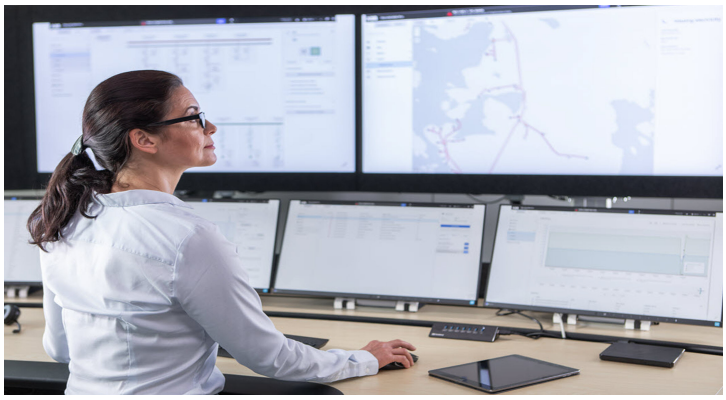
GRID AUTOMATION PRODUCTS

MicroSCADA X SYS600 10.2

Pipeline Operation Manual



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Section 2 Introduction

2.1 This manual

This manual describes how to supervise and control the pipeline 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.

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, e.g. 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	31.3.2021	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.

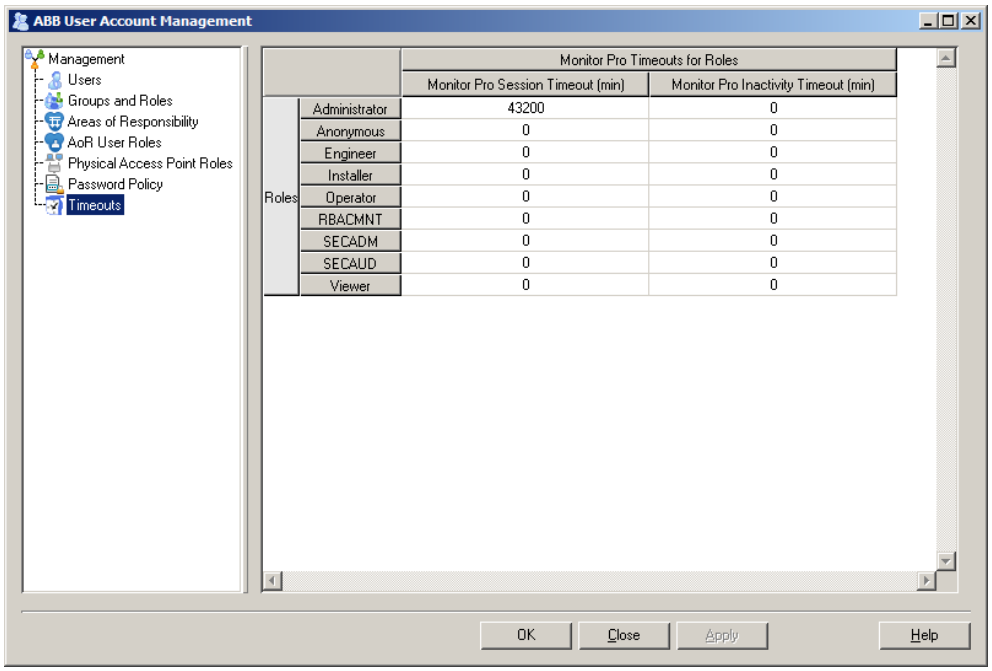


Figure 2: The User Account Management timeouts tab

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.

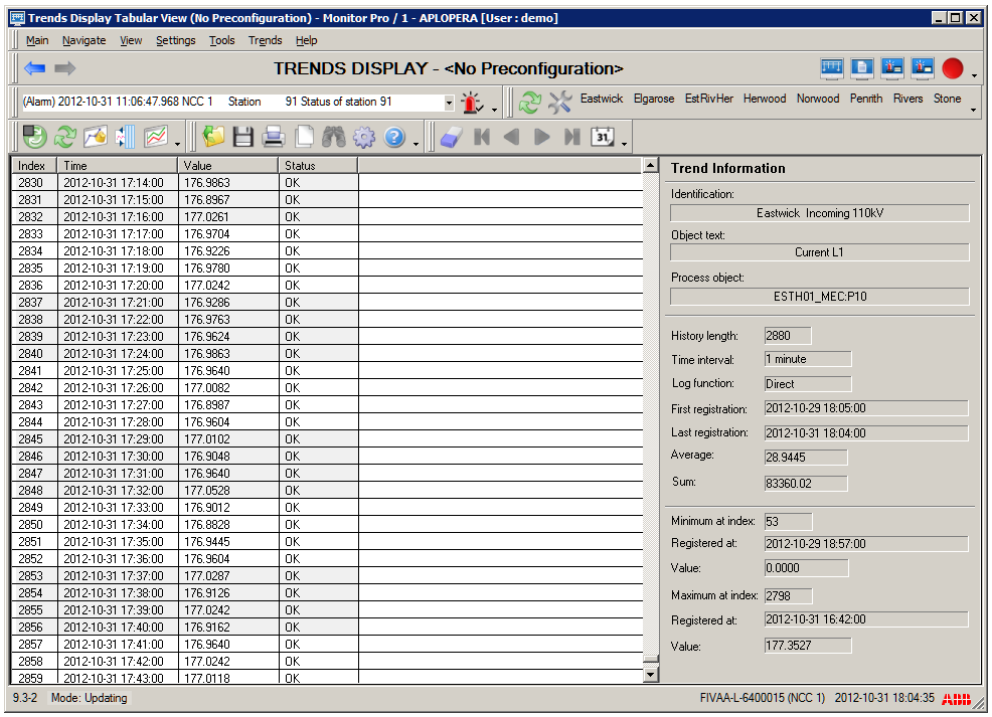


Figure 3: Example of Trends display

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.

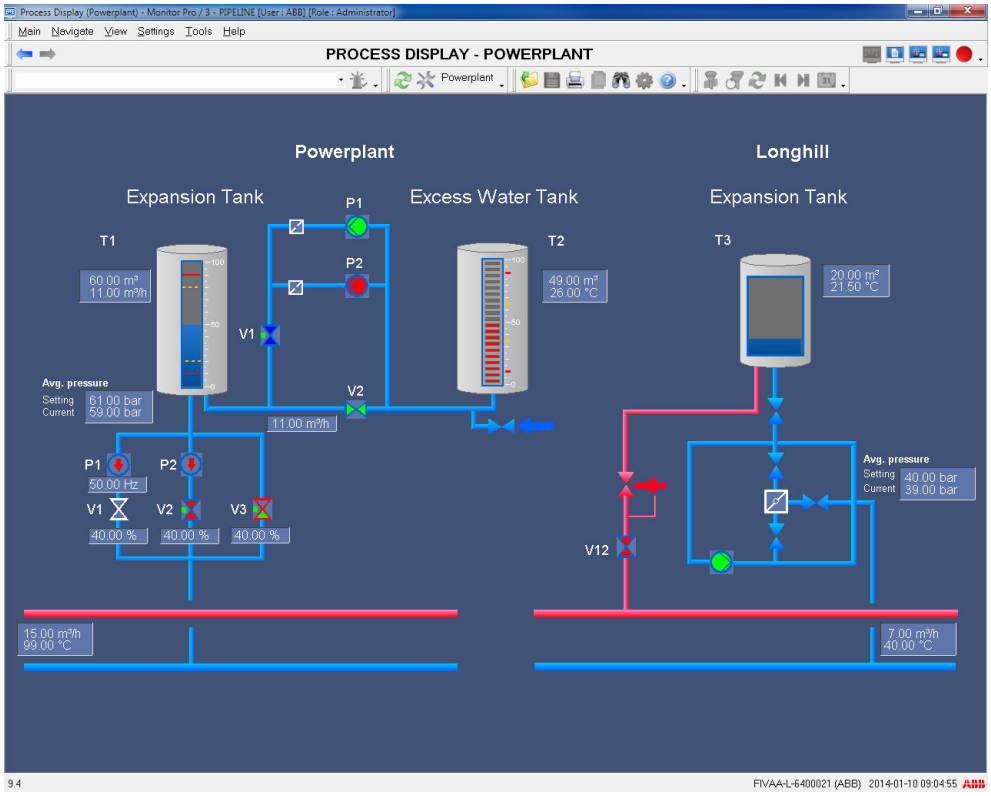


Figure 4: Station Process Display

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 4.6.

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.

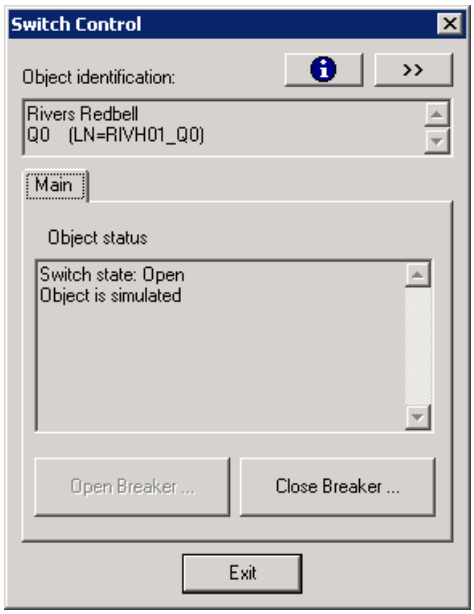


Figure 5: Main display of a Control dialog

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 (i.e. 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.

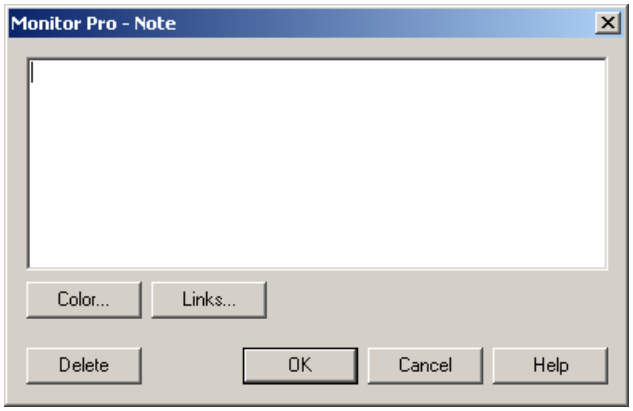


Figure 6: Process Display Note

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**.

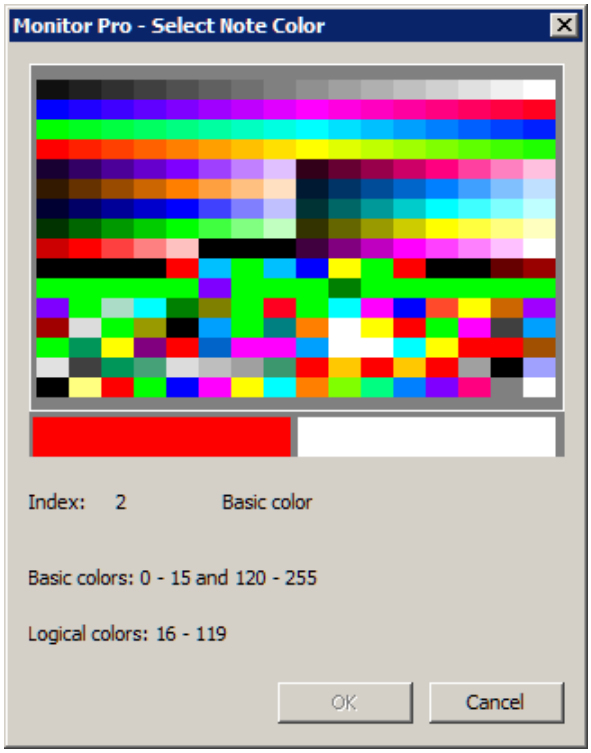


Figure 7: Changing the Process Display Note color

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.

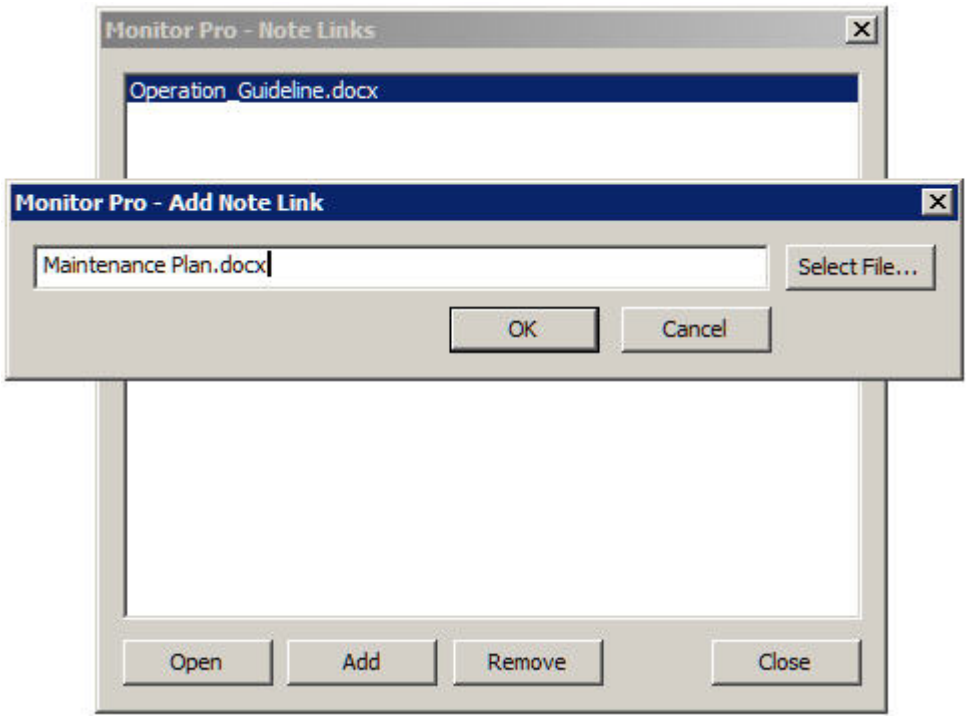


Figure 8: Process Display Note Links

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.

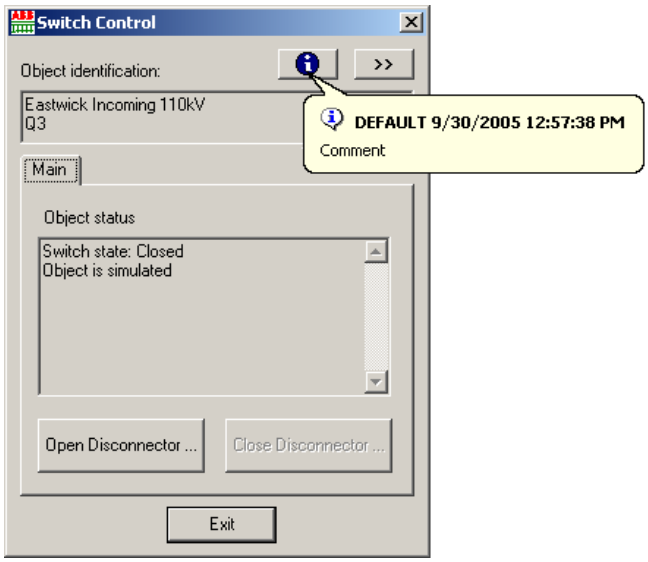


Figure 9: Comment in the control dialog

To add a comment:

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

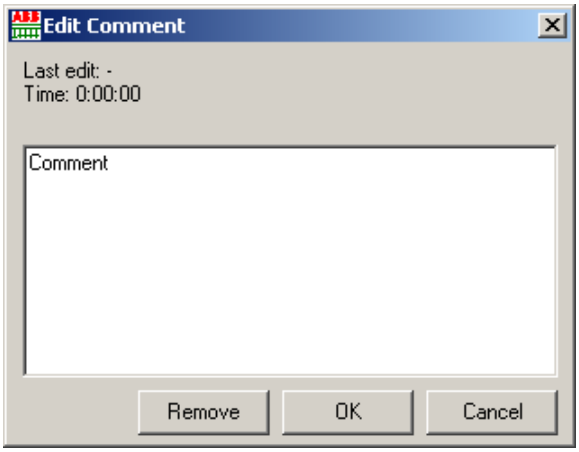


Figure 10: Adding comment to control dialog

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.

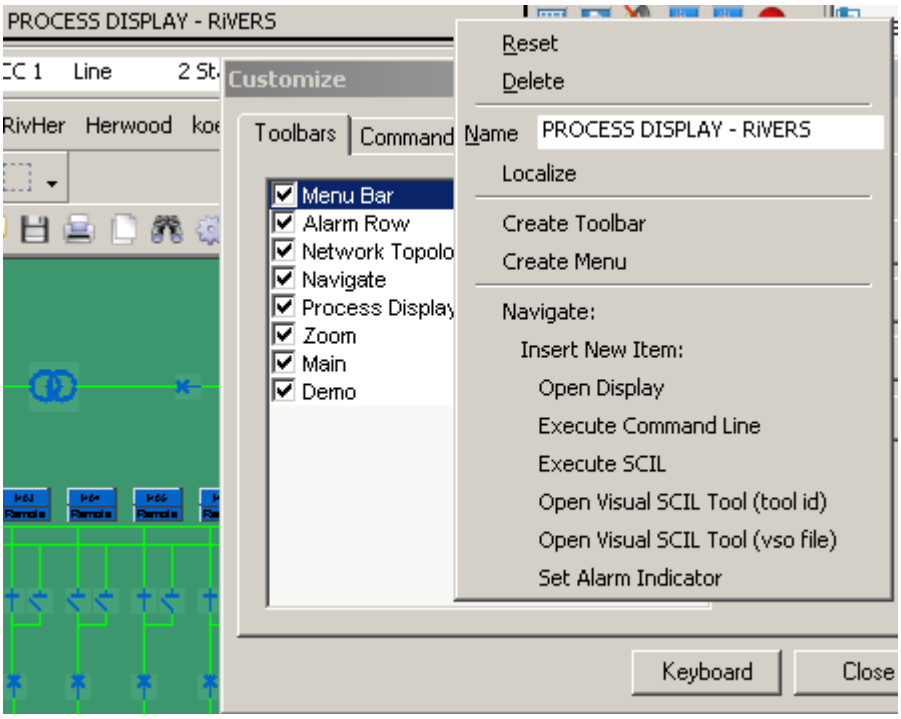


Figure 11: Renaming the Process Display

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

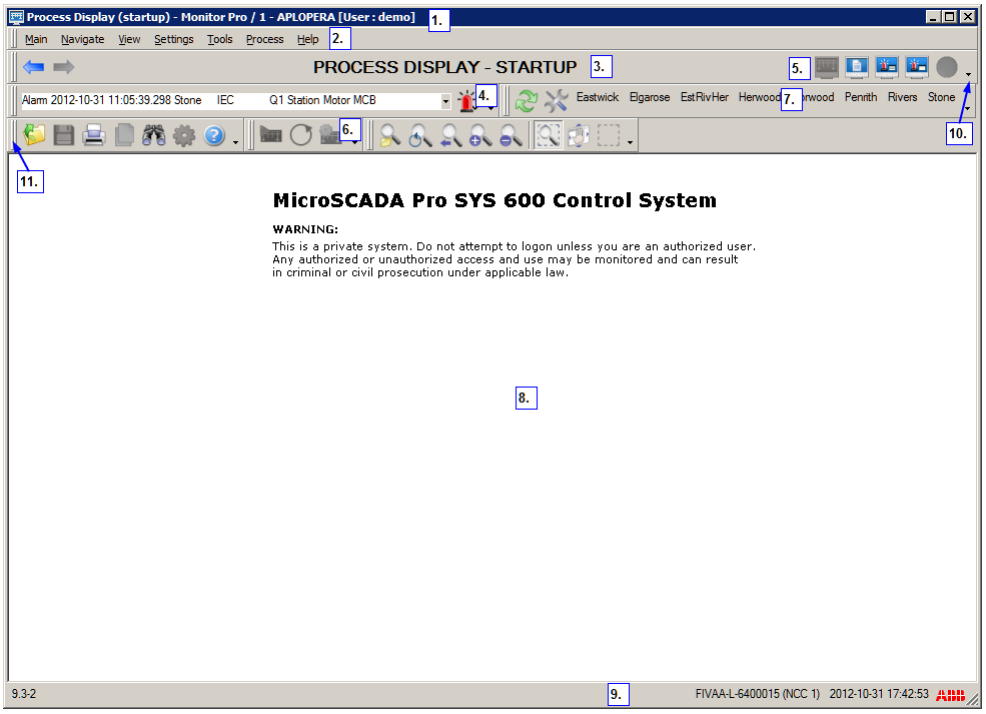


Figure 12: Monitor Pro default layout after the login

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.

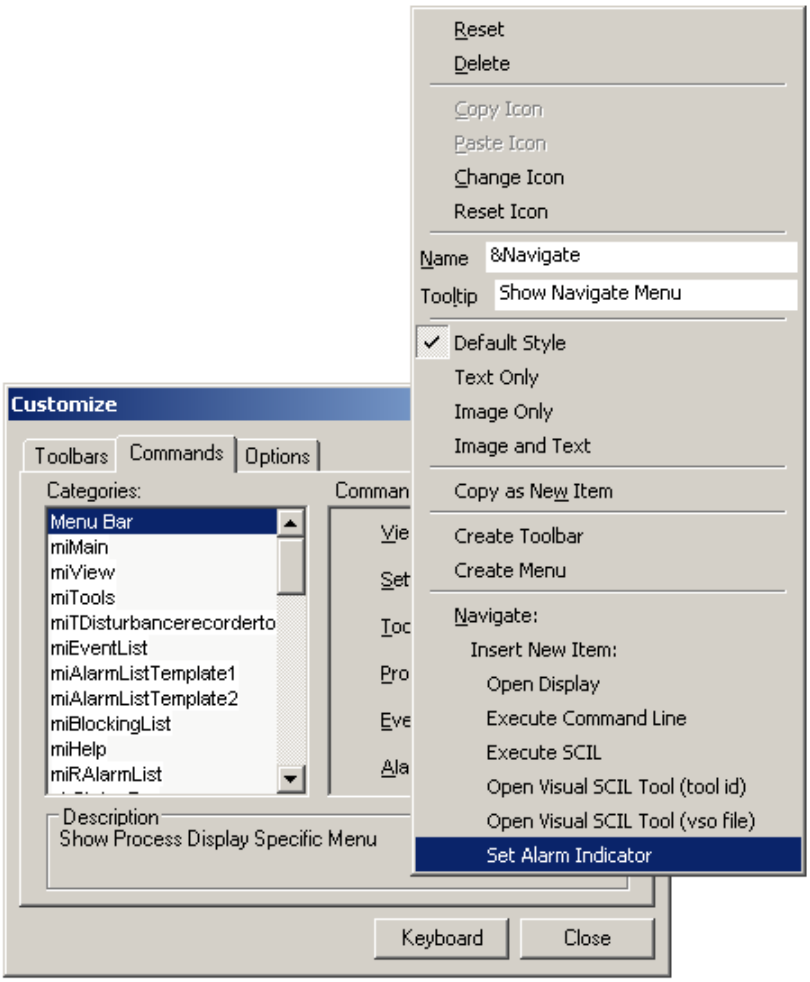


Figure 13: Command context menu while the Customize dialog is open.

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).

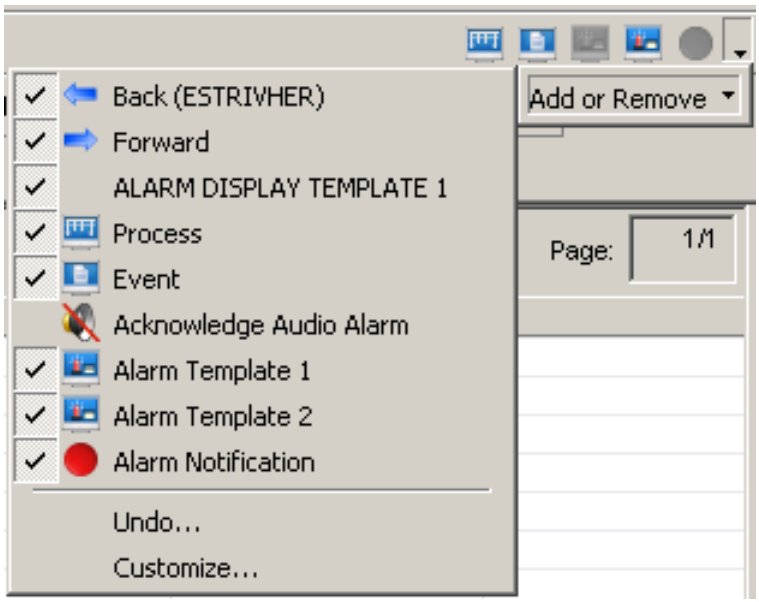


Figure 14: Adding and removing tool

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.

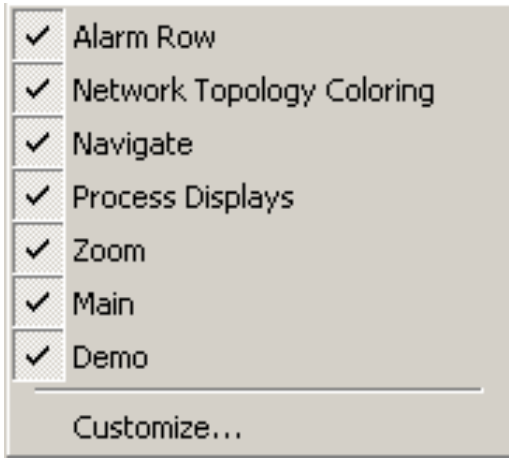


Figure 15: Showing and hiding toolbars

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.

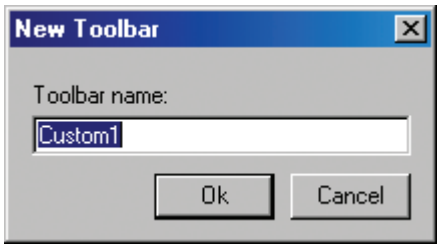


Figure 16: New Toolbar dialog

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).

