
GRID AUTOMATION PRODUCTS

MicroSCADA X SYS600 10.2

Operation Manual





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Section 2 Introduction

2.1 This manual

This manual describes how to supervise and control the power process with the SYS600 Monitor Pro user interface. The supervision and control is done by means of Process Displays, event/alarm displays, trends, measurement reports and so on. The manual also describes the basic customizing possibilities of the user interface.

For supervising and controlling power process with Workplace X, please refer to SYS600 10.0 Operation Manual for Workplace X.

2.2 Use of symbols

This publication includes warning, caution and information symbols where appropriate to point out safety-related or other important information. It also includes tips to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:



Warning icon indicates the presence of a hazard which could result in personal injury.



Caution icon indicates important information or a warning related to the concept discussed in the text. It might indicate the presence of a hazard, which could result in corruption of software or damage to equipment/property.



Information icon alerts the reader to relevant factors and conditions.



Tip icon indicates advice on, for example, how to design a project or how to use a certain function.

Although warning hazards are related to personal injury, and caution hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warnings and caution notices.

2.3 Intended audience

This manual is intended for installation personnel, administrators and skilled operators to support installation of the software.

2.4 Related documents

| Name of the manual | Document ID |
|--|------------------|
| DMS600 4.5 Operation Manual | 1MRS257833 |
| SYS600 10.2 Application Design | 1MRK 511 466-UEN |
| SYS600 10.2 Process Display Design | 1MRK 511 478-UEN |
| SYS600 10.2 Installation and Administration Manual | 1MRK 511 496-UEN |
| SYS600 10.2 Operation Manual for Workplace X | 1MRK 511 500-UEN |

2.5 Document conventions

The following conventions are used for the presentation of material:

- The words in names of screen elements (for example, the title in the title bar of a dialog, the label for a field of a dialog box) are initially capitalized.
- Capital letters are used for file names.
- Capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, press the CTRL key. Although the Enter and Shift keys are not labeled they are written in capital letters, for example, press ENTER.
- Lowercase letters are used for the name of a keyboard key that is not labeled on the keyboard. For example, the space bar, comma key and so on.
- Press CTRL+C indicates that the user must hold down the CTRL key while pressing the C key (in this case, to copy a selected object).
- Press ALT E C indicates that the user presses and releases each key in sequence (in this case, to copy a selected object).
- The names of push and toggle buttons are boldfaced. For example, click **OK**.
- The names of menus and menu items are boldfaced. For example, the **File** menu.
 - The following convention is used for menu operations: **Menu Name/Menu Item/Cascaded Menu Item**. For example: select **File/Open/New Project**.
 - The **Start** menu name always refers to the **Start** menu on the Windows Task Bar.
- System prompts/messages and user responses/input are shown in the Courier font. For example, if the user enters a value that is out of range, the following message is displayed: Entered value is not valid.
- The user may be told to enter the string MIF349 in a field. The string is shown as follows in the procedure: **MIF349**
- Variables are shown using lowercase letters: sequence name

2.6 Document revisions

| Revision | Version number | Date | History |
|----------|----------------|------------|---------------------------------|
| A | 10.2 | 31.03.2021 | New document for SYS600 10.2 |

Section 3 Overview

This section introduces the SYS600 user interface functions. All application areas and functions described in this manual are not necessarily covered by every customer's application. Likewise, this manual may not describe every application functionality a customer may have, because the functionality of individual applications is designed according to the needs of each customer.

3.1 Getting started

Start a Monitor Pro session by launching the SYS600 Monitor Pro program. The **Login** dialog is displayed when Monitor Pro is started, see [Figure 1](#).

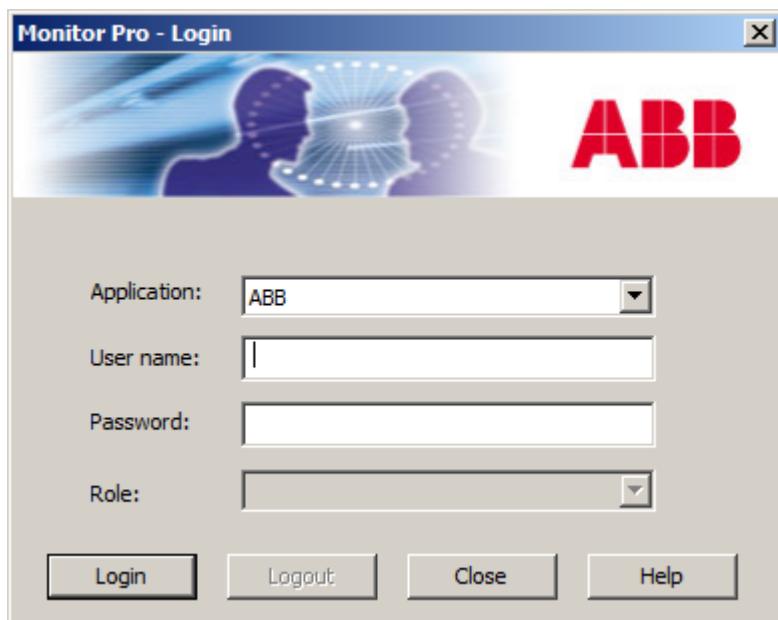


Figure 1: Monitor Pro login dialog

Clicking **Close** in the **Login** dialog closes the **Login** dialog, but leaves the Monitor Pro still running.

3.1.1 Login

To login, select an application from the **Application** drop-down list or click on the Process Display view if Monitor Pro is running. Type the user name and password into the corresponding fields and click **Login**.

Each user is associated with a certain user profile defined by the system manager. For more information, see SYS600 Application Design.

If the user name and the password do not match or the user name does not exist, the **Login** dialog is displayed again and login may be attempted again. Each attempt to login is registered by the system, even those that fail.

If login is successful, the first display is shown on the screen (if one has been defined in the **Application Settings** dialog). All the operations subsequently performed on the Monitor Pro are related to the authority profile associated with the user name. The user name is also included as an identifier in the event register when certain manual operations are performed.



In order to prevent unauthorized usage of a user name and authority profile, always logout when leaving the control room.

3.1.2 Logout

In Monitor Pro, logout means that the current user name and user authority are cleared.

The options for logout are:

- Selecting **Main/Logout**
- Closing the Monitor Pro by selecting **Main/Exit**.
- Automatic time based logout executed by Monitor Pro.
- Changing the SYS600 application state from **HOT** to **WARM** or **COLD**.
- The SYS600 OPC DA server or service is stopped.

3.1.3 Time based logout

An automatic logout is done after a certain time period (for example 8 hours). The logout duration is defined in the User Account Management tool. The values are application specific. After time based logout, the user must login again via the **Login** dialog.

3.1.4 Time-based logout after inactivity

Users with appropriate permissions can set a timeout threshold for idle sessions. If there is no interaction between the user and the product on application level (no user activity or commands) for the configured time, the session is discarded and the user must re-authenticate before the next interaction.

Logout duration after inactivity can be configured in the User Account Management tool.

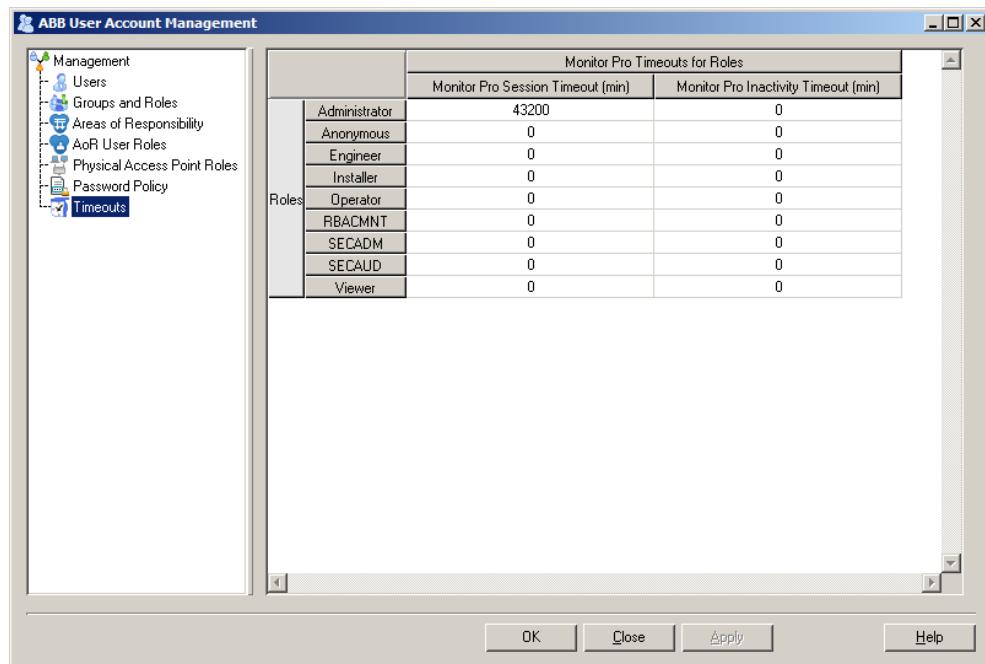


Figure 2: The User Account Management timeouts tab

The same definitions are available for logout duration after inactivity as for logout duration (notify messages/closing Monitor Pro when logout occurs).

3.2 Application displays

There are many different types of application displays: Process Displays, System Supervision Displays, Alarm Display, Event and Blocking Displays, Measurement Reports Display and Trends Displays. [Figure 3](#) illustrates an example of application display.

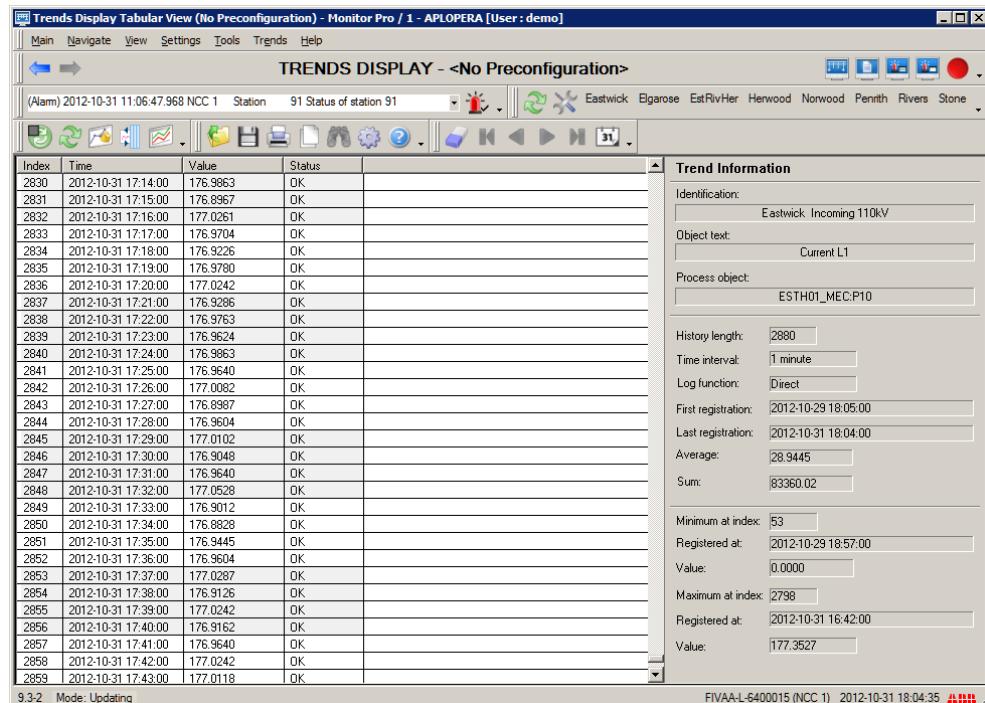


Figure 3: Example of Trends display

3.3 Process Displays

The Process Displays contain information on objects with dynamic behavior on the system process in graphical form, see [Figure 4](#). Process Displays contain functions for zooming, panning and de-cluttering displays.

The display name, the application's name and number as well as the login user are presented on the title bar of the Process Display.

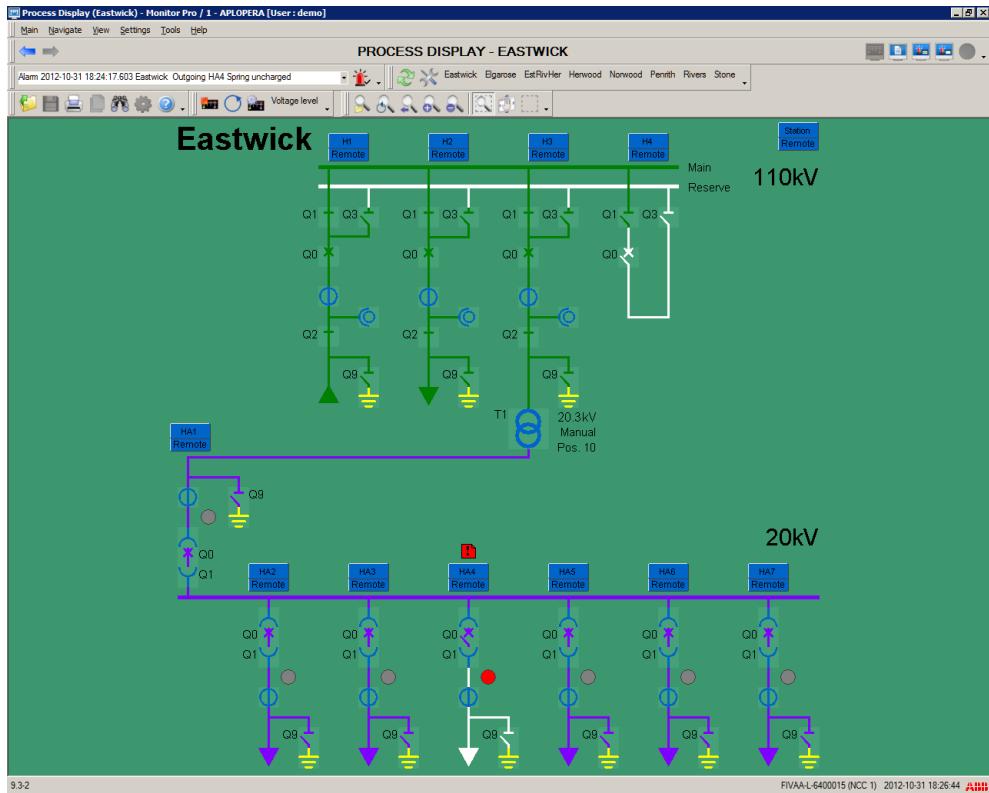


Figure 4: Station Process Display

3.3.1 Controlling the process

[Figure 4](#) is an example of a station Process Display in a single line diagram form. The power processes can generally be shown in the Process Display in different presentations. The presentation to be used is selected when the Process Displays are configured. For more information about the colors used in Process Display, see [Section 4.10](#) and [Section 4.11](#).

The primary devices can be interacted through the control dialogs accessed from the Process Display, see [Figure 5](#). Only users in certain user groups are allowed to execute control operations.

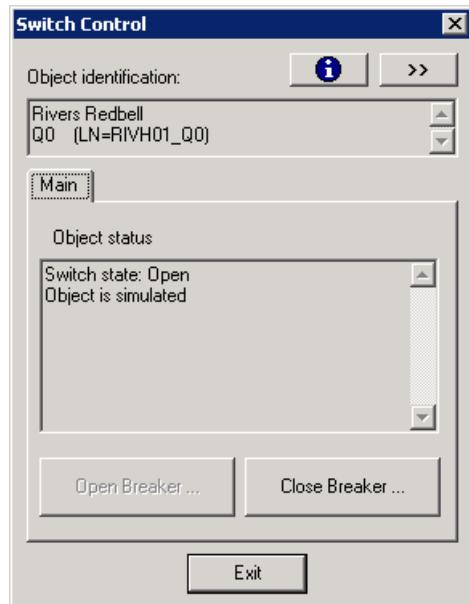


Figure 5: Main display of a Control dialog



The user can switch between the main view and the advanced view by clicking the >> and << buttons in the upper right hand corner of a Control dialog.

3.3.2 Adding Process Display Notes

A Process Display Note can be added to a Process Display to point out important information, for example a line that is under construction. The Process Display Note comments can be freely edited (that is, added, deleted, moved) without it affecting the actual process.

To add a Process Display Note, select **Tools/Notes** and select the color for the comment. The colors should be used according to the importance of the comment.

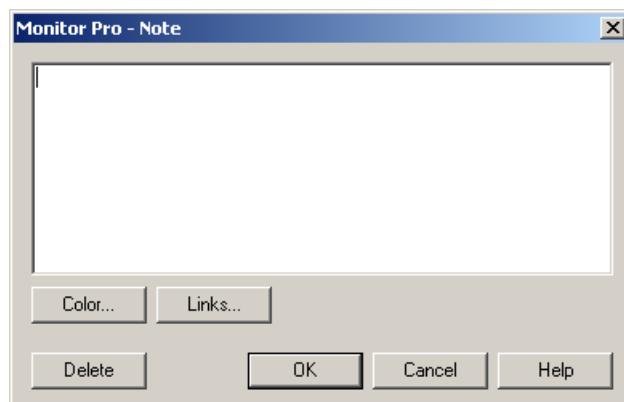


Figure 6: Process Display Note

The available colors are:

- Symbol 1 (Yellow)
- Symbol 2 (Red)
- Symbol 3 (Green)
- Symbol 4 (Magenta)
- Symbol 5 (Cyan)

To change the color of the Process Display Note, click **Color** in the Process Display **Note** dialog. The Process Display Note Color dialog opens, see [Figure 7](#). Select a color for the Process Display Note and click **OK**.

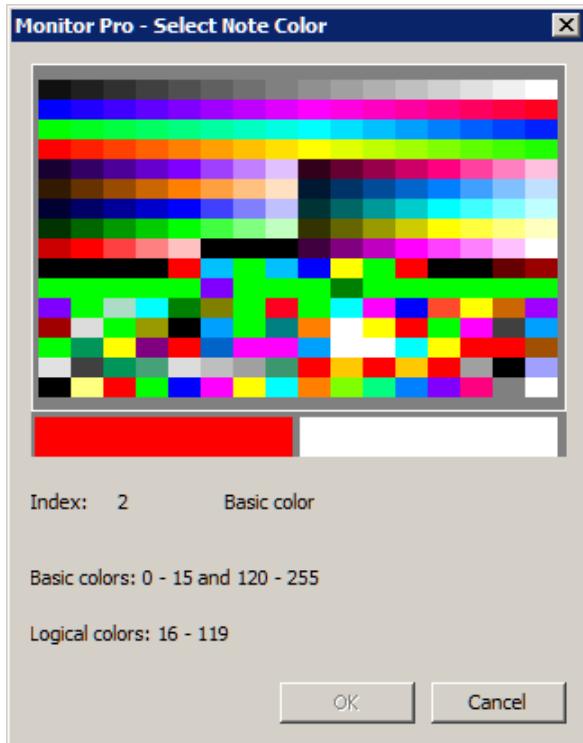


Figure 7: Changing the Process Display Note color

The Process Display Note object is created on the center of the visible display. It can be moved into the right place with the mouse.

To write a comment:

1. Click the Process Display Note object. A Process Display **Note** dialog is displayed.
2. Type a comment to the **Note** box.
3. Click **OK**.

3.3.2.1 Deleting Process Display Note

Delete a Process Display Note object by opening the Process Display **Note** dialog and selecting **Delete**. Monitor Pro confirms the operation by displaying a warning dialog. The comment information is removed and the Process Display Note object is deleted from the display.

3.3.2.2 Moving Process Display Note

Move the Process Display Note by dragging it with the mouse.

3.3.2.3 Resizing Process Display Note

Resize Process Display Notes by holding down the right mouse button and moving the cursor up or down. Moving up the cursor increases the Process Display Note and moving down decreases the Process Display Note.

3.3.2.4 Adding Process Display Note links

Create links to files on the server or on a local computer by selecting **Links** from the Process Display **Note** dialog. A Process Display **Note Links** dialog is displayed.

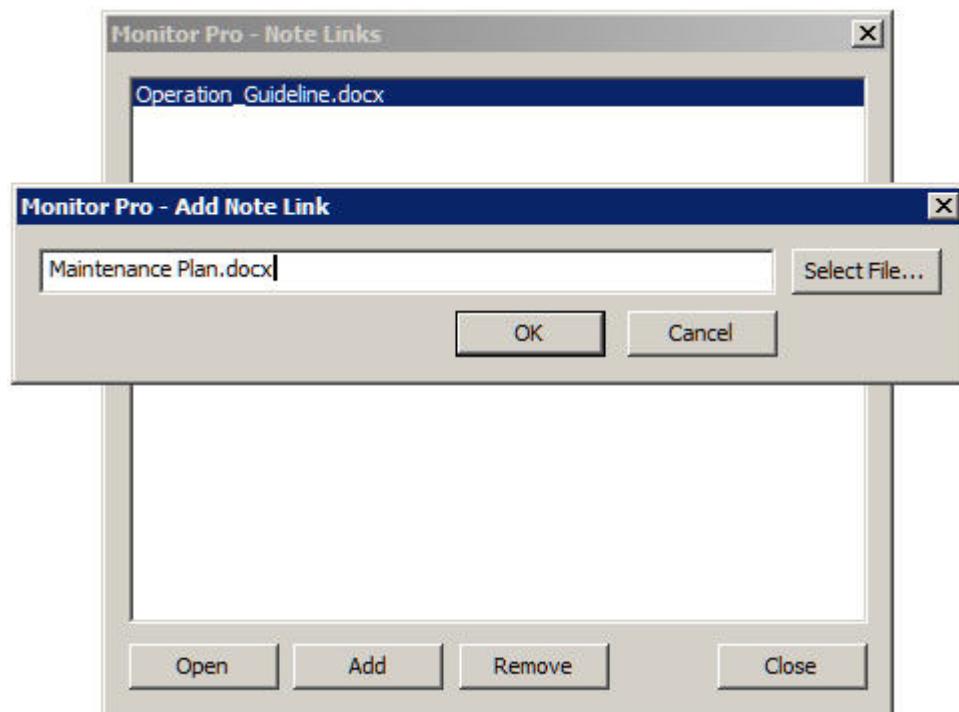


Figure 8: Process Display Note Links

Add new links by browsing the file should be linked to the comment. Click **Open** to open the linked file. For example, if the linked file is a .txt file, it is opened from the Process Display **Note Links** dialog in Windows Notepad.

Remove the links by selecting the corresponding link and clicking **Remove**.

3.3.3 Adding a comment to an object

A comment can be written for an object, for example a circuit breaker. The comment is displayed for all users who open the control dialog of the same object. The comment is independent of the display file where the object is presented. User name and edit time are also stored for the comment.

If a comment has been added to an object, it is displayed when the control dialog is opened, see [Figure 9](#).

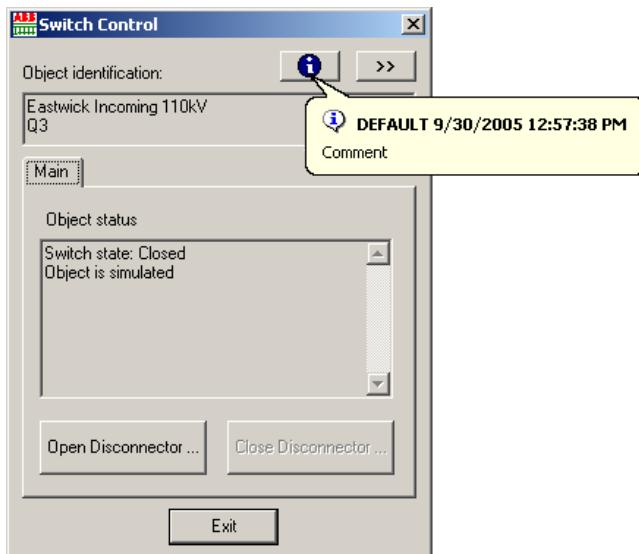


Figure 9: Comment in the control dialog

To add a comment:

1. Click the information symbol (i) in the control dialog to open the dialog, see [Figure 10](#).

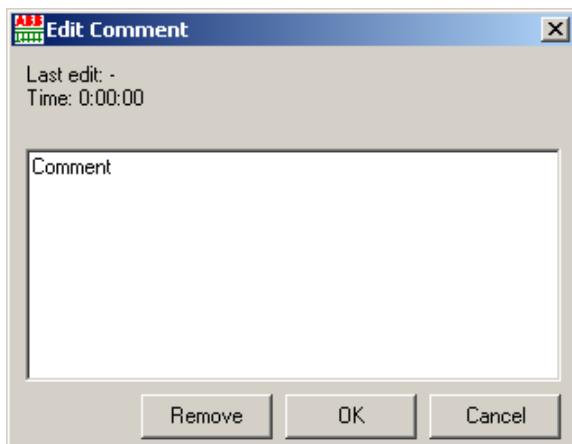


Figure 10: Adding comment to control dialog

2. Write the comment.
3. Click OK.

3.3.4 Renaming Process Display

A Process Display can be renamed through the Customize dialog:

1. From the main menu, select **Settings/CUSTOMIZE** to open the **Customize** dialog.
2. Right-click the Process Display name.
3. Select **Name** and enter a new name for the Process Display [Figure 11](#).

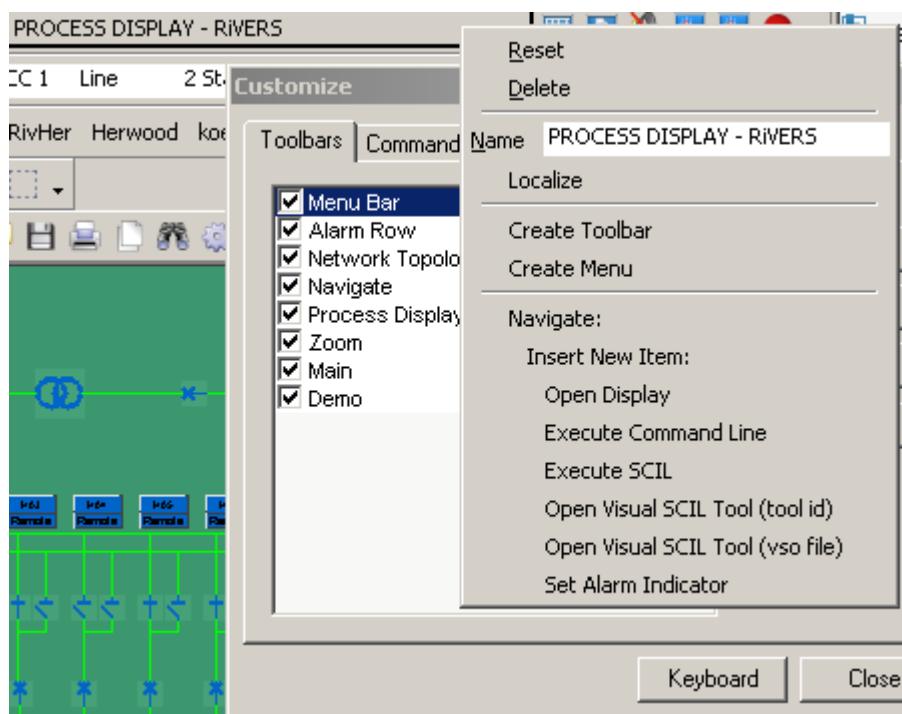


Figure 11: Renaming the Process Display

The **Customize** dialog can also be opened by right-clicking the Process Display name, and selecting **Customize** from the context menu.

3.4 Monitor Pro layout

Default Monitor Pro layout contains the following components:

1. Process Display name, application number, application name, user name
2. Main menu bar
3. View Info
4. Latest unacknowledged alarms
5. Shortcut to displays
6. Network Topology Coloring toolbar
7. Process Displays
8. Application display area
9. Status bar
10. Customization tool
11. Handle for moving toolbars

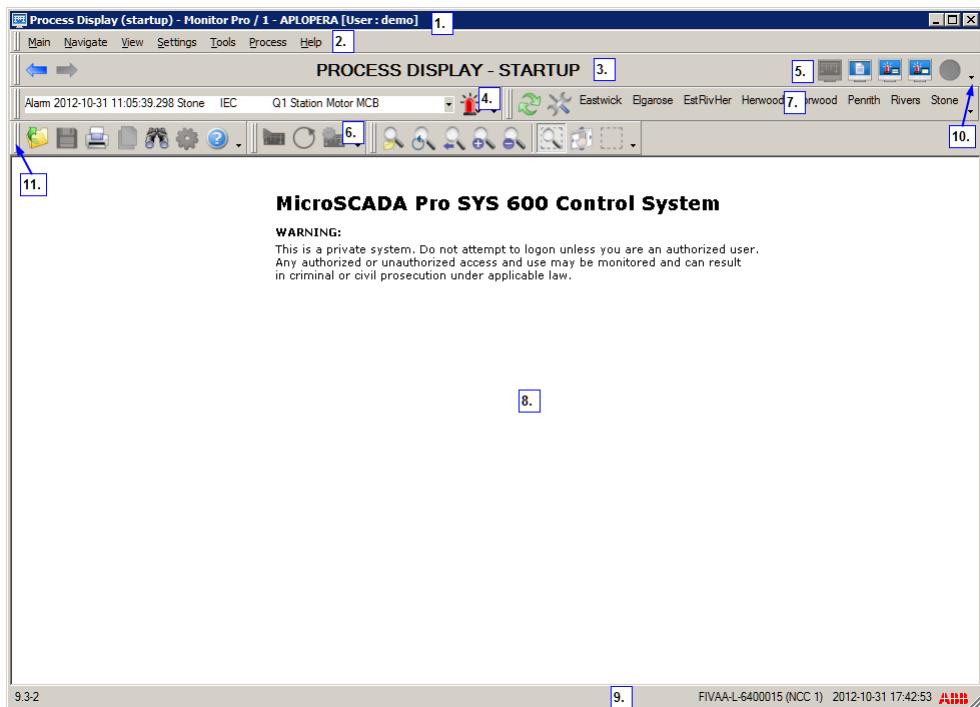


Figure 12: Monitor Pro default layout after the login

3.4.1 Specifying toolbars

Toolbars can be added and removed by right-clicking the existing toolbar, docking area or standard menu, and selecting or clearing the checked commands from the context menu.

By default, Monitor Pro has just a small set of visible prebuilt toolbars. Each user can modify the layout of Monitor Pro to correspond to their requirements. The layout modifications are saved at logout. At the next login, the user's default layout is loaded in the application. By default, Monitor Pro loads and hides some of the toolbars and menus depending on the current display. For example, if the Event Display is displayed, both the Event Display menu and Event Display toolbars are loaded.

Toolbar visibility and position are display specific. For example, if the user moves the alarm row to a certain position in Process Display, it will not affect the alarm row position in Event Display.



Reset Toolbars Resets the toolbar positions. User-specific customizations are not lost. Shortcut key: CTRL+ALT+SHIFT+T.

3.4.2 Changing application layout

Display the **Customize** dialog by double-clicking any empty space on the toolbar area of Monitor Pro. The little arrows in the toolbars can also be used to customize toolbars, commands or options. The **Customize** dialog can also be selected in **Settings/Customize** (see [Figure 13](#)).

The **Customize** dialog can be used to:

- Add, reset, rename and delete custom toolbars. Old menu items can be deleted and renamed, but new ones cannot be added. Some menu items (for example the ones in **Process Display** menu) and some toolbars (for example the buttons in application specific

- toolbar) are not customizable because their contents is dynamic. For example, the contents of Process Display Toolbar are generated based on the files found in a certain folder.
- Change the Command Context menu's caption and style. The Command Context menu is another way to customize. It is displayed when the **Customize** dialog is open and the toolbar is right-clicked. The styles can be changed to:
 - **Default Style:** Contains both text and icon, if available
 - **Text Only:** Only text (caption of tool) is shown
 - **Image Only:** Only the icon is displayed, if available
 - **Image and Text:** Contains both text and icon, if available
 - Categorize the action tools and drag-and-drop commands to any toolbar, menu or submenu.
 - Change the icon size in Monitor Pro.
 - Create keyboard shortcuts.

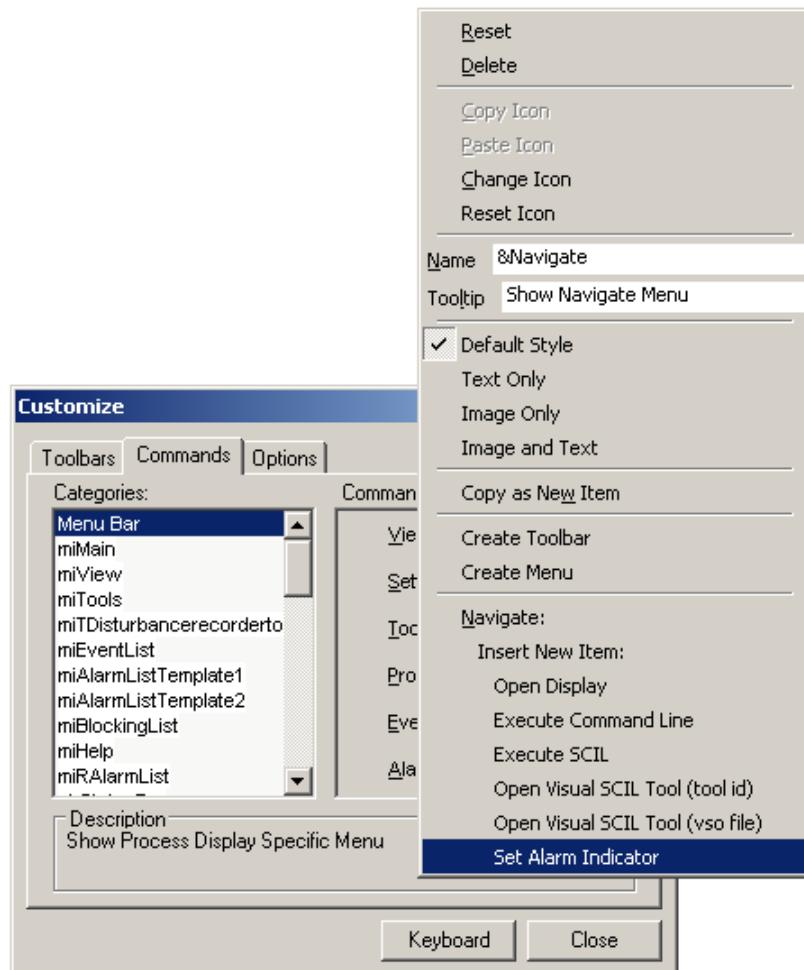


Figure 13: Command context menu while the Customize dialog is open.

When the **Customize** dialog is open, the toolbar buttons and menu items can be moved around. If the CTRL key is held down while moving the tool, the tool is copied.

The last button on the right of each toolbar is a little arrow button. This quick customization shortcut allows the user to show or hide tools from the toolbar without opening the **Customize** dialog (see [Figure 14](#)).

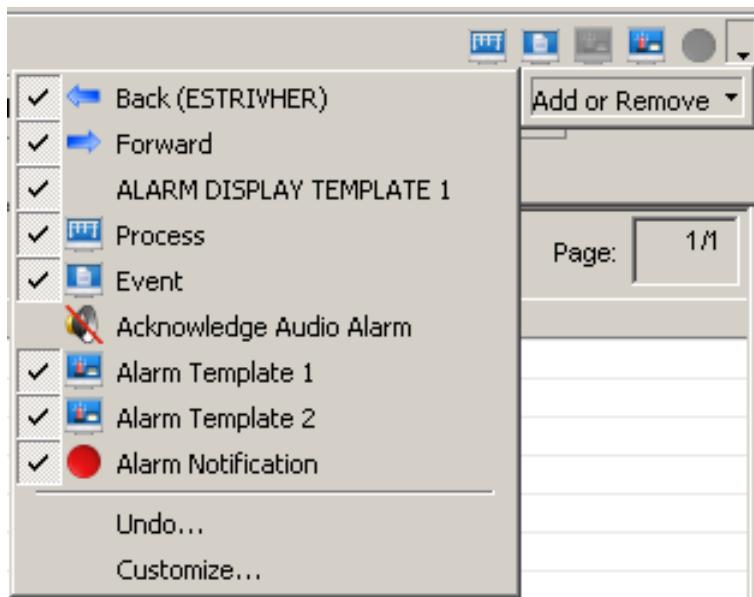


Figure 14: Adding and removing tool

The buttons can also be moved between toolbars without opening the **Customize** dialog. This can be done by holding down the ALT key and dragging the buttons to another location. Buttons can be deleted by dragging them away from the toolbar. Pressing CTRL+ALT while moving the button copies the button. This function is not possible for menu items without the **Customize** dialog.

All the toolbars and menus can be shown or hidden without the **Customize** dialog by right-clicking the main menu bar and selecting or deselecting the toolbars (see [Figure 15](#)). The user has access to different toolbars according to the display in use (see [Table 1](#)). For the Process Display, Alarm Display, Event Display, Blocking Display or Trends Display and full screen mode there are different configurations depending on which toolbars are shown.

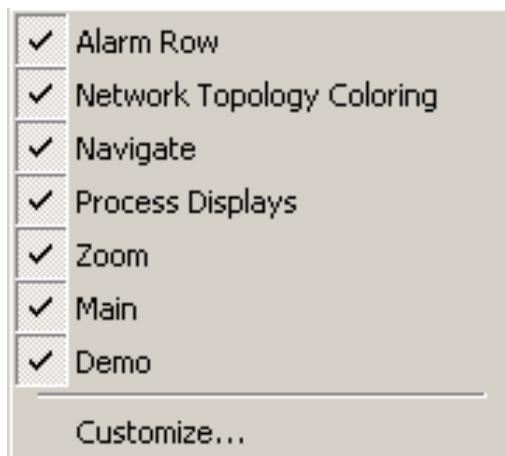


Figure 15: Showing and hiding toolbars

Table 1: Toolbars according to different displays

| Display | Toolbars |
|------------------------------|--|
| Process | Menu Bar Alarm Row Network Topology Coloring Navigate Zoom |
| Event | Menu Bar Alarm Row Event Display Navigate Process Displays Main |
| Alarm | |
| Template 1 | Menu Bar Alarm Row Alarm Display Template 1 Navigate Process Displays Main |
| Template 2 | Menu Bar Alarm Row Alarm Display Template 2 Navigate Process Displays Main |
| Blocking | Menu Bar Alarm Row Blocking Display Navigate Process Displays Main |
| Trend | |
| Graphical View | Menu Bar Alarm Row Trends Display Trends Graphical Mode Navigate Process Displays Zoom Main |
| Tabular View | Menu Bar Alarm Row Trends Display Trends Tabular View Navigate Process Displays Main |
| Table continues on next page | |

| Display | Toolbars |
|---------------------|--|
| Measurement Reports | |
| Graphical View | Menu Bar Alarm Row Measurement Reports Display Measurement Reports Graphical View Navigate Process Displays Zoom Main |
| Tabular View | Menu Bar Alarm Row Measurement Reports Display Measurement Reports Tabular View Navigate Process Displays Main |

To create a new toolbar:

1. Select **New** from the **Customize** dialog.
2. Type a new name for the toolbar.
3. Click **OK**. A new toolbar is shown in the **Toolbars** tab.

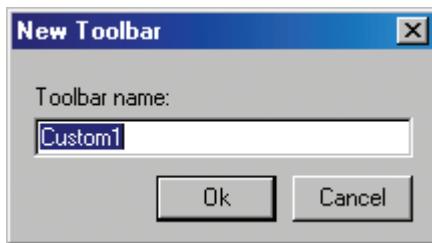


Figure 16: New Toolbar dialog

When the user selects a toolbar they have created, the **Rename** and **Delete** buttons become active. The created toolbar can be renamed or deleted. Clicking the **Undo** button loads the last saved layout.

By clicking **Keyboard** in the **Toolbars** tab a Keyboard dialog is displayed (see [Figure 17](#)).

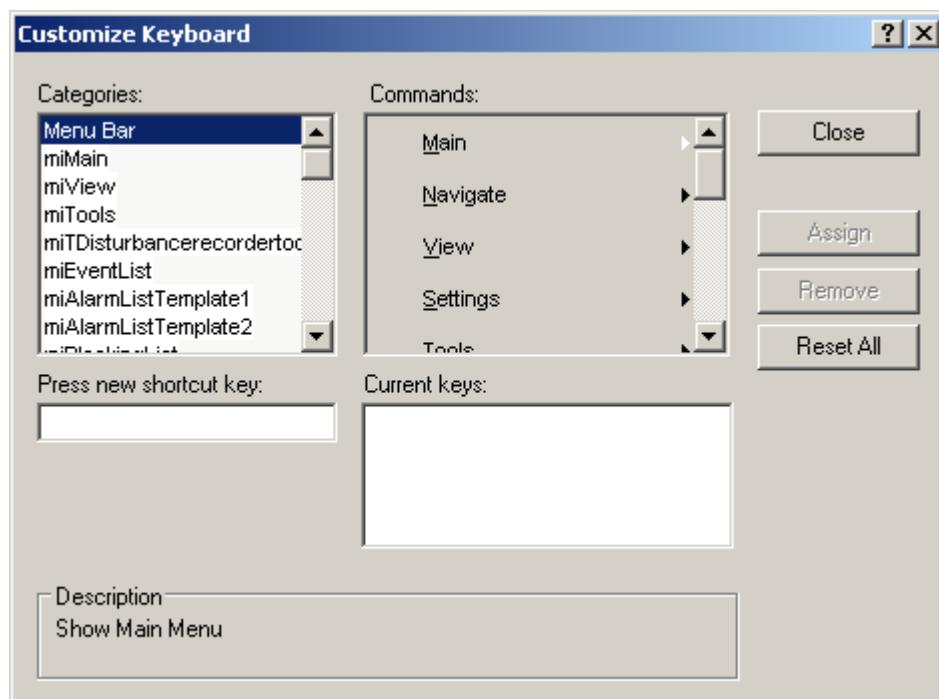


Figure 17: The Customize Keyboard dialog

New keyboard shortcuts can be added for menu items and toolbars seen in the Categories section.

Categories:

- Built-in Menus: All the top-level menus
- Start with characters mi: All menus that have sub-menus
- Start with characters tb: All toolbars (except the user defined toolbars created with **Customize** dialog)

Commands:

- Sub menu items and buttons of the selected category

To assign a new value to the tool (menu item, button in the toolbar):

1. In the **Categories** section, select the category in which the menu item or toolbar buttons are located.
2. In the **Commands** section, select the command (menu item, buttons in the toolbar).
3. Click the New shortcut key box so that the mouse cursor blinks in it and press the new shortcut key combination. The key combination is displayed in the box.
4. Click **Assign**, and the shortcut key appears in the Current Keys section.

The shortcut key can be deleted by clicking **Remove**. Clicking **Reset All** resets the shortcut keys.

In the **Commands** tab of the **Customize** dialog, categories and commands are the same as in **Toolbars** tab (see [Figure 18](#)).

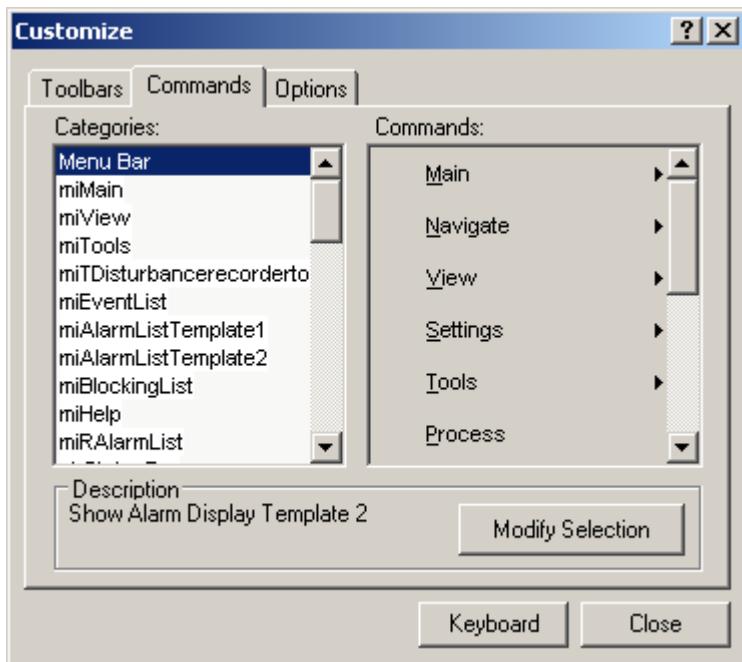


Figure 18: Commands tab of Customize dialog

The Commands can be moved around the same way as on the **Toolbars** tab. Clicking **Modify Selection** corresponds to the function when a toolbar button or menu item is right-clicked (when the **Customize** dialog is open) and a similar context menu is displayed. The **Modify Selection** button becomes active when a tool is selected either from the menu or from the toolbar.

Personalized menus can be selected into use in the **Options** tab (see [Figure 19](#)).

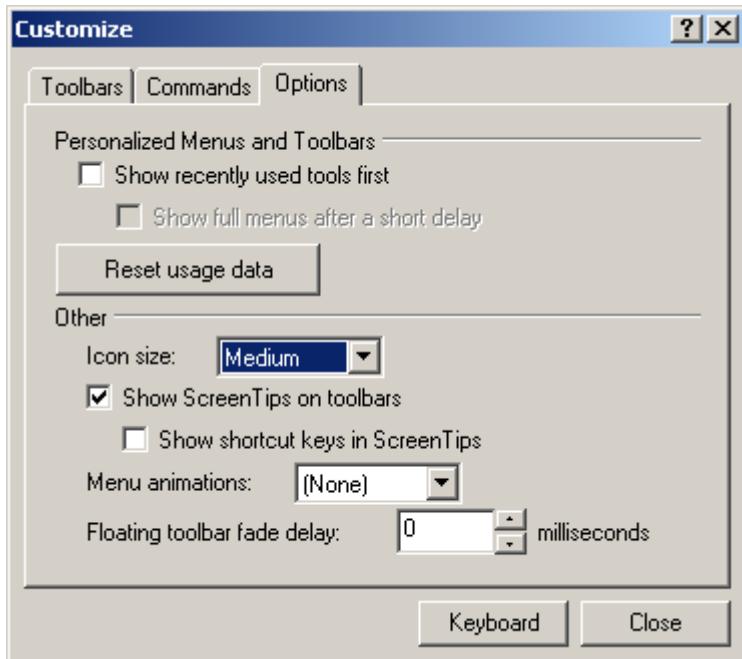


Figure 19: Option tab of Customize dialog

Only the most recently used menus are visible. The memory of the menu usage can be cleared by clicking **Reset usage data**. Menu animations can be selected or the size of icons changed in the **Other** field.



If another option than None is selected in the **Menu animations** box, automatic menu command activations can occur when the pointer is moved over the menus.

3.4.2.1 Alarm row

The Alarm row provides a quick notification of an alarming event in the system. The advantage is that it can be noticed easily, and it also instantly tells the operator what has happened and where. With the alarm row the alarms can easily be acknowledged. Display the alarm row by selecting it on the **Toolbar** tab.



Figure 20: Alarm row

The alarm row shows all the unacknowledged active and inactive alarms in the system. The latest alarm is shown on the top of the list. Any of the alarms shown on the list can be selected to be acknowledged.

The user authorization level has to be at least Control (1) before alarms can be acknowledged (the Alarm row uses authorization group ALARM_HANDLING). For more information, see [SYS600 Application Design](#).

On the Alarm row, active and inactive alarms are separated by showing the alarm text in parentheses (Alarm) if the alarm is inactive. Thereafter, the date and time of the alarm and the object text of the alarming object are presented.

3.4.2.2 Status bar

The Status bar shows the SYS600 version number, Base system Node Name, (system name) and the current date and time.

3.4.3 Resetting Layout

To reset the layout, select **Settings/Reset Layout**. This action restores the layout from either the previously saved layout or the installation default layout, see [Figure 21](#).

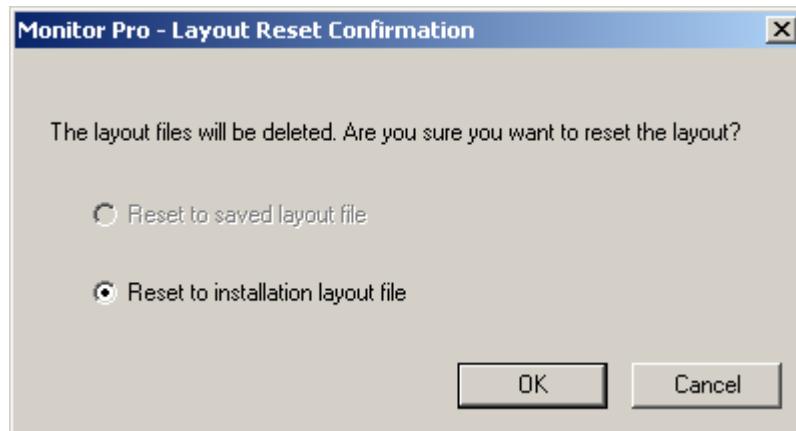


Figure 21: The Layout Reset Confirmation dialog

3.5 Using process lists

There are three types of process lists:

- Alarm Display, presents the actual alarm state in the process data base.
- Event Display, presents all events reported to the system.
- Blocking Display, presents the blocking situation in the process data base. Some typical blockings are alarm, event and control blocking.

These lists are all described in separate sections, see [Section 5](#), [Section 6](#) and [Section 7](#).

3.6 Using reports and trends

Reports can be used for analyzing sampled measurements. Collected data can be presented in a graphical or numerical form.

Typical reports are energy, currents, process disturbance reports (for example trippings, earth-faults, overcurrents, auto-reclosures). These reports can be used for analyzing fault situations, for improving service and maintenance, as well as for normal supervision.

Trends can be used for trend analyses and showing measured values in a graphical or numerical form.

The reports and trends are described in separate sections, see [Section 10](#) and [Section 9](#).

Section 4 Process controlling

This section describes the generic control dialogs in SYS600 Power Process Library. These dialogs provide fast and easy access to the device status and to the single devices in a substation. The Control dialog combines different kinds of information, depending on the object.

Control dialogs interact with standard objects created with Object Navigator by using the Power Process Library (SA_LIB) standard functions. Control dialogs are generic and they have the same user-interface appearance, independent on the IED and the communication protocol defined in standard object configuration. The available functionality and access rights for a user can be limited using authorization levels.

4.1 Navigating

The user can flexibly navigate between the Process Displays and within a Process Display.

Navigate between the different Process Displays by:

- selecting **Main/Open**
- clicking a shortcut on the Process Displays toolbar.
- clicking **Go to Previous Display** or **Go to Next Display** in the View Info toolbar.
- clicking elements in a Process Display.

When a certain element in a Process Display is clicked, a predefined area of a different Process Display is shown.

- using menu commands and toolbar buttons.
Define the needed menu commands and toolbar buttons for navigating to a predefined area of a different Process Display.
- locating an object in the Event, Alarm or Blocking display.
To locate the object, right-click on a selected line to open a shortcut menu and select **Locate object in Monitor Pro** or **Locate object in Monitor Pro/new window**.

