they can be displayed as a chart by selecting the Chart option in dropdown menu and executing the desired action with ▶. The new chart will now be displayed underneath all currently displayed charts or tables. If more than one measurement is selected it is important whether all measurements should be displayed *Together* in one chart (by choosing the Together option) or separately as a one separate chart for every one selected measurement (by choosing the Separate option).

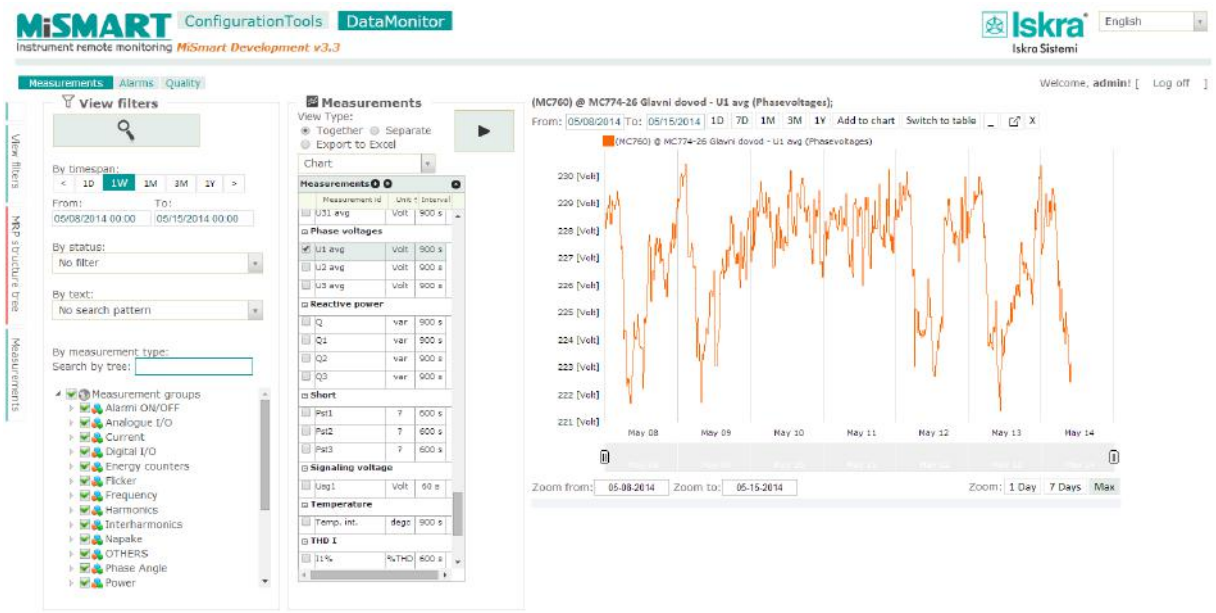


Figure 20: A chart showing one measurement

Other measurements can also be added to existing charts (*the already displayed measurements are not allowed*) by pressing the *Add to chart* Add to chart button which is located above the current plot. Every measurement will be displayed in different color and a corresponding legend is auto-generated which includes the color with the corresponding measuring point together with its measurement and measurement group.

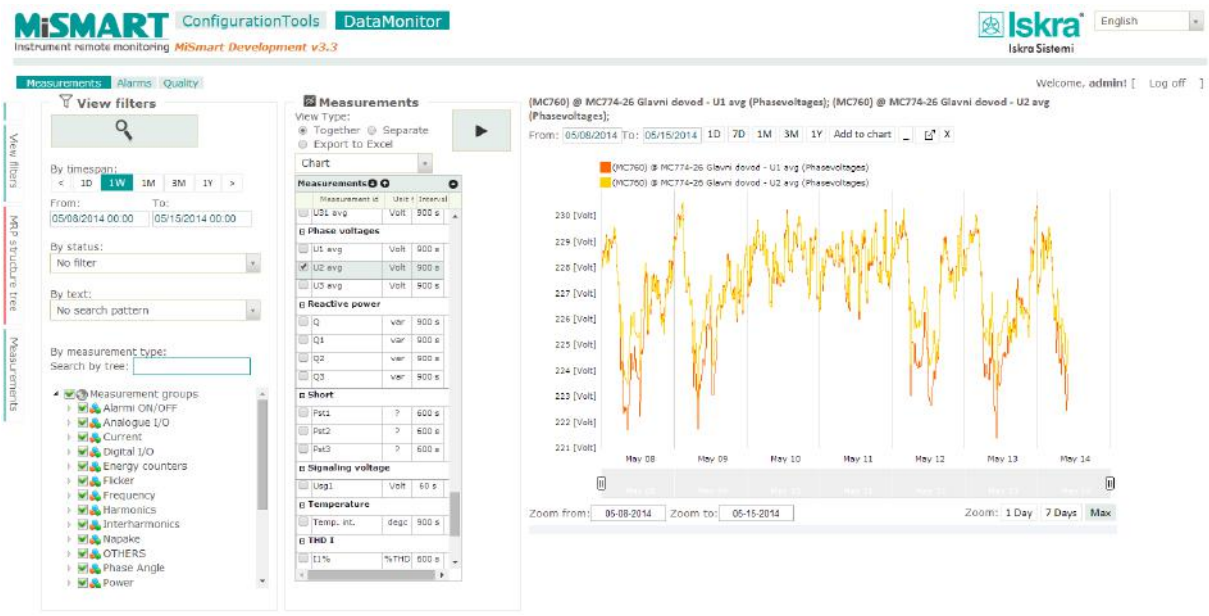
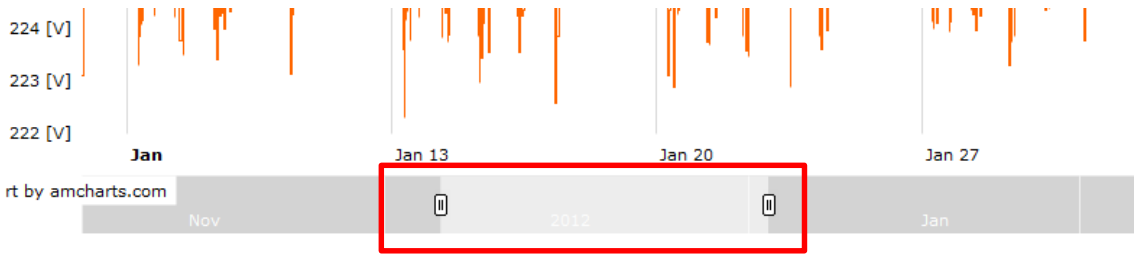


Figure 21: A chart with two displayed measurements

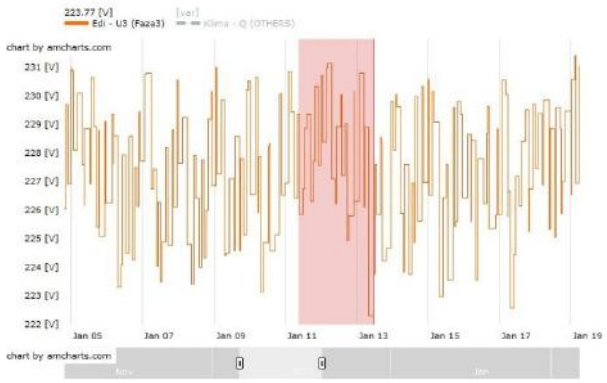
The following chart actions are also available:

- *Changing the chart time period* in a control above the plotted chart which enables quick and arbitrary time period settings. By clicking into the date field a popup calendar is displayed like in every other date control field. Buttons 1D, 7D, 1M ... enable shortcuts for quick timespan definition in regard to the currently selected end timestamp. When a new timespan is entered data is reloaded from the database.

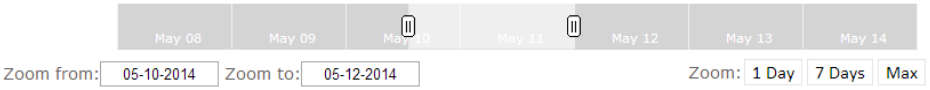
- The timespan (zoom in/out factor) of the currently loaded dataset can also be changed *by manipulating the slider control underneath the chart*:



  The currently selected timespan can also be moved by dragging the lighter ruler area left or right.
- *A particular chart can also be shown in a new full screen window* to make a more scrupulous data analysis by clicking the button.
- *Data zoom-in*, which can be done by selecting a region on the chart with a mouse.



- The chart can be put into its original form by clicking max, at the lower right side of every chart.
- Data zoom in/out can also be done with the slider control underneath the chart by fine-tuning the begin and end slider.



- If there is only one measurement available in a chart the control bar above the chart also offers an option of switching data into a table by selecting the Switch to table button.
- A particular chart can be removed from the current view by clicking the close button X at the top right corner. All other currently shown charts or tables are then moved upwards.
- By clicking into the legend square button Produkcija - Moč faza 1 (Activepower) a particular measurement can be hidden from a chart.
- A chart can be minimized by clicking the _ button to maximized by clicking the □ button at the top right corner of the cart
- Bar plots also have a grouping functionality which groups data according to a selected group period by selecting the *Group by dropdown option*. You can select the minute, hour, day, week or month grouping period when doing this:

2.1.5.3 Viewing data in table form

Measurements can be put into table view in two different ways. It can be selected by choosing an appropriate view type by selecting the button Table in dropdown menu and confirming the action with ►. The table is then displayed at the right side under all currently already plotted charts or tables. If more than one measurement is selected as many tables as there are selected measurements are drawn one underneath the other. Every table view can be switched into a chart by selecting the button Switch to chart above a particular table.

The alternative is to first plot a chart by selecting a particular measurement from a selected measurement point and then switching the view into a table with the Switch to table button above a particular chart.

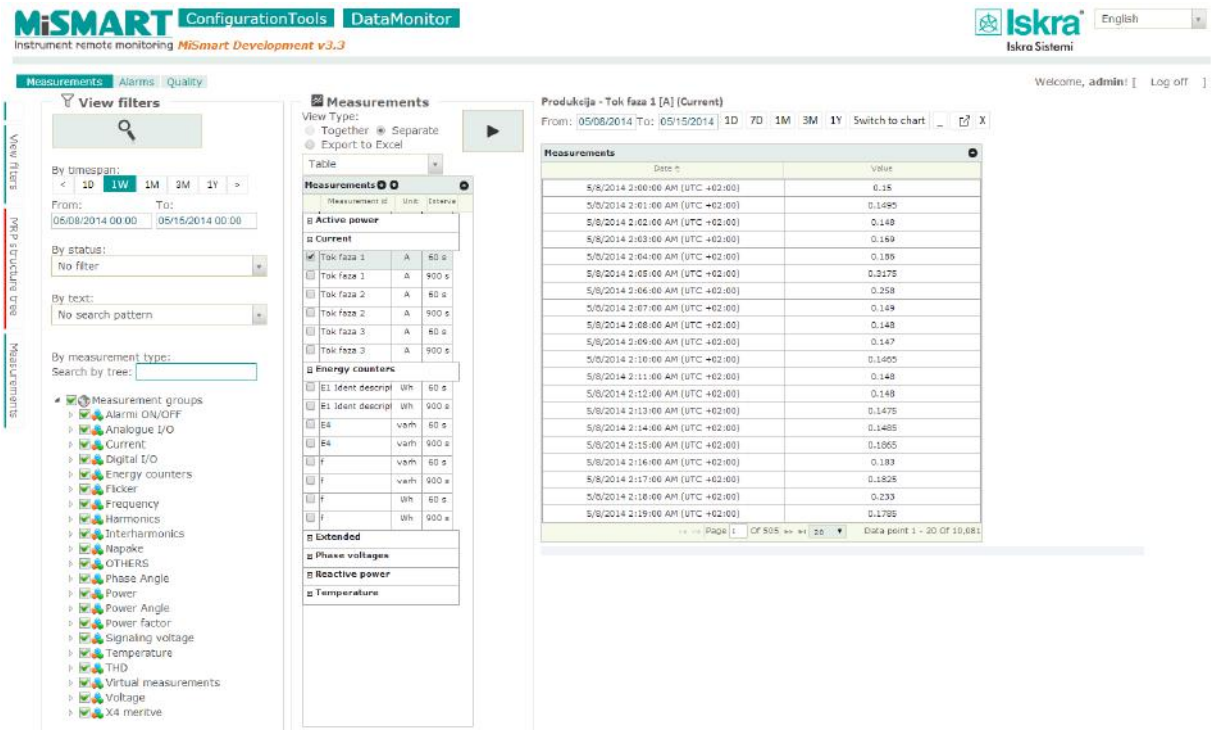


Figure 22: A table showing one measurement

Due to a large amount of data the measurement data is loaded within multiple pages. The paging control is available from the control line under any table:

The following actions are available in a table:

- *Changing the chart time period* in a control above the plotted chart which enables quick and arbitrary time period settings. By clicking into the date field a popup calendar is displayed like in every other date control field. Buttons 1D, 7D, 1M,..enable shortcuts for quick timespan definition in regard to the currently selected end timestamp. When a new timespan is entered data is reloaded from the database.

- *A particular chart can also be shown in in a new full screen window* to make a more scrupulous data analysis by clicking the button.
- A particular table can be removed from the current view by clicking the close button at the top right corner. All other currently shown charts or tables are then moved upwards.
- A table can be minimized by clicking the button to maximized by clicking the button at the top right corner of the table
- In the table header there is a minimization option by clicking the icon at the top right corner of the table.

2.1.5.4 Exporting measurements into Excel

Measurements can also be viewed in Excel. Within Measurements under View Type the *Export to Excel* Export to Excel option is available. By selecting the action button an Excel is generated on the server and a link to the server located file appears in the view area at the right of the screen. By clicking this link this file is downloaded to a the users' computer and opened with Excel if or is installed on this computer:

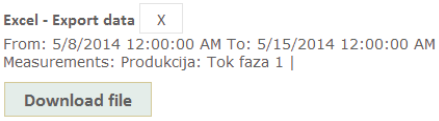


Figure 23: Exporting measurements into Excel

	A	B	C
1	Meter reference point name	Produkcija	
2	Measurement	Tok faza 1	
3	Unit	A	
4	From:	8.5.2014 0:00:00 (UTC +02:00)	
5	To:	15.5.2014 0:00:00 (UTC +02:00)	
6			
7	Timestamp (in local time)	Time-zone offset from UTC	Values
8	8.5.2014 0:00:00	UTC +02:00	0,145000
9	8.5.2014 0:01:00	UTC +02:00	0,148000
10	8.5.2014 0:02:00	UTC +02:00	0,148000
11	8.5.2014 0:03:00	UTC +02:00	0,154500
12	8.5.2014 0:04:00	UTC +02:00	0,186000
13	8.5.2014 0:05:00	UTC +02:00	0,183500
14	8.5.2014 0:06:00	UTC +02:00	0,183500
15	8.5.2014 0:07:00	UTC +02:00	0,157000
16	8.5.2014 0:08:00	UTC +02:00	0,148500
17	8.5.2014 0:09:00	UTC +02:00	0,148500
18	8.5.2014 0:10:00	UTC +02:00	0,148500
19	8.5.2014 0:11:00	UTC +02:00	0,148000
20	8.5.2014 0:12:00	UTC +02:00	0,147500
21	8.5.2014 0:13:00	UTC +02:00	0,221000
22	8.5.2014 0:14:00	UTC +02:00	0,169500
23	8.5.2014 0:15:00	UTC +02:00	0,147500
24	8.5.2014 0:16:00	UTC +02:00	0,148500
25	8.5.2014 0:17:00	UTC +02:00	0,148000
26	8.5.2014 0:18:00	UTC +02:00	0,148000
27	8.5.2014 0:19:00	UTC +02:00	0,238000
28	8.5.2014 0:20:00	UTC +02:00	0,231500
29	8.5.2014 0:21:00	UTC +02:00	0,183500
30	8.5.2014 0:22:00	UTC +02:00	0,171500
31	8.5.2014 0:23:00	UTC +02:00	0,147500
32	8.5.2014 0:24:00	UTC +02:00	0,148000
33	8.5.2014 0:25:00	UTC +02:00	0,147000
34	8.5.2014 0:26:00	UTC +02:00	0,175000
35	8.5.2014 0:27:00	UTC +02:00	0,232000
36	8.5.2014 0:28:00	UTC +02:00	0,147500
37	8.5.2014 0:29:00	UTC +02:00	0,147500
38	8.5.2014 0:30:00	UTC +02:00	0,146500

Figure 24: An Excel table

2.1.5.5 PQdif - file export

PQdif - Power Quality Data Interchange Format is a binary format defined with the IEEE 1159.3 – 2003 standard, intended for measurement interchange (such as voltages, currents, power, energies,…).
MiSmart enables exporting data into the standardized PQdif file format (PQdif file) aswell as into a PQdif folder (PQdif folder) format. This file format can be viewed with a free Pqdiffractor viewer (please download it from - http://www.pqview.com/pqdiffractor/). The Pqdif folder on the other hand creates as many files as there are different time intervals selected and was introduced for later manipulation in the PQView SW package (http://www.pqview.com/).

To export data into PQdif file you should first select all desired measurements, select the

option from the dropdown menu and confirm the export action with the button on the right hand side. After the action has been executed a link to a server-created PQdif file is offered for download in the view area which can then be downloaded and opened for viewing in PQdiffractor, if this SW is installed on the users' computer:

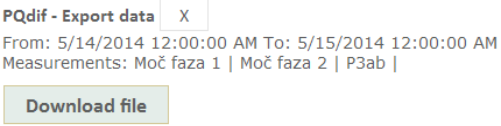


Figure 25: Server-created PQdif file link

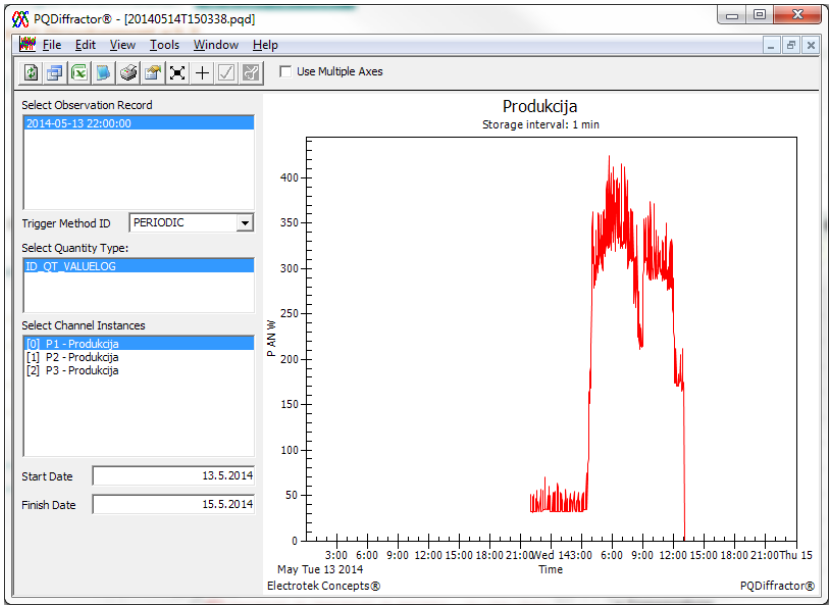
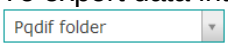


Figure 26: Measurements as seen in the PQDiffractor SW package

2.1.5.6 PQdif - folder export

The Pqdif folder is intended to be used in relation to the PQView SW package (http://www.pqview.com/).

To export data into PQdif folder you should first select all desired measurements, select the 

option from the dropdown menu and confirm the export action with the button on the right hand side. After the action has been executed a link to a server-created PQdif folder is offered for download in the view area which can then be downloaded and opened for viewing Windows Explorer. Within Windows Explorer you can then open every particular period related file in PQdiffractor, if this SW is installed on the users' computer:

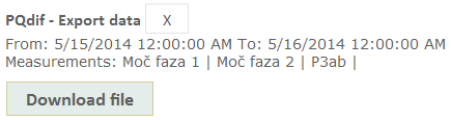


Figure 27: Server-created PQdif folder link

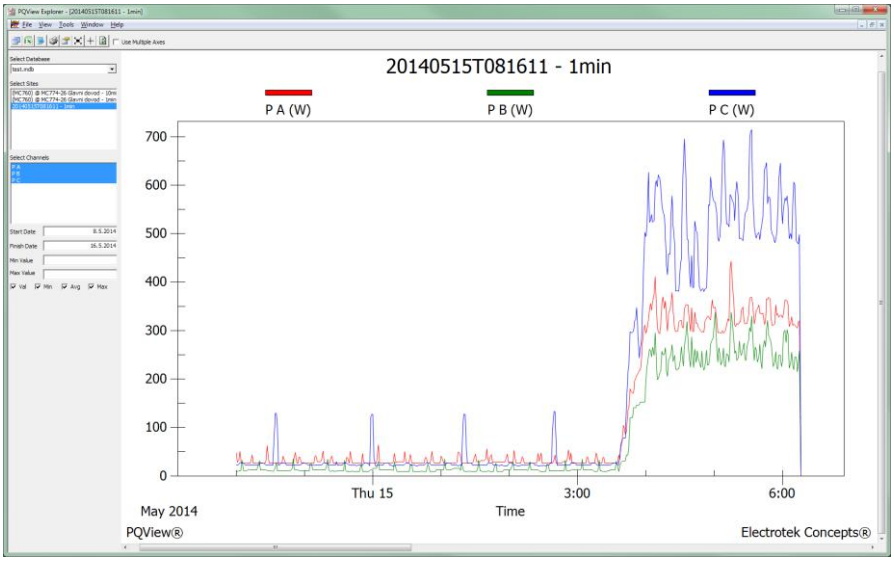
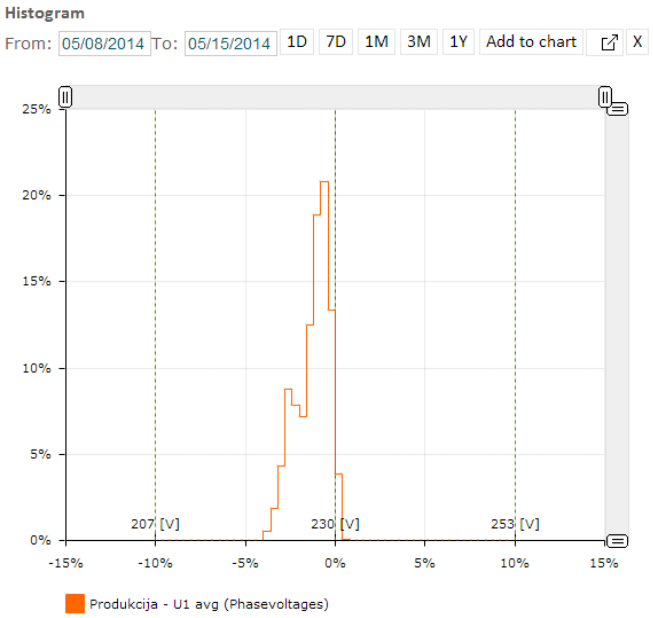


Figure 28: Measurements as seen in the PQView SW package

2.1.5.7 Statistical options: Analysing measurements in a histogram

A histogram is a view type which is used in statistical analysis to show a frequency distribution of a particular statistical variable. The horizontal axis displays measurement values while the vertical axis displays the normalized frequency as a percentage of the total number of available samples.

After selecting a particular measurement at a selected measurement point this option is available by selecting Histogram in dropdown menu and upon action request with the ▶ button all selected measurements are added at the right side of the screen in a new chart together with a corresponding table.



Class %		Class [Volt]		U1 avg (60s) - Produkcija %	Count
-4.4	-4	219.88	220.8	0.01	1
-4	-3.6	220.8	221.72	0.55	52
-3.6	-3.2	221.72	222.64	1.86	175
-3.2	-2.8	222.64	223.56	4.34	407
-2.8	-2.4	223.56	224.48	8.77	823
-2.4	-2	224.48	225.4	7.83	735
-2	-1.6	225.4	226.32	7.15	671
-1.6	-1.2	226.32	227.24	12.48	1171
-1.2	-0.8	227.24	228.16	18.91	1775
-0.8	-0.4	228.16	229.08	20.81	1953
-0.4	0	229.08	230	13.37	1255
0	0.4	230	230.92	3.83	359
0.4	0.8	230.92	231.84	0.09	8

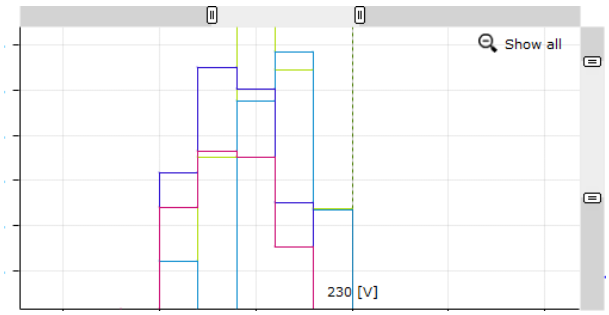
Figure 29: Histogram data representation

More than only one measurement can be added to a particular histogram under the confition that all displayed measurements have the same unit.