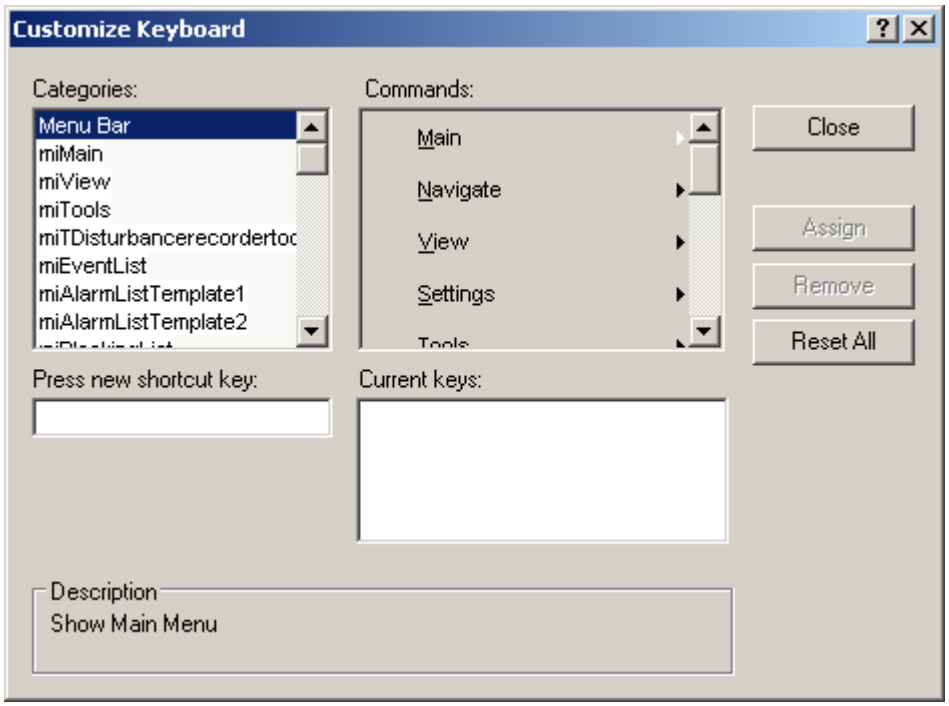


Figure 17: The Customize Keyboard dialog

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).

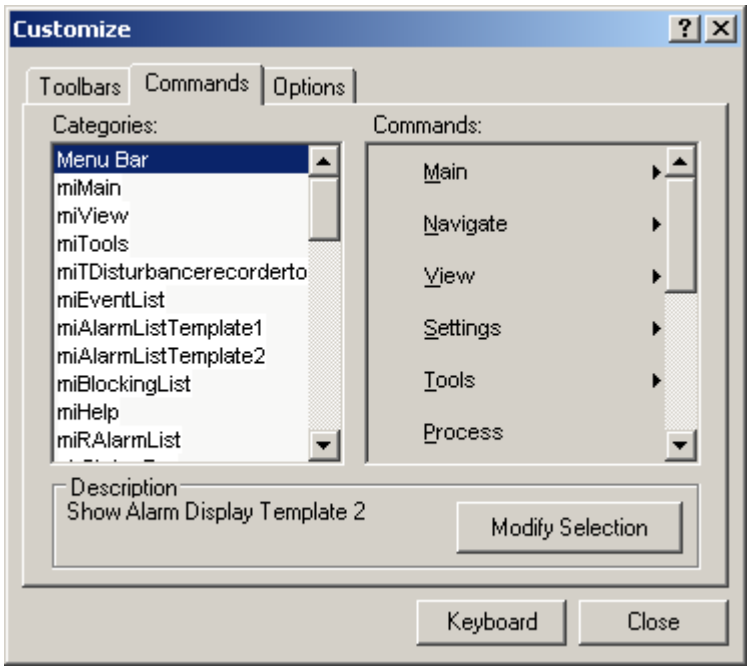


Figure 18: Commands tab of Customize dialog

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).

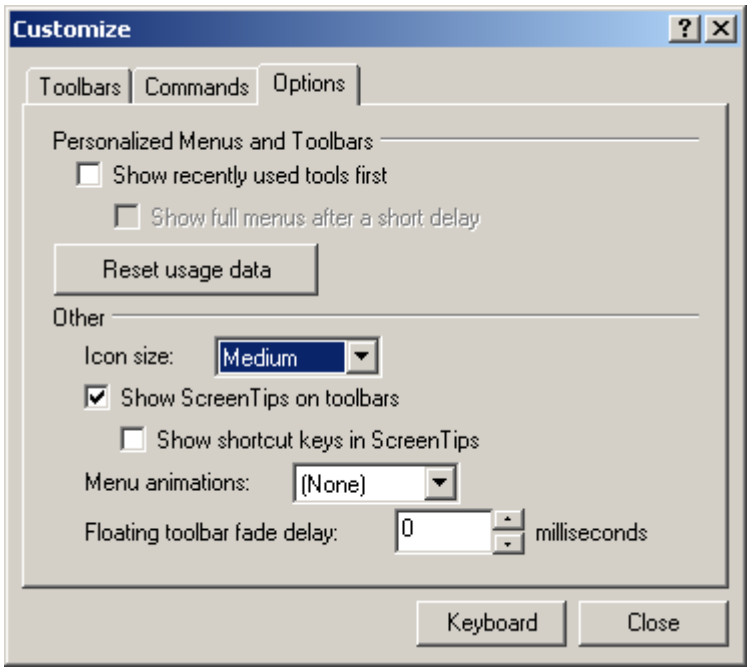


Figure 19: Option tab of Customize dialog

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.

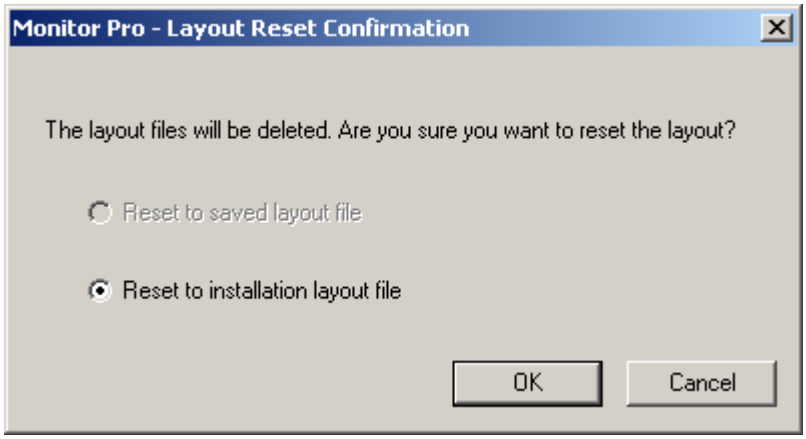


Figure 21: The Layout Reset Confirmation dialog

3.5 Using process lists

There are three types of process lists:

- Alarm Display lists the actual alarm state in the process data base.
- Event Display lists all the events reported to the system.
- Blocking Display lists 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 11 and Section 9.

Section 4 Process controlling

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.

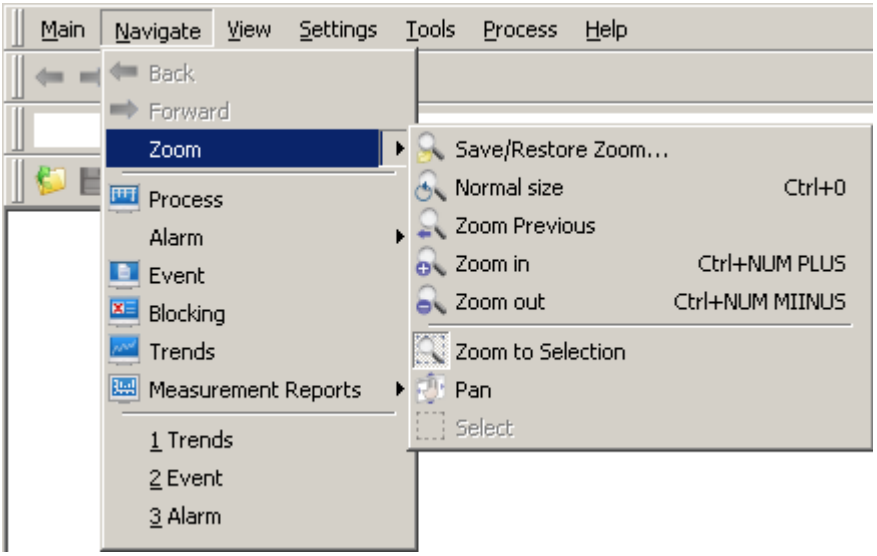


Figure 22: Zoom submenu

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	Scroll the mouse wheel forward or press CTRL and click the left mouse button. Zooming in with touch screen is handled by using two fingers in contact with the screen at the same time and moving fingers together along an axis.	Zooms in.
Zoom out	Scroll the mouse wheel backward or press CTRL + SHIFT and click the left mouse button. Zooming out with touch screen is handled by using 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 left arrow key on the keyboard	Moves the zoomed area to the left.
Step Right	Press right arrow key on the keyboard	Moves the zoomed area to the right.
Step Up	Press up arrow key on the keyboard	Moves the zoomed area up.
Step Down	Press down arrow 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

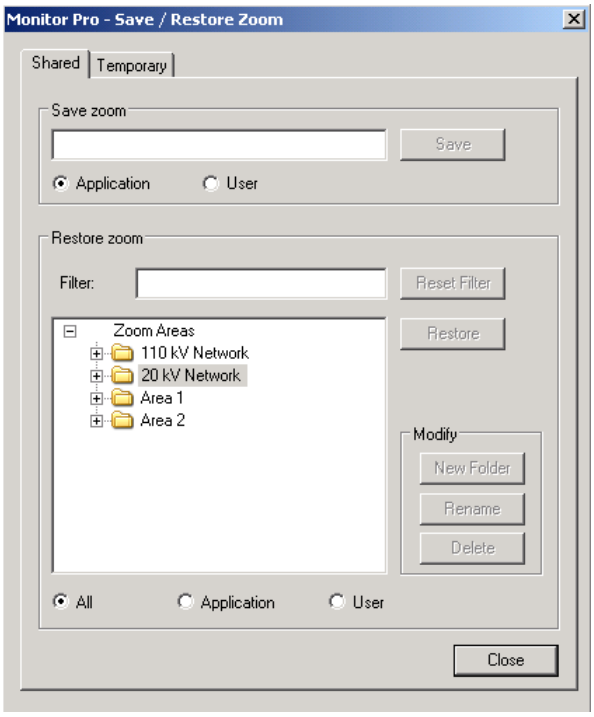


Figure 24: Save / Restore Zoom dialog

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

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

To delete a zoom view, 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 zoom views 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.

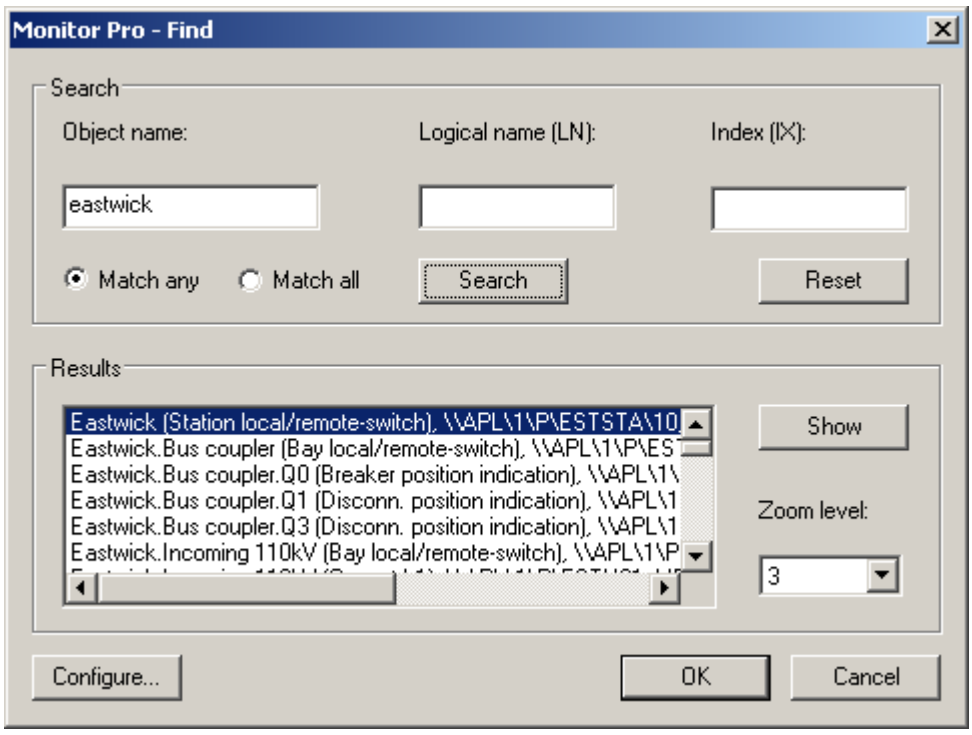


Figure 26: Find process objects

4.4 Control Dialogs

This section describes the generic control dialogs of pipeline process as well as the functionality of those dialogs. The dialogs combine information from the current device status with the possibility to control the process objects. The available information and control possibilities depend on the type of process object and the user's authorization level.

The control dialogs function with objects created with the Object navigator's Standard function tool.

4.4.1 Station L/R Switch

The station control dialog shows the operator location information. The dialog shows if the control is authorized from the station locally or from remote control center. The possible options and their availability depend on the station type and the current process state.

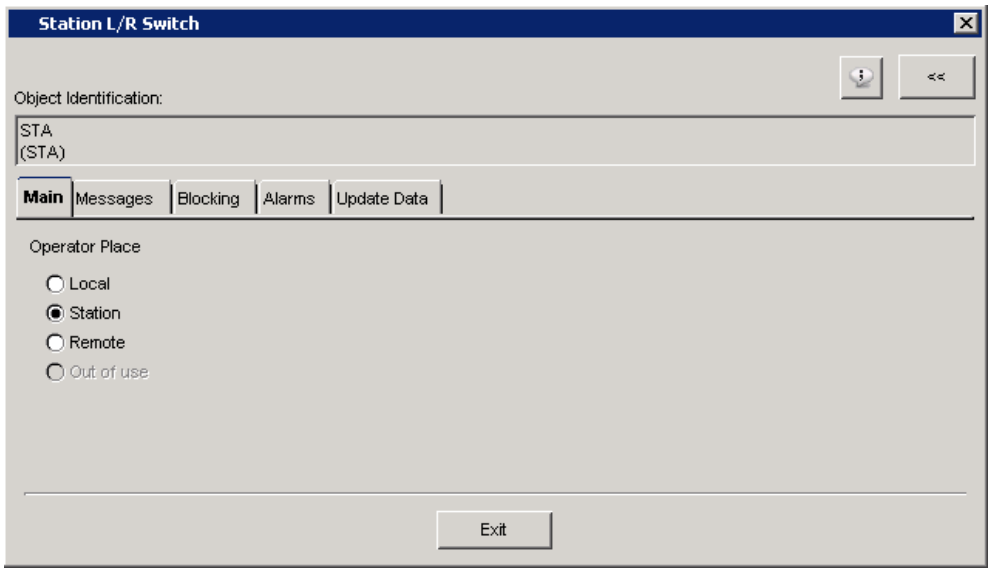


Figure 27: Station L/R Switch

Change the control location by selecting the desired operator location radio button and confirming the action in the following dialog.

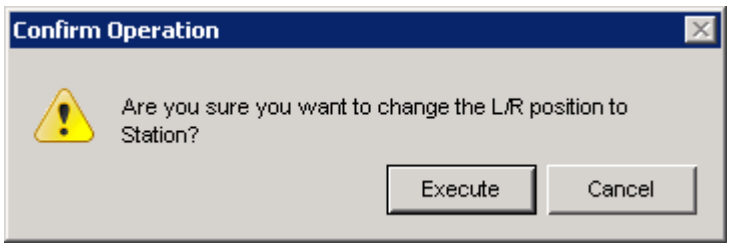


Figure 28: Confirmation dialog for changing the control location to station

The messages tab shows the state of the object and other possible messages affecting the current object. In the example Figure 29, messages can be seen on the left side of the dialog.

The Blockings tab shows the blockings affecting the current station. In the example, control and events are blocked for the station object. Alarm is blocked on at least on one object belonging to that station. This partial blocking can be seen from the grayed background of alarm checkbox.

To change the blockings:

- Change the states of checkboxes to block or unblock desired actions
- Click **Apply** to activate the changes.

Cancel will clear any selections made and refresh the status from the process database. Click **Refresh** to force the blocking status refresh from the process database.

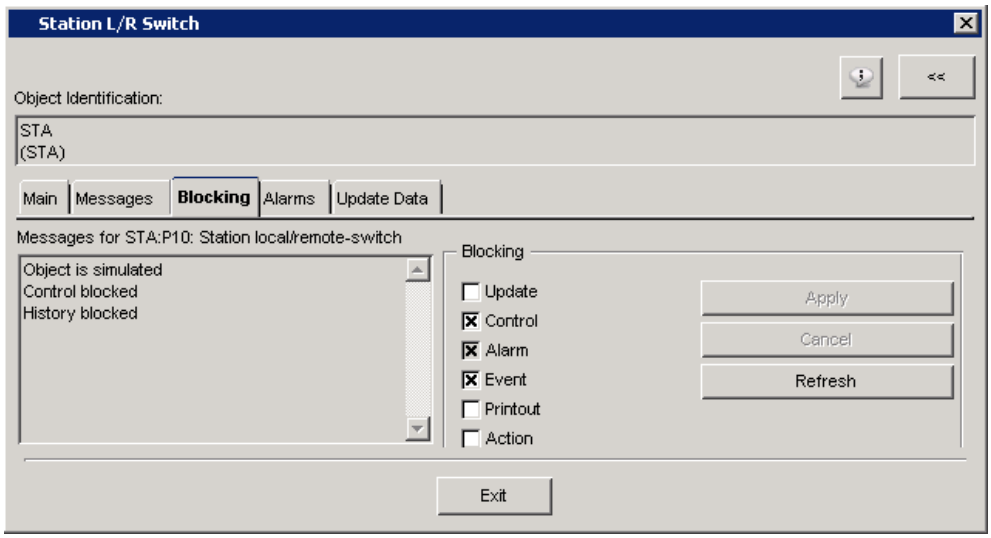


Figure 29: Station L/R Switch Messages and Blocking tabs

The alarms tab shows the current alarms affecting the station. If the station object itself is in alarming state, it will be shown in the list, but the alarm list also shows all the alarming signals under the station.

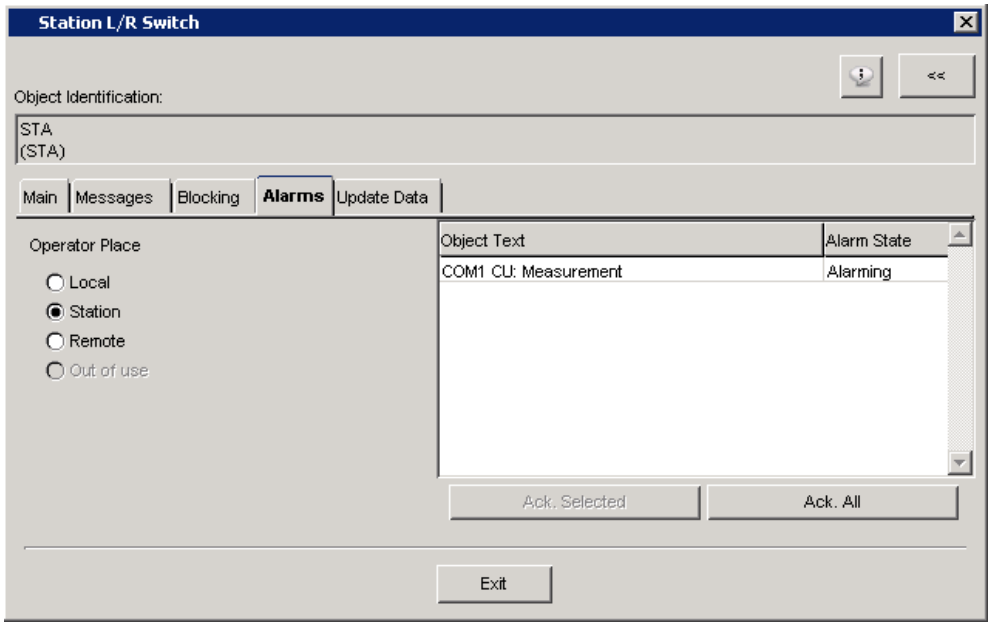


Figure 30: Station L/R Switch Alarms tab

Update Process Data updates the process database from the actual process for the selected station. **Update Process Data...** can be used to initialize the substation after system restart or a communication break, or to verify that the process databases matches the process state.

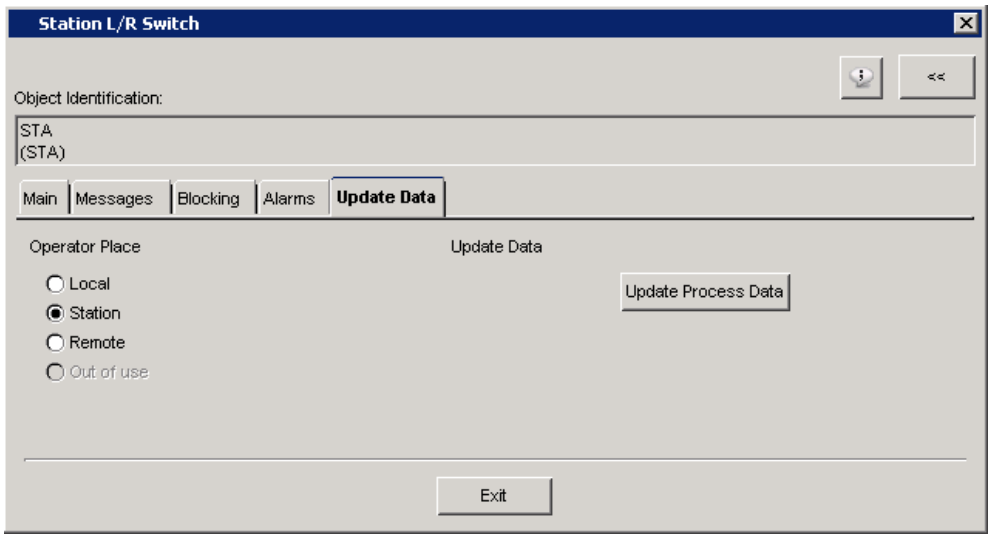


Figure 31: Station L/R Switch Update Data tab

4.4.2 Bay (Equipment Group) L/R Switch

The equipment group L/R Switch behaves like the station L/R switch. The control operations are the same, but the blocking, alarms and data updates are done only at the group level (not for the whole station as with Station L/R Switch). For control instructions and description of the different elements, see Section 4.4.1.

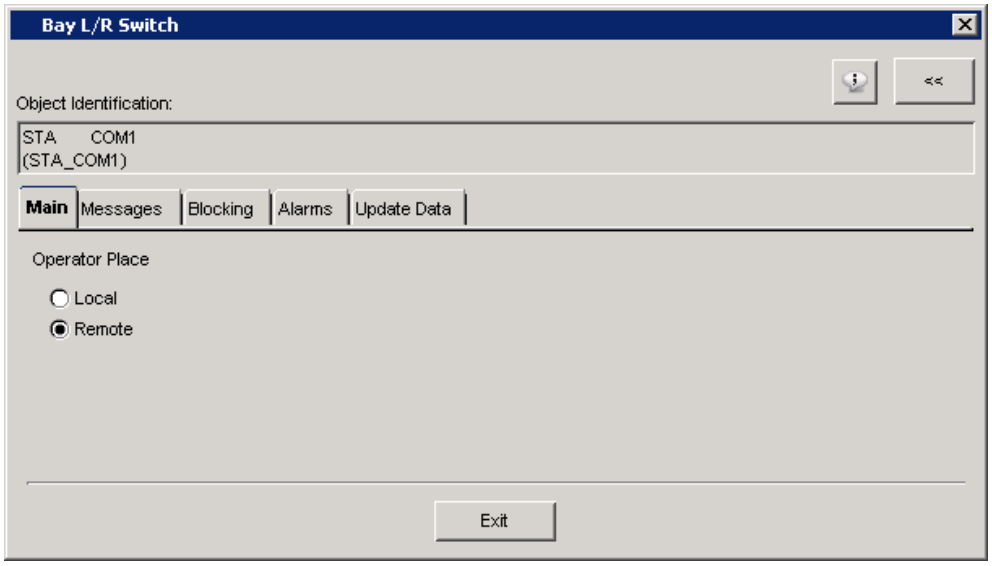


Figure 32: Bay L/R Switch Main

4.4.3 Pump, Valve, Fan, Compressor and Motor Control

Control dialogs Pump, Valve, Fan, Compressor and Motor Control all behave the same way and can be used to view and control the current state of the device. The available functions found in the control dialog depend on the application and process object configuration:

- In basic mode (the default opening mode for most of the dialogs), only the object identification, status and control buttons are shown.
- In the advanced mode, the object status and control button are shown on the left side.

Object status messages show information concerning the process object, for example object state, whether the pump is running or not, or whether the process object is simulated in the MicroSCADA process database and is not showing the current process state. The right side of the dialog shows other information and controls depending on the selected tab.

To start or stop the Pump, click the **Pump Start ...** or **Pump Stop ...** button and confirm the operation in the confirmation dialog after the action button is clicked. Similar operations are available for all other control dialogs.