Navigate within displays by:

- using the **Save/Restore Zoom** dialog.
Use this dialog for zooming to predefined locations.
- clicking elements in a Process Display.
When a certain element in a Process Display is clicked, a predefined area of the same Process Display is shown.
- using menu commands and toolbar buttons.
Define the needed menu commands and toolbar buttons for navigating to a predefined area of the same Process Display.
- using the mouse to grab and pan the view by clicking **Select Panning** button on the Zoom toolbar.
- using Flicks with touch screen.
By default with Back and Forward Flicks the navigation of Displays occurs. The defaults can be changed in Windows Control Panel – Pen and Touch.

The **Navigate** menu shows 5 of the previously used displays (with a preconfiguration). This information is stored to the user-specific ini-file and is available on next login.

4.2 Zooming

Zoom Monitor Pro by selecting **Navigate/Zoom**. The zooming options are displayed as a submenu of the Zoom command, see [Figure 22](#).

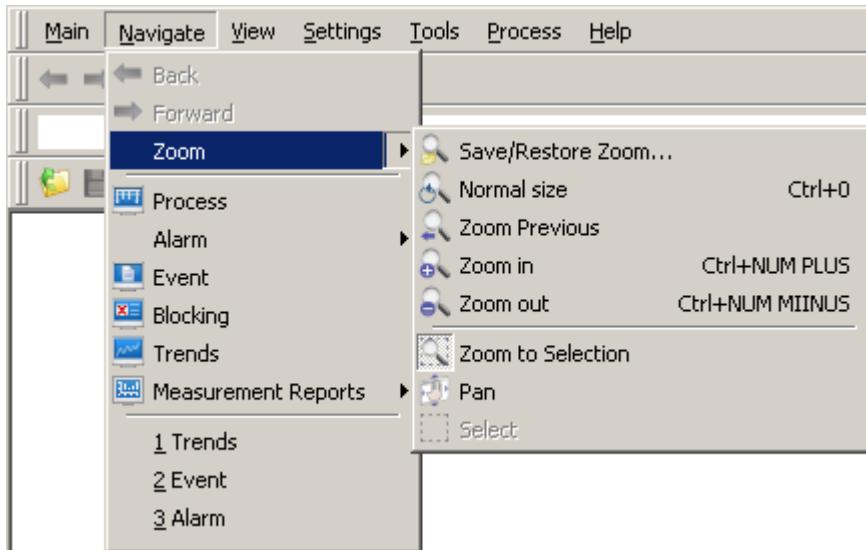


Figure 22: Zoom submenu

Table 2: Zoom commands

| Command | Shortcut key | Description |
|-------------------|--|--|
| Save/Restore Zoom | - | Opens the Save/Restore Zoom dialog. |
| Normal size | CTRL + ALT + space | Zooms to the normal size. |
| Zoom Previous | - | Returns to the previous Zoom level. |
| Zoom in | Rotate the mouse wheel forward or press CTRL and click the left mouse button. Zooming in with touch screen is handled by entering two fingers in contact with the screen at the same time and moving fingers together along an axis. | Zooms in. |
| Zoom out | Rotate the mouse wheel backward or press CTRL + SHIFT and click the left mouse button. Zooming out with touch screen is handled by entering two fingers in contact with the screen at the same time and moving fingers apart along an axis. | Zooms out. |
| Zoom to Selection | Press CTRL, click the left mouse button and select the zoom area. | Zooms in the selected area. |
| Pan | Click the mouse wheel and move the mouse. Panning in touch screen is handled by entering one or two fingers in contact with the screen and dragging while keeping the fingers in the same position relative to each other. | Moves the graphic with the mouse. |
| Step Left | Press arrow left key on the keyboard | Moves the zoomed area to the left. |

Table continues on next page

| Command | Shortcut key | Description |
|------------|---------------------------------------|-------------------------------------|
| Step Right | Press arrow right key on the keyboard | Moves the zoomed area to the right. |
| Step Up | Press arrow up key on the keyboard | Moves the zoomed area up. |
| Step Down | Press arrow down key on the keyboard | Moves the zoomed area down. |

It is possible to save application and user specific zoom areas with the **Save/Restore Zoom** dialog, see [Figure 24](#). Open the **Save/Restore Zoom** dialog either by clicking the icon in the Zoom tool bar, see [Figure 23](#) or from the main tool bar, select **Navigate/Zoom/Save/Restore Zoom**, see [Figure 22](#).



Figure 23: Save/Restore Zoom icon

Open the **Save/Restore Zoom** dialog, enter a name for the zoom in the **Save zoom** field, select either the **Application** or **User** radio button and click **Save**.

The user can also:

- create a new folder in the tree structure
- delete a folder in the tree structure
- rename items in the tree structure
- drag and drop items in the tree structure
- define filters for specific items to be displayed

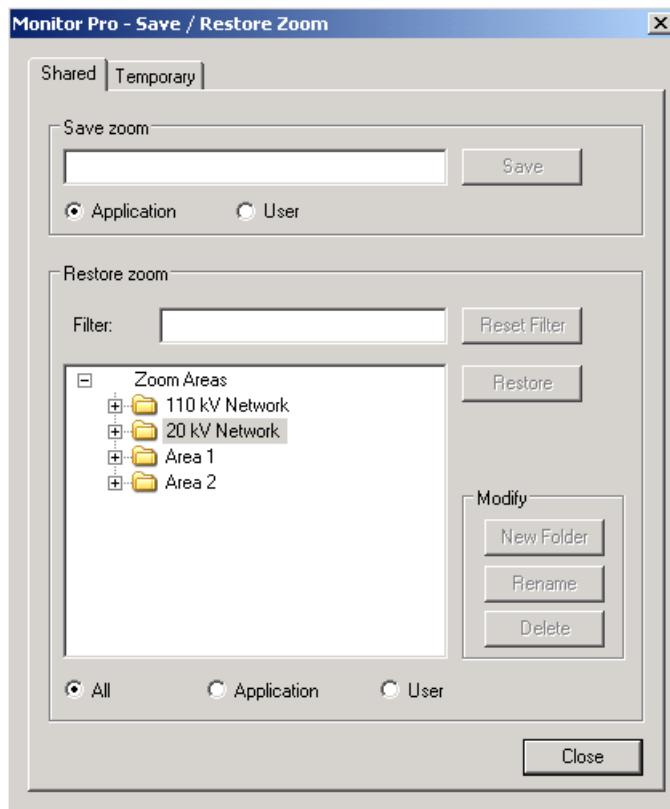


Figure 24: Save / Restore Zoom dialog

The saved zoom can be seen in the **Restore zoom** field. The list of saved zooms can be filtered using the **All**, **Application** and **User** radio buttons.

To restore a saved zoom, select the zoom name the **Restore zoom** field, and click **Restore**.

To delete a zoom, select the zoom name the **Restore zoom** field, and click **Delete**.

To save zoomed views for the current session, select the **Temporary** tab, at the top of the **Save/Restore Zoom** dialog. All zooms saved here will be lost on closing the current session.

4.3 Find

Objects within the display can be found and zoomed in on using the **Find** function on the toolbar, see [Figure 25](#).



Figure 25: Find tool

Searches can be made using the **Object name**, or part of it, the **Logical name (LN)** or **Index (IX)**. Select the required object from the search result and *click Show* to display. To change the zoom level, *select* the value from **Zoom level**, then *click Show* to display the object, see [Figure 26](#).

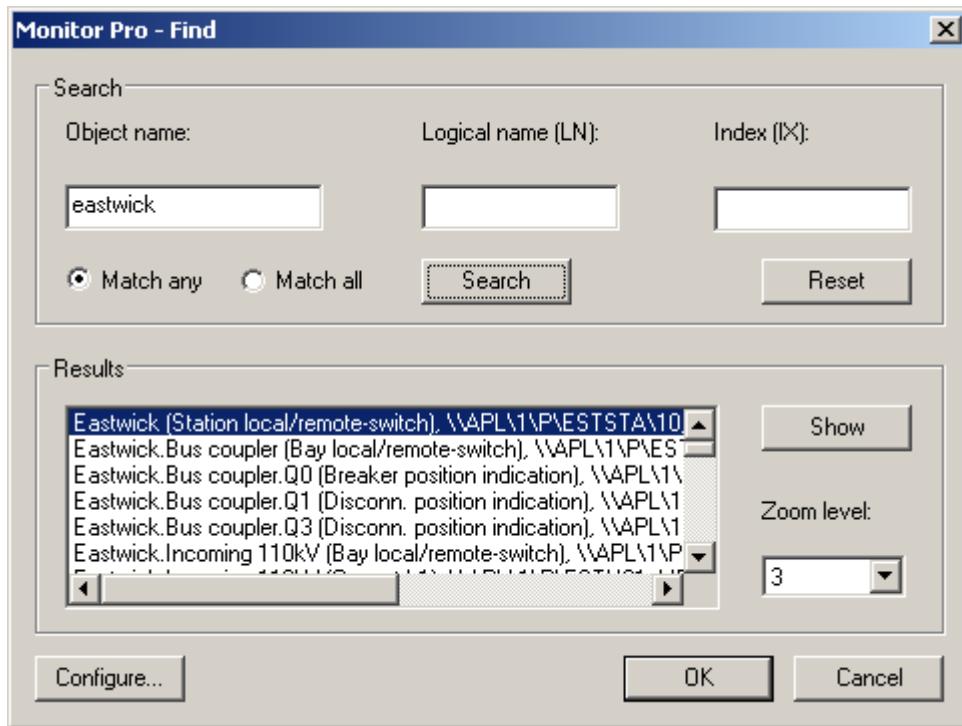


Figure 26: Find process objects

4.4 Station Local/Remote control

The station control shows the operator location information of the substation, that is, whether the control is authorized from the station locally or from an external control center. The state can be set to Station or Remote in the **Station L/R Switch** dialog.

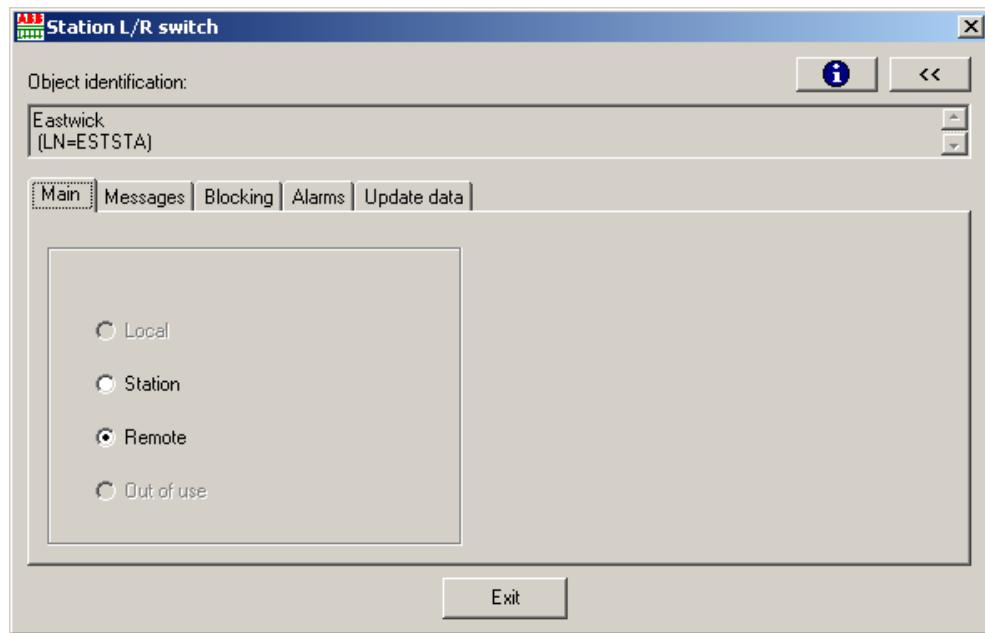


Figure 27: The Main tab of the Station Local/Remote switch dialog

The **Main** tab of the dialog shows the object name and the selection for operator location. Select the operator location by selecting the right option button. The available options depend on the object configuration. Unavailable options are dimmed.

Select the corresponding option for operator location (for example Remote). Close the control dialog by clicking the **Exit** button.

The **Messages** tab ([Figure 28](#)) shows different messages concerning the object. A message is shown, for example, if the object is simulated or the information of the physical local/remote key position is unknown.

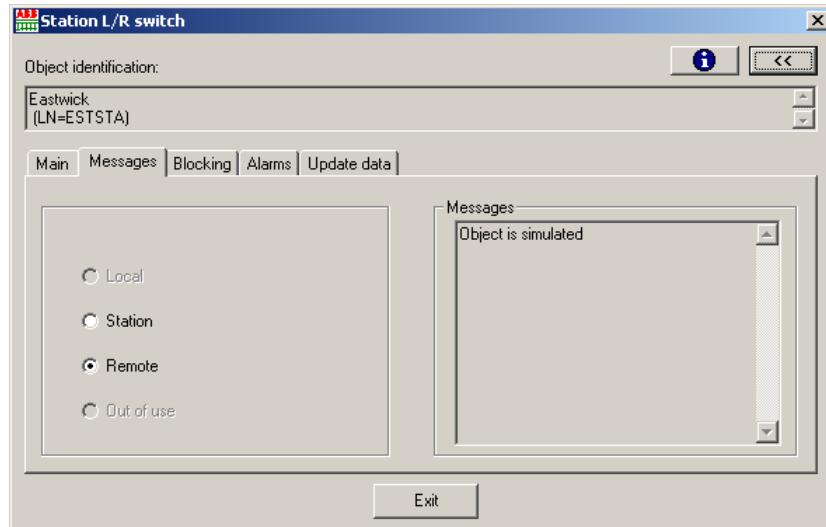


Figure 28: The Messages tab of the Station L/R switch dialog

Different blockings concerning the process object that belong to the station are shown and controlled in the **Blocking** tab, see [Figure 29](#).

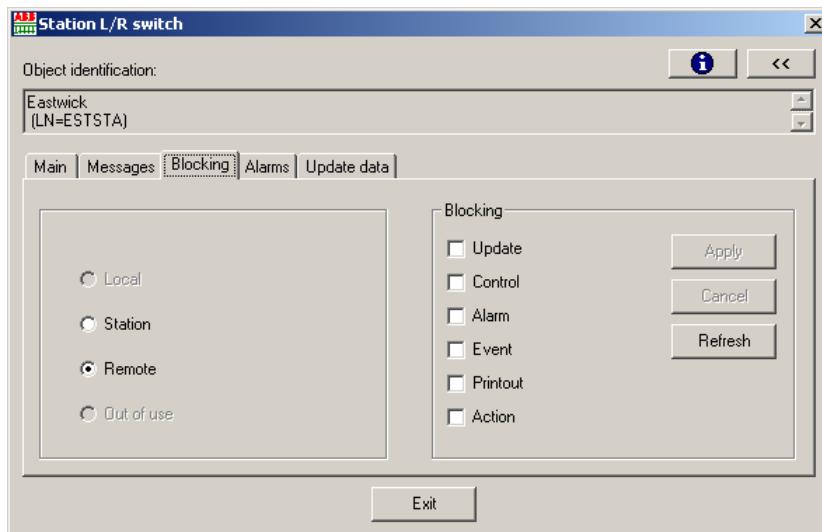


Figure 29: The Blocking tab of the Station L/R switch dialog

After selection (multiple selections allowed), click **Apply** for making the changes. Click **Cancel** to discard the changes made in this dialog. Click **Refresh** to update the blocking status in case it has been changed elsewhere in the system.

The alarms are shown on the **Alarms** tab, see [Figure 30](#). To acknowledge alarms click **Ack. All** or **Ack. selected**. Click **Refresh** to update the alarm status.

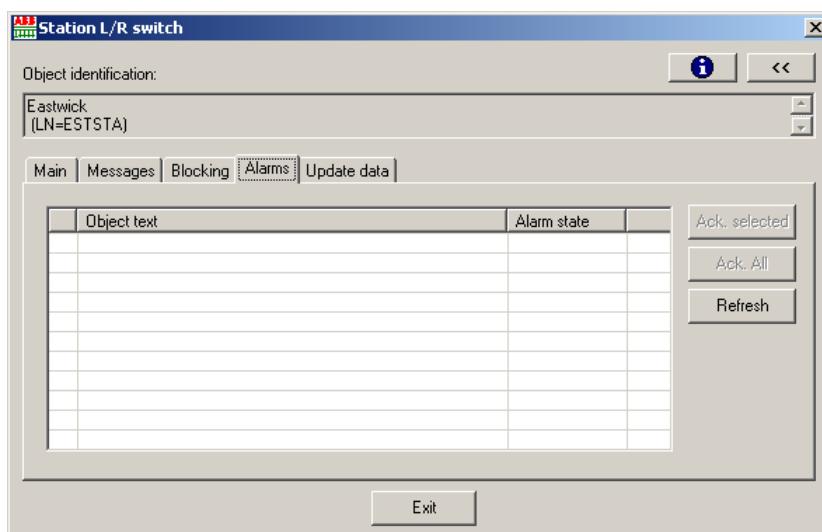


Figure 30: The Alarms tab of the Station L/R switch dialog

The **Update data** tab is aimed for updating the database from the actual process within the selected station, see [Figure 31](#). The **Update Process Data...** button can be used to initialize the substation after a system restart, or to verify database consistency.

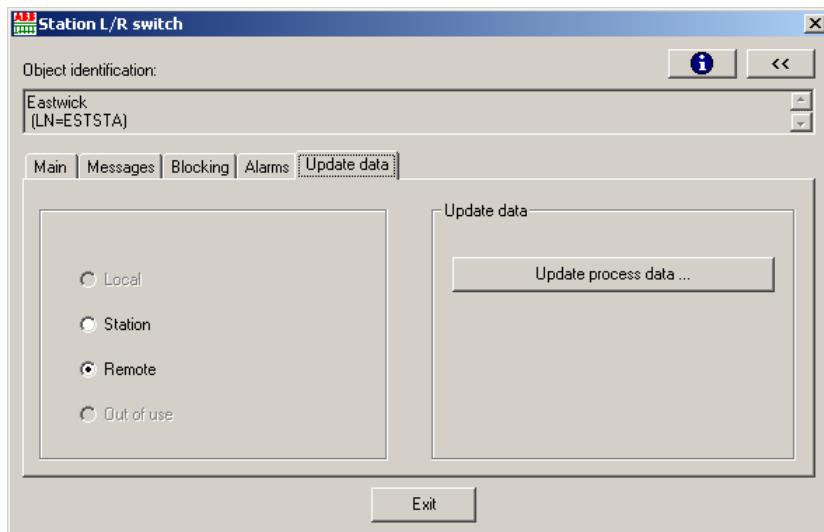


Figure 31: The Update data tab of the Station L/R switch dialog

4.5 Bay Local/Remote control

The Bay L/R control shows the operator location information of a bay in a substation, that is, whether the control is authorized from the bay unit locally or remotely over a communication link (for example station HSI).

If the Bay L/R switch is remotely controllable, it is possible to change the switch state from the control dialog.

The **Main** tab of the **Bay L/R Switch** dialog ([Figure 32](#)) shows the object name and the selection for the operator location. Select the operator location by selecting the corresponding option. The available options depend on the object configuration, unavailable options are dimmed.

Select the corresponding option for operator location (for example Remote). Close the control dialog by clicking **Exit**.

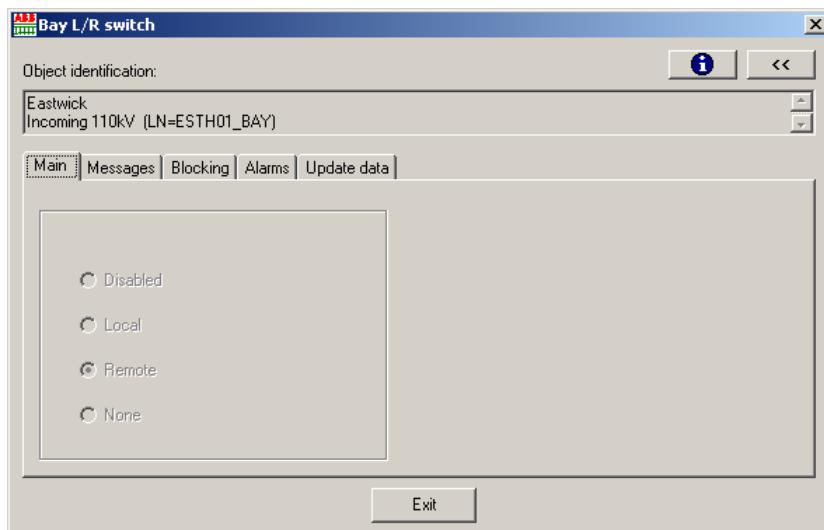


Figure 32: The Main tab of the Bay L/R switch dialog

In **Operator place** tab ([Figure 33](#)) it is possible to set the authorized control location for each bay separately.

For operator place handling, there are three different principles:

1. MicroSCADA Internal model
2. IEC 61850 model
3. Custom model

4.5.1 MicroSCADA Internal model

The operator place switch has meaning, if the IED L/R switch is in remote position. In this case the operator place can be the following

- None, control is prevented both from Station and NCC
- Station, control is allowed from station level if system is defined as Substation Control System (SCS).
- Remote, control is allowed from remote level if system is defined as Network Control Center (NCC).
- Station/Remote control is allowed both from SCS and NCC

System location (SCS/NCC) is defined in Application Settings Dialog. If process object for Operator place switch does not exist in process database, this tab is not shown.

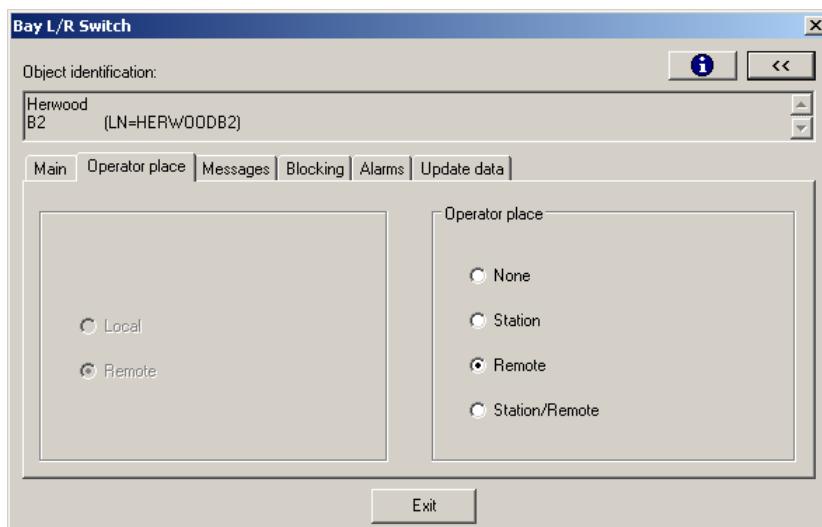


Figure 33: The Operator place tab of the Bay L/R switch dialog

4.5.2 IEC 61850 model

The IEC 61850 model can be the same for the bay as for device level objects such as the breaker. For more information, see [Section 4.6.10](#).



IEDs implement the operator place differently with the IEC 61850 protocol. The handling in the control dialogs can be a combination of the IEC 61850 model and the Custom model.

4.5.3 Custom model

The operator place of the Bay L/R switch is modeled in a user-defined program. For each value of the bay L/R indication, the authorized control places are mapped. Each value can have more than one authorized control place. The authorized control place can be one of the following:

- OFF, control is not allowed from any place
- LOCAL, control is in the front panel of the IED
- STATION, control is on the station level
- NCC, control is in the Network Control Center
- All, control allowed from every location

The system location (SCS/NCC) is defined in the Application Settings dialog. This location can be overridden by giving the system name in the user-defined program.

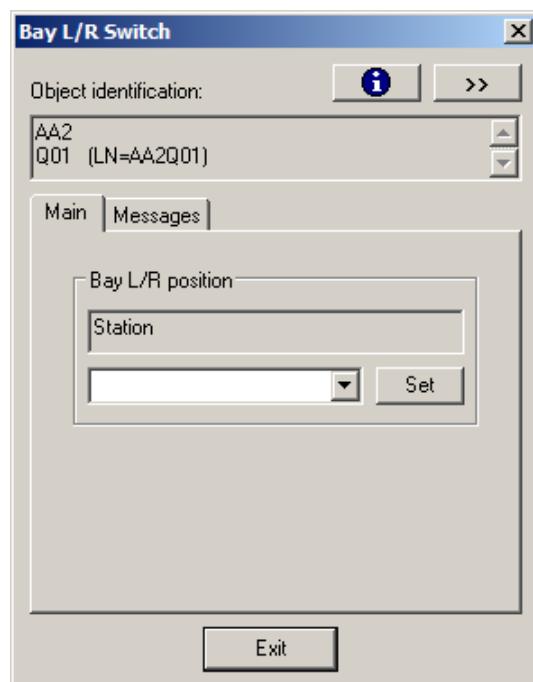


Figure 34: Custom Bay L/R dialog

The **Messages** tab shows the different messages concerning the selected object. A message is shown, for example, if the object is simulated or the information of the physical local/remote key position is unknown.

Different blockings concerning the process objects that belong to the bay are shown and controlled in the **Blocking** tab, see [Figure 35](#).

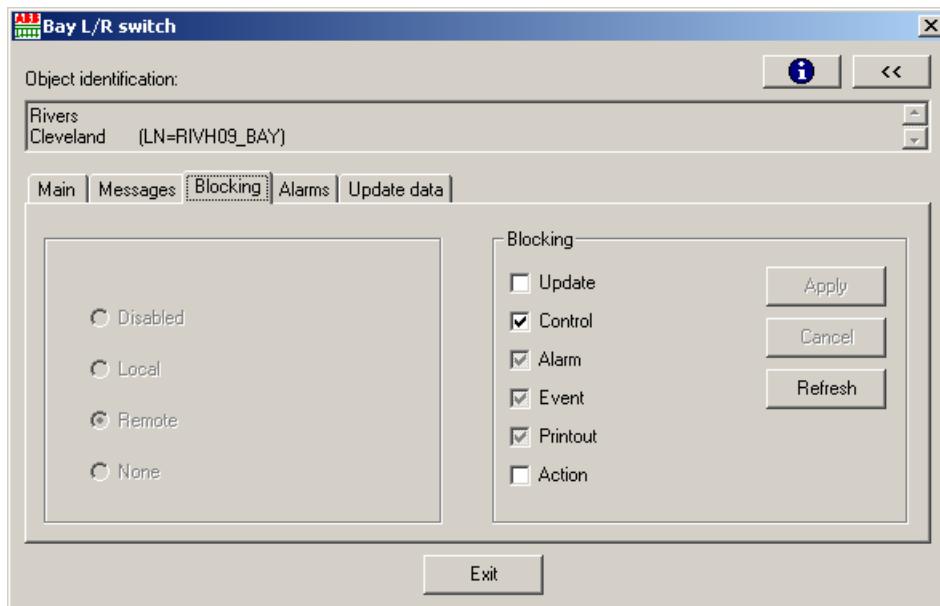


Figure 35: The Blocking tab of the Bay L/R switch dialog

After selection (multiple selection allowed) click **Apply** to make the changes. Click **Cancel** to restore the changes made. Click **Refresh** to update the status of the blocking in case it has been changed elsewhere in the system.

The alarms are shown on the **Alarms** tab, see [Figure 36](#). To acknowledge alarms click **Ack. All** or **Ack. selected**. Click **Refresh** to update the alarm status.

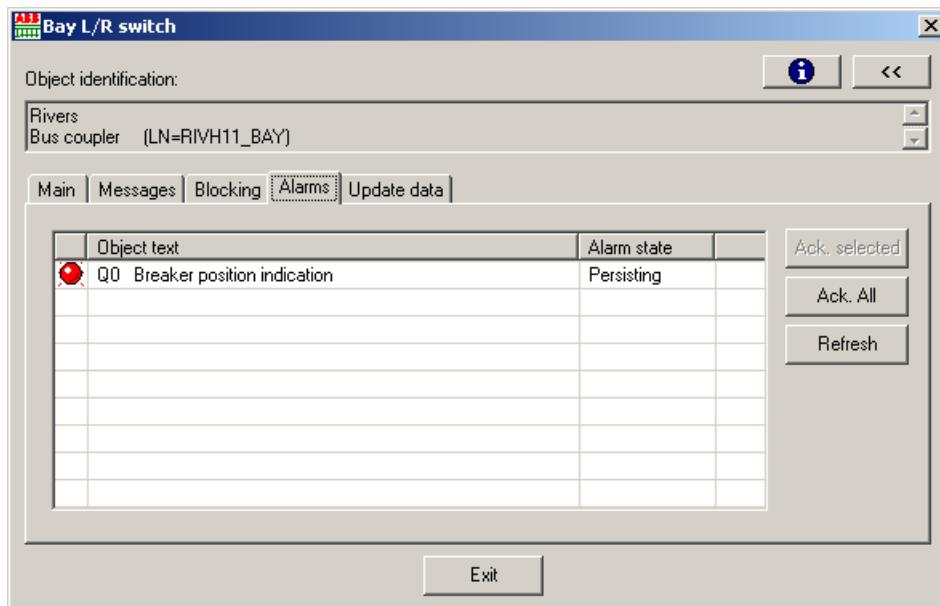


Figure 36: The Alarms tab of the Bay L/R switch dialog

The **Update Data** tab is aimed for updating the database from the actual process within the selected bay.

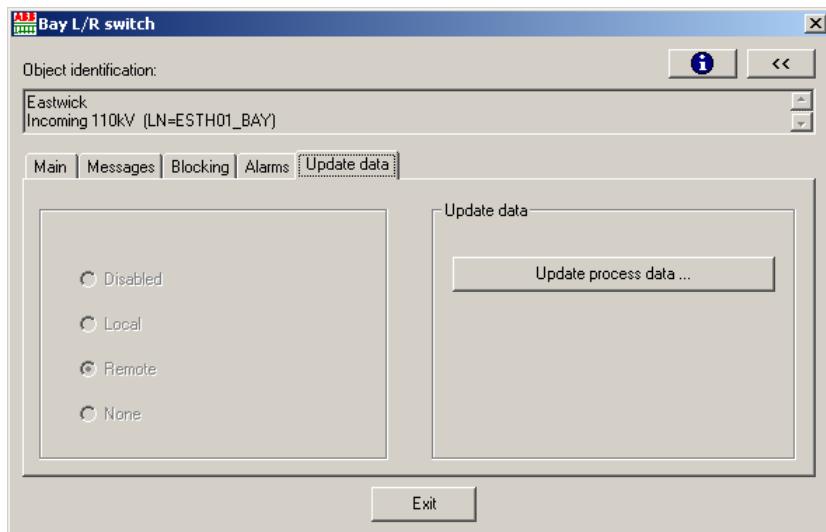


Figure 37: The Update data tab of the Bay L/R switch dialog

4.6 Switch control

Switch Control dialog can be used to show current state and status of a switch device object. It is also used for operating the switch device. Open the **Switch Control** dialog by clicking the objects. The same dialog operates with breakers, disconnectors and earthing disconnectors. The available functions are based on the configuration definition of the corresponding Power Process Library standard object.

There are several tab pages on this dialog. The object identification (station, bay and the object) are located above the tab pages. The tab pages in the **Switch Control** dialog are divided into the main display and the advanced display. In the main display, it is only possible to open and close the switch. Open the advanced display by clicking the >> button in the upper right corner of the **Switch Control** dialog.

Object status is shown on the **Main** tab. The object status can be, for example, authorization, blocking information and reservation information, as well as potential problems on the communication link acquiring the correct status. Possible errors during the operation appear in the **Object Status** field of the **Main** tab. Close the dialog by clicking **Exit**, pressing ESC key on keyboard or clicking the button on the upper-right corner of the dialog.

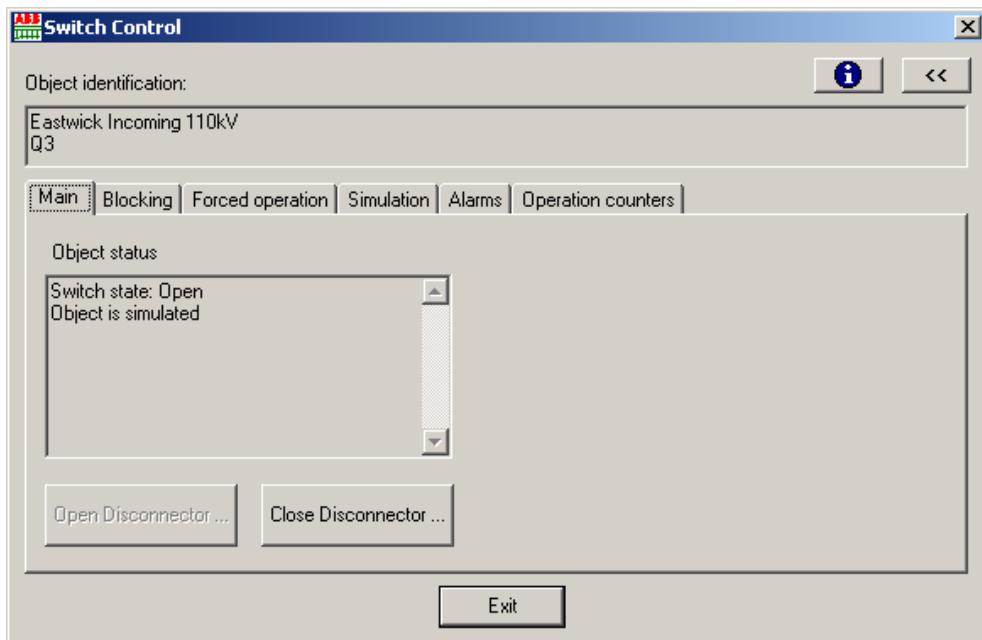


Figure 38: The Main tab of the Switch control dialog

If the switch device is opened or closed, the text "Object is selected for operation" is displayed in the **Object Status** field and the program asks the user to verify the control operation. In case of an error in selection, the error message is shown in the **Object Status** field.

If controlling is possible, the **Open Disconnector** or **Close Disconnector** buttons are active. Note that once the selection of the control command is done, it may include several steps on the process to be controlled (for example interlocking conditions are checked). These depend on the actual configuration of the process devices.

In the advanced display, there are tabbed pages for blockings, forced operation, simulation, alarms and operation counters.

4.6.1 Blockings

In the **Blocking** tab of the **Switch Control** dialog (Figure 39), the different blockings concerning the process objects that hold information about switch state are shown and controlled. After selection (multiple selection allowed), click **Apply** to make the changes. Clicking **Cancel** discards the made changes. To update the status of the blocking (in case it has been changed elsewhere in the system), click **Refresh**.

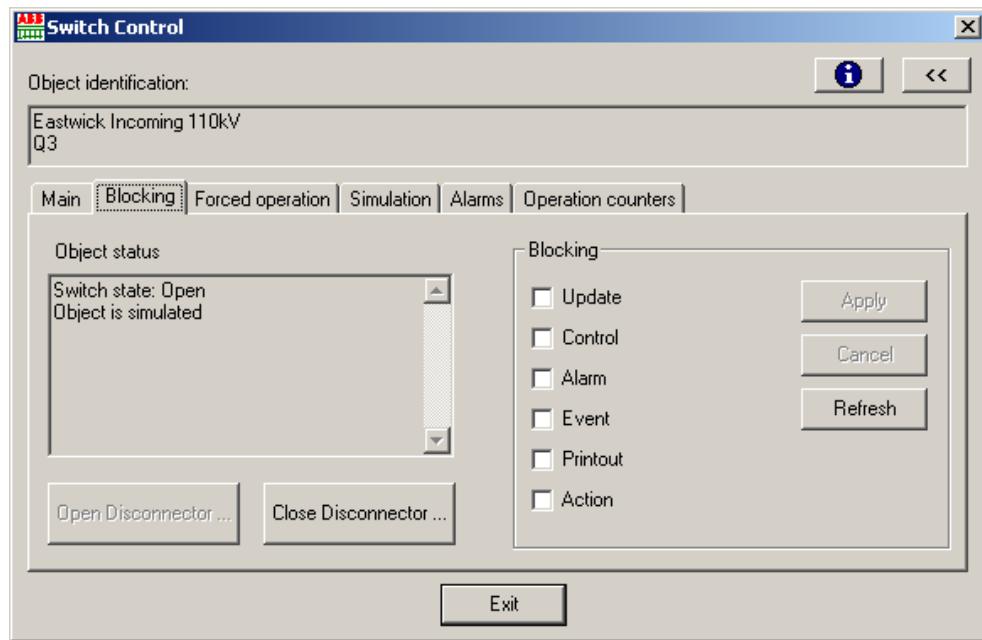


Figure 39: The Blocking tab of the Switch Control dialog

4.6.2 Forced operations

On the **Forced operation** tab (Figure 40), the internal blockings of SYS600 and Power Process Library control blockings can be bypassed. The user can force objects to operate in their command even if another user is connected to them or the function is normally not permitted. However, this does not disable any interlockings or other IED measures, that is, no special bypass messages are sent to the IEDs.

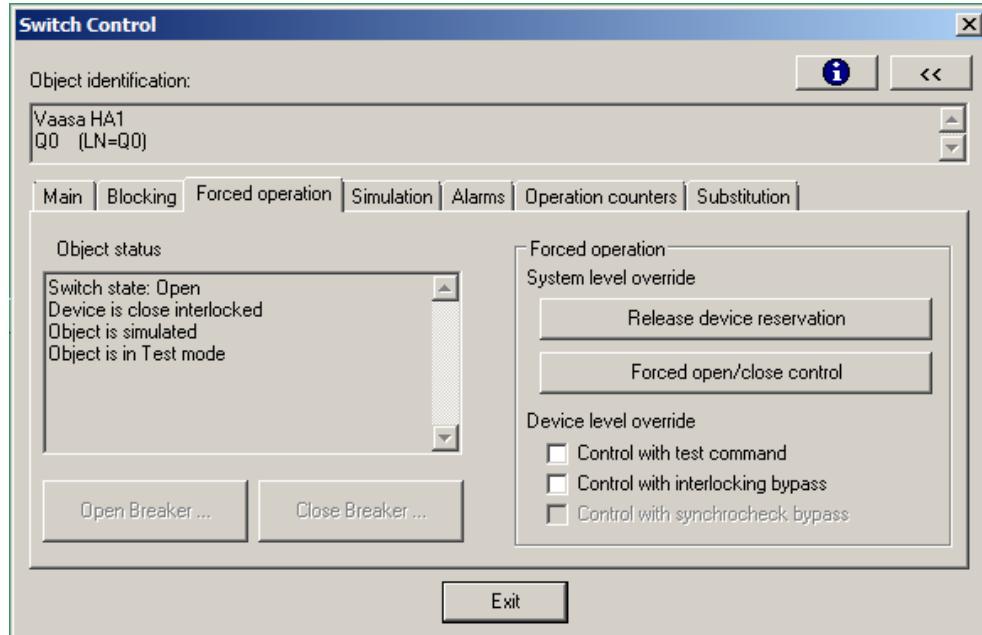


Figure 40: The Forced operation tab of the Switch Control dialog

If an object is selected on another display or it is under command and the user wants to have the control, click **Release device reservation**. When this is done, Control dialogs disappear

from other operators. Releasing of command reservation is possible only if the process object for switch device command event is simulated in the MicroSCADA process database.

Open Disconnector and **Close Disconnector** buttons may be inactive for various reasons, for example, the switch is in the middle position. The **Forced open/close control** button can be used for enabling the buttons for actual control. In this case the controlling is as normal control without bypassing options.

There are three different device-level overrides available in the control dialog. When the controlling is done with the test command or the interlocking bypass/synchrocheck bypass option, the command is sent and handled in the actual IED.



The test command, interlocking and synchrocheck bypass functions can only be used with the IEC 61850 protocol.

If the switch device is interlocked or synchrocheck inhibits the control, select the corresponding check box and control the switch device in a normal way with the **Open Disconnector** and **Close Disconnector** buttons. The Event Display shows that controlling was done with the bypass option.

The following table presents the control type for the switch device:

Table 3: *ABBCommandBitmask*

| Name | Type | Value/Value range | M/O/C | OPC Data Type |
|------------------------------------|------|----------------------|-------|---------------|
| NormalControl ¹⁾ | 1bit | FALSE (0) TRUE (1) | M | 0 |
| InterlockOverride ²⁾ | 1bit | FALSE (0) TRUE (1) | M | 1 |
| SynchrocheckOverride ³⁾ | 1bit | FALSE (0) TRUE (1) | M | 2 |
| TestCommand ⁴⁾ | 1bit | FALSE (0) TRUE (1) | M | 3 |

1) NormalControl: true = normal operation, false = inverse operation (for example On/Off)

2) InterlockOverride: true = interlockcheck > false

3) SynchrocheckOverride: true = syncrocheck > false

4) TestCommand: true = test command

4.6.3 Simulation

The state of the switch object can be simulated on the **Simulation** tab ([Figure 41](#)). The state is then indicated on Process Displays with blue color and appropriate messages on control dialogs. Simulation cannot be deactivated if there is no process communication for the corresponding process object.

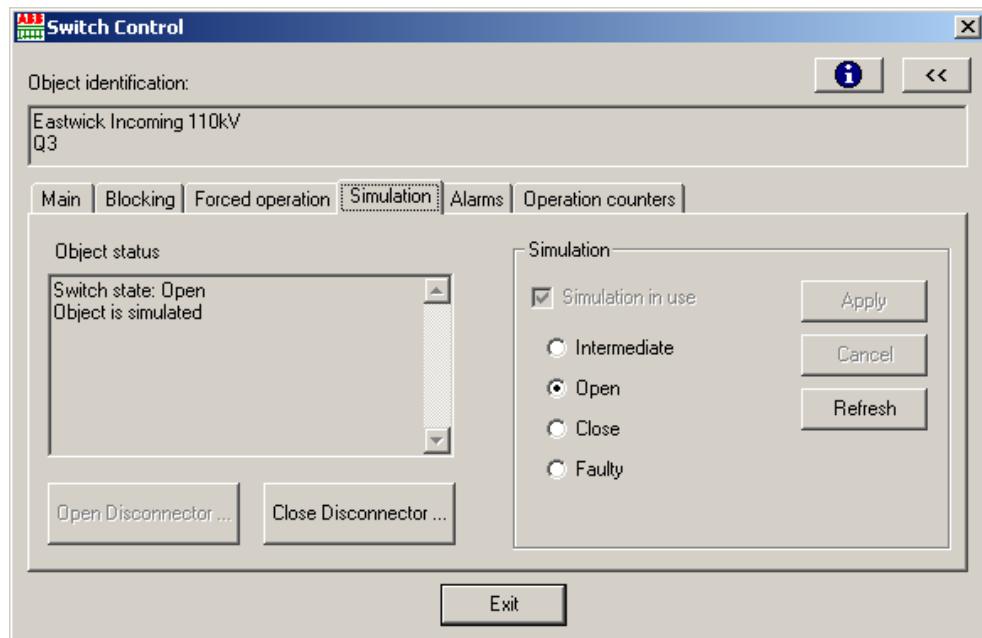


Figure 41: Simulation tab of the Switch Control dialog

After the selection, click **Apply** to apply the changes. Clicking **Cancel** discards the made changes. By clicking **Refresh**, the status of the simulation is updated in case it has been changed elsewhere in the system.

4.6.4 Alarms

The alarms are shown on the **Alarms** tab (Figure 42). To acknowledge alarms click **Ack. All** or **Ack. selected**. Click **Refresh** to update the alarm status.

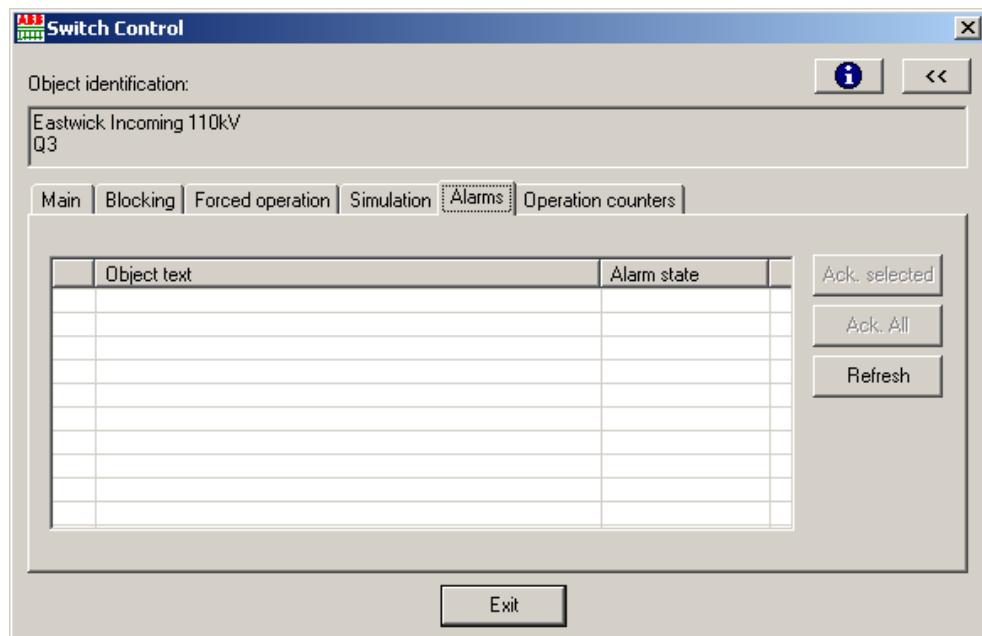


Figure 42: The Alarms tab of the Switch Control dialog

4.6.5 Auto-reclose

In case auto-reclose function is configured for the switch object, the messages from the function is shown in the **Object Status** box of the **Reclosing** tab ([Figure 43](#)). Interrupt an ongoing sequence by clicking **Interrupt AR sequence**. This button is dimmed if the corresponding function is not available.

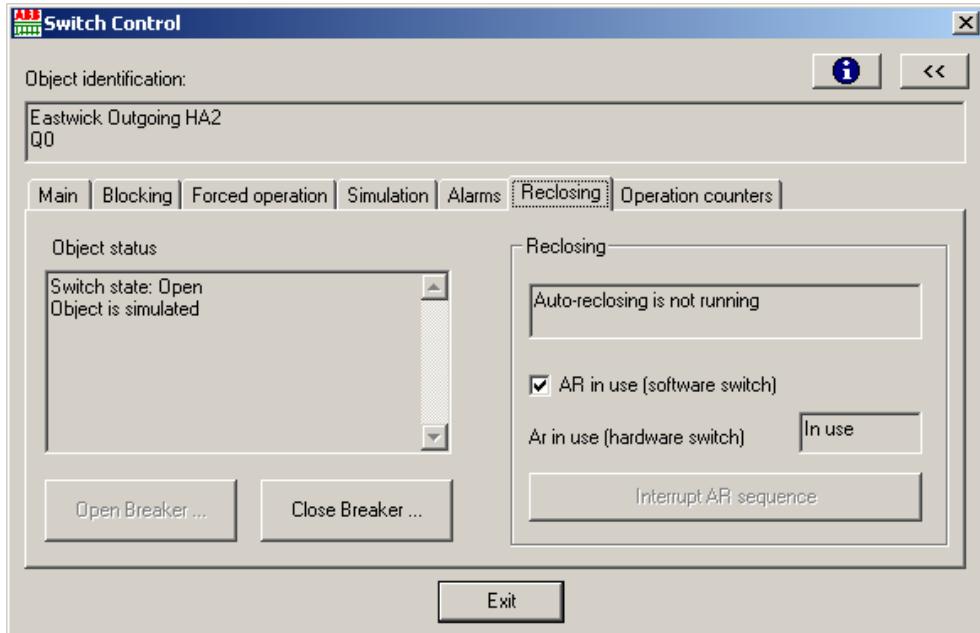


Figure 43: The Reclosing tab of the Switch Control dialog

4.6.6 Operation counters

When the switch is closed with the **Close Disconnector** button in the **Switch Control** dialog, the number in the **Operation counter value** field is incremented.

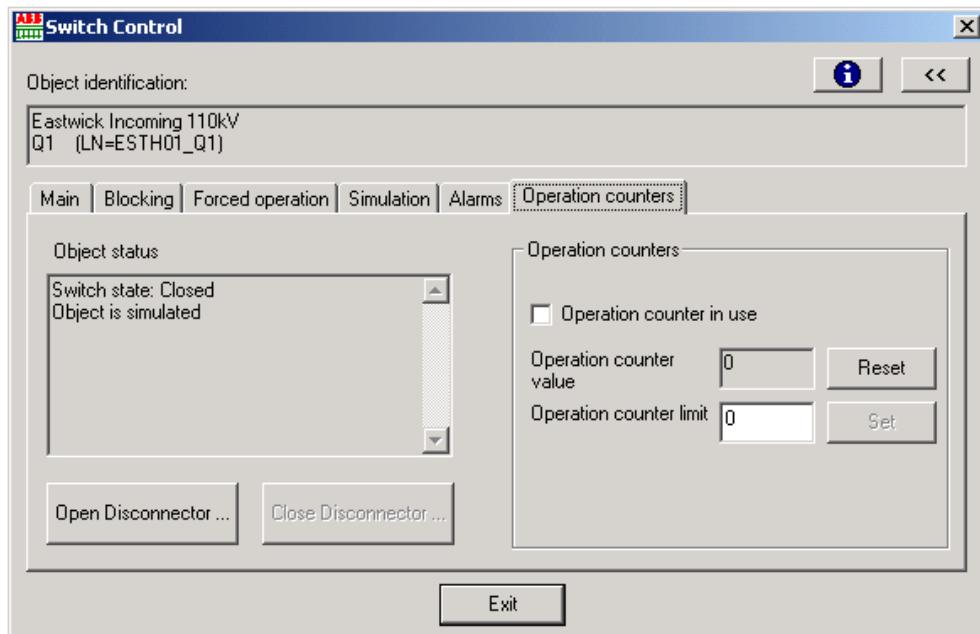


Figure 44: The Operation counters tab of the Switch Control dialog

When the operation counter value reaches the limit defined in the **Operation counter limit** field, a message "Operation counter limit reached" is displayed on the **Operation counters** tabbed page.

