COM600 Station Automation Series
COM605 3.2

Operator's Guide

Contents:

1. About this manual

1.1. Copyrights

1.2. Trademarks

1.3. General

This manual provides thorough information on the Control and Monitoring Unit COM605 and the central concepts related to it. For more information on each topic related to a specific protocol, refer to the list of related documents in 1.8, Related documents.

Information in this operator's guide is intended for operators who perform every-day operations.

1.4. Use of symbols

This publication includes warning, caution, and information icons that point out safety related conditions or other important information. It also includes tip icons to point out useful information to the reader. The corresponding icons should be interpreted as follows.

The electrical warning icon indicates the presence of a hazard which could result in electrical shock.

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

The caution icon indicates important information or 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 or property.

The information icon alerts the reader to relevant facts and conditions.

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

1.5. 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 window, the label for a field of a dialog box) are initially capitalized.
- Capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, press the ENTER key.
- 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 you must hold down the CTRL key while pressing the C key (to copy a selected object in this case).
- Press ESC E C indicates that you press and release each key in sequence (to copy a selected object in this case).
- 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: **MenuName** > **MenuItem** > **CascadedMenuItem**. For example: select **File** > **New** > **Type**.
  - The **Start** menu name always refers to the **Start** menu on the Windows taskbar.
- System prompts/messages and user responses/input are shown in the Courier font. For example, if you enter a value out of range, the following message is displayed:

```
Entered value is not valid. The value must be 0 to 30.
```

- You 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

1.6. Terminology

The following is a list of terms associated with the Control and Monitoring Unit COM605 that you should be familiar with. The list contains terms that are unique to ABB or have a usage or definition that is different from standard industry usage.

Term	Description
Alarm	An abnormal state of a condition.
Alarms and Events; AE	An OPC service for providing information about alarms and events to OPC clients.
Device	A physical device that behaves as its own communication node in the network, e.g. protection relay.
Event	Change of process data or an OPC internal value. Normally, an event consists of value, quality and timestamp.
Intelligent Electronic Device	A physical IEC 61850 device that behaves as its own communication node in the IEC 61850 protocol.
OPC	Series of standards specifications aiming at open connectivity in industrial automation and the enterprise systems that support industry.
Property	Named data item.

1.7. Abbreviations

The following is a list of abbreviations associated with the Control and Monitoring Unit COM605 that you should be familiar with. See also 1.6, Terminology.

Abbreviation	Description
AE	Alarms and Events
CET	Communication Engineering Tool
DO	Data Object
GW	Gateway, component connecting two communication networks together

Abbreviation	Description
HMI	Human Machine Interface
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
LAN	Local Area Network
SLD	Single Line Diagram

1.8. Related documents

Name of the manual	MRS number
COM600 User’s Guide	1MRS756125

1.9. Document history

Document version/date	Product revision	History
A/16.10.2006	3.0	Document created
B/22.1.2007	3.0	Document revised
C/8.6.2007	3.0	Document revised
D/21.12.2007	3.1	Document revised
E/17.06.2008	3.2	Document revised

2. Introduction

2.1. Product overview

Control and Monitoring Unit COM605 allows easy access to the protection and control devices of a substation with HMI functionality. The substation can be accessed either locally or remotely through a built-in web server.

COM605 uses an embedded operating system and runs in a dedicated industrial computer without moving parts.

The products are configured using a separate engineering PC that is connected via the local area network (LAN). For more information, refer to COM600 User's Guide.

3. HMI operations

3.1. General about HMI

The HMI interface consists of different views, a menu bar and a tool bar.

You can choose between views by clicking the tabs on the left:
- **Substation**: Shows the substation structure.
- **Communication**: Shows the communication structure.
- **Users**: (Only administrator) Shows the user information. The administrator can manage users in this view.
- **Settings**: (If not administrator) Shows the user information. The user can change the password in this view.

The Menu bar contains the following functions:
- **General**: Shows device information.
- **Single Line Diagram**: Shows the Single Line Diagram view.
- **Events**: Shows the events list.
- **Alarms**: Shows the events list.
- **Help**: Shows the HMI help.
- **Logout**: Logs you out of the window.

3.2. Predefined user account

HMI has a predefined user account with administrator rights.