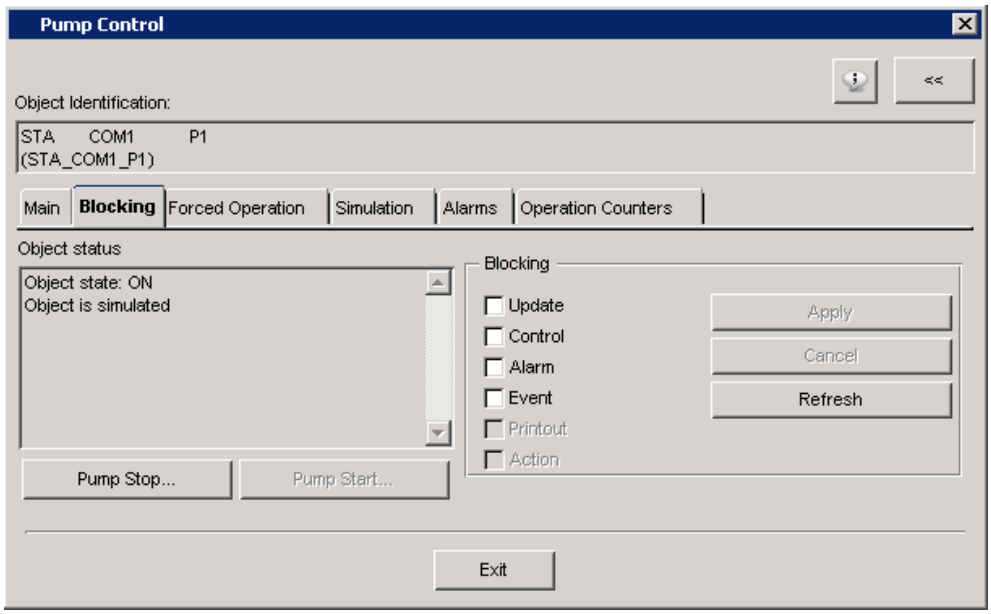


Figure 33: Pump Control Dialog

4.4.3.1 Blockings

The Blocking tab of the Control dialog shows the different blockings concerning the current process object. Changing the blockings can be done from this view if the current user is authorized to change the blockings. In Figure 33, the Blocking tab can be seen in the right side of the dialog. In this case, none of the possible blockings have been made and the printout and action blockings are not available for this particular object. The available blockings depend on the process object and its configuration.

To change a blocking, change the selection on the checkbox and click **Apply**. Multiple changes can be made at once. Clicking **Cancel** or **Refresh** discards the changes and refreshes the dialog status from the process database.

4.4.3.2 Forced Operation

Forced Operation tab can be used to release device reservation and to override control blocks on the SYS600 side. It is not possible to override any IED measures preventing the control with the forced operation. Access to forced operation controls depends on the application configuration and the user authorization levels. It is possible that the tab is not visible if configuration or authorization does not allow it.

If an object is selected on another monitor and control is needed on this monitor, click **Release device reservation**. This closes the control dialog from other operators and allows the control

from the current dialog. It is also possible that the selection is not cleared correctly in case of abnormal termination of control dialog or other errors. This can also be fixed with the **Release device reservation** button.

The control buttons may be inactive for various other reasons than selection on another monitor. The **Forced control** button can be used to enable the control buttons. The buttons will be enabled, but the control operations might not succeed anyway depending on the state of the process.

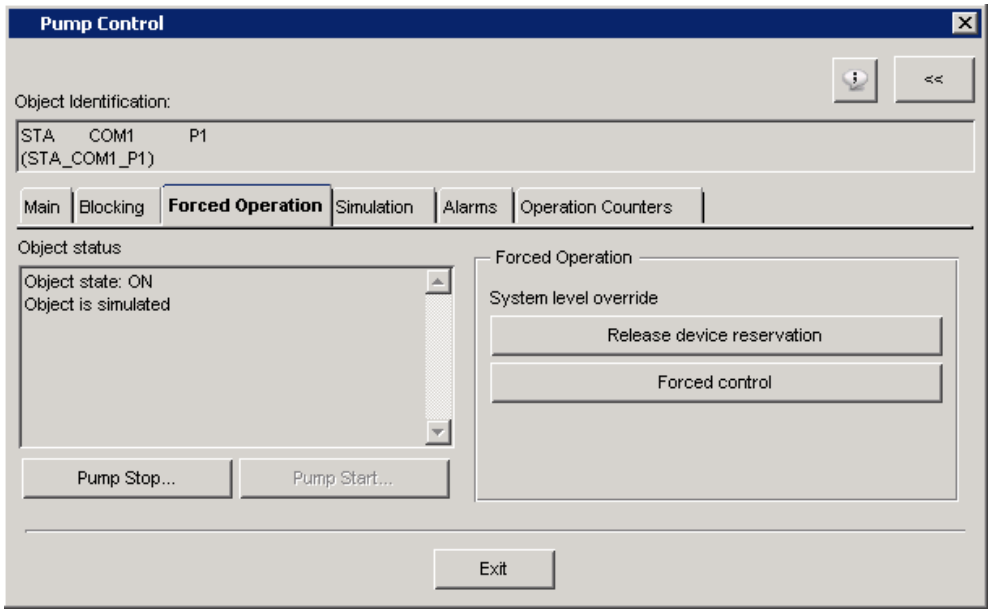


Figure 34: Pump Control Forced Operation

4.4.3.3 Simulation

The state of controls can be simulated on the Simulation tab. The simulation is indicated in the object status with appropriate message in case it is active. The simulation cannot be taken out of use if there is no real process communication available for the process object. Visibility of the simulation tab depends on the user authorization level.

To enable simulation:

- Check the **Simulation in use** checkbox and select the desired simulated state
- Click **Apply**.

To disable simulation:

- Remove the selection from the **Simulation in use** checkbox
- Click **Apply**

Enabling and disabling simulation may not be possible or allowed for the current user. In that case, the checkbox is dimmed and changes cannot be made.

To change the simulated state, select the desired state from the list of states and click **Apply**. Clicking **Cancel** after changing state the dialog will refresh the current state from the process database.

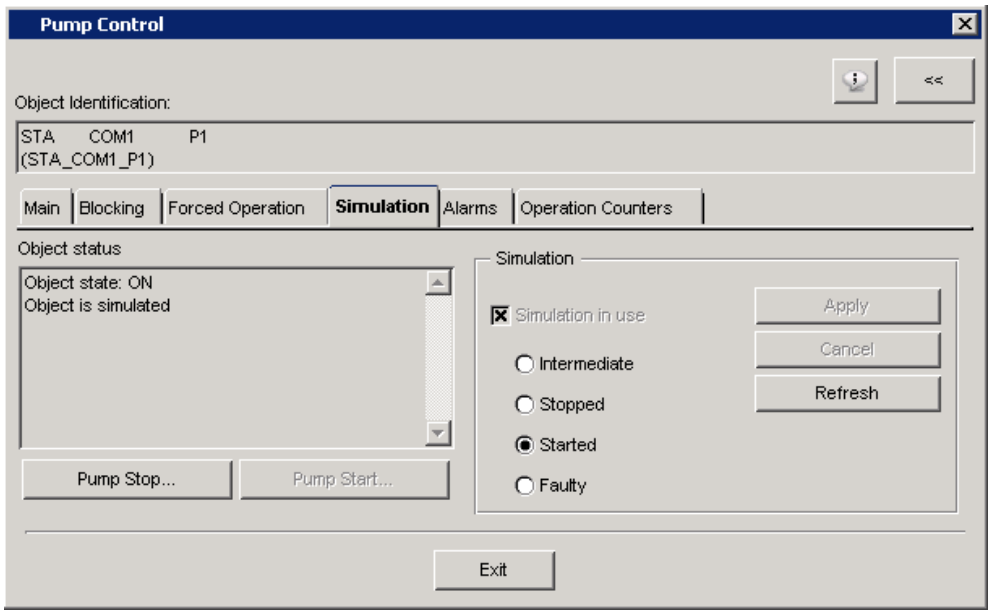


Figure 35: Pump Control Simulation tab

4.4.3.4 Alarms

The Alarms tab shows active and fleeting alarms concerning the current object. It allows acknowledging a single alarm at a time or all alarms at once.

To acknowledge a single alarm, select it from the list and click **Ack. selected**. Confirm the acknowledgement in the confirmation dialog.

To acknowledge all alarms, click **Ack. All** and confirm the action in the confirmation dialog.

If the signal is still in alarming state after the acknowledgement, it will remain in the list in acknowledged state. To remove it from the list, the cause of the alarm has to be cleared. In the example figure below, the object should be removed from the faulty state. If the buttons are not enabled even when a signal in alarming state is selected, the current user does not have required authorization to acknowledge the alarm.

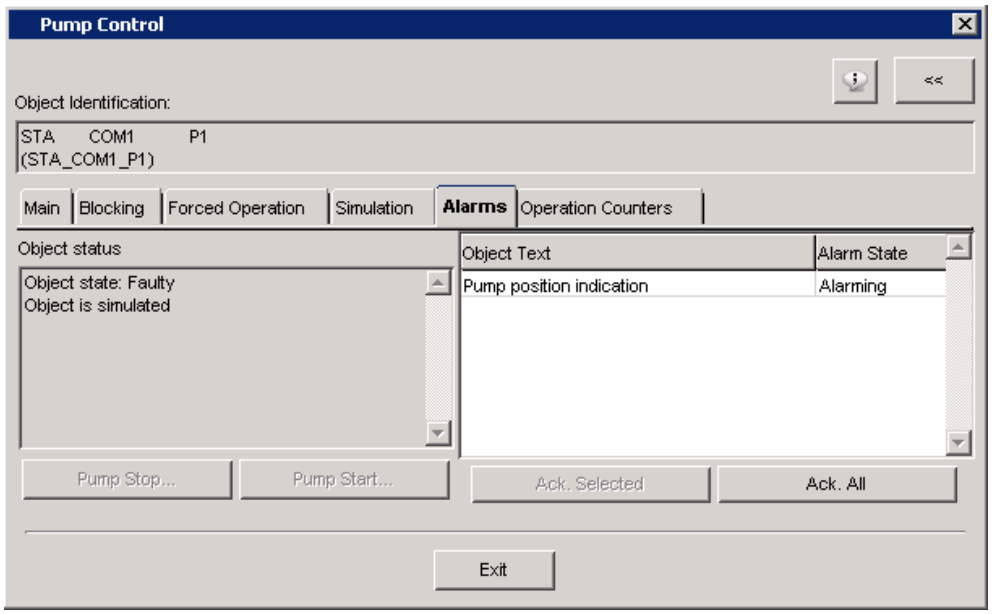


Figure 36: Pump Control Alarms tab

4.4.3.5 Operation Counters

Operation counters count the start and stop operations for pumps and other objects.

To enable operation counters, select the **Operation counter in use** and fill in the counter limit value. Click set.

To reset current counter value click **Reset**. The **Set** button is dimmed in case the counters are not in use. If all the buttons and **Operation counter in use** is disabled, the user does not have the required authorization level to change the operation counters.

When the counters are in use and the operation counter limit is reached, the message is shown with the object status messages.

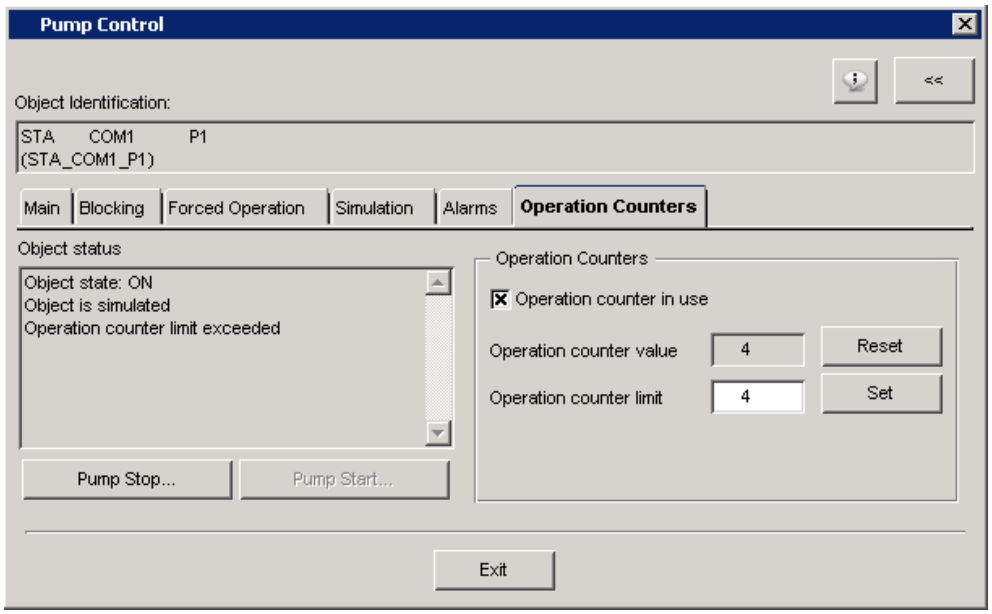


Figure 37: Pump Control Operation Counters tab

4.4.4 Pump with Auto-Manual Control

Controlling pumps with automatic and manual modes work similarly to pumps with only manual control. For general control options, see Section 4.4.3.

When a pump is in manual mode, the control options are the same as for a pump without automatic mode. When in automatic mode, the start and stop control buttons are disabled and only switching to manual mode is possible without forced control. With forced control, all the buttons are enabled and it is possible to issue commands from the dialog. It does not necessarily mean that the process will accept or act on these control requests.

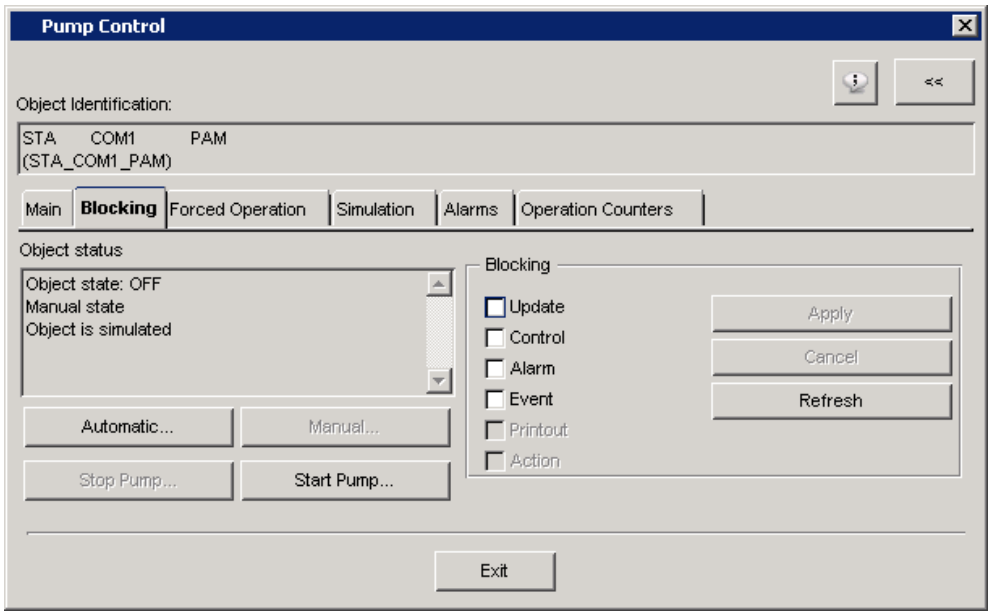


Figure 38: Pump Control with automatic and manual modes

4.4.5 Measurements

The Measurement dialogs show configured data from different measurable elements from the process. These elements include tanks, pressure levels and temperature.

The overview of configured values are shown on the left side of the dialog (with a summary of the current status, if available). The background of the value field and bargraphs also reflect the value status. In usual configurations, the alarming values are shown in red.

The visibility of bargraphs can be toggled with the  button.

The Value Details tab on the right side of the dialog shows detailed information on the signal selected from the left side. Current value and its registration time is shown along with the minimum and maximum values. To freeze a value, click the **Freeze** button. The frozen value is then shown in the details view as long as the dialog is open or another value is frozen.

To reset the maximum or minimum recorded value, click the appropriate button. If the buttons are not enabled, the user does not have permission to perform the reset operation.

Simulating the measurement value is possible from the Value Details tab if the user is authorized to change the simulation or simulated values. If the permissions are not met, it is only possible to view the simulation state.

To simulate a value, select the signal from the left side and select **Simulation in use**. Type in the value to be simulated to the value field and click **Apply**.

To remove the simulation, remove the selection from **Simulation in use** and click **Apply**. It is not possible to remove simulation if the measured value is not connected to process.

Clicking **Cancel** clears any pending changes and refreshes the state from the process database.

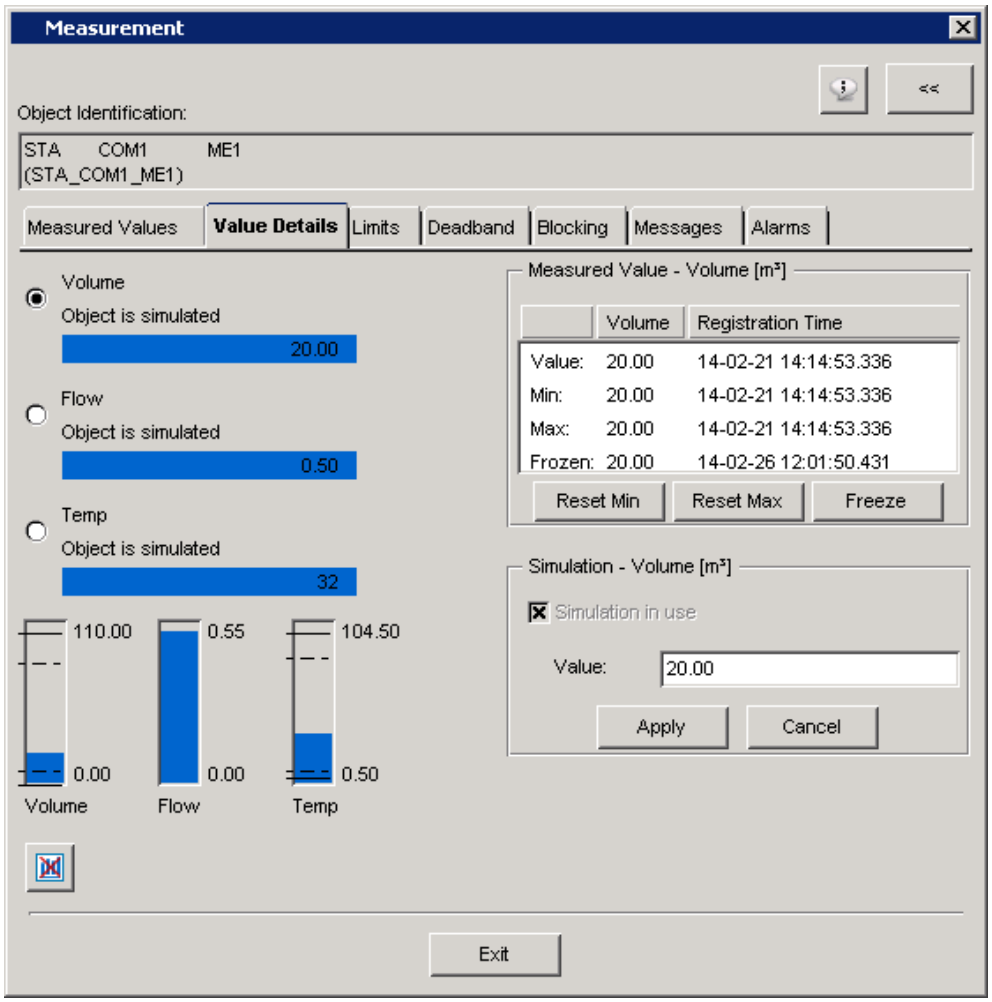


Figure 39: Measurement Dialog with Value Details tab

Vertical bargraphs should only be used as a general hint of the current value and configured limit values. The precise values should always be read from the value fields instead of relying on the bargraph.

4.4.5.1 Limits

From the Measurement Limits tab it is possible to see and change the configured limit values for the selected measurement depending on the user's authorization level.

To set the limits, type the limit values to the fields and click **Apply**. An error is shown if the values cannot be set and no changes are made.

The high alarm limit must be greater than or equal to the high warning limit. The high warning limit must be greater than or equal to the low warning limit. The low alarm limit must be less or equal to the low warning limit.

To clear the limits, set all values to 0 and click **Apply**. All the changes affect the selected measurement only. To change another measurement from the same object, select it from the left side of the dialog and repeat the process.

If the buttons are disabled, the user does not have the required authorization to change the limit values.

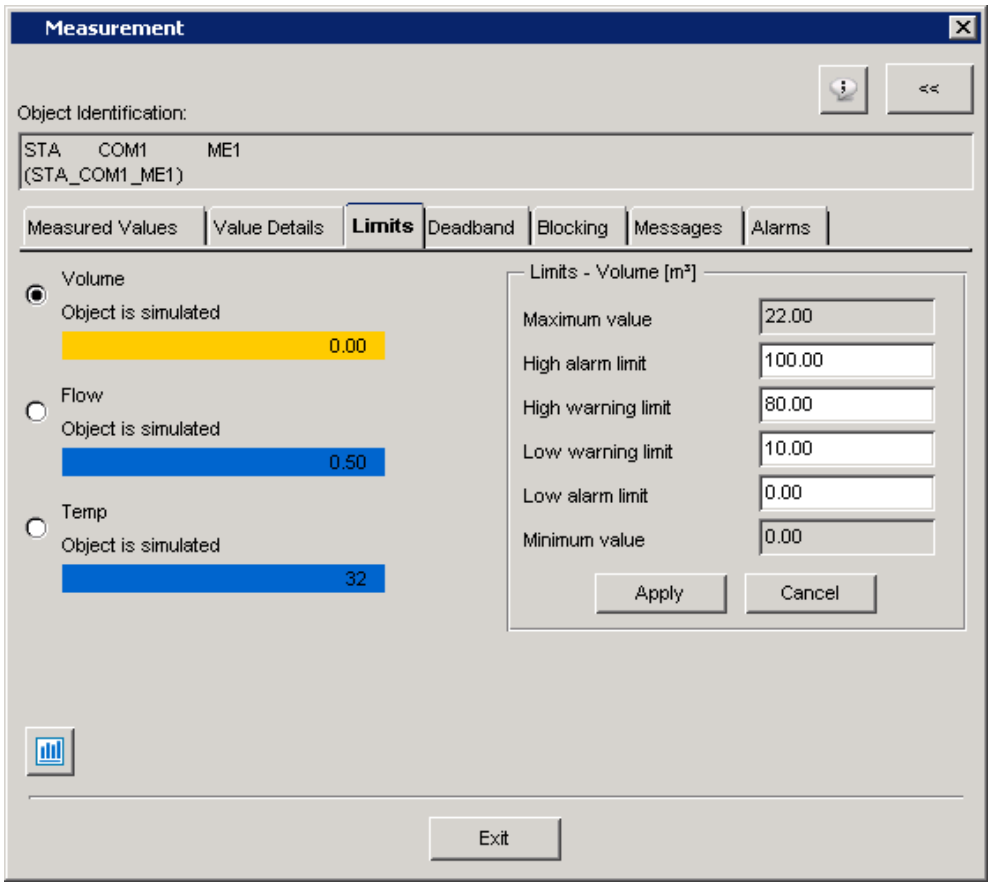


Figure 40: Measurement Limits tab

4.4.5.2 Deadband

On the Deadband tab, the user can enable or disable the zero deadband supervision and change the limit value. With zero deadband supervision enabled, values between +/- of the configured limit value are shown as 0.

To enable the zero deadband supervision, select the **Enable zero deadband supervision**, fill in the limit value and click **Apply**. The deadband is not taken into use before the next update for the measurement is received from the process or before a new value that falls within the deadband range is simulated.

To disable the deadband supervision, remove the selection from **Enable zero deadband supervision** and click **Apply**.

If the buttons are not enabled, the user is not allowed to make changes to zero deadband supervision.

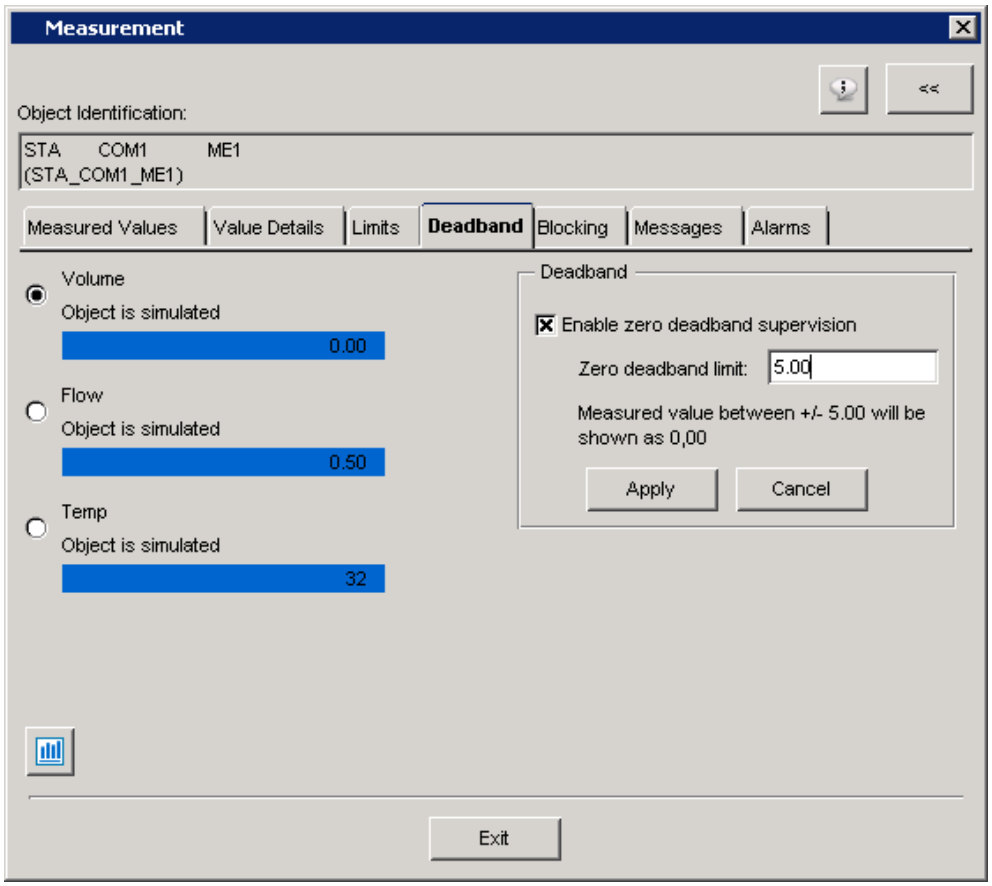


Figure 41: Measurement Deadband tab

4.4.5.3 Blocking

It is possible to change the blockings of both a single measurement as well as all the measurements of an object at once. When **Apply to selected** is checked, the changes affect only the measurements selected from the left side. Otherwise, all blockings of the objects measurements are changed to the state that is selected in the blockings tab. Confirm the changes by clicking **Apply**.