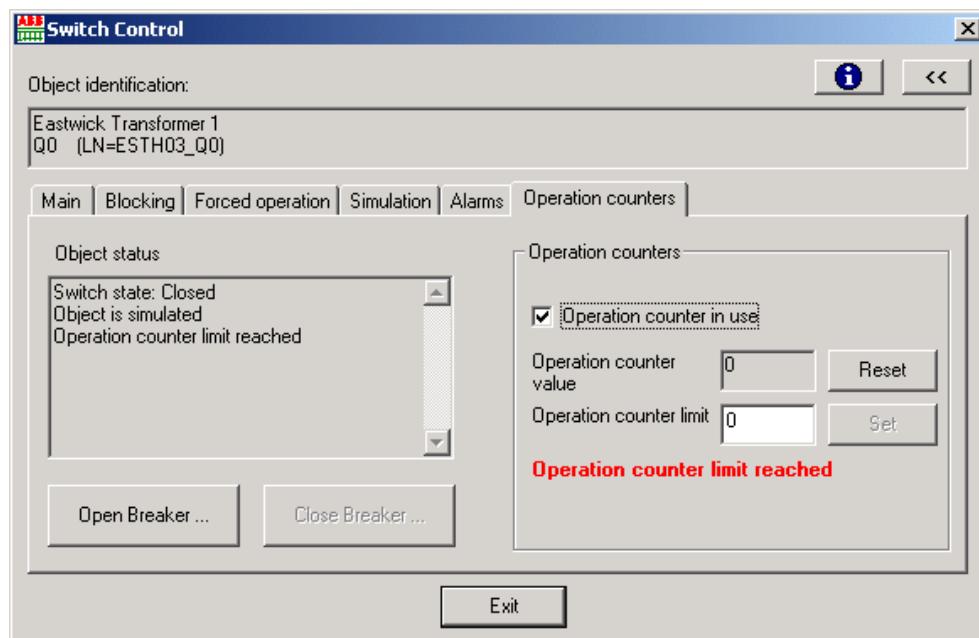


Figure 45: The Operation counter limit reached

To reset the operation counter value, click the **Reset** button next to the **Operation counter value** field. To reset the operation counter limit value, click the **Set** button next to the **Operation counter limit** field and enter a new value.

To switch off the operation counter, clear the **Operation counter in use** check box. When the operation counter is not in use, the counter value is not increased when the switch device is closed.

4.6.7 Substitution

In the substitution tab, it is possible to set/replace the value, for example breaker position indication, directly to the control device (relay). Substitution is available only with the IEC 61850 protocol.

The table shows all the signals having substitution capability and the current substitution status (True/False). The current value is shown on the right-hand side. The layout of the Substitution box changes according to the type of the signal (Analog value, Double Binary value or Binary value).

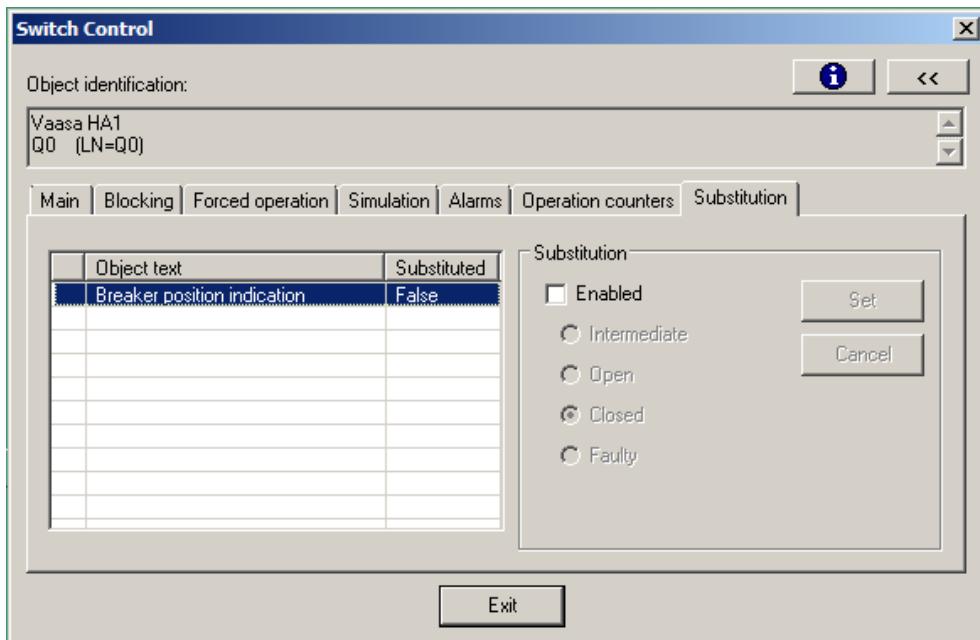


Figure 46: The substitution tab of the Switch Control dialog

To Enable the substitution, select the signal from the table on the left-hand side, check **Enabled**, select/enter the value and click **Set**.

To Disable the substitution, uncheck Enabled and click **Set**. When the substitution is disabled, the actual process value is retrieved from the process.

4.6.8 Dial-up

If a switch device is connected to the system via an autocaller line (a modem with functions for automatic dial-up), Control dialog detects this configuration. When the Control dialog is opened, the autocaller state is displayed in the **Object Status** field of the **Dial up** tab. Autocaller can have the following states:

- IDLE: ready to make a call
- CONNECTED: transmission is activated
- BUSY: for example, dialing
- INITIAL: uninitialized
- CONFIGURE: the IU attribute of the line is set to 0

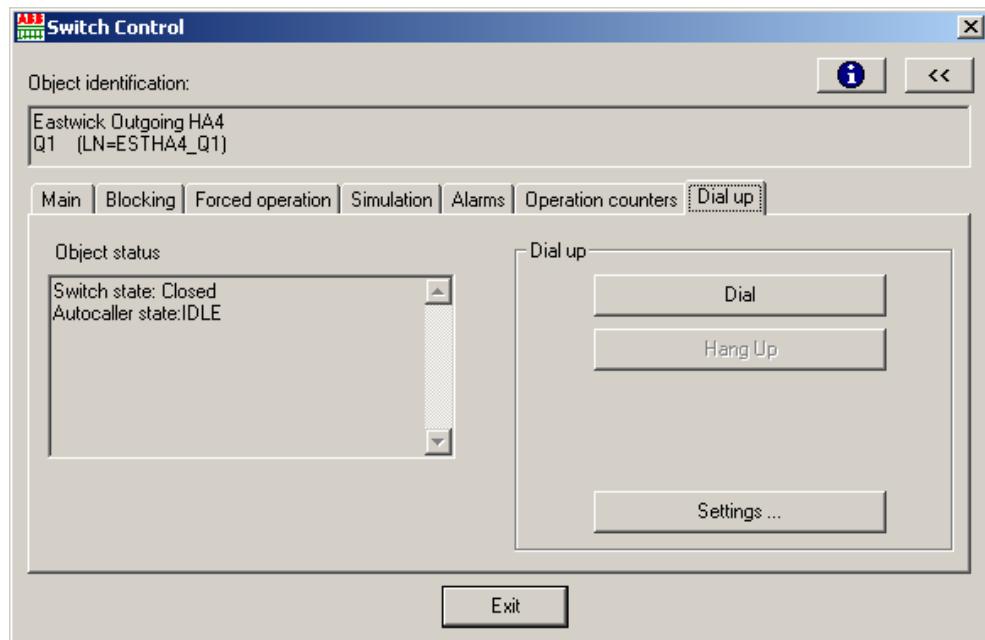


Figure 47: The Dial up tab

If the autocaller state is idle, the **Dial up** tab is automatically displayed. Depending on the configuration, the following options are available in the **Dial up** tab:

- **Dial** opens the connection to the device. When making a call to the device, the **Object Status** field indicates the progress of the call with the autocaller state and a raising counter.

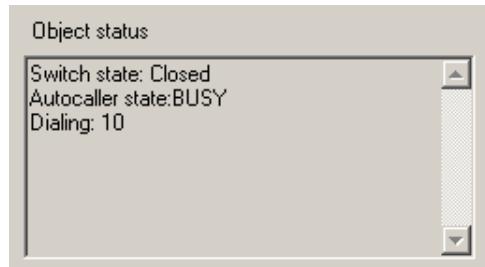


Figure 48: The Autocaller state is busy

When the object is configured so that Synchronize and/or Update Data commands are automatically sent to the device, it is also shown in the status field.

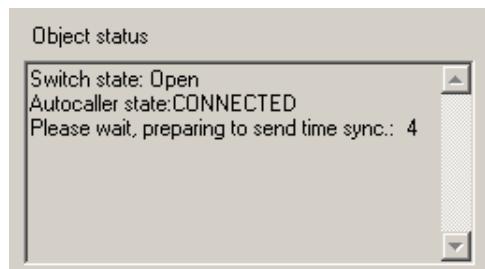


Figure 49: The Synchronize command is sent to the device

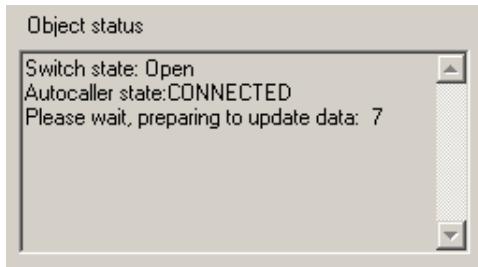


Figure 50: The Update Data command is sent to the device

Control buttons are available after the connections are ready:

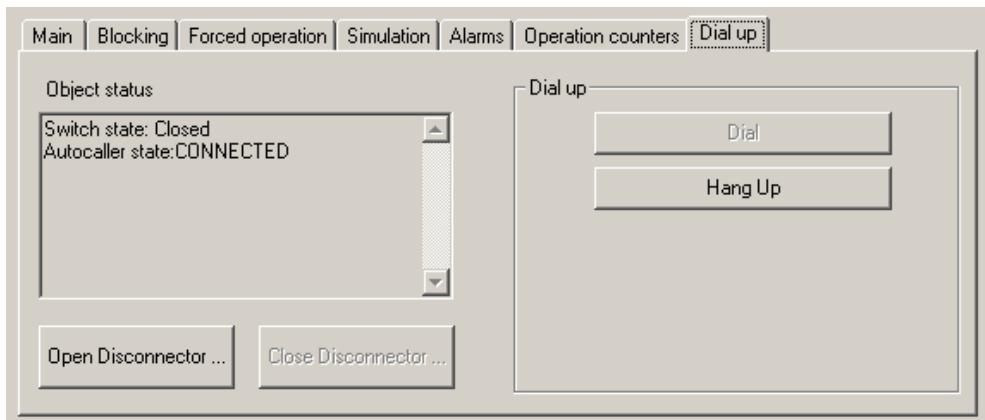


Figure 51: The autocaller state is connected

- **Hang Up** closes the connection.
- **Synchronize** sends the time synchronization command to the device. An object can be configured so that the Synchronize command is automatically sent to the device when the connection is ready.
- **Update Data** updates the process data from the device. An object can be configured so that Update Data command is automatically sent to the device when the connection is ready.
- **Settings** opens the Dial-up settings dialog.

4.6.8.1 Dial-up settings



Figure 52: Dial-up settings

The **Settings** dialog can be opened if an object is not yet configured for dial-up and/or the user has engineering privileges for process control.

The **Settings** dialog has the following options:

- **Automatically call** automatically opens the connection when the control dialog is opened.
- **Automatically synchronize** automatically sends the time synchronization command when the connection is ready.
- **Automatically update data** automatically sends the update process data command when the connection (and time synchronization) is ready.
- **Automatically Hang up** automatically closes the connection when the control dialog is closed.



The indication process object has to be connected to process (UN>0, OA>0), in order to have the Dial-up functionality in the Control dialog.

4.6.9 Tagout

If the Tagout function is configured for the switch device, the status of the function is shown in the **Tagout** tab ([Figure 53](#)).

The **Tagout** tab position depends on the active Tagout class. If the class contains also the blocking functionality, the Blocking tab will be replaced with the **Tagout** tab. If the active Tagout class does not contain the blocking functionality, the **Tagout** tab appears last in the dialog [Figure 54](#).

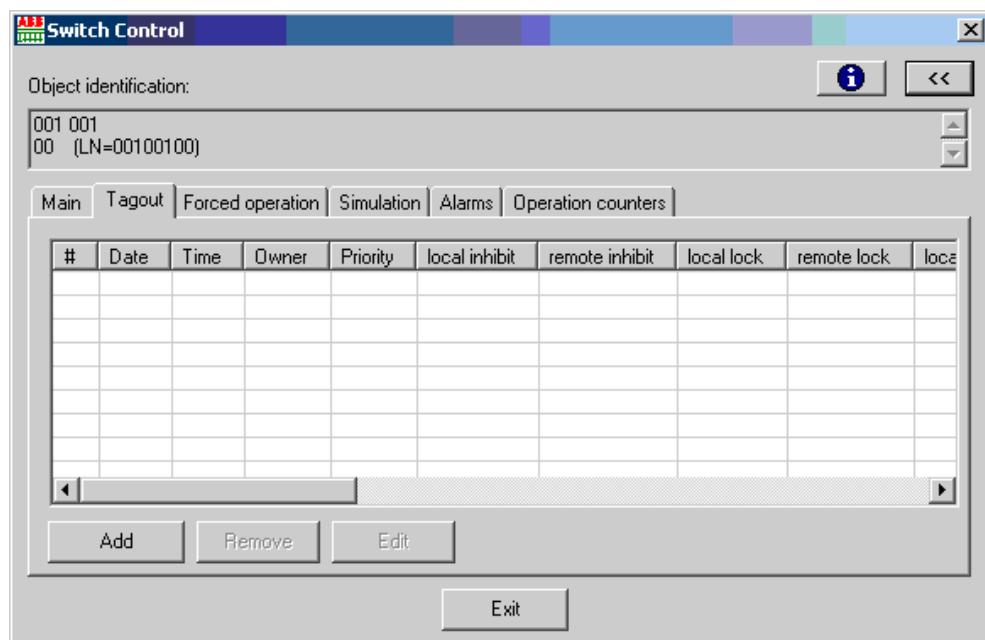


Figure 53: The Tagout tab with blockings of the Switch Control dialog

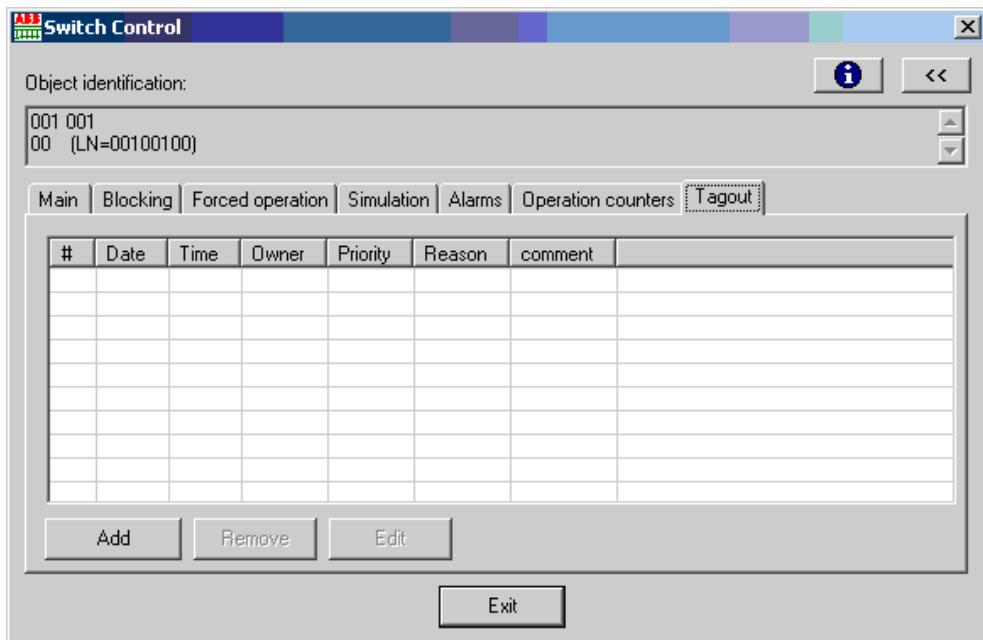


Figure 54: The Tagout tab without blockings of the Switch Control dialog

The properties and the view of the **Tagout** tab can be adjusted with the Tagout Class Editor.

To add a tagout, click **Add**. The **Add/Edit Tagout** dialog opens.

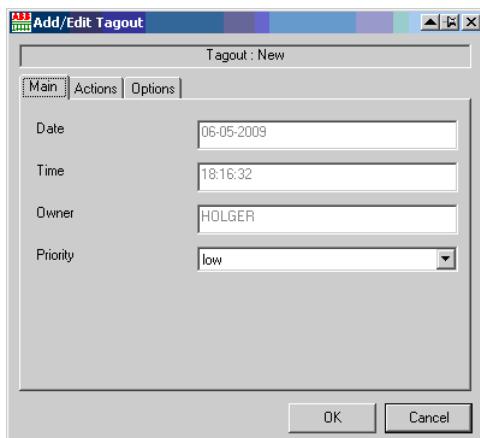


Figure 55: The Add/Edit Tagout dialog

The **Add/Edit Tagout** dialog contains several tabs. The title and the position of the tabs can be adjusted with the Tagout Class Editor.



Only the owner of the tagout can edit and remove active tagouts.

To remove a tagout:

1. Select a tagout from the list of active tagouts
2. Click **Remove**
3. The **Remove Tagout** confirmation dialog opens

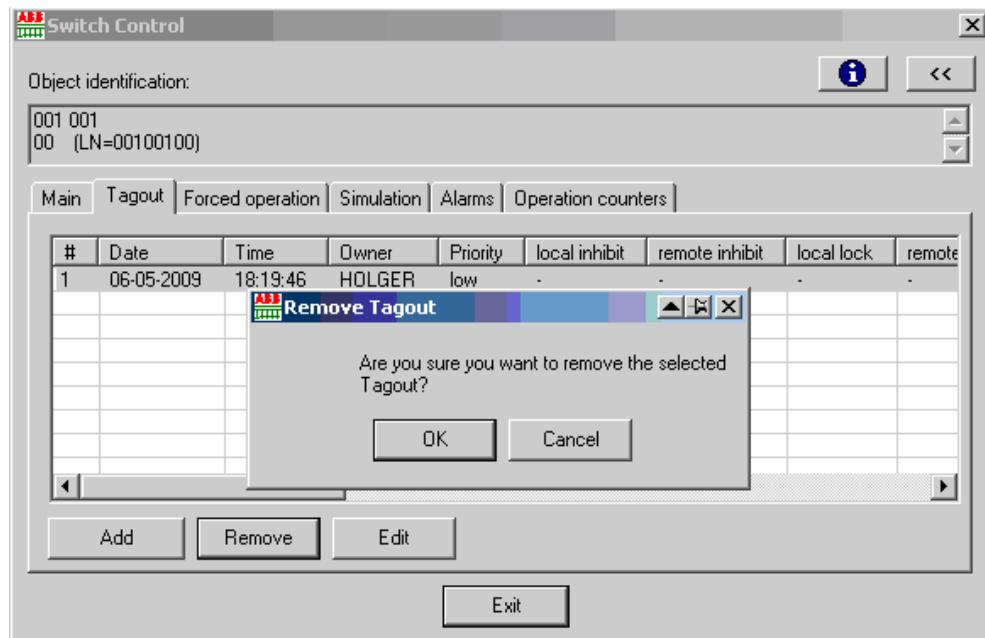


Figure 56: The Remove Tagout confirmation dialog

To edit a tagout:

1. Select a tagout from the list of active tagouts
2. Click **Edit** or double-click the tagout
3. The Add/Edit Tagout dialog opens

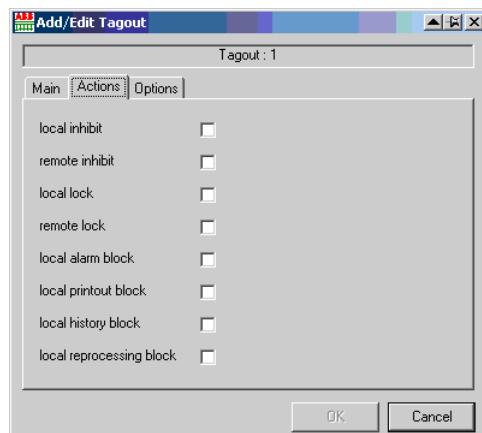


Figure 57: The Add/Edit Tagout dialog

4.6.10 Operator Place

When the operator place checking is configured to an object, The Operator Place tab indicating the current state switches appears.

4.6.10.1 Multilevel switching authority allows control

Indication only. When this option is enabled, both Station level and NCC level are authorized operator places for the object

4.6.10.2 Device Level Control

Indication only. The state of the device level L/R switch. Local means that control authority is in the front panel of the device. Remote means that control can be done via remote communication.

4.6.10.3 System Level Control

This option is enabled if Device Level control is in Remote position. The control authority of the device can be switched between Station and NCC.

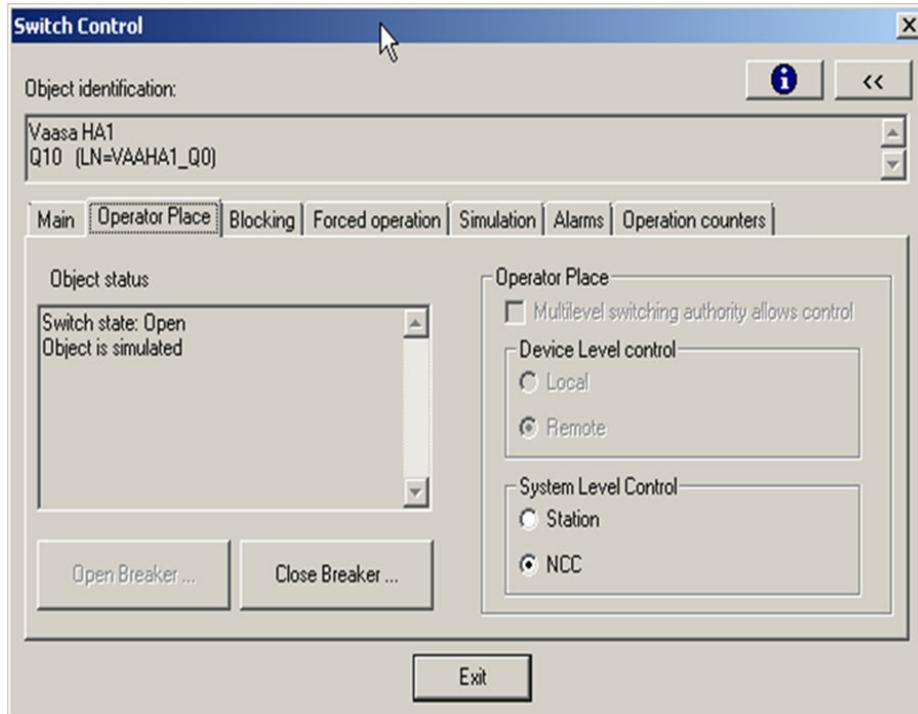


Figure 58: The Operator Place tab of the Switch Control Dialog



The view in the Operator Place tab is dynamic depending on the object configuration. If the indication does not exist in the process database, also the functionality is hidden in the tab.

4.7

Transformer voltage control

Tap changer control dialog shows the current state of the transformer voltage controller, and can be used for operating it as well. The available functions are based on the configuration definition of the corresponding Power Process Library standard object.

The identification information (station, bay, object) is shown in the box on the **Main** tab, see ([Figure 59](#)). Set the control operation mode by clicking the corresponding option under the Operation mode. The options are available depending on object configuration, the unavailable options are dimmed. Confirm the selection by clicking the **Execute** button. Cancel the selection by clicking **Cancel**. The symbol buttons are presented in the beginning of [Section 4](#).

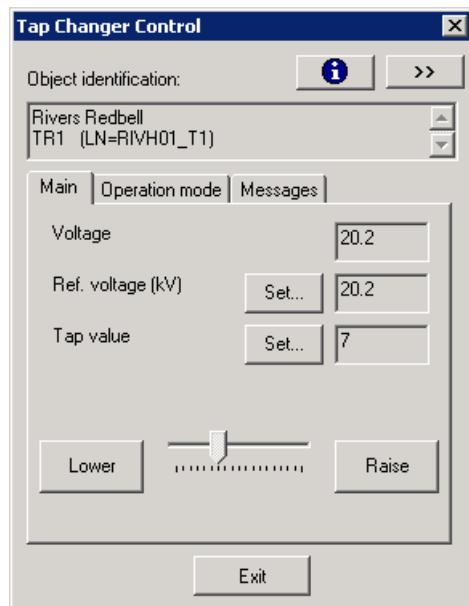


Figure 59: The Main tab of the Tap changer control dialog

Voltage or tap positions can be controlled if the configuration and status allow it. Control the voltage and tap values by using the **Lower** and **Raise** buttons. In the **Main** tab, the current tap position and voltage values can be set as well.

To set Reference voltage:

1. Click **Set** and the **Reference voltage setting** dialog opens
2. Type a new value in kilovolts to the New reference voltage box
3. Click **OK**



Figure 60: The Reference voltage setting dialog

The unit changes dynamically according to the unit defined in the ST attribute of the reference voltage process object.

Reference voltage setting requires the following:

- Process object to set reference voltage value (command object)
- Process object for indication of reference voltage
- User interface support for setting the reference value

To set Tap value:

1. Click **Set** and the **Tap value setting** dialog opens



Figure 61: The Tap value setting dialog

2. Type a new value to the Tap value settings box
3. Click **OK**

Tap value setting requires the following:

- Process object to set reference tap value (command object).
- Process object for indication of tap value.
- User interface support for setting the tap value. This can be implemented in control dialog by adding a text box where numerical tap value can be written.

The **Set** is not visible if numerical command object does not exist.

The **Messages** tab shows different messages concerning the object, for example if the object is simulated, or the information of the voltage controller is unknown.

On the **Operation** tab the operation mode can be selected (Figure 62).

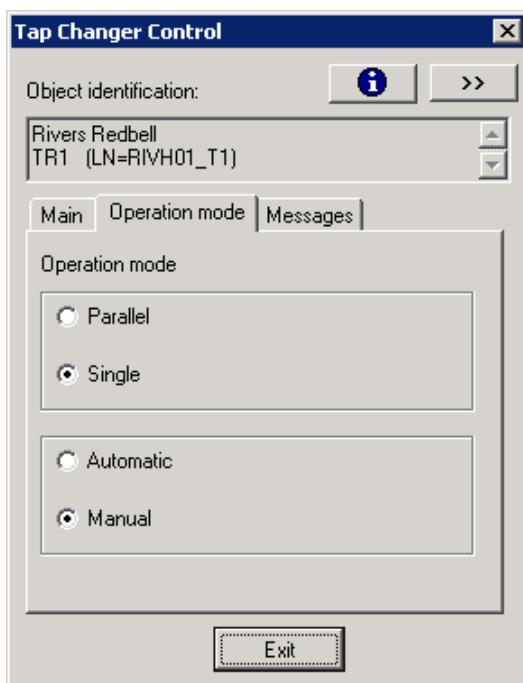


Figure 62: The Operation mode tab of the Tap changer control dialog

Different blockings concerning the process objects holding information about the voltage controller are shown and controlled in **Blocking** tab (Figure 63). After selection (multiple selections allowed), click **OK** to apply the changes. Clicking **Cancel** discards the made changes. Click **Refresh** to update the status of the blocking in case it has been changed elsewhere in the system.

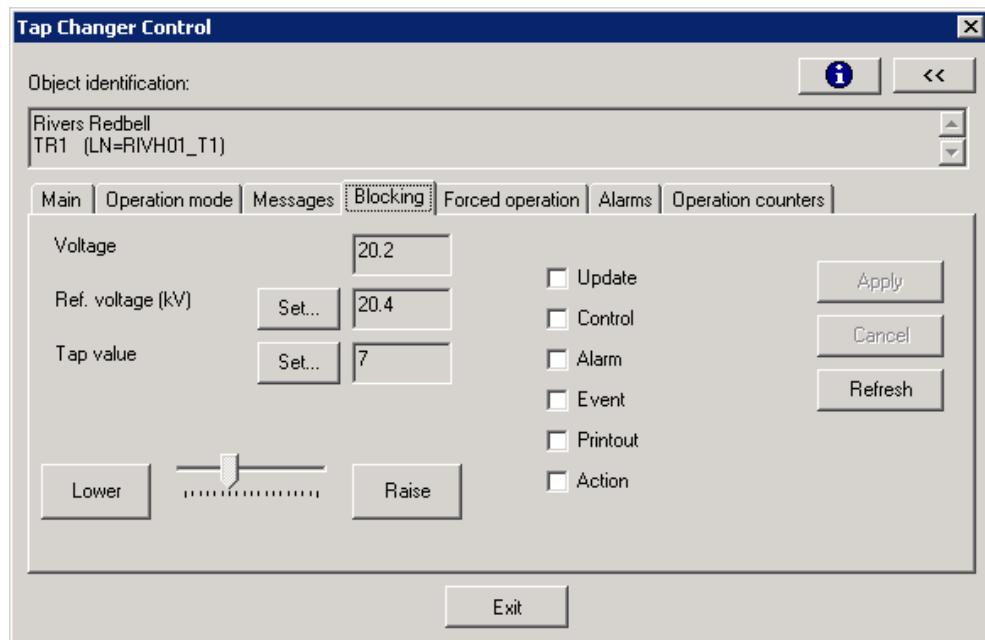


Figure 63: The Blocking tab of the Tap changer control dialog

If an object is selected on the current or on another monitor, clicking Release device reservation resets the selection and the user has the authority for controlling the object.

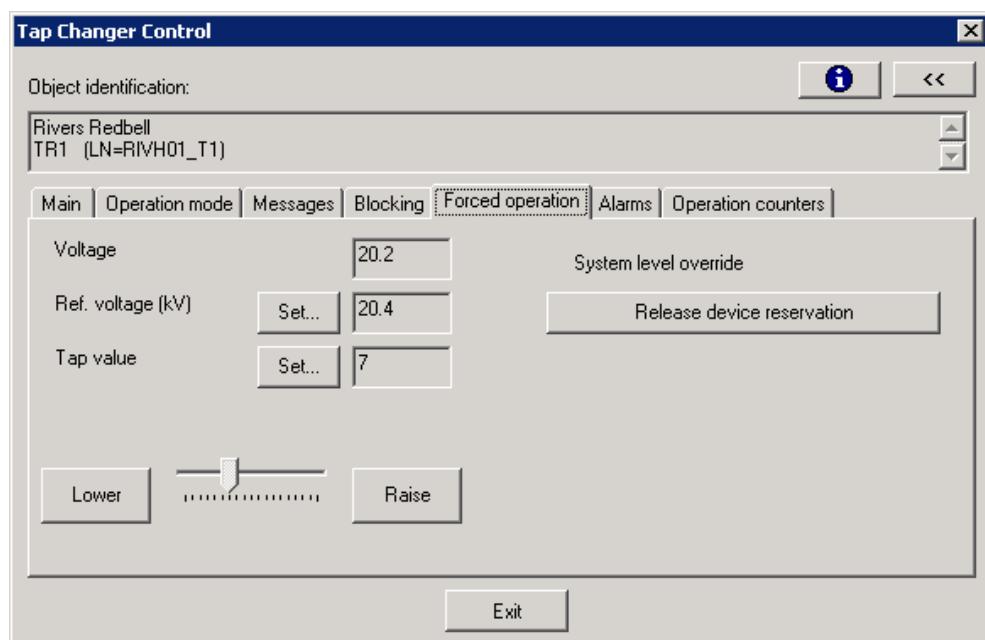


Figure 64: The Forced operation tab of the Tap changer control dialog

When a control operation, that is a change the tap position either with **Raise** or **Lower** buttons is made in the **Tap changer control** dialog box, or with direct setting of the tap value with the **Set** button in the **Switch Control** dialog box, the number in the **Operation counter value** field is incremented.

The **Operation counter value** field can be found in the **Operation counters** tab of the **Tap changer control** dialog box.

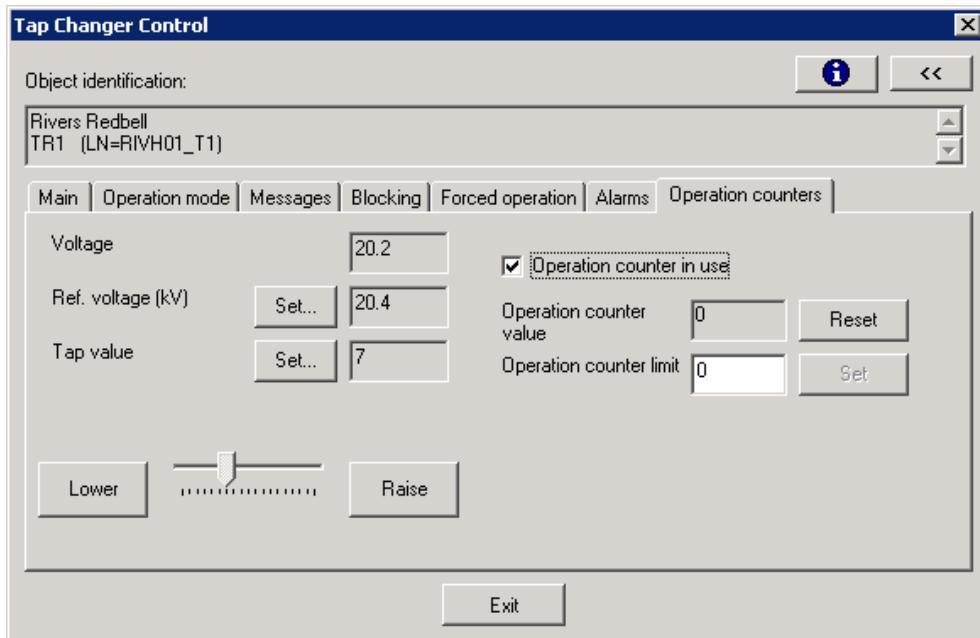


Figure 65: The Operation counters tab of the Tap changer control dialog

When the operation counter value reaches the limit defined in the **Operation counter limit** field, a message **Operation counter limit reached** is displayed on the **Operation counters** tab.

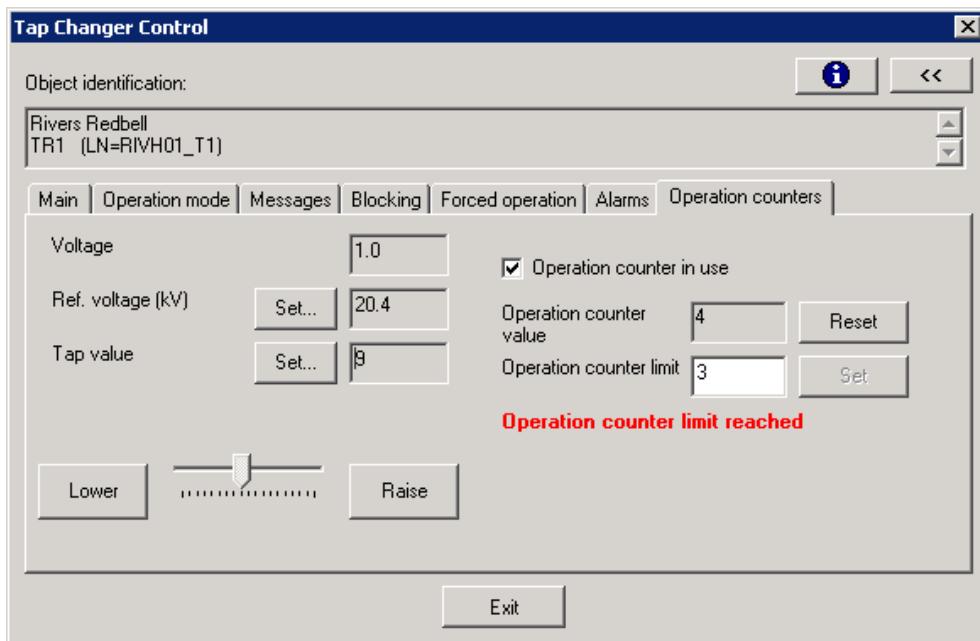


Figure 66: Operation counter limit reached

To reset the operation counter value, click the **Reset** button next to the **Operation counter value** field. To reset the operation counter limit value, click the **Set** button next to the **Operation counter limit** field and enter a new value.

To switch off the operation counter, clear the check box **Operation counter in use**. When the operation counter is not in use, the counter value is not increased when the tap value is changed.

4.8 Measurement control

View the measured values in numeric and bar graph presentations in the **Measurement** dialog. The values and bar graphs are colored based on the state and status of the measured signal.

Show and hide the bar graph presentation by clicking the  button in the **Measurement** dialog ([Figure 67](#)).

Open the advanced display by clicking the **>>** button in the upper right corner of the **Measurement** dialog. The number of shown measurands depends on the configuration of the measurement object ([Figure 68](#)).

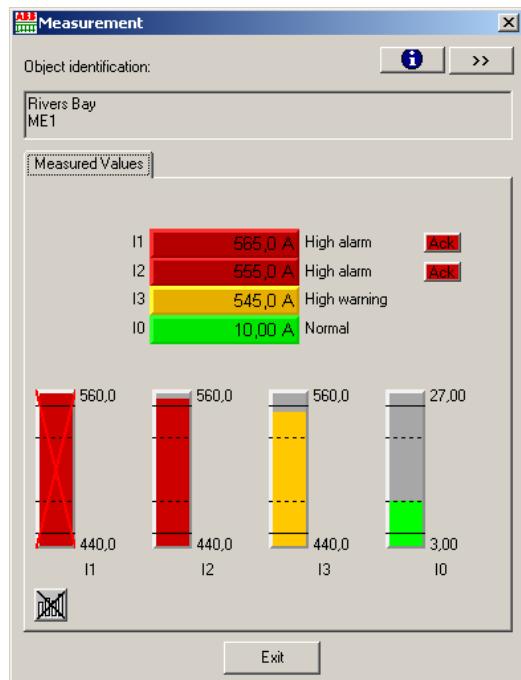


Figure 67: Normal display with bar graphs

In the **Measurement** dialog the following can be monitored:

- 1 to 4 measurement values including measured values and unit information
- 1 to 4 state and/or status indicators (text and coloring)
- 1 to 4 alarm acknowledgement buttons (blinking button, visible if the measurement has an unacknowledged alarm, confirmation dialog for acknowledgement of the alarm)
- 1 to 4 optional bar graphs (The bar graph is not shown, if a measurement does not have alarm or warning limits, for example, it is a pulse counter)
- The advanced display includes tabbed pages for measured values, limits, zero deadband supervision, blocking, object messages and alarms.

If the information on the tab is related to only one measurand, the option buttons to select the measurand become visible ([Figure 68](#)). Otherwise the option buttons are hidden.

The different colors on the dialog are based on definitions made for the used color scheme.

The reserved space for the maximum value of the bar graph is high alarm limit + 10% of the difference between high and low alarm limits. The reserved space for the minimum value of the bar graph is low alarm limit - 10% of the difference between high and low alarm limits. If the measured value is above high alarm limit or below low alarm limit, the 10% space reservation is added to or subtracted from the measured value.

If the limit supervision is handled by IED or if the limit supervision is not in use (all alarm and warning limits have been set to same value), the bar graph does not display limit lines.

In the **Measured Values** tab of the **Measurement** dialog it is possible to:

- See the selected measured value and timestamp
- Reset the min value and timestamp
- Reset the max value and timestamp
- Reset the frozen value and timestamp
- Simulate a value
- Check that the simulated value is valid

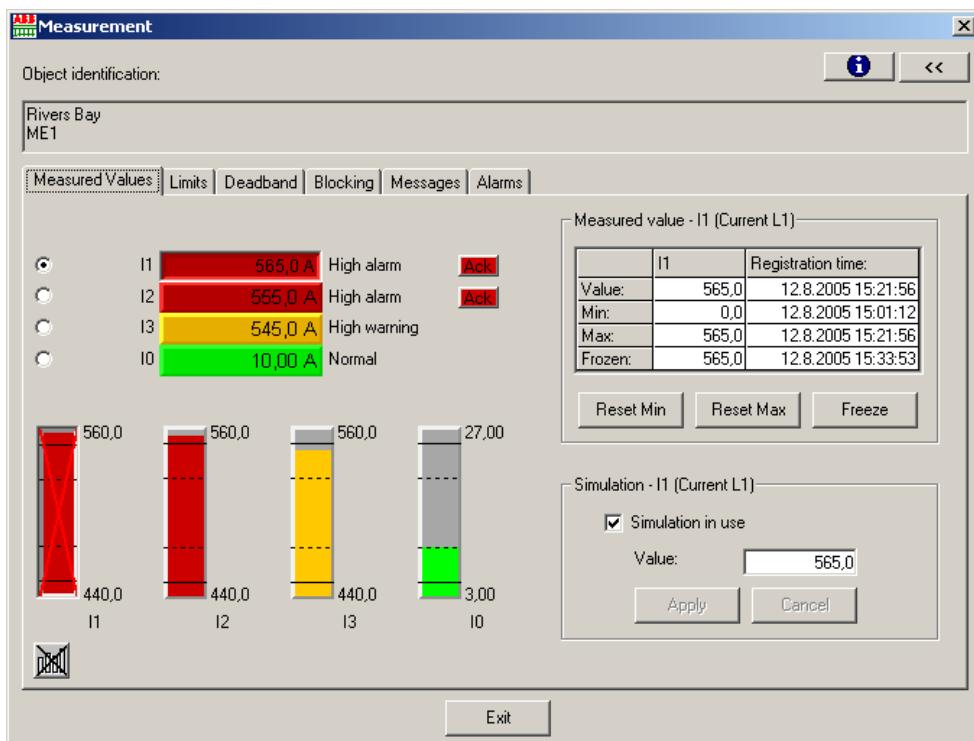


Figure 68: Advanced display with measured value and simulation

The simulated value entered is validated at first. If the simulated value is not valid, the **Value** box is displayed in red color (Figure 69).

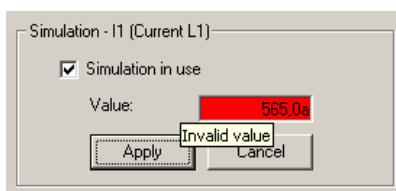


Figure 69: Invalid simulated value

On the **Limits** tab it is possible to:

- Set the high and low alarm and warning limit values. The maximum and minimum values are calculated like in the bar graphs (the limits cannot be set, for example, for pulse counters).
- Copy and paste the limit values by right-clicking on the limits frame.

A warning message will be shown if the limits in the process have been changed during the edition of the new limits in the **Measurement** dialog.

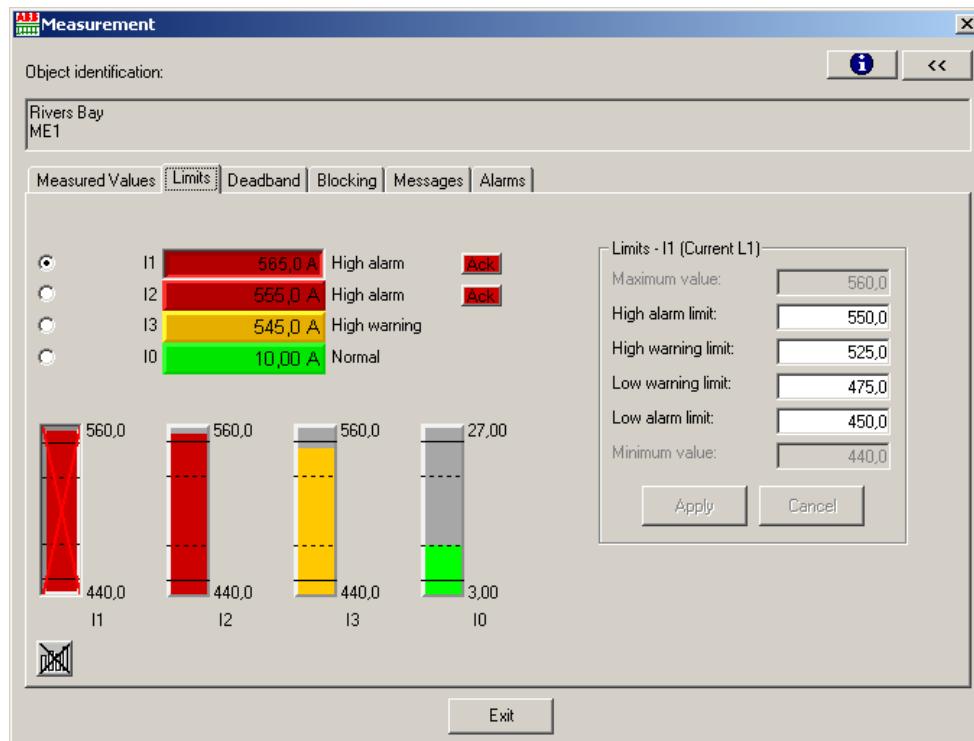


Figure 70: The Limits tab of the Measurement dialog

The limit values entered are validated at first. If, for example, the high warning limit is bigger than the high alarm limit, the inappropriate limits are shown in red color (see [Figure 71](#)).



Figure 71: Inappropriate limits

If a limit is not a number, the invalid limit is shown in red color (see [Figure 72](#)).

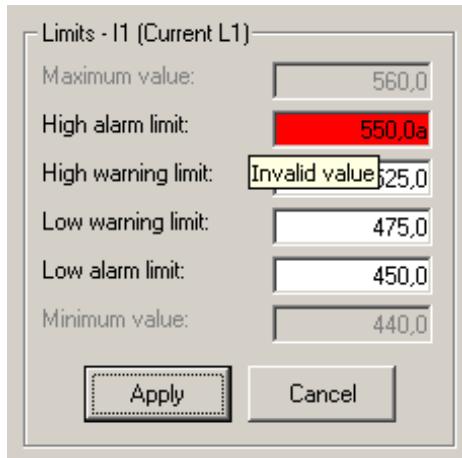


Figure 72: Invalid limit value

The zero deadband supervision can be set on the **Deadband** tab.

A warning message is shown if the deadband value in the process is changed during the edition of the new setting value in the **Measurement** dialog.

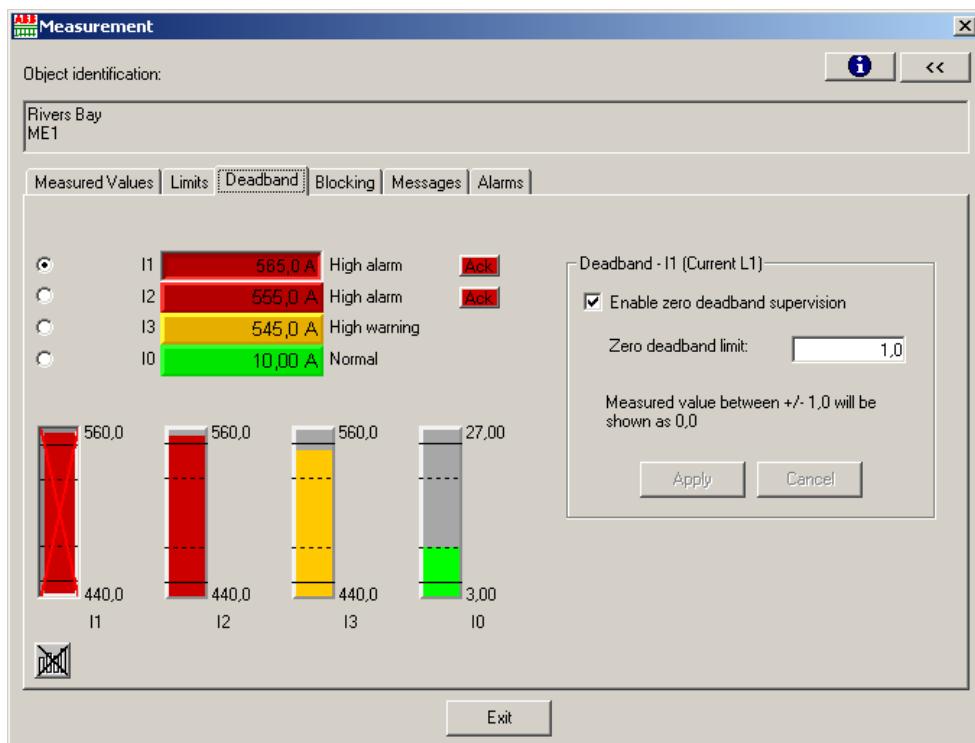


Figure 73: The Deadband tab of the Measurement dialog

The deadband limit value entered is validated at first. If an invalid deadband value is set, the invalid limit is shown in red color (see [Figure 74](#)).

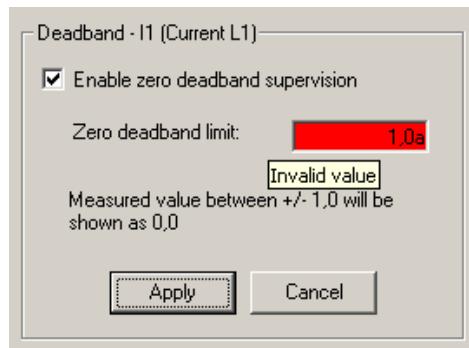


Figure 74: Invalid deadband setting value

On the **Blocking** tab the measurements can be blocked.

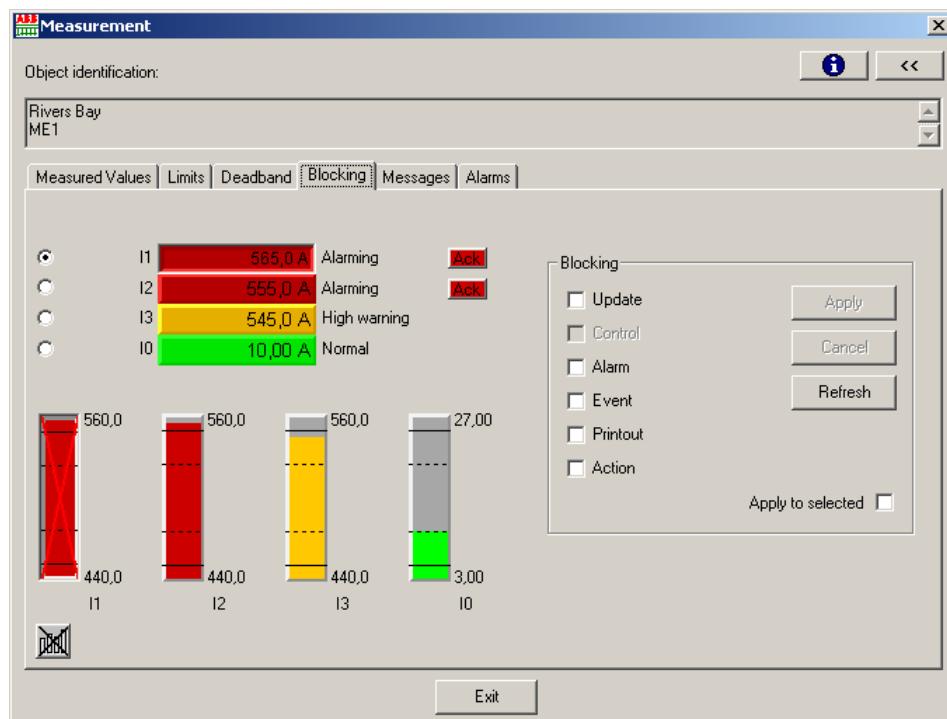


Figure 75: The Blocking tab of the Measurement dialog

The condition of the **Blocking** check box shows its status:

- checked, respective measurements are blocked (**Alarm** in [Figure 76](#)).
- unchecked, respective measurements are not blocked, (**Event**, **Printout** and **Action** in [Figure 76](#)).
- grayed out, some but not all measurements are blocked (**Update** in [Figure 76](#)).
- disabled, blocking cannot be applied to the function in question (**Control** in [Figure 76](#)).