- User name: admin
- Password: adminadmin

When you log in for the first time as an administrator, you have to change the password before you can proceed using HMI. If you forget the new password, restore the factory settings with the Management tool in CET. After the factory settings have been restored, you can only log in with the predefined administrator password mentioned above.

3.3. User management

3.3.1. General about managing users

COM605 has the following user levels:
- Viewer = Only allowed to view
- Operator = Authorized to make operations
- Engineer = Allowed to change IED parameters, but no operation rights
- Administrator = Full access

The administrator can add users and define access rights with the User Management tool.

The user levels of the selected user are displayed in the User Information view and they can be modified by the administrator.

The purpose of the user groups is mainly to provide customized user interfaces for different users.

Functionality	Viewers	Operators	Engineers	Administrators
SLD	X	X	X	X
Control Dialogs	view	X	view	X
Event list	X	X	X	X
Alarm list	view	X	view	X
User management	*1	*1	*1	X
PST	view	view	X	X
Disturbance recording	view	X	X	X
System supervision	view	X	X	X

*1: Can change own password.

view: view-only.

3.3.2. Adding new users

The administrator can add users in the **Add User** window.

To add a new user:
1. Click on the **Users** tab on the left.
2. Select **Add User**.
3. Type in a new user name. The length of the user name can be 1 - 99 characters and it can only contain characters a - z and 0 - 9.
4. Type in a password and confirm it. The length of the password can be 9 - 99 characters and it can only contain characters a - z and 0 - 9.
5. Select a user group from the drop-down menu.
6. Click **Apply** to save the user information.

3.3.3. Modifying user properties

The administrator can modify user information by using the tool bar on top of the User Information view.

To remove a user:
1. Click on the **Users** tab on the left.
2. Select the user you want to remove.
3. Click **Remove User** and confirm by clicking **OK**.

To change a user's user group:
1. Click on the **Users** tab on the left.
2. Select the user whose user group you want to change.
3. Click **Change User Group**.
4. In the Change User's Group view, select a new group from the drop-down menu.
5. Click **Apply**.

3.3.4. Changing user's password

To change the password (administrator):
1. Click on the **Users** tab on the left.
2. Select the user whose password you want to change.
3. Click **Change password**.
4. Type in a new password and confirm it.
5. Click **Apply**.

To change your own password:
1. Click on the **Settings** tab on the left.
2. Click **Change password**.
3. Type in the old password.
4. Type in a new password and confirm it.
5. Click **Apply**.

3.4. Connecting HMI to the COM600 computer

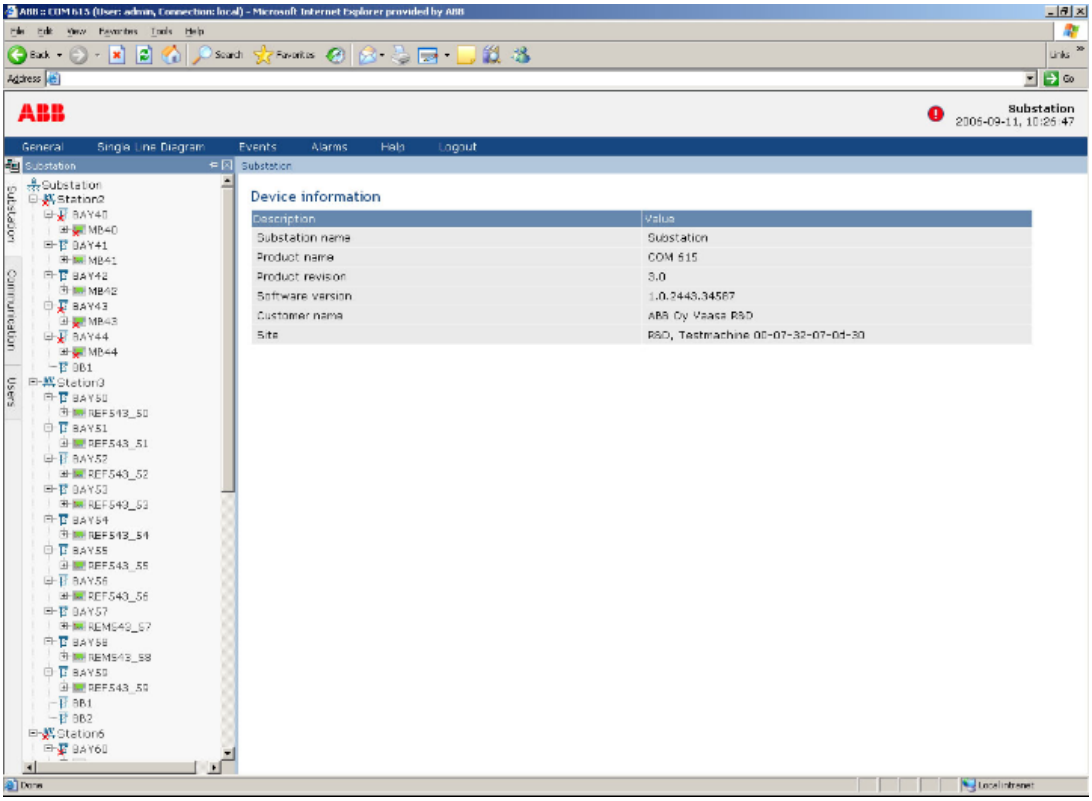
To connect HMI to the COM600 computer:
1. Open Internet Explorer.
2. Type in the IP address of the COM600 computer.
3. Accept the certificate.
4. A login window opens. Type in the password and log in.