The following chart actions are also available:

- *Changing the chart time period* in a control above the plotted chart which enables quick and arbitrary time period settings. By clicking into the date field a popup calendar is displayed like in every other date control field. Buttons 1D, 7D, 1M,..enable shortcuts for quick timespan definition in regard to the currently selected end timestamp. When a new timespan is entered data is reloaded from the database.

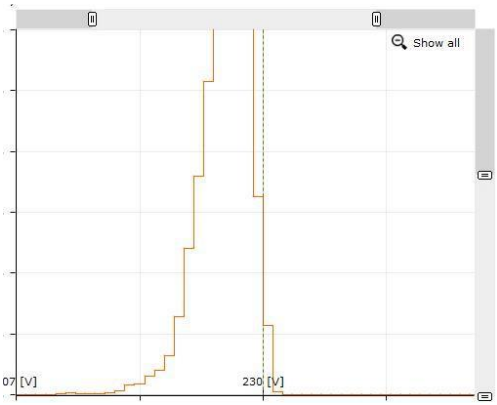
- The chart can *be zoomed in and out with two sliders* located at the top and right corners of the chart. With the horizontal slider you can adjust the zoom level of the value axis and with the vertical slider the zoom level of the percentage level axis.



A selected vertical percentage or horizontal value area can also be dragged to a desired location by holding and moving the mouse in the light gray area of the ruler.

- *The histogram chart can also be shown in a new full screen window* to make a more detailed data analysis by clicking the button.
- *Histogram data on the chart can also be zoomed in/out* by selecting a particular chart region with the mouse.

- The chart zoom level can be reset by clicking the *Show all* button - Show all
- The *exact positioning of the start and end of data* which is displayed for both axes can be achieved by changing the borders of both slider control.



- A particular chart can be removed from the current view by clicking the close button X at the top right corner. All other currently shown charts or tables are then moved upwards.
- By *clicking into the legend square button* Feeder Station - P1 (Activepowers) a particular measurement can be hidden from a chart.
- A chart can be minimized by clicking the – button to maximized by clicking the □ button at the top right corner of the cart

2.1.5.8 Statistical options: Analyzing measurements in a percentile view

Percentiles are used for displaying sample frequency distribution for a particular statistical dataset. A percentile with the notification CPXX denotes the limit value where XX% of all samples in the dataset lie. Its' usage is similar to any other measurement displaying.

To access this functionality first go to *DataMonitor*/*Measurements*. Under View Type in a dropdown menu Percentile must be selected and then click on the ▶ action button displays a table showing CP99, CP95, CP05, CP01, average, maximum and minimum values for all selected measurements.

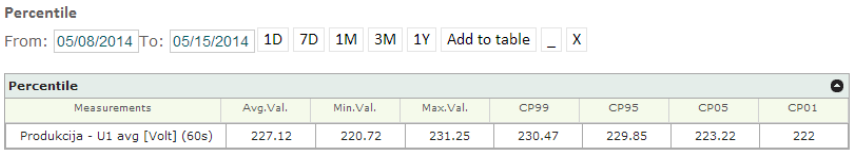


Figure 30: Showing only one measurement in a percentile table

To add measurements from the measurement table displayed on the left they can be selected and added to the table with the Add to table button.

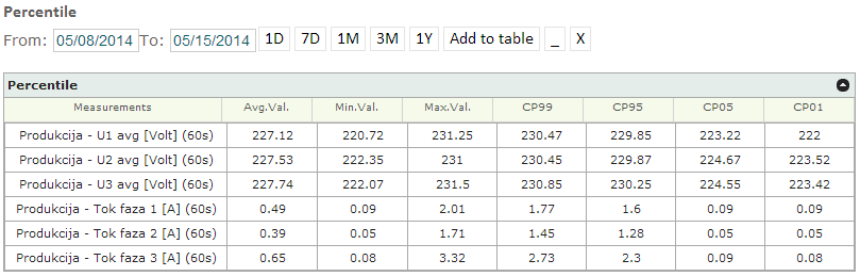


Figure 31: Multiple measurements in a percentile table

By clicking and table line a chart is drawn underneath the table. The chart includes lines indicating all 7 statistical parameters with a corresponding legend.

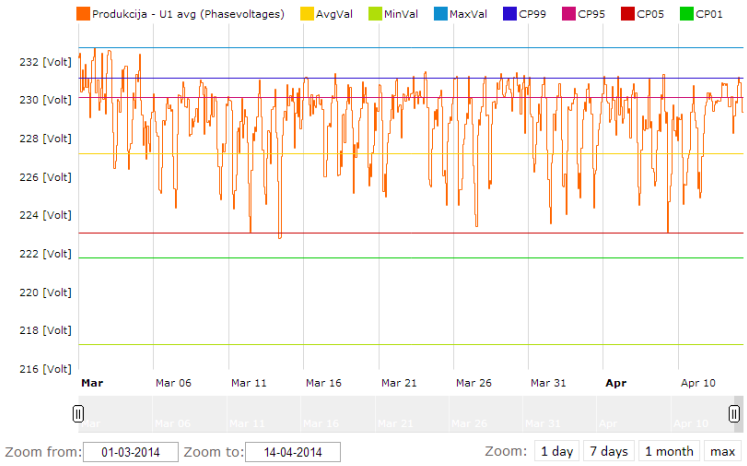


Figure 32: Percentile parameter displaying

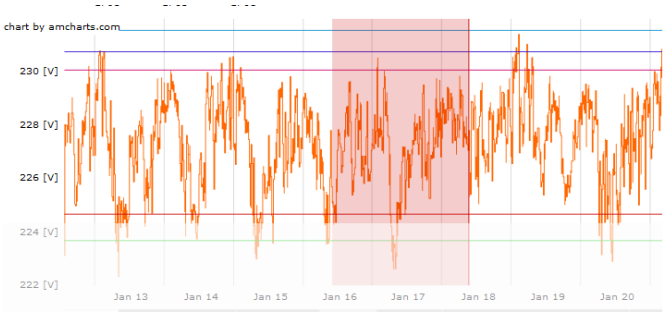
The following chart actions are also available:

- *Changing the chart time period* in a control above the plotted chart which enables quick and arbitrary time period settings. By clicking into the date field a popup calendar is displayed like in every other date control field. Buttons 1D, 7D, 1M,..enable shortcuts for quick timespan definition in regard to the currently selected end timestamp. When a new timespan is entered data is reloaded from the database.

- The timespan (zoom in/out factor) of the currently loaded dataset can also be changed *by manipulating the slider control underneath the chart*:

The currently selected timespan can also be moved by dragging the lighter ruler area left or right.

- *A particular chart can also be shown in a new full screen window* to make a more scrupulous data analysis by clicking the button.
- *Data zoom-in*, which can be done by selecting a region on the chart with a mouse.



- The chart can be put into its original form by clicking the max, at the lower right side of every chart.
- A particular chart can be removed from the current view by clicking the close button X at the top right corner. All other currently shown charts or tables are then moved upwards.
- By clicking into the legend square button Produkcija - U1 avg (Phasevoltages) AvgVal MinVal MaxVal CP99 CP95 CP05 CP01 a particular measurement can be hidden from a chart.
- A chart can be minimized by clicking the – button to maximized by clicking the □ button at the top right corner of the cart

2.1.5.9 Statistical options: Analysing measurements in a phase load symmetry view

Phase load symmetry describes how the load in all three phases is balanced. In an ideal case each phase would have one third of the total load so the aim of this statistical tool is aimed at quickly determining the amount of load unbalance.

The phase load symmetry function is located under *DataMonitor | Measurements*. Under *View Type* in a dropdown menu Phase load unsymm... must be selected and then click on the ▶ action button displays data in pie-chart form at the right side of the screen underneath all currently drawn data.

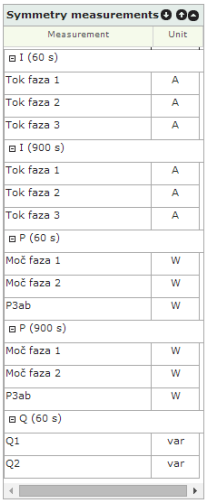


Figure 33:A table showing all available load symmetry measurements from a selected measurement point

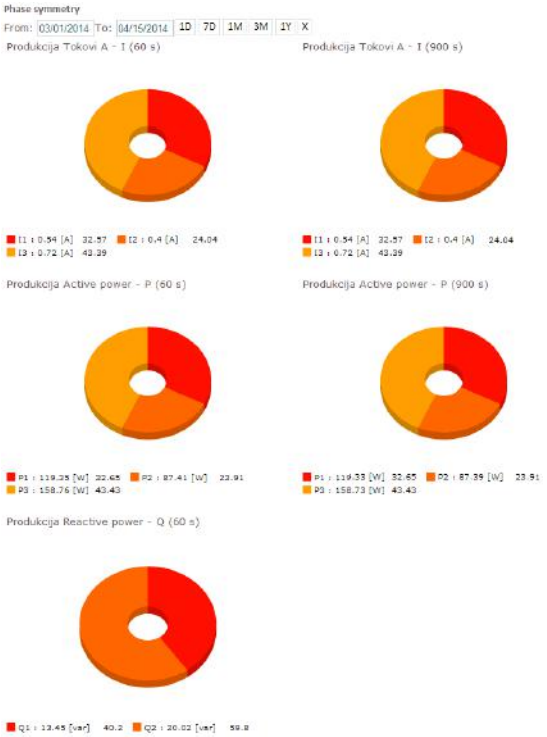
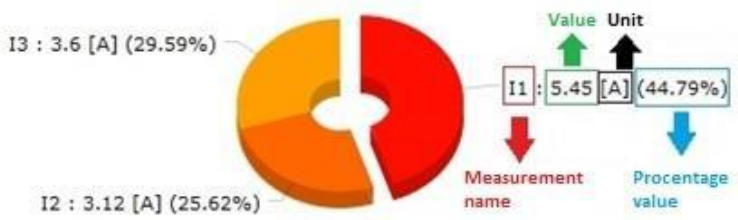


Figure 34: Phase load symmetry displayed as a pie-chart

When selecting a particular data point a table of all measurements which are subject to load symmetry analysis appear. They are divided into related groups – P, Q, S and I respectively. For every one of the available groups a pie-chart is drawn showing the absolute values and percentage parts for every phase load.



The following chart actions are also available:

- *Changing the time period* in a control above the plotted pie-charts which enables quick and arbitrary time period settings. By clicking into the date field a popup calendar is displayed like in every other date control field. Buttons 1D, 7D, 1M,..enable shortcuts for quick timespan definition in regard to the currently selected end timestamp. When a new timespan is entered data is reloaded from the database and recalculated.

- A particular chart can be removed from the current view by clicking the close button X at the top right corner. All other currently shown charts or tables are then moved upwards.

- By clicking on a particular pie-chart part the selected part is moved away from the central circle.

2.1.5.10 Statistical options: Analyzing the peak power

The peak power function is located under *DataMonitor /Measurements*. Under View Type in a dropdown menu Peak power should be selected. After that a measurement table including only P appears if available at the selected meter point. P should now be selected and the action button ▶ pressed to display the peak power relevant information at the right side:

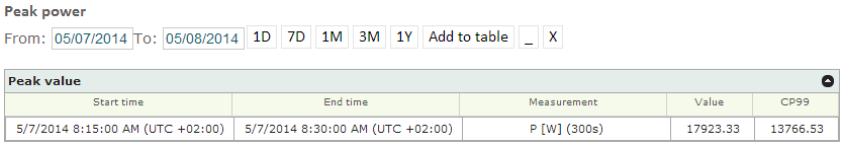


Figure 35: The peak power within the selected time period

The peak power is calculated as a maximum value of the measurement point total power which is calculated for 15 minute intervals.

2.2 Alarm monitoring module – Alarms

The alarm monitoring module is accessed by clicking at the Alarms tab through system navigation:

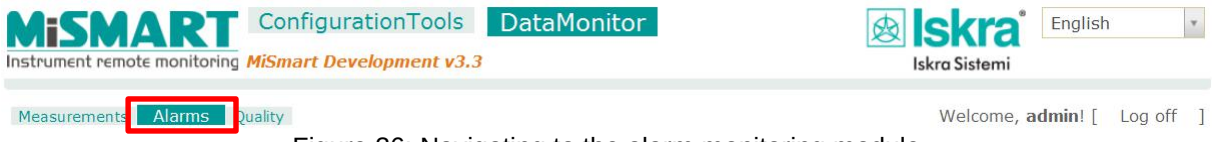


Figure 36: Navigating to the alarm monitoring module

2.2.1 Filter resources view - Setting the measurements for alarm monitoring

In the left part of the screen the desired set of meter points in the structure tree can be filtered out by pressing the refresh ▶ button. By default all measurements are selected. All available measurement groups can then be filtered out by selecting the relevant ones:

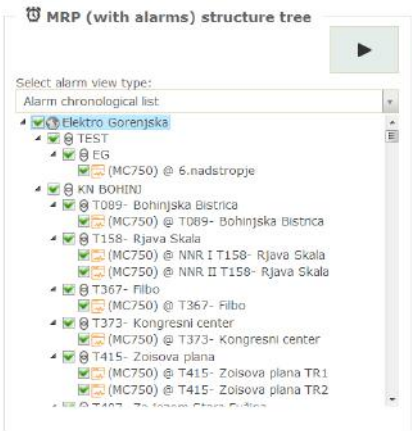


Figure 37: Filters – choosing relevant measurements

A tree of all measurements which are configured within the system appears (to see how measurements are configured please see chapter Configuration Tools/Measurement idents). Any group can be expanded and measurements selected by checkbox-ing the desired ones. The system will now consider only those alarms which have appeared on any of the selected measurements.

✓ ***Important:***

Upon changing quantities for displaying the topological tree structure – data nodes at the right is NOT refreshed automatically. It is only refreshed with the meter points which include alarms on requested quantities after clicking on the ▶ *icon. A reload indicator can appear for a short period of time.*

2.2.2 User scenarios– Alarms

There are three possible alarm view types – Alarm chronological list, active alarms and alarm system statistics which are all explained in the following chapters.

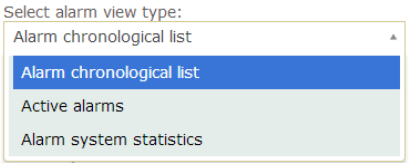


Figure 38: Selecting alarm view type

2.2.2.1 Reviewing alarms in table form - Alarms

This option is selected by clicking on Alarm chronological list under View Type and executed with the confirmation button ▶. A chronological order table is then drawn at the right side of the screen which is sorted from newest to oldest alarms which appeared within the system.

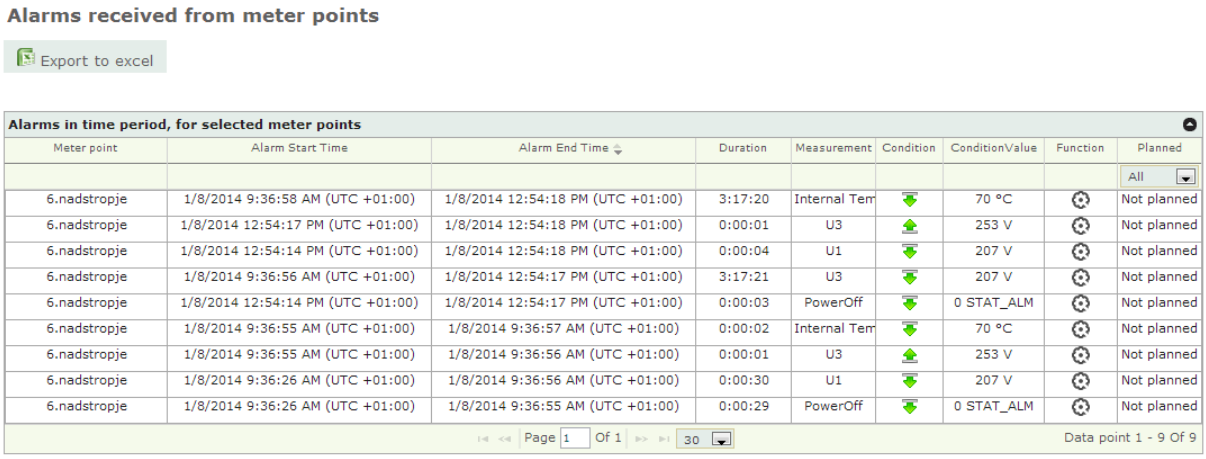


Figure 39: A chronological table showing alarms

Depending on the amount of data the table can be segmented through pages which can be navigated through with the paging control underneath the table:

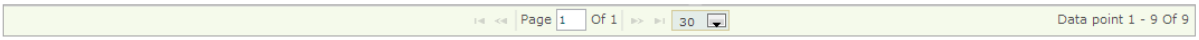


Figure 40: Alarms - paging control

Other available actions:

- *Sorting* by a particular column is done by clicking this particular column header.

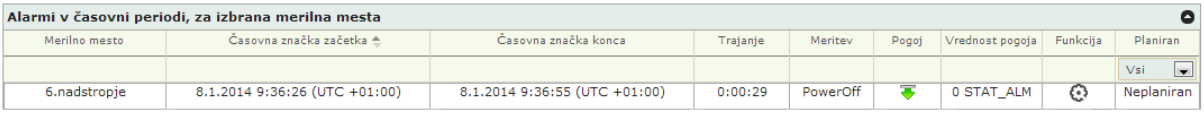


Figure 41: Sorting by a particular column

In the last column you can see whether an alarm was planned or unplanned.

- In the table header there is a minimization option by clicking the icon at the top right corner of the table.
- The alarm table can be exported into Excel by pressing the Export to excel icon above the table. The Excel file is then generated on the server side and can be downloaded to the local computer by pressing *Download file*. After this the file is opened in Excel if installed.

2.2.2.2 Alarm statistics reviewing - Alarm statistics

The other alarm option is to show alarm statistics. In alarm structure under View Type the option Alarm system statistics should be selected and confirmed with the button. The statistics will now be drawn in three parts at the right side of the screen for all selected meter points.

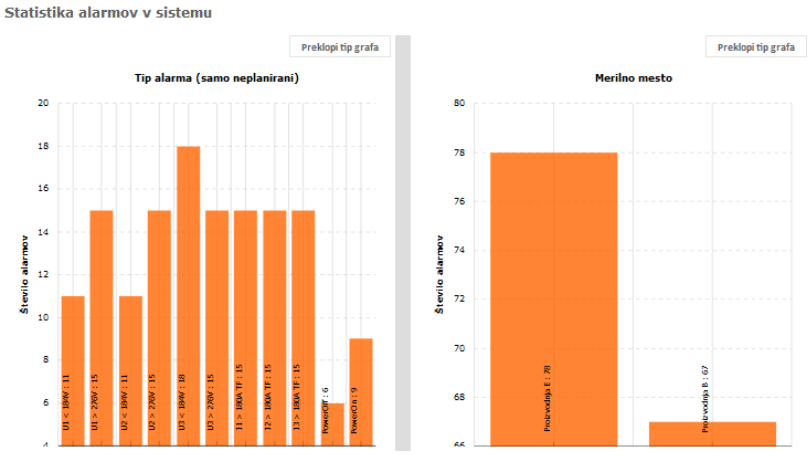


Figure 42: Showing general alarm data in bar chart form

The left bar chart sorts all unplanned alarms (planned alarms are excluded) by their type (by default all alarms are unplanned in the system unless they have been mar as planned). The vertical axis at the left bar chart shows the count for every alarm type while the right bar chart shows the unplanned alarm count by meter point. Alarm types and meter point names can be deduced from the charts by placing the mouse cursor over a particular bar.
The chart type can be changed into a pie-chart representation by pressing *Switch chart type*.

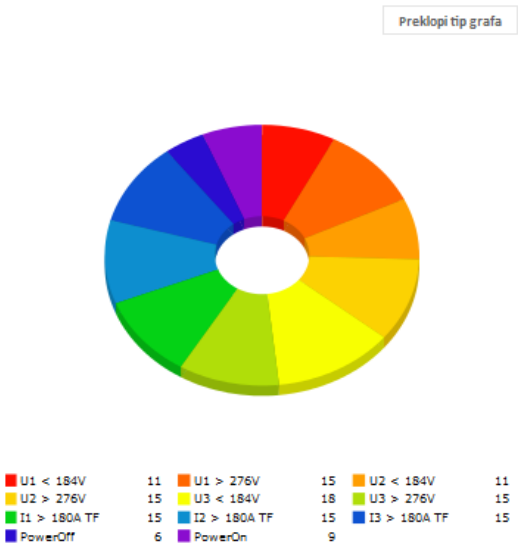


Figure 43: Displaying data as a pie-chart

Glavni pregled statistike alarmov

Merilno mesto	Tip alarma	Št. alarmov	Planiranih alarmo	Neplaniranih aları
Proizvodnja E	U1 avg < 184V Actual value	6	0	6
Proizvodnja E	U1 avg > 276V Actual value	8	0	8
Proizvodnja E	U2 avg < 184V Actual value	6	0	6
Proizvodnja E	U2 avg > 276V Actual value	8	0	8
Proizvodnja E	U3 avg < 184V Actual value	10	0	10
Proizvodnja E	U3 avg > 276V Actual value	8	0	8
Proizvodnja E	Tok faza 1 > 180A Thermal function	8	0	8
Proizvodnja E	Tok faza 2 > 180A Thermal function	8	0	8
Proizvodnja E	Tok faza 3 > 180A Thermal function	8	0	8
Proizvodnja E	PowerOff	3	0	3
Proizvodnja E	PowerOn	5	0	5
Proizvodnja B	U1 avg < 184V Actual value	5	0	5
Proizvodnja B	U1 avg > 276V Actual value	7	0	7
Proizvodnja B	U2 avg < 184V Actual value	5	0	5
Proizvodnja B	U2 avg > 276V Actual value	7	0	7
Proizvodnja B	U3 avg < 184V Actual value	8	0	8
Proizvodnja B	U3 avg > 276V Actual value	7	0	7
Proizvodnja B	Tok faza 1 > 180A Thermal function	7	0	7
Proizvodnja B	Tok faza 2 > 180A Thermal function	7	0	7
Proizvodnja B	Tok faza 3 > 180A Thermal function	7	0	7
Proizvodnja B	PowerOff	3	0	3
Proizvodnja B	PowerOn	4	0	4

Figure 44: Alarm table

The alarm table shows the number of planned and unplanned alarms at a certain meter point for every particular alarm type. The table can be minimized by clicking the icon.

Bar-charts below show unplanned alarm statistics by type at all meter points in the system which contain alarms.

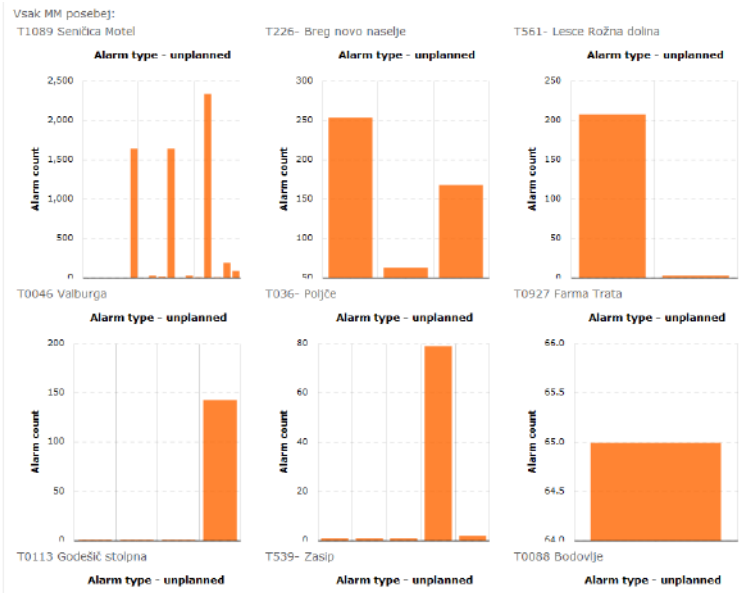


Figure 45: Bar charts depicting the number of alarms by type at all meter points

2.2.2.3 Active alarms

The points of interest should first be specified by selecting the desired MRPs. By clicking the Active alarms option and confirming it with the ▶ button all active alarms fort he selected MRPs are displayed as a list. The table is sorted chronologically based on the alarm start time.