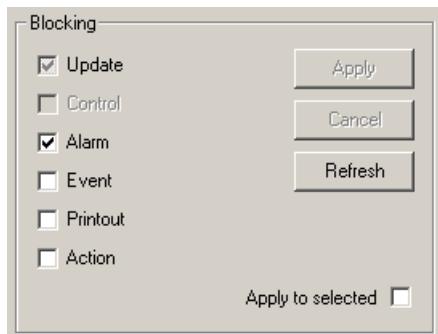


Figure 76: Example of condition on Blocking check boxes

When **Apply to selected** is checked, the blocking will affect only to the single measurement selected by the radio button to the left of the dialog.

On the **Messages** tab the object messages of a selected measurand can be seen.

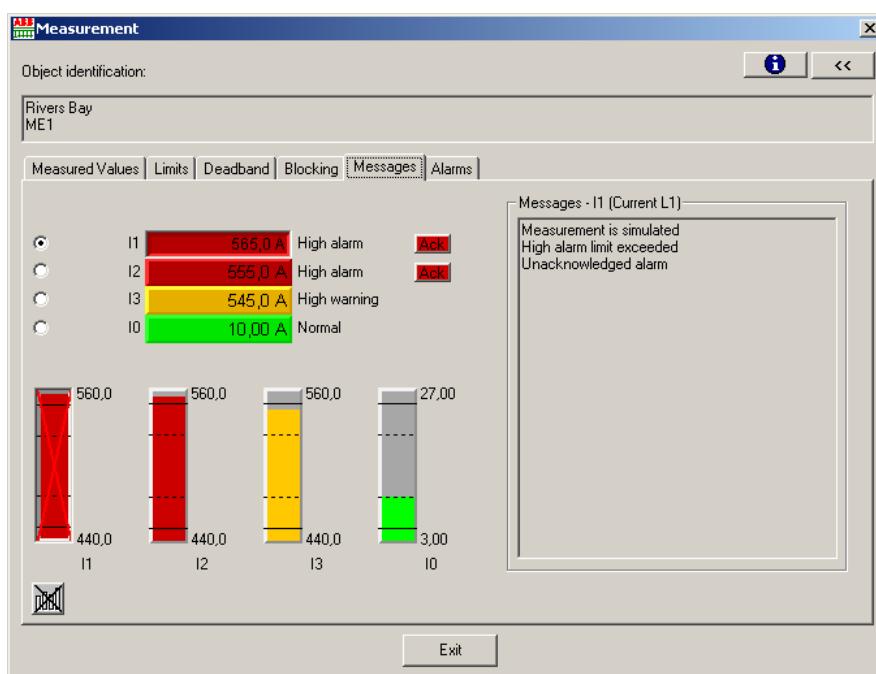


Figure 77: The Messages tab of the Measurement dialog

On the **Alarms** tab the alarms of the measurand can be seen.

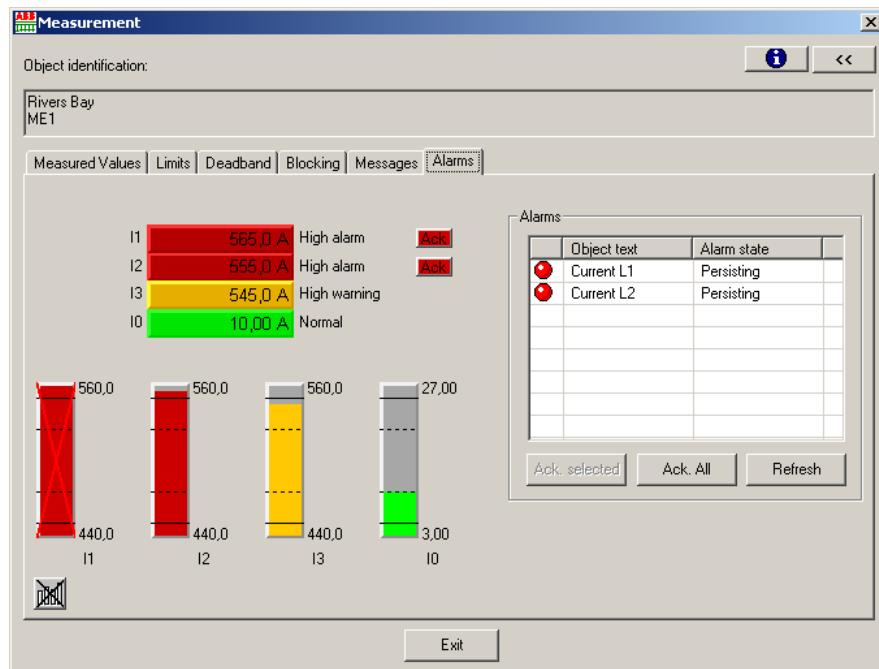


Figure 78: Extended display with alarms

4.9 Alarm indicator control

The Alarm Indicator control is used to monitor the alarm state of input signals. The status of each signal is indicated in the Alarm indicator control dialog shown in [Figure 80](#).

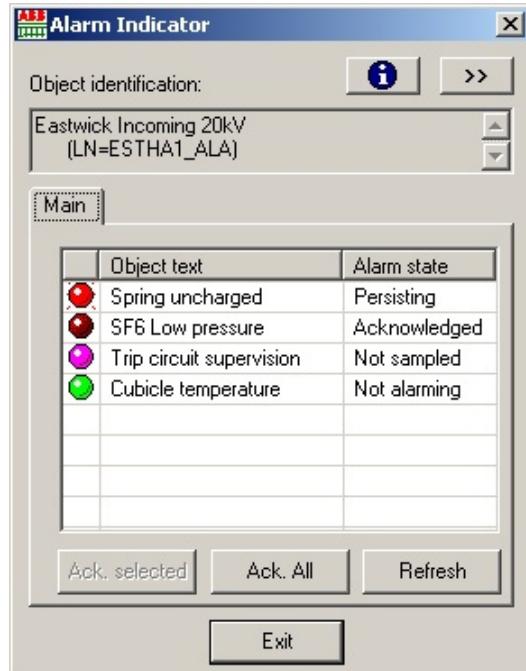


Figure 79: The Alarm indicator control dialog

The Alarm indicator symbols and their meaning are explained in [Table 4](#).

Table 4: Alarm indicators

| Symbol | Meaning |
|--------|--------------------------------|
| ● | Not sampled or uncertain |
| ● X | Alarm, active unacknowledged |
| ● | Alarm, fleeting unacknowledged |
| ● | Alarm, active acknowledged |
| ● | Substituted |
| ● | Blocked |
| ● | Manually entered |
| ● | Normal |

In addition to the symbols above, the alarm state is also shown in textual form. In the Alarm state column, each signal can have the following explanation:

- Persisting
- Fleeting
- Acknowledged
- Not sampled
- Not alarming

Different blockings concerning the process object that belong to the alarm indicator are shown and controlled in the **Blocking** tab, see [Figure 80](#).

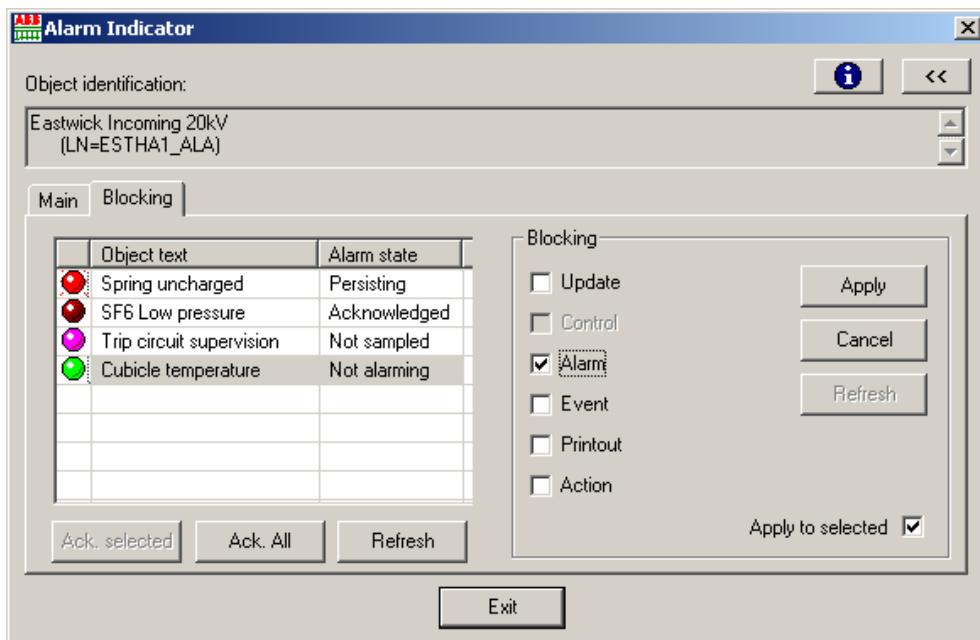


Figure 80: The Alarm indicator control dialog, the Blocking tab

The blocking can be done to either all signals or to one signal only. To block all signals related to alarm indicator, select Blockings and click **Apply**.

In order to block only one signal, select the signal from the list, check

"**Apply to selected**" and click **Apply**.

4.10 Color Setting Tool

Color Setting Tool is used to change the RGB values of logical colors. The tool contains tabs for status colors, network topology colors and miscellaneous colors, which are related to the Process display. There are also dedicated tab sheets for the rest of the displays (Alarm / Event / Blocking / Trends / Measurement Reports display).

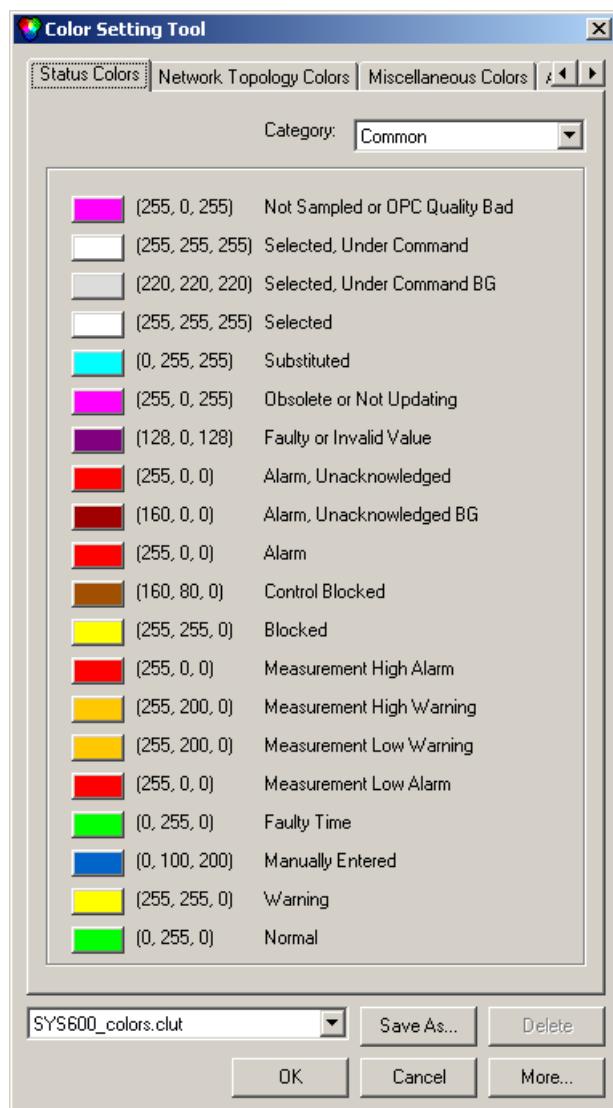


Figure 81: Color Setting Tool

4.11 Network topology coloring

The network topology coloring in SYS600 Monitor Pro can be used to indicate the status of line segments in several different ways. It can indicate which line segments are powered, unpowered or in certain other states, or more accurately which voltage level each line segment has. Alternatively, each voltage source type can have a color that is used for line segments they are connected to. Network topology coloring may also be used to indicate situations where two or more voltage sources form a loop.

To define the network topology coloring settings, select **Settings/Network Topology Coloring...** The Network Topology coloring dialog is displayed in

[Figure 82](#) shows how the network topology coloring settings can be used in the current monitor. Save the settings to be used as default by clicking **OK**. Restore the factory settings by clicking **Factory defaults**.

When the coloring is disabled, static coloring is used for line segments. When Use status colors setting is enabled, objects are colored using only their status color.

The user can also specify what kind of color is to be used for the powered network objects, for example, line segments and switching devices. There are three modes:

- One color mode
- Voltage level mode
- Voltage source mode

One color mode uses the same color for all powered network objects. In Voltage level mode, the color is specified for the voltage source (generator, transformer, line indicator) according to voltage level. In Voltage source mode, the same color is used for all network objects that are fed by some voltage source type.

Different voltage source types can be prioritized in the **Colors** tab. The colors used for the voltage levels and voltage source types can be set using the **Color Setting Tool**.

There are two modes to color sources (line indicators). In Adjacent line segment color, the color is taken from the line segment connected to the source. External color handling uses a color from some external origin, for example DMS 600.

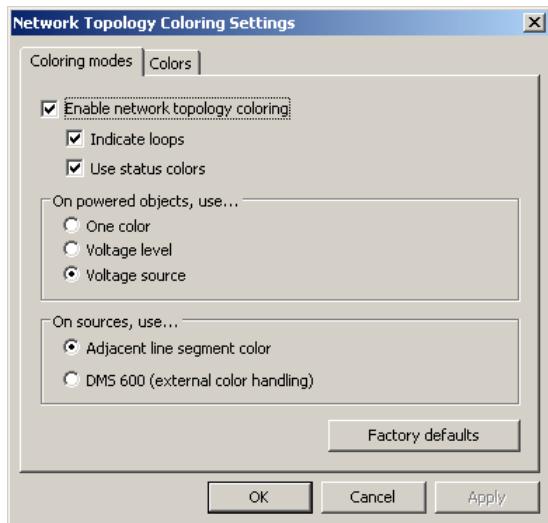


Figure 82: Network Topology Coloring Settings dialog

The priority of the voltage source colors can be ordered with the **Colors** tab. The device of the highest priority is on top of the list. To change the priority order, select a device from the list and click the arrow buttons on the right to change the order. Priority setting is only applicable if the user has selected to color powered line segments according to voltage source type in **Coloring modes** tab.

Section 5 Event Display

With the Event Display, the information about events occurring in the system can be monitored. Thus, the user can make the right decisions and verify that taken measures have been successfully performed. The user can also receive information about activities carried out by other users, operations of objects, acknowledging of alarms, editing of limit values, logging in, and all other type of events which can occur.

The screenshot shows the 'Event Display (No Preconfiguration) - Monitor Pro / 1 - APOPERA [User: demo]' window. The main area displays a table of events with columns: #, A, S, T, Time (ET+EM), Station, Bay, Dev., Object Text, Event Text, and Alarm Class. The table lists various events such as breaker execute command, breaker position indication, breaker close select command, etc. A context menu is open over row number 34, showing options like 'Comment...', 'Locate object in Monitor Pro', 'Locate object in Monitor Pro - new window', 'performed', 'Blockings...', 'Use as Filter...', and 'Break'. The status bar at the bottom shows 'Filters: Not used Mode: Updating Scroll Order: Event' and 'FIVAA-L-6400015 (NCC 1) 2012-11-01 10:36:09 ARB'.

| # | A | S | T | Time (ET+EM) | Station | Bay | Dev. | Object Text | Event Text | Alarm Class |
|----|---|---|---|-------------------------|----------|-----------------|------------|------------------------------|---|-------------|
| 17 | | | | 2012-10-31 21:04:03.087 | Eastwick | Incoming 110kV | Q0 | Breaker execute command | Executed | 0 |
| 18 | | | | 2012-10-31 21:04:03.087 | Eastwick | Incoming 110kV | Q0 | Breaker position indication | Closed | 1 |
| 19 | | | | 2012-10-31 21:04:02.118 | Eastwick | Incoming 110kV | Q0 | Breaker close select command | Selected | 0 |
| 20 | | | | 2012-10-31 21:03:53.663 | NCC 1 | FIVAA-L-6400015 | User: DEMO | Operation performed | 0 | |
| 21 | | | | 2012-10-31 21:03:53.663 | Eastwick | Incoming 110kV | Q0 | Breaker position indication | Open | 1 |
| 22 | * | | | 2012-10-31 21:03:53.662 | Eastwick | Incoming 110kV | Q0 | Breaker execute command | Executed | 0 |
| 23 | * | | | 2012-10-31 21:03:52.684 | Eastwick | Incoming 110kV | Q0 | Breaker open select command | Selected | 0 |
| 24 | * | | | 2012-10-31 21:03:06.144 | Eastwick | Outgoing HA3 | | SF6 Low pressure | Alarm | 1 |
| 25 | | | | 2012-10-31 20:58:41.715 | Eastwick | Incoming 110kV | | Current L1 | Normal | 1 |
| 26 | | | | 2012-10-31 20:58:34.972 | Eastwick | Incoming 110kV | | Current L1 | High Warning | 1 |
| 27 | * | | | 2012-10-31 20:58:21.884 | Eastwick | Incoming 110kV | | Current L1 | High Alarm | 1 |
| 28 | | | | 2012-10-31 20:57:53.109 | Eastwick | Incoming 110kV | | Current L1 | Normal | 1 |
| 29 | | | | 2012-10-31 20:57:53.107 | NCC 1 | FIVAA-L-6400015 | User: DEMO | Operation performed | 0 | |
| 30 | | | | 2012-10-31 20:57:53.107 | Eastwick | Outgoing HA5 | Q0 | Breaker position indication | Open | 0 |
| 31 | | | | 2012-10-31 20:57:53.106 | Eastwick | Outgoing HA5 | Q0 | Breaker command | Open executed | 0 |
| 32 | | | | 2012-10-31 20:57:52.223 | Eastwick | Outgoing HA5 | Q0 | Breaker command | Selected | 0 |
| 33 | | | | 2012-10-31 20:57:47.050 | NCC 1 | FIVAA-L-6400015 | User: DEMO | Operation performed | 0 | |
| 34 | | | | 2012-10-31 20:57:47.050 | Eastwick | Bus coupler | Q1 | Disco | Comment... | 1 |
| 35 | | | | 2012-10-31 20:57:47.049 | Eastwick | Bus coupler | Q1 | Disco | | 0 |
| 36 | | | | 2012-10-31 20:57:46.126 | Eastwick | Bus coupler | Q1 | Disco | Locate object in Monitor Pro | 0 |
| 37 | | | | 2012-10-31 20:57:43.530 | NCC 1 | FIVAA-L-6400015 | User: DEMO | performed | Locate object in Monitor Pro - new window | 0 |
| 38 | | | | 2012-10-31 20:57:43.529 | Eastwick | Bus coupler | Q0 | Break | performed | 0 |
| 39 | | | | 2012-10-31 20:57:43.529 | Eastwick | Bus coupler | Q0 | Break | Blockings... | 0 |
| 40 | | | | 2012-10-31 20:57:42.710 | Eastwick | Bus coupler | Q0 | Breaker open select command | Use as Filter... | 1 |
| 41 | | | | 2012-10-31 20:57:36.565 | Eastwick | Incoming 110kV | | Current L1 | Selected | 0 |
| 42 | | | | 2012-10-31 20:57:36.563 | NCC 1 | FIVAA-L-6400015 | User: DEMO | High Warning | High Warning | 1 |
| 43 | | | | 2012-10-31 20:57:36.563 | Eastwick | Incoming 110kV | Q1 | Connec. position indication | Operation performed | 0 |
| | | | | | | | | | Open | 1 |

Figure 83: Event Display main view

The Event Display presents the data in a structured way for the user's convenience. Each event is one row in the display. With default settings, Event Display rows consist of a time stamp, object identification, a signal text and a text indicating the status.

The Event Display contains the following features and options:

- Configurable layout: columns, fonts, toolbars, coloring, and so on
- Configurable coloring of events
- Configurable modes: log/event order, latest at top/bottom
- Updating/Frozen modes
- Easy navigation through scrolling, go to date, time filters, and so on
- Extensive filtering that can be stored and easily called up later
- Find
- Sorting by column
- Copy/Paste of events to other applications
- Printouts
- Commenting of events

The event activation and consequential actions are defined in the process database separately for each individual object.

Typical examples on events are:

- Changes in or updating of an object value
- Changes of an alarm and a warning state
- Changes of the alarm definition, alarm blocking, acknowledgement, and so on

When an event occurs in the system, the operator wants to receive an answer to the following questions (answers provided below each question):

1. What happened?
 - A change in the state of the object or an executed operation.
2. Where did it happen?
 - A descriptive text (object identification, OI and object text, OX) comprising of, for example, a device notation and the type of object or operation.
3. When did it happen?
 - The point of time when the event occurred. If the event originates from a station providing a time stamp, this time stamp will be used. Depending on the station, the time is on a second or a millisecond level. In other cases, the time stamp is the SYS600 system time with an accuracy of 10 milliseconds.

The following functions can be activated by an event:

- Automatic printout. Like alarms, events can cause automatic printouts on the event and alarm printer.
- Activation in the report database, for example automatic control operations, registration, report printout, and so on.

Depending on how crucial an object is, the following events in the object may activate an event printout, a registration in the history buffer, or an activity in the report database (from the least crucial to the most crucial object):

- No activation
- An alarm is activated and deactivated
- The alarm or warning state changes
- The object value changes
- The object value is updated, although it is not changed

There are two ways to access the Event Display: selecting **Navigate/Event** or by clicking **Event Display** on the toolbar.

The **Event** menu contains the following commands:

Filters Opens a **Filter Settings** dialog, where filters can be selected and edited.

Reset Filter Resets filters.

Comment Opens a **Comments** dialog, which is used for writing comments to events.

Keep Updating Sets the Event Display to the updating mode. When changing to Event Display, the mode is by default set to updating mode, provided there is a user logged in.

Stop Updating Sets the Event Display to the frozen mode. When changing to Event Display, the mode is by default set to frozen mode if no user is logged in.

Show Info Fields Displays/hides the info fields.

Show Headers Displays/hides the list headers.

Previous Event Set Displays the list of previous events.

Next event set Displays the list of next events.

Last Event Displays the list of last events.

Select Day Opens a Day select dialog.

Export: Exports the current view in CSV file format.

The toolbar is a shortcut that can be used in parallel with the drop-down menu.



Figure 84: Event Display toolbar

The buttons in the toolbar from left to right are:

- Show Filters
- Reset Filter
- Switch to Updating or Frozen Mode
- Go to Previous Event Set
- Go to Next Event Set
- Go to Last Event
- Go to Selected Day

The toolbar buttons can be added or removed in the same way as in applications in general, see [Section 3.4.2](#).

If the Event Display is in updating mode, the list will be updated when a new event occurs in the system. When the list is in frozen mode (non-updating), a message will be displayed informing the user to proceed to the last events and to change the mode to the updating mode.

5.1 Event Rows

With default settings an event row contains the following information:

- Status sign
- Time stamp
- Object identification
- Signal name
- Event text

The first column always shows the row number in the list. With default settings, the next three columns are status columns. The Date and Time columns present the time stamp of the event. The Station, Bay and Device columns present the Object Identifier (OI), and the following column the Object Text (OX). The Event Text (MX) column present the event message information.

It is also possible to use only one column to show the object identification. In that case station, bay and device names are shown in one column. The column is labeled as Object Identifier.

5.1.1 Alarm symbol

The alarm symbol is the first status column shown in the beginning of the event row. If the object is alarming, the symbol * is displayed.

5.1.2 Object status symbol

The second status column shows the signal status. If the object status differs from normal, the status symbol is displayed as follows:

Table 5: Object status symbols

| Status | Color | Symbol |
|----------------|---------|--------|
| Faulty value | Magenta | F |
| Obsolete value | Red | < |
| Faulty time | Red | T |
| Not sampled | Magenta | ? |

5.1.3 Object comment symbol

The object comment symbol is the third status column shown in the beginning of the event row. When a comment is added, the exclamation point (!) is displayed.

5.2 The Event Display User Interface

The information presented on the screen consists of several elements, which will be described in the following section.

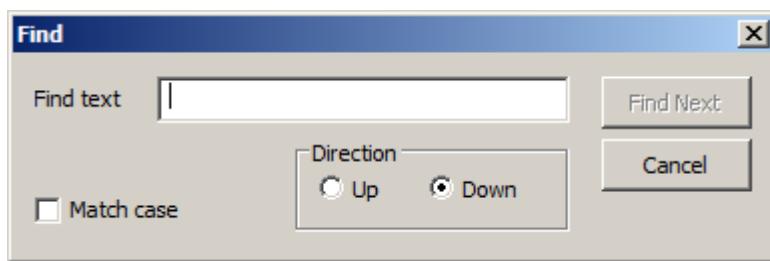
5.2.1 Using the Event Display User Interface

5.2.1.1 Sorting Rows

Rows can be sorted by clicking a column header. If the same column is clicked twice, the sorting order is reversed.

5.2.1.2 Finding

Rows can be searched for using the Find function by going to **Main/Find** or by clicking the  icon.



The **Find** dialog box searches the list from start to end. If an event row contains the desired text, it is selected. A message appears when the end point of the search has been reached or when the searched text is not found.

5.2.1.3 Printing

List can be printed (**Main/Print** or the  icon). The user can print either all rows, selected rows, or a page range. The font size in the print is automatically adjusted so that all the data fits into the page. If the text does not fit into the page, the rest of the columns are printed to following pages.

5.2.1.4 Copying List Rows

Selected rows from the list can be copied. Rows are copied as tab separated values. Time attributes are copied in standard format.

5.2.2 Using Filters

A list can be filtered. Only the rows that match the filter are shown.

Filters are defined by selecting **Filters** from the menu bar. The **Filter** dialog contains standard filters that can be selected by the user. The **Filter** dialog provides at least the following standard filters: all events, event time, per substation, per bay and per device.

It is possible to change the existing filters or to add new filters that can be stored and reused by other operators. The **Filter** dialog contains a specification form where new filters can be created or the existing filters can be changed.



The filter can also be defined by right-clicking on a row in a list, and by selecting Use as Filter. This uses a part of the rows OI as the filter.

In Alarm Display and Event Display on the upper part of the **Filter** dialog, there are two options that specify whether the Lower Time Limit or Upper Time Limit is used. If the Lower Time Limit is not in use (off), the alarms or events will be presented from the latest backwards. If the Upper Time Limit is not in use, the alarms or events will be presented up to the latest. Only when a time limit is in use, the corresponding date and time limits can be defined. Clicking the drop-down menu in the time limit field opens the date selector, by which the time limit can be defined ([Figure 85](#)). Whether the Lower Time Limit or Upper Time Limit is defined, the date selector opens the related time limit below indicating which time limit is edited.

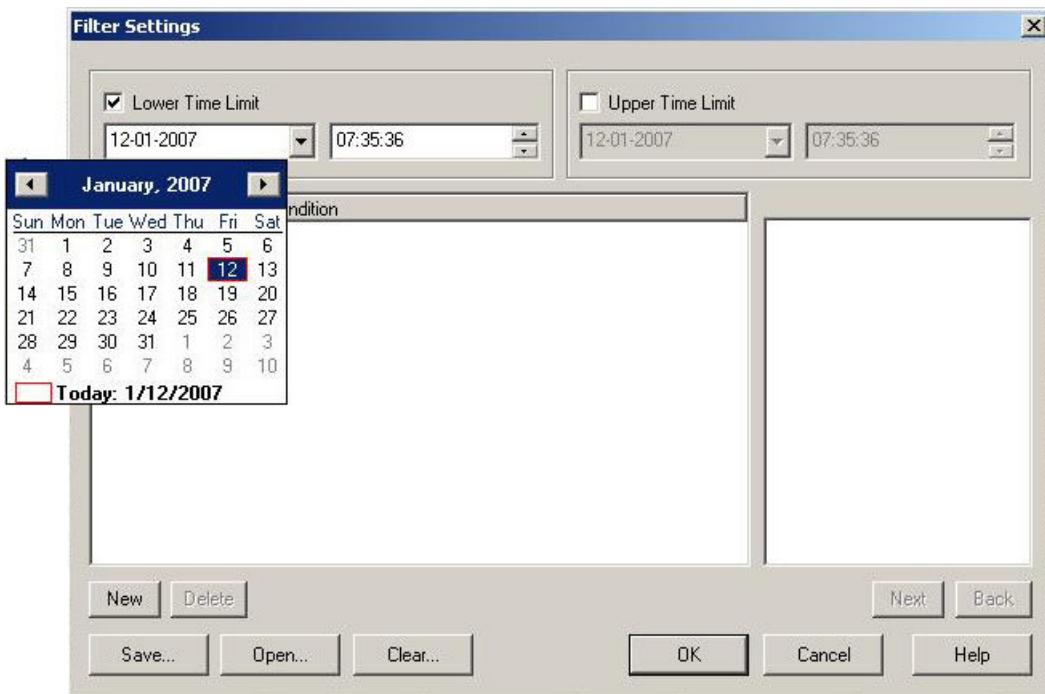


Figure 85: Edit Upper Time Limit

To save the active filter settings, select **Preconfigurations...** in the **Filter Settings** dialog. The **Preconfigurations** dialog is opened, in which the name for the preconfiguration can be defined. Define the location of the preconfiguration in the **Visibility** field. When selecting the **Application** option, the preconfiguration becomes accessible for all the users of the application, see [Figure 86](#). Click **Save** to save the preconfiguration file. Click **Close** to close the dialog without saving.

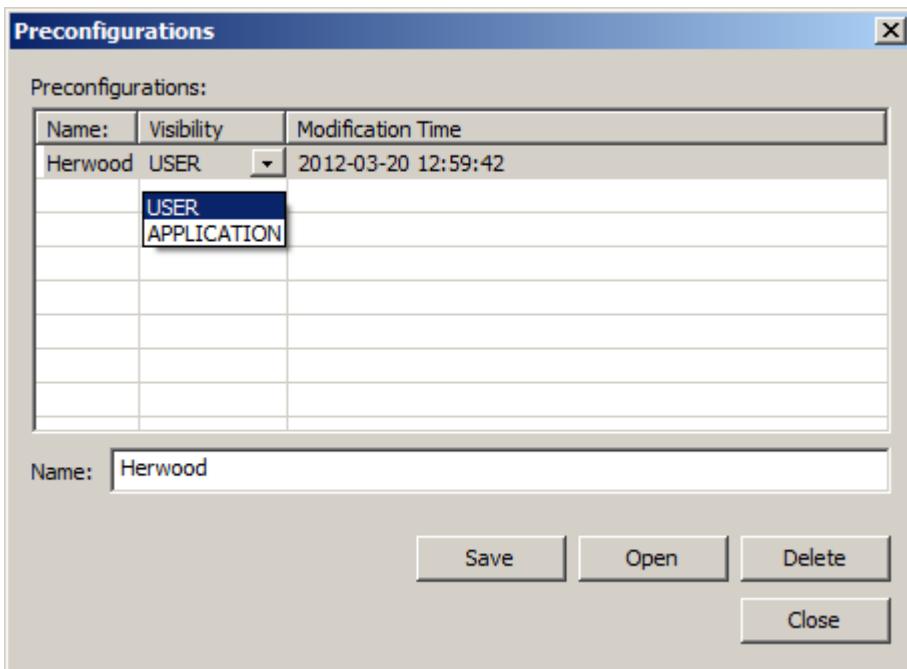


Figure 86: Visibility definition

To load preconfigured filter settings, select **Preconfigurations** in the **Filter Settings** dialog. Sort preconfigurations by name, visibility setting or modification time. When clicking **Open**,

the preconfiguration file is loaded and set as an active filter. Clicking **Close** closes the dialog without opening any files. To activate the filter, click **OK** in the main filter dialog.

5.2.3 Locating Signals

Right-click a line row to open a context menu. In this menu, **Locate object in DMS**, **Locate object in Monitor Pro**, or **Locate object in Monitor Pro - new window** can be selected.

| Time | Station | Bay |
|-----------------------|---------|--------|
| 09-10-22 09:26:22.394 | NCC 1 | APL |
| 09-10-22 09:26:50.394 | NCC 1 | WIS829 |
| 09-10-22 09:27:20.507 | | |
| 09-10-22 09:27:20.547 | | |
| 09-10-22 09:27:24.012 | | |
| 09-10-22 09:27:30.822 | | |
| 09-10-22 09:27:30.822 | | |
| 09-10-22 09:27:30.832 | | |
| 09-10-22 09:27:33.015 | | |
| 09-10-22 09:27:37.422 | | |

Comment...
 Locate object in DMS
 Locate object in Monitor Pro
 Locate object in Monitor Pro - new window
 Blockings...
 Use as Filter...

Figure 87: Locating object

Locate object in DMS displays the process point according to the logical node and the index (LN and IX) attributes. This function is provided together with DMS 600. For more information, see DMS 600 Operation Manual.

Locate object in Monitor Pro opens a Process Display and zooms into the symbol that presents the same object that produced the row, and marks it with a highlighted symbol.

Locate object in Monitor Pro - new window opens a Process Display in a new window, zooms into the symbol that presents the same object that produced the row, and marks it with a highlighted symbol.

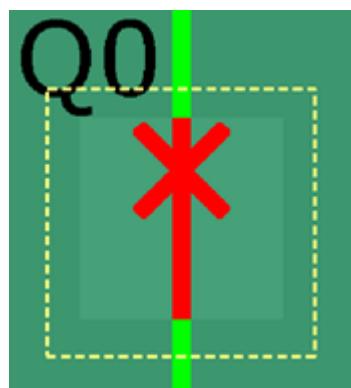


Figure 88: Highlighted symbol

5.2.4 Blocking Signals

Signal blocking states for each signal in the list can be viewed and modified. For more information on blockings see [Section 7.3](#).

Signal blocking state dialog is accessed through a context menu that appears by right-clicking a row, see [Figure 89](#).

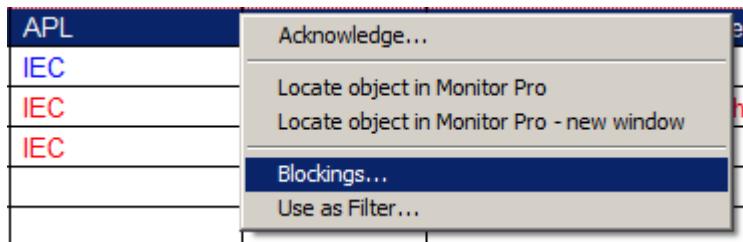


Figure 89: An access to Blockings

Blockings can be set with option buttons, see [Figure 90](#). If some of the blockings are not allowed to a signal, the option button is disabled.

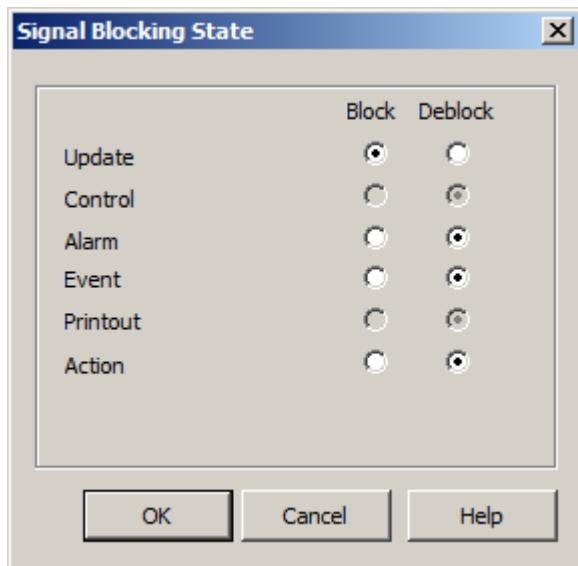


Figure 90: Signal Blocking State dialog

5.2.5 Customizing the column layout

The layout settings can be configured by selecting **Settings/Display Settings.../Layout Settings**. The dialog is shown in [Figure 91](#).

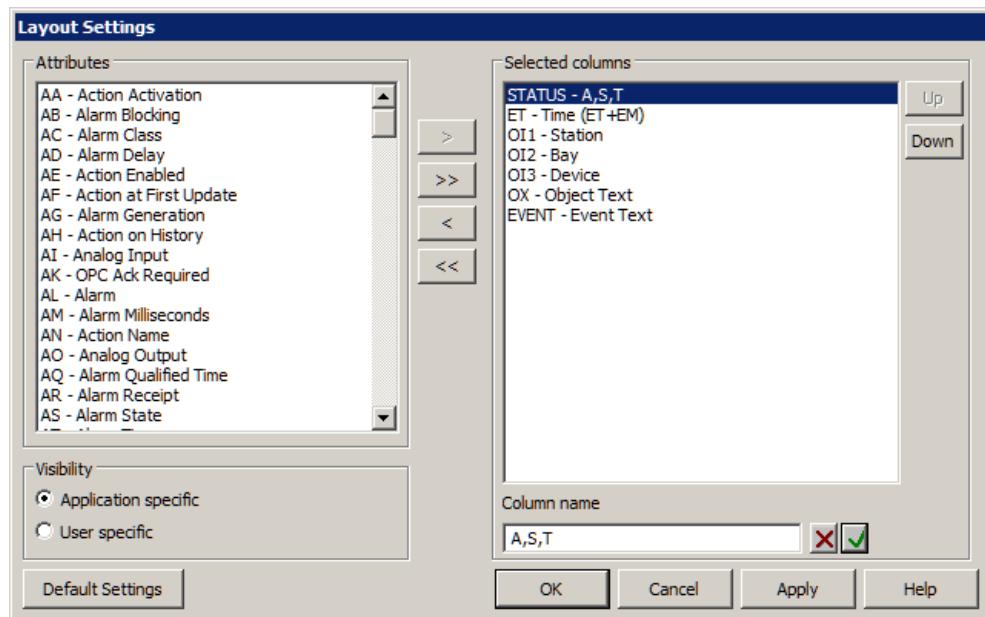


Figure 91: Layout settings

All the available attributes are shown in the **Attributes** box. **Selected Columns** is a list of currently selected columns. Add attributes to **Selected Columns** list by clicking **>**. Clicking **>>** adds all the attributes to **Selected columns** list.

Remove selected attributes from the **Selected Columns** list by clicking **<** or remove all attributes from **Selected columns** list by clicking **<<**.

Change the order of the columns by selecting a column and clicking **Up** or **Down** buttons.

Default Settings restores the settings to an installation defaults for specific display type.

5.2.5.1 Renaming the Columns

The column headers can be defined. Select the column from the list of selected columns. Enter the new name to the column name field and click the icon.

In Event Display, there is a special STATUS column, which is displayed as three consecutive columns in the list. Names for these can be given separated by a comma, as shown in the [Figure 91](#).

5.2.6 Color Settings

It is possible to configure certain events to use different colors in the list display. This improves the possibility to locate certain system events. For example, important events, which cause alarms in the system, can be defined to use the red color in the Event Display. For more information, see SYS600 Application Design.

To use the color settings, the authorization level Control (1) is required. The Color Setting tool is in the read-only mode, if the authorization level is lower than Engineering (2) in the TOOLS authorization group. If the TOOLS authorization group is not found, the authorization group GENERAL is used.

The **Color Settings** dialog is used when the list display is customized with different colors for rows on the list display. The coloring of a row in a list is defined with one or multiple conditions defined in the **Color Settings** dialog, see [Figure 92](#).

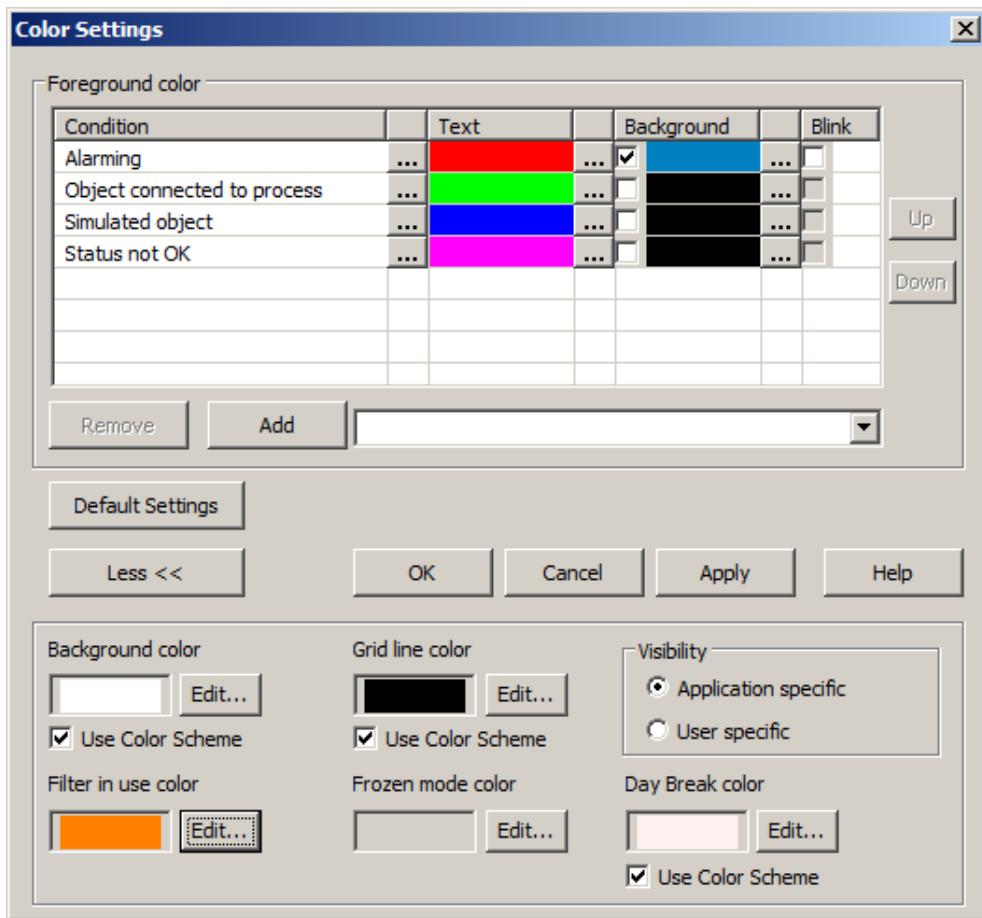


Figure 92: The Color Settings dialog.

To add a new coloring rule to the list, click **Add**. Remove the selected coloring rule from the list by clicking **Remove**. The position of the selected row can be changed by clicking the **Up** or **Down** buttons. Coloring rules are prioritized according to their order in the list and the first rule matching the criteria is used.

The background color of every display can be changed. The Color settings dialog has **Edit** buttons to open the **Color** dialog, where the color selection is done. The selected color is displayed as a colored box.

Default Settings button reverts the color settings.

There are some predefined color rules. A predefined color rule can be added to the list by selecting it from the drop down list and clicking the **Add** button. Unused predefinitions are shown in the drop-down list. When a preconfigure color rule is removed, it is returned to the drop down list.

User Activity Log Display uses Event Display color settings definitions. Only color rules can be defined specific to the User Activity Log Display.

Frozen mode color and Filter in use color are used in markers in the Monitor Pro application window to highlight that the appropriate mode is used.



Figure 93: Frozen mode color

Day Break color is used on event display. When events are sorted by the time column, every other day uses day break color as background color.

5.2.6.1 Color conditions

The condition of when a coloring rule is applied is defined with edit condition dialog. Conditions can be entered either by using conditions rows or by hand in the filter field. The condition is a simple logical expression such as AL = 1 AND AR = 0. Conditions can also contain parenthesis. A name can be given to each condition.

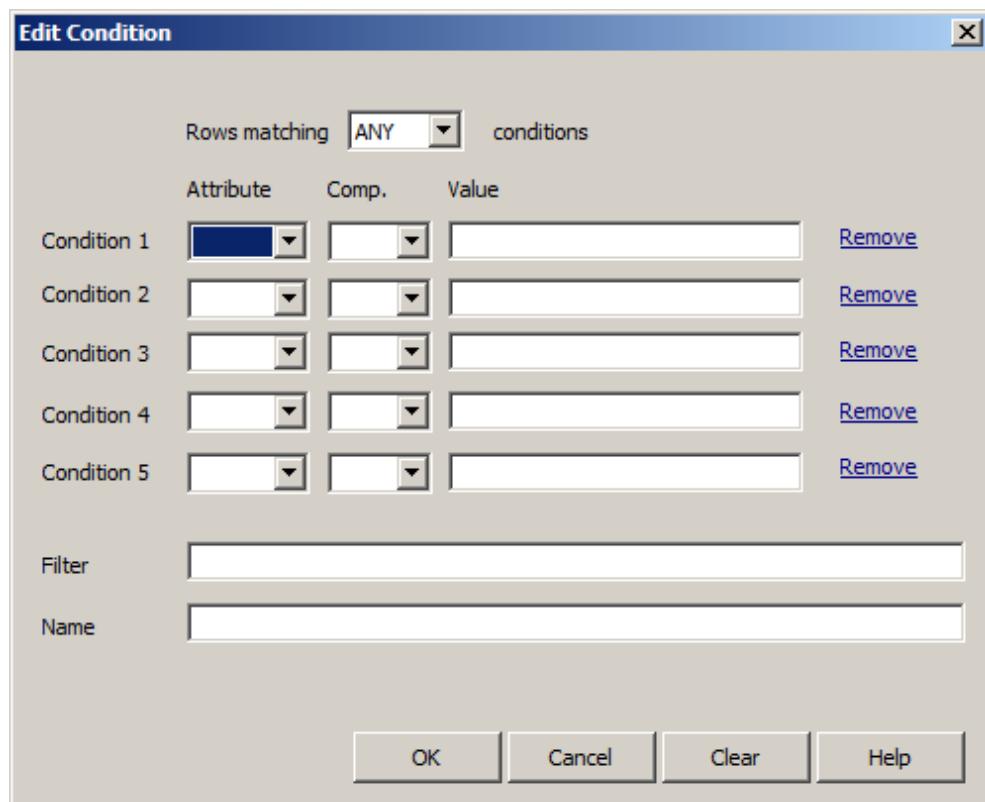


Figure 94: Edit Condition dialog

The available operators for the conditions are described in [Table 6](#).

Table 6: Condition operators

| Operator | Function |
|-----------------------|-----------------------|
| <code>== or =</code> | Equal than |
| <code><</code> | Less than |
| <code>></code> | Greater than |
| <code><=</code> | Less or equal than |
| <code>>=</code> | Greater or equal than |
| <code><></code> | Not equal to |

The **Value** field contains the value that is compared to the selected attribute by using the selected comparison operator. It is possible to use the wildcard characters % and * when defining the value of the **Value** field, but, in that case, the only allowed operators are = and <>. For example, a value 5* means that the first character in the value must be 5 but the rest of the value can contain any number of arbitrary characters. Character % means any character.

5.2.7 Exporting Data

It is possible to save the data shown in event, alarm and blocking lists to a file in CSV format. The separator between the columns is the List Separator character defined in operating systems Regional Settings. If the List Separator is defined to be '.' (full stop), it is replaced with ';' (semicolon) character.

To export data:

1. Select **Export...** from list specific menu. The **Save As** dialog opens.
2. Specify the folder and the file name for CSV export file.
3. Click **Save** button to export the data.

The exported text file contains the header information, the export creation time, and the events data. To open the export file with, for example, Microsoft Excel, select **Format/Cells/Text** in the Category list to display the format correctly.

5.2.8 Indicating Daylight Saving Time

Lists have a setting for Daylight Saving visualization. The setting is accessed via the lists' **General Settings** dialog. If the setting is enabled, lists will indicate Daylight Saving times in each list column having timestamp information. Daylight Saving timestamps are suffixed with '*' (asterisk) character.

5.3 Handling events

Events in SYS600 system are stored in the history database (HDB). There are two types of events: process events and internal events. Process events are events that belong to supervised processes such as indications, protecting events, alarm limits for measurements, tripped breakers, and so on. Internal events are events that indicate disturbances in the supervision system. They are normally initialized by the system.

When an event occurs in the system, it is instantly printed on the event printer and stored in the history database. The history database consists of history database files, of which each contains the events for one day. The files are named according to the date as APL_yymmdd.PHD. For example, the file APL_040630.phd contains the events logged on 30-Jun-2004. The files are stored in the directory /SC/APL/nnn/APL_, where nnn is the name of the application.

5.3.1 Event Display Settings

To configure Event Display settings (see [Figure 95](#)), the authorization level Control is required. The **Settings** dialog is used when customizing the list.

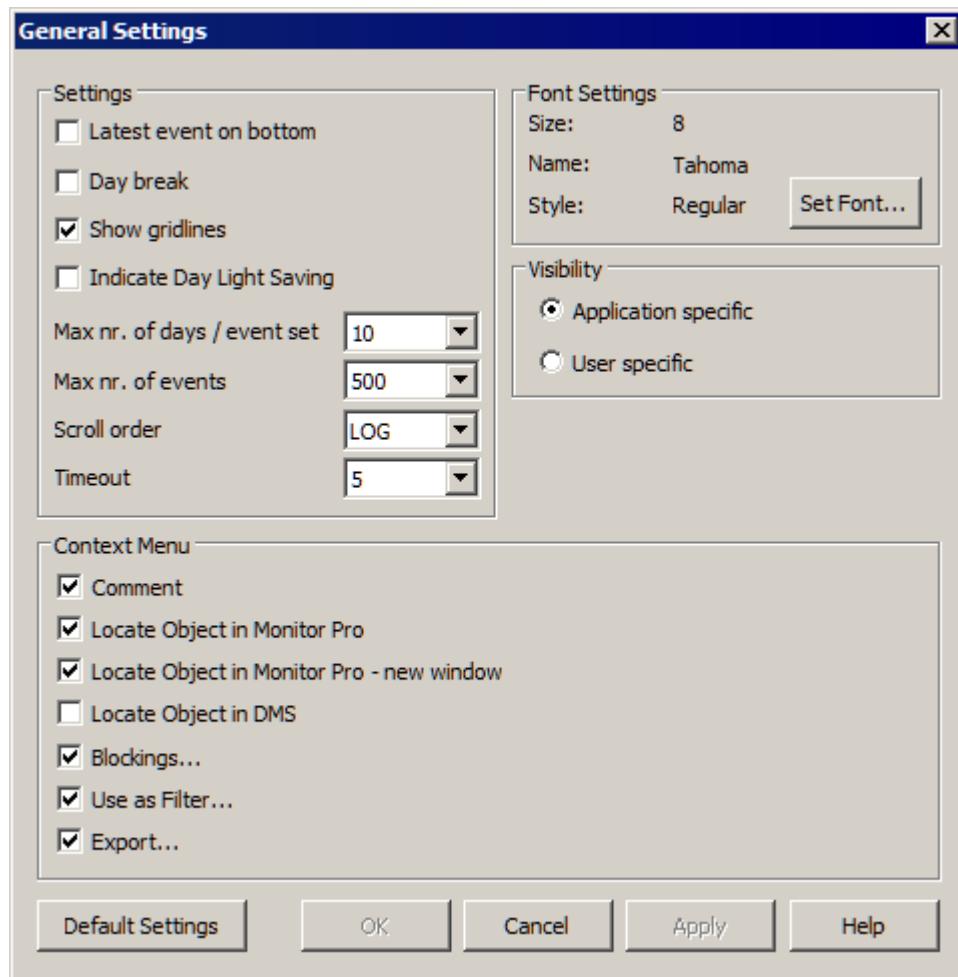


Figure 95: Settings dialog

To configure the Event Display, the following settings can be specified:

- In the **Max nr. of days / event set** drop-down list the maximum number of days that will be included in one event set can be set.
- In the **Max nr. of events** drop-down list the maximum number of events that will be included in one event set can be selected.
- In the **Scroll order** drop-down list the sorting order of the events in the frozen mode can be defined.
- In the **Timeout** drop-down list the maximum amount of time for the history database query can be specified.
- Selecting the **Day break** option the user can define if a light blue background will be presented between the events that have time stamps from different days.
- Selecting the **Latest event on bottom** option the user can specify the location of the latest event on the list.
- Selecting the **Show Grid** lines option shows the gridlines in the events list.
- Under the **Font Settings** the font style and size can be defined.