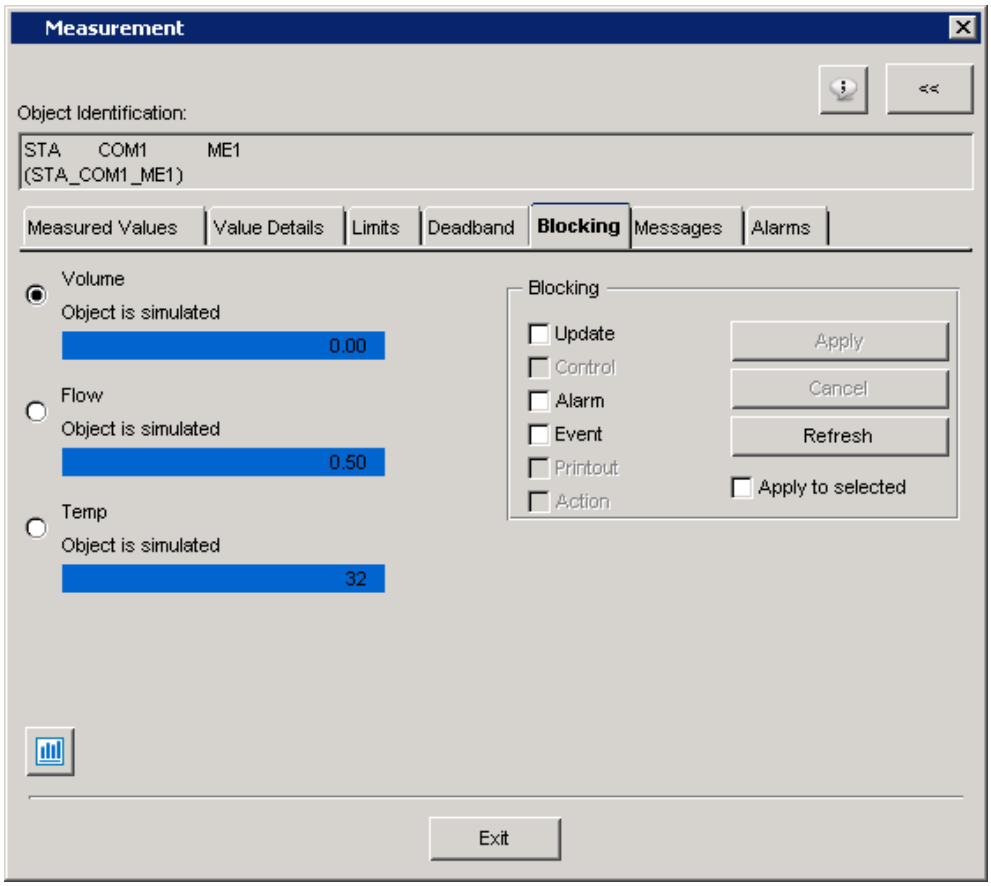


Figure 42: Measurement blocking tab

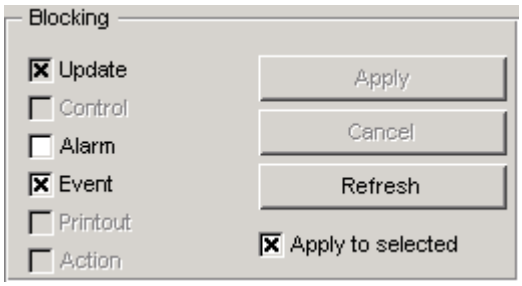


Figure 43: Measurement with partial blockings

In Figure 43, the update is blocked for some of the object measurements:

- Alarm is not blocked for any of the items
- Event is blocked for all of the object measurements.

Partial update blocking is illustrated by the shaded background of the checkbox. When the background of the checkbox is clear, all the measurements of the object are blocked. Since Alarm is not blocked for any of the measurements, it is shown as an unchecked checkbox with a clear background. Control, printout and action are not applicable for these measurements and are therefore disabled and cannot be changed.

4.4.5.4 Messages

Messages are shown one message at a time. To check all messages and the state of all the measurements of an object, select the measurement from the left side of the dialog one at a time and check the Messages tab.

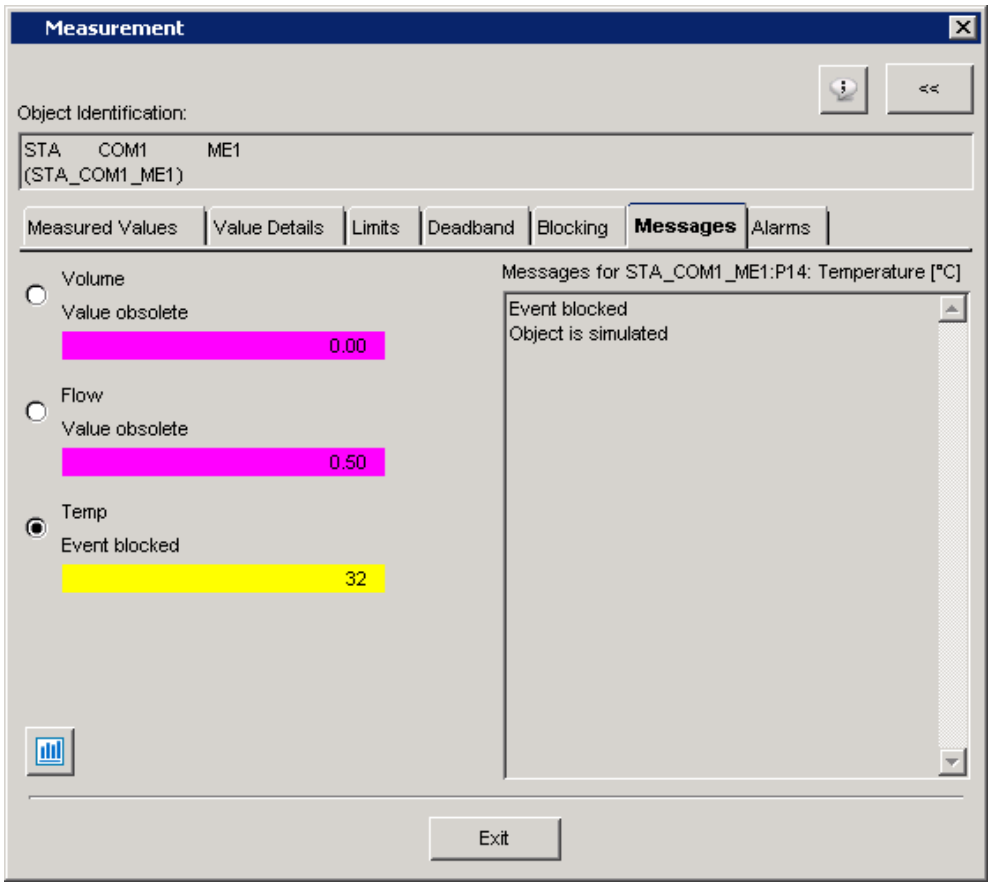


Figure 44: Messages for the temperature measurement

4.4.5.5 Alarms

The alarms for all measurement objects are shown on the Alarms tab. To see all the alarms of an object, there is no need to select the measurements separately.

Acknowledging the alarms works as with other objects. To acknowledge an alarm, select it from the list and click **Ack. selected**. Confirm the acknowledgement in the confirmation dialog.

To acknowledge all shown alarms at once, click **Ack. All** and confirm the acknowledgement from the confirmation dialog.

The buttons are not enabled when there are no messages acknowledge or when the user does not have the required authorization to acknowledge alarms.

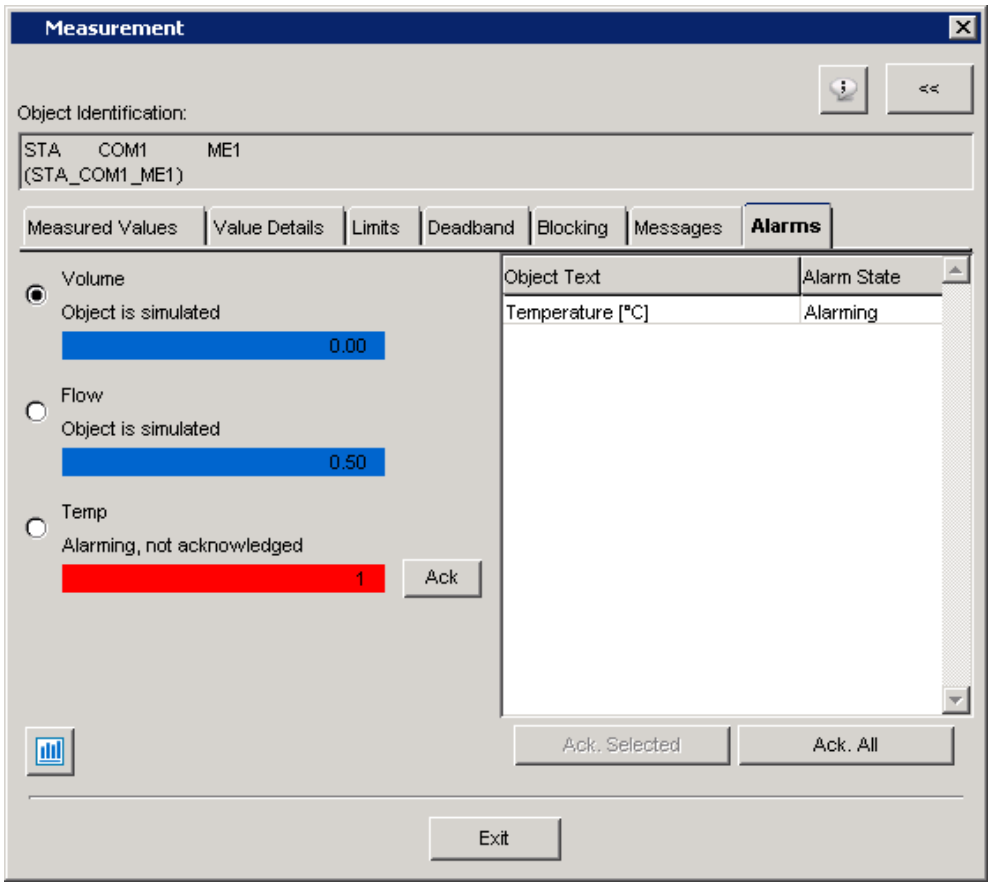


Figure 45: Measurement alarms

4.4.6 Control Unit

Control unit consists of one or more measurement values and a setpoint value, which the process value is controlled towards.

There are two ways to set a new setpoint value:

1. Use the slider to select an appropriate value and click **Set**. Confirm the action in the confirmation dialog to set the new value.
2. Type the new setpoint value to the field and click **Set**.
   This is useful in case the slider cannot be shown correctly when the setpoint is configured without high and low output limits.

Hide the setpoint controls by clicking the  button.

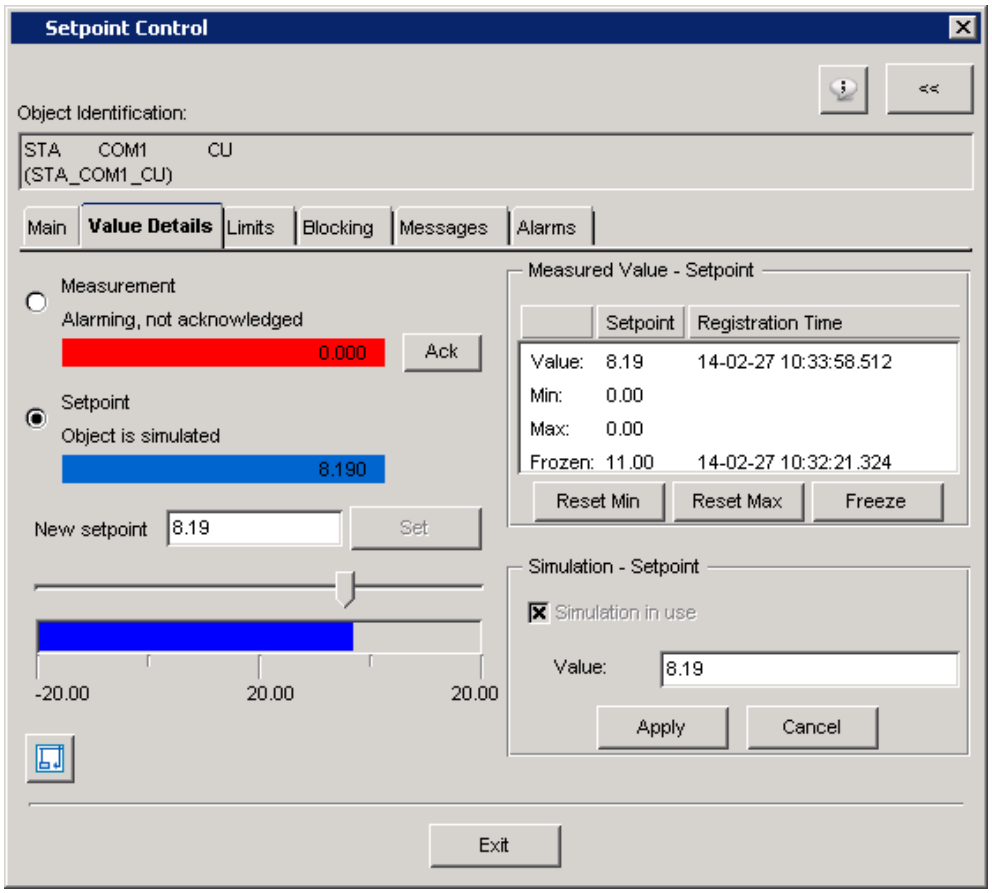


Figure 46: Control unit with one measurement and setpoint value

All other control unit functionalities works as with any other measurement. For more information on limits, blocking, messages and alarms, see Section 4.4.5.

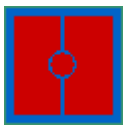
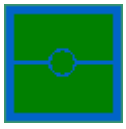
4.5 Symbols

This section displays the different dynamic symbols available in the pipeline library. The state colors are shown as in the default color scheme. The states may be colored differently depending on the used color scheme.

4.5.1 Pump symbols

Symbol	Meaning
	Pump stopped
	Pump running
	Pumps with power level indicators running with 75%/50%/25% power levels.
	Pumps with automatic-manual control. Pump stopped, in manual control mode. Pump stopped, in automatic control mode.

4.5.2 Valve symbols

Symbol	Meaning
	Valve open
	Valve closed
	Valve open (flap valve)
	Valve closed (flap valve)
	Valves with open level at different open percentage levels. 75% open 50% open 25% open

4.5.3 Tank symbols

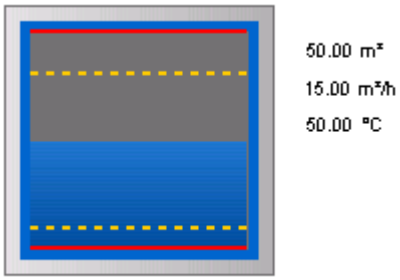
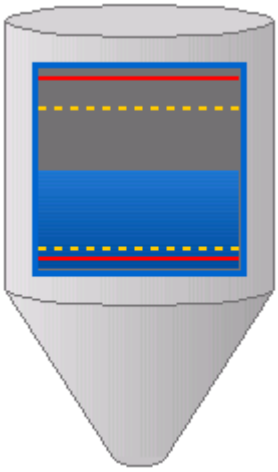
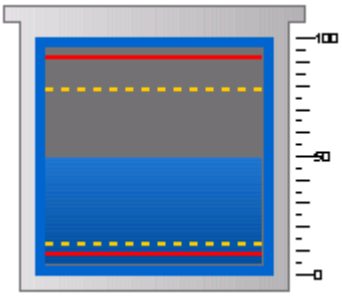
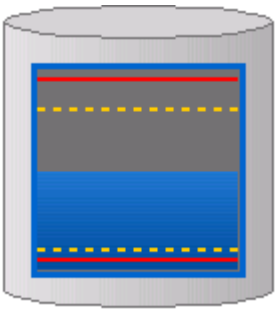
Symbol	Meaning
	Tank, Simple 1
	Tank, Cone
	Tank, Simple 2
	Tank, Low cylinder

Table continues on next page

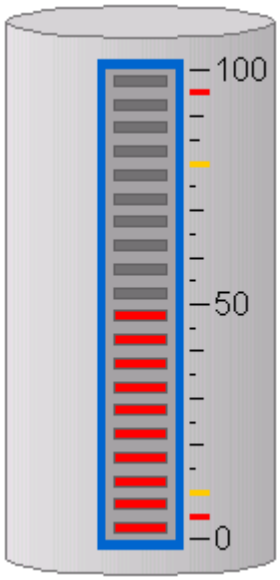
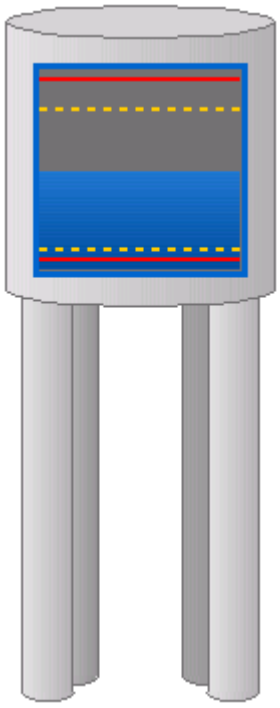
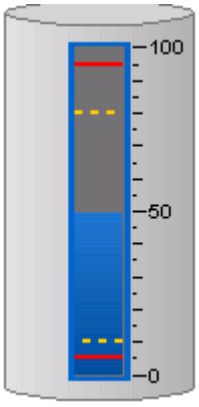
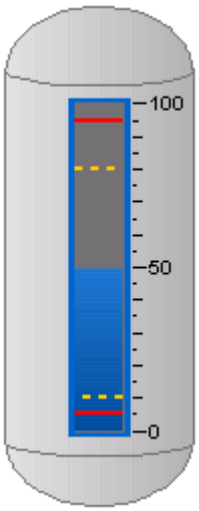
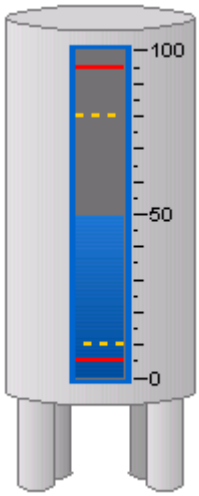
Symbol	Meaning
	Tank LED
	Tank, High legs

Table continues on next page

Symbol	Meaning
	Tank, normal
	Tank, Rounded
	Tank, Legs

4.5.4 Miscellaneous symbols

Symbol	Meaning
	Compressor on
	Compressor off
	Fan on
	Fan off
	Rotary valve on
	Rotary valve off
	Burner on (with flame)
	Burner off
	Control unit
	Local/Remote in remote state
	Local/Remote in station state

4.6 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).

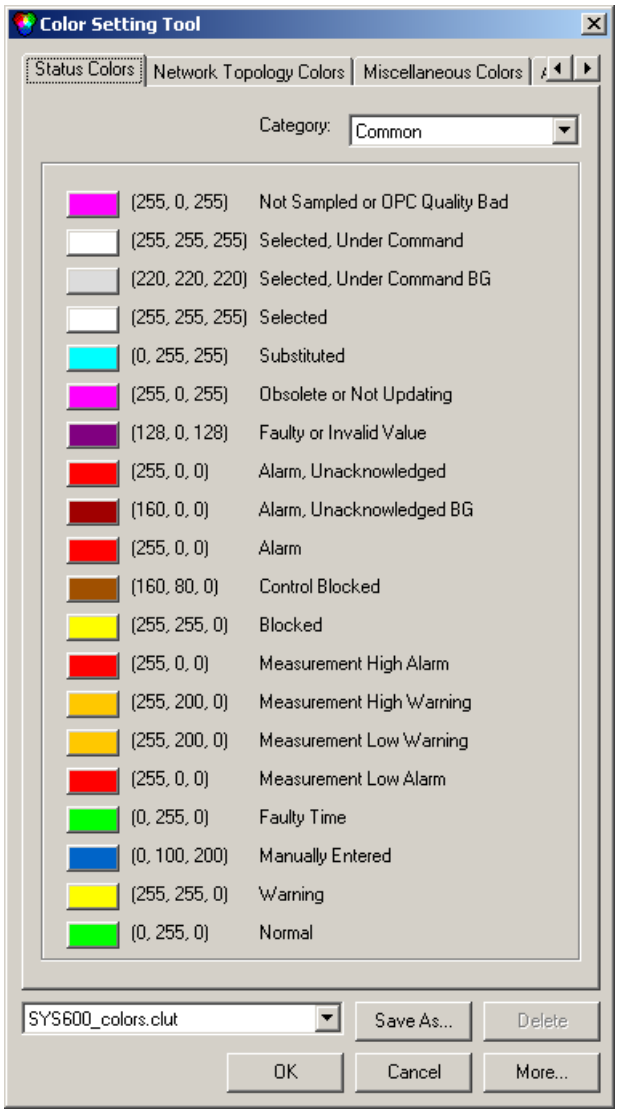


Figure 47: Color Setting Tool

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.

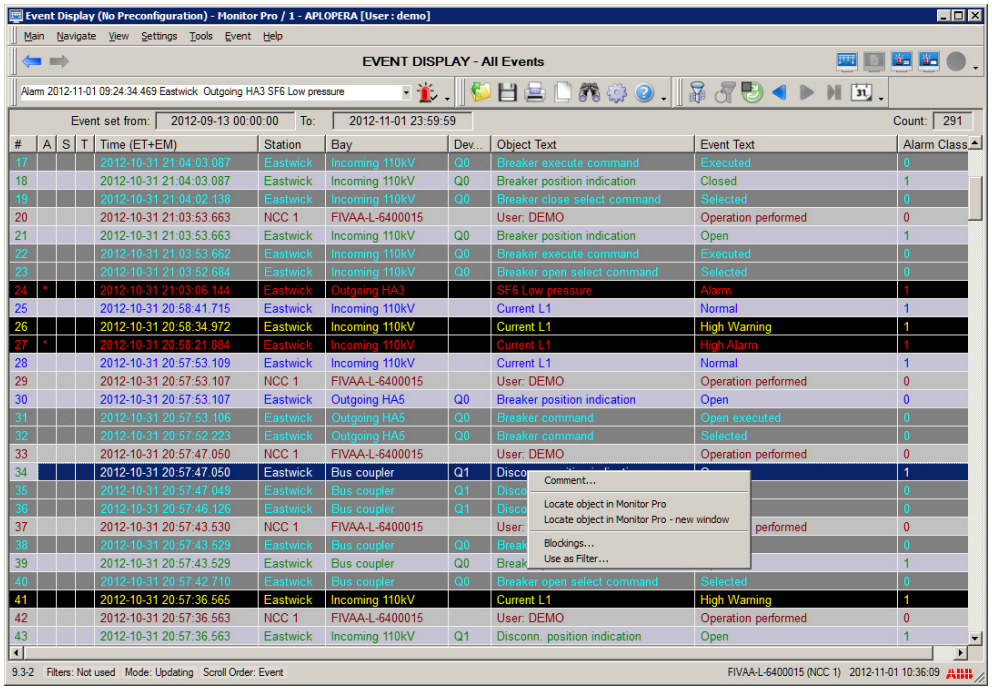


Figure 48: Event Display main view

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 49: 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 3: 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.

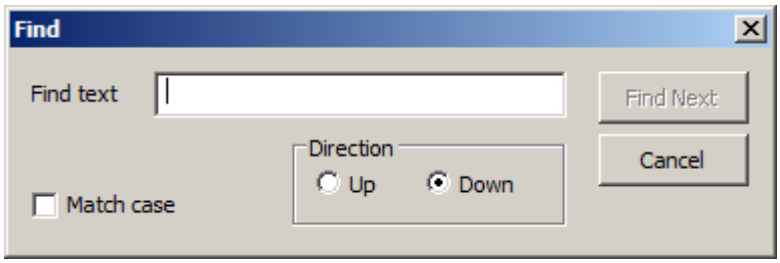
5.2.1 Using the Event Display User Interface

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 50). 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.

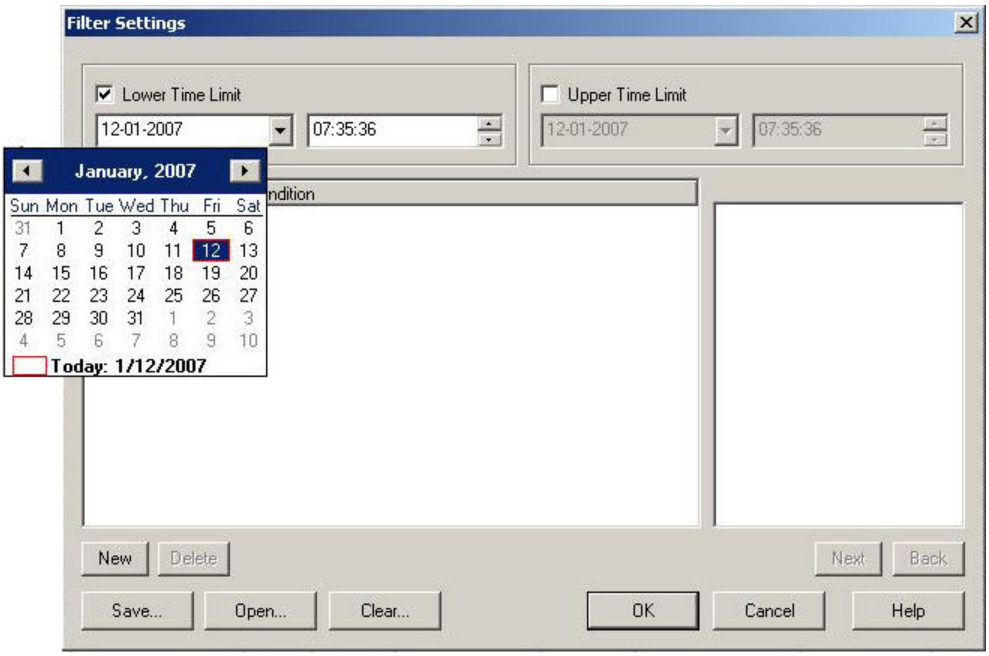


Figure 50: Edit Upper Time Limit

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 51. Click **Save** to save the preconfiguration file. Click **Close** to close the dialog without saving.