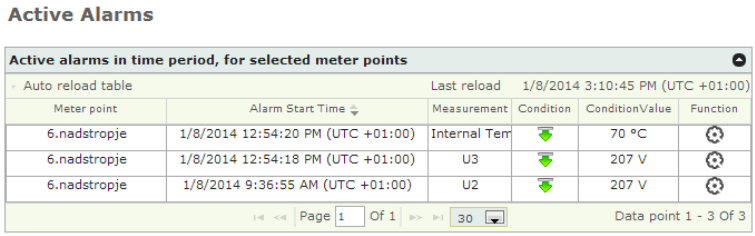


Figure 46: A table of active alarms showing only alarms for one MRP

A pager is added to the table if there are many entries:

Figure 47: Pager table control

Three actions are possible from the table:

- *Changing the alphabetical or number order* – click on the suitable column header.

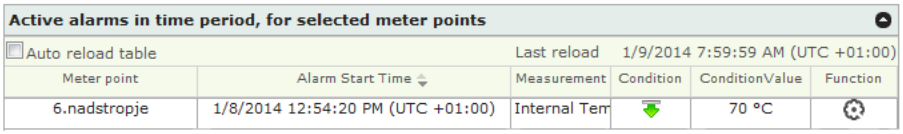


Figure 48: Changing the alphabetical and number sorting

- The table can be maximized/minimized by clicking on the icon at the upper right corner.
- By clicking the icon in the upper left table corner automatic table reloading is enabled. The icon is then changed to .

2.3 Power quality module – Quality

The power quality module can be accessed by clicking at the Quality tab through system navigation:

Figure 49: Accessing the power quality module

2.3.1 Data nodes – reviewing and interpreting the topological tree

The topological tree in Data nodes shows grid distribution with only those meter points with attached power quality analyzing instruments (e.g. MC760 instruments).

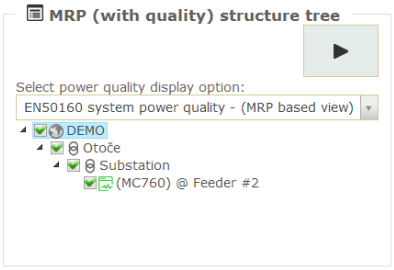


Figure 50: A topological tree showing all meter points with attached power quality analyzing instruments

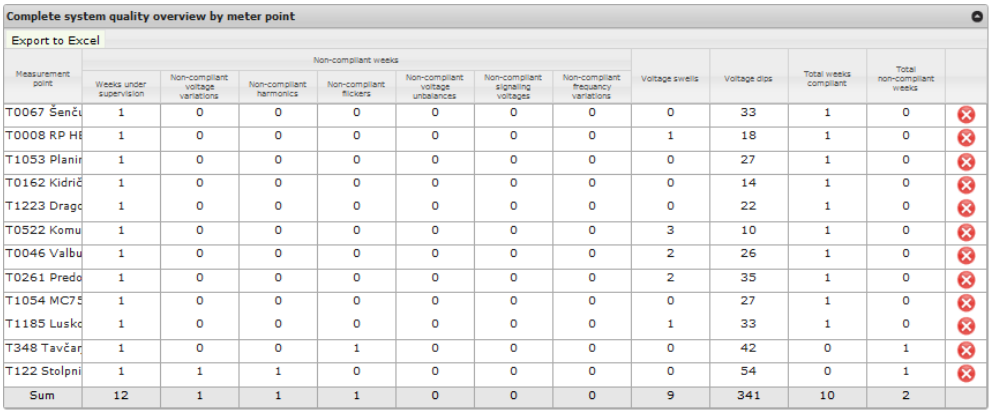
2.3.2 User scenarios – Quality

There are two ways in which system power quality data can be displayed. Under data nodes you can select *System power quality (in EN50160 format)* where you can get insight into power quality according to meter point with a particular meter point analysis option. The second option offers System power quality (weekly overview) where all quality related data is seen in one comprehensive aggregated table. Both scenarios will be described in the following sections.

2.3.2.1 Reviewing power quality data in EN50160 format

This option is available through *DataMonitor / Quality* where a Data nodes tree appears showing all meter points which have quality analyzer instruments attached to them. To select this option choose the

button in a dropdown menu, select the desired meter points and execute the action by pressing the button. Two tables will now appear at the right side of the screen where the upper table gives a system quality general overview by selected meter point.



Complete system quality overview by meter point

Export to Excel

Measurement point	Non-compliant weeks							Voltage swells	Voltage dips	Total weeks compliant	Total non-compliant weeks	
	Weeks under supervision	Non-compliant voltage variations	Non-compliant harmonics	Non-compliant flickers	Non-compliant voltage unbalances	Non-compliant signalling voltages	Non-compliant frequency variations					
T0067 Šenč	1	0	0	0	0	0	0	0	33	1	0	
T0008 RP HE	1	0	0	0	0	0	0	1	18	1	0	
T1053 Planir	1	0	0	0	0	0	0	0	27	1	0	
T0162 Kidrič	1	0	0	0	0	0	0	0	14	1	0	
T1223 Dragc	1	0	0	0	0	0	0	0	22	1	0	
T0522 Komu	1	0	0	0	0	0	0	3	10	1	0	
T0046 Valbu	1	0	0	0	0	0	0	2	26	1	0	
T0261 Predo	1	0	0	0	0	0	0	2	35	1	0	
T1054 MC75	1	0	0	0	0	0	0	0	27	1	0	
T1185 Lusko	1	0	0	0	0	0	0	1	33	1	0	
T348 Tavčar	1	0	0	1	0	0	0	0	42	0	1	
T122 Stolpni	1	1	1	0	0	0	0	0	54	0	1	
Sum	12	1	1	1	0	0	0	9	341	10	2	

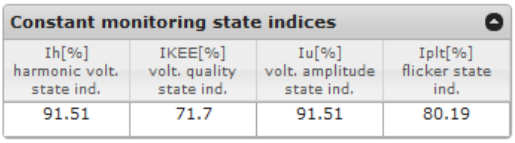
Figure 51: Complete system quality overview by meter point

The first table column includes previously selected meter point names whereas the other columns give information on compliance of all relevant parameters which are specified with the EN50160 standard

Important:

- *The last table column enables deleting a particular line from the table by clicking the button.*
- *The last line – Sum is added to the table automatically and cannot be removed from the table*
- *By pressing the Export to Excel button at the upper left table corner an Excel is created on the server and the link to this file appears*
- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*

The table underneath indicates *Constant monitoring state indices* and is determined according to values in the upper table. The values in this table are dynamically calculated if content of the table above changes.



Constant monitoring state indices

Ih[%] harmonic volt. state ind.	IKEE[%] volt. quality state ind.	Iu[%] volt. amplitude state ind.	Iplt[%] flicker state ind.
91.51	71.7	91.51	80.19

Figure 52: A table with monitoring state indices

Important:

- *To export both these tables together (Complete system quality overview by meter point in Constant monitoring state indices) or all tables which are currently shown on screen into Excel the Export to Excel Export to excel button which is located above the "Complete system quality overview by meter point" table should be pressed.*

By clicking a particular line (select in a meter point) in the table *Complete system quality overview by meter point* table a new table with all available reports within the selected time period is shown.

Selected time period report(s) for: (T0008 RP HE Standard)

Export to Excel

Report start	Report end	Compliance	Status	Monitoring duration
2013-04-14	2013-04-20	!	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-04-21	2013-04-27	!	Completed	Monitoring time: 6days 23hours 50minutes 0 seconds
2013-04-28	2013-05-04	✓	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-05-05	2013-05-11	!	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-05-12	2013-05-18	!	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-05-19	2013-05-25	✓	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-05-26	2013-06-01	✓	Completed	Monitoring time: 6days 23hours 50minutes 0 seconds
2013-06-02	2013-06-08	✓	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds
2013-06-09	2013-06-15	✓	Completed	Monitoring time: 7days 0hours 0minutes 0 seconds

Figure 53: Selected time period reports for one meter point

Important:

- *By clicking table column headers data within the table is sorted accordingly.*
- *By pressing the Export to Excel button at the upper left table corner an Excel is created on the server and the link to this file appears*
- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*

By clicking on a desired line within *the Selected time period report* table a new table with the EN50160 report is displayed below.

EN50160 report for selected meter point (Klima)

Export to Excel

Parameter	Compliance	L1	L2	L3	Multi phase	Required quality	Limit	Details
Freq. var.1	✓	100.00 %	-	-		99.50 % / Week	±1%	No details
Freq. var.2	✓	100.00 %	-	-		100.00 % / Week	+4%/-6%	No details
Voltage var.1	✓	100.00 %	100.00 %	100.00 %		95.00 % / Week	±10%	No details
Voltage var.2	✓	100.00 %	100.00 %	100.00 %		100.00 % / Week	+10%/-15%	No details
Voltage unbl.	✓	100.00 %	%	%		95.00 % / Week	±2%	No details
Rapid volt. ch.	✓	0	0	0		20 / Week	5	No details
Flicker pst		94.05 %	89.68 %	87.50 %		Info Only	±1%	Details available
Flicker plt		-	-	-	-	No Monitoring	-	Details available
Voltage dips	✓	0 / 14	0 / 13	0 / 49		50 / Year	90	No details
Voltage swells	✓	0 / 0	0 / 0	0 / 0		50 / Year	110	No details
Short inter.	✓	0 / 2	0 / 2	0 / 2		100 / Year	1%	No details
Long int.	✓	0 / 2	0 / 1	0 / 1		10 / Year	%	No details
THD	✓	100.00 %	100.00 %	100.00 %		95.00 % / Week	±8%	No details
Harmonics	✓	100.00 %	100.00 %	100.00 %		95.00 % / Week		No details

Figure 54: EN50160 compliant report for a selected meter point

The last table column – Details - shows whether or not anomalies are present for a particular parameter. If a particular line indicates “Details available” in the last column a new table with a list of these anomalies will appear underneath upon clicking this parameter line. Lines which have no detail cannot be further analyzed.

Important:

- *By pressing the Export to Excel button at the upper left table corner an Excel is created on the server and the link to this file appears*
- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*

A table *Details-list of anomalies (anomaly type),* showing a list of this type anomalies together with start and end timestamps appears.

Details - list of anomalies (Klima : Flicker pst)

Export to Excel

Anomaly start time	Anomaly end time	Duration [h:m:s,ms]	Phase	Average [-]
4/30/2013 5:20:00.000 AM (UTC +02:00)	4/30/2013 5:30:00.000 AM (UTC +02:00)	0:10:00	3	2.97
5/1/2013 5:10:00.000 AM (UTC +02:00)	5/1/2013 5:20:00.000 AM (UTC +02:00)	0:10:00	2	2.44
5/1/2013 5:40:00.000 PM (UTC +02:00)	5/1/2013 5:50:00.000 PM (UTC +02:00)	0:10:00	1	2.35
5/1/2013 5:40:00.000 PM (UTC +02:00)	5/1/2013 6:00:00.000 PM (UTC +02:00)	0:20:00	3	2.67
5/1/2013 6:10:00.000 PM (UTC +02:00)	5/1/2013 6:20:00.000 PM (UTC +02:00)	0:10:00	3	3.15
5/1/2013 6:30:00.000 PM (UTC +02:00)	5/1/2013 6:40:00.000 PM (UTC +02:00)	0:10:00	3	3.45
5/1/2013 7:10:00.000 PM (UTC +02:00)	5/1/2013 7:20:00.000 PM (UTC +02:00)	0:10:00	1	2.53
5/1/2013 7:10:00.000 PM (UTC +02:00)	5/1/2013 7:30:00.000 PM (UTC +02:00)	0:20:00	3	3.13
5/1/2013 7:40:00.000 PM (UTC +02:00)	5/1/2013 8:00:00.000 PM (UTC +02:00)	0:20:00	1	2.46
5/1/2013 7:40:00.000 PM (UTC +02:00)	5/1/2013 8:10:00.000 PM (UTC +02:00)	0:30:00	3	2.97
5/1/2013 8:30:00.000 PM (UTC +02:00)	5/1/2013 8:40:00.000 PM (UTC +02:00)	0:10:00	3	2.69
5/1/2013 8:50:00.000 PM (UTC +02:00)	5/1/2013 9:10:00.000 PM (UTC +02:00)	0:20:00	3	2.69
5/1/2013 9:30:00.000 PM (UTC +02:00)	5/1/2013 9:40:00.000 PM (UTC +02:00)	0:10:00	3	2.74
5/1/2013 9:50:00.000 PM (UTC +02:00)	5/1/2013 10:10:00.000 PM (UTC +02:00)	0:20:00	1	2.39
5/1/2013 9:50:00.000 PM (UTC +02:00)	5/1/2013 10:20:00.000 PM (UTC +02:00)	0:30:00	3	2.69
5/1/2013 10:30:00.000 PM (UTC +02:00)	5/1/2013 11:00:00.000 PM (UTC +02:00)	0:30:00	2	2.58
5/1/2013 10:40:00.000 PM (UTC +02:00)	5/1/2013 11:00:00.000 PM (UTC +02:00)	0:20:00	3	2.94
5/1/2013 11:40:00.000 PM (UTC +02:00)	5/1/2013 11:50:00.000 PM (UTC +02:00)	0:10:00	3	2.9
5/2/2013 12:10:00.000 AM (UTC +02:00)	5/2/2013 12:20:00.000 AM (UTC +02:00)	0:10:00	2	2.35
5/2/2013 12:20:00.000 AM (UTC +02:00)	5/2/2013 12:30:00.000 AM (UTC +02:00)	0:10:00	3	2.32

Page 1 of 4 20 Anomalies 1 - 20 Of 77

Figure 55: A list of anomalies of type “Flicker pst”

Important:

- *By pressing the Export to Excel button at the upper left table corner an Excel is created on the server and the link to this file appears*
- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*
- *Depending on the amount of data the table can be segmented through pages which can be navigated through with the paging control underneath the table:*

2.3.2.2 Reviewing system power quality by week

This option is available through *DataMonitor /Quality* where a Data nodes tree appears showing all meter points which have quality analyzer instruments attached to them. To select this option choose the EN50160 system power quality - (as an aggregated list) button, select the desired meter points (MRPs) and execute the action by pressing the button. All available power quality data will now appear in one aggregated table indicating the failed reports in red color and the passed ones in green:

Report start	Report end	Meter point name	Compliance
4/14/2013	4/20/2013	Klima	Failed
4/21/2013	4/27/2013	Klima	Failed
4/28/2013	5/4/2013	Klima	OK
5/5/2013	5/11/2013	Klima	Failed
5/12/2013	5/18/2013	Klima	Failed
5/19/2013	5/25/2013	Klima	Failed
5/26/2013	6/1/2013	Klima	Failed
6/2/2013	6/8/2013	Klima	Failed
6/9/2013	6/15/2013	Klima	Failed
6/16/2013	6/22/2013	Klima	Failed
6/23/2013	6/30/2013	Klima	Failed
6/30/2013	7/7/2013	Klima	Failed
7/7/2013	7/14/2013	Klima	Failed
7/14/2013	7/21/2013	Klima	Failed
7/21/2013	7/28/2013	Klima	Failed
7/28/2013	8/4/2013	Klima	Failed
8/4/2013	8/11/2013	Klima	Failed
8/11/2013	8/18/2013	Klima	Failed
8/18/2013	8/25/2013	Klima	Failed
9/1/2013	9/3/2013	Klima	Failed
9/3/2013	9/8/2013	Klima	Failed
9/8/2013	9/15/2013	Klima	Failed
9/15/2013	9/22/2013	Klima	Failed
9/22/2013	9/29/2013	Klima	Failed
9/29/2013	10/6/2013	Klima	Failed
10/6/2013	10/13/2013	Klima	Failed
10/13/2013	10/20/2013	Klima	Failed
10/20/2013	10/27/2013	Klima	Failed
10/27/2013	11/3/2013	Klima	Failed
11/3/2013	11/10/2013	Klima	Failed

Figure 56: Aggregated power quality table by week

The Quality weekly overview for selected time period tables shows the compliance of all parameters which are monitored within a particular power quality report. The first two columns (Report start in Report end) indicate the start and the end time period of the generated report. (this timespan can be longer than only one week depending on how this is configured within the instrument)

The compliance column determines whether the report is compliant with the EN50160 standard.

Above the table there is a desired timespan control. By clicking the < and > beside the date entry fields the date is changed by a 7 day interval. When changing the date the table below refreshes automatically.

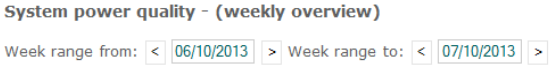


Figure 57: Timespan control

When clicking on a line in the *Quality weekly overview for selected time period* table a new table named *List of anomalies + meter point name + data timespan* appears underneath. This table shows a list of all anomalies which have appeared within the selected time period.

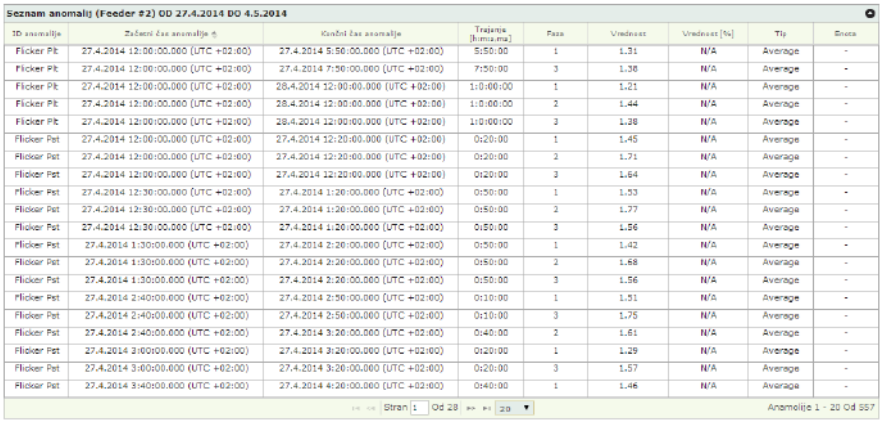
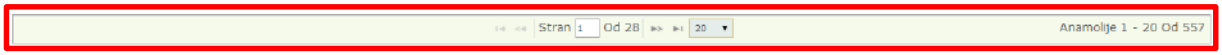


Figure 58: List of all anomalies for a particular report

Important:

- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*
- *Depending on the amount of data the table can be segmented through pages which can be navigated through with the paging control underneath the table:*



2.3.2.3 Reviewing system power quality – PQ anomaly list

This option is available through *DataMonitor / Quality* where a Data nodes tree appears showing all meter points which have quality analyzer instruments attached to them. To select this option choose the All PQ anomaly list button, select the desired meter points and execute the action by pressing the button. All available power quality anomaly data will now appear in one aggregated chronologically ordered table:

All PQ anomaly list

vse anomalije

Measurement point	Description	Anomaly start time	Anomaly end time	Duration [h:m:s.ms]	Phase	Value [%]	Value
All	All						
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.17	4.17
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.08	4.08
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.71	4.71
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.55	9.55
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.34	9.34
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	3	10.78	10.78
Kuhinja	Voltage Dip	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	1	0	0
Kuhinja	Voltage Dip	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	2	0	0
Kuhinja	Voltage Dip	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	3	0	0
Kuhinja	Short Interruption	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	1	0.16	0.37
Kuhinja	Short Interruption	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	2	0.82	1.89
Kuhinja	Short Interruption	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	3	0.22	0.51
Kuhinja	Rapid Voltage Change	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	1	80.14	184.32
Kuhinja	Rapid Voltage Change	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	2	-58.84	-135.33
Kuhinja	Rapid Voltage Change	12/28/2014 12:19:46.000 PM (UTC +01:00)	12/28/2014 12:19:48.000 PM (UTC +01:00)	0:00:02	3	-87.71	-201.73
Kuhinja	Flicker Pst	12/28/2014 8:00:00.000 PM (UTC +01:00)	12/28/2014 8:10:00.000 PM (UTC +01:00)	0:10:00	1	1.31	1.31
Kuhinja	Flicker Pst	12/28/2014 8:00:00.000 PM (UTC +01:00)	12/28/2014 8:10:00.000 PM (UTC +01:00)	0:10:00	2	1.29	1.29
Kuhinja	Rapid Voltage Change	12/28/2014 8:02:09.000 PM (UTC +01:00)	12/28/2014 8:02:11.000 PM (UTC +01:00)	0:00:02	1	-5.03	-11.57
Kuhinja	Flicker Pst	12/28/2014 8:20:00.000 PM (UTC +01:00)	12/28/2014 8:30:00.000 PM (UTC +01:00)	0:10:00	1	1.06	1.06
Kuhinja	Flicker Pst	12/28/2014 8:20:00.000 PM (UTC +01:00)	12/28/2014 8:30:00.000 PM (UTC +01:00)	0:10:00	2	1.1	1.1

Page 1 of 70 20 Anomalies 1 - 20 Of 1,391

Figure 59: List of all anomalies

If multiple meter points are selected and presented in the table, a specific one can be sorted out by means of a corresponding drop-down menu control:

All PQ anomaly list

vse anomalije

Measurement point	Description	Anomaly start time	Anomaly end time	Duration [h:m:s,ms]	Phase	Value [%]	Value
All	All						
(MC760) @ MC774-26 GD	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.15	4.15
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.08	4.08
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.67	4.67
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.15	4.15
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.07	4.07
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.69	4.69
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.17	4.17
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.08	4.08
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.71	4.71
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.18	4.18
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.11	4.11
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.7	4.7
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.49	9.49
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.33	9.33
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	3	10.7	10.7
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.5	9.5
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.31	9.31
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	3	10.74	10.74
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.55	9.55
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.34	9.34

Page 1 of 278 20 Anomalies 1 - 20 Of 5,551

Figure 60: List of all anomalies – sort by meter point

Also, a sort control for filtering by PQ parameter description (i.e. type) is available:

All PQ anomaly list

vse anomalije

Measurement point	Description	Anomaly start time	Anomaly end time	Duration [h:m:s,ms]	Phase	Value [%]	Value
All	All						
(MC760) @ MC774-26	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.15	4.15
(MC760) @ MC774-26	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.08	4.08
(MC760) @ MC774-26	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.67	4.67
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.15	4.15
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.07	4.07
Klima	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.69	4.69
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.17	4.17
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.08	4.08
Kuhinja	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.71	4.71
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	1	4.18	4.18
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	2	4.11	4.11
Produkcija	Flicker Plt	12/28/2014 12:00:00.000 PM (UTC +01:00)	12/28/2014 2:00:00.000 PM (UTC +01:00)	2:00:00	3	4.7	4.7
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.49	9.49
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.33	9.33
(MC760) @ MC774-26	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	3	10.7	10.7
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.5	9.5
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.31	9.31
Klima	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	3	10.74	10.74
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	1	9.55	9.55
Kuhinja	Flicker Pst	12/28/2014 12:10:00.000 PM (UTC +01:00)	12/28/2014 12:20:00.000 PM (UTC +01:00)	0:10:00	2	9.34	9.34

Page 1 of 278 20 Anomalies 1 - 20 Of 5,551

Figure 61: List of all anomalies – sort by PQ parameter

Important:

- *In the table header there is a minimization option by clicking the icon at the top right corner of the table.*
- *Depending on the amount of data the table can be segmented through pages which can be navigated through with the paging control underneath the table:*

3 MiSMART configuration tools - a tool for system configuration

MiSMART configuration tools is an application for making the complete system configuration and is primarily intended for system administrators. It consists of following content modules:

- *Measurement nodes*,
- *measurement Idents*,
- *devices,*
- *user management*.

Under Configuration Tools it is possible to create and manipulate the topological tree, configure meter point settings, group meter points, add new instruments into the system etc. Some simple tools for measurement and alarm reviewing are also available. For more thorough data analysis please use the Data Monitor application as described in the previous chapter of this manual.

3.1 Accessing system Configuration Tools

The application is accessed with a web browser by entering a suitable URL.