The following items can be selected to be shown in the **Context Menu**:

- **Comment**
- **Locate object in Monitor Pro**
- **Locate object in Monitor Pro - new window**
- **Locate object in DMS**
- **Blockings...**
- **Use as Filter...**
- **Export...**

Locate object in DMS option is available only if DMS 600 is installed.

The scroll order setting defines the time attribute used in the list. If the setting is LOG the history logging time (HT) is used. If the setting is event, the event time (ET) is used.

5.3.2 Event Comments

Comments can be used for making remarks to events. The comments are available to all Event Display users. Comments can also be removed.

The **Comments** dialog can be opened by right-clicking an event row with or without the comment marker and selecting **Comment** in the context menu. Events with comment markers are shown in [Figure 96](#).

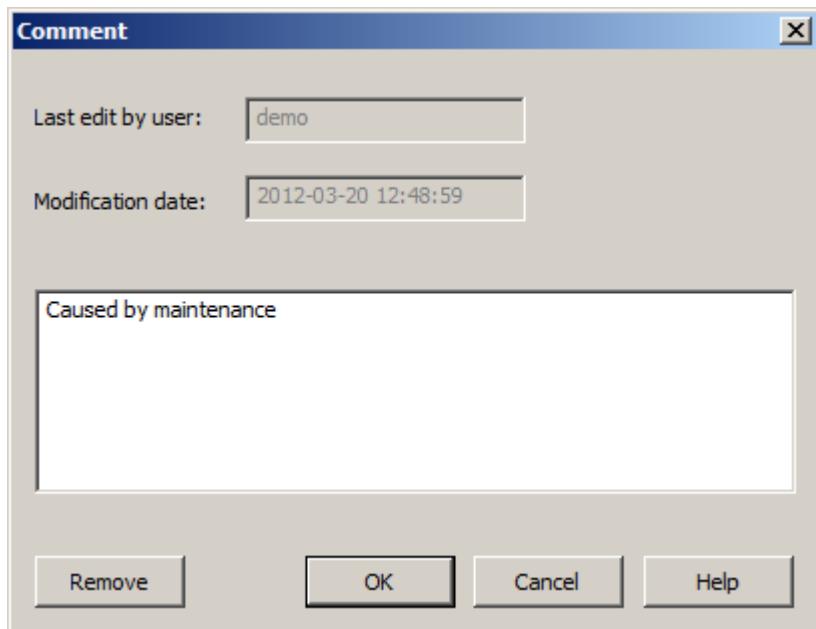


Figure 96: Comments dialog

To add a comment:

1. Open the **Comments** dialog.
2. Write the comment to the dialog and click **OK**.
3. Press Enter after each line. If no comment text is given, no comment mark will be displayed in the Event Display.

Open the **Comment** dialog to read the comment. To remove the comment, click **Remove Comment**. The **Last Edit by User** and **Modification date** fields show the name of the user that last edited the comment, and the time and date of the modification.

The length of the comment is limited. If the comment is too long, the **OK** button is disabled.

Section 6 Alarm Display

The Alarm Display shows a summary of the present alarm situation of the supervised process. Each alarm is normally presented as an alarm text row, which describes the cause of the alarm in the process. With default settings the alarm text row normally has a time stamp, an object identification, an object text and text indicating the alarm status. See [Figure 97](#) for Alarm Display Template 1 and [Figure 98](#) for Alarm Display Template 2.

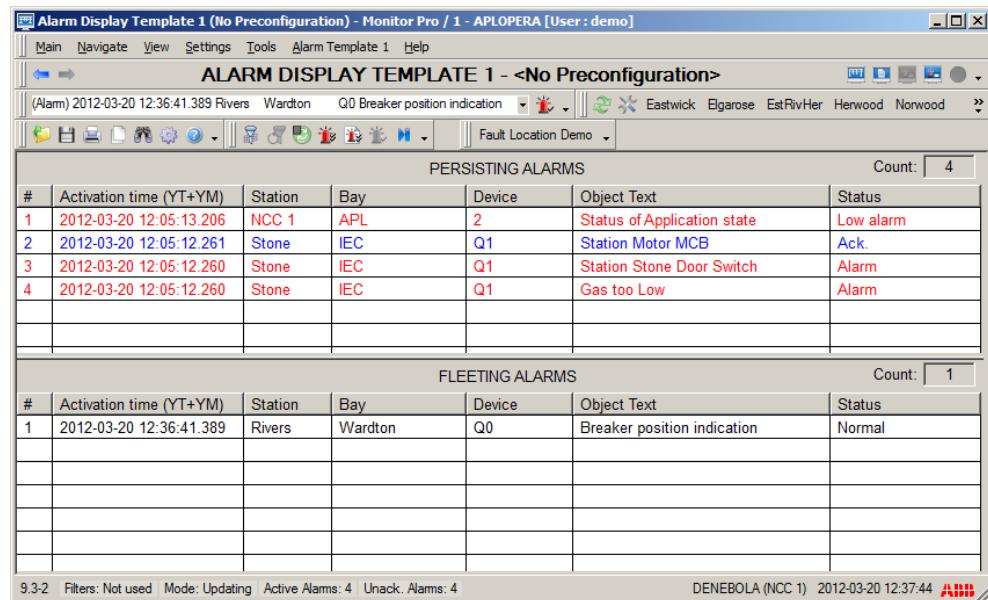


Figure 97: Alarm Display Template 1

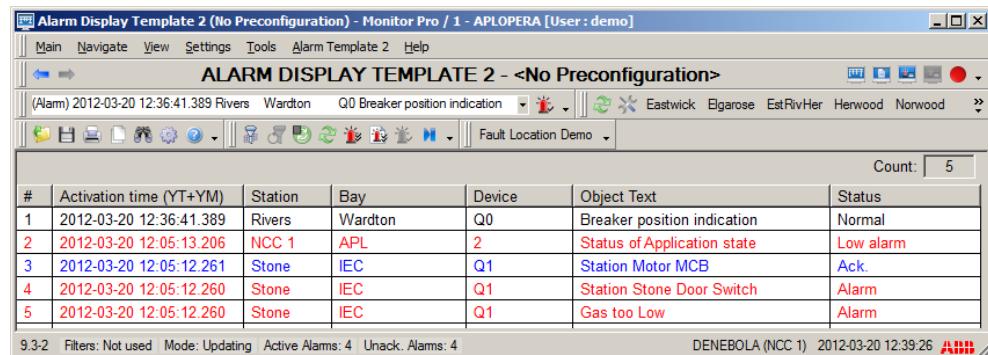


Figure 98: Alarm Display Template 2

The Alarm Display contains the following features and options:

- Two types of Alarm Display templates
- Filters
- Alarm Display setting tool for colors and text layout
- Updating/Frozen modes
- Alarm acknowledgement
- Alarm reset function
- Authorization support
- Help in all dialogs (The complete manual will be opened from Help)
- Visible Alarm Class

- Locate object in DMS
- Locate object in Monitor Pro
- Column sort
- Find

Template 1 and Template 2 also have other features than those described above.

These templates include:

- Fields indicating the number of active and unacknowledged alarms
- A field indicating the use of filters
- A field indicating the current mode
- Alarm count indication on both lists.

The Alarm Display is started by selecting **Navigate/Alarm**. By default, the two templates are included in the **Alarm** menu.

When the filters are defined, only those alarms matching the filter configuration are displayed. When the filter is defined, the text "Filters:Used" is displayed on the Monitor Pro application window. By default, the filters are not used.

An alarm is activated in the following situations:

- An incoming binary signal (BI type process object) changes to an alarming state.
- A double indication (DB type process object) changes to an alarming state, for example a breaker middle state due to a faulty operation.
- An analog measured value (AI type process object) exceeds the alarm limits (the preset upper and lower limits).
- An object is marked faulty by a process device.
- A system error or communication failure occurs.

If the process object has an alarm function and the alarm is not blocked, information on the alarming process object will be displayed in the alarm list.

The **Alarm Display Template 1** and **2** menus contain the following commands:

Filters Opens a dialog, where filters can be selected and edited.

Reset Filter Resets filters back to the default settings.

Keep Updating Sets the Alarm Display to the updating mode. When changing to Alarm Display, the mode is by default set to updating mode if a user is logged in.

Stop Updating Sets the Alarm Display to the frozen mode. When changing to Alarm Display, the mode is by default set to frozen mode if no user is logged in.

Acknowledge...

All Acknowledges all the alarms on the list. A confirmation dialog is opened to confirm the operation.

Page Acknowledges all the alarms on the current pages (both lists). A confirmation dialog is opened to confirm the operation.

Show Info Fields Displays/hides the info fields.

Show Headers Displays/hides the list headers.

Last Alarm Scrolls the list to show the latest alarm and sets the mode to updating.

Export: Exports the current view in CSV file format.

The toolbar provides a shortcut to the commands in the menus. The toolbars in the Alarm Display Template 1 and Alarm Display Template 2 can be modified separately.



Figure 99: Toolbar of Alarm Display

The buttons in the toolbar of Alarm Display are from left to right:

- Show Filters
- Reset Filter
- Switch to Updating or Frozen Mode
- Acknowledge All
- Acknowledge Page
- Acknowledge Selected Alarm
- Go to Last Alarm

Add or remove buttons on the toolbar the same way as in applications in general, refer to [Section 3.4.2](#).

The list can be set to two different modes: frozen and updating. When the list is in the frozen mode, it is not updated, and the alarm information can be read easily. If alarms are changed while the Alarm Display is in the frozen mode, the operator is notified with an informative text on the display area. When in the updating mode, the Alarm Display is updated when alarms are changed. The current mode is indicated in the Monitor Pro application window.

6.1 Alarm rows

Each alarm is presented as a single alarm row.

Different alarm templates list alarms in different states. The states are shown in [Figure 100](#). With default settings, the different states are colored differently. The default colors are the background colors in the figure.

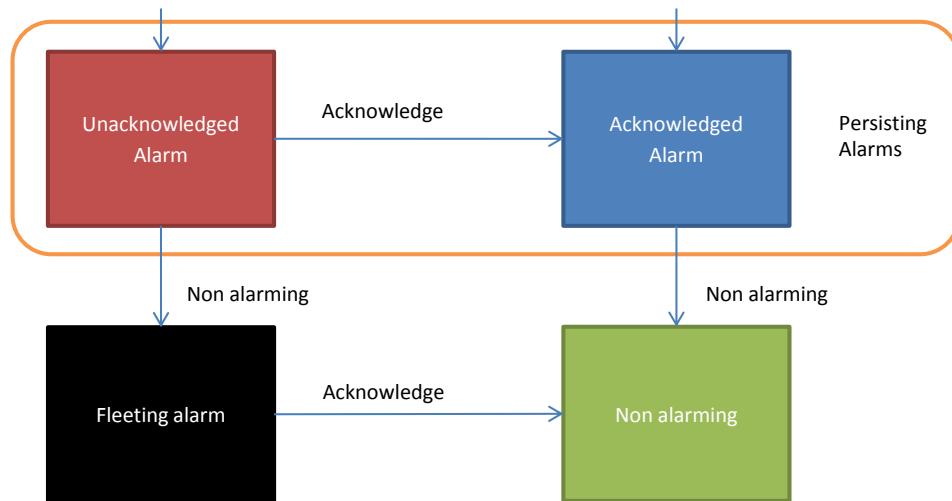


Figure 100: Alarm states

When a new alarm is created, it can either be unacknowledged or already acknowledged. On Template 1, these are shown in the upper list. If a signal leaves the alarming state but the alarm was unacknowledged, the alarm becomes a fleeting alarm. Fleeting alarms are shown on

the lower list on Template 1. When a fleeting alarm is acknowledged, the signal enters non-alarming state. Template 1 does not show non-alarming signals.

On Template 2, unacknowledged, acknowledged, and fleeting alarms are always shown. With default settings, non-alarming signals are shown in the list, if the state of the alarm is changed when the list is visible. When the list is refreshed, the non-alarming signals are removed. If Remove fleeting alarm is set, non-alarming signals are not shown on the list at all.

The values for status column and default colors are explained in [Table 7](#).

Table 7: Default colors and status texts of the alarm types

| Alarm type | Default color | Status text | Explanation |
|---------------------------------------|---------------|--|---|
| Active unacknowledged ¹⁾ | Red | Alarm High alarm ²⁾ Low alarm ²⁾ | An alarm has been reported, but it has not been acknowledged. |
| Active acknowledged ¹⁾ | Blue | Ack High alarm Ack ²⁾ Low alarm Ack ²⁾ | An alarm has been reported, and it has been acknowledged. |
| Inactive unacknowledged ¹⁾ | Black | Normal | The state has been alarming, but it is no longer alarming. |

1) included in persisting alarms

2) shown with analog values

c. included in fleeting alarms

In the Alarm Display Template 2, the inactive acknowledged alarms can also be kept on the list. Due to this, Template 2 functions as a sort of alarm log. The inactive acknowledged alarms are erased from the list when the Alarm Display is closed. The same can be done by selecting **Alarm Display Template 2/Refresh** from the menu.

All alarms are displayed on a single list. A flashing character * indicates all unacknowledged alarms, both active and inactive. Template 2 is presented in [Figure 98](#).

[Table 8](#) provides an explanation for the different alarm types.

Table 8: Alarm types

| Alarm Type | Explanation |
|-------------------------|---|
| Active unacknowledged | An alarm has been reported, but it has not been acknowledged. |
| Active acknowledged | The alarm has been inactivated (the state is normal again). |
| Inactive unacknowledged | The state has been alarming, but it is no longer alarming. |
| Inactive acknowledged | An alarm has been reported, and it has been acknowledged. |

6.2 The Alarm Display User Interface

The alarm display works in the same way as the event display, see [Section 5.2](#). In the alarm display Template 1, there are two separate lists in the display. All configurations on the list affect both of the lists.

6.3 Handling alarms

The process database is the part of the base system where all the registration of incoming and outgoing process data takes place. The process database also supervises the current alarm situation of the various process objects by storing information of process objects with an alarm generating state into a special alarm buffer. The interface for alarm handling is the application process database, which is project specific, but the main functionality of the process database is always the same.

6.3.1 Process alarms

Process alarms are alarms that are related to the supervised process, for example, measurement values exceeding or going below the preset alarm limits, breakers tripping or getting into a faulty position and so on.

6.3.2 Internal alarms

Internal alarms are alarms caused by the network control system itself. Reasons for these alarms contain communication problems between a communication unit and substation, printer device errors, substation getting suspended, and so on. These kinds of erroneous states are detected and converted from internal system messages to alarms by the System Self Supervision function of SYS600.

6.3.3 System alarm

A system alarm is an alarm generated by an external module supervising the Base System. The external module is working as a Watch Dog for the base system and it generates an external alarm if the base system stops. It is not possible to include this alarm in the Alarm Display.

6.3.4 Alarm activation time

An activation time shows the time when the alarm was activated. The Time (AT attribute) and Activation time (YT attribute) columns are the same for active alarms. The column shows the time when the alarm was activated. For fleeting alarms, the Time (AT attribute) column shows the time when the object is changed back to normal state. The Activation time (YT attribute) column shows the time the alarm was activated.

6.3.5 Alarm acknowledgement

An acknowledgement of an alarm is a way to show that the operator has registered and identified the alarm. Generally, acknowledging an alarm does not affect the alarm state. An unacknowledged alarm remains in the alarm buffer until it is acknowledged, even if the alarm state has passed. A required acknowledgement can be set individually for each process object (RC attribute).

6.3.6 Alarm blocking

Alarm blocking blocks a signal in such a way that it cannot generate an alarm. (The same applies to history blocking, printout blocking and action blocking). Since the alarm is blocked, it is not registered in the process database when the process object gets into an alarm generating state. The other types of blocking are history blocking, printout blocking and action blocking.

It is not possible to block features that has not been activated, for example alarms, history, printouts and action features. Alarm blocking is set individually for each process object (AB attribute).

6.3.7 Alarm classes

The term alarm class means that the alarms can be grouped into seven equally significant alarm classes. This feature can be used when the user wants to group alarms caused by process objects with common properties, for example object location. From the base system's point of view, there is no internal priority between the different alarm classes. The alarm classes can also be used when searching alarms from the alarm buffer. By setting the alarm class to 0, the alarm function of a process object is set off. The use of alarm classes is user-defined.

Function and alarm class lists differ from the object lists in that they are not editable. This is to simplify modifications. The number of the selected alarm class refers directly to the alarm class of the alarms to be shown in the Alarm Display. Any combination between these two lists is possible.

6.3.8 Alarm Display Settings

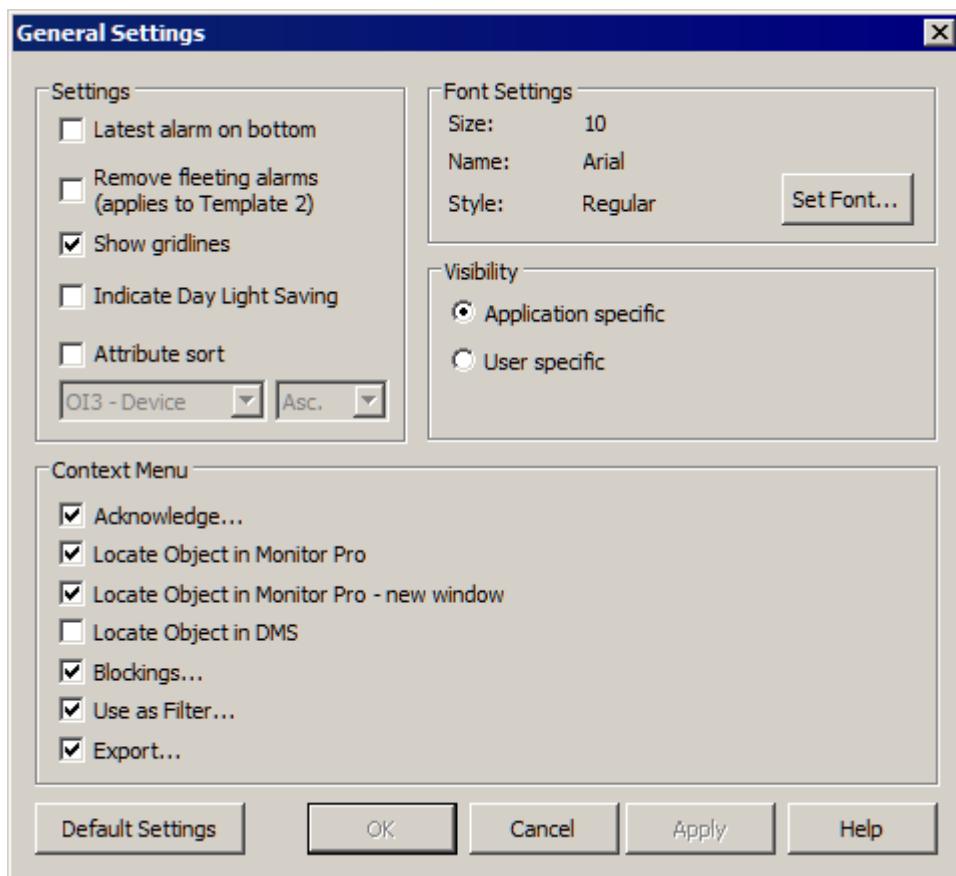


Figure 101: Settings dialog

The **Settings** dialog (see [Figure 101](#)) includes general settings, **Font Settings**, **Visibility** settings and **context menu** settings. The Latest alarm on bottom specifies whether the latest alarm is presented in the Alarm.

Display on the top or at bottom of the list. By default, the latest alarm is on the top. In the font settings the font size, name and style can be specified. The visibility settings include the

options **Application specific** and **User specific**. The following items can be selected to be shown in the **context menu**:

- **Acknowledge...**
- **Locate object in Monitor Pro**
- **Locate object in Monitor Pro - new window**
- **Locate object in DMS**
- **Blockings...**
- **Use as Filter...**
- **Export...**

6.3.9 Acknowledging alarms

6.3.9.1 Alarm row

Acknowledge a single alarm by selecting the alarm from the dropdown list, see [Figure 102](#).



Figure 102: Latest Alarms dialog

If the selected alarm is unacknowledged, the Acknowledgement dialog in [Figure 103](#) can be opened by clicking the **Acknowledge Selected Alarm** button on the right-hand side of the Alarm Row.

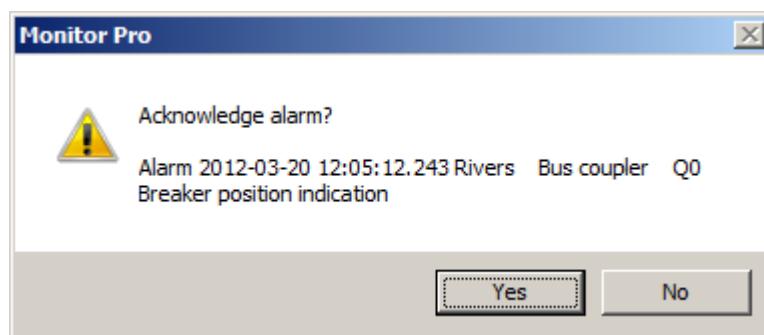


Figure 103: Acknowledge alarm dialog

In the dialog, the alarm text row (except for the status text) is shown to ensure that the right alarm is acknowledged. If **Yes** is clicked, the alarm will be acknowledged, the dialog closed, and the Alarm Display will be updated. Clicking **No** closes the dialog.

6.3.9.2 Alarm list

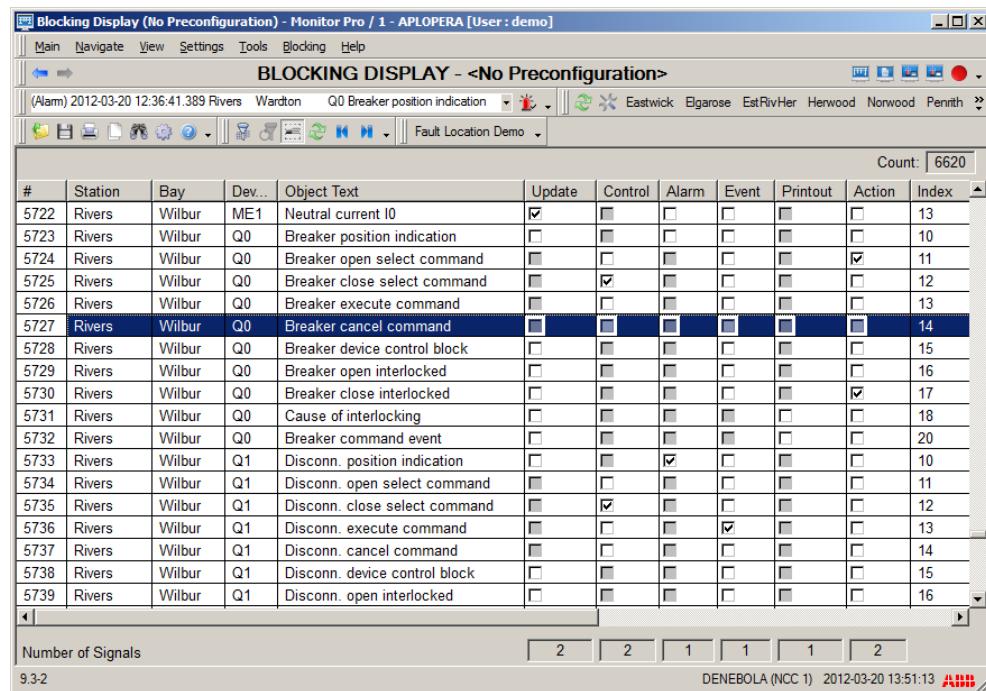
In the Alarm List, it is possible to **Acknowledge All** or **Acknowledge Page** from the corresponding toolbar or menu option. It is also possible to select the alarms to be acknowledged from the list by doing the following:

Press CTRL and click the alarms in the list to pick several alarms. Press SHIFT and click two rows on the list to select an area. When the alarms are selected, they can be acknowledged either from the context menu (right-click) or by using menu or toolbar option **Acknowledge Selected Alarm**.

A single alarm can be acknowledged by double-clicking the alarm in the list.

Section 7 Blocking Display

The Blocking Display summarizes the present blocking situation of signals in the supervised process. Each signal is presented as a signal row, which describes the signal in the process. The signal text row normally consists of a signal text and a group of check boxes indicating the blocking state. [Figure 104](#) shows the Blocking Display main view.



The screenshot shows the 'BLOCKING DISPLAY - <No Preconfiguration>' window. At the top, there's a menu bar with Main, Navigate, View, Settings, Tools, Blocking, and Help. Below the menu is a toolbar with icons for zoom, search, and other functions. The main area is a table titled 'BLOCKING DISPLAY' with the following columns: #, Station, Bay, Dev..., Object Text, Update, Control, Alarm, Event, Printout, Action, and Index. The table lists various signals from station Rivers and bay Wilbur, such as ME1 Neutral current I0, Q0 Breaker position indication, and Q0 Breaker open select command. Each row contains a set of checkboxes for each of the ten columns. The bottom of the window shows a summary of the number of signals and the date and time (DENEBOLA (NCC 1) 2012-03-20 13:51:13).

| # | Station | Bay | Dev... | Object Text | Update | Control | Alarm | Event | Printout | Action | Index |
|------|---------|--------|--------|-------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------|
| 5722 | Rivers | Wilbur | ME1 | Neutral current I0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13 |
| 5723 | Rivers | Wilbur | Q0 | Breaker position indication | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 |
| 5724 | Rivers | Wilbur | Q0 | Breaker open select command | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 11 |
| 5725 | Rivers | Wilbur | Q0 | Breaker close select command | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 12 |
| 5726 | Rivers | Wilbur | Q0 | Breaker execute command | <input type="checkbox"/> | 13 |
| 5727 | Rivers | Wilbur | Q0 | Breaker cancel command | <input checked="" type="checkbox"/> | 14 |
| 5728 | Rivers | Wilbur | Q0 | Breaker device control block | <input type="checkbox"/> | 15 |
| 5729 | Rivers | Wilbur | Q0 | Breaker open interlocked | <input type="checkbox"/> | 16 |
| 5730 | Rivers | Wilbur | Q0 | Breaker close interlocked | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 17 |
| 5731 | Rivers | Wilbur | Q0 | Cause of interlocking | <input type="checkbox"/> | 18 |
| 5732 | Rivers | Wilbur | Q0 | Breaker command event | <input type="checkbox"/> | 20 |
| 5733 | Rivers | Wilbur | Q1 | Disconn. position indication | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 |
| 5734 | Rivers | Wilbur | Q1 | Disconn. open select command | <input type="checkbox"/> | 11 |
| 5735 | Rivers | Wilbur | Q1 | Disconn. close select command | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 12 |
| 5736 | Rivers | Wilbur | Q1 | Disconn. execute command | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13 |
| 5737 | Rivers | Wilbur | Q1 | Disconn. cancel command | <input type="checkbox"/> | 14 |
| 5738 | Rivers | Wilbur | Q1 | Disconn. device control block | <input type="checkbox"/> | 15 |
| 5739 | Rivers | Wilbur | Q1 | Disconn. open interlocked | <input type="checkbox"/> | 16 |

Figure 104: The Blocking Display main view

The Blocking Display contains the following features and options:

- Selection of signal(s) for blocking/deblocking
- Blocking Display setting tool for the view layout
- Printout of blocking situation
- Event and printout enabling/disabling
- Authorization support
- Possibility to copy contents on the clipboard of the operating system
- Help in all dialogs (the complete Operation Manual will be opened)
- Locate object in DMS
- Locate object in Monitor Pro
- Column sort
- Find

The Blocking Display can be started by selecting **Navigate/Blocking** (see [Figure 105](#)).

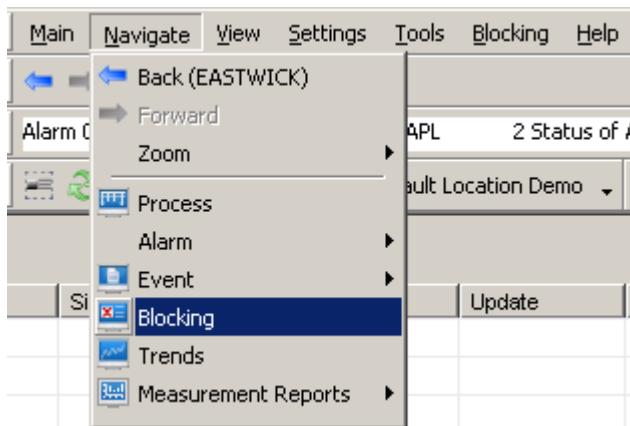


Figure 105: Starting the Blocking Display

All the tools can be used either by clicking the shortcuts on the toolbar or by selecting the corresponding items in the **Blocking** menu.

The **Blocking** menu contains the following commands:

Filters: Opens a Filter Settings dialog, where filters can be selected and edited.

Reset Filter: Resets filters.

Refresh: Updates the blocking information.

Show All Signals: Loads all signals to the display despite of their blocking status.

Show Info Fields: Displays/hides the info fields.

Show Headers: Displays/hides the list headers.

First Blocking: Shows the first blocking.

Last Blocking: Shows the last blocking.

Export: Exports the current view in CSV file format.

The toolbar is a shortcut that can be used in parallel with the drop-down menu.



Figure 106: Toolbar of the Blocking Display

The buttons in the toolbar from left to right are:

- Filters
- Reset Filters
- Show All Signals
- Refresh
- First Blocking
- Last Blocking

7.1

Blocking Rows

There are six different types of blockings: alarm, update, control, event, printout, and action blocking. Each blocking type has a condition that is defined when the particular blocking can

be used. Alarm blocking can be done only if the signal has a defined alarm class. Update blocking is only applicable for input signals and control blocking is only applicable for output signals. Event blocking can be done if events are enabled for the signal. Printout blocking can be used if the signal has a printer defined. Action blocking is available if actions are enabled for the signal. Different blocking types are described in [Table 9](#).

Table 9: Blocking types and their attribute values

| Blocking type | Header in printout | Attribute values | Condition |
|------------------|--------------------|------------------|---------------|
| Alarm blocked | AB | AB = 1 | AC > 0 |
| Update blocked | UB | UB = 1 | Input signal |
| Control blocked | CB | UB = 1 | Output signal |
| Event blocked | EB | HB = 1 | HE = 1 |
| Printout blocked | PB | PB = 1 | LD > 0 |
| Action blocked | XB | XB = 1 | AE = 1 |

7.2 The Blocking Display User Interface

The blocking display works in the same way as the event display. See [Section 5.2](#). By default, the list contains only signals that are blocked. By selecting **Blocking/All Signals** all the signals can be seen.

7.3 Handling Blockings

The SYS600 provides a wide range of blocking attributes, which are included in the Blocking Display. To provide a blocking handling mechanism in a more clear and rational way, the following blocking types are provided by the Blocking Display:

Alarm blocking: alarms are not raised, regardless of the object state.

Update blocking: indications are not updated by the process.

Control blocking: operation commands are not sent to the process.

Event blocking: event registrations are not made, events are not shown in the Event Display.

Printout blocking: events are not sent to the printer.

Action blocking: event channel activation is blocked.

The blocking activity must be expanded to the signal level. The reason for this is that, for example, in case of an oscillating signal, the user must be able to block it but leave the other signals (related to the device in question) unblocked to minimize the information loss. Blocking is possible either by setting the blocking state for each signal presented on the list or by fetching any signal from the database and setting its blocking.

When a signal is update-deblocked, its state in the database is not necessarily up to date, since the state of the process device may have changed while the signal has been update-blocked. Therefore, the state of each signal must be updated from the process when the signal is update-deblocked.

Blocking Display is not automatically updated when a blocking signal has changed. A Refresh function is provided to enable updating of the blocking information. The Blocking Display is refreshed by selecting **Blocking/Refresh** or by clicking the appropriate toolbar button.

7.3.1 Setting signal blocking state

The blocking state of the signal can be set by clicking the selection box for the signal in question. Since a signal can be either of indication or of control type, the selection boxes corresponding to either one of the blocking types is unset and unavailable, depending on the signal.

An alternative way to set the blocking states for the signals is to use the copy-paste function. The selected signal's blocking states are copied by pressing CTRL-C and the blocking states can be set to another signal by pressing CTRL-V. Multiple signals can be blocked or deblocked by selecting multiple rows and selection **Block/Deblock** from the context menu.



If all the blockings are deblocked, the signal will be removed from the Blocking Display after next view refresh. If a non-internal signal is in the update-deblocked mode and it is connected to a process, its state will be updated.

7.3.2 Blocking Display Settings

The settings part of the Blocking Display functions consists of two main parts: view and event/printout settings. The user can concentrate on one or more blocking types by excluding the other blocking types from the list with the view part of the Blocking Display Settings dialog (shown in [Figure 107](#)).

There are settings for enabling event generation and printout on a change of blocking. Events and printouts are enabled/disabled regardless of the attributes (HE and PB) of the target signal.

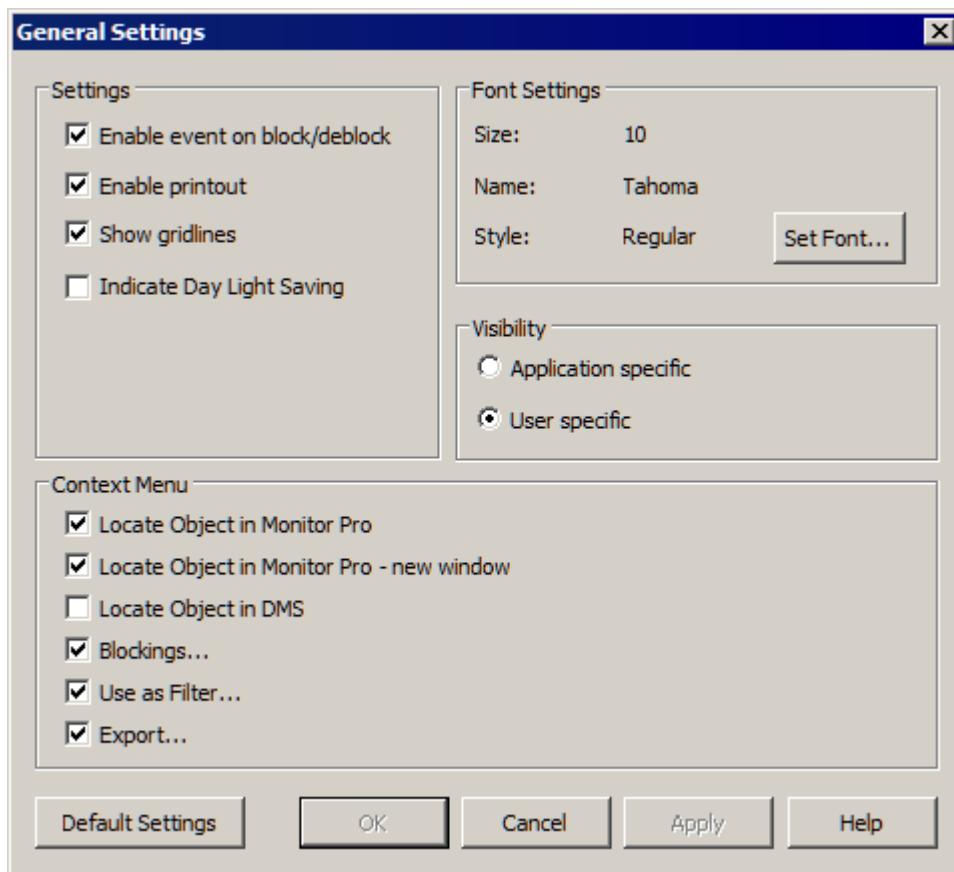


Figure 107: The Blocking Display General Settings dialog

Section 8 User Activity Log Display

With the User Activity Log Display the information about all user activity related events can be monitored and analyzed. Typical user activity related events are user login and logout events.

| # | Event ID | Time | Event Text | User | Severity | Source |
|----|----------|-------------------------|--------------------------------------|------|----------|--------|
| 21 | 1220 | 2014-01-30 12:44:37.938 | Log-out by user inactivity (timeout) | demo | 0 | MAIN |
| 20 | 1110 | 2014-01-29 16:07:43.005 | Log-in successful | demo | 0 | MAIN |
| 19 | 1220 | 2014-01-29 15:28:00.027 | Log-out by user inactivity (timeout) | demo | 0 | MAIN |
| 18 | 1110 | 2014-01-29 15:01:22.721 | Log-in successful | demo | 0 | MAIN |
| 17 | 1210 | 2014-01-29 14:33:55.557 | Log-out (user logged out) | demo | 0 | MAIN |
| 16 | 1110 | 2014-01-29 12:21:46.017 | Log-in successful | demo | 0 | MAIN |
| 15 | 1210 | 2014-01-29 12:17:35.314 | Log-out (user logged out) | demo | 0 | MAIN |
| 14 | 1110 | 2014-01-29 11:10:46.378 | Log-in successful | demo | 0 | MAIN |
| 13 | 1110 | 2014-01-22 12:29:48.225 | Log-in successful | demo | 0 | MAIN |
| 12 | 1210 | 2014-01-22 12:25:09.666 | Log-out (user logged out) | demo | 0 | MAIN |
| 11 | 1110 | 2014-01-22 12:24:49.542 | Log-in successful | demo | 0 | MAIN |
| 10 | 1210 | 2014-01-22 12:19:14.843 | Log-out (user logged out) | demo | 0 | MAIN |
| 9 | 1210 | 2014-01-22 12:18:23.666 | Log-out (user logged out) | demo | 0 | MAIN |
| 8 | 1110 | 2014-01-22 12:17:48.005 | Log-in successful | demo | 0 | MAIN |
| 7 | 1110 | 2014-01-22 12:10:15.835 | Log-in successful | demo | 0 | MAIN |
| 6 | 1210 | 2014-01-22 12:05:28.607 | Log-out (user logged out) | demo | 0 | MAIN |
| 5 | 1110 | 2014-01-22 12:05:15.160 | Log-in successful | demo | 0 | MAIN |
| 4 | 1210 | 2014-01-22 12:05:08.078 | Log-out (user logged out) | demo | 0 | MAIN |
| 3 | 1110 | 2014-01-22 12:04:59.123 | Log-in successful | demo | 0 | MAIN |
| 2 | 1210 | 2014-01-22 12:01:37.578 | Log-out (user logged out) | demo | 0 | MAIN |

Figure 108: The User Activity Log Display main view

Each user activity event is one row in the display. With default settings, User Activity Log Display rows consist of event identifier, a time stamp, event text, user name, severity of the event and the source application of the event.

The User Activity Log Display contains the following features and options:

- Configurable layout: columns, fonts, toolbars, coloring, and so on
- Configurable coloring of user activity events
- Configurable mode for presenting latest event at top/bottom
- Easy navigation through scrolling, go to date, time filters, and so on
- Extensive filtering that can be stored and easily called up later using preconfigurations
- Find
- Sorting by column
- Printouts

The User Activity Log Display is accessed by selecting **Navigate/User Activity Log**.

The **User Activity Log** menu contains the following commands:

Filters Opens a **Filter Settings** dialog, where filters can be selected and edited.

Reset Filter: Resets filters.

Refresh: Updates the User Activity Log information.

Show Info Fields: Displays/hides the info fields.

Show Headers: Displays/hides the list headers.

Go to First: Shows the first user activity event.

Go to Last: Shows the last user activity event.

Select Day: Opens a Day select dialog.

Export: Exports the current view into CSV file format.

The toolbar is a shortcut that can be used in parallel with the drop-down menu.



Figure 109: User Activity Log Display toolbar

The buttons in the toolbar from left to right are:

- Show Filters
- Reset Filter
- Refresh User Activity Log
- Go to First User activity
- Go to Last User activity
- Go to Selected Day

The toolbar buttons can be added or removed in the same way as in applications in general, see [Section 3.4.2](#).

The User Activity Log Display is not automatically updated when new user activity events occur in the application. New user activity events can be fetched by Refreshing the display or by pressing F5.

Section 9 Trends Display

The Trends Display is used for trend analyses and for showing measured values in the form of a curve or a table.

A trend is a time related follow-up of process data. All types of process objects, for example in and out data and binary, analog and digital data can be illustrated as trends.

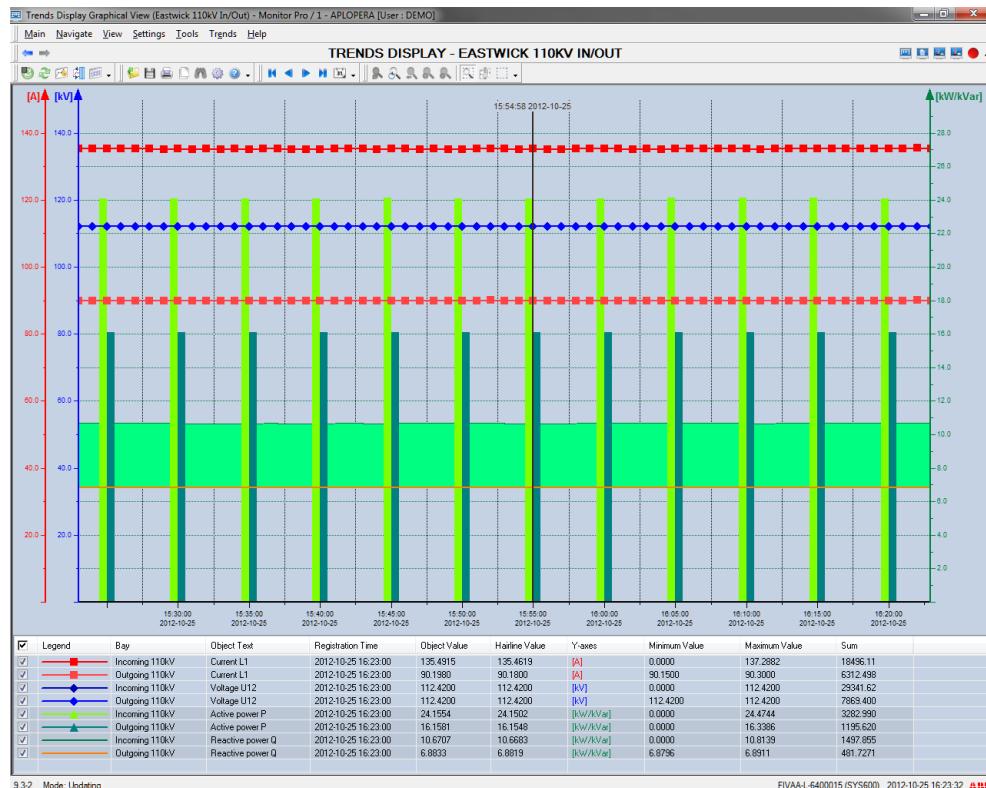


Figure 110: The Trends Display

The Trends Display contains the following features:

- Graphical or tabular view
- Zooming mode
- Scrolling with scroll bars and panning
- Configurable axes and line properties
- Using legend
- Using hairline
- Update interval options from 10 seconds to 10 minutes
- Calculation formulas; direct, mean, sum, integral and difference
- Clearing trend data by the user
- Save, Open and Delete preconfigurations
- Printout option
- Update/Frozen modes
- Authorization support
- Copy to clipboard
- Export to CSV file

Trend display configuration includes a set of parameters such as colors, fonts, and so on, which are called trend preconfigurations. For more information on preconfigurations, see [Section 9.6](#).

9.1 Starting Trends Display

The Trends Display can be started by selecting **Navigate/Trends**(see [Figure 111](#)).

To open the basic Trends Display, select **Navigate/Trends/No Preconfiguration**. For more information about saving the preconfiguration, see [Section 9.6](#).

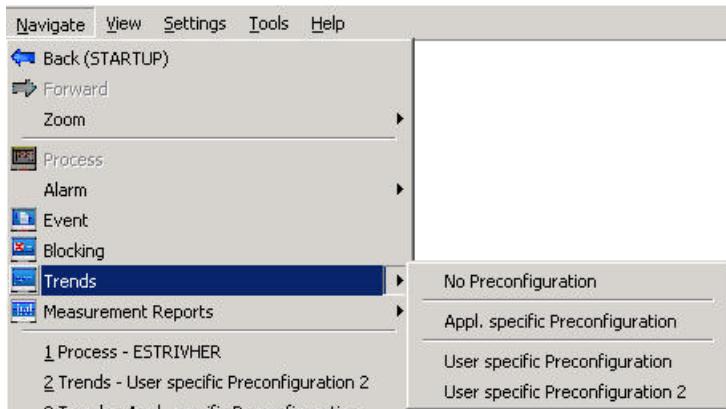


Figure 111: Trends navigation menu

9.2 The Trend Basket

The Trend Basket is a link between the process data and the Trend display. With the **Trend Basket** dialog the user can select data from the process database to be logged and shown in the Trend display.

The **Trend Basket** dialog can be opened by selecting **Trends/Trend Basket**, or by clicking the corresponding button  in the toolbar. The **Trend Basket** dialog lists the system objects and lets the user pick the objects to be shown in the trend.

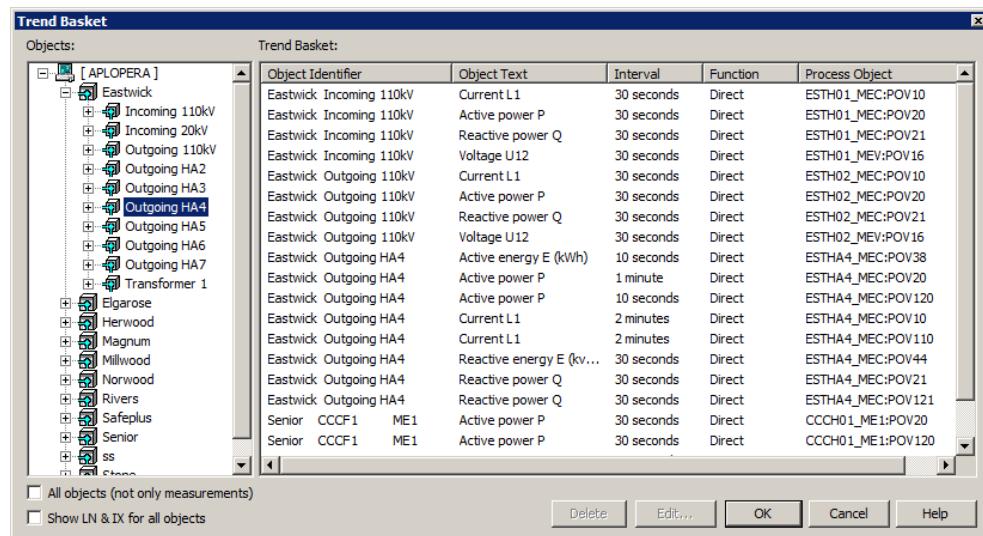


Figure 112: The Trend Basket dialog

By default, only measurement objects are shown. If the **All Objects (not only measurements)** option is selected, the Trend Basket object tree displays all the objects from the process database.

9.2.1 Add and remove Trends

The available objects are presented on the left side of the dialog. In the object tree's lowest level objects which will be included into the Trend Basket list can be selected one at a time.

There are three ways to add objects to the Trend Basket from the object list:

1. right-click the object and select the **Add to Trend Basket** command from the **context menu**. Added objects are shown on the right side in the Trend Basket.
2. drag an object from the available object list and drop it into the Trend Basket list on the right side.
3. double-click the object to add it to the Trend Basket list.

To remove selected object from the Trend Basket:

1. right-click the object in the Trend Basket list and select **Remove Log** from the **context menu**.
2. press the **Delete** key from the keyboard.
3. click **Delete** button in the dialog.



Check from the **Show/Hide Trend curves** dialog that the related trend items are included in the active preconfiguration.

9.2.2 Trend settings

The **Trend Basket** dialog will also be used to configure individual trend parameters. The **Trend Setting** dialog for the selected trend can be opened by double-clicking an object, selecting the corresponding **Log Settings...** item from the context menu or by clicking the **Edit...** button.

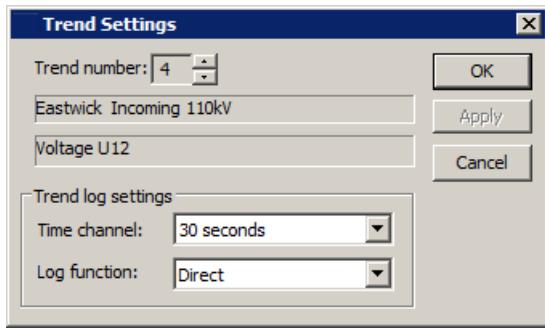


Figure 113: The Trend Settings dialog

The following Trend properties can be changed:

- Time channel (10, 30 seconds; 1, 2, 5 or 10 minutes)
- Logging function (Direct, Sum, Mean, Integral or Difference), see [Table 10](#).



Change the Log function will cause the lost of all existing data for the selected Trend.

Table 10: Log functions

| | | Log function | | | | |
|----------|------|--------------|-----|------|----------|------------|
| Log time | Data | Direct | Sum | Mean | Integral | Difference |
| T-1 | 0 | 0 | 0 | 0 | 0 | 0 |
| T0 | 1 | 1 | 1 | 1 | 0 | 1 |
| T+1 min | 2 | 2 | 3 | 1.5 | 60 | 1 |
| T+2 min | 3 | 3 | 6 | 2 | 180 | 1 |
| T+3 min | 5 | 5 | 10 | 2.75 | 360 | 2 |
| T+4 min | 4 | 4 | 14 | 3 | 660 | -1 |

9.2.3 Clearing Trend data

Clearing the Trend data for the selected Trend can be done by right-clicking an item in the Trend Basket and selecting **Clear log data** from the **context menu**, or by clicking the

corresponding button  from the Trends tabular view toolbar.



Access to this functionality requires at least ENGINEERING level (2) access rights. Otherwise, the appropriate functions are unavailable.

9.3 The user interface

The Trend data can be presented in a tabular or in a graphical view. These two views share the same Trend database.

Both views also share some of the toolbars and the Trends Display menu.

9.3.1 Trends Display toolbars

The Trends Display has four toolbars. Three are used for both views and one dedicated for the graphical view.

When the Trends Display is started for the first time, all the three toolbars are visible. Show or hide the toolbars by selecting **Settings/Customize**. Add or remove buttons on the toolbars the same way as described in [Section 3.4.2](#).