3.5. Substation and communication structures

3.5.1. Substation structure

You can open the substation view of HMI by clicking on the **Substation** tab on the left. The substation structure displays the substation and voltage level objects, bays and IEDs, and their functions.

You can see the status of the IEDs in the substation structure. If there is a problem in communication, there is a red cross next to the IED.



substation_view.jpg

Figure 3.5.1-1 The substation view to HMI

Alarm and event information

By clicking on the voltage level and bay objects, you can access their specific alarm lists. To look at a list of events, click on **View Events** above the Persisting Alarms list.

IED information

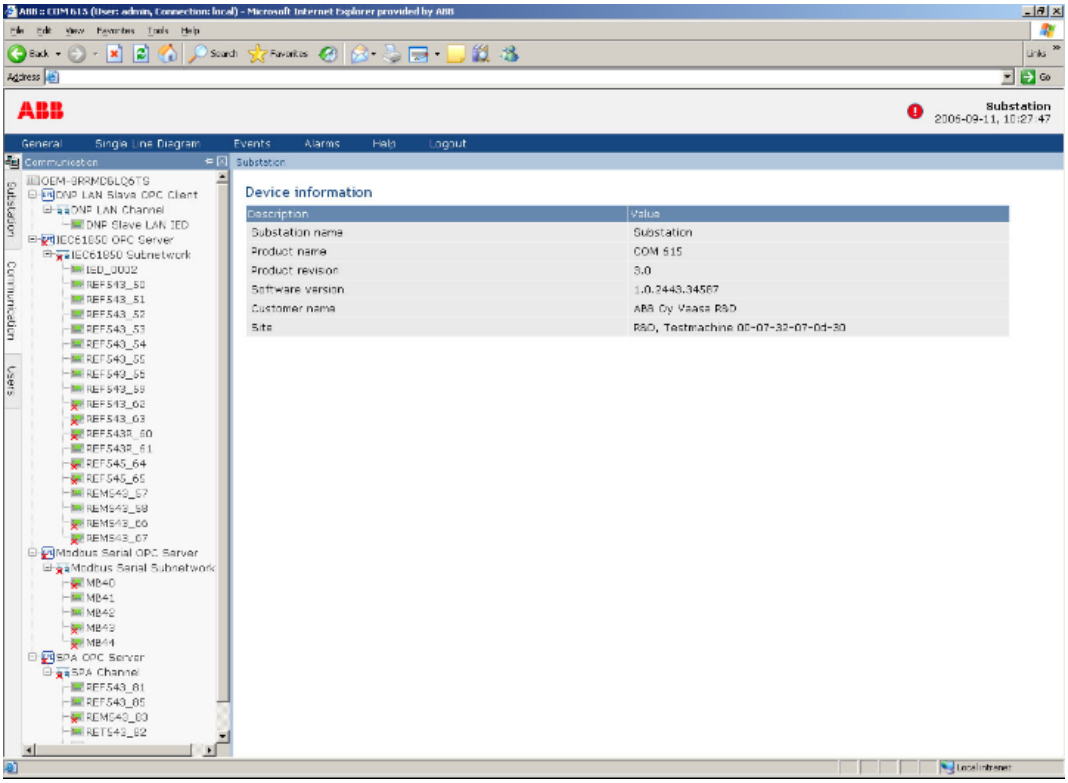
By clicking on the IED objects you can view their communication status and information on diagnostic counters. Below each IED in the substation structure you can click on **Disturbances**, **Parameters** or **Measurements** to access the corresponding data.