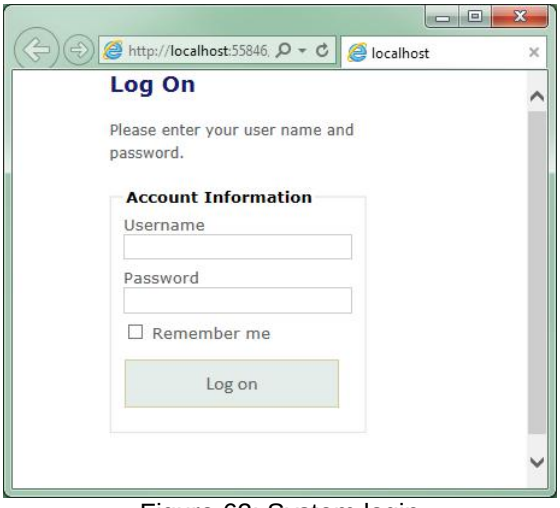


Figure 62: System login

The username is entered into the *Username* field and the password next to the *Password* field. Please confirm the login by *Log On.* To remember the credentials for next login check the *Remember me* option.

3.2 Configuration tools – main window

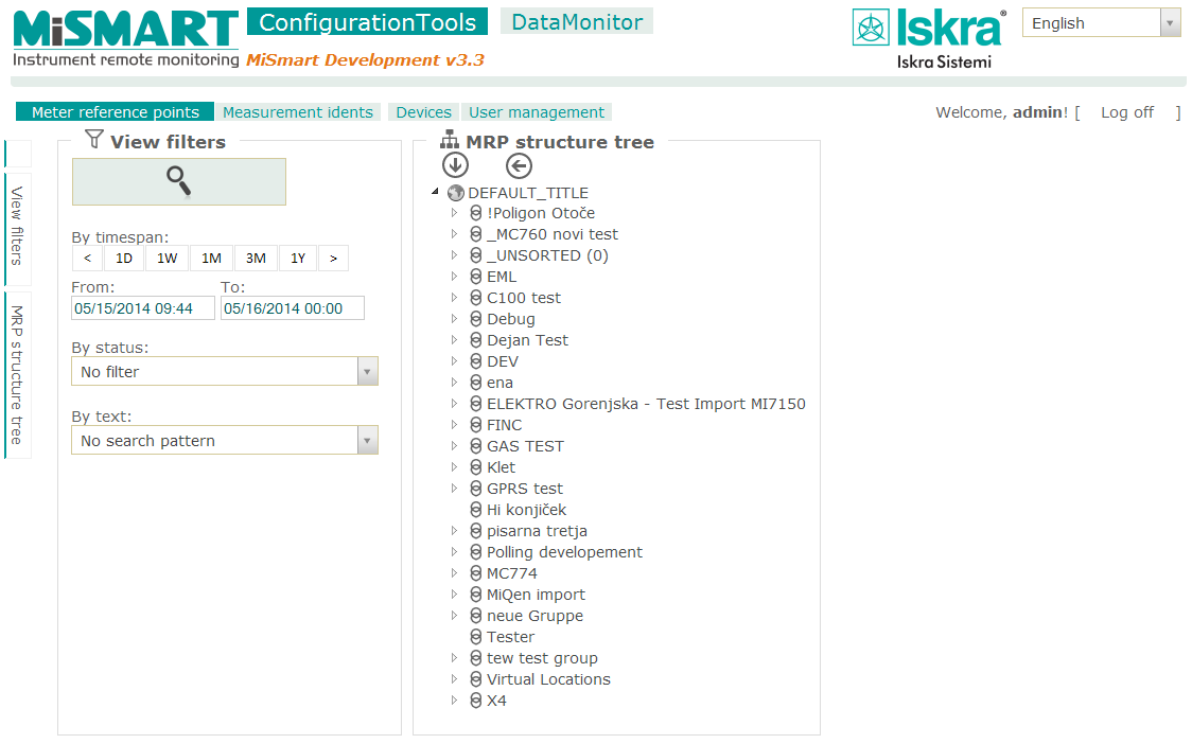


Figure 63: Configuration tools - main window

After logging into the system a screen consisting out of three sections appears:

1. *The uppermost screen part includes two lines with navigation control buttons. The upper one switches between applications and the lower one between different application modules.*
2. *A topology structure tree of meter points is displayed on the left side.*
3. *Upon clicking a node in the topology tree structure its' properties appear at the right side depending on the node type.*

3.3 Application navigation

To switch between various MiSMART parts and for logging on and off the system the upper navigation part of the window is used:

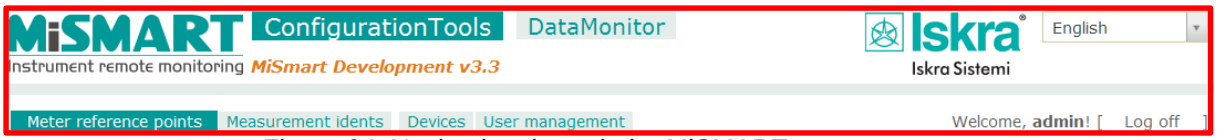


Figure 64: Navigation through the MiSMART system

3.3.1 Switching between MiSMART Data Monitor and MiSMART Configuration Tools

Switchover between the MiSMART Data Monitor and Configuration Tools applications is done by navigating through buttons in the upper navigation bar.

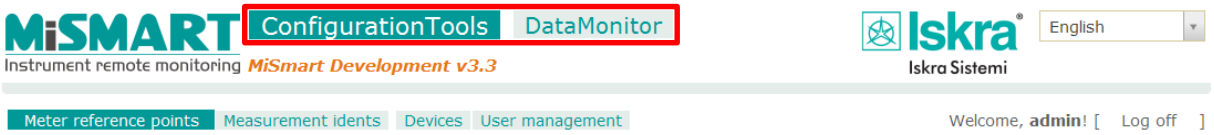


Figure 65: Application navigation buttons

3.3.2 Logging off from the Configuration Tools application

The Log off button appears at the upper right corner of tge application:

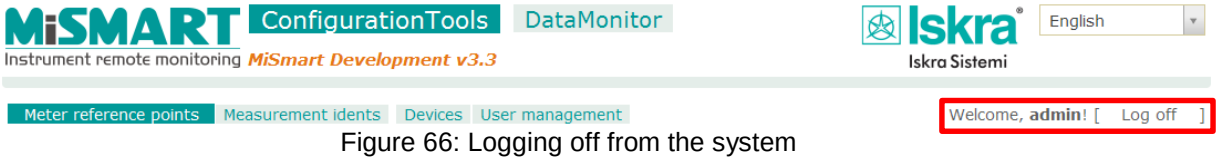


Figure 66: Logging off from the system

3.3.3 Switching between application module *Measurement nodes* and *Measurement Idents*

In MiSmart Configuration tools four tools are included:

- A tool for editing MRPs - *Meter reference point*,
- A tool for setting up measurement idents - *Measurement Idents*,
- a tool for setting up devices - *Devices* as well as
- a user management tool - *User management*.

A description of these is in the following chapters:

Figure 67: Application module navigation buttons

3.4 User Management

This tool enables creating user accounts as well as editing existing user accounts.

3.4.1 Window navigation

This tool is divided into three parts – *Users, User access* and *Group Functionalities* which are described in the next chapters.

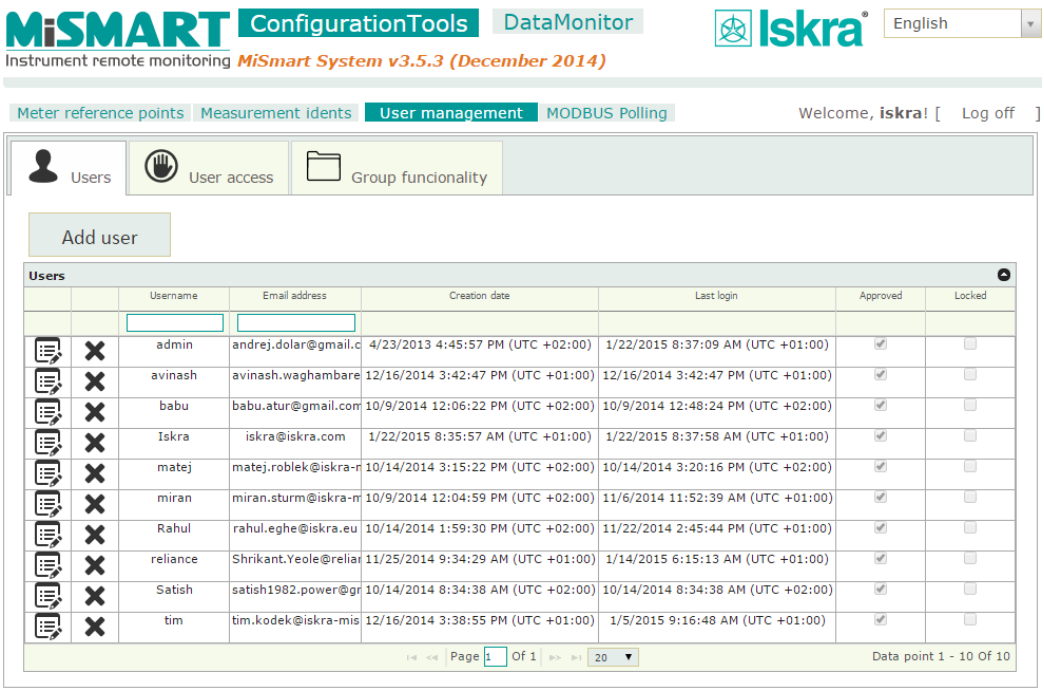


Figure 68: User Management

3.4.2 Users

Under the Users tab a new user account can be created or an existing one edited.

3.4.2.1 Creating a new user

By clicking the Add User button (Add user) a window for new user account creation is opened:

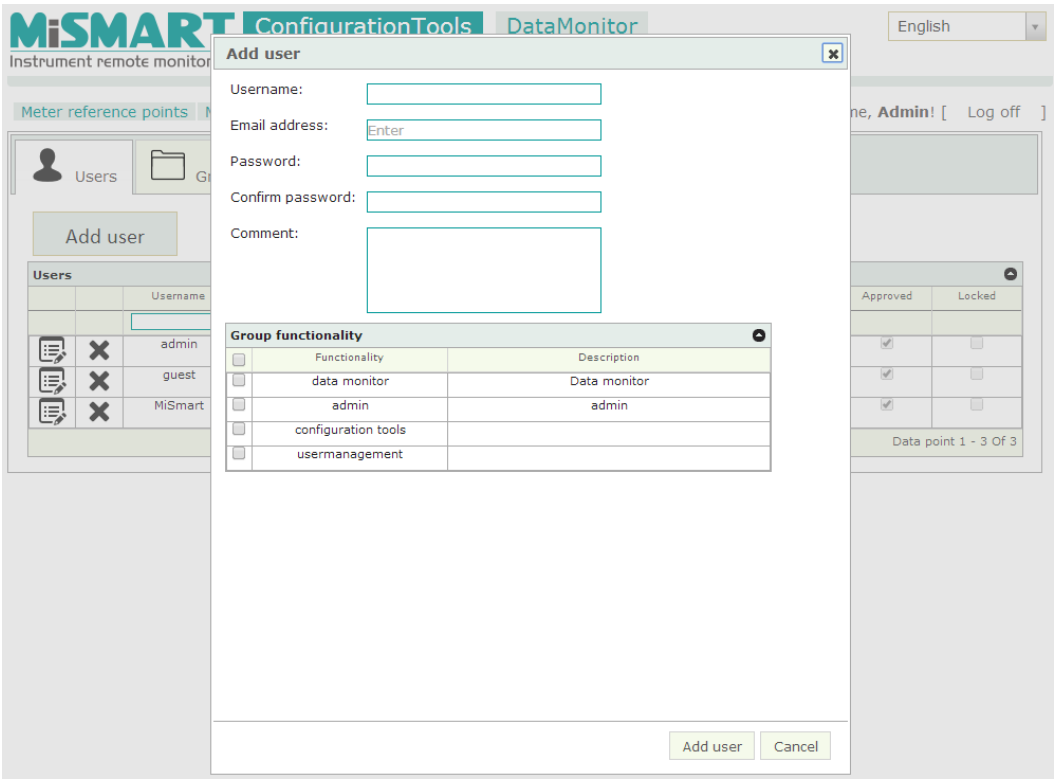


Figure 69: Add user account

A new *Username, Email, Password* (at least 6 characters which should include at least one capital letter and one number) as well as *Group functionalities* which the new user will have access to are defined.

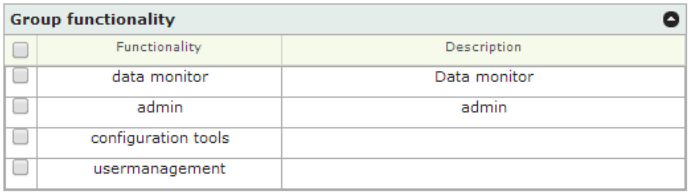


Figure 70: Group functionalities

The process of adding a new user is finished by clicking on the Add user (Add user) button.

The newly added user can then be seen from the *Users* table.

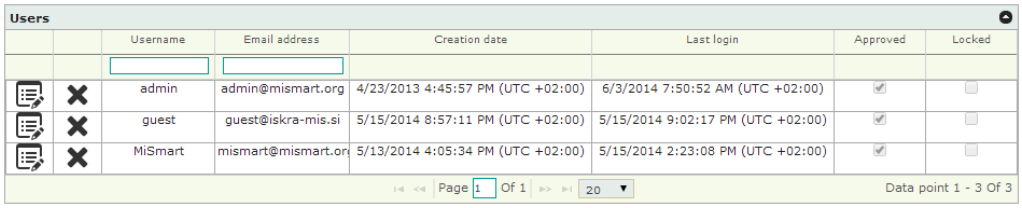


Figure 71: Users table

A user can be searched through the name or email:

Figure 72: Searching for a user

A user can be removed by selecting the ✖ button.

3.4.2.2 Editing existing user accounts

By clicking on *Edit* button a window where user account settings can be manipulated is displayed:

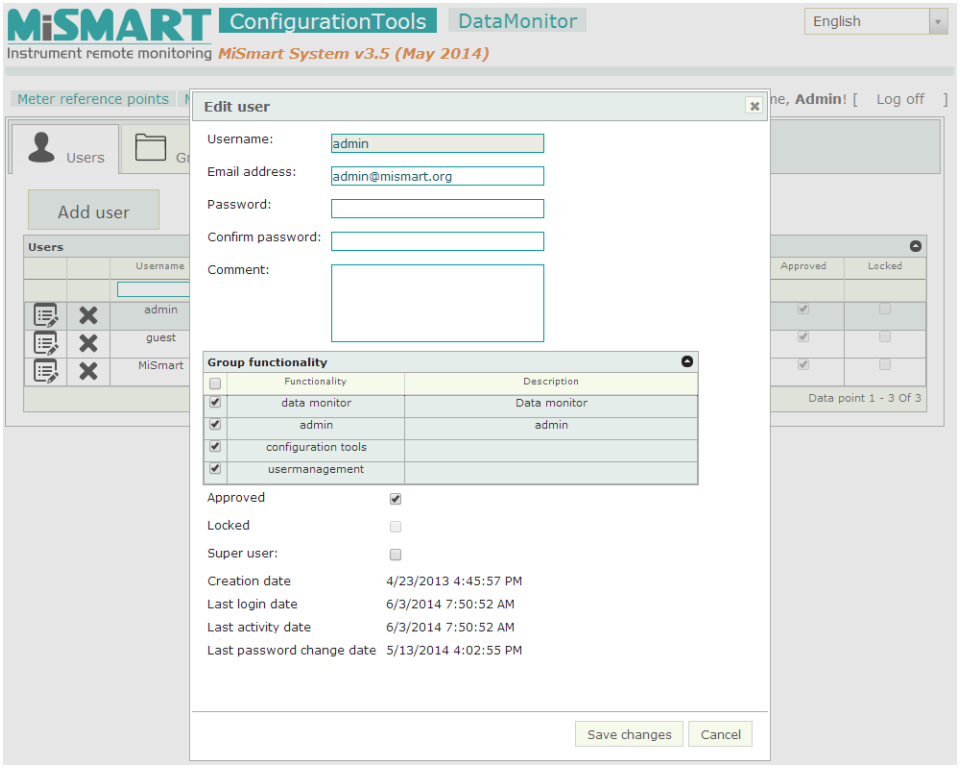


Figure 73: Editing an existing users' account

Email and *Group functionalities* can be changed for every particular user.

The process is finished by clicking on the Save Changes (Save changes) button.

3.4.3 User access

Users with access to User management can define user's rights to access certain meter groups.

3.4.3.1 Add/remove meter group access

Clicking on User access tab opens User access configuration window:

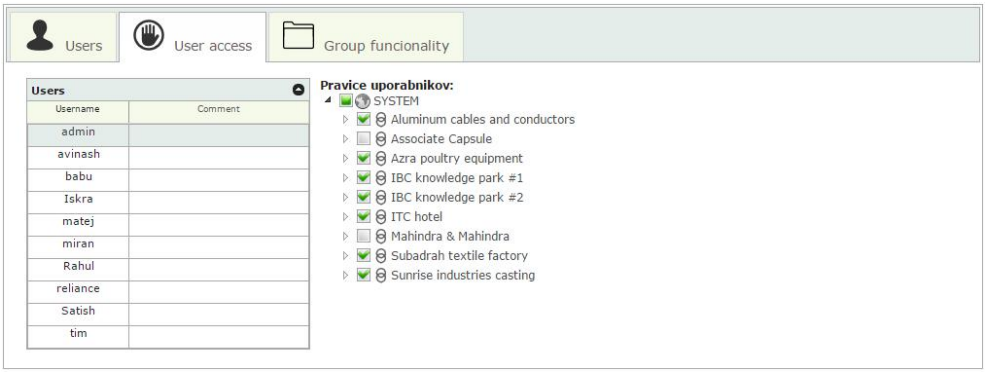


Figure 74: User access configuration window

User access window is divided into two parts:

- Select user for edit on the left side:

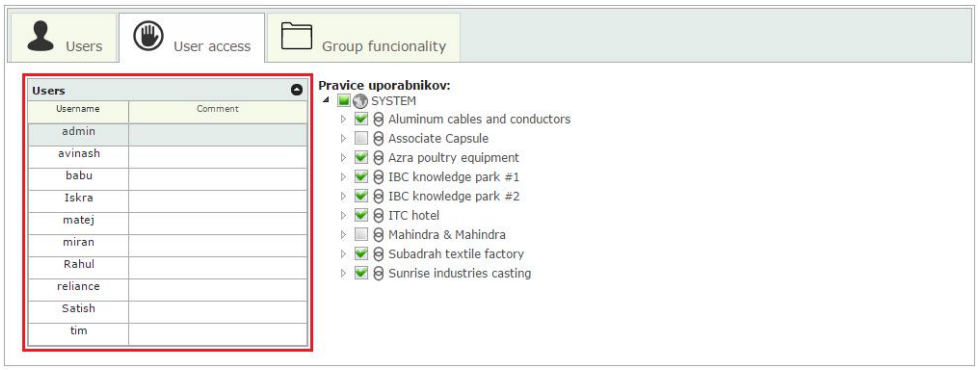


Figure 75: User access configuration window – User select

- Then chose to which meter groups the currently selected user will have access:

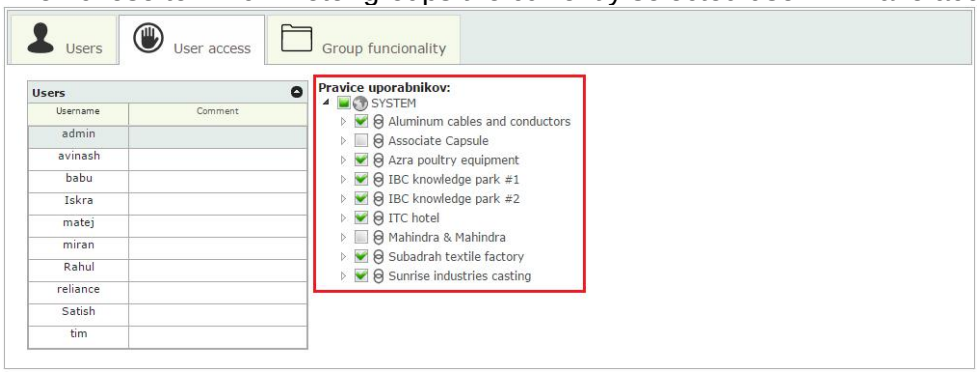


Figure 76: User access configuration window – Add/remove meter group access

In the left part the user whos' user access we would like to edit is selected while in part two, meter groups that we would like to add to that certain user, are selected via check boxes.

Changes will be updated at next refresh.

3.4.4 Group functionalities

Under the *Group functionalities* tab a new functionality group can be created or an existing Group Functionality can be edited.

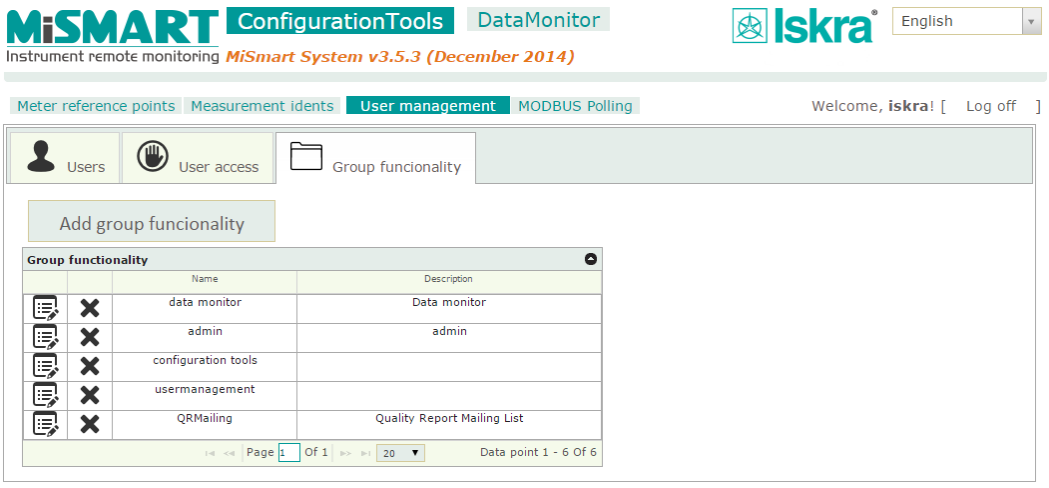


Figure 77: Group functionalities

3.4.4.1 Creating a new group functionality

A new group functionality can be added by clicking on: Add group funcionality .

A new window appears where a *Name* and *Description* of the new functionality can be entered:

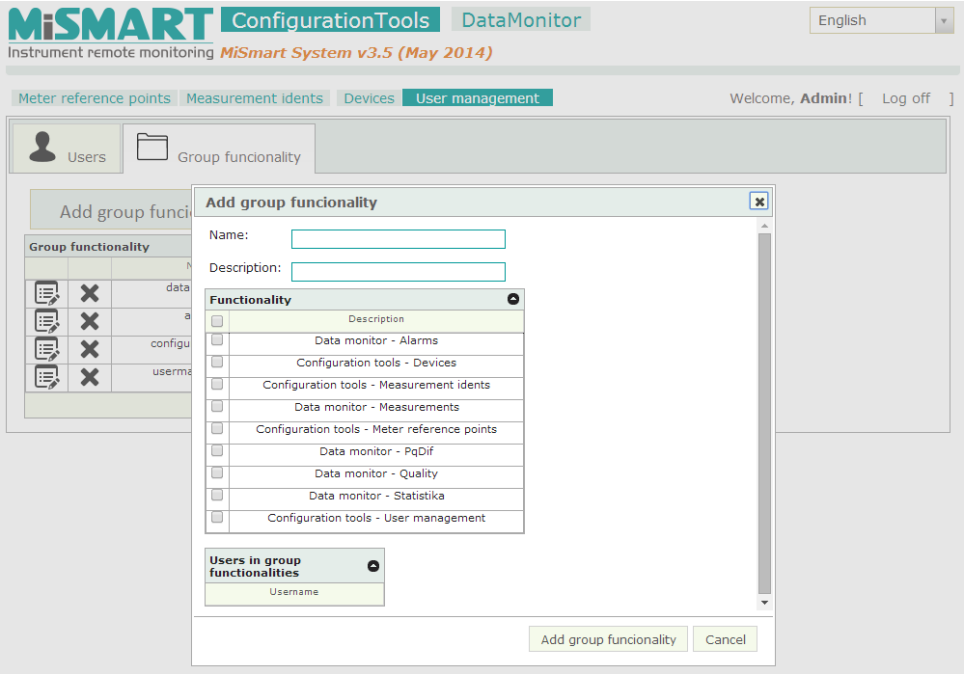


Figure 78: Creating new group functionality

The process is concluded by clicking on the confirmation button in the lower right corner of the screen - Add group funcionality .