Figure 114: Main toolbar

Table 11: Main toolbar functions

| Function | Description |
|------------------------------|--|
| Open Preconfiguration | Opens the Open Preconfiguration dialog. |
| Save Preconfiguration | Opens the Save Preconfiguration dialog. |
| Print | Prints the selected report to a network printer or a specified output file. |
| Copy to Clipboard | Copies the selected visible trend data to the operating system clipboard. |
| Find | This function is disabled for the Trends display. |
| Display Settings | Opens a sub-menu with the following items: <ul style="list-style-type: none"> • General Legend Settings... • Graph Settings... • Legend layout Settings... |
| Help | Opens the Help dialog |

The Trends Display toolbar buttons and drop-down lists from left to right are as follows:

- Switch updating/frozen mode
- Refresh
- Open Trend Basket
- Show or hide trend curves
- Switch tabular/graphical view



Figure 115: Display toolbar

Table 12: Display toolbar functions

| Function | Description |
|---|--|
| Switch between updating and frozen mode |  indicates the update mode as active mode. Clicking this button will change to the frozen mode.  indicates the frozen mode as active mode. Clicking this button will change to the update mode. |
| Refresh | Forces a display refresh. |
| Show/hide trend curves | Open the Show/Hide dialog, where the user can select which curves to show in the current view. |
| Switch tabular/graphical view |  The graphical view is active. Clicking this button will change to the tabular view.  The tabular view is active. Clicking this button will change to the graphical view. |

9.3.2 Trends Display menus

The toolbar commands can also be selected from the Trends menu (see [Figure 116](#) and [Figure 117](#)). Some of the menu items are active for graphical view only.

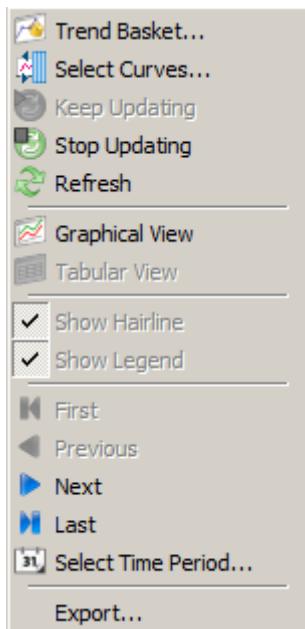


Figure 116: Trends Display menu for tabular view

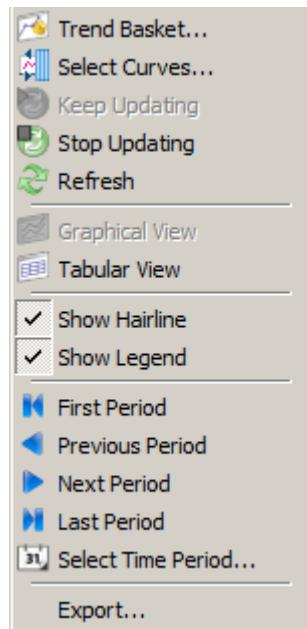


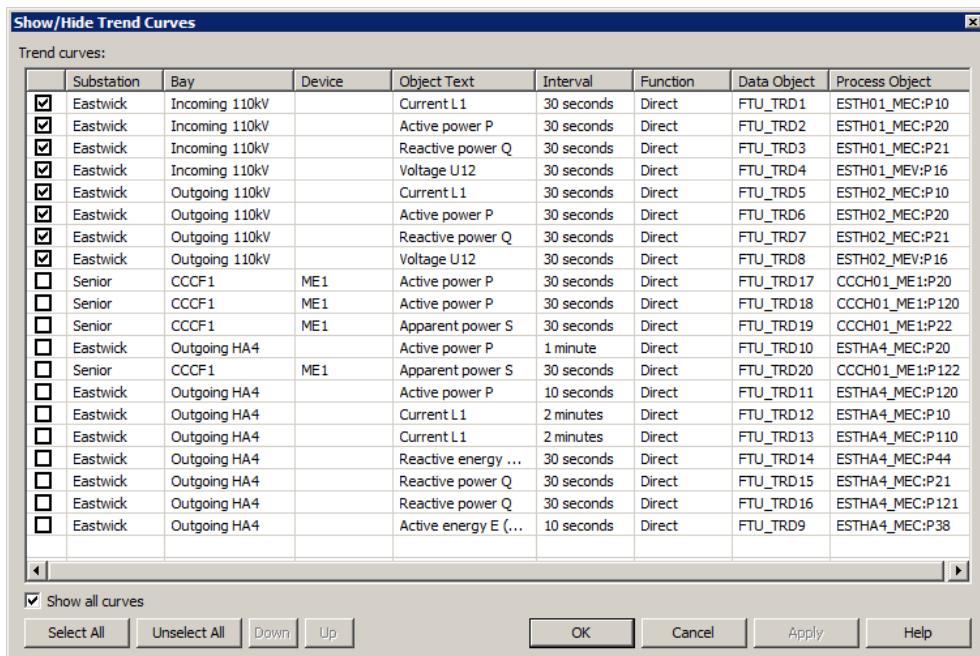
Figure 117: Trends Display menu for graphical view

In addition to the toolbars the following functions are available from the menu:

- Show/Hide Hairline
- Show/Hide Legend
- Export...

9.3.3 Using Trend curves

Show and hide the trend curves by selecting **Trends/Select Curves**, or by clicking the corresponding button  in the Trends Display toolbar. The **Show/Hide Trend curves** dialog displays the items the Trend Basket contains. These items can be included in or excluded from the selected preconfiguration by selecting or clearing the corresponding checkbox. It is also possible to select all or clear all of the items by using the appropriate commands from the context menu, or by using the command buttons.

*Figure 118: Show/Hide Trend Curves dialog*

By default, all the added items in the Trend Basket are automatically included and displayed in the trend curves as well. View the detailed information about the trended items in preconfiguration in the **Show/Hide Trend curves** dialog.

With the **Show All Curves** check-box all Trend curves not used for the selected preconfiguration can be hidden.

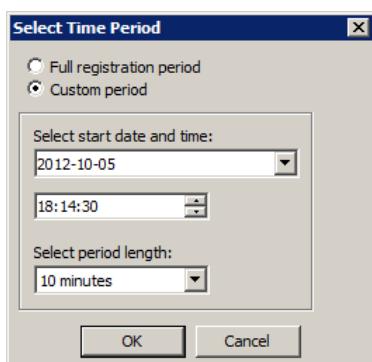
To change the Trend curve position within the preconfiguration, select one curve and use the corresponding **Down** or **Up** button. This will also change the position in the curve legend. After changing the position, the preconfiguration must be saved to keep the position change.



Up to 20 Trend curves can be viewed for the graphical and tabular view.

9.3.4 Time range

The time period used in tabular and graphical view can be changed with the **Select Time Period** dialog, which can be opened from the **navigation toolbar**

*Figure 119: Select Time Period dialog*

By default, the Full registration period is applied. This means that all the samples are shown on the graphical view, and the accuracy of the registration time is scaled accordingly. When Custom period is selected, it is possible to select a start date and time for the detailed information. The first registration time is shown on the X axis. Additionally, the length of the period is defined to one of the following alternatives: 30 days, 5 days, 1 day, 1 hour, 10 minutes or 1 minute.

9.4 Graphical view

In the graphical view, up to twenty measurements can be presented on a two-dimensional coordinate system that consists of a horizontal time (X) axis and a vertical value (Y) axis. The curves can be panned both in the X and Y directions and the parameters of the Y axis can be changed. All the curves can be hidden from the view with the dialog.

The horizontal (X) axis of the graphical view represents the registration time of the measurement, and the vertical (Y) axis represents the value of the measurement. The X axis is divided into intervals specific to the selected time range. The time of every interval point is labeled below the X axis. The amount of the shown interval points depends on the zooming level.

The Y axis is automatically divided into intervals according to the registered values. Note that the graphical view does not recognize any units or scales, only the values registered in the trends database.

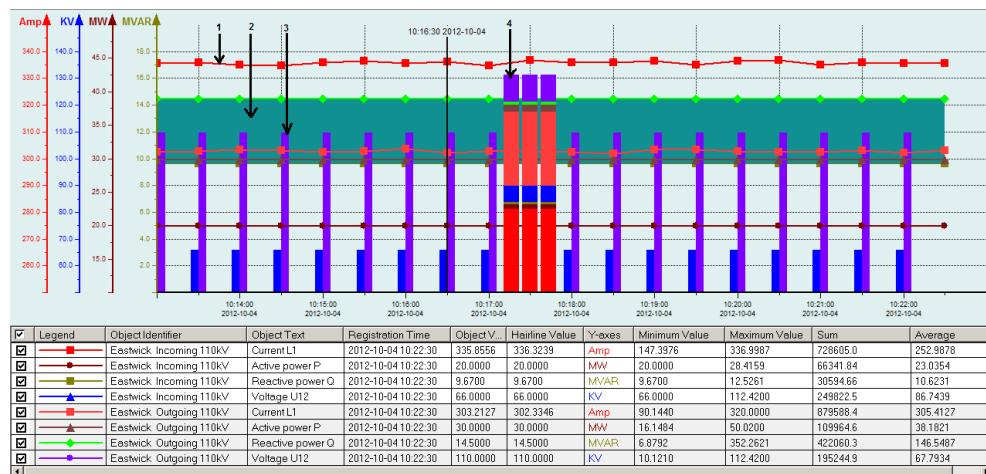


Figure 120: Graphical view of Trends

The graphical view has the following functional areas:

- The plot area where the trended data will be shown.
- The legend area shows selected curve properties, hairline values and summary information.

For the plot area, the following curve types can be chosen:

1. Plot (default)
2. Area (fills the area between two selected curves or between a curve and the X or Y axis)
3. Bar or group of bars
4. Stacked bar

The curve type can be configured with the dialog.



Not all data are always available for the curve type Bar and Stacked bar. The amount of displayed bars or groups of bars depends on the zooming level.

The legend position can be changed with the dialog or the Legend Control context menu.

The legend show up can be disabled with the dialog or from the **Trends** menu.

9.4.1 Navigation

The Navigation toolbar buttons from left to right are as follows:

- **Go to First Period**
- **Go to Previous Period**
- **Go to Next Period**
- **Go to Last Period**
- **Select Period**



Figure 121: Navigation toolbar

Table 13: Navigation toolbar functions

| Function | Description |
|------------------------------|---|
| Go to First Period | Shows the data for the first time period in the selected time range. |
| Go to Previous Period | Shows the data for the previous time period in the selected time range. |
| Go to Next Period | Shows the data for the next time period in the selected time range. |
| Go to Last Period | Shows the data for the last time period in the selected time range. |
| Select Period | Opens the dialog to enter the start time and the time range. |

9.4.2 Scrolling, panning and zooming

Select the zooming mode to outline the area that needs to be zoomed in the graphical view. Scroll to the zoomed curve by using the scroll bars.

By selecting the panning mode the user can drag the curve with the mouse. Panning is only possible after zooming in.

For more information about zooming, see [Section 4.2](#).

The Trends Display **Zoom** toolbar buttons from left to right are as follows:

- Save/Restore Zoom, disabled for Trends display graphical view
- Reset zoom to normal
- Zoom Previous, disabled for Trends display graphical view
- Zoom In, disabled for Trends display graphical view
- Zoom Out, disabled for Trends display graphical view
- Select zooming mode
- Select panning mode
- Select selection area for copy selected area data to the clipboard



Figure 122: Zoom toolbar

The **Save/Restore Zoom...**, **Zoom Previous**, **Zoom in** and **Zoom out** buttons can be removed, because they are not used for the graphical view of the Trends Display.

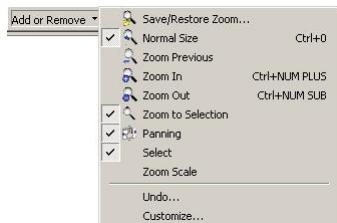


Figure 123: Removed buttons from the zoom toolbar

9.4.3 The Hairline function

Hairline provides more accurate information on the graphical view. It is related to certain time and it is relating values for Trend data in the configuration.

To view the hairline on the graphical view, select **Show Hairline** from the **Trends** menu.

Place the hairline into another location by dragging it horizontally. New time information is displayed above the hairline.

By using the left or right arrow key the hairline will be snapped to the previous respectively next valid curve value.

The values for the Trend curve items are displayed in the legends hairline value column.

Instead of placing the hairline by dragging, any point in the plot area can be selected. Select the **Show Hairline Here** item from the context menu. The hairline will be placed at that point.

9.4.4 Graph Settings

The dialog can be opened either by clicking the appropriate Main toolbar button or by right-clicking inside the plot area and selecting the **Graph Settings...** item.

Authorization level has to be at least Control (1) to be able to change these properties.

After modifying the settings in the dialog, save it as a preconfiguration if the changes need to be permanent.

1. Common Settings

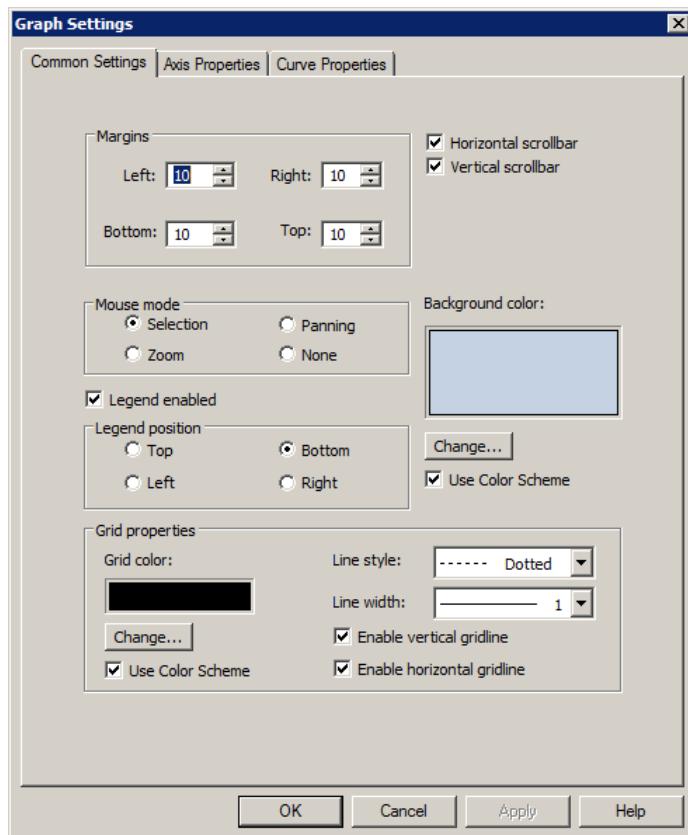


Figure 124: The Graph Settings dialog, Common Settings

Table 14: Graph Settings, Common Settings

| Setting | Description |
|------------------|--|
| background color | If "Use color scheme" is enabled, the background color from the active color scheme will be used. If not, the user can freely choose any color with the color chooser. |
| Grid color | If "Use color scheme" is enabled, the grid color from the active color scheme will be used. If not, the user can freely choose any color with the color chooser. |
| Mouse mode | If the Mouse mode "Selection" is active, area selection with the mouse can be used to copy the data from the selected area to the clipboard. |

2. Axis properties

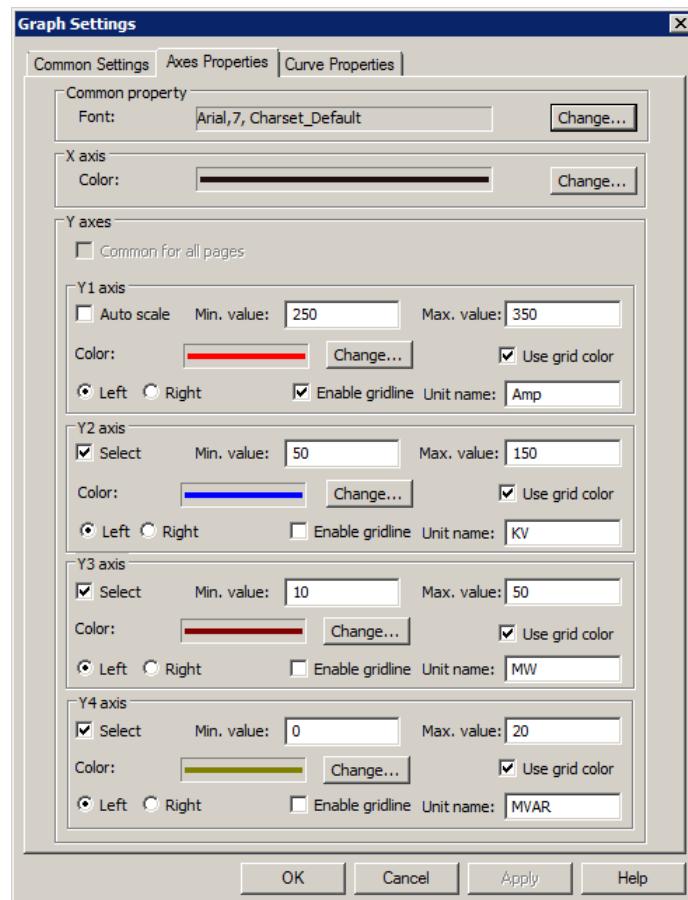


Figure 125: The Graph Settings dialog, Axis Properties

Table 15: Graph Settings, Axis Properties

| Setting | Description |
|--------------------------------------|--|
| Font | Font for the Axis annotation |
| Color (all Y axes) | Axis line color |
| Y axes common for all pages | If checked the current Y axes configuration will be used for all existing report pages. If not checked different Y axes properties can be defined for every selected page. This option is disabled for reports having only a single page configured. |
| Select (Y2 .. Y4 axes) | Show/hide selected Y axis (By default it will be hidden) |
| Auto scale (Y1 axis) | The scaling is based on the minimum and maximum values for the complete time range, not only for the selected time range. |
| Use Grid color (all Y axes) | If enabled, the dedicated Y axis gridline color will be used. Otherwise the gridline color from global color setting tool will be used. |
| Left or right selection (all Y axes) | Y axis placement |
| Enable gridline (all Y axes) | If enabled, horizontal gridline corresponding with Y axis will be shown. |
| Unit name (all Y axes) | Display unit name of Y axis, default value is Y1, Y2, Y3, Y4. |

3. Curve properties

The **Curve Properties** tab can be used to change individual curve settings. First the correct report curve must be selected from the drop-down list.

The **Curve Properties** dialog can be also opened via the curve right mouse click context menu in the graphical area or the legend.

Selecting the **All Curves** option helps to change the curve type for all available curves.

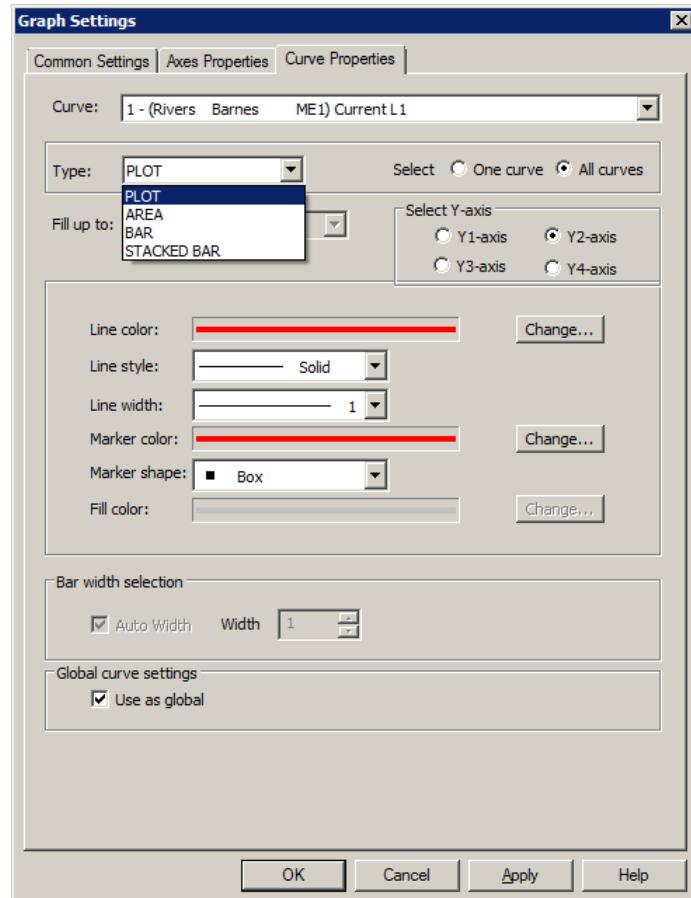


Figure 126: The Graph Settings dialog, Curve Properties

Table 16: Graph Settings, Curve Properties

| Setting | Description |
|------------------------------|---|
| Curve type | The curve types plot, area and bar can be chosen for each individual trend. The stacked bar type can only be used for all enabled trend curves. |
| Bar width selection | Either the automatic bar width calculation or manually entered value can be chosen. This setting is only available for the curve type Bar or Stacked bar. |
| Select Y axes | Maps Curve to selected Y axis. |
| Marker color | If the curve data has a none normal status the corresponding color from the color setting tool will be used as marker color. |
| Use curve settings as global | If this option is selected the current curve settings will be stored as global settings. Every time the same curve object will be added to some preconfiguration this global settings will be used. To be able to use different settings this option needs to get unchecked. In case use as global is checked and the current properties will be changed, for example, new line color selected, the stored global settings will be overwritten. Curve settings defined as being global will be stored in a separate file and not in the selected preconfiguration. Changed global curve settings will be saved with OK or Apply button selection. |

9.4.5 Configuring and mapping Multiple Y-axes

It's possible to use 4 different Y axes to accumulate four different ranges of curve values. Curves from Trends display can be mapped with any Y axis.

The following steps are required to configure and map Y axes:

1. Open **Graph Settings /Axes Properties**
2. Select (Enable) particular Y-axes
3. Provide Min. and Max. value for selected axes
4. Set the axes color
5. Select Enable/Disable gridline
6. Select **Curve Properties** tab
7. Select curve
8. Map enabled Y-axes with selected curve
9. Apply Changes

9.4.6 The Legend

The Legend shows selected curves attributes, the hairline values and summary information in a tabular form.

| Legend | Object Identifier | Object Text | Registration Time | Object V... | Hairline Value | Y-exes | Minimum Value | Maximum Value | Sum | Average | |
|-------------------------------------|-------------------|-------------------------|-------------------|---------------------|----------------|----------|---------------|---------------|----------|----------|----------|
| <input checked="" type="checkbox"/> | —●— | Eastwick Incoming 110kV | Current L1 | 2012-10-05 10:32:00 | 335.4447 | 336.4446 | Amp | 0.0000 | 336.9987 | 963030.1 | 334.3855 |
| <input checked="" type="checkbox"/> | —●— | Eastwick Incoming 110kV | Active power P | 2012-10-05 10:32:00 | 20.0000 | 20.0000 | MW | 0.0000 | 20.0000 | 57320.00 | 19.9028 |
| <input checked="" type="checkbox"/> | —■— | Eastwick Incoming 110kV | Reactive power Q | 2012-10-05 10:32:00 | 9.6700 | 9.6700 | MVAR | 0.0000 | 9.6700 | 27714.22 | 9.6230 |
| <input checked="" type="checkbox"/> | —▲— | Eastwick Incoming 110kV | Voltage U12 | 2012-10-05 10:32:00 | 66.0000 | 66.0000 | KV | 0.0000 | 66.0000 | 189156.0 | 65.6792 |
| <input checked="" type="checkbox"/> | —●— | Eastwick Outgoing 110kV | Current L1 | 2012-10-05 10:32:00 | 302.8358 | 303.6592 | Amp | 0.0000 | 303.9998 | 868409.1 | 301.5309 |
| <input checked="" type="checkbox"/> | —▲— | Eastwick Outgoing 110kV | Active power P | 2012-10-05 10:32:00 | 30.0000 | 30.0000 | MW | 0.0000 | 30.0000 | 85980.00 | 29.8542 |
| <input checked="" type="checkbox"/> | —●— | Eastwick Outgoing 110kV | Reactive power Q | 2012-10-05 10:32:00 | 14.5000 | 14.5000 | MVAR | 0.0000 | 14.5000 | 41557.00 | 14.4295 |
| <input checked="" type="checkbox"/> | —■— | Eastwick Outgoing 110kV | Voltage U12 | 2012-10-05 10:32:00 | 110.0000 | 110.0000 | KV | 0.0000 | 110.0000 | 315260.0 | 109.4653 |

Figure 127: Legend area

Main Legend features are:

- Show curve properties, identifier, current, calculated and hairline values
- Show/hide all or selected curves
- Locate function via context menu
- Configurable legend position and column layout
- Highlight the selected curve if enabled

9.4.7 Legend show up and position

The legend can be shown/hidden by selecting the appropriate item from the **Trends** menu or in the **Common settings** tab from the dialog.

The legend position can be changed either from the legend context menu or in the **Common settings** tab from the dialog.

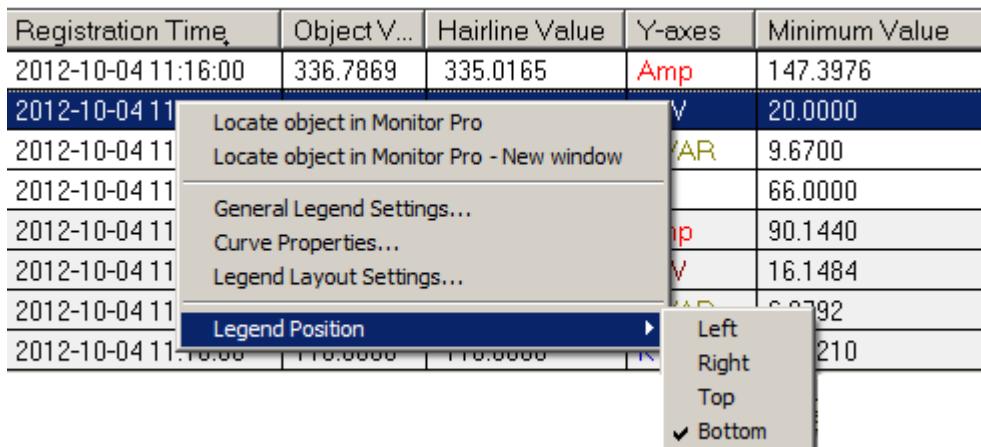


Figure 128: Legend context menu

9.4.8 Legend layout settings

The Legend layout settings can be configured by selecting **Settings/Display Settings/Legend layout Settings...** or from the Legend context menu.

The **Attributes** box shows all available attributes which can be added to the layout. The **Selected columns** box shows the list of already selected attributes.

Clicking > adds the selected attributes to the **Selected columns** list. Clicking >> adds all attributes to **Selected columns** list. Clicking < removes the selected attributes from the **Selected columns** list. Clicking << removes all attributes from the **Selected columns** list.

The column position within the Legend table can be changed by moving the selected column upwards or downwards using the **Up/Down** buttons.

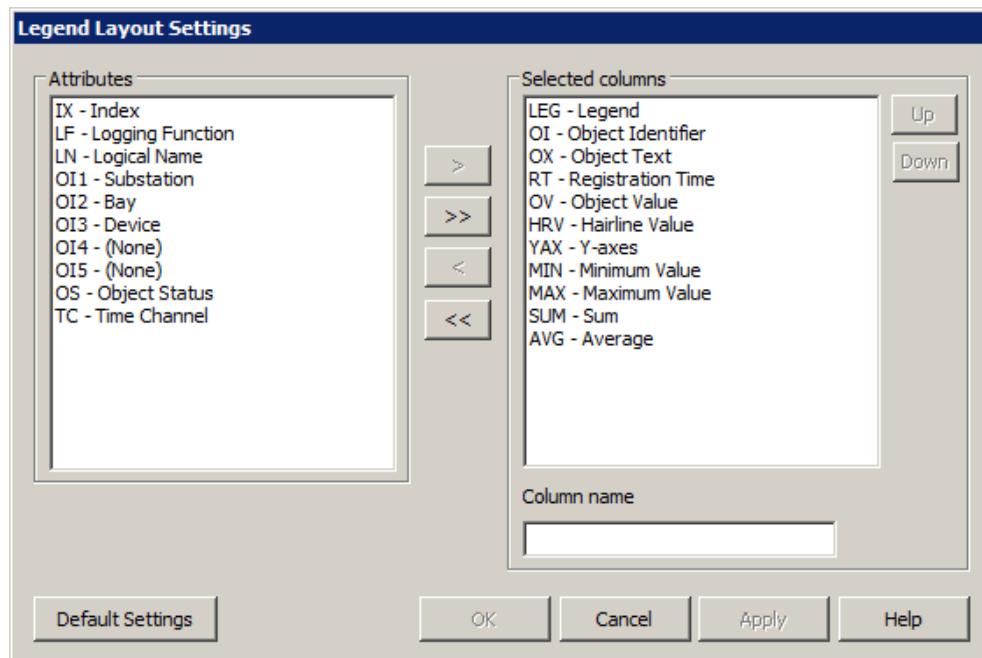


Figure 129: Legend layout settings dialog

- **Default Settings** restores the default installation settings.
- **OK** applies all the pending changes and closes the dialog.
- **Cancel** discards all the pending changes and closes the dialog but does not cancel or undo changes that have already been applied.
- **Apply** applies all the pending changes but leaves the dialog open.
- **Help** opens the help window.

Renaming the column header

Select the column from the list of selected columns. Enter the new name to the column name field and click the icon.

Select the **OK** or **Apply** button do activate all modifications.

9.4.9 General Legend settings

The general Legend settings can be configured by selecting **Settings/Display Settings/** **Legend General Settings** or from the Legend context menu.

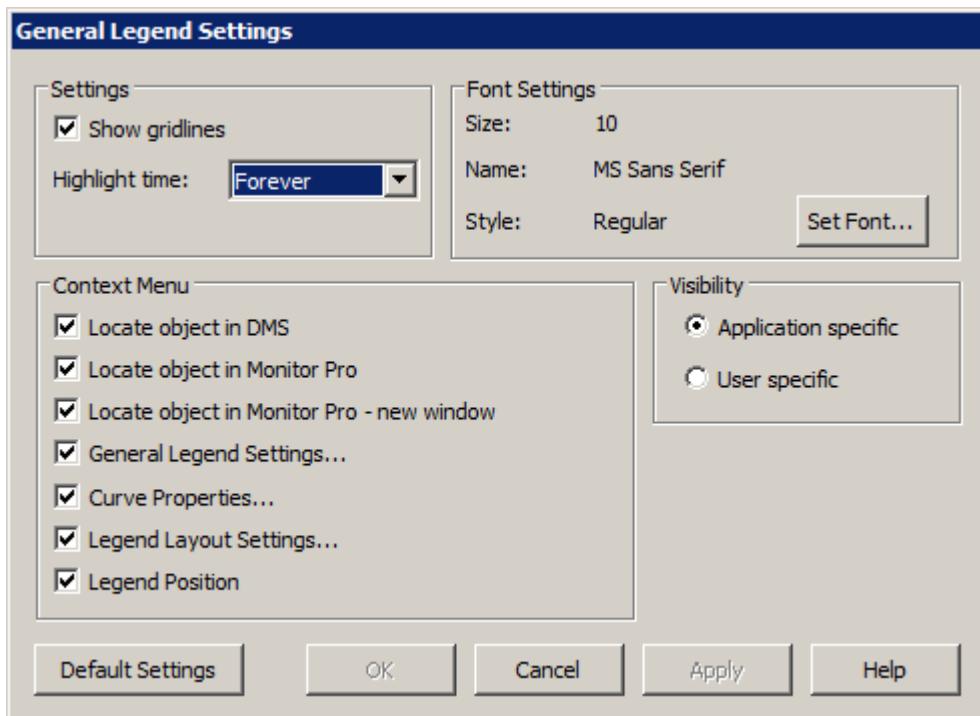


Figure 130: General Legend settings dialog

Table 17: General Legend settings

| Settings | Description |
|--------------------|---|
| Show gridlines | Enable/Disable gridlines for Legend area |
| Highlight time | The time a selected curve gets highlighted. Selectable options are: never, forever or defined time in steps of 5 seconds in the range from 5 to 60 seconds. |
| Set Font | Font style and size used for the Legend area |
| Context menu items | Configure the context menu items for the legend area |
| Visibility | Visibility is configured to be either Application or User specific |

9.4.10 Copying selected data to clipboard

Selected Trend data from the graphical view can be copied to the clipboard of the operating system.

Activate the selection mode from the Zoom toolbar.

Select the desired Trend data area with the mouse. After the mouse button is released, a dialog confirms that the data has been copied to the clipboard.



Figure 131: Copy to clipboard confirmation

If an empty area is selected, the following dialog is shown.



Figure 132: No data available for copy to clipboard

When the selection is pasted to the clipboard, the data is divided into several sections, where each section has a header and contents of each selected Trend data.

9.5 Tabular view

Up to twenty Trends can be presented in the tabular view at the same time.

Each Trend is shown in a separate page.

The tabular view contains the following columns:

- **Index** column
- **Time** column
- **Value** column
- **Status** column

| Index | Time | Value | Status |
|-------|---------------------|----------|--------|
| 2849 | 2012-10-05 10:37:30 | 336.2911 | OK |
| 2850 | 2012-10-05 10:38:00 | 335.3015 | OK |
| 2851 | 2012-10-05 10:38:30 | 336.1571 | OK |
| 2852 | 2012-10-05 10:39:00 | 336.5905 | OK |
| 2853 | 2012-10-05 10:39:30 | 335.3953 | OK |
| 2854 | 2012-10-05 10:40:00 | 335.8826 | OK |
| 2855 | 2012-10-05 10:40:30 | 336.8989 | OK |
| 2856 | 2012-10-05 10:41:00 | 336.1489 | OK |
| 2857 | 2012-10-05 10:41:30 | 335.5204 | OK |
| 2858 | 2012-10-05 10:42:00 | 335.7871 | OK |
| 2859 | 2012-10-05 10:42:30 | 335.7071 | OK |
| 2860 | 2012-10-05 10:43:00 | 335.4004 | OK |
| 2861 | 2012-10-05 10:43:30 | 335.2188 | OK |
| 2862 | 2012-10-05 10:44:00 | 336.3752 | OK |
| 2863 | 2012-10-05 10:44:30 | 335.6145 | OK |
| 2864 | 2012-10-05 10:45:00 | 336.4498 | OK |
| 2865 | 2012-10-05 10:45:30 | 335.1966 | OK |
| 2866 | 2012-10-05 10:46:00 | 336.4557 | OK |
| 2867 | 2012-10-05 10:46:30 | 335.1000 | OK |
| 2868 | 2012-10-05 10:47:00 | 335.4250 | OK |
| 2869 | 2012-10-05 10:47:30 | 336.2119 | OK |
| 2870 | 2012-10-05 10:48:00 | 336.2466 | OK |
| 2871 | 2012-10-05 10:48:30 | 335.6128 | OK |
| 2872 | 2012-10-05 10:49:00 | 335.0621 | OK |
| 2873 | 2012-10-05 10:49:30 | 336.2232 | OK |
| 2874 | 2012-10-05 10:50:00 | 336.5863 | OK |
| 2875 | 2012-10-05 10:50:30 | 336.3455 | OK |
| 2876 | 2012-10-05 10:51:00 | 336.5420 | OK |
| 2877 | 2012-10-05 10:51:30 | 336.7978 | OK |
| 2878 | 2012-10-05 10:52:00 | 335.3948 | OK |
| 2879 | 2012-10-05 10:52:30 | 336.2574 | OK |
| 2880 | 2012-10-05 10:53:00 | 336.5762 | OK |

Trend Information

Identification: Eastwick_Incoming 110kV

Object text: Current L1

Process object: ESTH01_MEC:P10

History length: 2880

Time interval: 30 seconds

Log function: Direct

First registration: 2012-10-03 22:31:00

Last registration: 2012-10-05 10:53:00

Average: 334.3839

Sum: 963025.6

Minimum at index: 2749

Registered at: 2012-10-04 21:25:00

Value: 0.0000

Maximum at index: 1

Registered at: 2012-10-03 22:31:00

Value: 336.9987

Figure 133: Tabular view of Trends

Trend values, registration time and status are shown on the list. Other Trend parameters, for example object text, time interval, logging function and statistics, are shown on the right side.

The Status column provides a clear text description for the status of the trended data.

Table 18: Tabular view, status column

| Status column | Description |
|---------------|---|
| OK | The Trend data has been registered under good conditions. |
| Suspicious | The source of the Trend data has been marked as suspicious, for example, if the input card has some failure. |
| Obsolete | The source of the Trend data has been marked as obsolete (not up to date), for example, if the connection to the data collection device has been lost. |
| Faulty time | The source of the Trend data has an inaccurate time stamp because of time synchronization. |
| Man. Entered | This Trend data has been manually entered by an operator. |
| Not sampled | The source of the Trend data never had a valid value, for example, after system start before the connection with data collection device is established. |

9.5.1 General settings

The **General Settings** dialog can be opened either by clicking the appropriate Main toolbar button  or by selecting **Settings/Display Settings**.

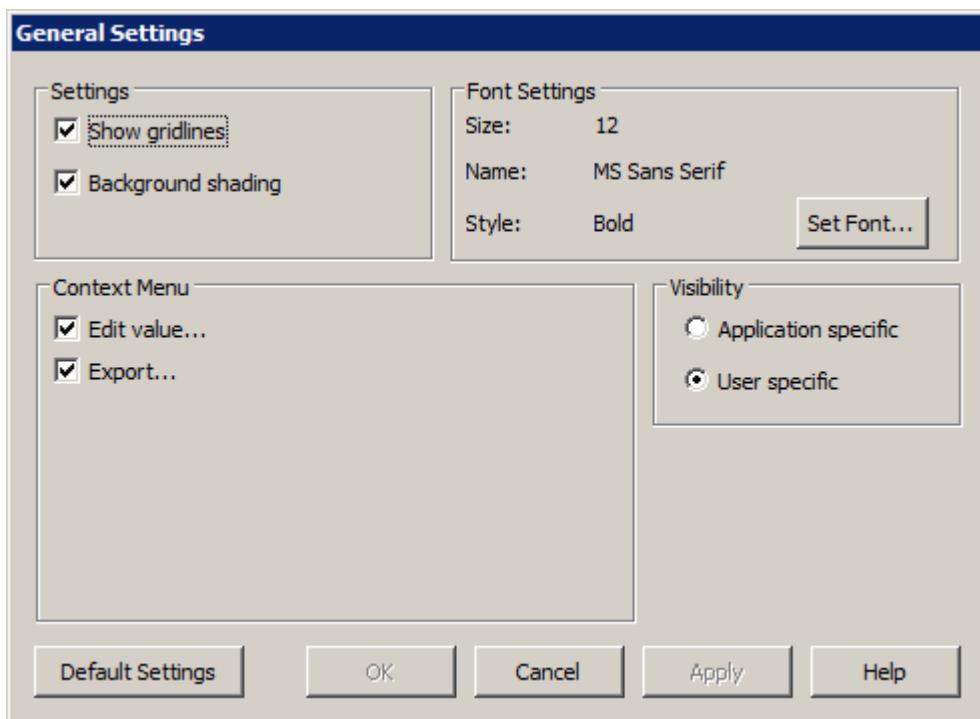


Figure 134: General Settings

Table 19: Tabular view, General Settings

| Settings | Description |
|--------------------|--|
| Show gridlines | Enable/Disable gridlines for tabular data area |
| Background shading | Enable/Disable the row shading effect |
| Set Font | Font style and size used for the tabular data area |
| Context menu items | Configure the context menu items for the tabular data area |
| Visibility | Visibility is configured to be either Application or User specific |

9.5.2 Navigation

The **Navigation** toolbar buttons from left to right are:

- Clear Current Trend Log
- Shift to First
- Shift to Previous
- Shift to Next
- Shift to Last
- Select Day Period



Figure 135: Navigation toolbar

Table 20: Navigation toolbar functions

| Function | Description |
|-------------------------|--|
| Clear Current Trend Log | Removes all data from the selected Trend. The sampling of new values restarts. |
| Shift to First | Shows the data for the first Trend. |
| Shift to Previous | Shows the data for the previous Trend. |
| Shift to Next | Shows the data for the next Trend. |
| Shift to Last | Shows the data for the last Trend. |
| Select Day Period | Opens the dialog to enter the start time and the time range. |

9.5.3 Editing values

When the tabular view is active, it is possible to enter a specified Trend value manually.

To enter the value manually:

1. Right-click the specified value and select **Edit value** from the context menu or double-click the value that needs to be edited. The **Edit Value** dialog is displayed.

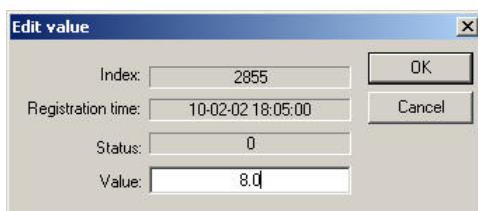


Figure 136: Edit value dialog

2. The text fields of this dialog show the index, registration time, status and current value of the selected registration. Type a new value into the **Value** field.
3. Click **OK** to change the new value to the Trend. To leave the value unchanged, click **Cancel**.



The Status column text is changed to "Man. Entered".

9.5.4 Copying selected data to the clipboard

The data selection can be done by using one of the three methods:

1. To select the successive values, click the first row of the reported item to be selected, press the SHIFT key down and click the last row of the reported item.
2. To select the specific values, click the first row of the reported item to be selected, press the CTRL key down and click more specific rows of the reported items.
3. To select all, press CTRL+A.

When the selection is done, select the appropriate button  from the **Main** toolbar or press CTRL+C.

When pasting the selection to the clipboard, the data is divided into several sections, where each section has a header and contents of each selected report item.

9.6 Preconfigurations

The current Trend settings can be saved in a preconfiguration (see [Figure 137](#)). The following properties will be saved:

- Background color of the graphical form
- Colors and styles of the X and Y axes
- Text fonts of the axes
- Trend curve colors and styles
- Trend curve marker colors and styles
- Trend curve title fonts
- Visibility and position of the legend in the graphical view
- Visibility of the Trend curves
- Auto scaling of Y axes
- Type of the curves in the graphical view
- Legend settings
- Curve properties from global settings selection

Saving the current Trend settings can be done by selecting **Main/Save**, or by clicking the appropriate Main toolbar button . The **Save Preconfiguration** dialog is displayed, see [Figure 137](#).

To create a new preconfiguration, a new name must be entered in the **Name** field and it must be saved.

To replace an existing preconfiguration with the current Trend settings, the existing preconfiguration name must be selected and **Save** button clicked.

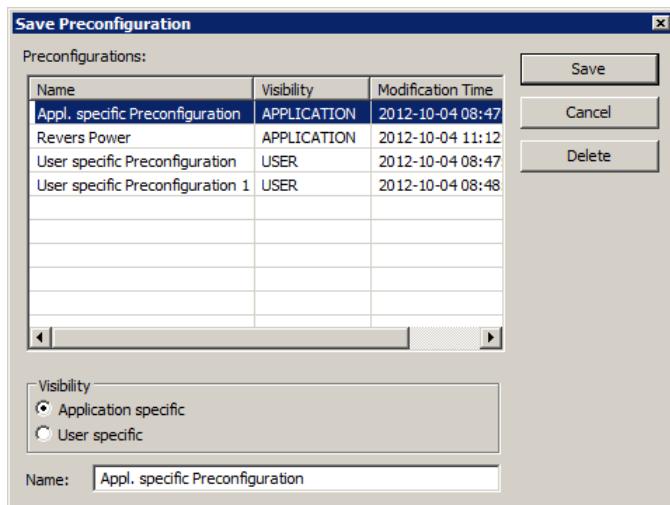


Figure 137: Save Preconfiguration dialog

All the saved application specific preconfigurations are available for all users working with a certain application. Each user can save individual preconfigurations by selecting the **User specific** preconfiguration visibility checkbox.

The Monitor Pro Menubar item **Navigate/Trends** shows all available preconfigurations.

All the application and user specific preconfigurations are displayed as a submenu of this command. User specific preconfigurations are only visible for the creator of the preconfiguration.

Additionally, it is also possible to open preconfigurations using the appropriate button from the **Main** toolbar. The **Open Preconfiguration** dialog is displayed. On appropriate preconfiguration name selection and clicking the **Open** button the preconfiguration is loaded and all the parameters are applied to the Trends Display.



To delete an existing preconfiguration the name must be selected in the **Save Preconfiguration** or **Open Preconfiguration** dialog. Clicking the **Delete** button will remove the preconfiguration.

9.7 Exporting Trends

It is possible to save the selected Trend data to a file in .CSV format. In .CSV format, the separator between the columns is retrieved from the system settings. It can be changed in Windows control panel > Region and Language > Additional settings... > Customize Format numbers tab > List separator.

To export data:

1. Select **Export** item from the Trends menu or from the right-click context menu. The **Save As** dialog opens.
2. Select a folder and file name for the selection.
3. Click the **Save** button to export the data.

The exported text file contains the header information, curve statistics and curve values. A curve value includes an index, the time, value, and status.

To open the export file with, for example, Microsoft Excel, select **Format/Cells/Text** (in the Category list) to display the format correctly.

9.8 Printing Trends

Printing the Trend data either in the tabular view or in the graphic view can be done by selecting **Main/Print** from the menubar or by clicking the appropriate button from the **Main** toolbar. The current Trend registration values are printed as shown on the left side list of the tabular form. The Trend information from the right side of the tabular form will be printed on the last page.

When printing from the graphic view, the printout is exactly the same as shown in the graphical view at that moment. The legend information will be printed on the last page.

9.9 Authorizing

Trends Display follows the authorization concept of MicroSCADA X. The authorization level is checked from the authorization group Trends. If this authorization group does not exist, the authorization level of the group GENERAL is used.

The following functions in the Trend views require at least Control (1) authorization level:

- Changing Graph Settings
- Manually entering values



To be able to clear the Trend data, the Engineering level (2) is required.

Section 10 Measurement Reports

Measurement Reports provide an interface for showing measured values for further data analysis in the application. It can be used for monitoring time related follow ups of the process as well as measured or calculated data. It shows the history of these values and the entering values. The reports are meant for various types of time related reports, for example hourly, daily, weekly, monthly and yearly reports.

Generally, all types of data can be illustrated as reports. All data for the reports is calculated and stored in real time. The report data is collected and calculated cyclically. The most common method is to collect raw data from the process, refine it and store it in the report database. Measurement Reports can be used, for instance, in reporting the following:

- Energy (active, reactive)
- Current (for example bay level)
- Voltage (for example bay level)
- Frequency
- Temperature
- District heating

All data values in the report can be presented either in tabular (numerical) or in a graphical view. The contents and the reprocessing of data has been defined during the configuration of the Measurement Reports, which is described in the Application Design manual. During runtime, the collected data may be updated due to the following reasons in the application:

- At predefined time intervals
- As a calculation result

Measurement Reports contain the following features:

- All types of process objects illustrated as reports
- All types of process objects illustrated as reports- demo
- Graphical or tabular view modes
- Zooming mode
- Scrolling with scroll bars and panning
- Configurable axes and line properties
- Using legend and hairline
- Report types with different time resolution (hourly, daily, weekly, monthly, yearly)
- Quick report type with different time resolution (hourly, daily weekly, monthly, yearly)
- Load duration curves
- User specific and application specific preconfigurations

10.1 Starting Measurement Reports Display

Start Measurement Reports by selecting **Navigate/Measurement Reports** and select the appropriate report type (see [Figure 138](#)).

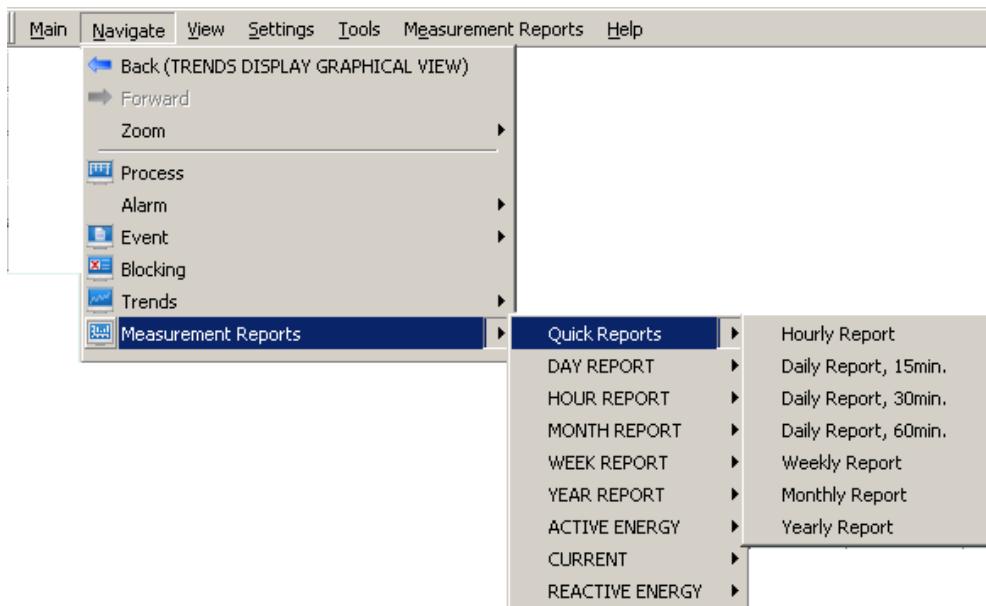


Figure 138: Default opening of the Measurement Reports displays

The Measurement Reports menu structure is dynamic and application/customer specific. It may differ from the example shown in [Figure 138](#).

10.2 The user interface

The report data can be presented in a tabular or in a graphical view. These two views share the same report database. Both views also share some of the toolbars and the Measurement Reports menu. In addition, some basic information about the selected Measurement Report display will be shown in both views.

10.2.1 Measurement Reports Display toolbars

Measurement Reports has four toolbars. Three toolbars are used for both views and one is dedicated for the graphical view.

With the first Measurement Reports start all toolbars are visible. Toolbars can be shown or hidden through the **Settings/Customize** mode. It is possible to add or remove buttons on the toolbars the same way as described in [Section 3.4.2](#).