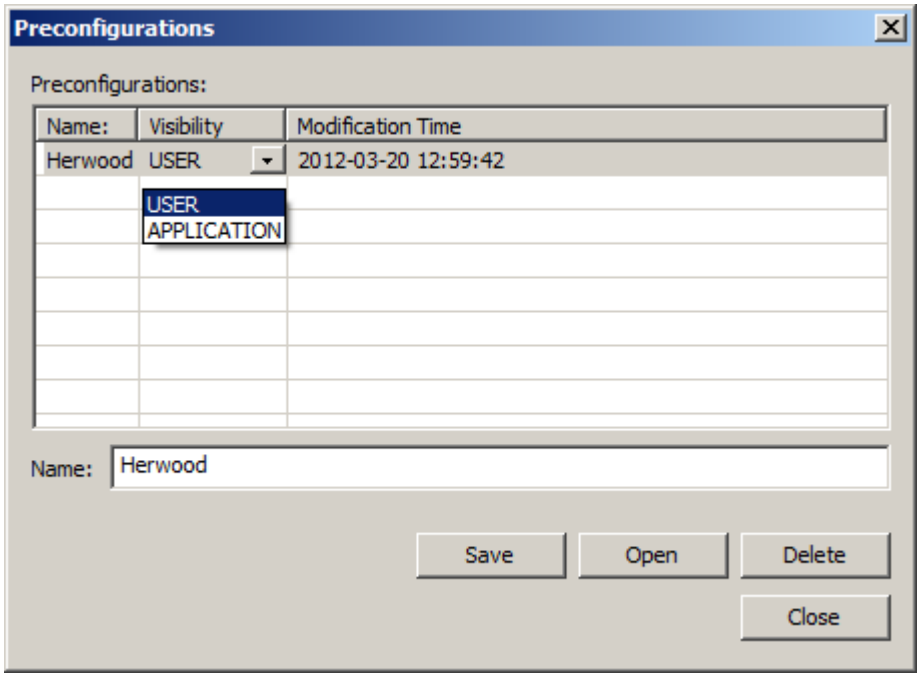


Figure 51: Visibility definition

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.

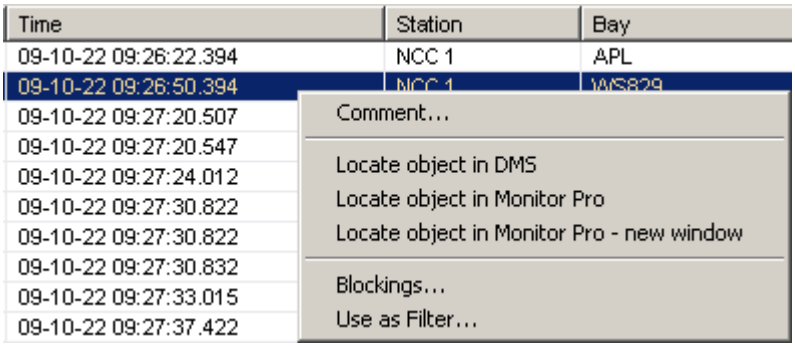


Figure 52: Locating object

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.

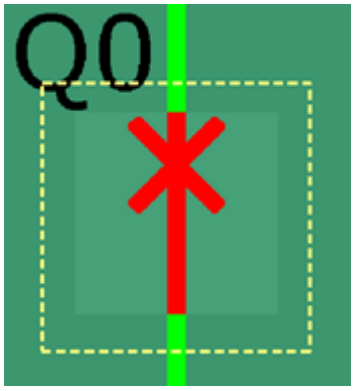


Figure 53: Highlighted symbol

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 54.

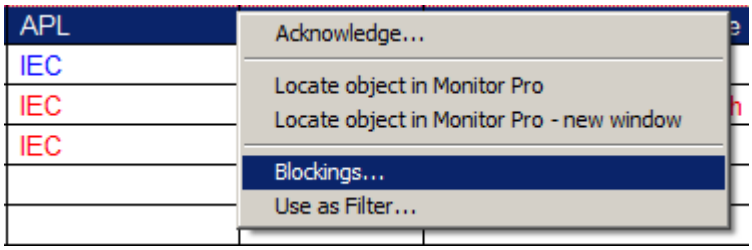


Figure 54: An access to Blockings

Blockings can be set with option buttons, see Figure 55. If some of the blockings are not allowed to a signal, the option button is disabled.

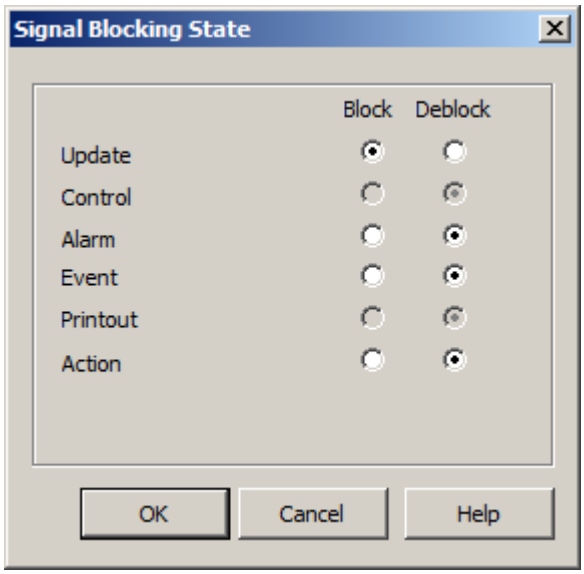


Figure 55: Signal Blocking State dialog

5.2.5 Customizing the column layout

The layout settings can be configured by selecting **Settings/Display Settings.../Layout Settings**. The dialog in shown in Figure 56.

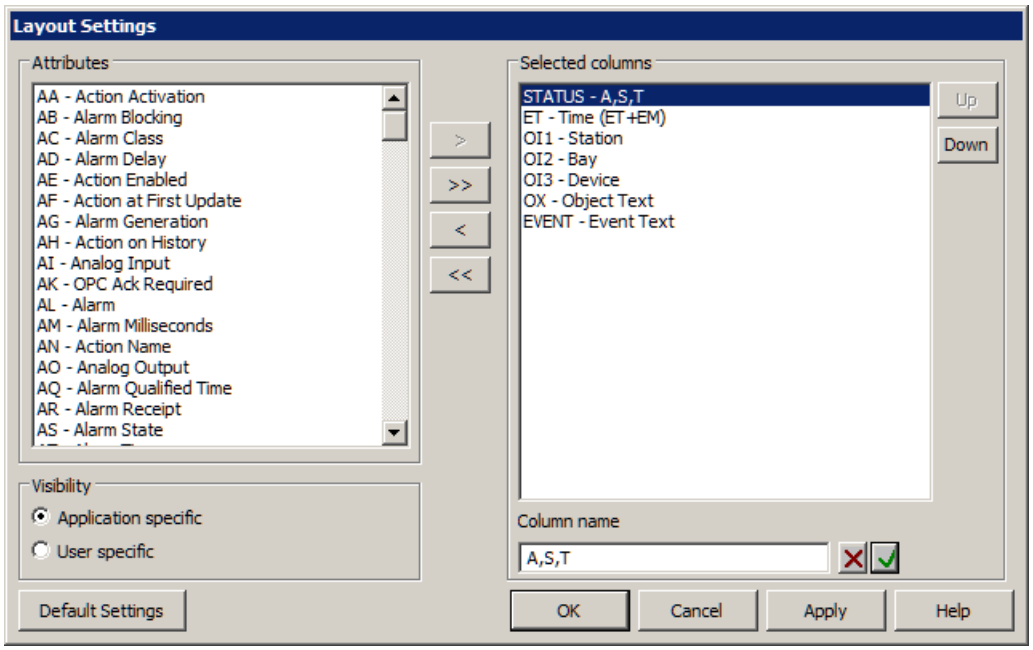


Figure 56: Layout settings

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 56.

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 57.

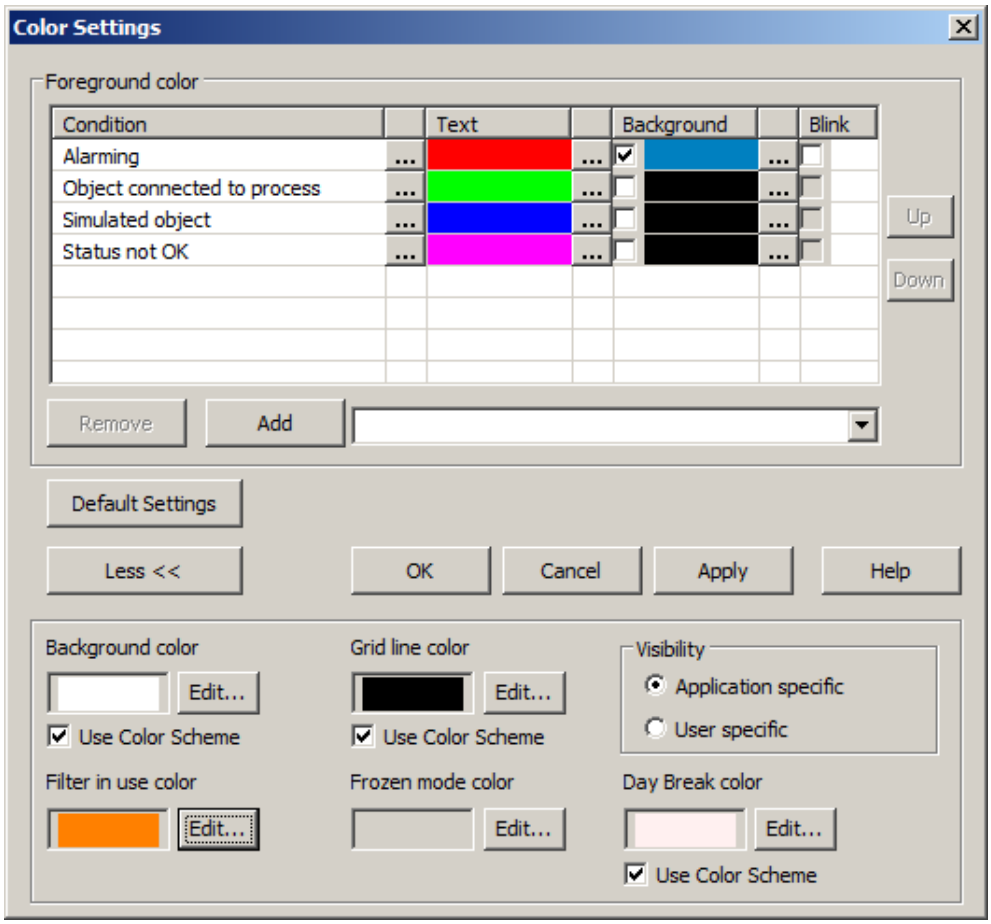


Figure 57: The Color Settings dialog.

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 58: 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.

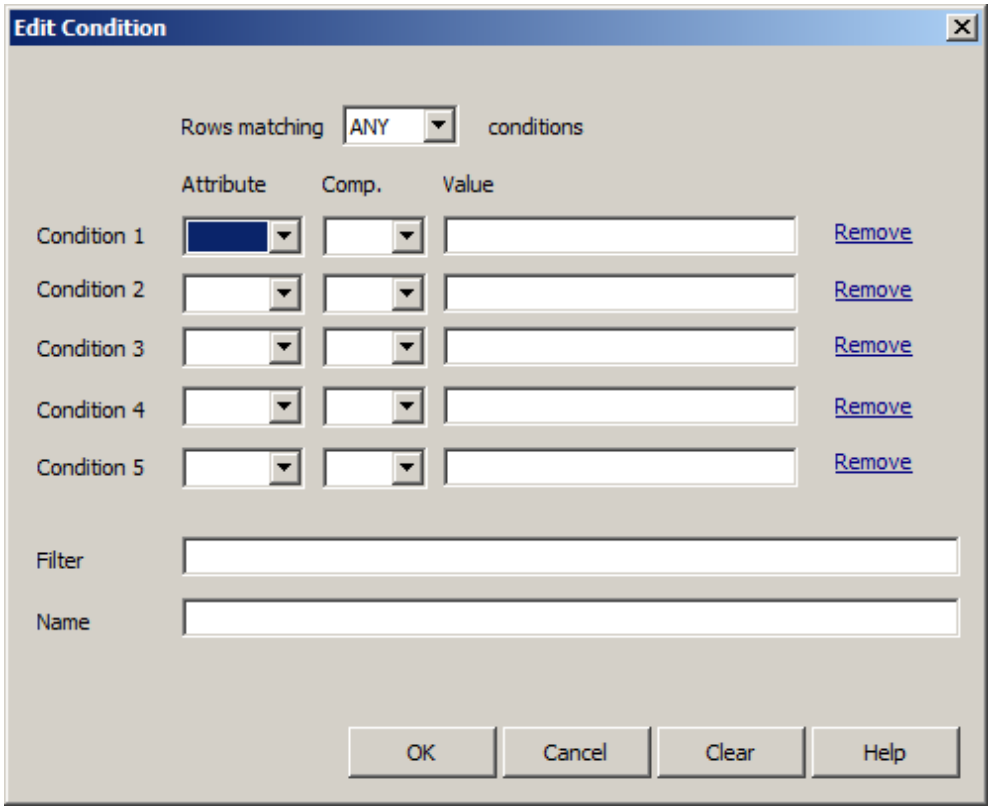


Figure 59: Edit Condition dialog

The available operators for the conditions are described in Table 4.

Table 4: Condition operators

Operator	Function
== or =	Equal than
<	Less than
>	Greater than
<=	Less or equal than
>=	Greater or equal than
<>	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 e.g. 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 '*' (asterix) 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 60), the authorization level Control is required. The **Settings** dialog is used when customizing the list.

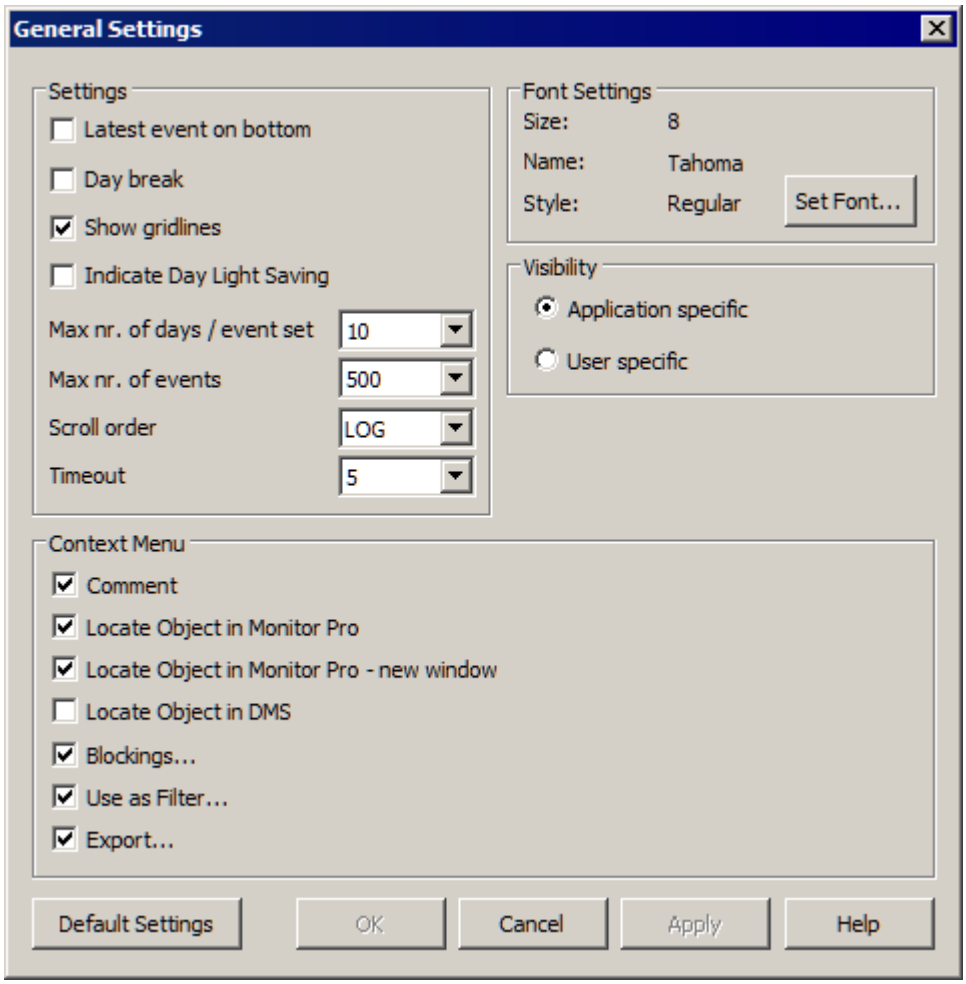


Figure 60: Settings dialog

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 61.

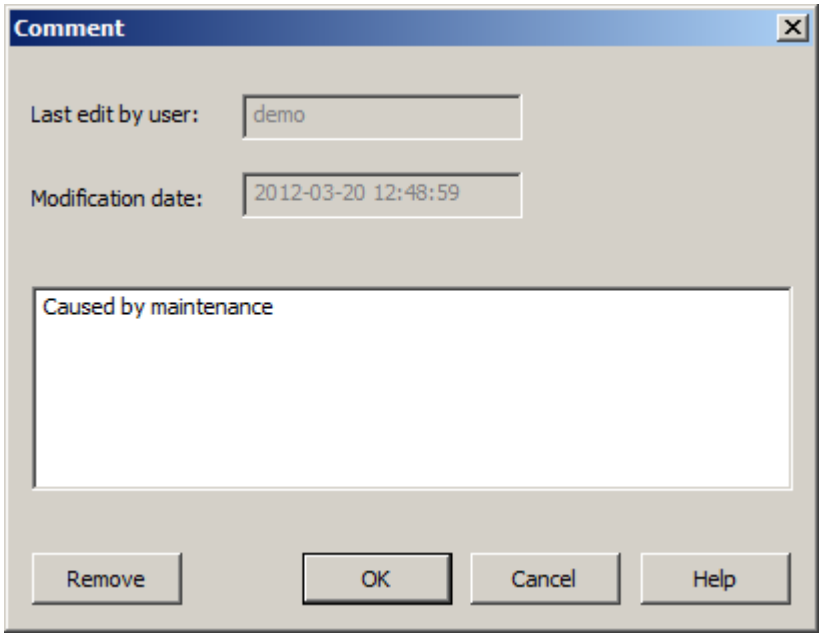


Figure 61: Comments dialog

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 62 for Alarm Display Template 1 and Figure 63 for Alarm Display Template 2.

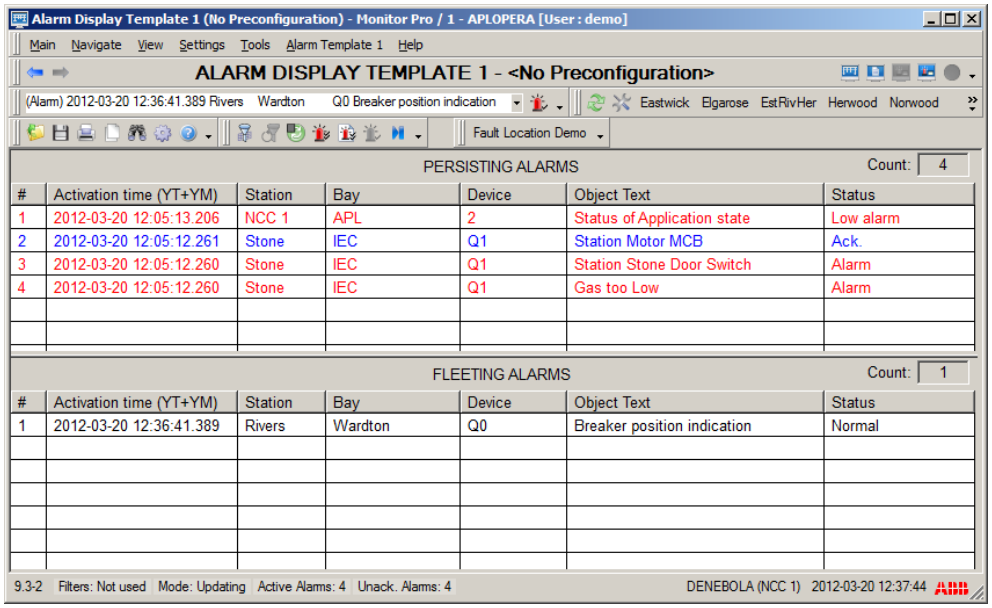


Figure 62: Alarm Display Template 1

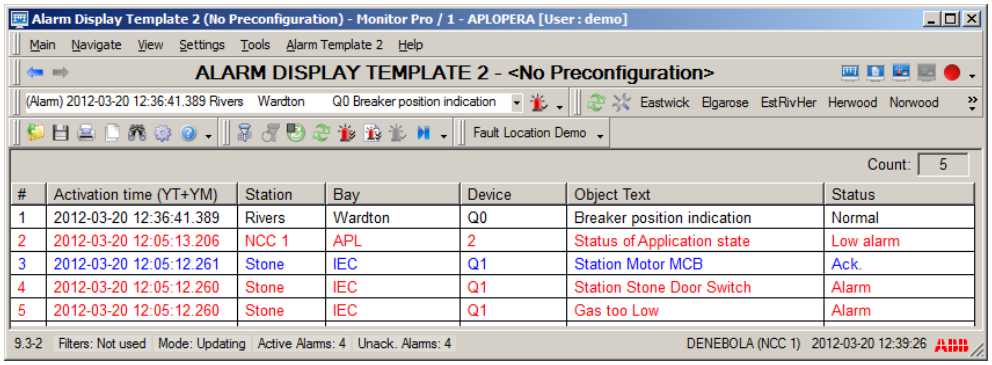


Figure 63: Alarm Display Template 2

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 64: 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 show in Figure 65. With default settings, the different states are colored differently. The default colors are the background colors in the figure.

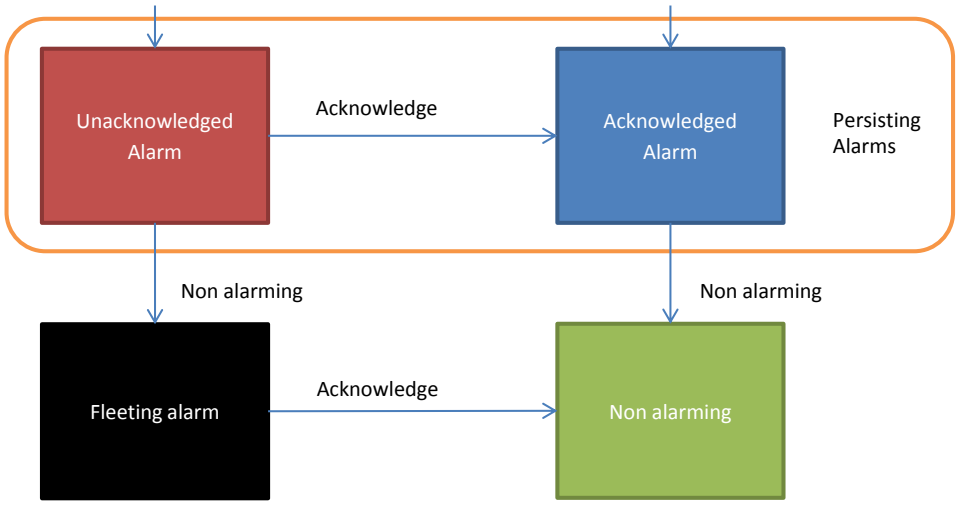


Figure 65: Alarm states

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 show 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 show on the list at all.

The values for status column and default colors are explained in Table 5.

Table 5: 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 63.

Table 6 provides an explanation for the different alarm types.

Table 6: 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

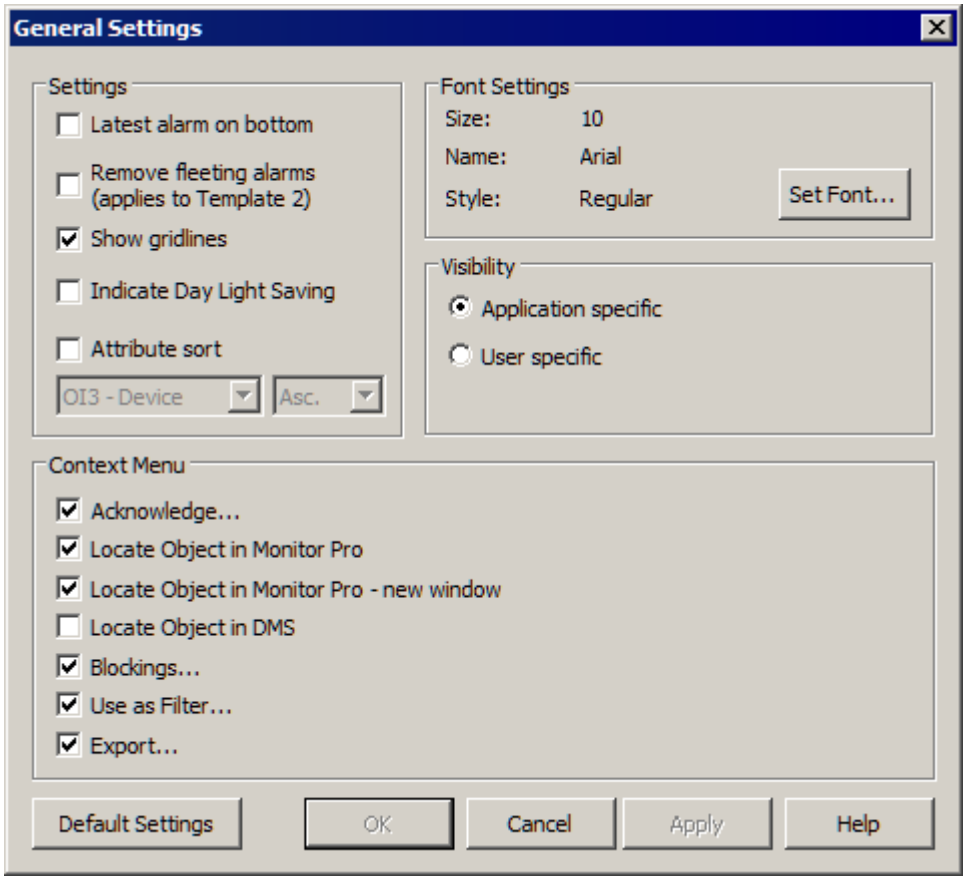


Figure 66: Settings dialog

The **Settings** dialog (see Figure 66) 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 67.

Figure 67: Latest Alarms dialog

If the selected alarm is unacknowledged, the Acknowledgement dialog in Figure 68 can be opened by clicking the **Acknowledge Selected Alarm** button on the right-hand side of the Alarm Row.