3.4.4.2 Editing a group functionality

A group functionality can be edited by clicking on the *Edit* button:

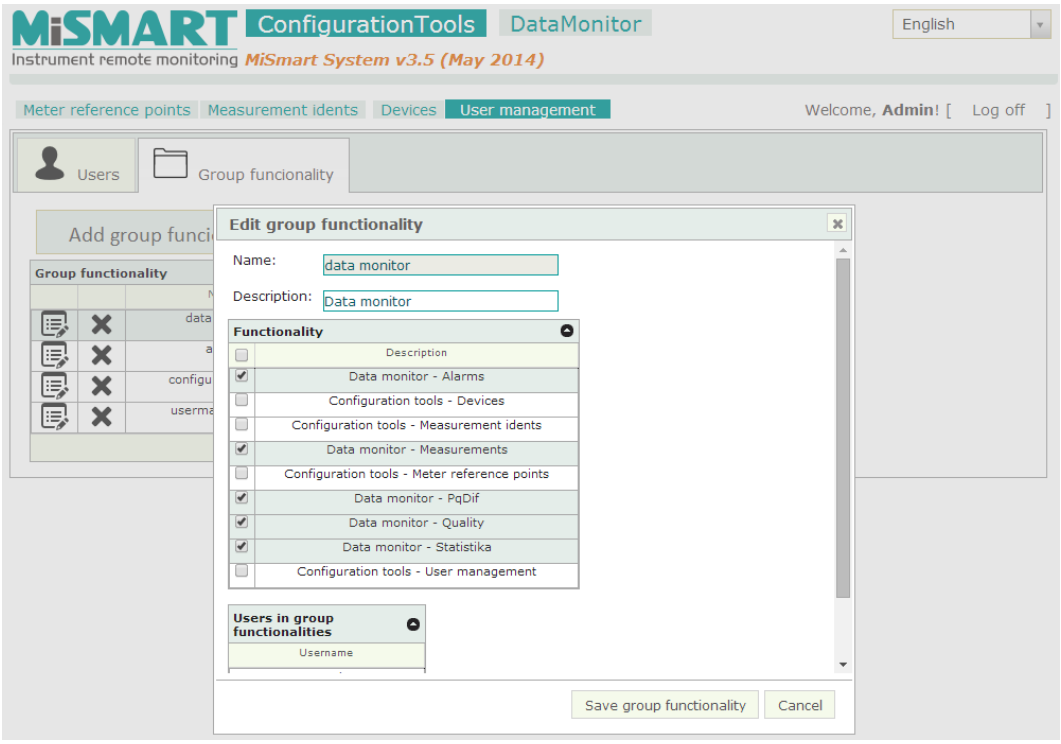


Figure 79: Editing a group functionality

You can change the name as well as the description of the selected group functionality.

The process is then concluded by clicking on the Save group functionality button in the lower-right corner of the window.

3.5 A tool for editing meter reference points (MRP) – measurement nodes

This tool, which opens up automatically after logging into the Configuration Tools and enables creating, editing, and managing metering nodes. The following chapter describes how to work with the tool together with its possibilities.

3.5.1 Window appearance

On the left hand side of the window the MRP structure tree opens, which shows a picture of the complete system in which metering nodes and the group of metering nodes are located. When logging into the system for the first time the tree structure contains only the main group. All the MRPs need to be added to the tree later.
The right side of the window is intended for editing data from a particular selected object within the tree structure.

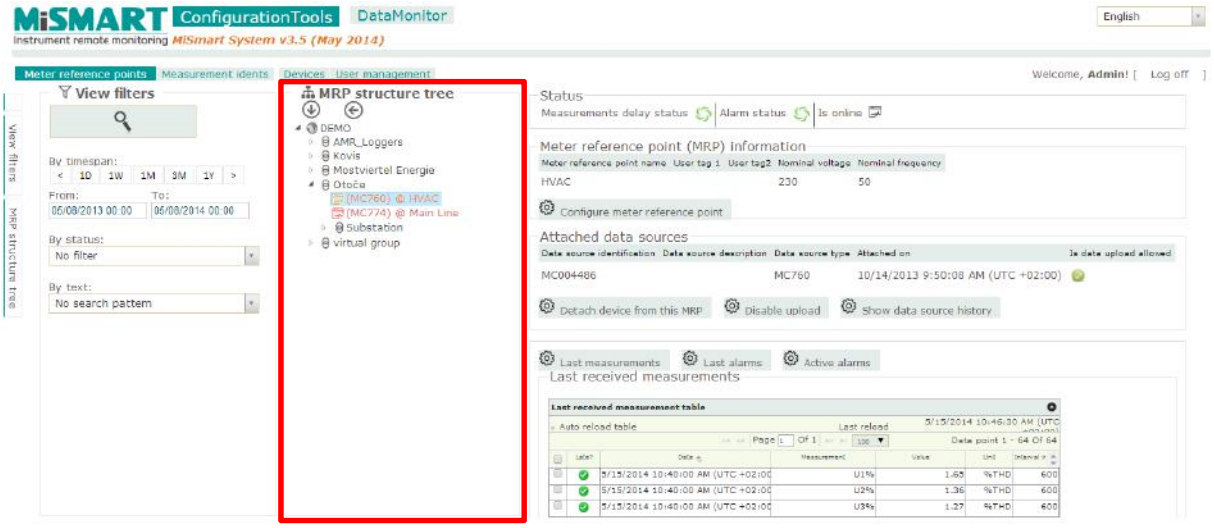


Figure 80: The MRP structure tree

3.5.2 General system overview

By clicking on the uppermost node of the MRP structure tree a General system overview of the system is given. This overview gives an overall statistics of the installed system with all relecant data:

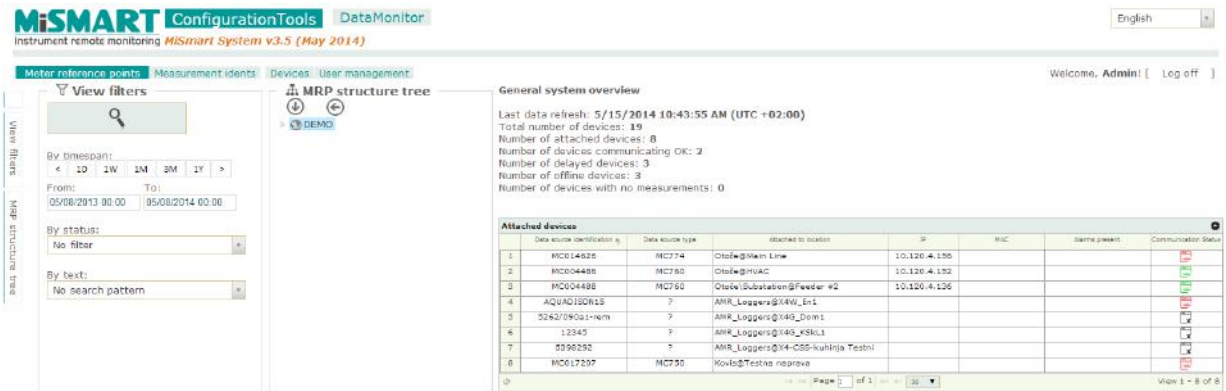


Figure 81: General system overview

3.5.3 Group of metering nodes - Group node

Group nodes are used to build a good and user friendly MRP structure tree structure. By using group nodes an unlimited number of sub-levels can be created for each group and also metering nodes with measurement instruments (MRP nodes) can be configured at the bottom-most level.

Example: *A parent group node would typically contain sub-levels named after places where measuring equipment is locally installed. Each local sub-levels is then named after an electrical substation to which a suitable measurement instrument is attached.*

3.5.3.1 Creating group nodes

Group nodes at which metering nodes with *Meter Reference Points* are attached are created by marking the parent group, right-clicking on it and selecting command *Group of items* in the *Create* group.
In tree structure at the appropriate location a new empty group named *New node* appears, after which a name can be assigned to the MRP. The process of creation is completed by pressing the *Enter* key.
An unlimited number of top level group can be created within the system together with an unlimited number of subgroups:

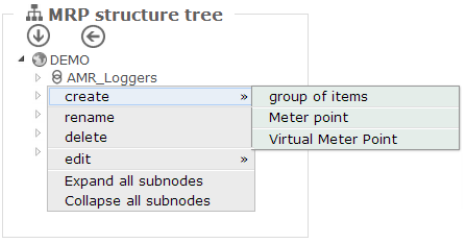


Figure 82: Creating group nodes

3.5.3.2 Renaming, deleting, and moving group nodes

It is possible to carry out various operations on a particular group node by right-clicking on a selected group node.

3.5.3.3 Renaming group nodes

Group nodes can be renamed by choosing the command *Rename*. After selecting the command the name field of the group node turns blue and it is possible to enter a different name or edit the existing one. The operation is confirmed by pressing *Enter* key.

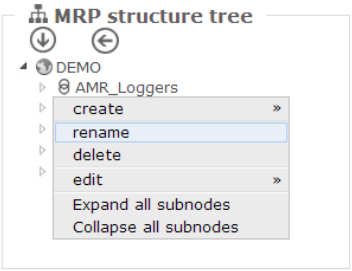


Figure 83: Renaming group nodes

3.5.3.4 Deleting group nodes

Group nodes can be deleted by choosing the command *Delete*. To perform this action the selected group should not contain any MRP nodes, or sub-groups containing MRP nodes. After executing this operation the user receives a notification of a successful deletion of group nodes.

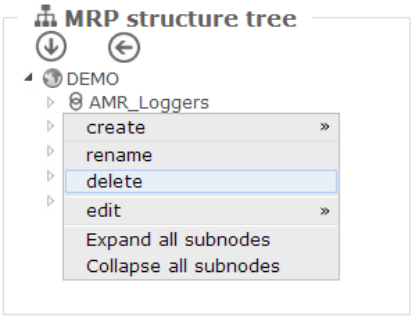


Figure 84: Deleting group nodes

3.5.3.5 Moving group nodes

Group nodes together with its sub-groups and metering nodes can be moved to any other location in tree groups. To make a move, mark the group (only the parent element), right Click on it and select command *Cut* in the *Edit* group. Then move the mouse to the desired location, right-click on it and select command *Paste* in the *Edit* group.
Another possibility is to mark and drag (left-click on the highlighted group) measurement group to the desired location.

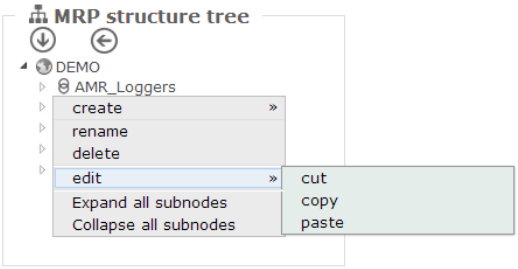


Figure 85: Moving group nodes

3.5.4 Meter Reference Point (MRP)

Meter reference point (MRP) is the point at which a measurement instrument is attached. An instrument attached into the system always represents the lowest level in the tree structure hierarchy.
A Meter Reference Point can be created, moved to another group and renamed. Only one active measurement instrument can be attached at a MRP at any givem point in time (the description is given below in the document).

3.5.4.1 Creating Meter Reference Point

The process of creating a Meter Reference Point is similar to the process of creating group nodes. The group, in which a new meter reference point will be created, must be marked. Right-click on it and select command *Meter point* in the *Create* group.
From the tree structure at the appropriate location a new empty group named *New node* appears, which can be arbitrarily renamed. The process of creation is completed by pressing the *Enter* key.

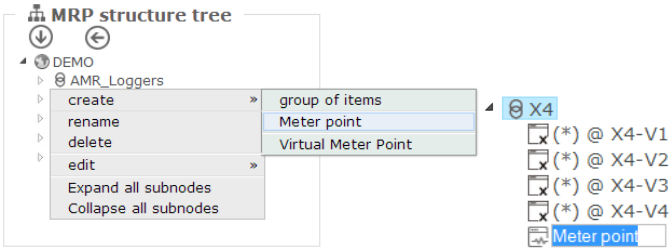


Figure 86: Creating an MRP

3.5.4.2 Renaming, deleting, and moving Meter Reference Points

It is possible to carry out various operations on an MRP, which are mostly accessible by right-clicking on a selected group node.

3.5.4.2.1 Renaming an MRP

An MRP can be renamed by choosing the command *Rename*. After selecting this command the name field of an MRP turns blue ant it is possible to enter a different name or edit the existing one. The operation is confirmed by pressing the *Enter* key.

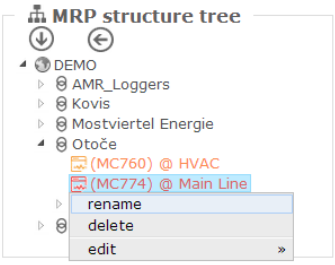


Figure 87: Renaming meter reference point

3.5.4.2.2 Moving MRPs to another location

An MRP can be arbitrarily moved to another group node. To make a move, mark the MRP, right-click on it and select command *Cut* in the *Edit* group. Then move the mouse to the desired destination location, right-click on it and select command *Paste* in the *Edit* group. Another possibility is to mark and drag (left-click on the highlighted meter reference point) the MRP to the desired location.

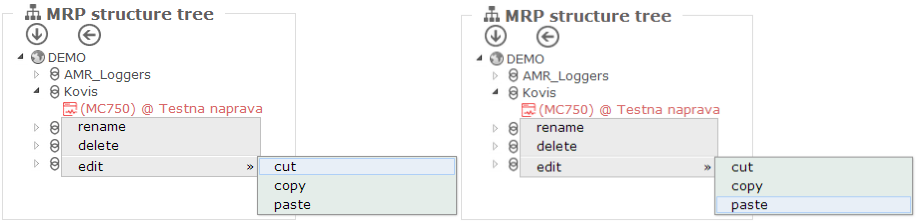


Figure 88: Moving an MRP

3.5.4.3 MRP status

The MRP status gives the information of what is happening to it and to attached measurement instruments in a given point in time. Indication of status is reflected by the color of the icons of the MRP in the tree structure. Detailed information and analysis on the status can be found in the central part of the application window when a certain MRP is selected. Below is a list of all possible statuses:

- *Measurement instrument is not attached at MRP,*
- *Measurement instrument is attached and running OK,*

- *Measurement instrument is attached and it has history of alarms in the selected timeframe,*
- *Measurement instrument's pushing data is delayed,*
- *An instrument is attached to an MRP but no data has yet been received.*

For more information on the MRP statuses and measurement instrument attached to it, a particular meter reference point must be chosen (left mouse click). This displays additional information in the center of the application window. The status is displayed in the top status section under *Status*.
In the status section two icons (wheels) indicate the activity, where their color corresponds to the current deice status.

3.5.4.3.1 Measurement instrument is not attached at an MRP

This status shows that currently at this MRP there is no measurement instrument attached. The history of attached measurement instruments and the latest data are visible under the status information in the central part of the program window.

The corresponding icon in tree structure is colored gray in this case:

In the status section (the central part of the application window) a gray icon and caption *No measuring device is currently attached* is displayed.

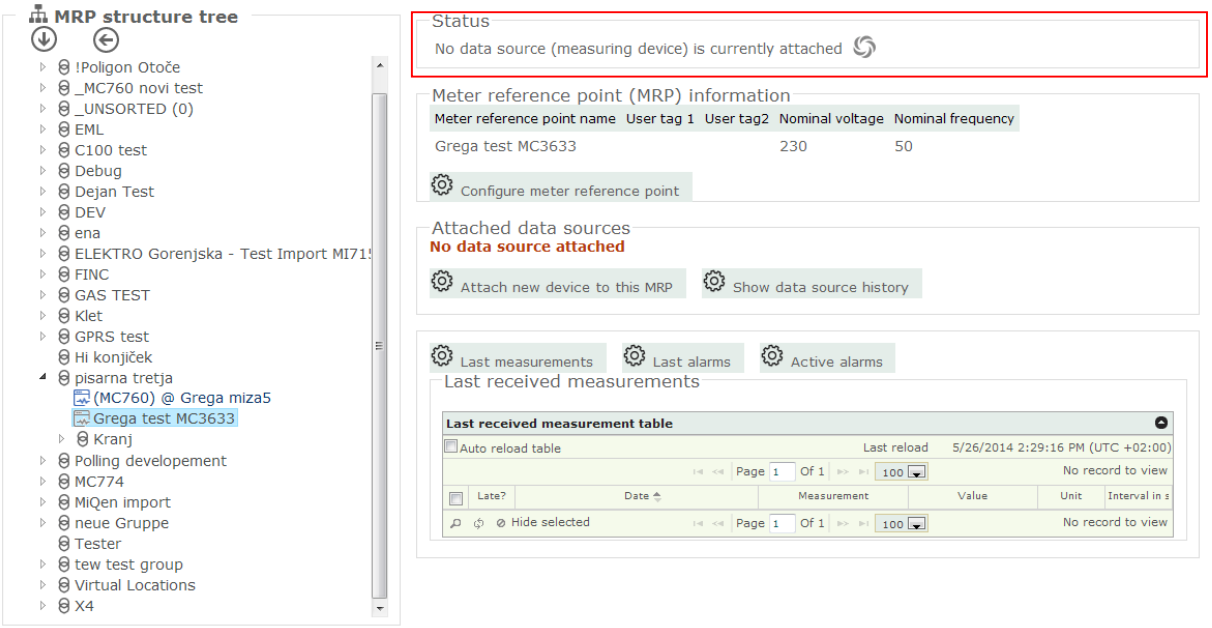


Figure 89: Measurement instrument status

3.5.4.3.2 Measurement instrument is attached and running OK

This status shows that measurement instrument at this MRP is attached and it it regularly pushes data (data does not deviate for more than the specified number of pushing periods) and measurement instrument did not detect any alarms within the filter-specified timeframe.

Icon in tree structure is colored green in this case:

In the status section (the central part of the application window), the two icons (wheels) are colored green to indicate that everything is fine.

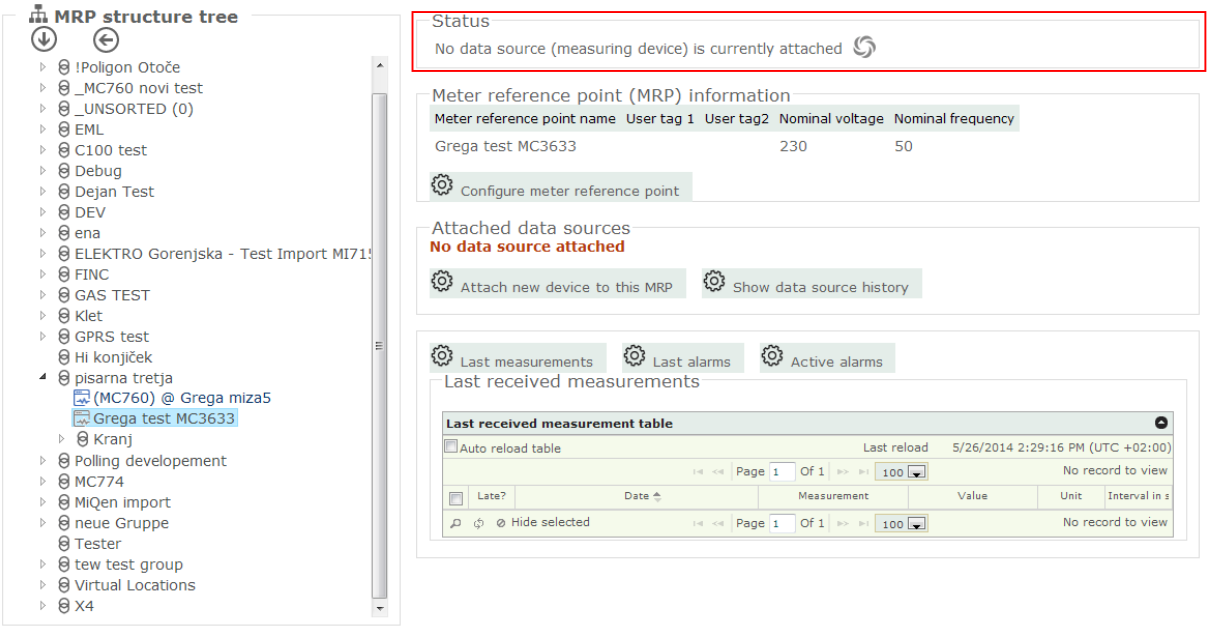


Figure 90: Measurement instrument status

3.5.4.3.3 *Measurement instrument is attached and it has history of alarms in the selected timeframe*

This status shows that a measurement instrument at this meter reference point is attached, it regularly pushes data (data does not deviate for more than the specified number of pushing periods) and that the measurement instrument has detected alarms in the selected timeframe.

Icon in tree structure is colored orange in this case:

If measurement instrument's pushing data is delayed at the same time, the icon turns red because this information has display priority:

In the status section (the central part of the application window), there are two icons (wheels) in this case. The right one, which indicates information about the alarms, is colored orange:

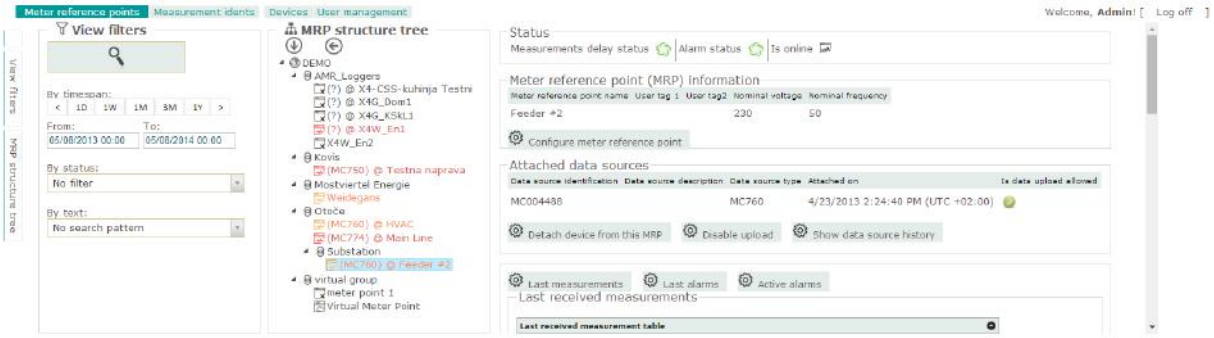


Figure 91: Measurement instrument status

3.5.4.3.4 *Measurement instrument's data pushing is delayed*

This status shows that a measurement instrument at this MRP is attached, but data pushing is delayed (data deviates for more than a specified number of pushing periods).

The icon in the tree structure is colored red in this case:

The icon remains red even in case of alarm within the specified timeframe, because this information has a higher priority.

In the status section (the central part of the application window), there are two icons (wheels) in this case. The left one which indicates information about regular pushing is colored red.

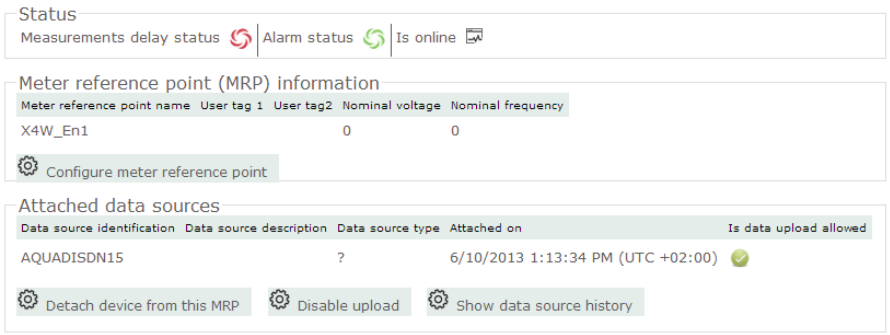


Figure 92: Measurement instrument status if data pushin is delayed

3.5.4.3.5 A measurement instrument is attached to an MRP but no data is received

This status shows that measurement instrument at this MRP is attached, but it has not been able to send any data yet.