The Measurement Reports Main toolbar buttons from left to right are as follows:

- Open Preconfiguration
- Save Preconfiguration
- Print Display
- Copy to Clipboard from Selected Display
- Find in Selected Display
- Show Display Settings
- Show Help



Figure 139: Main Toolbar

Table 21: Main Toolbar functions

| Function | Description |
|-------------------------------|--|
| Open Display Preconfiguration | Opens the Open Preconfiguration dialog. |
| Save Preconfiguration | Opens the Save Preconfiguration dialog. |
| Print | Prints the selected report to a network printer or a specified output file. |
| Copy to Clipboard | Copies the selected visible report data to the operating system clipboard. |
| Find | This function is disabled for the Measurement Reports views. |
| Display Settings | Opens a sub-menu with the following items: - General Legend Settings... - Graph Settings... - Legend layout Settings... |
| Help | Opens the Help dialog. |

The Measurement Reports display toolbar buttons and drop-down lists from left to right are as follows:

- Switch updating/frozen mode
- Refresh
- Show/hide report data
- Switch tabular/graphical view
- Select report page
- Select time interval

*Figure 140: Display Toolbar**Table 22: Display Toolbar functions*

| Function | Description |
|---|--|
| Switch between updating and frozen mode | indicates the update mode as active mode. Clicking this button will change to the frozen mode. indicates the frozen mode as active mode. Clicking this button will change to the update mode. |
| Refresh | Forces a display refresh. |
| Show/hide report data (curves) | Open the show/hide dialog, where the user can select which data to show in the current view. |
| Table continues on next page | |

| Function | Description |
|-------------------------------|--|
| Switch tabular/graphical view |  The graphical view is active. Clicking this button will change to the tabular view.  The tabular view is active. Clicking this button will change to the graphical view. |
| Select report page | The items to select with this drop-down list are different depending on the selected Report display type. For configured standard Report pages: contains all existing and configured pages for the selected Measurement Report display. For Quick-Reports pages: contains all existing Quick-Report preconfigurations for the selected Quick Report display. The * character indicates the default configuration used in the selected Quick Report display. |
| Select time interval | This drop-down list is only enabled for the hourly base Quick Report display. It contains a list of all used sampling time intervals. |

The Measurement report Navigation toolbar buttons from left to right are as follows:

- Go to first available period
- Go to previous period
- Go to next period
- Go to last available period
- Select period



Figure 141: Navigation toolbar

Table 23: Navigation toolbar functions

| Function | Description |
|------------------------------|--|
| Go to first available period | Navigates to the first available period in the report. If the current period is already the first, the button will be dimmed. |
| Go to previous period | Navigates to the previous period in the report. If the previous period is outside the history area, the previous period button will be dimmed. |
| Go to next period | Navigates to the next period in the report. If the next period is outside the history area, the next period button will be dimmed. |
| Go to last available period | Navigates to the last available period in the report. If the current period is already the last, the button will be dimmed. |
| Select period | Opens the Select Date dialog from which the target period for the report can be selected. |

Browse backwards and forwards in time by one hour, day, month or year at a time. The browsing interval is related to the time relation of the report type. To browse backwards, click the previous hour/day/week/month (arrow left). To browse forward, click the next hour/day/week/month (arrow right). The same selections can be made from the menu bar. The values from the previous or next interval are fetched and displayed.

Select a specific hour, day, month or year in the **Select Period** dialog. The selection is related to the time relation of the report type. To open the **Select Period** dialog, click the date sheet symbol.

10.2.2 Measurement Reports Display menus

The toolbar commands can be selected from the **Measurement Reports** menu (see [Figure 142](#) and [Figure 143](#)). Some of the menu items are active only for the graphical view.

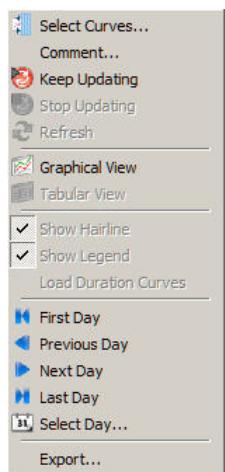


Figure 142: Measurement Reports menu for the tabular view

The menu for the tabular view contains the same commands as the toolbars.

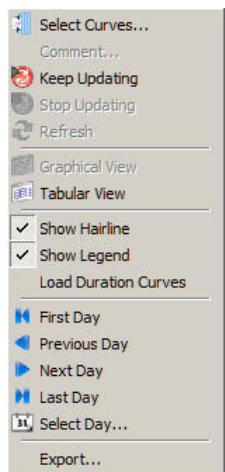


Figure 143: The Measurement Reports menu for the graphical view

In addition to the toolbars, the following functions are available from the menu:

- Show/Hide Hairline
- Load Duration Curves
- Export...

For more information about the commands, see [Section 10.3](#).

10.2.3 Measurement Reports Display header

The header contains the following information fields from left to right:

- Period field
- Measurement Unit information

Period: Monday 2012-10-29 (W-44)

Unit: kWh / kVAr / A

Figure 144: Measurement Reports header

The **Period** field gives information about the date/time range for the current visible data. The field content depends on the current active report type:

- For hourly and daily reports the current active day, as shown in [Figure 144](#).
- For weekly reports the current active week.

Period: Week 43 / 2012 (2012-10-22 - 2012-10-28)

- For monthly reports the current active month.

Period: October 2012 (W 40 - W 44)

- For yearly reports the current active year.

Period: Year 2012

10.3 Graphical view

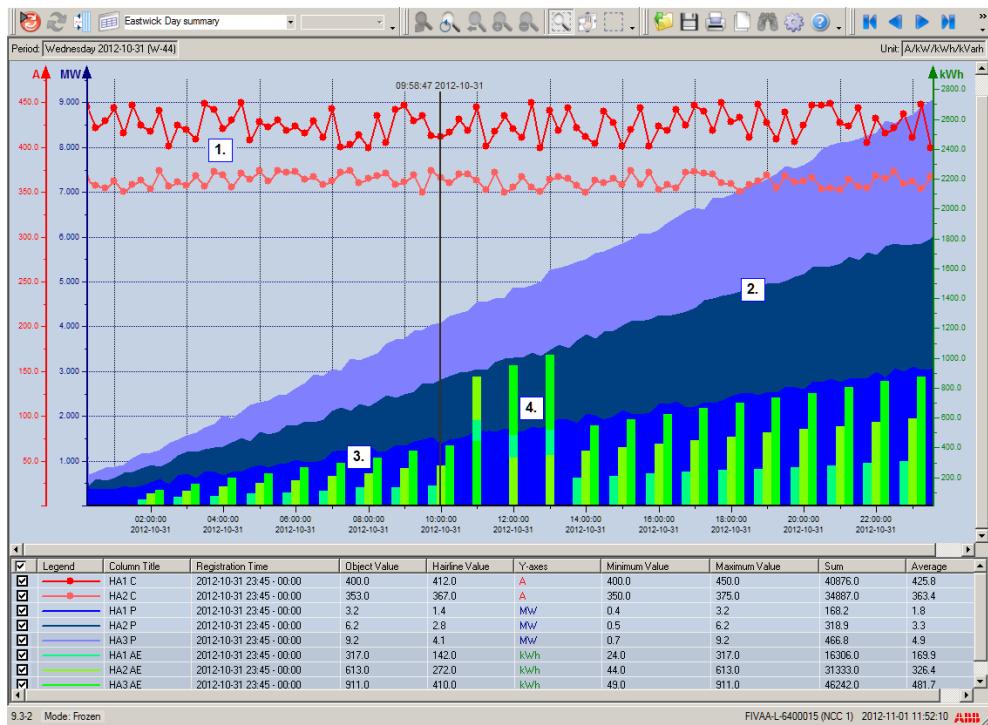
In the graphical view, up to twenty measurements can be presented on a two dimensional coordinate system that consists of a horizontal time (X) axis and a vertical value (Y) axis. The curves can be panned both in the X and Y directions and the parameters of the Y axis can be changed. All the curves can be hidden from the view with the dialog.

The horizontal (X) axis of the graphical view represents the time of the measurement, and the vertical (Y) axis represents the value of the measurement. The X axis is divided into intervals specific to the related period. The time of every interval point is labeled below the X axis. The amount of the shown interval points depends on the zooming level.

The Y axis is automatically divided into intervals according to the registered values.



The graphical view does not recognize any units or scales, only the values registered in the report database. To avoid confusion, curves with different units should use different Y axes.

**Figure 145: Graphical view**

The graphical view has the following functional areas:

- The plot area where the report data will be shown.
- The legend area shows part of the visible curve properties (optional, can be hidden with the dialog).

For the plot area, the following curve types [Figure 145](#) can be chosen:

1. Plot (default)
2. Area (fills the area between two selected curves or between a curve and the X or Y axis)
3. Bar
4. Stacked bar

The curve type can be configured with the dialog.

The legend show up can be disabled with the dialog or from the **Measurement Report** menu. The legend area shows for all visible curves the following default information:

- Column title (Report object name)
- Line color
- Marker shape
- Registration time and value for the last available from the selected view
- Hairline value
- Selected Y axis for enabled curves
- Summary information as, for example, minimum and maximum value.

The legend position can be changed with the dialog or in Help of the legend context menu.

The graphical view has the same main functionality as used for the Trends Display.

Information about:

- Scrolling, panning and zooming
- The Hairline function
- The Graph settings
- The Legend

can be found in [Section 9.4](#).

10.3.1 Load duration curves

It is possible to toggle between load curves and load duration curves in the graphical form. The Load Duration Curves mode can be enabled from the **Measurement Reports** menu.

10.4 Tabular view

In the tabular view, up to fifty measurements can be presented at the same time. Recommendation is to not use more than twenty. Each measurement is shown in an individually configured report column.

The tabular view contains the following columns:

- Comment column
- Time column
- A set of report data columns
- A set of summary information columns

The default accuracy of the report columns is two decimals, but it may be individually set for each column during the report configuration.

If a measurement data registration has an uncertain or an obsolete status, the corresponding cell is represented with the character "?" (see 1. in [Figure 146](#)). Manually entered values are indicated with the character "m" (see 2. in [Figure 146](#)).

If a measurement data registration is not sampled or has an erroneous status, there is no value available (see 3. in [Figure 146](#)).

| Time (Note) | Incoming HA1 | Outgoing HA2 | Outgoing HA3 | Outgoing HA4 | Outgoing HA5 | Outgoing HA6 | Outgoing HA7 |
|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 00:00 - | 322.48 | 68.63 | 0.00 | 0.00 | 93.78 | 59.74 | 100.33 |
| 00:15 - | 322.06 | 68.50 | 0.00 | 0.00 | 93.63 | 59.68 | 100.25 |
| 00:30 - | 321.92 | 68.46 | 0.00 | 0.00 | 93.60 | 59.67 | 100.20 |
| 00:45 - | 321.56 | 68.32 | 0.00 | 0.00 | 93.48 | 59.62 | 100.14 |
| 01:00 - | 321.33 | 68.29 | 0.00 | 0.00 | 93.40 | 59.58 | 100.05 |
| 01:15 - | 322.53 | 68.64 | 0.00 | 0.00 | 93.79 | 59.75 | 100.34 |
| 01:30 - | 322.11 | 68.52 | 0.00 | 0.00 | 93.66 | 59.69 | 100.24 |
| 01:45 - | 321.96 | 68.45 | 0.00 | 0.00 | 93.62 | 59.68 | 100.22 |
| 02:00 - | 321.55 | 2. 68.55 m | 0.00 | 0.00 | 93.48 | 59.62 | 100.11 |
| 02:15 - | 322.27 | 68.56 | 0.00 | 0.00 | 93.70 | 59.71 | 100.30 |
| 02:30 - | 322.93 | 68.73 | 0.00 | 0.00 | 93.92 | 59.80 | 100.47 |
| 02:45 - | 322.70 | 68.69 | 0.00 | 0.00 | 93.85 | 59.77 | 100.39 |
| 03:00 - | 1. 322.42 ? | 68.59 | 0.00 | 0.00 | 93.73 | 59.74 | 100.36 |
| 03:15 - | 322.11 | 68.52 | 0.00 | 0.00 | 93.66 | 59.69 | 100.24 |
| 03:30 - | 321.93 | 68.42 | 0.00 | 0.00 | 93.62 | 59.68 | 100.22 |
| 03:45 - | 321.55 | 68.35 | 0.00 | 0.00 | 93.48 | 59.62 | 100.11 |
| 04:00 - | 322.59 | 68.45 | 3. | 0.00 | 93.81 | 59.76 | 100.36 |
| 04:15 - | 322.86 | 68.69 | 0.00 | 0.00 | 93.92 | 59.80 | 100.44 |
| 04:30 - | 322.70 | 68.69 | 0.00 | 0.00 | 93.85 | 59.77 | 100.39 |
| 04:45 - | 322.34 | 68.55 | 0.00 | 0.00 | 93.73 | 59.72 | 100.33 |
| 05:00 - | 322.11 | 68.52 | 0.00 | 0.00 | 93.66 | 59.69 | 100.24 |
| 05:15 - | 321.85 | 68.42 | 0.00 | 0.00 | 93.58 | 59.66 | 100.19 |
| 05:30 - | 321.55 | 68.35 | 0.00 | 0.00 | 93.48 | 59.62 | 100.11 |
| 05:45 - | 322.59 | 68.66 | 0.00 | 0.00 | 93.81 | 59.76 | 100.36 |
| 06:00 - | 322.77 | 68.69 | 0.00 | 0.00 | 93.85 | 59.79 | 100.44 |
| 06:15 - | 322.70 | 68.69 | 0.00 | 0.00 | 93.85 | 59.77 | 100.39 |
| 06:30 - | 322.27 | 68.52 | 0.00 | 0.00 | 93.73 | 59.72 | 100.30 |
| 06:45 - | 322.11 | 68.52 | 0.00 | 0.00 | 93.66 | 59.69 | 100.24 |
| 07:00 - | 321.77 | 68.39 | 0.00 | 0.00 | 93.55 | 59.65 | 100.19 |
| 07:15 - | 321.55 | 68.35 | 0.00 | 0.00 | 93.48 | 59.62 | 100.11 |
| 07:30 - | 322.91 | 68.73 | 0.00 | 0.00 | 93.93 | 59.80 | 100.45 |
| 07:45 - | 322.70 | 68.69 | 0.00 | 0.00 | 93.85 | 59.77 | 100.39 |
| Mean | 322.26 ? | 68.55 m | 0.00 ? | 0.00 | 93.71 | 59.71 | 100.29 |
| Min | 321.33 ? | 68.29 m | 0.00 ? | 0.00 | 93.40 | 59.58 | 100.05 |
| Max | 323.22 ? | 68.80 m | 0.00 ? | 0.00 | 94.04 | 59.85 | 100.53 |

Figure 146: The Tabular view

The measured column shows the report data as defined in the Report Page Configuration. The measurements can be based on the measurements of the process, manually entered or calculated values.

10.4.1 General settings

The **General Settings** dialog can be opened either by clicking the appropriate Main toolbar



button or by selecting **Settings/Display Settings**.

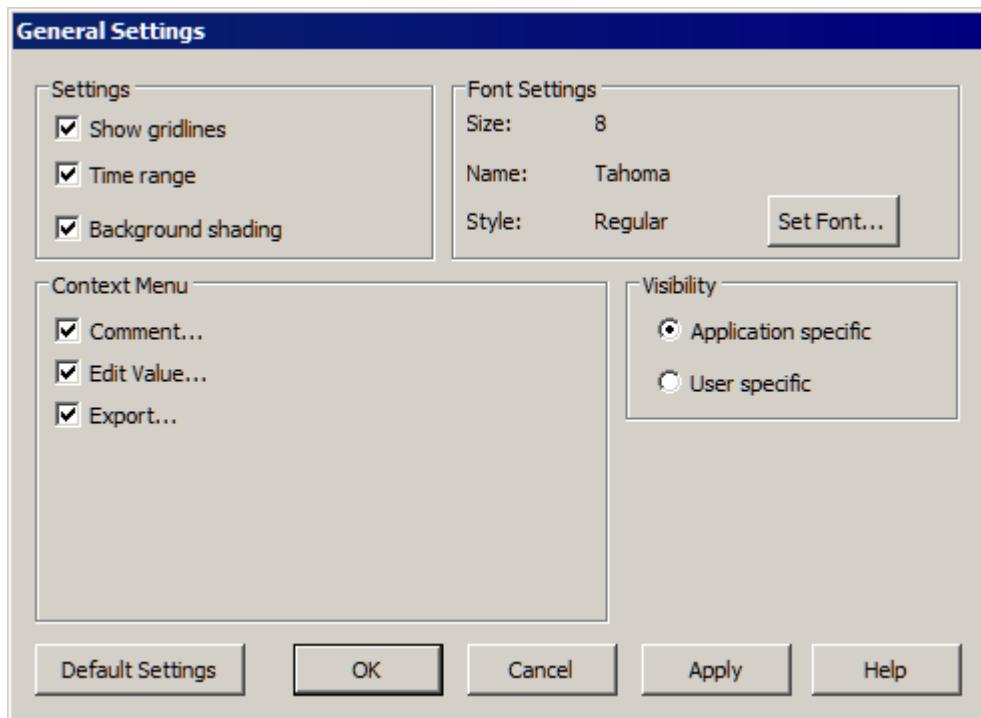


Figure 147: General Settings

Table 24: Tabular view, General Settings

| Settings | Description |
|--------------------|--|
| Show gridlines | Enable/Disable gridlines for tabular data area |
| Time range | If selected the period start and end time will be shown in the time column else only the period start time |
| Background shading | Enable/Disable the row shading effect |
| Set Font | Font style and size used for the tabular data area |
| Context menu items | Configure the context menu items for the tabular data area |
| Visibility | Visibility is configured to be either Application or User specific |

10.4.2 Daylight saving leap hour data

All data sampled and calculated during the one hour transition from daylight saving time to standard time will be stored on a separate location and made available in all DAY reports as shown in below figure.

| Period: Sunday 2013-10-27 (w-43) | | | | | |
|----------------------------------|---------------|---------|---------|---------|---------|
| Comment | Time | Min | Max | Mean | Sum |
| | 02:00 - 02:15 | 2702.01 | 2702.01 | 2702.01 | 2702.01 |
| | 02:15 - 02:30 | 2702.16 | 2702.16 | 2702.16 | 2702.16 |
| | 02:30 - 02:45 | 2702.31 | 2702.31 | 2702.31 | 2702.31 |
| | 02:45 - 03:00 | 2702.46 | 2702.46 | 2702.46 | 2702.46 |
| | 03:00 - 03:15 | 316.00 | 316.00 | 316.00 | 316.00 |
| | 03:15 - 03:30 | 317.00 | 317.00 | 317.00 | 317.00 |
| | 03:30 - 03:45 | 318.00 | 318.00 | 318.00 | 318.00 |
| | 03:45 - 04:00 | 319.00 | 319.00 | 319.00 | 319.00 |
| | 03:00 - 03:15 | 2703.01 | 2703.01 | 2703.01 | 2703.01 |
| | 03:15 - 03:30 | 2703.16 | 2703.16 | 2703.16 | 2703.16 |

Figure 148: Leap hour data presentation

The data from that extra hour are also included in the summary information calculation.

10.4.3 Time column

The following figures show and explain the different time column formats based on the selected Report Display base type.

Hour report, time interval 3 minutes

| | |
|---------|------|
| 11:00 - | -343 |
| 11:03 - | -689 |
| 11:06 - | -343 |
| 11:09 - | -686 |
| 11:12 - | -343 |

The indication in the time column is shown as time, for example 11:03 or 11:06.
The time indicates the period begin.
In the example to the left, "11:00 -" indicates the period from 11:00 to 11:03.
The sampling time for this period was at 11:03.

Day report, 15 minutes period

| | |
|---------|--------|
| 00:00 - | 321.63 |
| 00:15 - | 322.31 |
| 00:30 - | 322.93 |
| 00:45 - | 322.88 |
| 01:00 - | 322.39 |

In the daily reports, the time resolution is 15, 30 or 60 minutes.
The indication in the time column is shown as time, for example 00:00 or 00:15.
The time indicates the period begin.
In the example to the left, "00:00 -" indicates the period from 00:00 to 00:15.
The sampling or calculation time for this period value was at 00:15.

Week report

| | |
|-----------|---------|
| Monday | -222474 |
| Tuesday | -221783 |
| Wednesday | -222662 |
| Thursday | -223209 |
| Friday | -223114 |

In the weekly reports, the indication in the time column is the day of the week, for example Monday or Tuesday.

Month report

| | |
|---|----------|
| 1 | -223.246 |
| 2 | -223.208 |
| 3 | -223.200 |
| 4 | -223.111 |
| 5 | -221.922 |

In the monthly reports, the indication in the time column is the day of the month, for example 1, 2 or 3.

Year report

| | |
|----------|--------|
| January | 332.85 |
| February | 330.77 |
| March | 330.22 |
| April | 330.13 |
| May | 329.75 |

In the yearly reports, the indication in the time column is the name of the month, for example January or February.

For hour and day reports, the time column can be configured in a way that the start and the end time of each period will be shown. This can be done in help of the "Time Range" parameter in the **General Settings** dialog.

10.4.4 Editing values

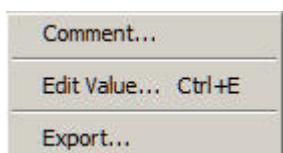
Data included in the measurement reports can be edited in the tabular view with the **Edit Value** dialog, if an appropriate command is accessible in the user's authorization.

Manually edit value is only possible in Day report displays where the interval is equal to the Report Object base period. If, for example, Report Object base period is 15 min, then editing is only enabled in Day report displays with a 15-minute interval time.

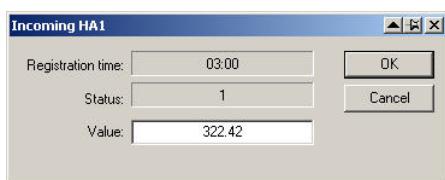
The edited values are stored into the report database, and other values, for example calculated values that depend on it, are automatically recalculated using the new value.

To enter the data registration manually:

1. Right-click the item in the report column and select **Edit value** from the **context menu**. The **Edit Value** dialog is displayed.



2. The text fields of this dialog show the registration time and status, and the existing value of the selected registration. Type a new value in the **Value** field.



3. Click **OK** to change the new value to the measurement report. To leave the value unchanged, click **Cancel**.



The color of the measurement and status field is changed to indicate that the data registration has been manually entered.

10.4.5 Adding comments

A comment can be added or removed with the **Comment** dialog. The comment is attached to one row.

To open the **Comment** dialog, click the time column in the tabular format. The comment is saved to a file and the note is indicated with an exclamation mark next to the time column.

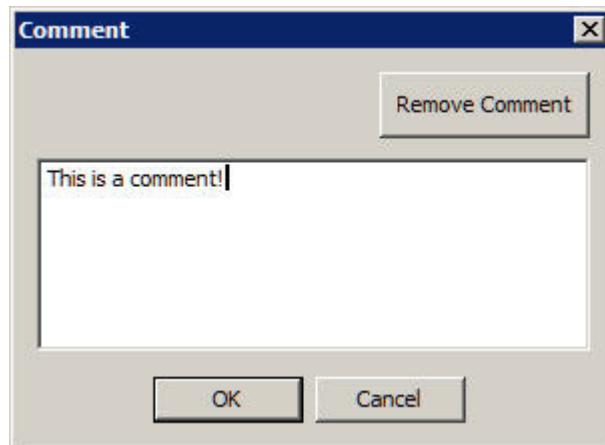


Figure 149: The Comment dialog

10.4.6 Copying selected data to the clipboard

See [Section 9.5.4](#).

10.5 Preconfigurations

The current Measurement Report settings can be saved in a preconfiguration. The following properties will be saved:

- Background color of the graphical view
- Colors and styles of the X and Y axes
- Colors and styles of the measurement curves
- Visibility of the legend in the graphical view
- Visibility of the measurement curves
- Auto scaling of the Y axes
- Type of the measurement curves in the graphical view
- Column widths of the tabular view
- Legend settings

Clicking the **Default** button in the **Open Preconfiguration/Save Preconfiguration** dialog will load the default graph and the general and layout settings of the legend.

Otherwise the preconfiguration handling for Measurement Reports works in a same way as for Trends, see [Section 9.6](#).

10.6 Exporting Reports

The selected report page can be saved to a file in .CSV format.

It is possible to save the selected Trend data to a file in .CSV format. In .CSV format, the separator between the columns is retrieved from the system settings. It can be changed in Windows control panel > Region and Language > Additional settings... > Customize Format numbers tab > List separator.

1. Select **Export** from the **Measurement Reports** menu. The **Save As** dialog is opened.
2. Specify the folder and the file name.
3. Click **Save** to export the data.

The exported text file contains the header information, the report time period, the unit information and the report data. When opening the export file with Microsoft Excel, select **Format/Cells/Text**(in the Category list).

This way the time format will be displayed correctly.

10.7 Printing Reports

Printing the Report data either in the tabular view or in the graphic view can be done by selecting **Main/Print** from the menu bar or by clicking the appropriate button from the **Main** toolbar. The summary information from the bottom of the tabular form will be printed on the last page.

When printing from the graphic view, the printout is exactly the same as shown in the graphical view at that moment. The legend information will be printed on the last page.

10.8 Authorizing

Measurement reports follow the authorization concept of MicroSCADA X. The authorization level is checked from the authorization group REPORTS. If this authorization group does not exist, the authorization level of the group GENERAL is used.

The following functions in the Report views require at least authorization level 1:

- Add, remove or edit comments
- Manually enter values

10.9 Quick Reports

Quick Report is essentially a report browser, which is able to show all the report objects defined within the report application. The objects to be shown at a time can be selected through the **Show/Hide Curve** dialog.

The current Quick Report configuration can be saved with a unique name and is available from the report page selection box.

Quick Reports are available on hourly, daily, weekly, monthly and yearly basis. The report data can be viewed both in tabular and in graphical form.

Section 11 Area of Responsibility

Areas of Responsibility (AoR) define user access rights and the role of a user to a specific area. Exclusive Access Rights (EAR) is a functionality extending the AoR concept. The EAR functionality is a token which allows only one user at a time to have rights for the area.

11.1 AoR user interface

All application users can use a specific AoR user interface to visualize the current AoR assignments. The user interface can be accessed from the **Tools/Area of Responsibility...** menu item. Only the users who have AoR definitions are shown in the user interface. The first row in the user interface shows the information for the current user. The users who have AoR definitions but who are currently not logged in to the application are listed in the Offline users section at the bottom of the view.

The user interface works in two different modes, the AoR-enabled mode and the EAR-enabled mode. The list header shows all AoRs where the current user has an AoR role definition. In the EAR-enabled mode it also shows the EAR role name for each AoR where the user has a role definition.

In the AoR-enabled mode, all users having AoR definitions are shown as Operators or Viewers. Only Operators are allowed to control switches belonging to the specific AoR. Operators have equal rights for the AoR, and they can operate simultaneously on the same AoR. [Figure 150](#) shows the user interface in the AoR-enabled mode.

The screenshot shows a Windows application window titled "Area of Responsibility Display / 1 - ABB [User: Jack]". The main grid displays user roles for four users: Jack, Joe, John, and two offline users: AOR_Master and Visitor. The columns represent areas: East, North, South, and West. The legend at the bottom indicates that blue cells represent "Operator" and white cells represent "Viewer".

| User/Area | East | North | South | West |
|----------------------|----------|----------|----------|----------|
| Jack | | Operator | | |
| Joe | Operator | | | |
| John | | | Operator | Operator |
| Offline Users | | | | |
| AOR_Master | Operator | | Operator | Operator |
| Visitor | | | | |

Legend: Operator Viewer Offline Users

Figure 150: AoR user interface in AoR-enabled mode

In the EAR-enabled mode, users can have different roles for each AoR. Viewers cannot operate on the AoR but they can see the current AoR assignments.

The legend at the bottom of the user interface describes the different user roles. Active Operator is a user having EAR for a specific AoR. Operator is a user who does not hold the EAR for a specific AoR but who can become Active Operator if the EAR ownership is changed.

Uncontrolled AoRs are highlighted in the lists header. [Figure 151](#) shows an example in which an AoR named West does not have any assigned operator. Also the User/Area header cell is highlighted when there is at least one uncontrolled AoR.

The user Operators can negotiate the owner of the EAR for a specific AoR. [Figure 151](#) shows similar situation as shown in [Figure 150](#) in which the EAR mode is activated.

| User/Area [Role] | East [Primary] | North [Primary] | South [Secondary] | West [Viewer] |
|----------------------|----------------|-----------------|-------------------|---------------|
| Jack | Take | | Request | |
| Joe | | Assign | | |
| John | Assign | Assign | | |
| Offline Users | | | | |
| AOR_Master | [Master] | [Master] | [Master] | [Master] |
| Visitor | | | | |



Figure 151: AoR user interface in EAR-enabled mode

[Table](#) shows the meaning of different EAR roles. For detailed information about EAR user roles and how the EARs are automatically assigned, see SYS600 Application Design.

Table 25: EAR role

| Authorization level | Meaning |
|------------------------|---|
| 0 - View | Can view AoR and EAR data (runtime information). |
| 1 - Secondary Operator | Can read EAR information (e.g. the user having the EAR for the AoR). The secondary operator for an AoR is allowed to have the EAR. |
| 2 - Primary Operator | Can read EAR information (e.g. the user having the EAR for the AoR). The primary operator for an AoR is allowed to and is the preferred operator to have the EAR. |
| 3 - Master Operator | Can read and write EAR information. The operator can force the EAR to him/herself or assign it to someone else who is allowed to have the EAR for the AoR. |

11.2 Requesting Ownership of EAR

A user having a Secondary Operator role for an AoR can request EAR from the current EAR owner. The AoRs which can be requested by the user show a Request button in each AoR column. As the user interface in [Figure 151](#) shows, user Jack can request AoR named South from its current EAR owner, John. A request for the EAR ownership needs confirmation from the current EAR owner. The current EAR owner can accept or reject the request in the Monitor Pro dialog or in the AoR user interface. [Figure 152](#) shows the request confirmation message in which Jack requests the ownership for the AoR named South from the current EAR owner, John.

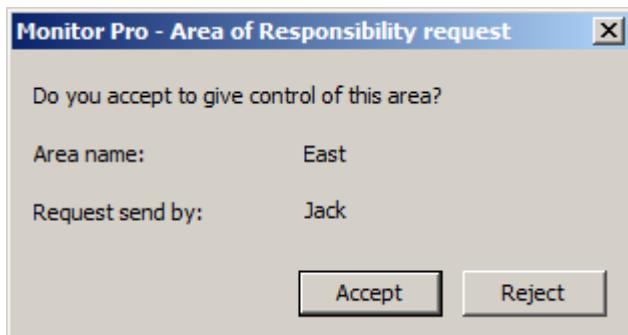


Figure 152: EAR request window

Secondary Operators can also try to **Give** an EAR role for any other user having a sufficient EAR role for that AoR. This request must also be accepted by the receiving user before the EAR ownership is changed.

The ownership of the EAR is changed only if the current EAR owner accepts the request. Timeout will occur for EAR requests after 30 seconds if the current EAR owner does not respond to the request. After the timeout, the ownership of the EAR is not changed.

11.3 Forced EAR Ownership Operations

Users having Primary Operator or Master Operator roles for a specific AoR can make forced ownership assignments. They can directly take the EAR ownership or assign it to any other user having at least an Operator role in a specific AoR. Forced EAR operations are made by clicking **Take** or **Assign** in the AoR user interface. [Table 26](#) shows EAR roles having forced operations rights. In all other cases the ownership of an AoR is transferred using requests.

Table 26: Operator EAR roles and forced operations

| EAR role | Current EAR owner role |
|----------------------|------------------------|
| 2 - Primary Operator | Seconday Operator. |
| 3 - Master Operator | Any Operator. |

[Figure 151](#) shows AoR user interface where user Jack can perform forced operations on AoRs East and North. He can Take the EAR ownership of AoR East or Assign it directly to user John. He can also directly Assign AoR North, which he currently has the ownership EAR, to either user Joe or John.

Situations in which the user either receives or loses EAR are notified by showing an information window. EAR notifications are purely informative and can be acknowledged only by clicking OK. [Figure 153](#) shows an example of an EAR notification window in which user Joe is informed that he has lost the EAR for the AoR named East and that the new EAR owner is Jack.

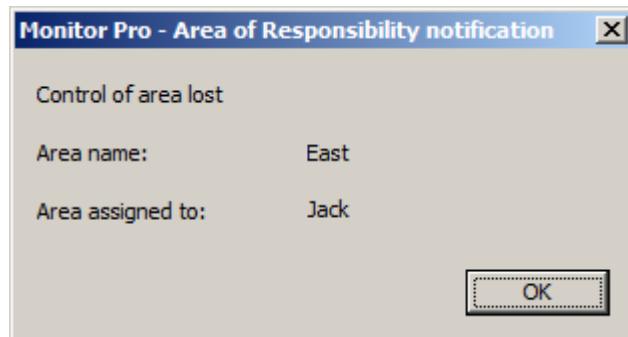


Figure 153: EAR lost information window

Section 12 System Self Supervision

System Self Supervision (SSS) is used in MicroSCADA X systems for supervising and monitoring the system. It provides status information of hardware and software using the supervision symbols of SYS600.

The System Self Supervision consists of:

- supervision application objects
- supervision monitoring symbols and control dialogs
- supervision events and alarms
- supervision logging

The supervision application objects provide the source for supervision state and status information. The supervision information is shown in the Event and Alarm lists. Typically, additional system supervision display has been designed for MicroSCADA X system supervision purposes. [Figure 154](#) shows the System Self Supervision dedicated symbols and statuses, which can be found from such a system supervision display. The supervision information is displayed in the supervision display by supervision monitoring.

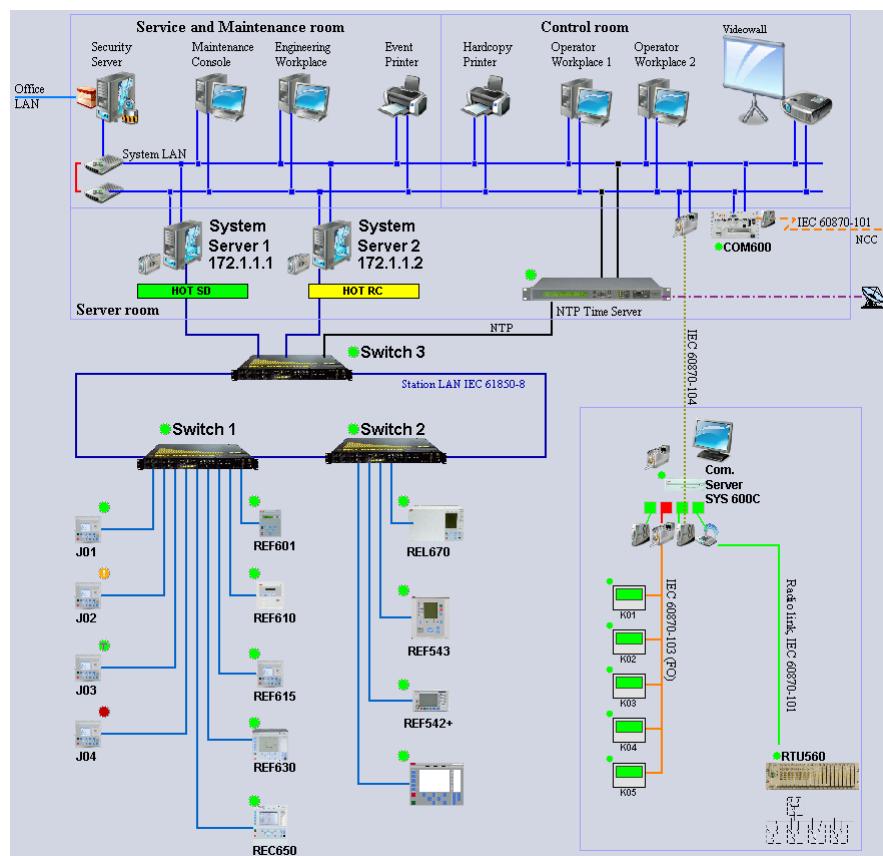


Figure 154: An example of a typical system supervision display

12.1 Supervision application objects

The main function of the supervision application objects is to provide the information source for the objects to be supervised. These application objects provide information for supervision monitoring symbols, appearance of information as events and alarms in the appropriate lists. Additionally, these application objects are involved in supervision logging.

12.2 Supervision monitoring symbols and control dialogs

The main function of supervision monitoring is to provide the visual information about the supervised objects in a user friendly way. Supervision symbols are reflecting the states and statuses based on usage of coloring. For example, green color typically indicates a good object status, whereas red color indicates a failure status. The alarming supervision symbols are indicated by a blinking red color.

12.2.1 Supervision symbols

About 50 symbols have been designed for system supervision purposes. These symbols are updated either as event based or time based manners by the runtime logic of supervision application objects. This way, the supervised object gets visualized by the real world object state and status in the system.

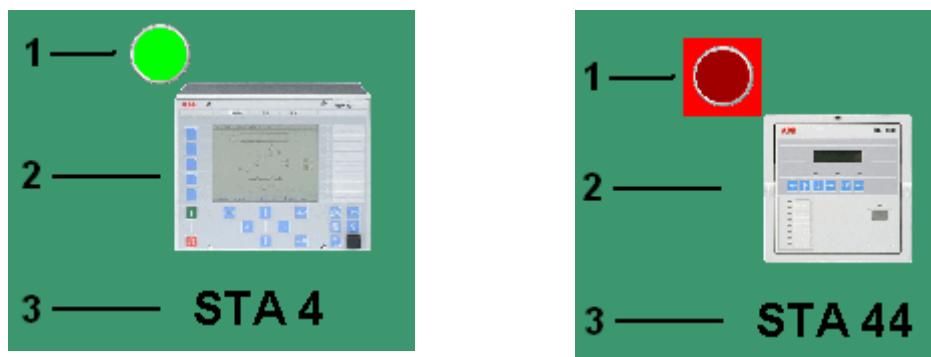
For example the following supervision symbol categories are available:

- System server
- Application
- Communication unit
- Station (IED)
- Workplace
- Computer accessories
- Network equipment
- Status

These supervision symbols are installed into the system supervision display using Display Builder. For information on the characteristics of all supervision symbols, see SYS600 Process Display design manual.

12.2.2 Symbol appearance

Principles for supervision symbol visual design are general and used for all supervision monitoring symbols. Some supervision symbols have both the dynamic and static appearance as indicated in [Figure 155](#).

Figure 155: Dynamic and static appearance of supervision symbols

A supervision symbol contains these appearances:

1. Dynamic state (circle) and status (rectangle) color indicators.
2. Static identification drawing of an object.
3. Dynamic identification text of an object.

The dynamic appearance contains both the state and status indicator of an object. Supervision state is indicated by a green or red circle. The rectangle part of the dynamic indicator shows the status of the supervision symbol. For example, a blinking red color indicates an alarm, which has not yet been acknowledged by the operator. The following table lists the typical states and statuses that may appear for supervision symbols.

Table 27: States and statuses for supervision symbols

| State and Status Indicator | Description |
|-----------------------------------|--|
| | Good status In good status the symbol is static green. |
| | Failure status with non-alarming In failure status the symbol background is blinking red. The cause for the failure status should be analyzed and corrective actions should be taken. |
| | Good status with Invalid Time In good status the symbol is static green. |
| | Unknown status In unknown status the symbol is static magenta. The cause for the unknown status should be analyzed and corrective actions should be taken. |
| | Warning status (warning limit has been exceeded) In warning status the symbol is static yellow. The cause for the warning status should be analyzed, because over time this object may change to failure status. |
| Table continues on next page | |

| | |
|--|--|
| | Good status with unacknowledged alarm Symbol has been in the alarming state, but not anymore. Acknowledgement of alarm will change the symbol to Good status. |
| | Failure status with unacknowledged alarm Symbol is generating an alarming state, which is still active. Acknowledgement of alarm will not change the symbol to good status. The cause for the failure status should be analyzed and corrective actions should be taken. |
| | Failure status with acknowledged alarm Symbol is generating an alarming state, which is still active. Alarm has already been acknowledged, but the cause for the failure status should be analyzed and corrective actions should be taken. |

Association to the real world object is achieved with the static part of symbol. For example, for Station supervision, there is a variety of IED products available. Additionally, it is possible to include a Station symbol, if needed. The available supervision symbols for IED products are shown in [Figure 156](#).



Figure 156: Supervision symbols for IED products

12.2.3 Supervision control dialogs

Supervision control dialogs are opened when the appropriate symbol in the supervision display is clicked. These dialogs have been designed to provide more information about the selected supervision object. Additionally, it is possible to perform the supervision related control operations, for example, sending general interrogation command to Station (IED) or activating the take over in HSB system. Supervision control dialog contents and authority handling for control operations can be configured.

For example, the following control dialogs are available:

- Base System Supervision
- Application Supervision
- Communication Node Supervision
- Communication Line Supervision
- Station Supervision
- SNMP Supervision

12.2.3.1 Common characteristics

Supervision control dialogs have common characteristics, such as the Power Process control dialogs. An example of **Station Supervision** is shown in [Figure 157](#). By default, dialog shows the **Main** tab. The selected supervision object is indicated in the dialog title and the **Object Identification** field. Detailed attribute information is shown in **Attribute** and **Value** columns. The dialog can be expanded by using the **>>** button.

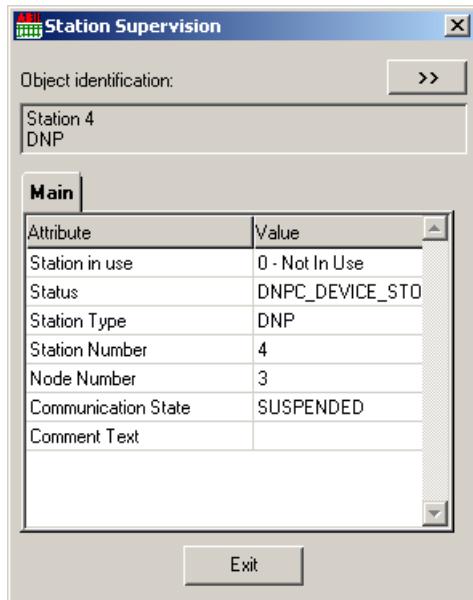


Figure 157: An example of a supervision control dialog

When the dialog is expanded, additional tabs appear, see [Figure 158](#). By using the tabs, it is possible to perform supervision control operations, especially in the **Control** tab. The supervision alarms for the selected object are listed in the **Alarms** tab. In this tab, it is possible to acknowledge selected or all alarms. Also other tabs may exist, for example **Diagnostics**, where typical operations are resetting the counter values with the appropriate buttons.

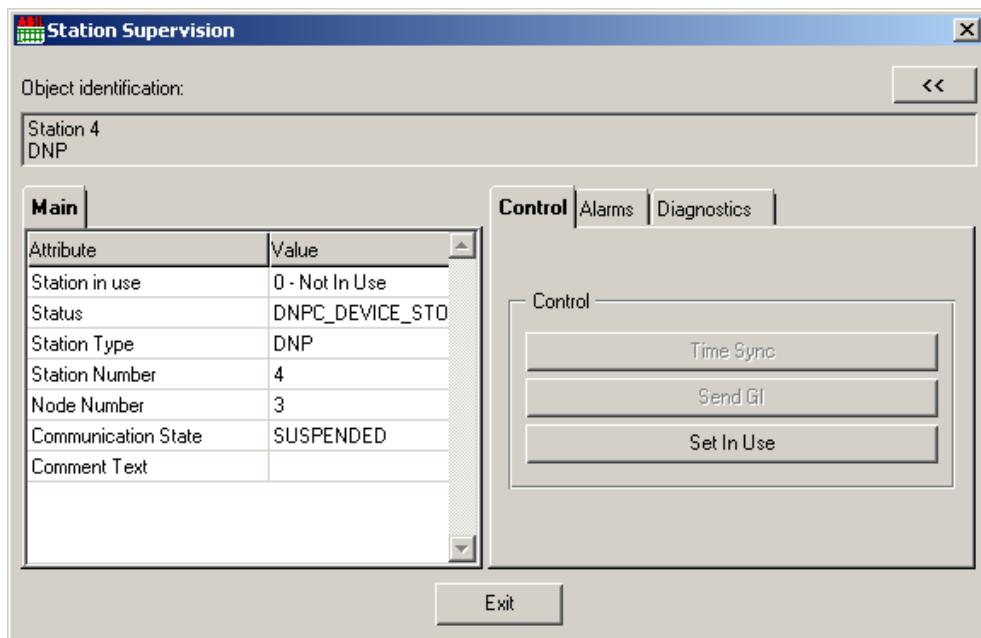


Figure 158: Expanded station supervision control dialog

12.2.3.2 Application supervision

The appearance of the control dialog for application supervision depends on the type of system. The **Main** and **Diagnostics** tabs are shown only for the single system, whereas the **Shadowing** and **Forced Takeover** tabs appear for a redundant system.

The **Diagnostics** and **Shadowing** tabs provide more detailed information about the application counters. In the **Forced Takeover** tab it is possible to activate the forced takeover.

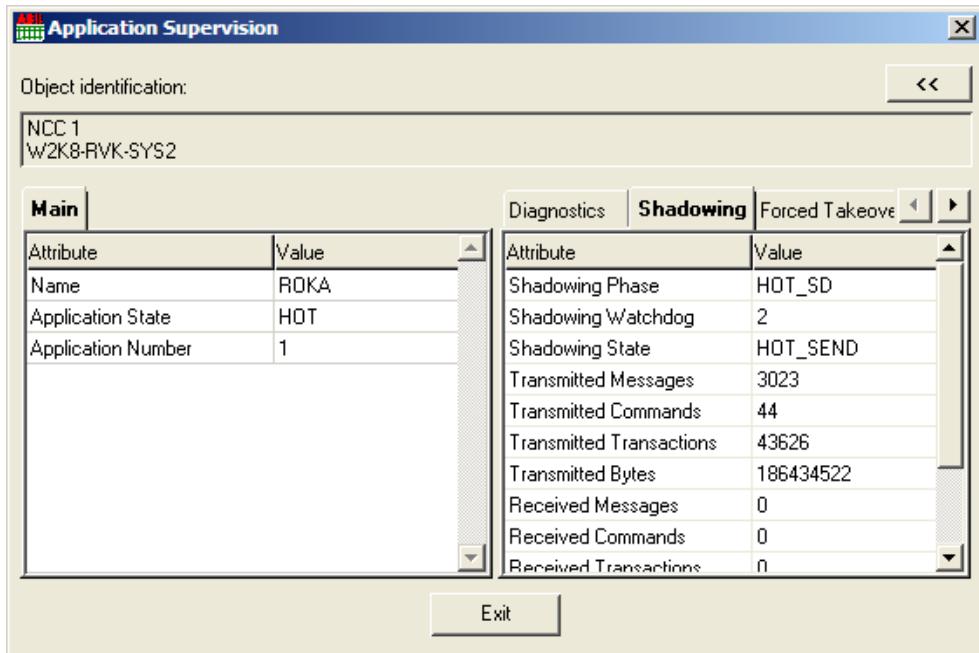


Figure 159: Application supervision control dialog

12.2.3.3 Communication Node supervision

There are control dialogs available for both PC-NET and IEC 61850 nodes. By default, the same attribute information is shown in the **Main** tab. Additionally, for PC-NET communication nodes, it is possible to expand the dialog to get details of each communication line.

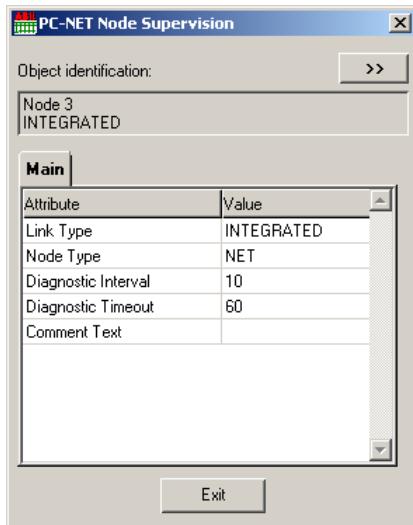


Figure 160: Communication node supervision control dialog

12.2.3.4 Communication Line supervision

Communication lines for PC-NET are shown when the PC-NET Node Supervision control dialog is expanded. Attributes for communication lines configured for selected PC-NET node are shown in separate tabs with attribute and value descriptions (for example, the **Line 5** tab).

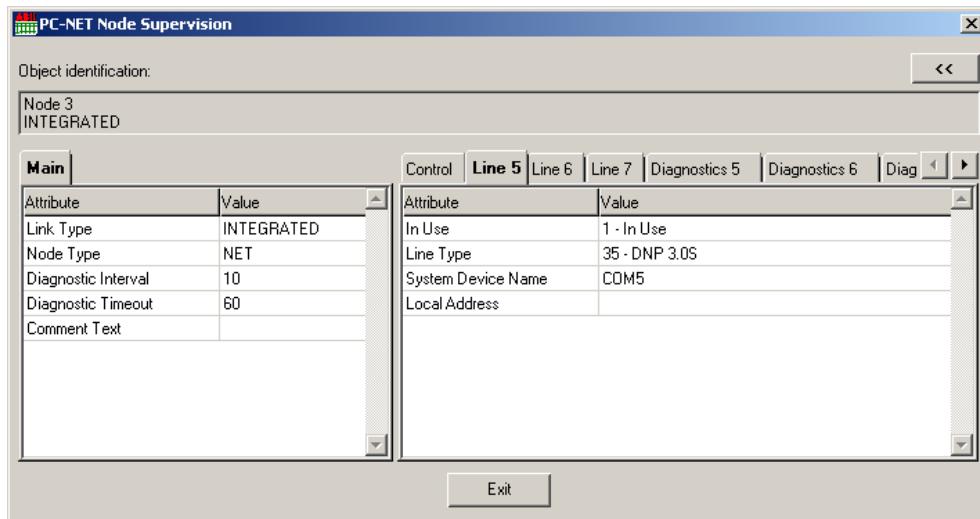


Figure 161: Communication line attributes

Communication line diagnostics can be monitored on the dedicated tabs, for example the **Diagnostics 5** tab. This tab shows **Index**, **Diagnostic Counter** and **Value** information for the selected communication line. Clicking **Reset** or **Reset All** clears the value information either for the selected diagnostic counter or all counters at the same time. **Clear to Send** and **Carrier Detect** items indicate the communication status for serial communication lines. These items are not visible to the TCP/IP communication lines. All information shown in this tab is cyclically updated.

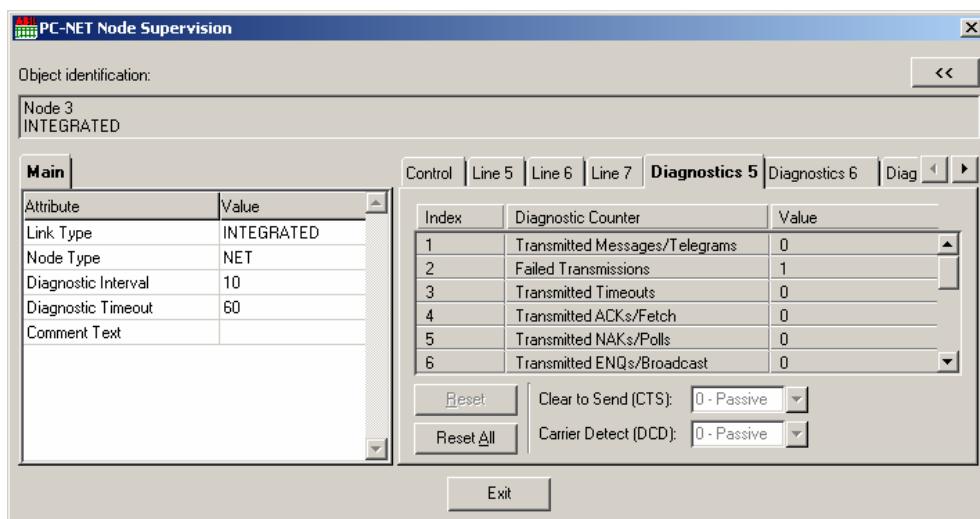


Figure 162: Communication line diagnostics

In the **Control** tab it is possible to set communication lines either out of use or in use. It is also possible to stop or start the PC-NET Node communication from that tab, too. See [Figure 163](#) for details.