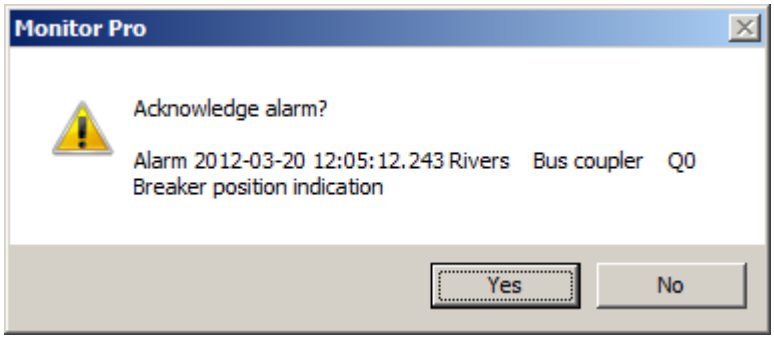


Figure 68: Acknowledge alarm dialog

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 69 shows the Blocking Display main view.

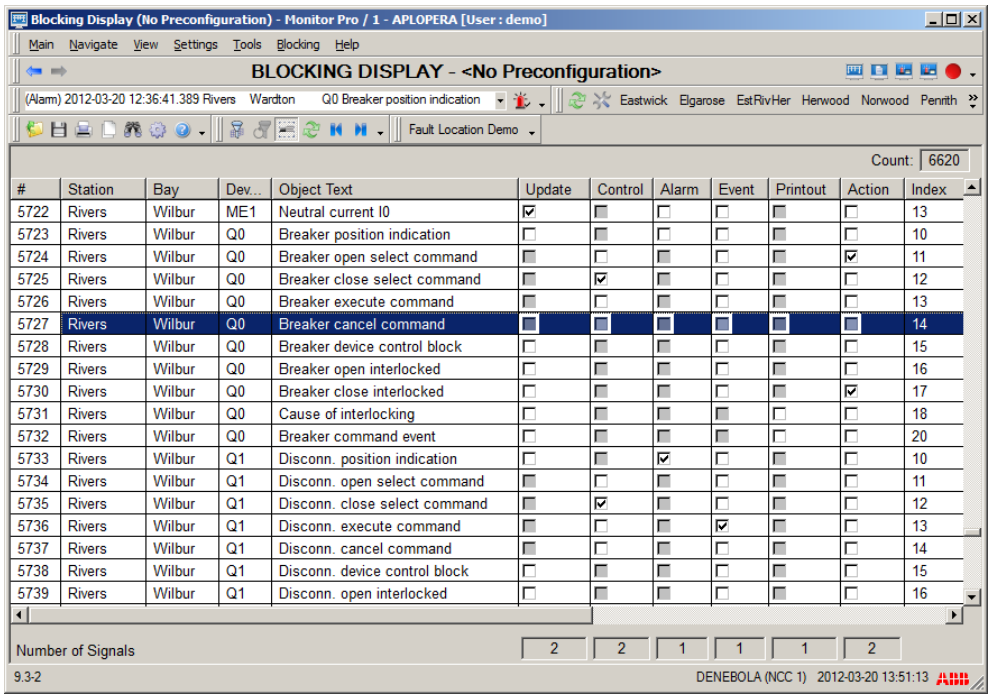


Figure 69: The Blocking Display main view

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 70).

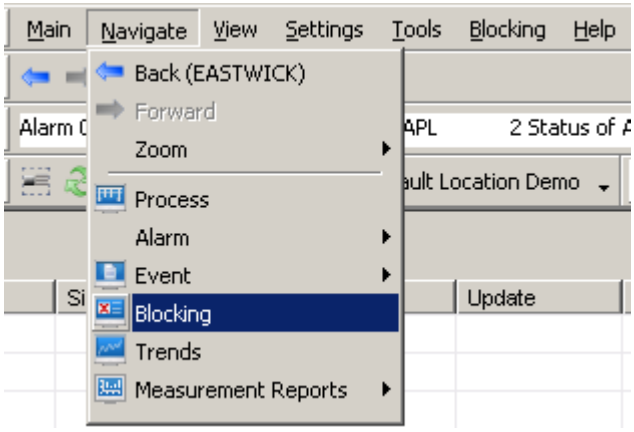


Figure 70: Starting the Blocking Display

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 71: 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 7.

Table 7: 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 72).

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.

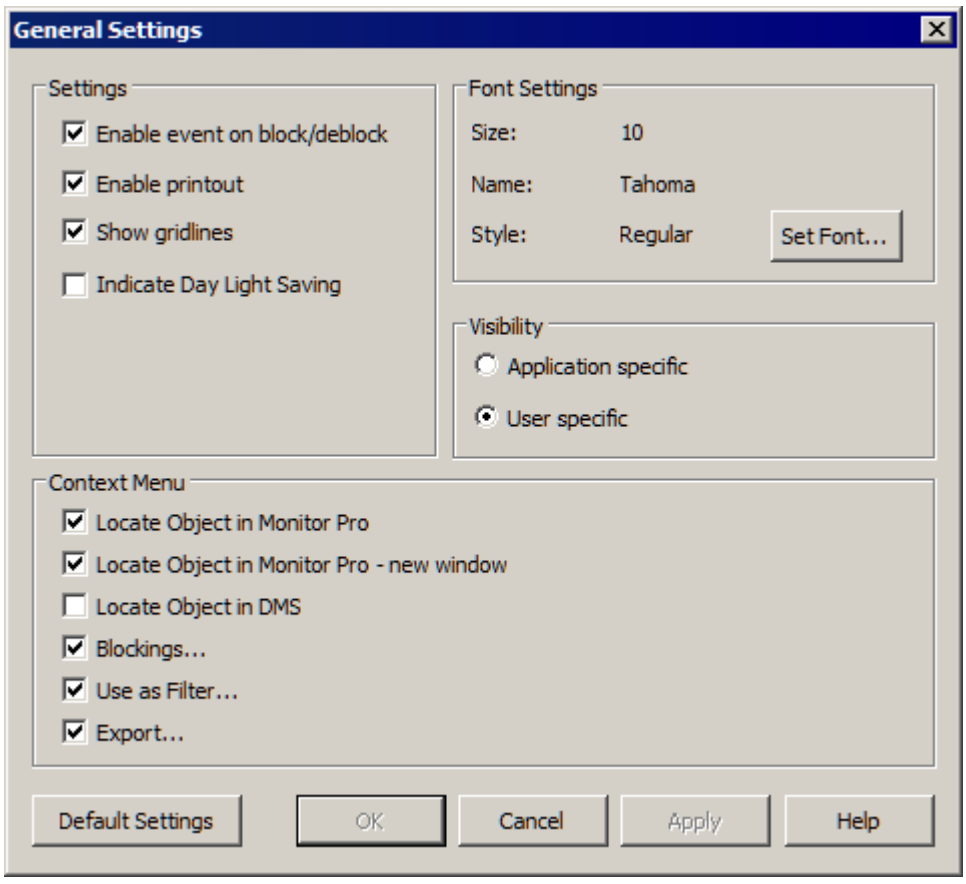


Figure 72: The Blocking Display General Settings dialog

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.

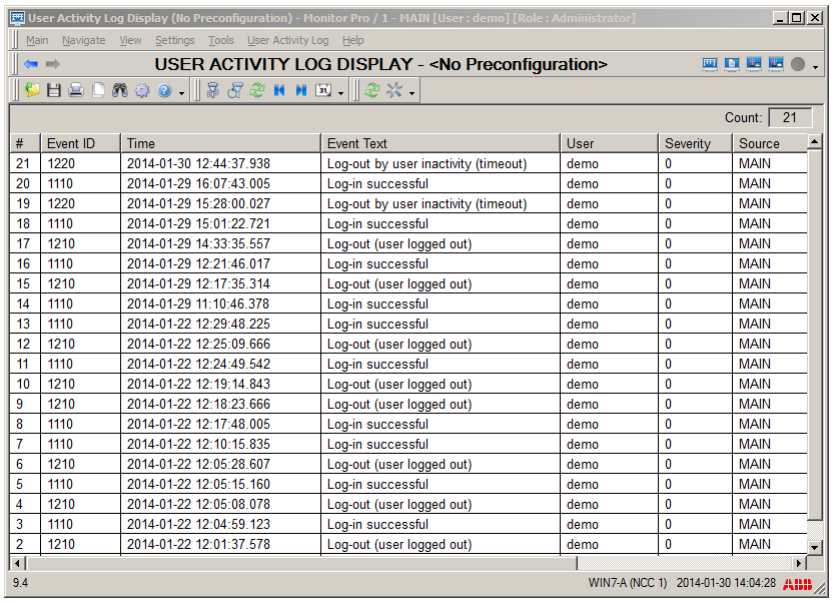


Figure 73: The User Activity Log Display main view

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 74: 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.

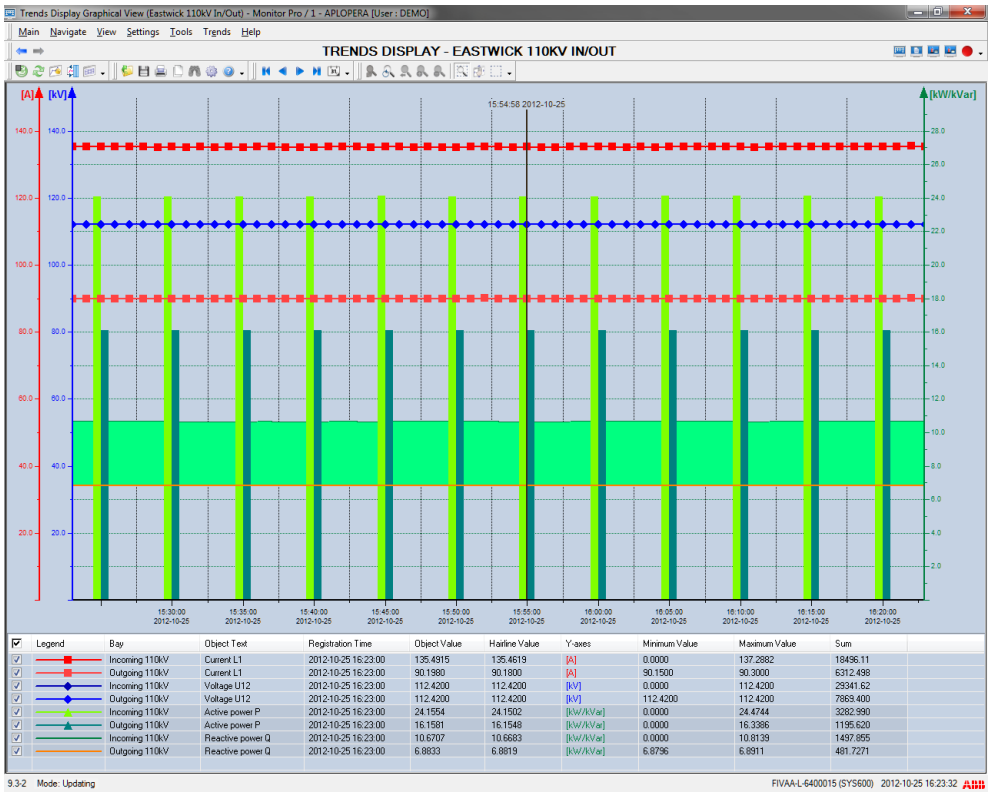


Figure 75: The Trends Display

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 76).

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

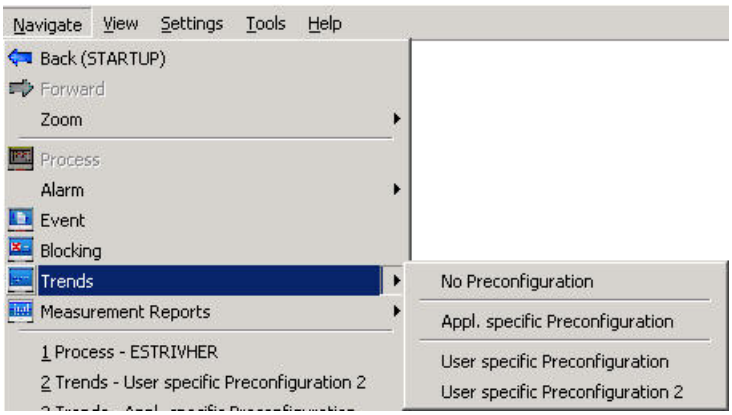


Figure 76: Trends navigation menu

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.

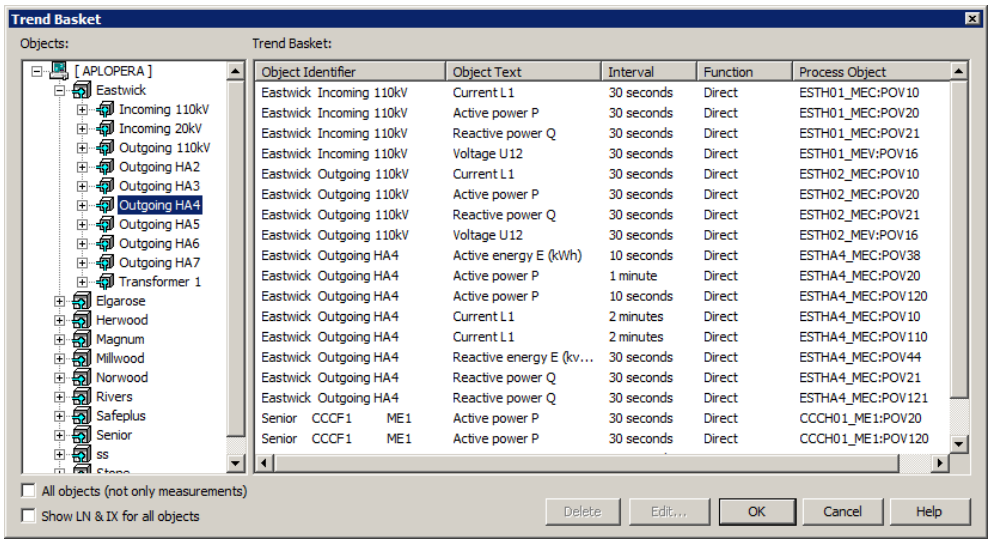


Figure 77: The Trend Basket dialog

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.

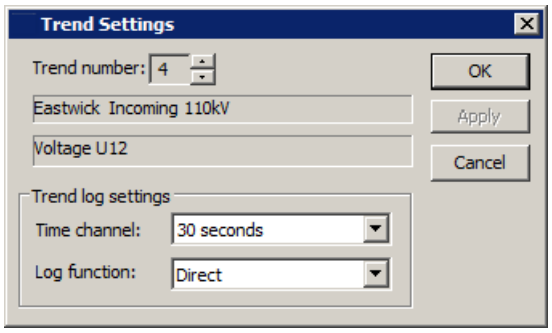


Figure 78: The Trend Settings dialog

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 8.

Change the Log function will delete all the existing data for the selected Trend.

Table 8: 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 79: Main toolbar

Table 9: 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: • **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 80: Display toolbar

Table 10: 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 81 and Figure 82). Some of the menu items are active for graphical view only.

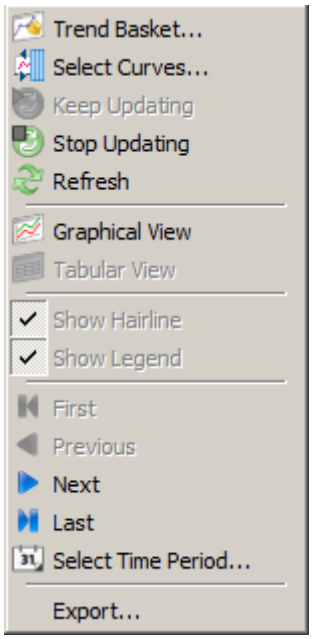


Figure 81: Trends Display menu for tabular view

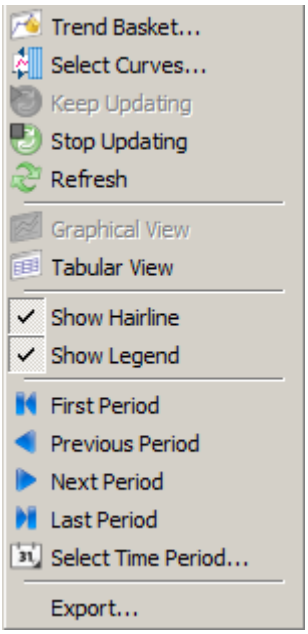


Figure 82: Trends Display menu for graphical view

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.

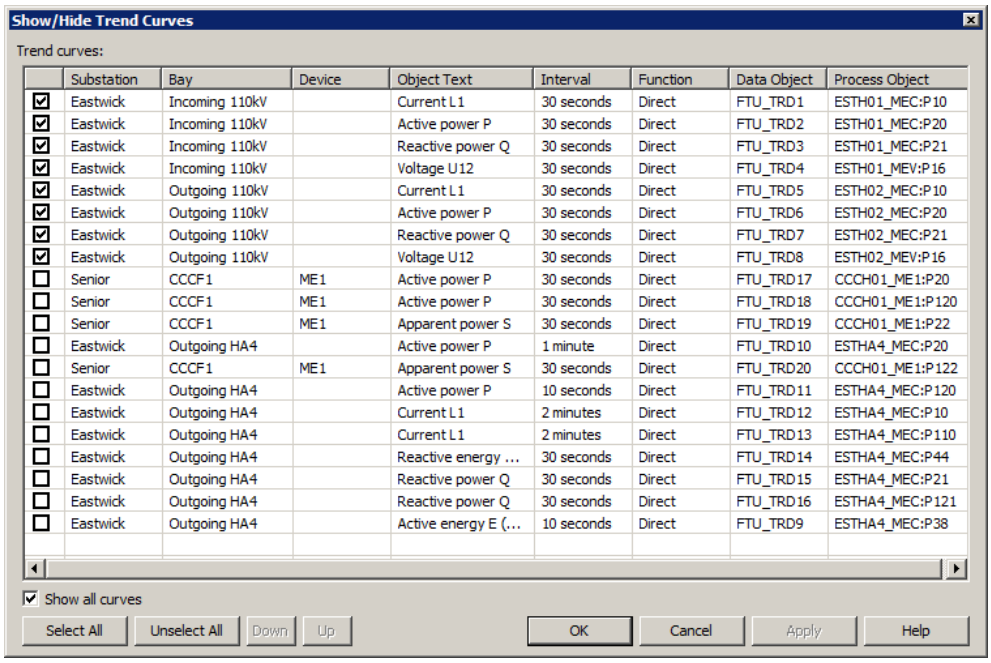


Figure 83: Show/Hide Trend Curves dialog

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** .

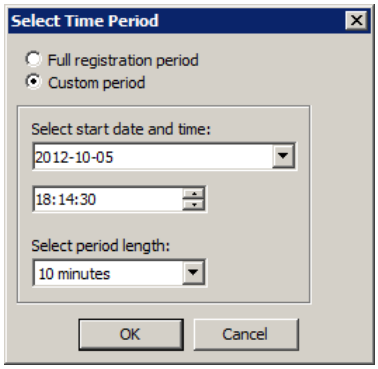


Figure 84: Select Time Period dialog

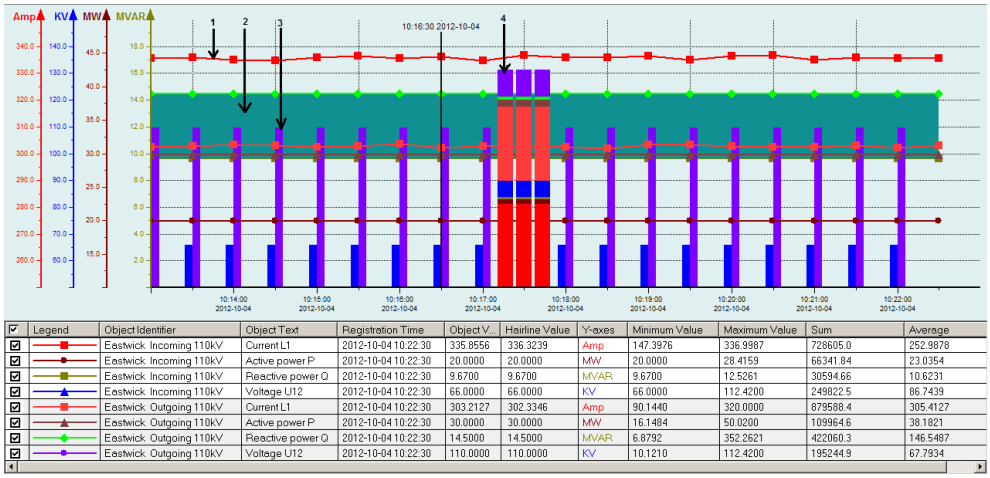
By default, the Full registration period is applied. This means that all the samples are shown on the graphical view, and the accuracy of the registration time is scaled accordingly. When Custom period is selected, it is possible to select a start date and time for the detailed information. The first 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 represented 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.



Legend	Object Identifier	Object Text	Registration Time	Object V...	Hairline Value	Y-axes	Minimum Value	Maximum Value	Sum	Average
	Eastwick Incoming 110kV	Current L1	2012-10-04 10:22:30	335.8556	336.3239	Amp	147.3976	336.9987	726605.0	252.9878
	Eastwick Incoming 110kV	Active power P	2012-10-04 10:22:30	20.0000	20.0000	MW	20.0000	28.4159	66341.84	23.0354
	Eastwick Incoming 110kV	Reactive power Q	2012-10-04 10:22:30	9.6700	9.6700	MVAR	9.6700	12.5261	30594.66	10.6231
	Eastwick Incoming 110kV	Voltage U12	2012-10-04 10:22:30	66.0000	66.0000	KV	66.0000	112.4200	249822.5	86.7439
	Eastwick Outgoing 110kV	Current L1	2012-10-04 10:22:30	303.2127	302.3346	Amp	90.1440	320.0000	879588.4	305.4127
	Eastwick Outgoing 110kV	Active power P	2012-10-04 10:22:30	30.0000	30.0000	MW	16.1484	50.0200	109964.6	38.1821
	Eastwick Outgoing 110kV	Reactive power Q	2012-10-04 10:22:30	14.5000	14.5000	MVAR	6.8792	352.2621	422060.3	146.5487
	Eastwick Outgoing 110kV	Voltage U12	2012-10-04 10:22:30	110.0000	110.0000	KV	10.1210	112.4200	195244.9	67.7934

Figure 85: 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 86: Navigation toolbar

Table 11: 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 87: 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.

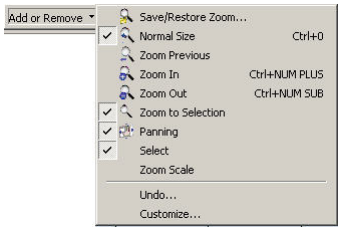


Figure 88: Removed buttons from the zoom toolbar

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

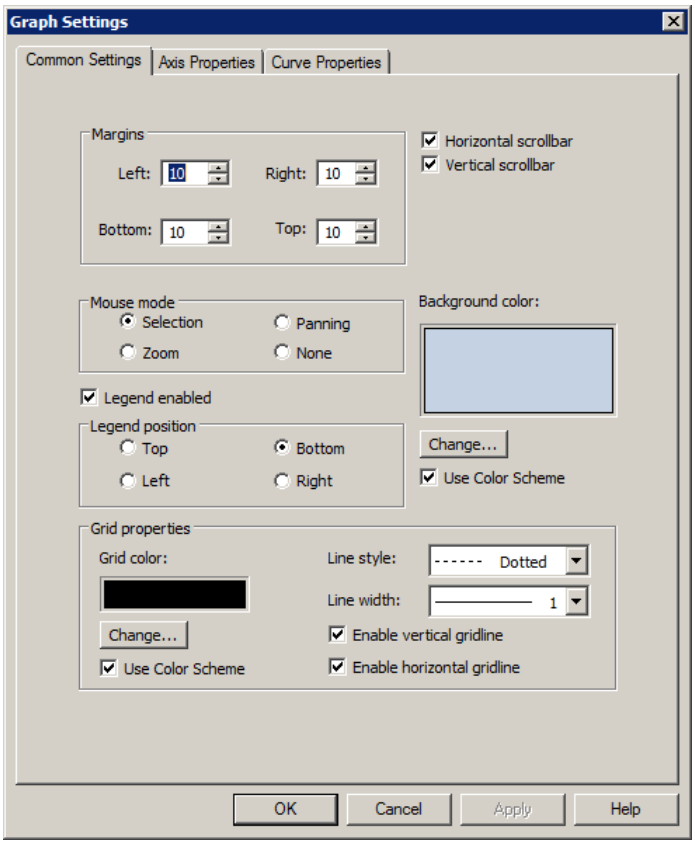


Figure 89: The Graph Settings dialog, Common Settings

Table 12: 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

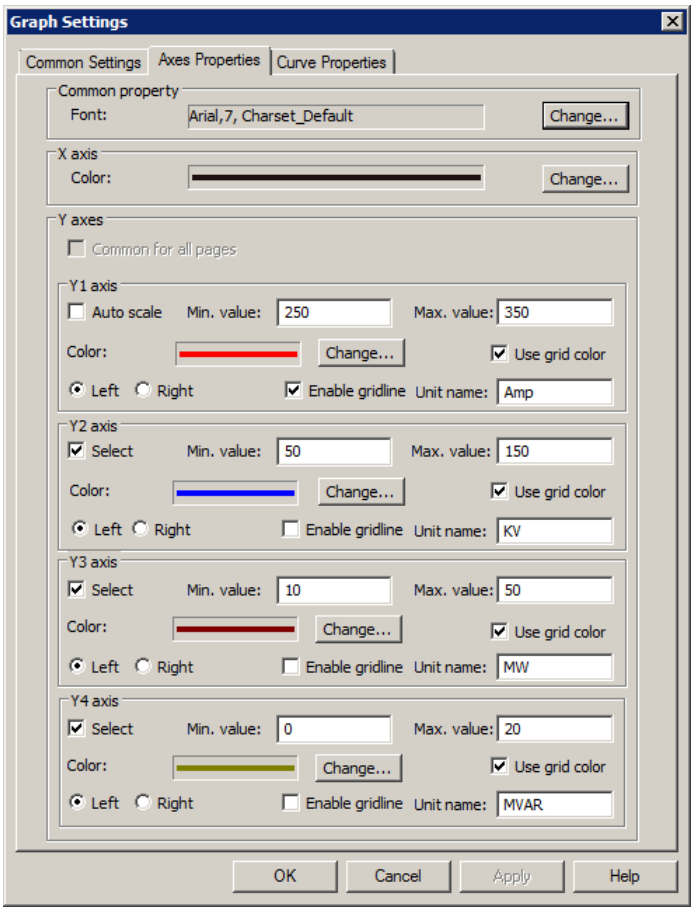


Figure 90: The Graph Settings dialog, Axis Properties

Table 13: 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.