Icon in tree structure is colored blue in this case:

The last results and last alarms tables at bottom right are in fact empty, as shown below:

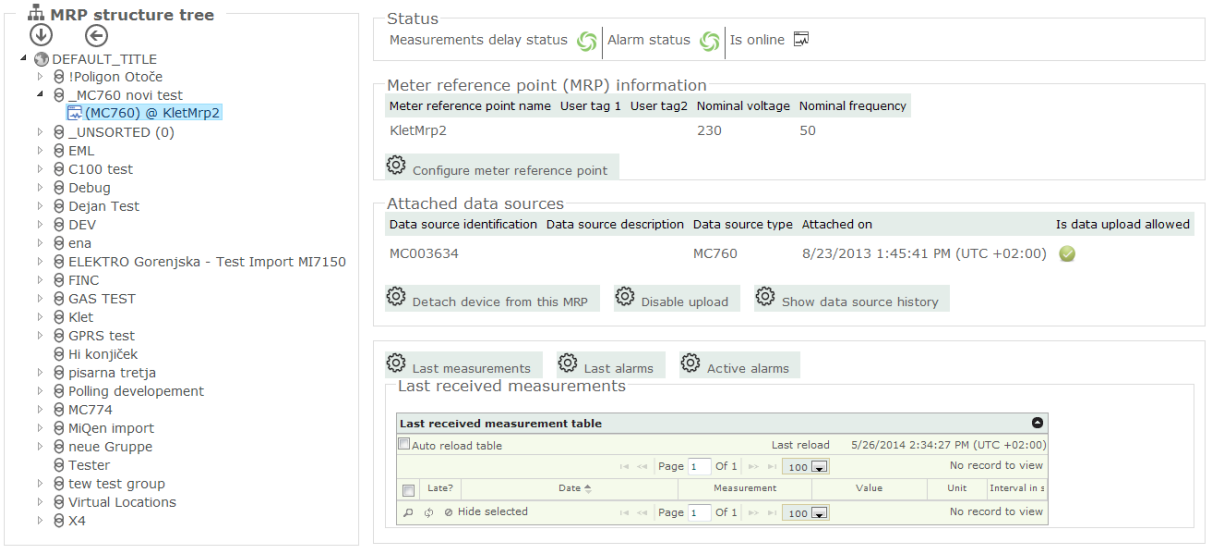


Figure 93: Measurement instrument status if no data is received

3.5.4.4 Additional information about meter reference point– Details

When an MRP is selected the *Details* section shows additional user information at central the part of the program window. There are two input fields for data input, icon on the right side indicates whether the MRP and corresponding measurement instrument are connected to the system inline or if the data is transferred into the system manually.

3.5.4.4.1 Editing additional MRP information

Additional information about a given MRP can be edited by clicking on the MRP. On the right side a window opens after clicking on *Configure meter reference point*, to open additional settings. A new section is where the MRP name can be changed and additional information related to an MRP can be entered to *User information 1* and *User information 2* fields. A checkbox *Is online*, tells that the device is connected to system via communication and automatic data pushing is enabled. Also Nominal voltage and frequency can be set.

Changes are confirmed by clicking the *Save* button.

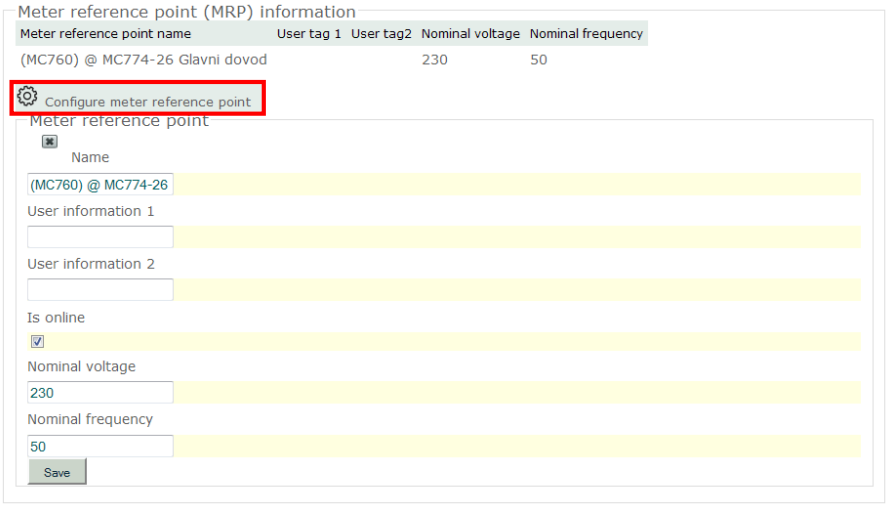


Figure 94: MRP setup window

3.5.4.5 Attaching measurement instrument to MRP

When the first data package arrives the MiSMART system registers a new measurement instrument, but meter reference point is nor assigned to it automatically. The measurement instrument will remain in an inactive state with the server refusing its data packages until theinstrument is attach to the desired meter reference point.

Attaching a measurement instrument to an MRP is divided into two steps. In the first step a measurement instrument is attached to an MRP while in the second one the proper permission to push data is assigned to the instrument.

3.5.4.5.1 Step 1 - Connecting measurement instrument to the MRP

When there is no measurement instrument attached to the MRP, *No device sources* caption can be seen in *Attached data sources* section. Underneath, there is *Attach new data sources to this meter reference point* button. By clicking on it a list for attaching measurement instrument opens up where all unattached measurement instruments are shown.

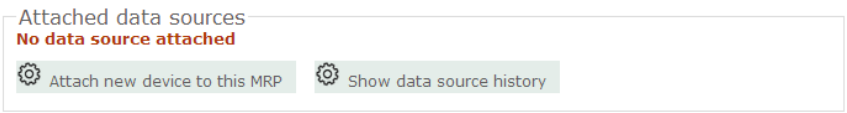


Figure 95: No data sources attached to MRP

From the list of unattached measurement instruments, one instrument must be chosen, which will be then selected for a particular MRP. By right-clicking on *Attach device* of desired measurement instrument a new window opens, where setting up the instrument continues. If the measurement instrument is not on the list, refreshing is done by pressing *Reload unattached devices.*

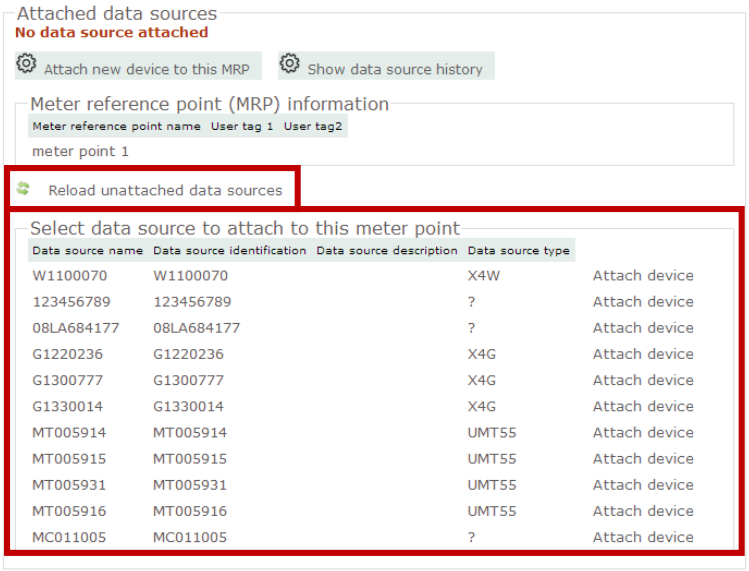


Figure 96: List of all measurement instruments

The process is completed by approving the selected unattached device by pressing the *Yes* or rejection by pressing *No* button in next step.

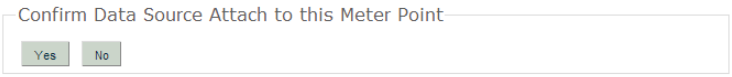
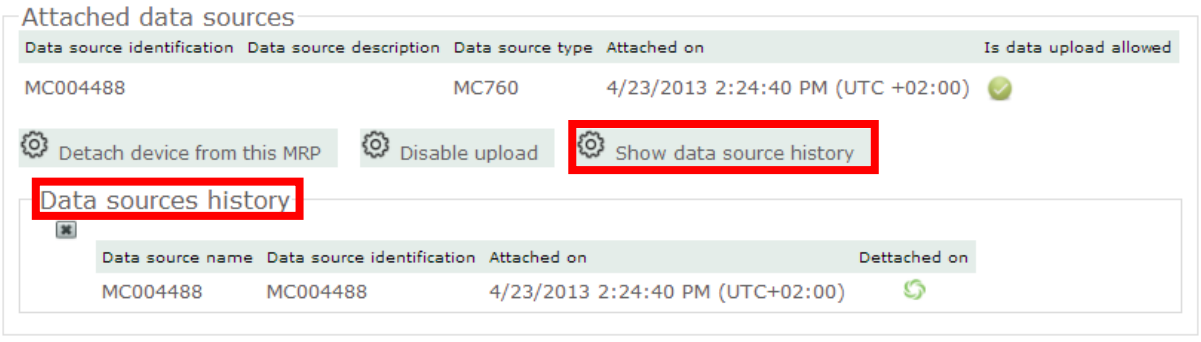


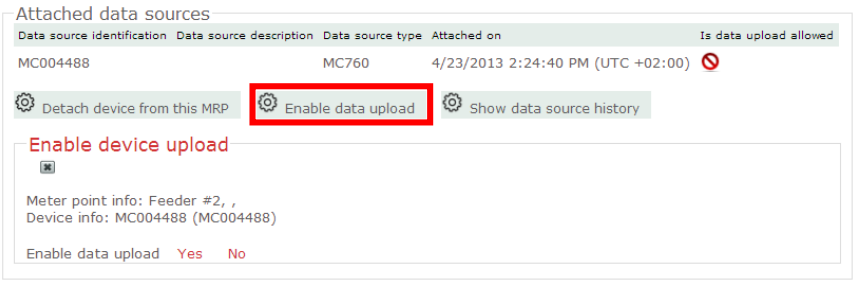
Figure 97:Approval of setup

The attached measurement instrument now appears in *Attached data sources* section, where it can be activated to start data pushing. It also appears in *Data sources history* section, which is activated by clicking *Show Data source history*. This section shows accumulated history of all measurement instruments attached to this meter reference point. The date of attachment is added automatically, as well as date, when measurement instrument is removed from meter reference point.



3.5.4.5.2 Step 2 - Activating and deactivating measurement instruments

Data pushing of a measurement instrument is enabled by clicking on the *Enable data upload* button in *Attached data source* section. This means that the server will be attached to the MRP at next pushed data (which comes from the measurement instruments at the next push data interval which is setup in the instrument) All data packages will be attached to this MRP from the point of activation all the way to the deactivation of a particular measurement instrument.



In the above case an icon for measurement instruments status, data pushing and information about alarms in the selected timeframe is colored green. Also in *Attached data source device* section a green button appears, which indicates that the measurement instrument is activated.

To deactivate measurement instrument, click *No* button at *Enable data upload*. After doing this the MiSMART server will stop accepting data packages from attached measurement instruments, and the user can detach the instrument from an MRP.

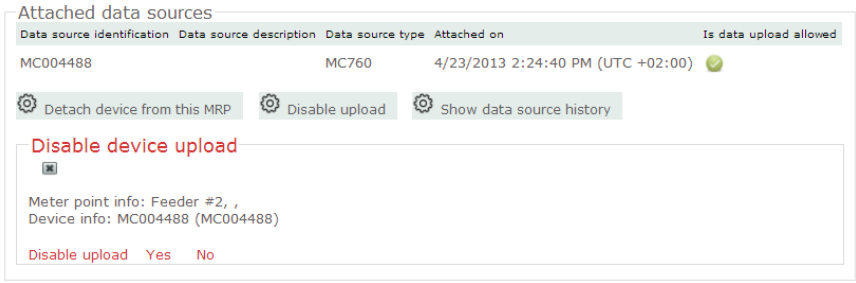


Figure 98: Detaching an instrument from an MRP

3.5.4.6 Replacing measurement instrument at MRP

To attach a new measurement instrument to an MRP, the old one must first be deactivated and then detached. For the deactivation process, please see the previous chapter.

To attach a new measurement instrument use the procedure “Attaching measurement instrument to meter reference point” as described in one of the preceding chapters.

3.5.4.7 Information about measurements and alarms on selected MRPs

In the lower part of the central application window, additional information to assist in the quick analysis of the system is available.

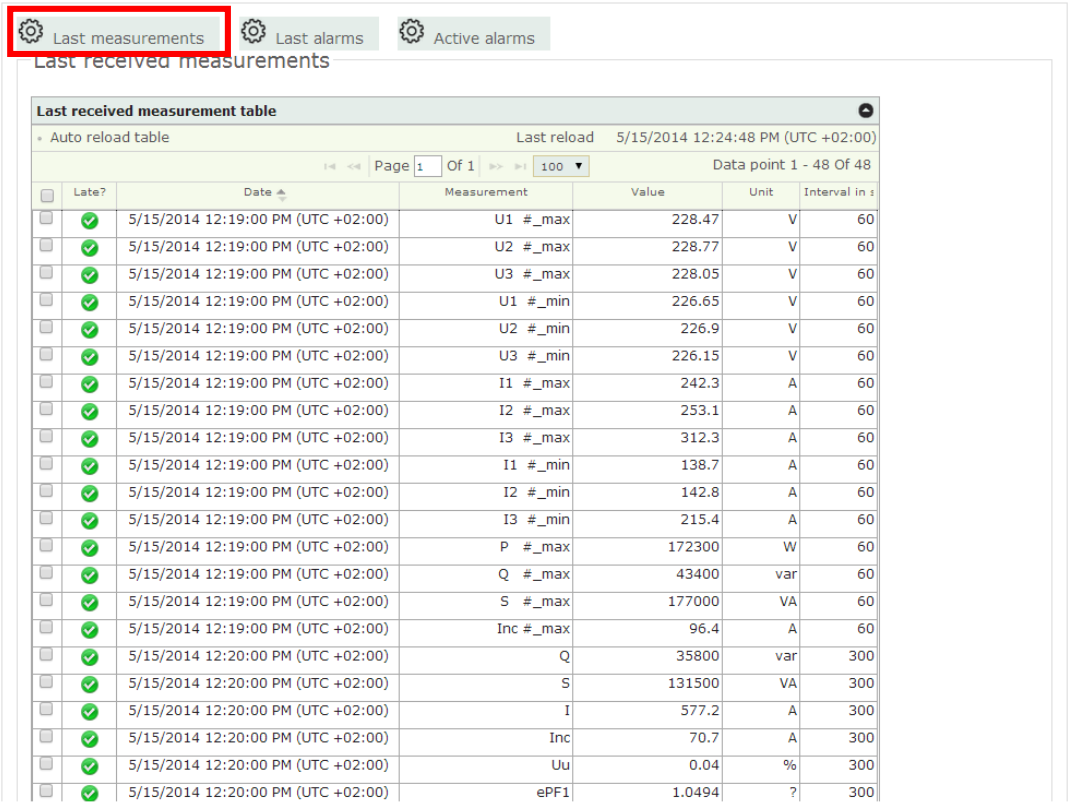
3.5.4.7.1 *Last Measurements*

By clicking on *Last Measurements* button, last data, received from the attached measurement instrument is shown in a table. If no measurement instrument is attached to an MRP this list will remain empty. The displayed list contains the last data packages received from the instrument and is is automatically displayed if the selected MRP with the attached measurement instrument holds data.

The list includes the following information about recently obtained results:

- Time tag after UTC (for central Europe the local time is +1 in winter and +2 in summer)
- Measured idents (i.e. measurements)
- Value
- Unit

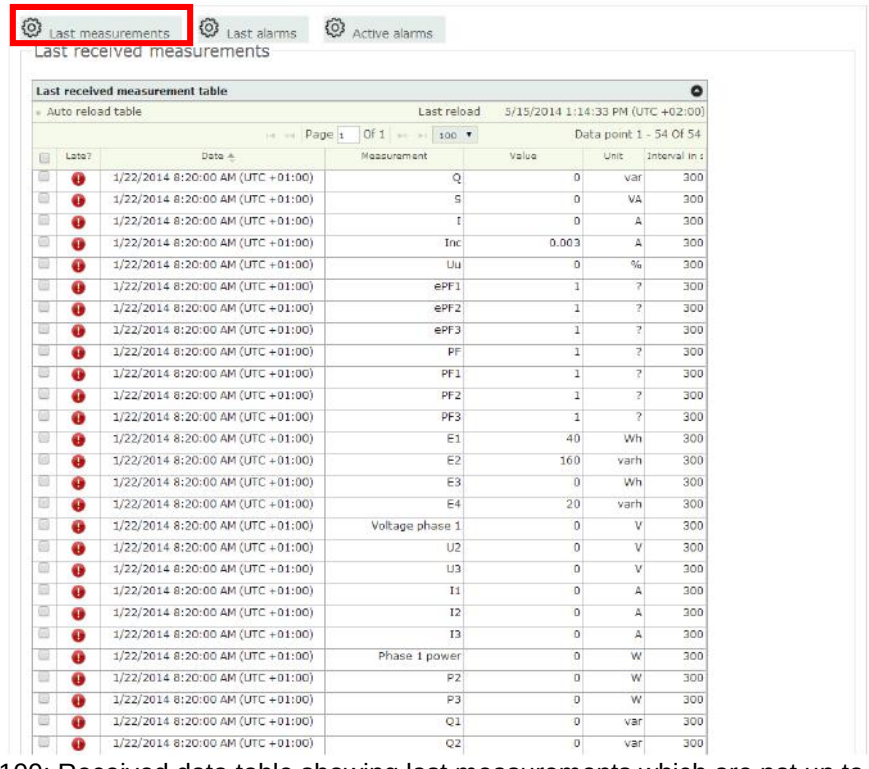
- pushing interval



Late?	Date	Measurement	Value	Unit	Interval in s
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U1 #_max	228.47	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U2 #_max	228.77	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U3 #_max	228.05	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U1 #_min	226.65	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U2 #_min	226.9	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	U3 #_min	226.15	V	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I1 #_max	242.3	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I2 #_max	253.1	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I3 #_max	312.3	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I1 #_min	138.7	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I2 #_min	142.8	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	I3 #_min	215.4	A	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	P #_max	172300	W	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	Q #_max	43400	var	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	S #_max	177000	VA	60
✓	5/15/2014 12:19:00 PM (UTC +02:00)	Inc #_max	96.4	A	60
✓	5/15/2014 12:20:00 PM (UTC +02:00)	Q	35800	var	300
✓	5/15/2014 12:20:00 PM (UTC +02:00)	S	131500	VA	300
✓	5/15/2014 12:20:00 PM (UTC +02:00)	I	577.2	A	300
✓	5/15/2014 12:20:00 PM (UTC +02:00)	Inc	70.7	A	300
✓	5/15/2014 12:20:00 PM (UTC +02:00)	Uu	0.04	%	300
✓	5/15/2014 12:20:00 PM (UTC +02:00)	ePF1	1.0494	?	300

Figure 99: Received data table showing last measurements which are up to date

If the measurement instrument is late in data pushing (status - measurement instrument's data pushing is delayed) the late results are colored red together with exclamation mark icons.



Late?	Date	Measurement	Value	Unit	Interval in s
!	1/22/2014 8:20:00 AM (UTC +01:00)	Q	0	var	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	S	0	VA	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	I	0	A	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Inc	0.003	A	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Uu	0	%	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	ePF1	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	ePF2	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	ePF3	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	PF	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	PF1	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	PF2	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	PF3	1	?	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	E1	40	Wh	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	E2	160	varh	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	E3	0	Wh	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	E4	20	varh	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Voltage phase 1	0	V	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	U2	0	V	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	U3	0	V	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	I1	0	A	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	I2	0	A	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	I3	0	A	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Phase 1 power	0	W	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	P2	0	W	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	P3	0	W	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Q1	0	var	300
!	1/22/2014 8:20:00 AM (UTC +01:00)	Q2	0	var	300

Figure 100: Received data table showing last measurements which are not up to date

List data items are colored red where data is not up to date (delayed). Status is set to "measurement instrument's data pushing is delayed" and remains in this condition until the data does not synchronize with the server again. An example of this is when the user sets new Measurement idents in memory of a particular measurement instrument. (see the setting up measurement instrument chapter later in this document)

If the user is aware of these changes and knows that certain idents (measurements) will no longer be received by the server, he should hide this information manually by pressing the "*Hide selected*" button underneath the table.

3.5.4.7.2 *Last alarms*

By clicking the *Last alarms* button all alarms, which were detected by the measurement instrument on an MRP are shown. This may also be seen from the tree structure by observing the MRP status.

The last alarm list includes following information about alarms:

- Time tag after UTC (for central Europe the local time is +1 in winter and +2 in summer)
- Measured idents (i.e. measurements)
- Set condition (higher or lower)
- Idents limit
- Unit
- On\off thermal function on alarm
- Alarm status (On\Off or interruption and return of supply)
- Alarm duration

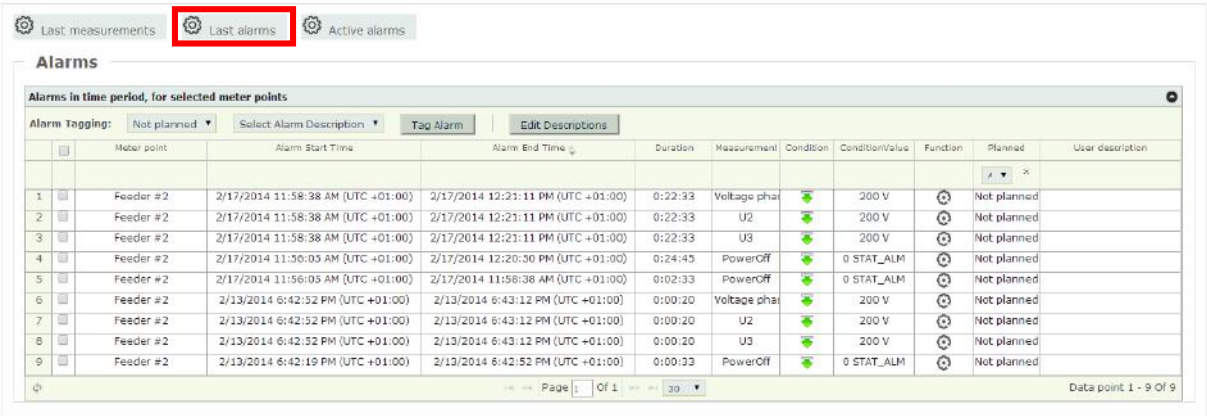


Figure 101: A chronological list of all alarms at a selected MRP

3.5.4.7.3 Setting planned and unplanned alarms

From the *Last alarms* table it is also possible to setup whether a particular alarm is unplanned or planned. This is important for statistics, because an alarm event which is marked as planned is excluded from the statistical dataset. By default all alarms are set to be unplanned. This can, however, be changed upon the users' request.

This is done in the upper part of *last alarm* table:

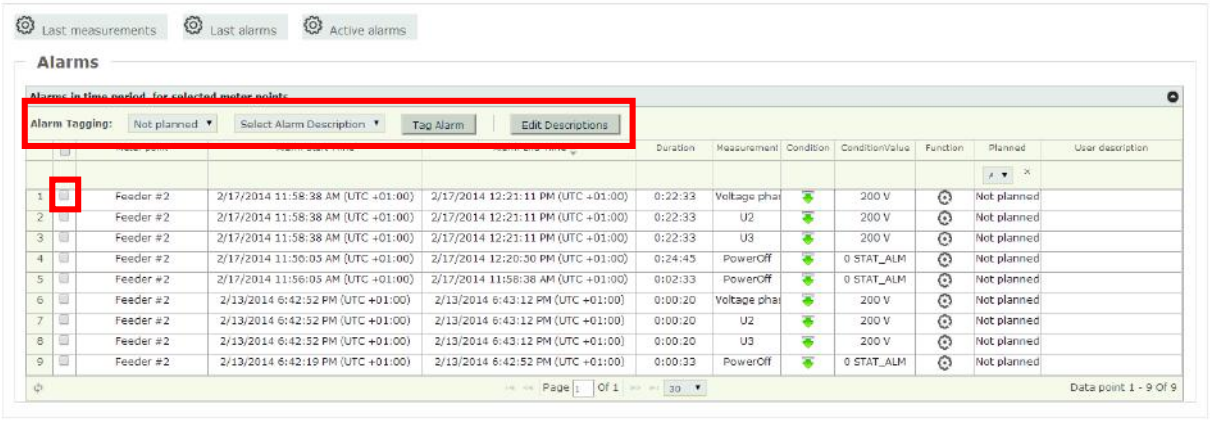


Figure 102: Setting planned and unplanned alarms at an MRP

First you should select the desired alarms on the left side of section by clicking on the checkmarks ☐ next to these alarms. If necessary a description can be edited by choosing the *Edit Descriptions* Edit Descriptions option. Following dialog window appears:

Figure 103: Add description for planed alarm dialog box

After confirming selection with OK button, added description can be selected and tagged in a dropdown menu Select Alarm Description Tag Alarm .