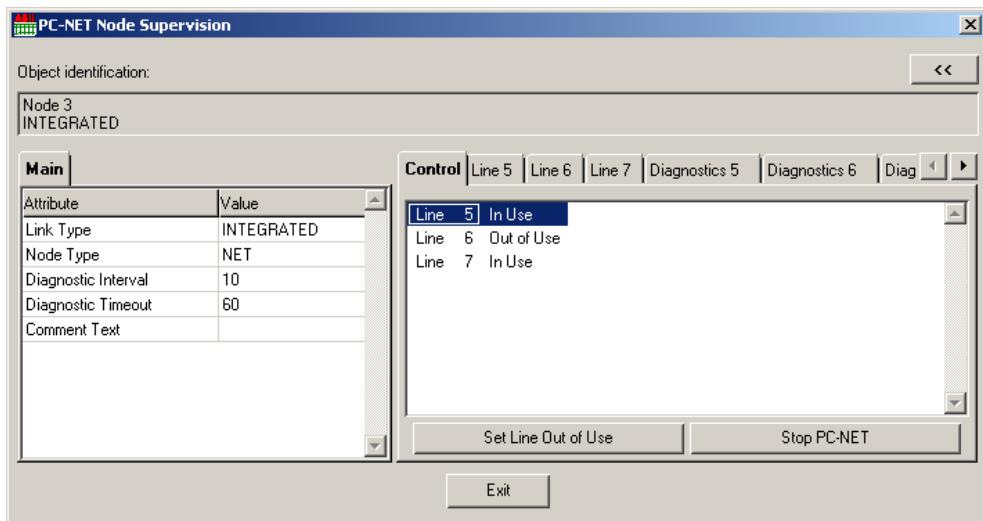


Figure 163: Communication line control

12.2.3.5 SNMP supervision

The appearance for SNMP supervision control dialog depends on the type of the SNMP device. Simple Network Management Protocol devices are able to provide information about them in the internet protocol network via network management protocol. Such devices are: servers, printers, hubs, switches and routers. An example of Network Switch with 8 ports is shown in [Figure 164](#). When the dialog is expanded, the alarms for the device are shown and control operations can be performed by using the **Ack. selected** and **Ack. All** buttons.

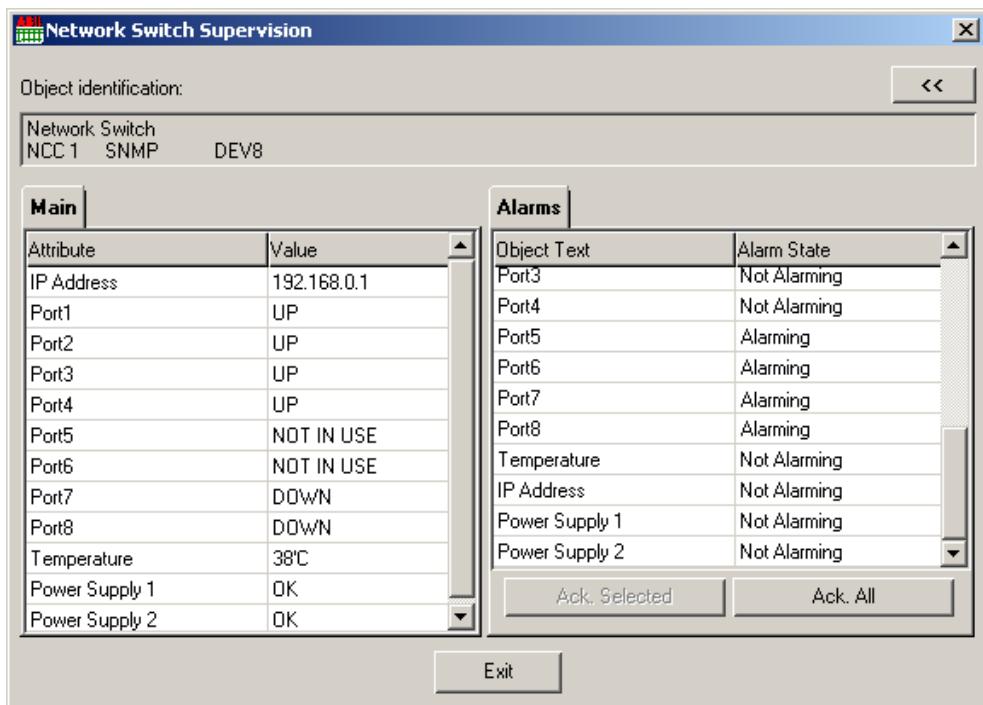


Figure 164: Network switch supervision control dialog

The appearance of attributes shown for the SNMP device is configured via device templates. For more information, see SYS600 Application Design manual. By default, the following device templates are found:

- Network switch
- GPS
- Computer
- Printer

12.3 Supervision events and alarms

System Self Supervision events and alarms in the system can be monitored in the Event and Alarm Displays. Events and alarms of each supervised object are generated according to the supervision event filtering specified during the configuration. For more information about the filtering, see SYS600 Application Design manual.

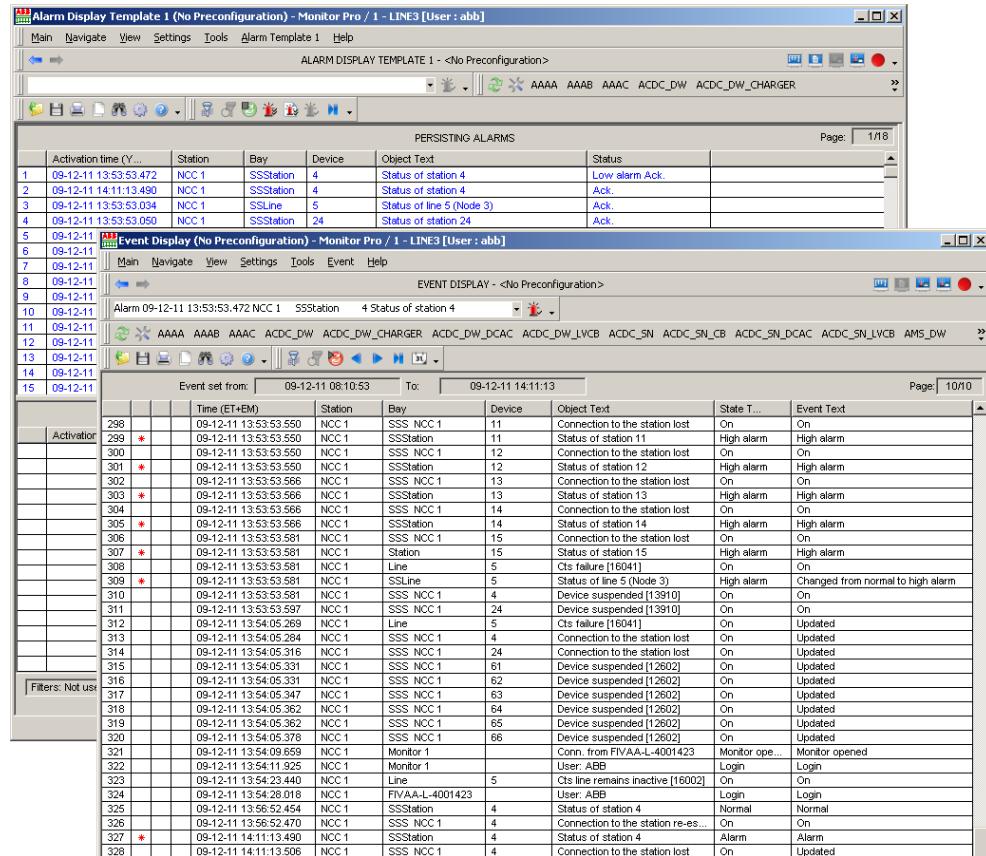


Figure 165: Supervision events and alarms

In case of an alarm, the supervised object causing an alarm can be found from the Alarm Display. This alarm indicates the existing state of the supervised object and it gets changed to the normal value as the supervised object receives the normalized event. The reason for causing the alarm in system can be found from the Event Display, for example Device stopped [13918].

12.3.1 Filtering supervision events and alarms

It is possible to define a filter condition that filters out all other events and alarms except the supervision related events and alarms shown in Alarm and Event Displays. In Event Display, selecting **Event/Filters** opens the **Filter Settings** dialog. Define the settings as shown in Figure 166. Click **OK** to apply the filter definition and close the dialog window.

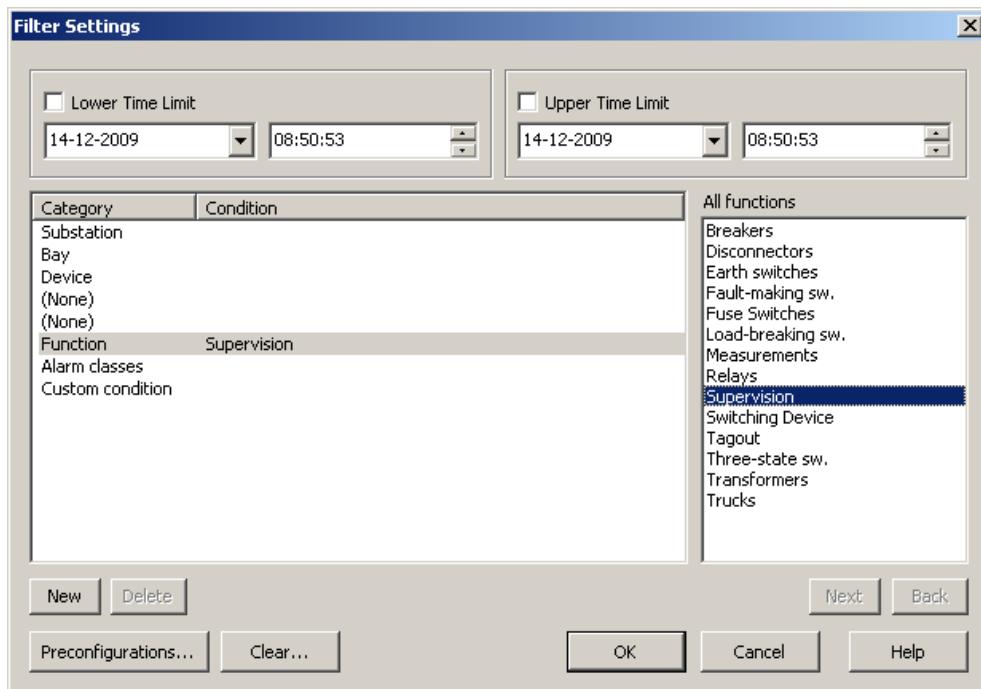


Figure 166: Filter Settings for Supervision information

12.4 Supervision logging

In addition to the supervision information appearance in the Event and Alarm Displays, each supervision object event can be logged into the supervision log file. These events are collected according to the supervision event filtering configuration and stored in the file system. For more information about the configuration for supervision event filtering and logging parameters, see SYS600 Application Design manual.

In addition to the Event and Alarm Displays, the supervision information can also be found from Supervision Log Viewer, when configured accordingly in MicroSCADA X system.

12.5 Supervision Log Viewer

Supervision Log Viewer is used for monitoring the supervision information logged into different log files. These files contain information about the supervision events related to the system software and hardware.

Supervision Log Viewer contains the following features:

- viewing common system messages of MicroSCADA X system
- viewing unknown process object messages of MicroSCADA X system
- viewing Windows Operating System events

12.5.1 Starting tool

Supervision Log Viewer can be started from the menu bar by selecting **Tools/Supervision Log**. When the tool gets started, it shows the contents of logged information at that moment. To update the view, select **View/Refresh** to get the tool reflected by the latest collected information. An example of the Supervision Log Viewer main view is shown in [Figure 167](#).

| PURESYS600 [102] / DEFAULT.EVT - Supervision Log | | |
|--|--------------|---|
| Date | Time | Description |
| 2012-11-06 | 09:33:43.702 | Station 441, node 4, line 4: Communication with cs lost [13484] |
| 2012-11-06 | 09:33:43.702 | Event in station 441: Suspended. |
| 2012-11-06 | 09:33:35.38 | Station 531, node 5, line 3: Device suspended [13251] |
| 2012-11-06 | 09:33:35.38 | Event in station 531: Suspended. |
| 2012-11-06 | 09:33:35.38 | Station 521, node 5, line 2: Startted [13803] |
| 2012-11-06 | 09:33:35.38 | NET line 3, Node 5: Status [0] |
| 2012-11-06 | 09:33:35.38 | NET line 2, Node 5: Status [0] |
| 2012-11-06 | 09:33:33.73 | Station 441, node 4, line 4: Status [0] |
| 2012-11-06 | 09:33:33.72 | Station 431, node 4, line 3: Status [0] |
| 2012-11-06 | 09:33:33.72 | Event in station 431: Running. |
| 2012-11-06 | 09:33:33.72 | Station 421, node 4, line 2: Device suspended [13863] |
| 2012-11-06 | 09:33:33.72 | Event in station 421: Suspended. |
| 2012-11-06 | 09:33:33.72 | NET line 5, Node 4: Line stopped [17658] |
| 2012-11-06 | 09:33:33.72 | NET line 4, Node 4: Status [0] |
| 2012-11-06 | 09:33:33.72 | NET line 3, Node 4: Status [0] |
| 2012-11-06 | 09:33:33.72 | NET line 2, Node 4: Line started [17607] |
| 2012-11-06 | 09:33:33.72 | NET line 1, Node 4: Line started [17657] |
| 2012-11-06 | 09:33:32.47 | Station 382, node 3, line 8: Device suspended [13251] |
| 2012-11-06 | 09:33:32.47 | Event in station 382: Suspended. |
| 2012-11-06 | 09:33:32.47 | Station 381, node 3, line 8: Device suspended [13251] |
| 2012-11-06 | 09:33:32.47 | Event in station 381: Suspended. |
| 2012-11-06 | 09:33:32.47 | Station 361, node 3, line 6: Device suspended [13801] |
| 2012-11-06 | 09:33:32.47 | Station 341, node 3, line 4: Status [0] |
| 2012-11-06 | 09:33:32.47 | Event in station 341: Running. |
| 2012-11-06 | 09:33:32.47 | Station 331, node 3, line 3: Device suspended [13863] |

Figure 167: Main view

Section 13 Sequence Executor

SYS600 Sequencer offers creation, execution and monitoring of switching device command sequences in MicroSCADA X. Sequencer has two separate tools one for creation and configuration of sequences (Sequence Configurator) and another tool for execution of sequences (Sequence Executor). This section describes sequence execution and monitoring using Sequence Executor. More details regarding Sequence Configurator tool can be found from SYS600 Application Design Manual.

A sequence is a collection of one or more steps (commands) for switching devices. Currently, the supported commands for sequence executions are switching device open or close commands and a custom message to display. For instance, opening a circuit breaker can be considered as one step in a sequence.

13.1 Launching the tool

Sequence Executor can be launched directly from Monitor Pro by selecting **Tools/Sequencer** as shown in [Figure 168](#).

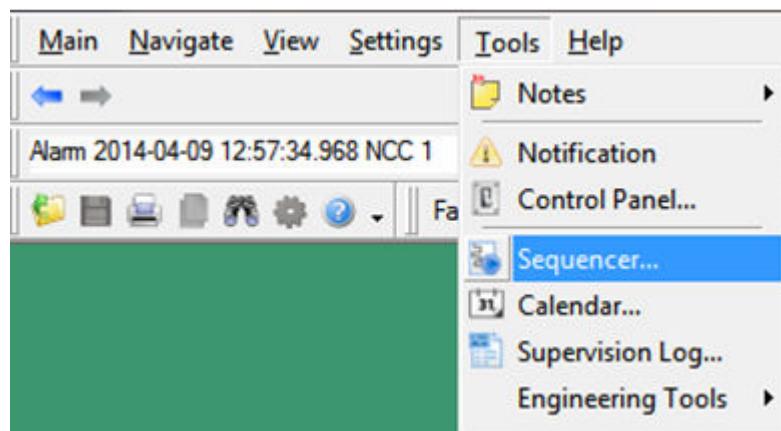


Figure 168: Launching Sequence Execution Tool in Monitor Pro



Sequencer menu item is not shown in the menu if the sequencer is missing or not enabled in the applied license or the sequencer package is not installed.

13.2 User Interface

By default, Sequence Executor shows an empty view with no sequence selected. A pre-configured sequence can be selected from the Sequence drop down menu to view the sequence steps and execute a sequence.

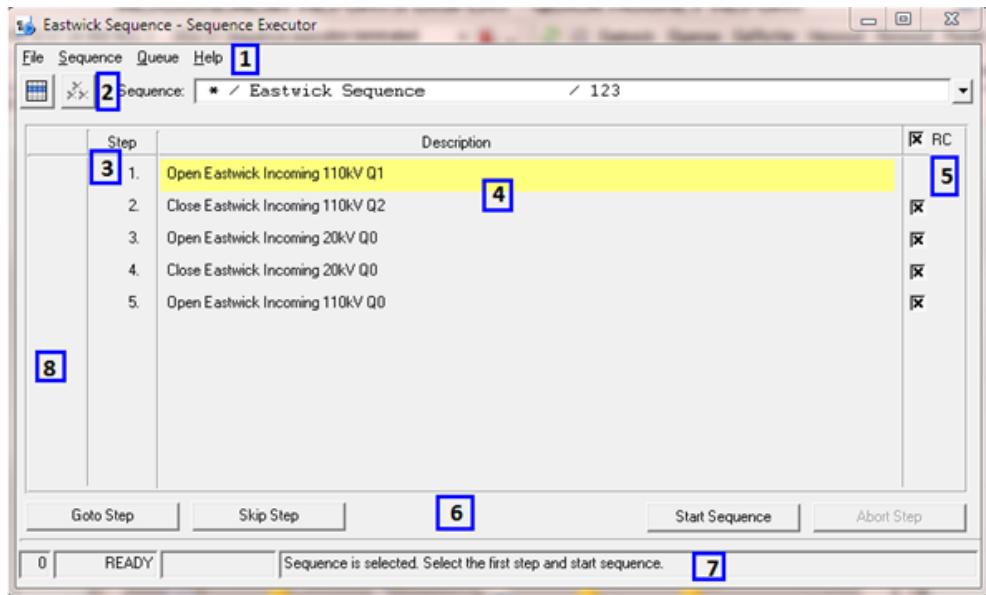


Figure 169: Sequence Executor showing the tool's layout and an opened sequence

Description of the tool layout shown in Figure 169 are described in [Table 28](#)

Table 28: Description of Sequence Executor Tool layout

| Order | Item Name | Description |
|-------|---------------------------|--|
| 1 | Menu bar | Contains the tool menus |
| 2 | Toolbar | Contains the toolbar buttons of sequence executor |
| 3 | Step numbers | Shows the step numbers in order |
| 4 | Descriptions of steps | Describes the steps as configured using Sequence Configurator tool |
| 5 | RC (Require Confirmation) | Checkboxes for selecting or deselecting user confirmation during step executions |
| 6 | Operation buttons section | Contains buttons that are used for sequence execution, step selection, skipping a running step and aborting a sequence |
| 7 | Status bar | Provides detailed information about the selected sequence and its current state |
| 8 | State of steps | Shows the states of the step executions using the symbols described in Figure 172 |

13.2.1 Menu bar

The menu bar in Sequence Executor consists of different menus including the commands/functions in the toolbar. The menus are shown in [Figure 170](#) below and the menu and menu items are described in detail in [Table 29](#)



Figure 170: Sequence Executor's Menu bar

Table 29: Sequence Execution Tool's menu bar functions

| Menu | Function | Description |
|----------|-----------------------|---|
| File | Exit | Exits Sequence Executor Tool |
| Sequence | Controllability Check | Executes controllability check to make sure that each switching device included in the sequence can be controlled (See Controllability Check Section) |
| | Execution Log | Shows detailed log or report of the last sequence execution (See Status and Outputs Section) |
| Queue | Queue State | Opens Queue State dialog that shows the tabular summary of sequences running or waiting in the execution queue |
| | Stop All | Aborts the running sequence and removes all waiting sequences from the execution queue. If aborted by an INT user, all sequences triggered by other triggers will also be stopped |
| Help | About | Information about the tool and system |

13.2.2 Toolbar

Sequence Executor toolbar, shown in [Figure 171](#), consists of three different functions.

The descriptions of the toolbar functions are described in [Table 30](#) below.

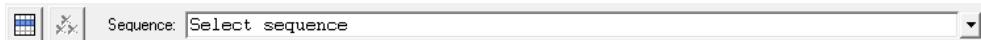


Figure 171: Toolbar in Sequence Executor

Table 30: Sequence Execution Tool's Toolbar functions

| Function | Description |
|--------------------|---|
| Queue State | Opens Queue State dialog that shows the tabular summary of sequences running or waiting in the execution queue |
| Queue/Stop All | Aborts the running sequence and removes all waiting sequences from the execution queue. If aborted by an INT user, all sequences triggered by other triggers will also be stopped. |
| Sequence Selection | Enables users to select a sequence from a list of configured sequences. After selecting a sequence from the drop down list, the following information is shown on the text field: <OI of the bay>/<The name of the sequence>/<Sequence number> If the sequence consists of steps from different bays, <OI of the bay> will be substituted by <*>. |

13.3 User Authorizations

Execution of sequences requires at least Level 2 Authorization Level. However Level 1 is enough for View Only rights for a running sequence.

13.4 Executing a Sequence

Sequences execution may require user confirmation. If the sequence steps are configured to require user confirmation the user has the possibility to choose one of the following actions after each step:

- Continue Sequence from next step
- Skip step
- Go to step to continue the execution from specified step
- Abort Sequence

To execute a sequence:

1. Select a sequence from Sequence drop down list in the toolbar.
The sequence opens with a list of steps having sequence number, description and RC (Require Confirmation) checkboxes. An empty Sequence drop down list shows that there is no sequence to execute.
2. Select/Clear the checkboxes in RC column (Optional)
By default the RC checkboxes are set according the sequence configuration. To toggle whether the user confirmation is required for the step, select/clear the checkboxes in RC column. You can also select/clear all the checkboxes in the column by selecting/clearing the RC checkbox in the column header.
Steps are executed without user confirmation when the checkboxes are clear. A selected checkbox shows that the step requires an interactive user confirmation.
3. Click on **Start Sequence** button to start sequence execution from the beginning/from the first step.
4. To start from a step other than the first step, click on GOTO STEP button and select a step to begin with. Press START SEQUENCE to start sequence execution from the selected step.
After sequence execution starts, the active step (the step under execution) is highlighted in yellow
5. Click on **Abort Sequence** button to abort/cancel sequence execution



In addition to an interactive user, sequences can be started from internal and external triggers. Internal triggers include event channel and Schedule function of the MicroSCADA X Calendar. Using external triggers, the sequences can be started from an NCC via COM500i functionality or from DMS600.

13.5 Statuses and Outputs

Sequence states are shown in the status bar indicated by number 7 in [Figure 169](#)

The tool shows the following sequence status information:

- Number of sequences in the execution queue
- State of sequence execution in status bar: Disabled, Ready, Running, Paused
- Current selected sequence with their ID (ID_APL) and name
- Description for every sequence step

The states of each step during sequence execution are indicated with different symbols. These symbols are located in front of each step (see section 8, State of steps, in [Figure 169](#)).

The description of the state of steps and the corresponding symbols are shown in [Figure 172](#)

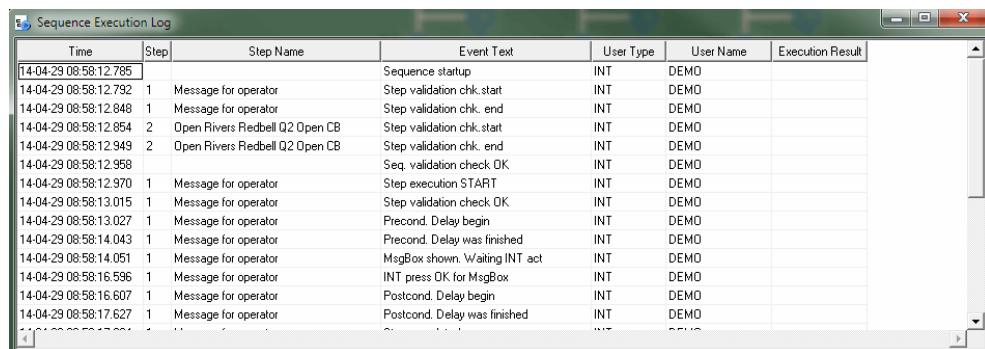
| State | Symbol |
|---------|--------|
| Success | ✓ |
| Fail | ✗ |
| Skip | — |

*Figure 172: State of Step and corresponding symbols***Sequence Execution Log**

Sequence Execution Log dialog shows the detailed log or report of the last sequence execution. The log includes the following information regarding the sequence:

- Time stamps
- Step number
- Step names
- Event texts for each step
- User Type
- User names
- Execution result (for example, successful/unsuccessful completion of sequence execution or error)

Select **Sequence>Execution Log** from the tool's menu to open the [Figure 173](#) as shown below



| Time | Step | Step Name | Event Text | User Type | User Name | Execution Result |
|-----------------------|------|--------------------------------|-------------------------------|-----------|-----------|------------------|
| 14-04-29 08:58:12.785 | | | Sequence startup | INT | DEMO | |
| 14-04-29 08:58:12.792 | 1 | Message for operator | Step validation chk.start | INT | DEMO | |
| 14-04-29 08:58:12.848 | 1 | Message for operator | Step validation chk.end | INT | DEMO | |
| 14-04-29 08:58:12.854 | 2 | Open Rivers Redbell Q2 Open CB | Step validation chk.start | INT | DEMO | |
| 14-04-29 08:58:12.949 | 2 | Open Rivers Redbell Q2 Open CB | Step validation chk.end | INT | DEMO | |
| 14-04-29 08:58:12.958 | | | Seq.validation check OK | INT | DEMO | |
| 14-04-29 08:58:12.970 | 1 | Message for operator | Step execution START | INT | DEMO | |
| 14-04-29 08:58:13.015 | 1 | Message for operator | Step validation check OK | INT | DEMO | |
| 14-04-29 08:58:13.027 | 1 | Message for operator | Precond Delay begin | INT | DEMO | |
| 14-04-29 08:58:14.043 | 1 | Message for operator | Precond Delay was finished | INT | DEMO | |
| 14-04-29 08:58:14.051 | 1 | Message for operator | MsgBox shown. Waiting INT act | INT | DEMO | |
| 14-04-29 08:58:16.596 | 1 | Message for operator | INT press OK for MsgBox | INT | DEMO | |
| 14-04-29 08:58:16.607 | 1 | Message for operator | Postcond. Delay begin | INT | DEMO | |
| 14-04-29 08:58:17.627 | 1 | Message for operator | Postcond. Delay was finished | INT | DEMO | |

Figure 173: Sequence Execution Log

13.6 Sequence Queue

Only one sequence can be executed at a time. The maximum numbers of sequences that are allowed to be in a queue for execution are five. See [Figure 174](#) Queue State Dialog



Only the non-interactive execution of sequences are queued. It is not possible to queue interactive user sequence execution.

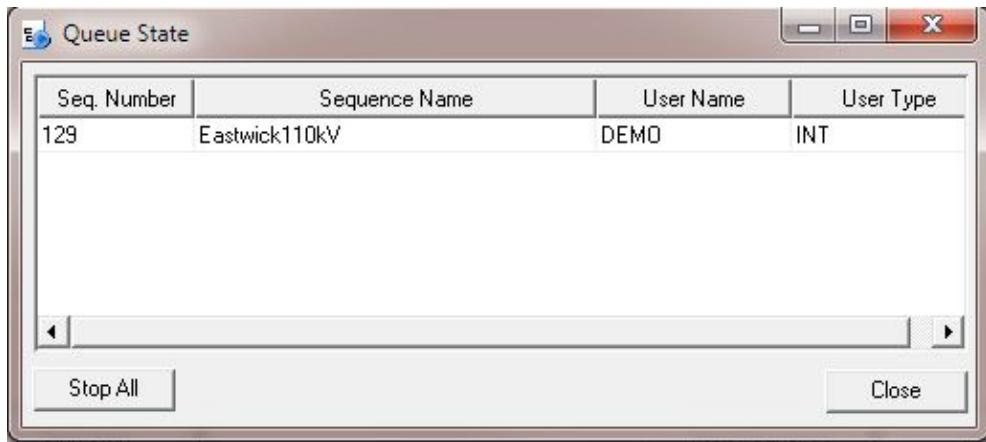


Figure 174: Queue State Dialog showing three pending sequences

To view the queued sequences:

1. Click on **Queue State** button in the tool bar or Select **Queue > Show State** from the menu to open the Queue State dialog.
The queue state dialog shows all sequences in the queue with their number, user name and user type.
2. Click on **Stop All** button to abort all the active and pending sequences in queue.

13.7 Controllability Check

Every step in a sequence must be controllable beforehand. Before any sequence execution is started, the sequencer function executes controllability check to make sure that each switching device included in the sequence can be controlled. The controllability check is repeated for each particular step command of the sequence. The progress of the sequence execution can be monitored and controlled in Sequence Executor. Controllability of steps is also checked when opening a new sequence. The Sequence Controllability Check dialog opens if one or more steps are not possible to be executed/controlled. See [Figure 175](#)

Sequence Controllability Check dialog can also be launched by selecting **Sequence > Controllability Check** from the main menu.

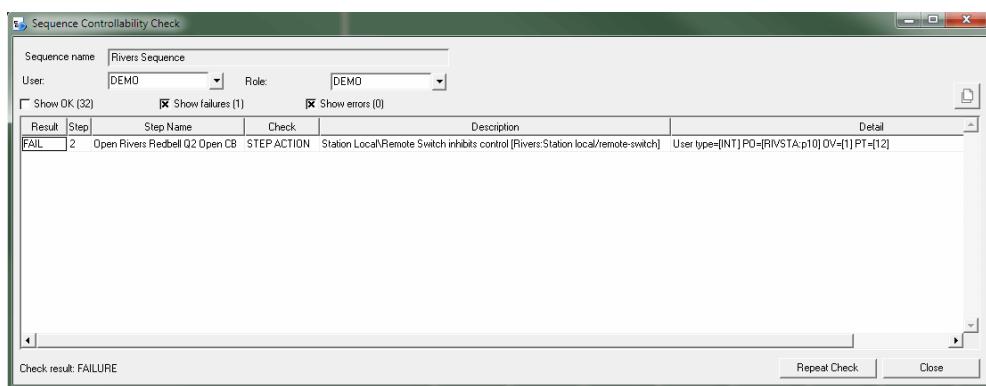


Figure 175: Controllability Check Dialog showing a failure due to station local/remote switch inhibition of control

Section 14 Using Calendar

Calendar is a tool for defining features or activities that depend on time.

Time periods can be applied, for instance, to define day and night tariffs, to specify contracts that are in force, general holidays, and so on. Calendar data can then be utilized by other functions, for example by the measurement reports.

It is possible to use the Calendar to define command procedures which are to be run on a defined day or on all days that are marked as a certain type of day. Default day settings are available either for all days or for workdays and Sundays separately.

Settings that determine the operations or properties which will take place at a certain moment of time, are defined in a day specific graphical attribute list. The attribute list is maintained by using an attribute tool that is integrated into the calendar. Each attribute has a graphical user interface of its own on the list.

Individual days can be configured independently with the attribute tool to have day specific attributes. The attribute list can also be defined for the day type. The day type is a logical name that can be used for connecting an attribute list to a day. All attributes defined for a day type are then applied to all days that have a link to the day type. Fast modifications can be performed simultaneously for several days by using the predefined day types. New day types can be created freely.

14.1 Opening Calendar

Calendar can be started in the application main picture. Select **Calendar** in the **Tools** menu.

The main calendar view is used for browsing general calendar information. The calendar is divided into 12 months, one in every tabbed page. A month can be selected by clicking the corresponding tab. The current day is marked with a red box (see [Figure 176](#)).

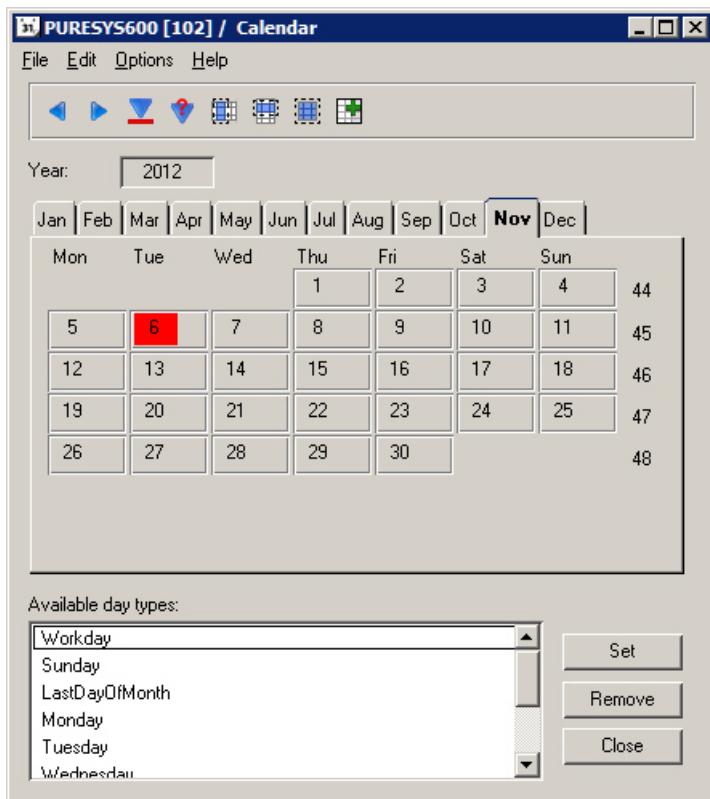


Figure 176: The Calendar tool

There are shortcuts in the toolbar for the most used commands. The commands are from left to right:

- Previous Year
- Next Year
- Go to Today
- Go to Year X
- Select Day of the Week
- Select Week
- Select Month
- Add Day Type

14.2 Making selections

Multiple selections can be made when the **Attribute** dialog is not open. Close it before making a multiple selection.

- Click a day in the **Calendar** to add the day into the selection.
- To deselect days, single-click the day label again. The current label state can also be changed by pressing the Space bar. Opening the **Attribute** dialog by double-clicking a day label also removes all other days selected except the current day.
- Selection can be expanded by using the selection buttons in the toolbar.
- Any day type can be added to the selection.
- Any day type setting can be removed from the selection.

14.3 Adding day type to group of days

When a selection is made, a day type can be added to the day group. Select a day type on the day type list and click **Set**. When the button is clicked, all the selection marks disappear and the number fonts of the selected day change to bold to indicate that they are provided with the relevant settings. If the day color is set on the day type attribute list, all the days are marked with that color.

To remove a day type setting from a day, make a multiple selection, select the day type to be removed and click **Remove**. Another way to remove a day type setting is to open the Edit day attributes dialog and to delete the corresponding day type block from the attribute list.

14.4 Setting day type attributes

To set a day type attribute, double-click the day type item on the list containing the day type names. This opens the **Attribute** dialog.

The day type attributes are defined in a similar way as the day attributes. The only difference is the text box in the upper part of the dialog where the type name is displayed. This name is also visible on the list of the main calendar view.

Changes made in the day type attributes are applied to all the days defined as that day type.

14.5 Saving attributes

Save the attributes by clicking **Apply**. Not clicking **Apply** before selecting another day will delete all the blocks containing invalid data. It is recommended to click **Apply** to check the data validity before moving to another day or closing the dialog.

Saving is also done when **Go to Today** is clicked. This is the most recommended way to save changes to the day or to day type attributes. When the **Attribute** dialog is closed, data validity is checked and valid data is saved.

14.6 Changing current time

To step one year forward, click **Next Year** on the toolbar. Similarly, to move to the previous year, click **Previous Year**. To move to any year between the years 1978–2045, click the **Go To Year** and type the year into the **Input** dialog.

14.7 Setting day attributes

Set the day and the day type attributes by double-clicking the day label (day number). The **Edit day attributes** dialog is then displayed (see [Figure 177](#)).

To add a new day attribute:

1. Click **Outage New** from the **Edit day attributes** dialog. A new block is added to the attribute list.
2. New attributes can be added into the day profile by clicking **Outage New**. In the subsequent dialog box, the type of the new attribute can be selected.
3. Click **Apply** after having edited the day attributes. The program checks the validity of the data and saves the changes. If data is not valid, an error message will be displayed.

Delete removes all the marked blocks. After having saved the attributes, the dialog can be closed by clicking **Close**.

Help displays the attribute tool help text.

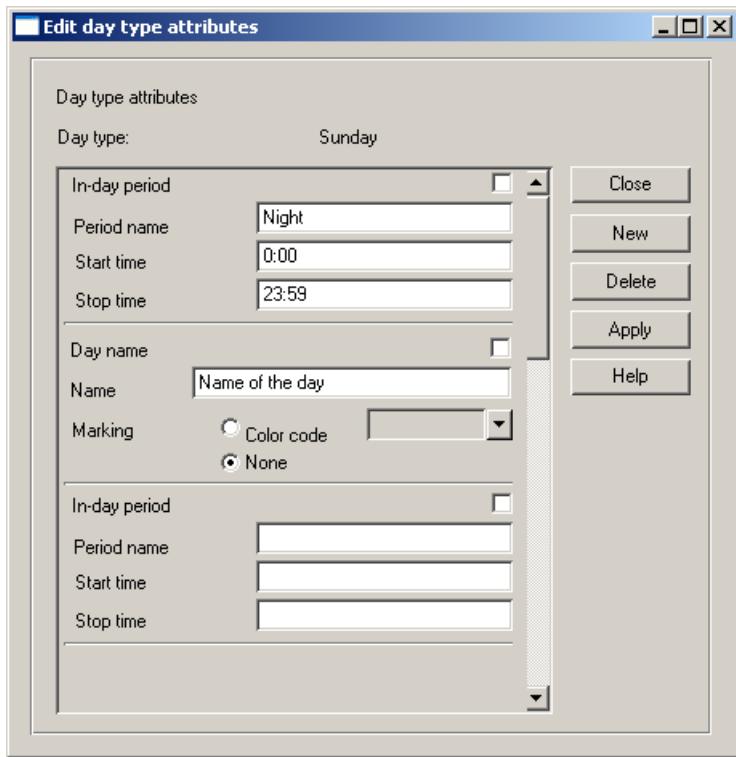


Figure 177: The Edit day type attributes dialog

A maximum of 10 attributes per day (or per day type) is allowed.

14.7.1 Available attributes

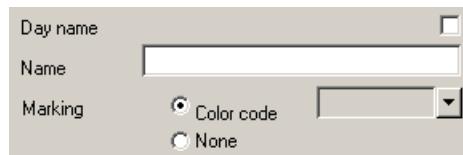
The following attributes are used in the attribute tool. Some of the blocks are available only for the day attribute list. Every block has a check box in the upper right corner. It is used for selecting the block.

1. **Assign type** Inserting this block into the attribute list of a day connects the day to a day type. All the settings made for the named day type are then applied to the current day. This block is available only for a day, not for a day type. All the day types that are defined in the Options tool are visible in the drop-down list.



Figure 178: The Assign type dialog

2. **Day name** A day is named with a given text string. The day color in the main calendar view is selected with the help of the drop-down list. The block is available both for days and day types.

*Figure 179: The Day name dialog*

3. **Run command procedure** It executes a command procedure at a given time of day. The running time is given with the time resolution of 1 minute. This block is available both for days and for day types.

*Figure 180: The Run command procedure dialog*

4. **Time period start/stop** This block is used to define periods which are in effect for several days. The block is available only for days.

*Figure 181: The Time period start/stop dialog*

5. **In-day period** The block defines a period that starts and ends during the current day 0:00-23:59. Time resolution is 1 minute. This block is available both for days and day types.

*Figure 182: The In-day period dialog*

14.8 Changing calendar properties

Open the **Calendar Properties** dialog from the **Options/Tool Properties...**menu. The dialog consists of three tabbed pages:

- General options
- Procedures
- Day types

14.8.1 General calendar options

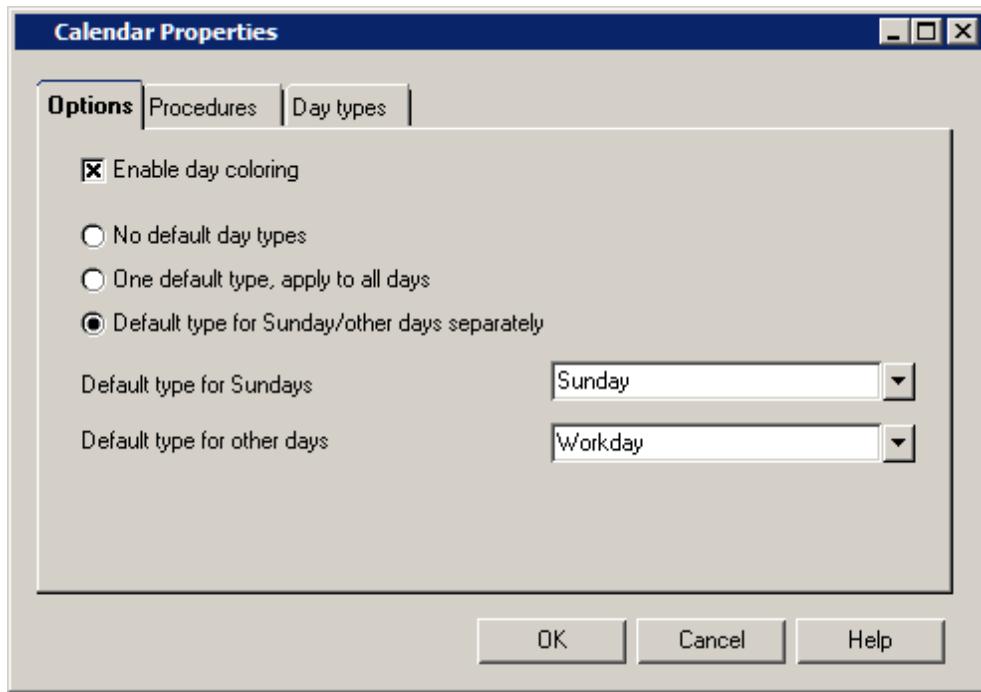


Figure 183: General calendar options

Table 31: Available default day types

| No | Type |
|----|---|
| 1 | No default types |
| 2 | One default type which is applied to all days |
| 3 | Default types for Sundays and other days separately. Default types are selected from the drop-down list where all the available day types are visible. The default type of an individual workday can be overridden by assigning it to Sunday type. Likewise, Sunday settings can be overridden with the day type of workday. If the default type of an individual day is to be overridden, select the day from the calendar's main view and assign it to an appropriate day type. |

To add more day types into the combo box, select the **Day types** tab and add new types on the list.

14.8.2 Procedures

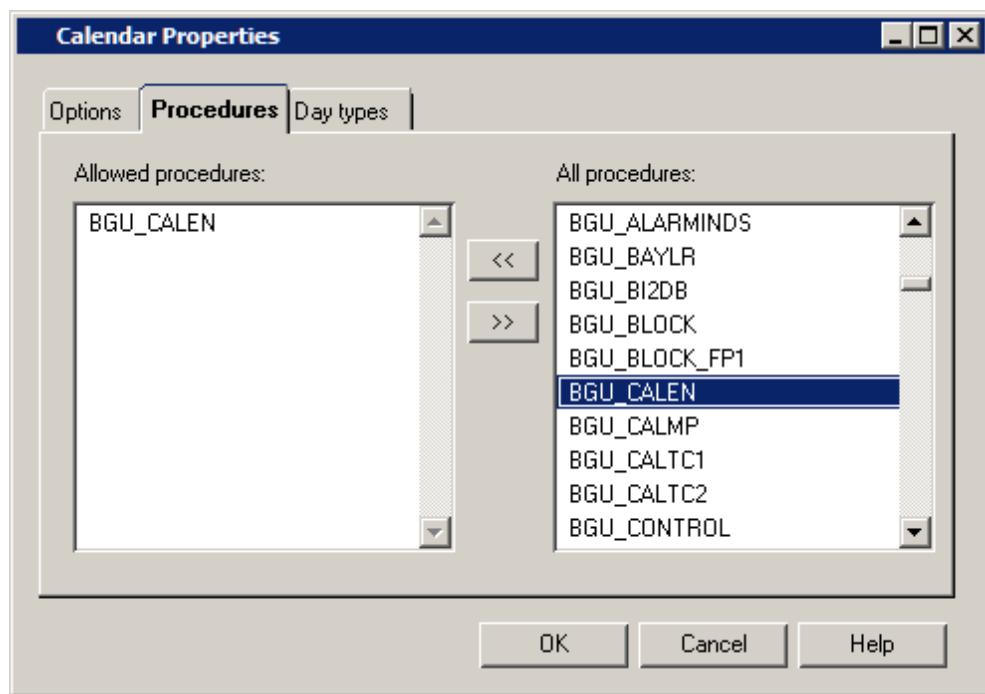


Figure 184: Allowed procedures

Allowed procedures can be defined in the **Procedures** tab of the **Calendar Options** dialog. On the right side of the **Procedures** tab are all the command procedures that exist in the system, on the left side are the command procedures that are allowed in the calendar.

To add new procedures to the list of allowed procedures, select a procedure from the All procedures list and click the << button. To remove a procedure from the list of allowed procedures, select a procedure and click the >> button.

Allowed procedures are used by the Run command procedure calendar attribute. Only allowed procedures are included in the combo box of the attribute (see [Figure 180](#)).

At least Engineering authorization level (2) is required to be able to modify the list of allowed procedures. The list is initially empty but it will be filled according to the user's above mentioned actions.

14.8.3 Day types

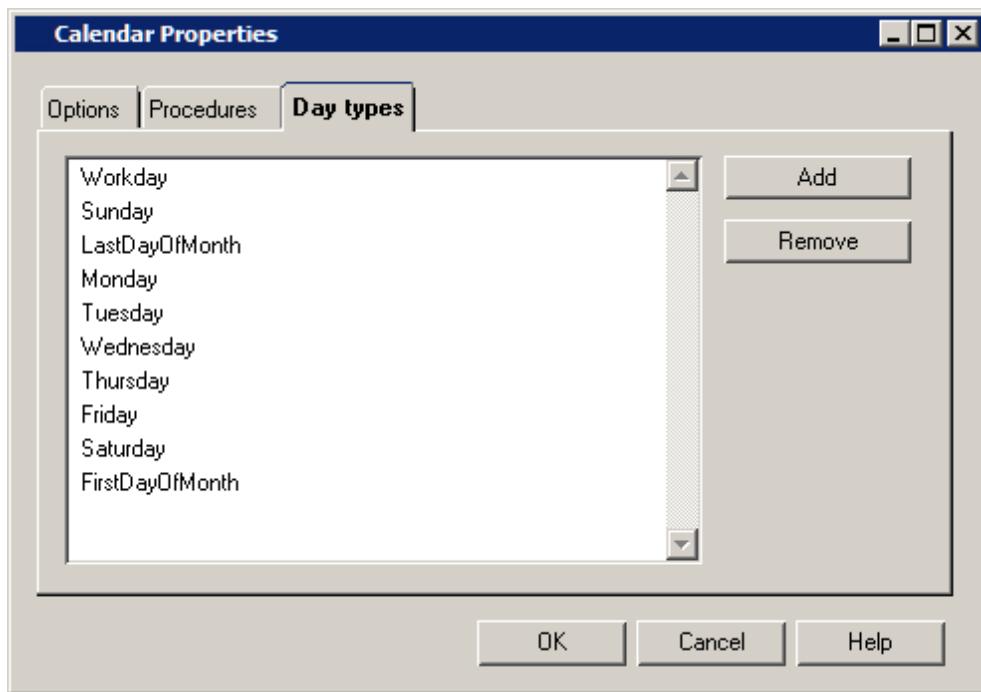


Figure 185: Day type tab

To add a new day type:

1. Click the **Add** button.
2. Type a name for the day type. The day type is displayed on the list.
3. Save the changes by clicking **OK**.

To remove a day type, select a day type from the list and click **Remove**.



If a day type is removed, all references to that day type are deleted from the calendar database.

Section 15 Terminology

| Term | Description |
|-------------------------------|--|
| Application | All the processes and views included in an application. Normally an application consists of an overview or a login dialog and several Process Displays and application views. |
| Application display | An application display gives the user an overview of the application. A Process Display is a picture, which shows a specific process in a station. In a very small application they can all be the same. |
| Attribute | Attributes contain the settings and definitions for the properties of the picture functions. They are stored in the process data base. |
| Authorization | Different users can have different access rights to the same picture functions and processes. |
| Authorization group | Picture functions and application pictures can be grouped into authorization groups and thereby require a certain user authorization level. |
| Authorization level | Different levels of authorization give the users different types of access (view, control operations, system manager and so on.). |
| LIB 500 | LIB 500 contains the needed base functionality for installing support packages like LIB 510, LIB 5xx... LIB 500 also provides functions like Event Display, Alarm Display, and Network topology coloring. |
| LIB 510 | LIB 510 is a support package, which contains the library functions for using for example MV process functions, Trends Displays, SPACOM Relay Setting Tool, RED Relay Setting Tool, DR-Collector Tool. |
| Library function | A library function is a function in a software package that is ready made and only needs configuration of the attributes. |
| Menu item | The available options that are listed when opening a drop-down menu. |
| MicroSCADA session | The whole operation from starting up the system, performing login, running the system with its customer application to ending the session. |
| MV process | Medium Voltage functions like Circuit breaker, Transformer, Three state switch, Station, Bay, and so on. Used as picture functions in the Process Displays. |
| Picture function | The functionality is built in with the application picture presented on the monitor. However, the application picture can contain one or several different picture functions, as well as several similar ones (disconnectors, transformers, and so on.). |
| Process Display Specific area | An area where process specific functions are presented. |
| Process database | A database, which contains the individual process objects and related attributes. |
| Process object | One signal in the Process database (for example a disconnector position indication). |
| Process Display | A type of an application picture containing process objects (for example MV Process Display functions), which are connected to the processes. In the Process Display, for example measurements, the states of disconnectors and breakers are normally updated and switching devices can be operated. |
| Representation symbol | The symbol used for a picture function, for example a circuit breaker, transformer, measurement, and relay. The representation symbol is selected during the configuration of the picture function. |
| Switching device | Devices in the MV process that can be operated (for example circuit breakers, three-state switches, and transformers). |

Section 16 Abbreviations

The following is a list of abbreviations the user should be familiar with. See also the terminology table.

| Abbreviation | Description |
|--------------|---|
| Clut | Color LookUp Table: a file where Display Builder saves the RGB (Red, Green, Blue) values for each color in color palette. |
| DMS | Distribution Management System |
| HDB | History Database |
| HSI | Human System Interface |
| IED | Intelligent Electronic Device |
| MV | Medium Voltage |
| NCC | Network Control Center |
| SA | Substation Automation |
| SCS | Substation Control System |
| SSS | System Self Supervision |

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Hitachi ABB Power Grids
Grid Automation Products
PL 688
65101 Vaasa, Finland

<https://hitachiabb-powergrids.com/microscadax>



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