Table continues on next page

Setting	Description
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.

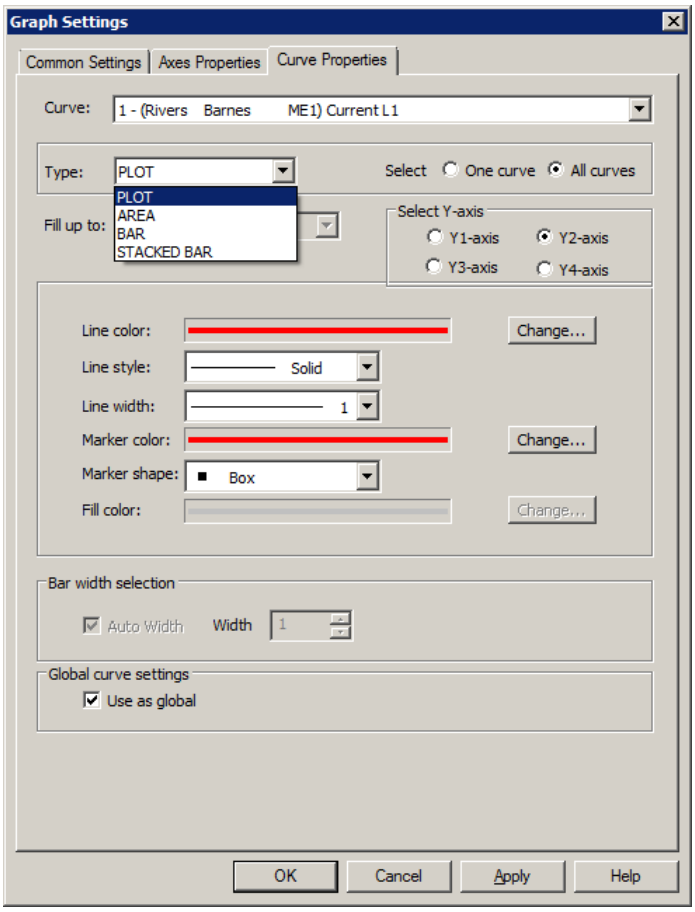


Figure 91: The Graph Settings dialog, Curve Properties

Table 14: 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, e.g. new line color selected, the stored global settings will be overwritten. Curve settings defined as 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-axes	Minimum Value	Maximum Value	Sum	Average
	Eastwick_Incoming 110kV	Current L1	2012-10-05 10:32:00	335.4447	336.4446	Amp	0.0000	336.9987	963030.1	334.3855
	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
	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
	Eastwick_Incoming 110kV	Voltage U12	2012-10-05 10:32:00	66.0000	66.0000	KV	0.0000	66.0000	189156.0	65.6792
	Eastwick_Outgoing 110kV	Current L1	2012-10-05 10:32:00	302.8358	303.6592	Amp	0.0000	303.9998	868409.1	301.5309
	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
	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
	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 92: 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.

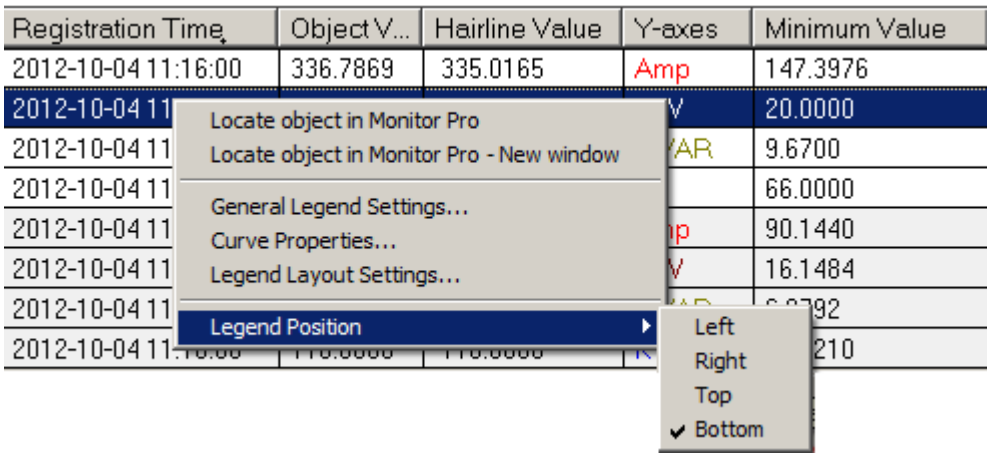


Figure 93: Legend context menu

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.

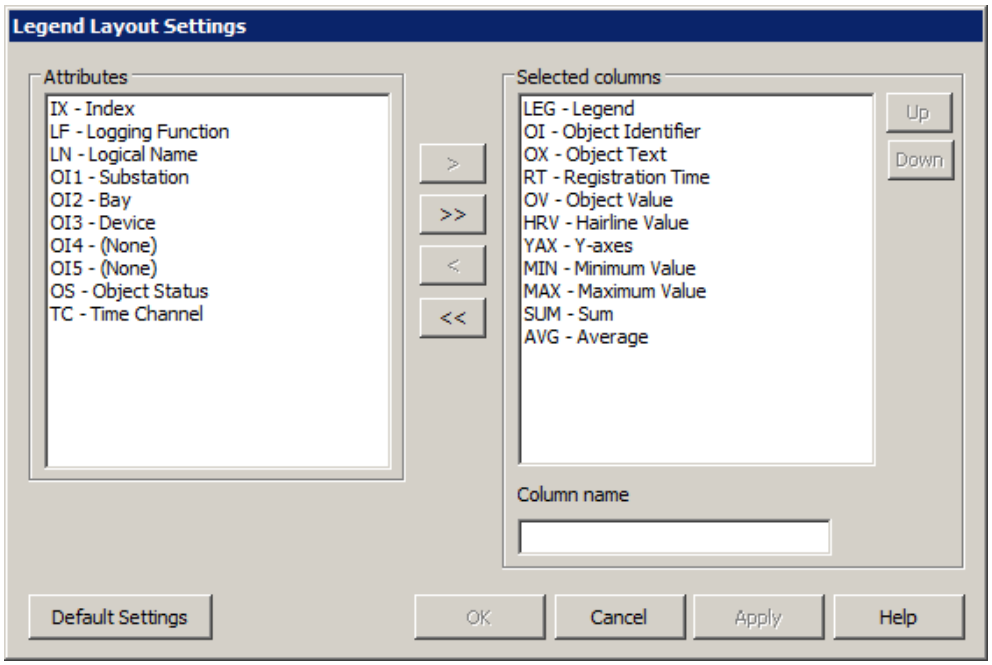


Figure 94: Legend layout settings dialog

- **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.

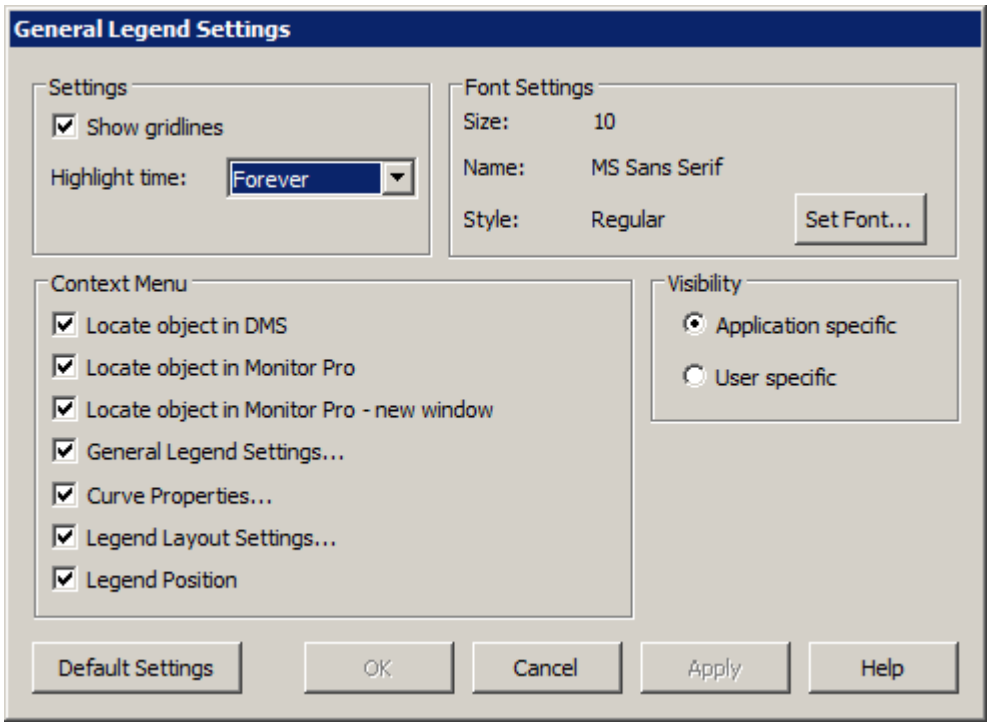


Figure 95: General Legend settings dialog

Table 15: 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 96: Copy to clipboard confirmation

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

Figure 97: 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.

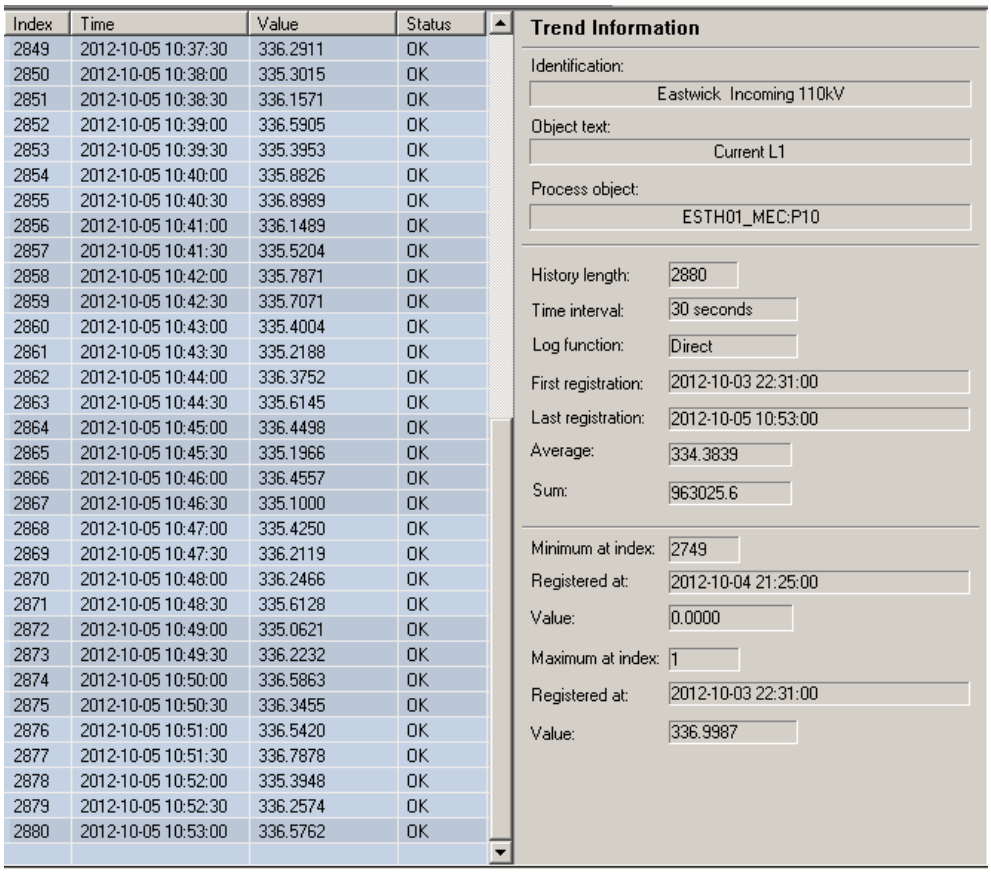
9.5 Tabular view

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	336.7878	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

Figure 98: 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 16: 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, e.g. if the input card has some failure.
Obsolete	The source of the Trend data has been marked as obsolete (not up to date), e.g. 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, e.g. 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**.

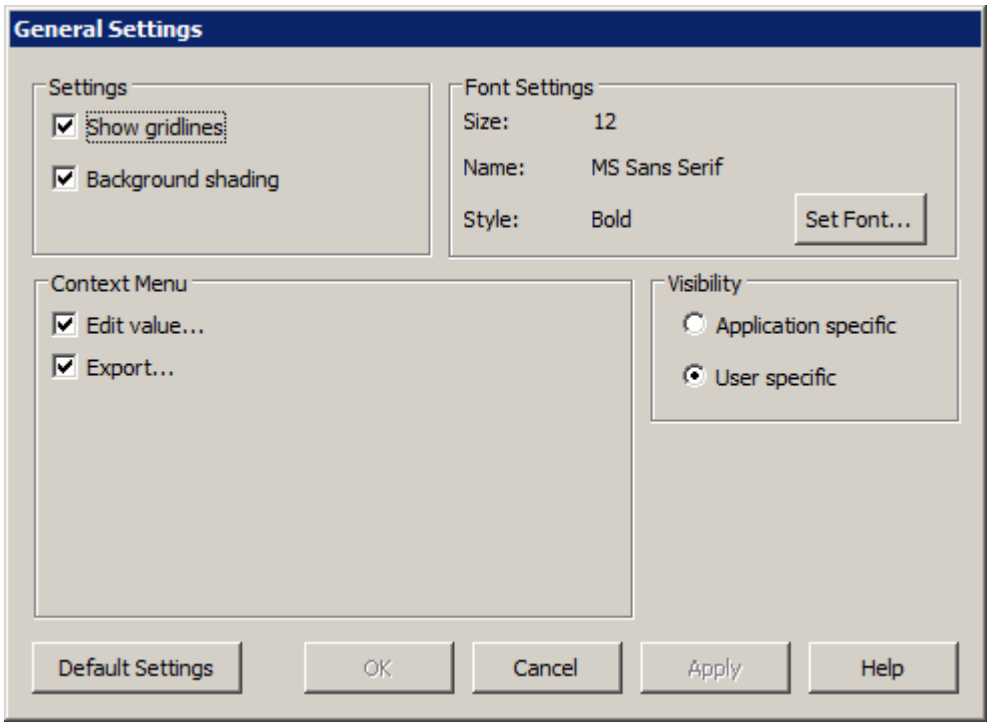


Figure 99: General Settings

Table 17: 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 100: Navigation toolbar

Table 18: 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.

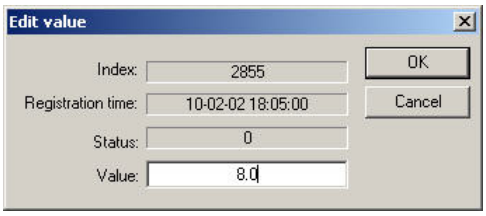


Figure 101: Edit value dialog

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 102). 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 102.

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.

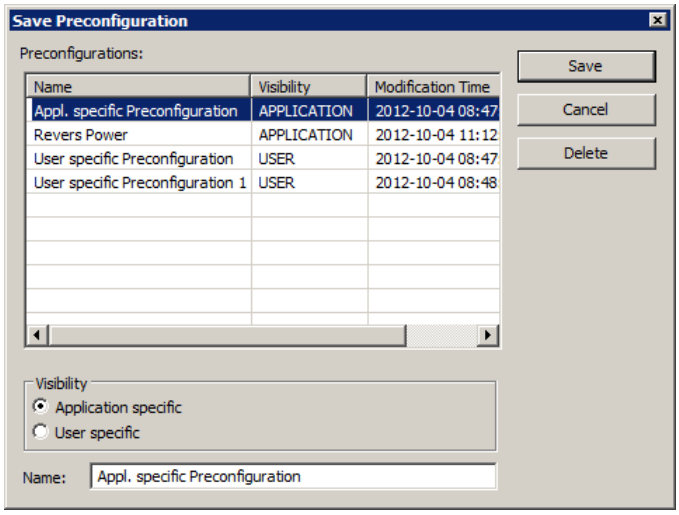


Figure 102: Save Preconfiguration dialog

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 e.g. 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 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 103 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.

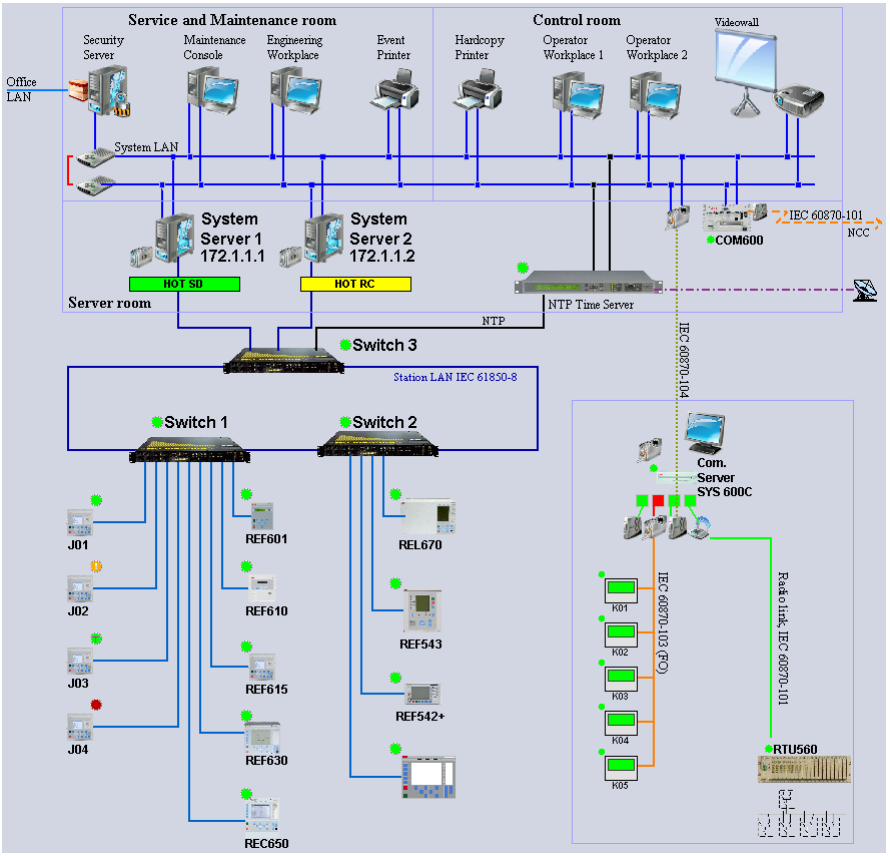


Figure 103: An example of a typical system supervision display

10.1 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.

10.2 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.

10.2.1 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:

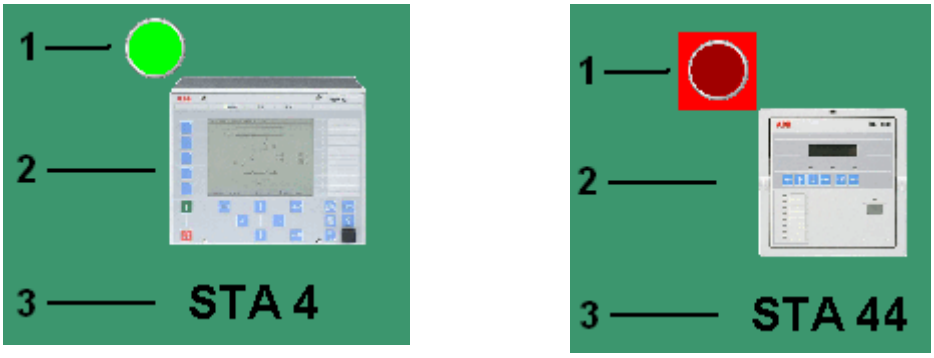
- System server
- Application
- Communication unit
- Station (IED)
- Workplace
- Computer accessories
- Network equipment
- Status

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.

10.2.2 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 104.

Figure 104: 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 19: 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 105.

Figure 105: Supervision symbols for IED products

10.2.3 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

10.2.3.1 Common characteristics

Supervision control dialogs have common characteristics, such as the Power Process control dialogs. An example of Station Supervision is shown in Figure 106. 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.

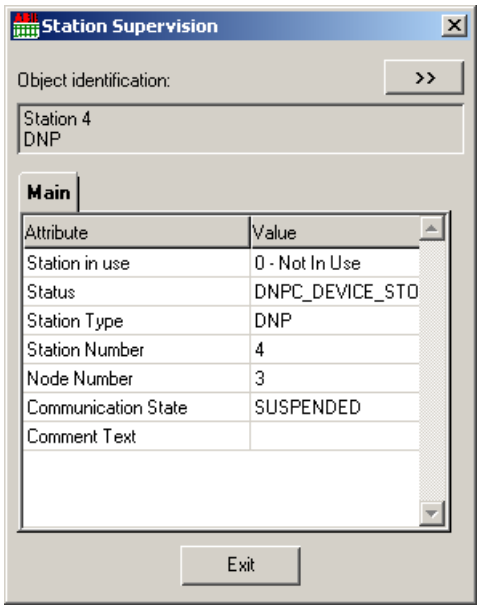


Figure 106: An example of a supervision control dialog

When the dialog is expanded, additional tabs appear, see Figure 107. 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.

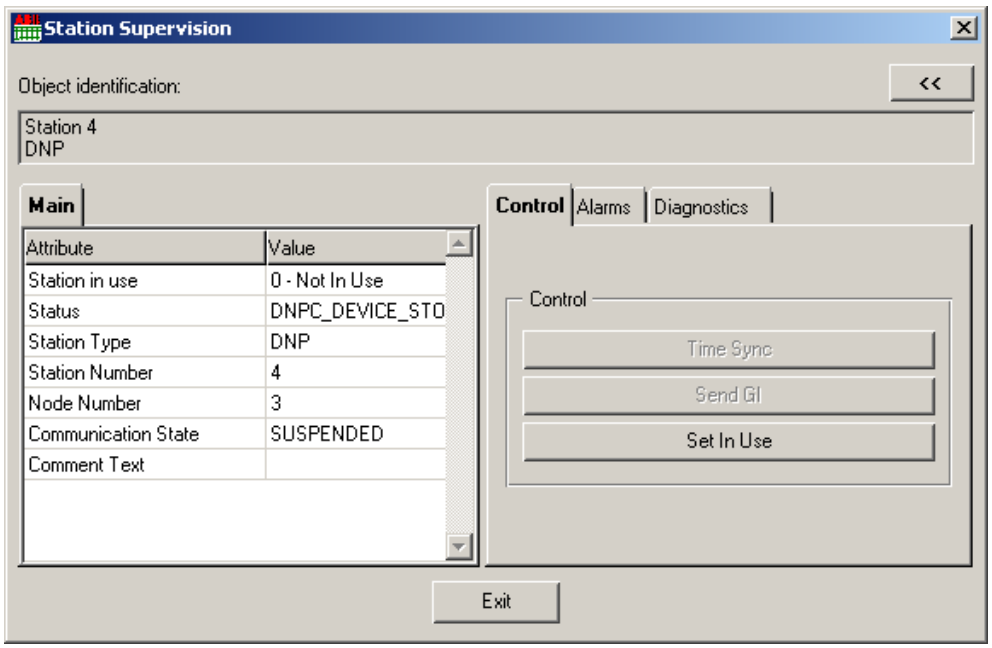


Figure 107: Expanded station supervision control dialog

10.2.3.2 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.

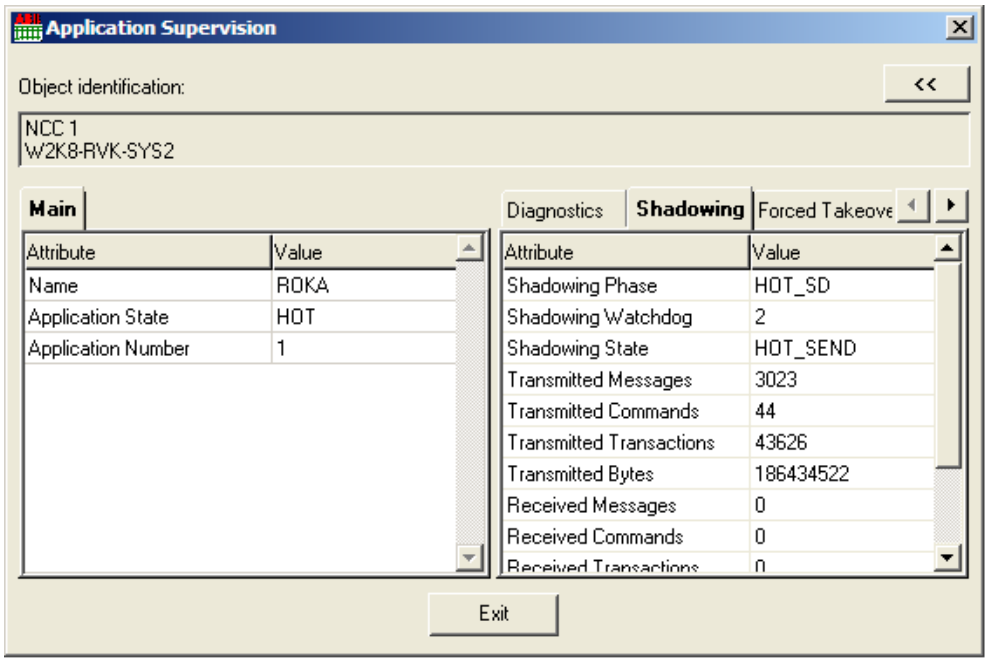


Figure 108: Application supervision control dialog

10.2.3.3 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.