3.6 Virtual locations

This tool enables creating operations on existing idents (measurements) coming from one one or multiple MRPs.

The operators for creating operations are:

- addition,
- subtraction,
- multiplication,
- division,
- brackets (precedence operators).

This tool is accessible within *Configuration Tools/Meter reference points.*

3.6.1 Creating a new virtual location

A new virtual location can be created by right-clicking on a MRP within the MRP structure tree. In the menu you should select the option – *Add to Virtual Location*.

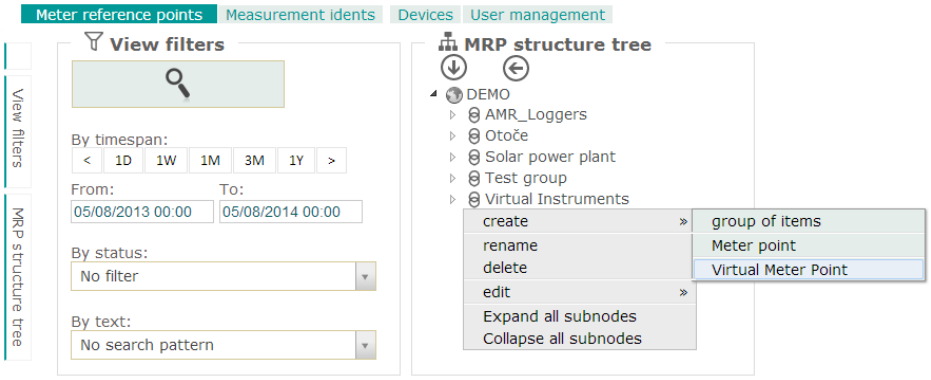


Figure 104: Creating a new virtual location

A newly added virtual location then appears within the MRP structure tree at the desired location.

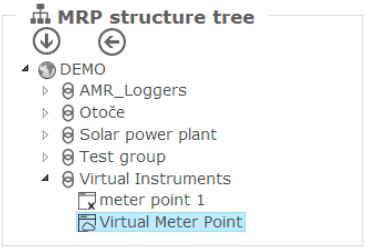


Figure 105: Virtual location

By left-clicking the virtual location settings of the virtual location can be accessed at the right side of the screen:

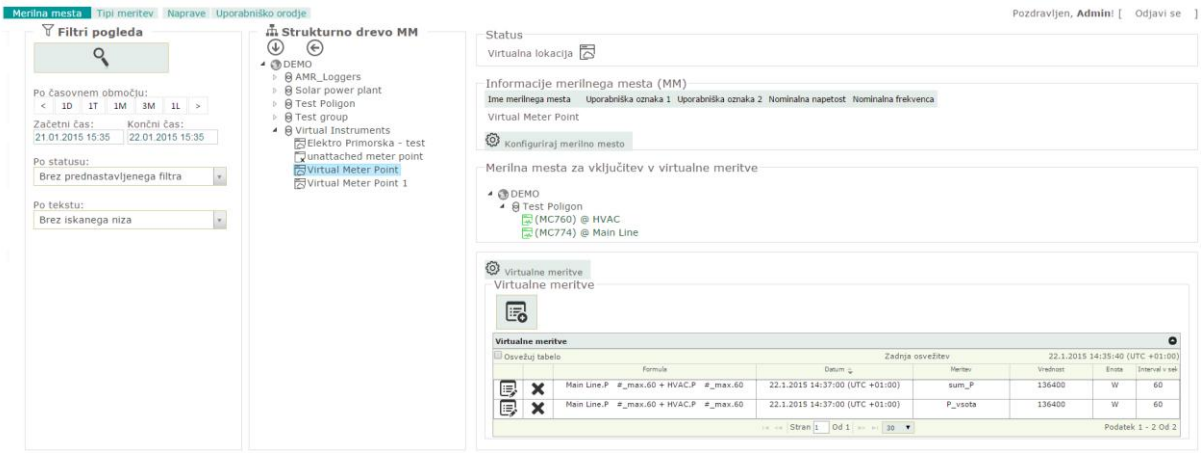


Figure 106: Settings related to a virtual location

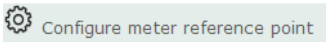
All the virtual location-related settings are described within the following chapters.

3.6.1.1 Status

Figure 107: Virtual location status

3.6.1.2 Meter reference point (MRP) information

This section shows the basic information of the selected virtual location.

By clicking on *Configure meter reference point* 

information related to the virtual location can be accessed:

Figure 108: Configuring a meter reference point

The Virtual Location can have the following information: *Name, User information 1, User information 2, Is online, Nominal voltage and Nominal frequency.*

The process of setting up a virtual location is then concluded by pressing the *Save* button -

.

3.6.1.3 MRPs to be included into a virtual location

This section shows all MRPs which can be manipulated within this virtual location.

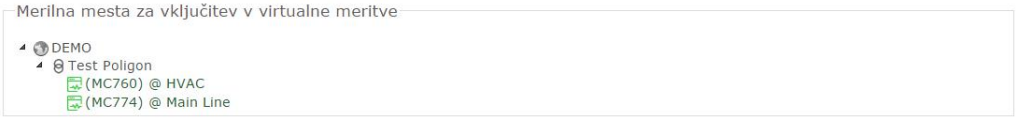


Figure 109: MRPs to be added to a virtual location

The process of adding MRPs with attached devices is described in the section 3.6.2.

3.6.2 Adding existing MRPs into a virtual location

By left-clicking on a previously created virtual location its details can be accessed.

MRPs are then added to the selected virtual location by right-clicking on a MRP from the MRP structure tree and selecting the option *Add to virtual location*.

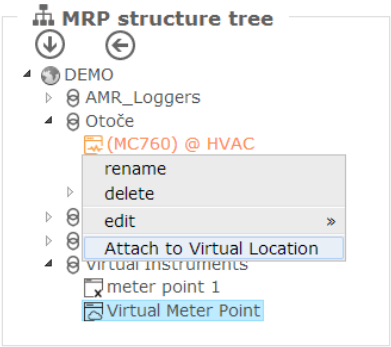
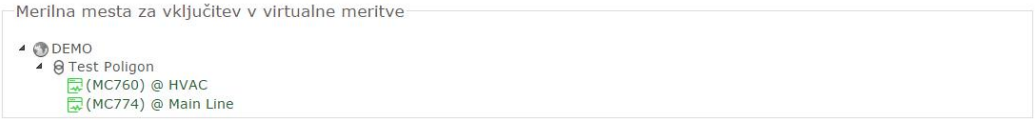


Figure 110: Adding an existing MRP into a virtual location

The selected MRP can now be seen under the section *MRP(s) to be included in virtual measurement*:



3.6.2.1 Virtual measurements

This is a tool for creating new virtual measurements within a selected virtual location.

The Add new virtual measurement should be clicked after which a new window appears:

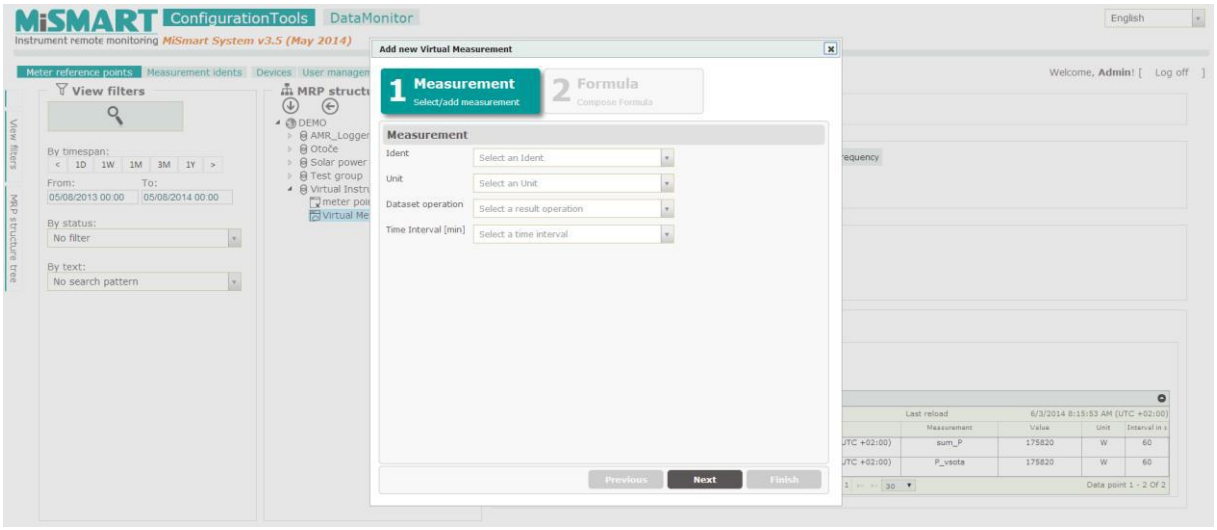


Figure 111: A new virtual measurement

The tool for creating a new virtual measurement appears which consists out of 2 parts – *Measurement* and *Formula*

Measurement:

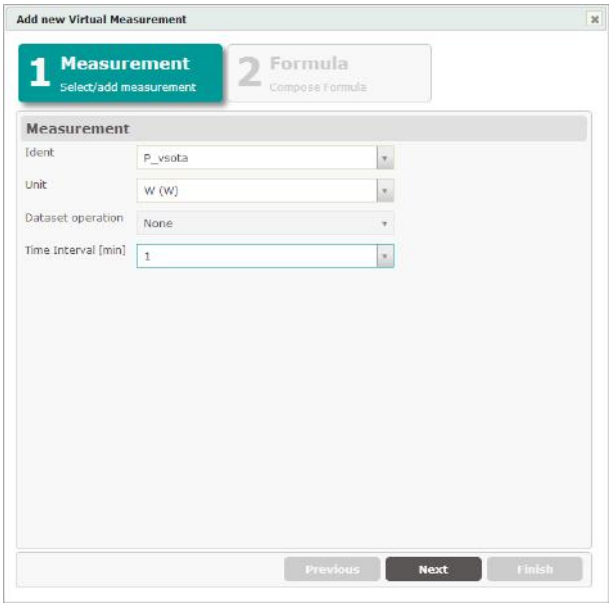


Figure 112: A new virtual measurement – Measurement

An arbitrary new *Ident name* (or an existing one) should first be selected as well as the *Unit*, *Operation* and *Time interval.* The time interval depends on the intersection of the selected unit as well as the MRPs which are included.

Then the button *Next* should be pressed.

Formula:

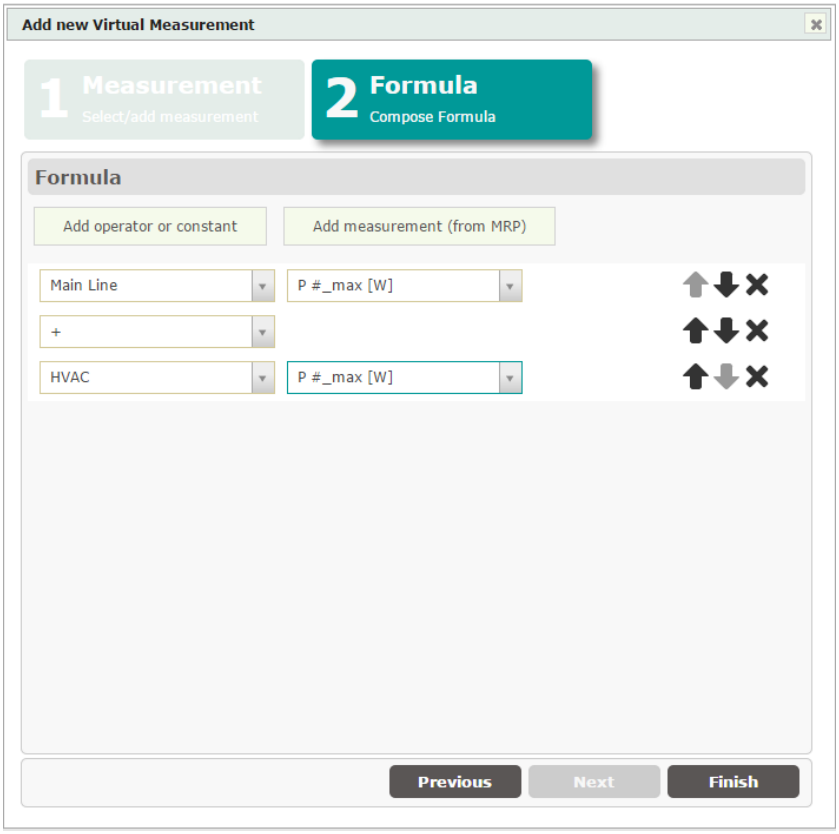


Figure 113: A new virtual measurement – Formula

First the Add measurement (from MRP) should be selected which offers all available MRPS already included to this virtual location. After a desired MRP has been selected the measurement dropdown menu appears on the right side where an appropriate measurement from this MRP should be selected.

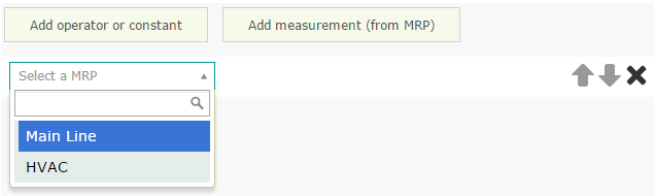


Figure 114: Select an MRP

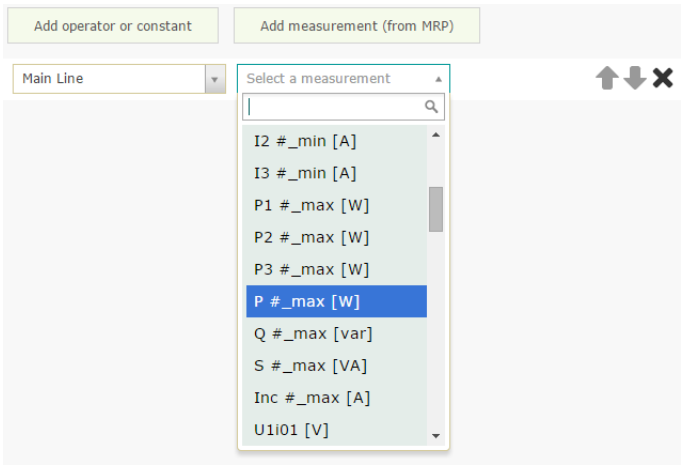


Figure 115: Select a measurement

The current selection can be deleted with ✖.

By clicking on the *Add operator or constant* Add operator or constant button a dropdown menu with all available operators is shown:

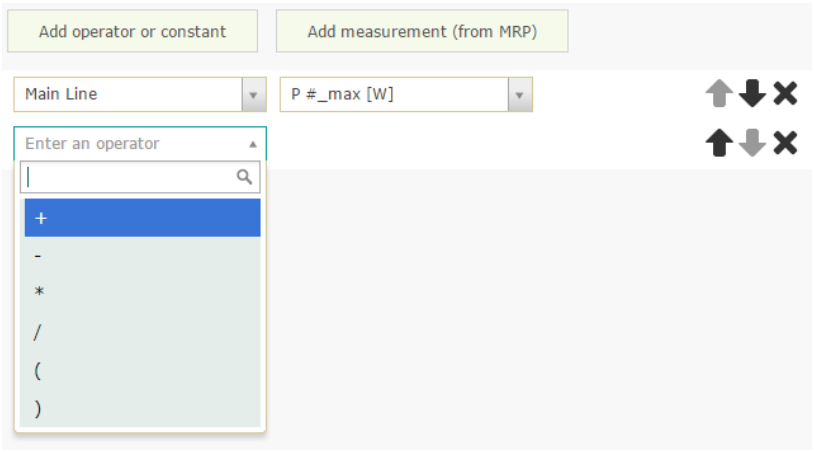


Figure 116: Selecting the addition operator

Measurements and operators can be moved up and down by pressing ⬆⬇.

The procedure should then be repeated for as long as the desired formula is created.

The process is concluded with the Finish button.

A new virtual measurement should then appear in the list of available *virtual measurements*:

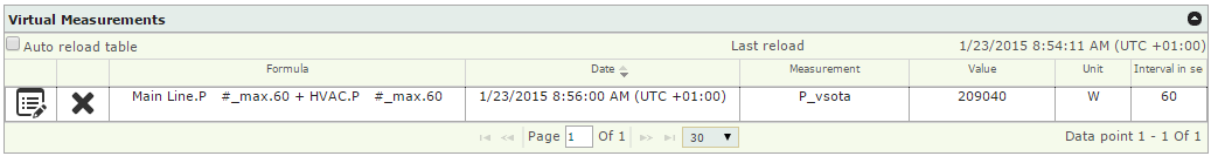


Figure 117: Existing virtual measurements

3.6.2.2 Edit virtual measurement

To edit an existing virtual measurement click icon next to the measurement you would like to edit:

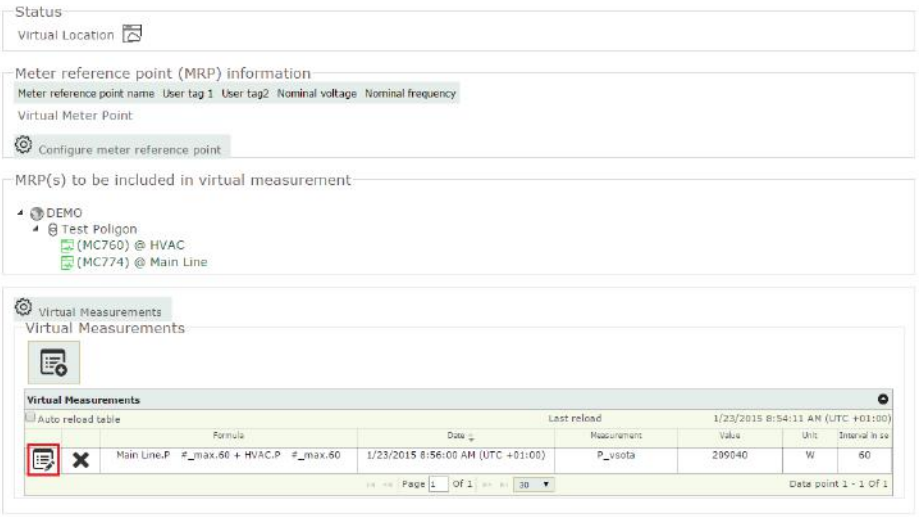


Figure 118: Edit virtual measurement

New window will open where you edit chosen measurement:

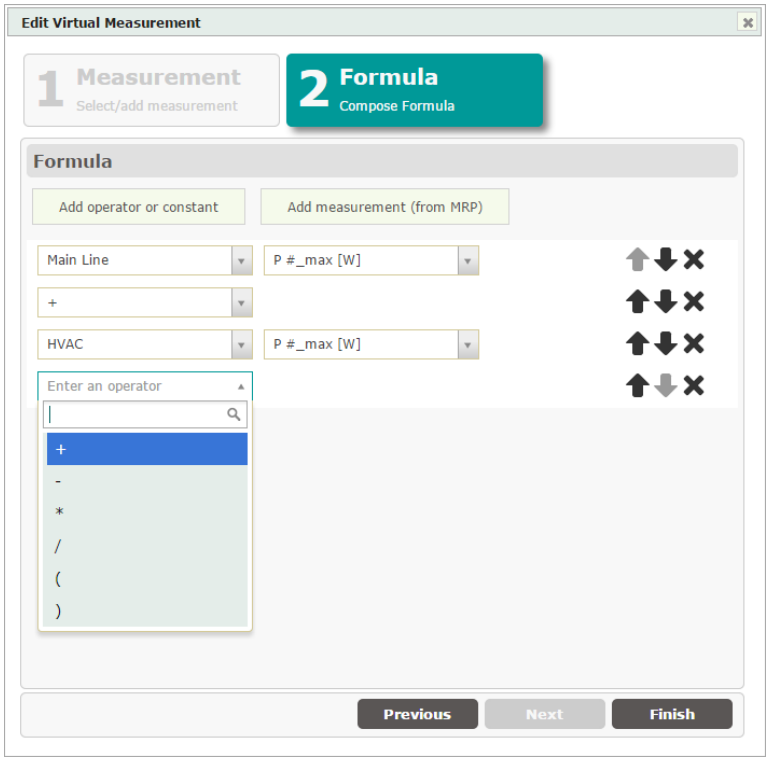


Figure 119: Edit virtual measurement formula

Edit options:

- Add operator or constant

- Add measurement (from MRP)

- Delete operator/measurement ✖
- Move operator/measurement ⬆⬇

The process is concluded with the

button.

3.7 A tool for editing the display of measurement parameters (idents)

This tool is aimed at editing the display of measurement parameters in the program MiSMART. With this tool the user can freely link to measurements to measurement groups, and can simplify searching and filtering for a specific measuring parameter in MiSMART Data tools browser.

A certain new ident (measurement) will appear on the list of all idents, as soon as any of the system attached measurement instruments sends such an ident into the system.
By clicking on any Measurement ident in the Measurement group tree structure, a Measurement information window opens up at the right side with list of measurements in this group:

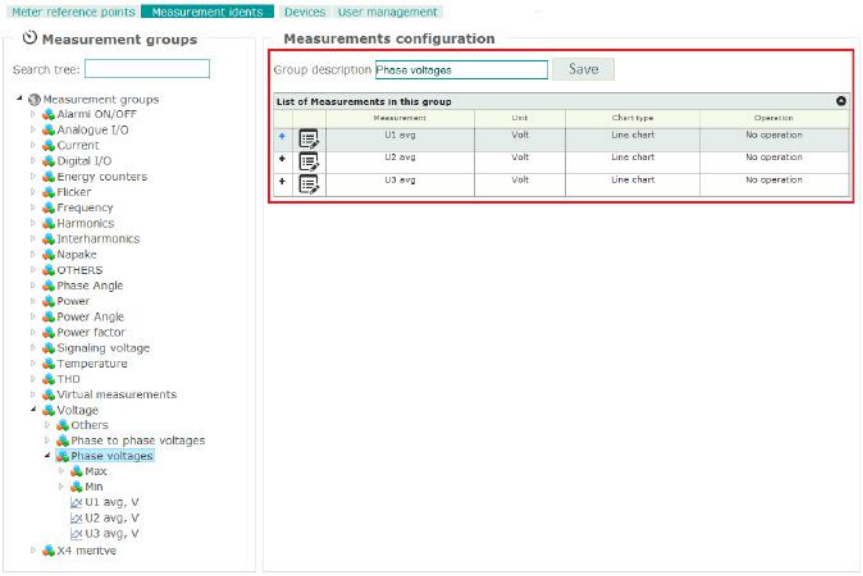


Figure 120: Measurement idents

Clicking + icon on the left side of measurement ident, reveals *List of MRP's with this measurement*:

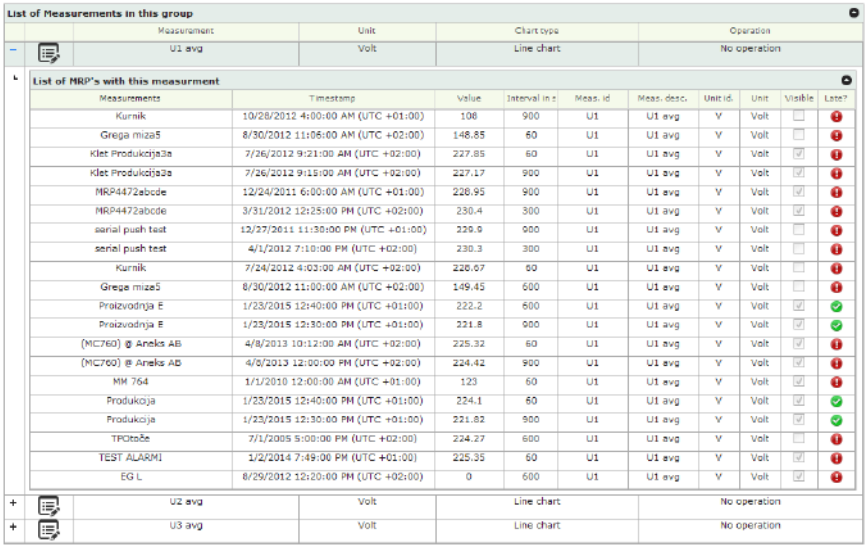


Figure 121: List of MRP's with this measurement

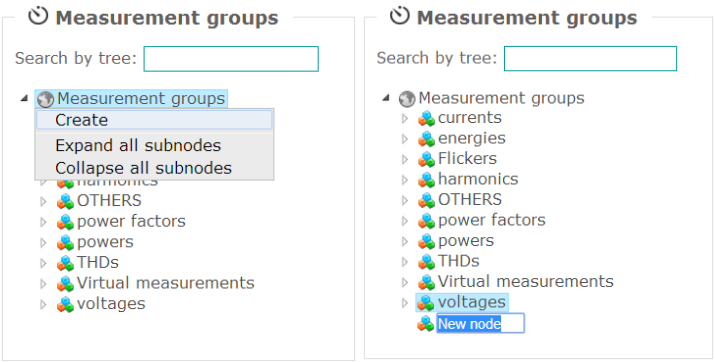
To close *List of MRP's with this measurement* click on − icon.