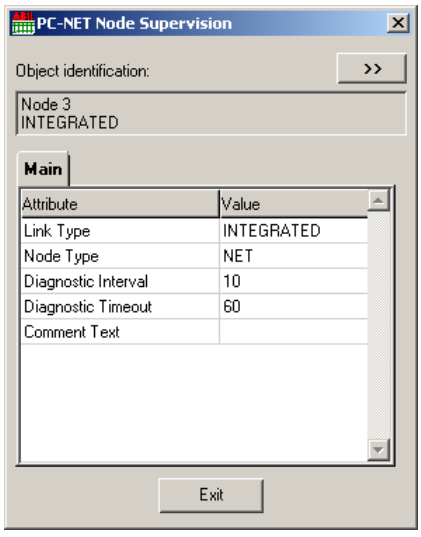


Figure 109: Communication node supervision control dialog

10.2.3.4 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).

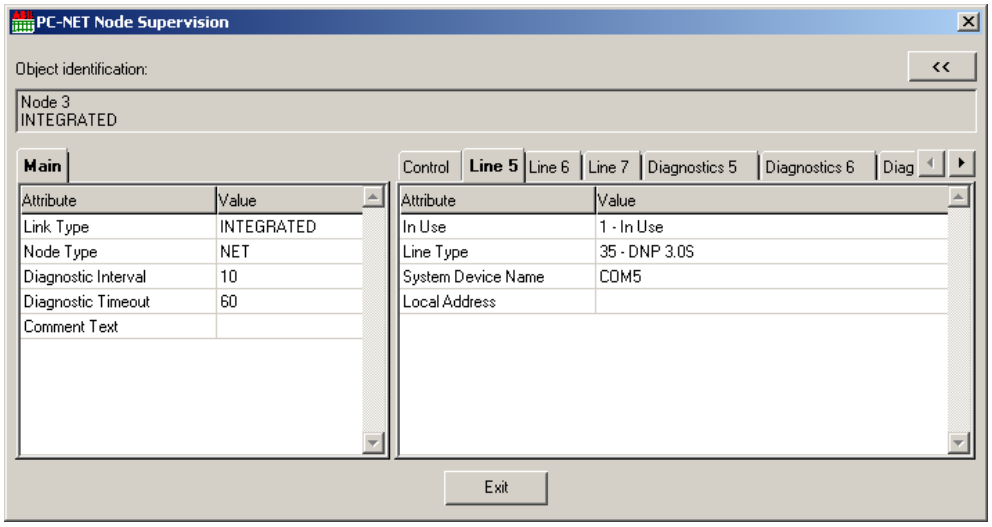


Figure 110: Communication line attributes

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.

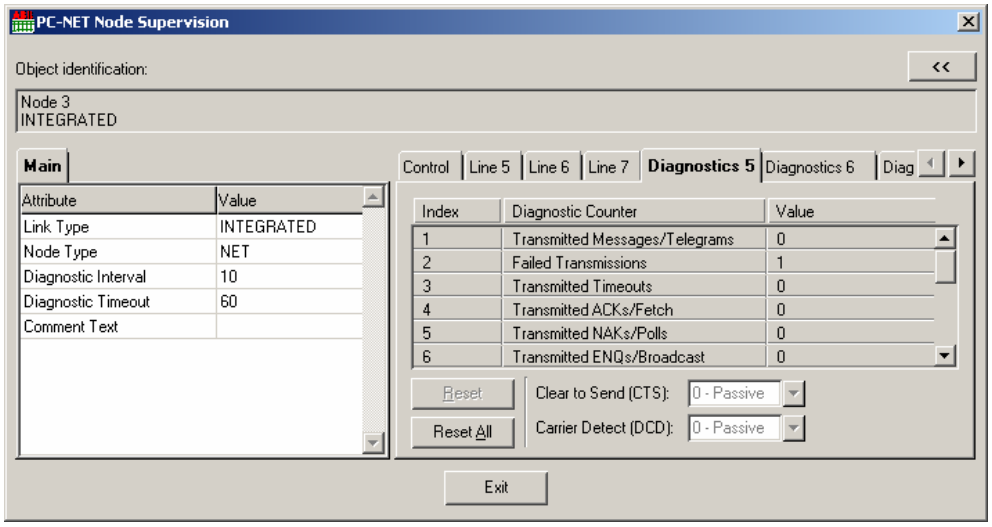


Figure 111: Communication line diagnostics

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 112 for details.

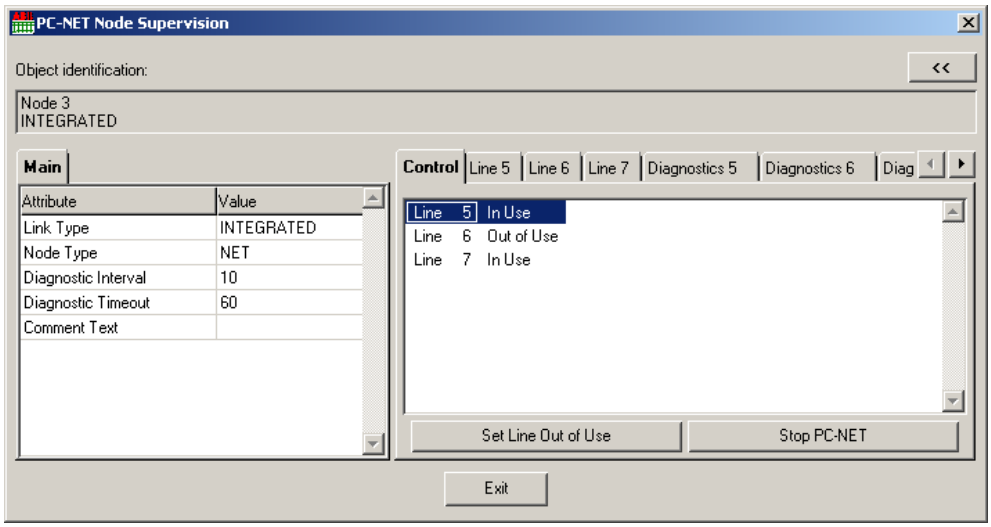


Figure 112: Communication line control

10.2.3.5 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 113. 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.

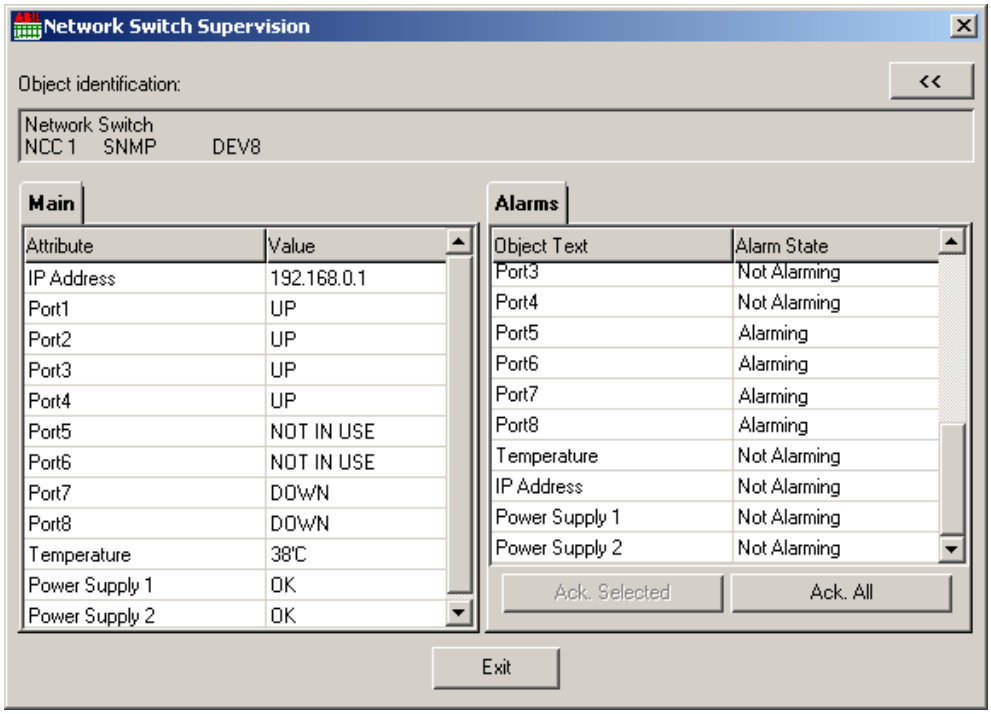


Figure 113: Network switch supervision control dialog

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

10.3 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.

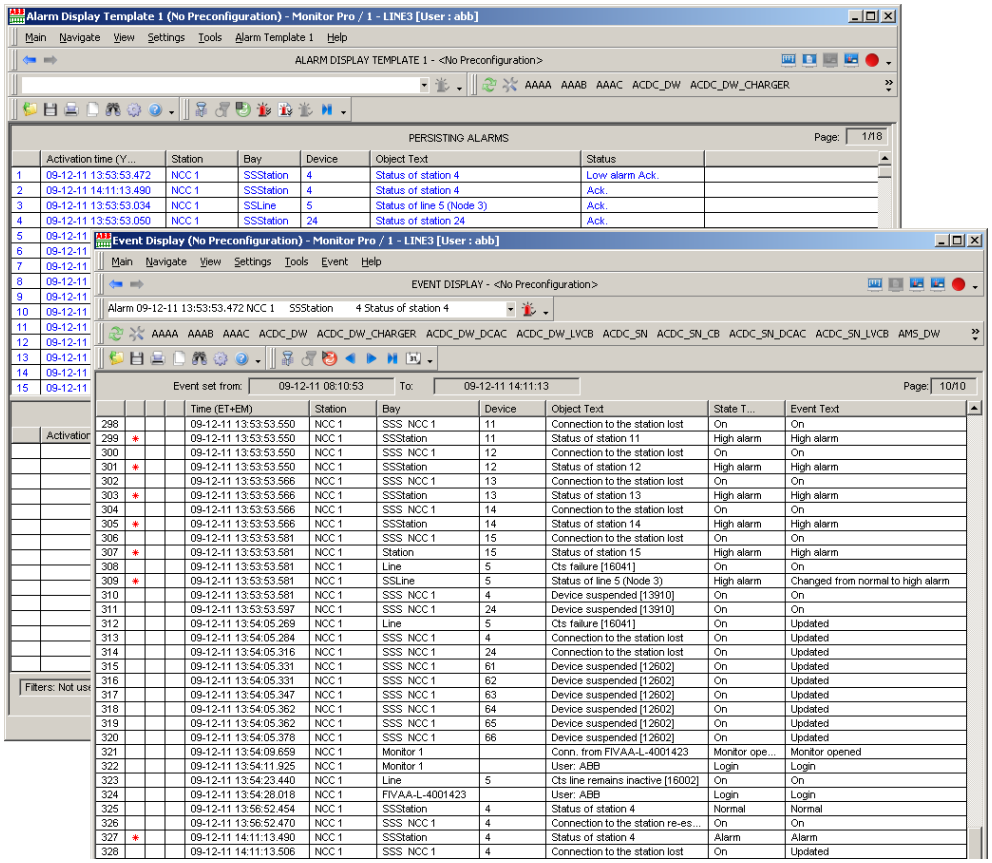


Figure 114: Supervision events and alarms

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].

10.3.1 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 115. Click **OK** to apply the filter definition and close the dialog window.

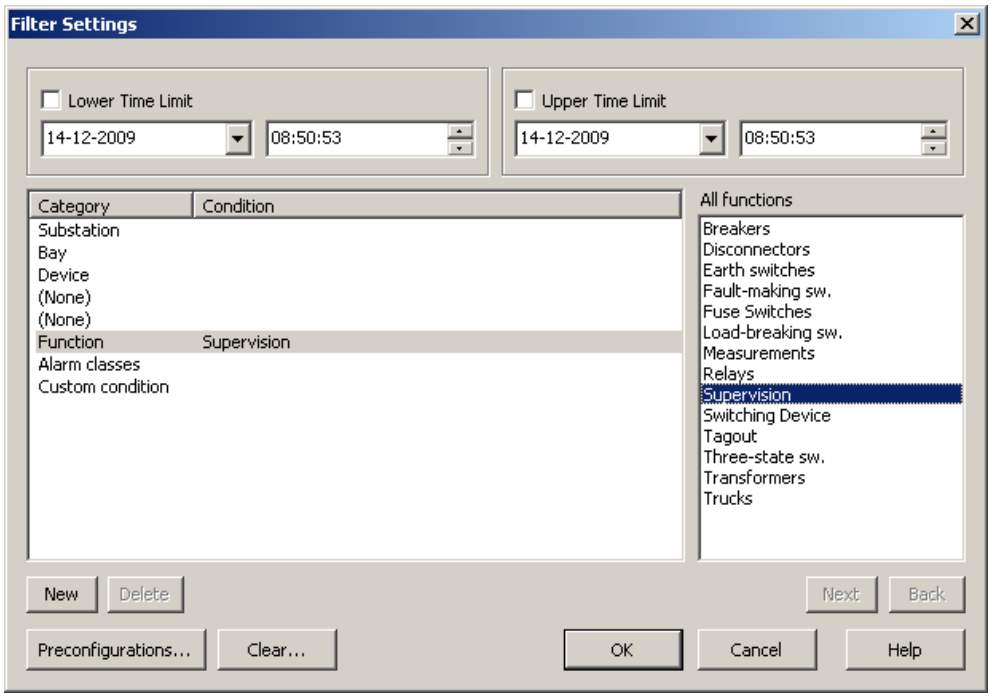


Figure 115: Filter Settings for Supervision information

10.4 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.

10.5 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

10.5.1 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 116.

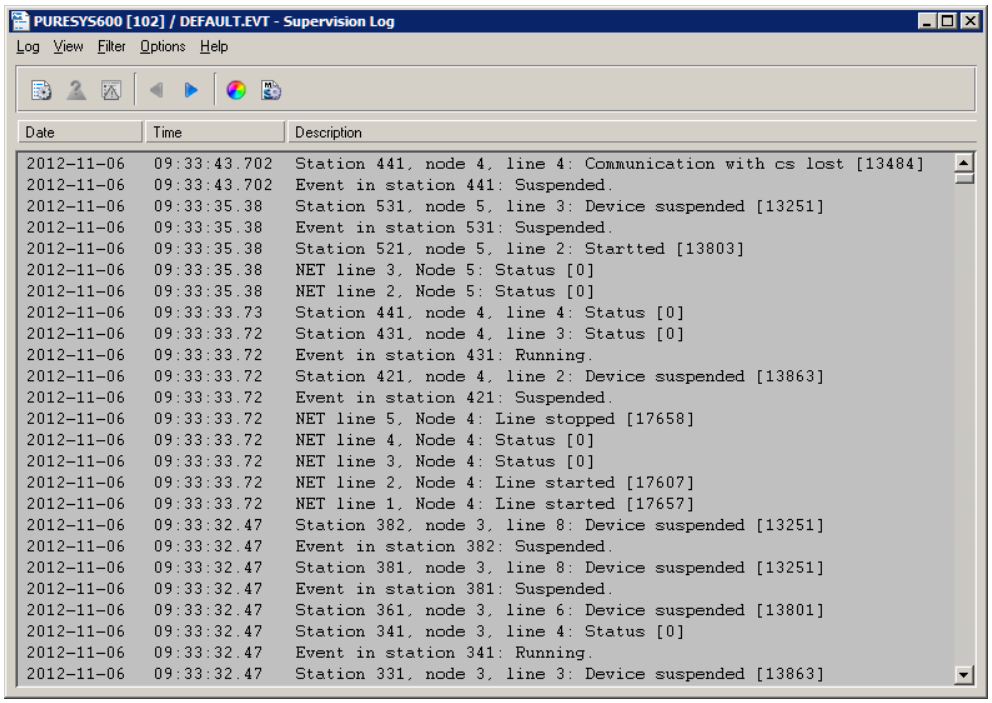


Figure 116: Main view

Section 11 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

11.1 Starting Measurement Reports Display

Start Measurement Reports by selecting **Navigate/Measurement Reports** and select the appropriate report type (see Figure 117).

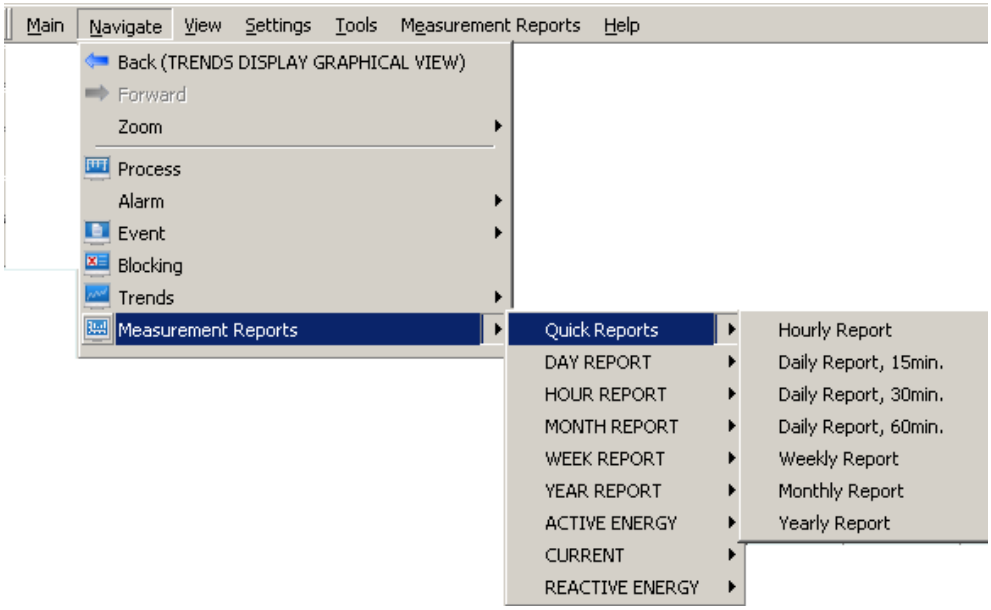


Figure 117: Default opening of the Measurement Reports displays

The Measurement Reports menu structure is dynamic and application/customer specific. It may differ from the example shown in Figure 117.

11.2 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.

11.2.1 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 118: Main Toolbar

Table 20: 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 119: Display Toolbar

Table 21: 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 120: Navigation toolbar

Table 22: 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.

11.2.2 Measurement Reports Display menus

The toolbar commands can be selected from the **Measurement Reports** menu (see Figure 121 and Figure 122). Some of the menu items are active only for the graphical view.

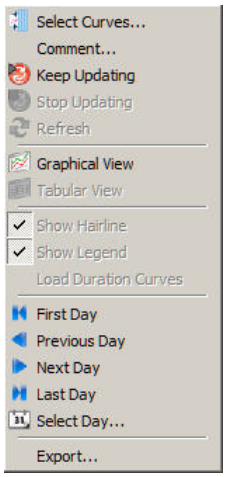


Figure 121: Measurement Reports menu for the tabular view

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

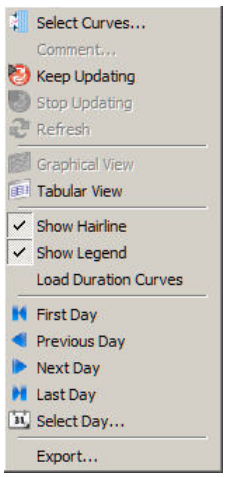


Figure 122: The Measurement Reports menu for the graphical view

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 11.3.

11.2.3 Measurement Reports Display header

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

- Period field
- Measurement Unit information

Figure 123: 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 123.
- For weekly reports the current active week.

- For monthly reports the current active month.

- For yearly reports the current active year.

11.3 Graphical view

In the graphical view, up to twenty measurements can be represented 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.

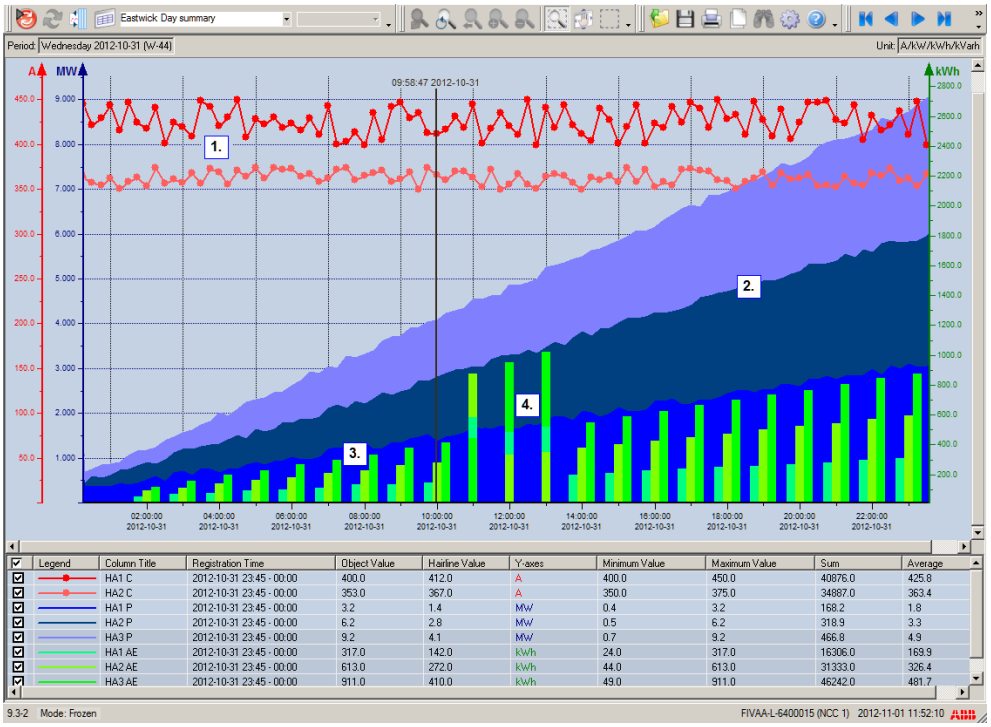


Figure 124: Graphical view

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 124 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 e.g. 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.

11.3.1 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.

11.4 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 125). Manually entered values are indicated with the character "m" (see 2. in Figure 125).

If a measurement data registration is not sampled or has an erroneous status, there is no value available (see 3. in Figure 125).

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 125: 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.

11.4.1 General settings

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

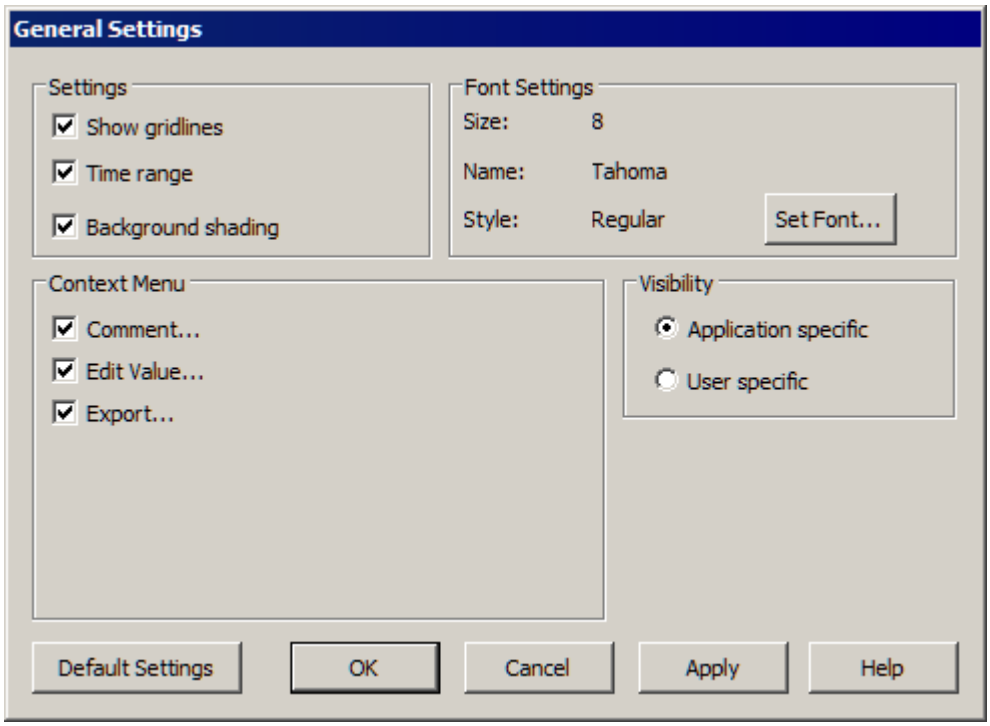


Figure 126: General Settings

Table 23: 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

11.4.2 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 127: Leap hour data presentation

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

11.4.3 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.

11.4.4 Editing values

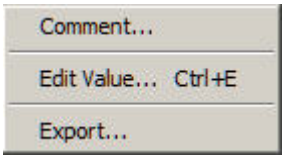
Data included in the measurement reports can be edited in the tabular view with the **Edit Value** dialog, if an appropriate command is accessible in the user's authorization.

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.

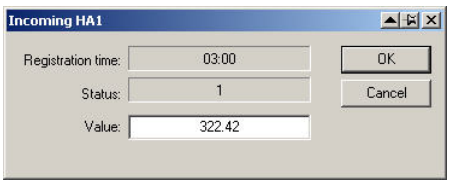
The edited values are stored into the report database, and other values, for example calculated values that depend on it, are automatically recalculated using the new value.

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.

11.4.5 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.

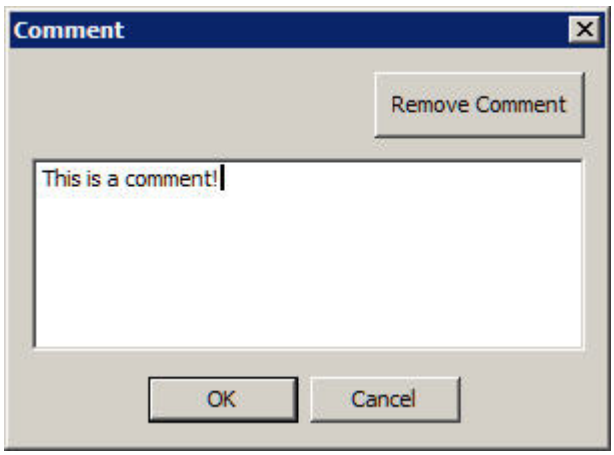


Figure 128: The Comment dialog

11.4.6 Copying selected data to the clipboard

See Section 9.5.4.

11.5 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.

11.6 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.

11.7 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.

11.8 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

11.9 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.

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Hitachi ABB Power Grids
Grid Automation Products
PL 688
65101 Vaasa, Finland

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