3.7.1 Window Appearance

On the left side of the window, the tree structure of the measured parameters (idents) is shown. These are at the start of the program all gathered in a group Others. In this window it is possible to add new groups and to move measurements idents from one group to another. The middle part of the window is intended to provide information about each measurement ident and possibility of adapting every particular ident's parameters.

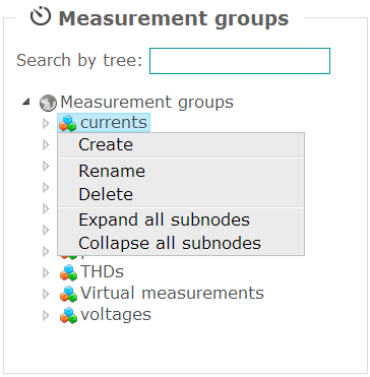
3.7.2 Creation of measuring quantity node

Measuring node, to which measured idents – *Measurements* can be attached is created by right mouse click on the parent group. This opens the drop-down menu where you select the option *Create*.
In the tree structure at the appropriate location a new empty group named *New node* appears, which can be arbitrarily renamed. The process of creation is completed by pressing the *Enter key*.
The user can create a tree structure of group on larger number of levels of subgroups.



3.7.3 Renaming, deleting and moving measurement groups

Over a measurement group it is possible to carry out various operations, which are mostly accessible by right-clicking on a selected measurement group.



3.7.4 Renaming measurement groups

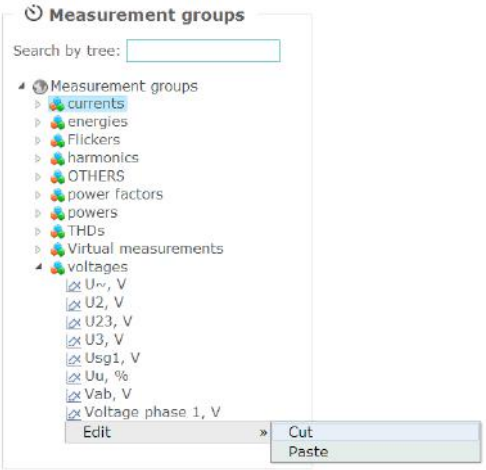
Measurement groups can be renamed by choosing the command *Rename*. After the selected command, the name field of the measurement group turns blue and it is possible to enter a different name or edit the existing one. The operation is confirmed by pressing the *Enter* key.

3.7.5 Deleting measurement groups

Measurement groups can be deleted by choosing the command *Delete*. To perform this action the group should not contain any measurement idents or a subset of the measurement idents. After the execution of the operation a notice of a successful deletion of the measurement idents is given.

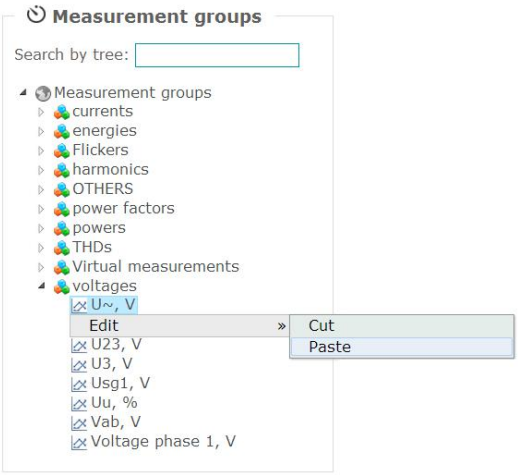
3.7.6 Moving measurement groups

Measurement groups together with its sub-groups and measuring idents can be moved to any other location in the tree groups. To make a move, mark the group (only the parent element), right-click on it and select command *Cut* in the *Edit* group. Then move the mouse to the desired location, right-click on it and select command *Paste* in the *Edit* group.
Another possibility is to mark and drag (left-click on the highlighted group) measurement group to the desired location.



3.7.7 Moving a measurement idents to measurement groups

Measurement idents or measurement groups, together with its sub-groups and measuring idents can be moved to any other location in the tree groups. To make a move, mark the group (only the parent element), right-click on it and select command *Cut* in the *Edit* group. Then move the mouse to the desired location, right-click on it and select command *Paste* in the *Edit* group.
Another possibility is to mark and drag (left-click on the highlighted group) measurement group to the desired location.



3.7.8 List of measurements in this group

3.7.9 Details edit of the individual measurement idents

The user has the option to set his own names for the measurement idents, as well as the type of graph, on which it is shown in MiSMART Data tools.

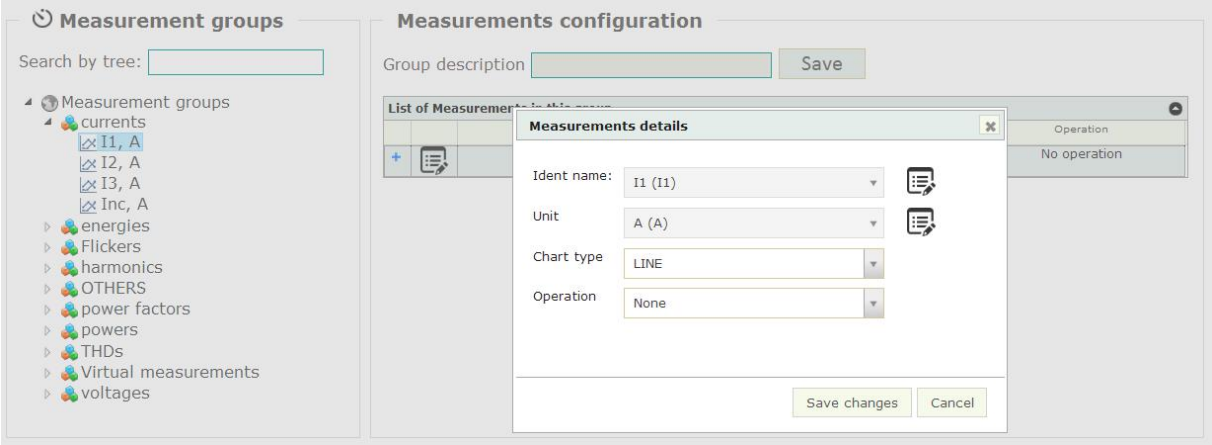


Figure 122: Details edit idents

3.7.10 Changing the name and unit of the measurement idents

Each measurement ident that appears in the system has its own identifiable name (*Measurement description*) and unit (*Unit description*). Since the default name in some cases, does not suit user, he can change name and description of the unit for each measurement ident:

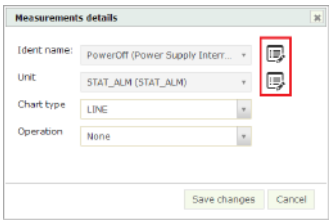


Figure 123: Edit idents name and unit description

3.7.11 Graphical presentation of measurement idents

For each measurement ident the type of graph can be set, line, bar graph or a special graph to display *Power Factor.*

3.7.12 Recalculating the displayed values - Daily Energy consumption graph

For some measurement idents it makes sense to display data as a consumption graph. Consumption represents the difference between the new value and the last sent value and thus only shows the differential between neighboring values.

When all the desired parameters are set, save the changes by clicking the *Save* button.

4 Setting up measurement instruments to connect into the system by using the MiQEN Setting Studio SW

To connect measurement instruments into the MiSMART system it is first necessary to setup all necessary measurements (e.g. current and voltage shifts, energy settings,…) together with some other parameters which is described in the following pages.

4.1 Ways to set up and communicate to the measurement instruments

A user can communicate with a measurement instrument in multiple ways, via the MMC/SD card or any of the built-in communication options. The procedures to do this are described in the instrument instruction manual of a swell as in the "Help" file of the MiQen configuration SW, which is the main tool for setting up measurement instrument.

When installing many new measurement instruments into the system it is recommended to create setting files (.msf files) for every particular instrument type which can then be cloned into other instruments within a larger group. A typical example for this could be a standardized transformer station with a standard set of measurements, alarms, and communication parameters ... In this case the user should first transfer these settings into all instruments, and then make other changes manually (e.g. gear settings, location,...)

4.1.1 MMC/SD card

MMC/SD card is a memory card which can be used for different purposes. In addition to storing data from the device memory and updating measurement instrument SW, it can also be used to transfer settings from and to the measurement instrument. Detailed procedures are described in the instruction manual for every measuring instrument.

4.1.2 USB communication

Users can connect to the measurement instrument via USB communication. Using this option is most appropriate when the user is physically near the instrument and can connect directly to it directly. Settings can be read and properly configured by using the MiQen configuration SW. Before the first USB connection to the measurement instrument, the user should first install the USB driver on their computer.

4.1.3 Ethernet communication

Ethernet communication is used if you want to access a measurement instrument from a remote location. Prerequisites for this to work are proper communication infrastructure, appropriate measurement instrument communication settings where one should know all these parameters (Measurement instrument IP, port).

4.2 Setting the instrument step-by-step

To include the measurement instrument into the system and to correctly display the information, the following parameters should be correctly set:

- Time zone and summer/winter time settings
- Communication settings for the server
- Setting up measurements for sending to the server

4.2.1 Time, time zone, summer/winter time

Correct setting of the time zone and the transition between summer and winter time is needed for correct operation. If time settings are done properly data timestamp on the server side have the correct time stamp, and also correct local time is shown in the measurement instrument. All data packages which are transmitted to the MiSMART system are equipped with a time stamp in UTC (Universal Time Code), which gets stored directly into the database. When interpreting the data with MiSMART this time is localized to the users local computer time.

For example the following instrument settings would typically apply for Slovenia:
Time zone: GMT + 1:00 European Central Time (Brussels)
Auto summer/winter time: Yes

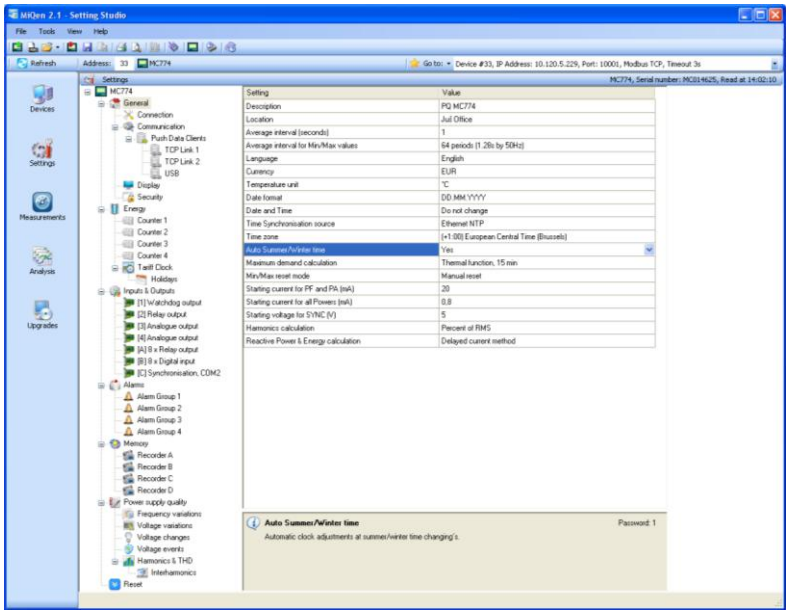


Figure 124: Time related settings

Time synchronization of measurement instruments and its settings are described in the next chapter "Communication settings for data transfer and measurement instrument time synchronization"

4.2.2 Communication settings for data pushing and measurement instrument time synchronization

To push data to the server, an IP address and port (to which data is transmitted) setup is required. The measurement instrument can push data to two different IP addresses, while the synchronization is set to one of these.

4.2.2.1 Communications settings for data transfer - IP server

A user can set two different TCP addresses to which data is transmitted (i.e. pushed). In addition to configuring communication parameters such as IP addresses and communication ports the user should also setup a proper data format of pushed packages and response times.

IP address and ports depend on the settings of each individual server that receives the data.

Data format for the measurement instrument which are included in the MiSMART system, must be set to: XML – Smart.

Response time in systems with fast communication should be set to less than 10s. For systems with slow communication, this setting can be higher.
This setting affects the transmission speed when there are large amounts of data in the measurement instrument memory. For response time settings under 10s, measurement instruments send data one by one. For settings over response times over 10s, each data package is automatically delayed for 10% of the set value.To see more details on this mechanism please see the appropriate instrument users' manual.

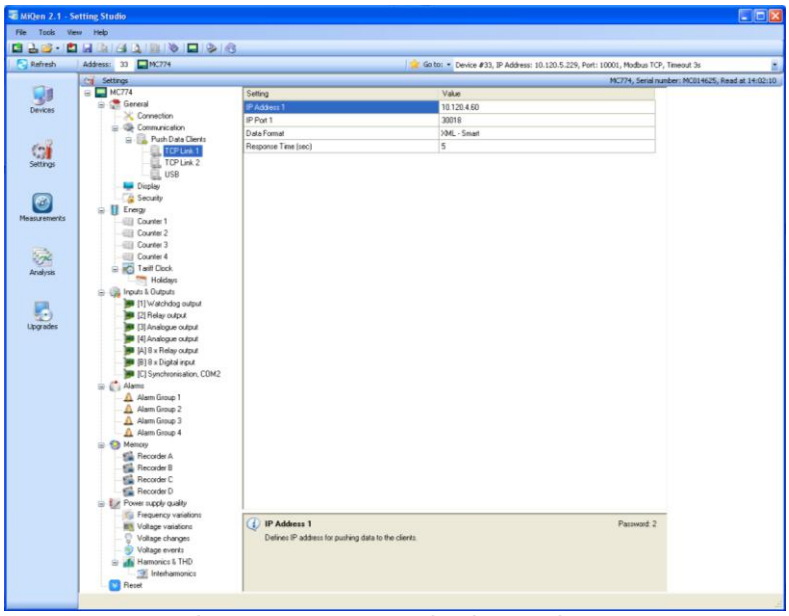


Figure 125: Communication settings

4.2.2.2 Measurement instrument time synchronization

For automatic time synchronization, you must setup through which server the device will be synchronized. In this process the device is synchronized to the server clock during every successful push package sending to the server. The setting is made in the Push data clients node under Communication:

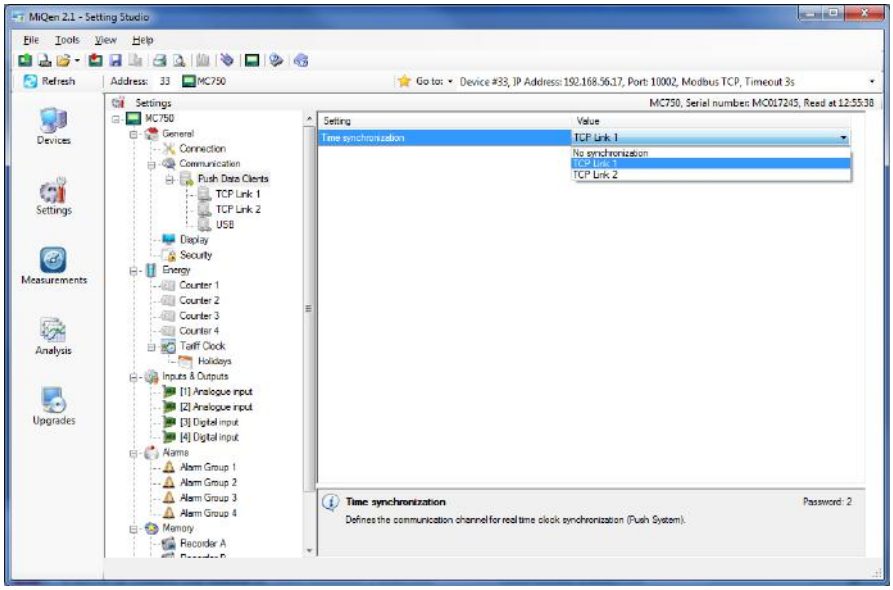


Figure 126: Automatic time synchronization

4.2.3 Settings for measurements and alarms pushing

Measuring center MC7xx can push measurements and alarms data, which are stored in the internal device memory. The data are equipped with the same time tags as in the internal memory. For each part of the memory the user can set to which of the servers the data will be pushed. For each of the servers and memory parts, the measurement instrument also keeps a record of which data have already been pushed to the server successfully.

4.2.3.1 Setting up measurements pushing

To push the measurements the user can set which particular part of the memory will be sent which server (either TCP1 or TCP2), the pushing period and the pushing time delay.

The pushing period can be set to:

- Each record
- Hourly
- Daily
- Weekly

If each record is selected as pushing period, the interval is equal to the interval at which data are recorded inside the memory.

Pushing time delay can be set in seconds. Increasing this delay is a useful feature when the system has a large number of measurement instruments which could cause overload of communication lines otherwise.

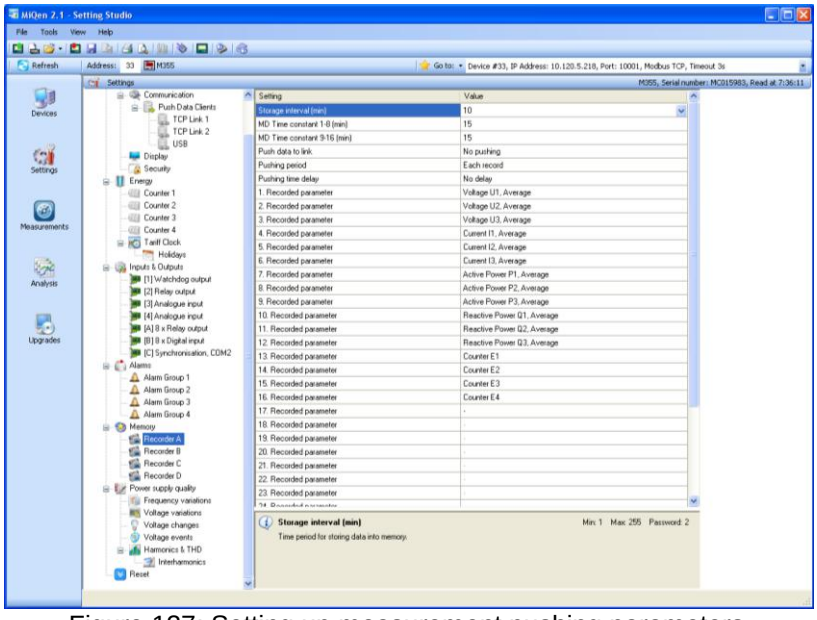


Figure 127: Setting up measurement pushing parameters

4.2.3.2 Setting up alarms pushing

The user can configure into which of the servers alarm data will be pushed.

Alarm data is pushed from the instrument as soon as the alarm appears. If the measurement instrument can't establish a communication link with the server and successfully submit an alarm data package, the data will be pushed at the next alarm or data transmission interval. Depending on which of the above events occurs first.

In addition to configured alarms, some in-built status alarms containing power failure interruption information (when the auxiliary power supply has been activated) is also pushed to the server.

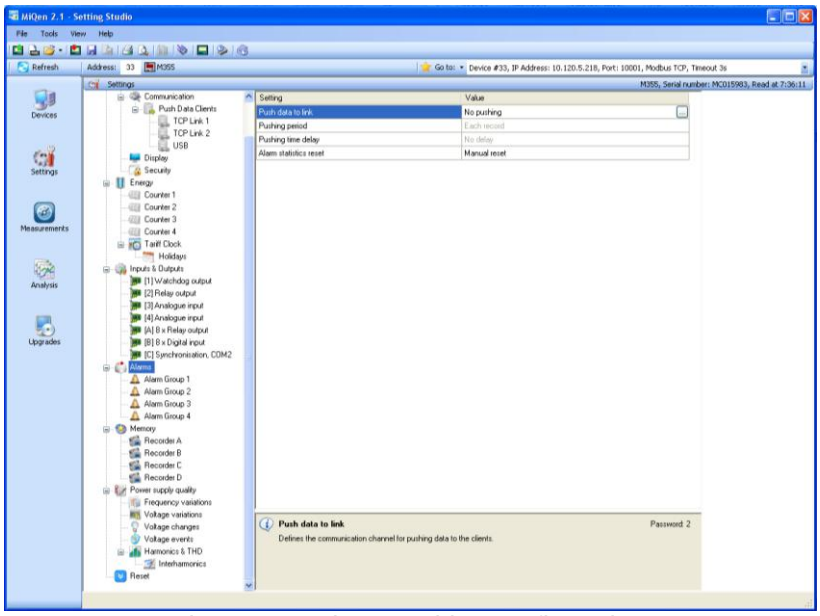


Figure 128: Alarm pushing configuration

4.3 Activating the pushing mechanism and data transfer logic

As already mentioned earlier in the document, measurements which are stored in the memory as well as configured alarms are being pushed to servers. A measurement instrument starts pushing data to the selected server at the first pushing period under the condition that data pushing to a chosen link is selected.

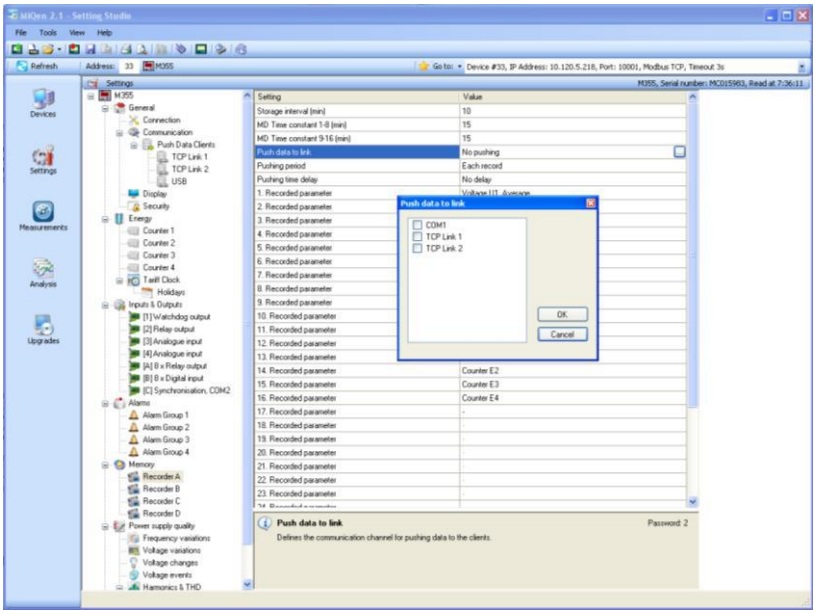


Figure129: Instrument pushing activation (shown for measurement recorder)

In cases when the selected link is not active, communication link to the server has not yet been established or when the measurement instrument can't push data, the instrument will always make new attempts and try to do so at the next pushing period. When the server connection is established after link setup, all data that has appeared since setup will be

pushed to the server. If in the meantime, the link is removed and then re-added, data will be pushed from the last added link.

If the user wants to add older data from the memory to the system, he/she can transfer it from the memory to MMC/SD card or via remote communication. For the import of these historic data into the MiSMART server a dedicated Data importer tool can be used, which is a separate software tool, and is not the subject of this document.

Printed in Slovenia • Subject to change without notice • GB

Iskra®

Iskra Sistemi, d. d.
Stegne 21
SI-1000 Ljubljana
Slovenia
Phone: +386 1 51 31 000
Fax: +386 1 51 11 532
www.iskrasistemi.si
info@iskrasistemi.si