It depends on the IED configuration, whether Disturbances, Parameters or Measurements are shown in the substation structure.

3.5.2. Communication structure

You can open the communication view of HMI by clicking on the **Communication** tab on the left. The communication structure is displayed in the window on the left. In the communication structure you can see the OPC Server, communication channel objects and the IEDs.

You can see the status of the IEDs in the communication structure. If there is a problem in communication, there is a red cross next to the IED.



communication_view.jpg

Figure 3.5.2-1 The communication view to HMI

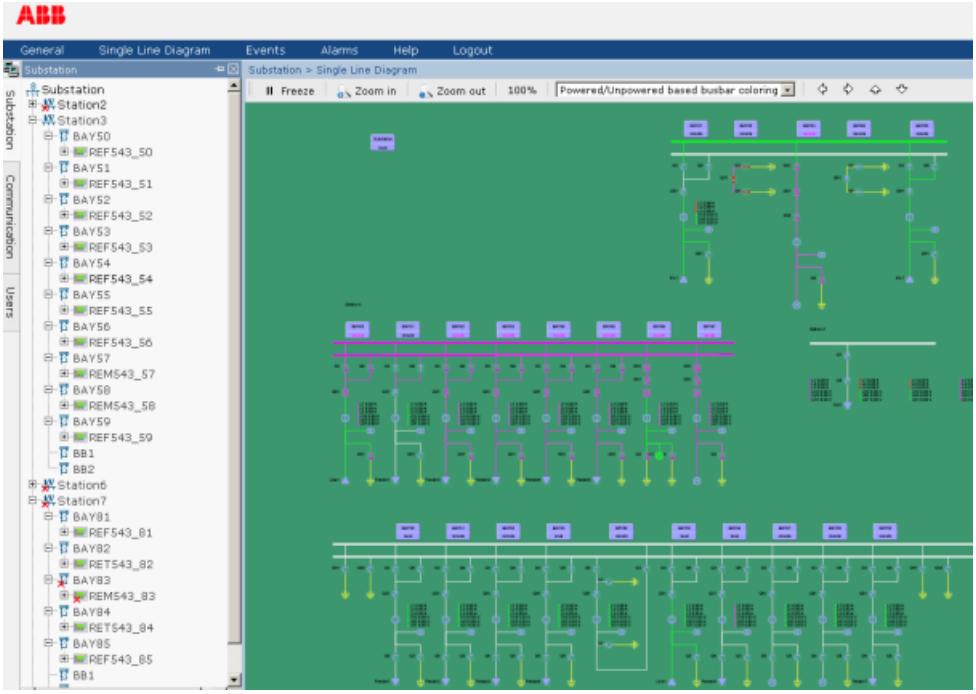
Device and diagnostics information

By clicking on the computer name at the top of the structure, you can see its device information, such as the hardware and software versions, in the window on the right side of the tree. By clicking on the OPC Server object name, corresponding device information is displayed on the right. You can view device diagnostics information of the whole subnetwork by clicking on the subnetwork object. To see the communication status or diagnostic counter information of individual devices, click on the IED objects.

3.6. Single Line Diagram

3.6.1. General about Single Line Diagram

A Single Line Diagram (SLD) is a graphical user interface presenting process objects (primary devices) of the substation as graphical symbols. HMI updates the SLD and the substation and communication structures at regular intervals. A sample SLD is shown in Figure 3.6.1-1



SLD_example.png

Figure 3.6.1-1 An example of the Single Line Diagram

For an explanation of the Single Line Diagram symbols, see Appendix 1 , Single Line Diagram symbols.

3.6.2. Switch Device Control

Switches (circuit breakers, disconnectors) can be operated using the Switch Device Control dialog.

Only operators and administrators are allowed to control the switches.

The station and bay local/remote switch must be in a position which allows it to be controlled with HMI. The target switch device must also support the operation and it must be configured properly.

To control a switch device (for example circuit breaker), click the object in the single line diagram. The Switch device control dialog opens.

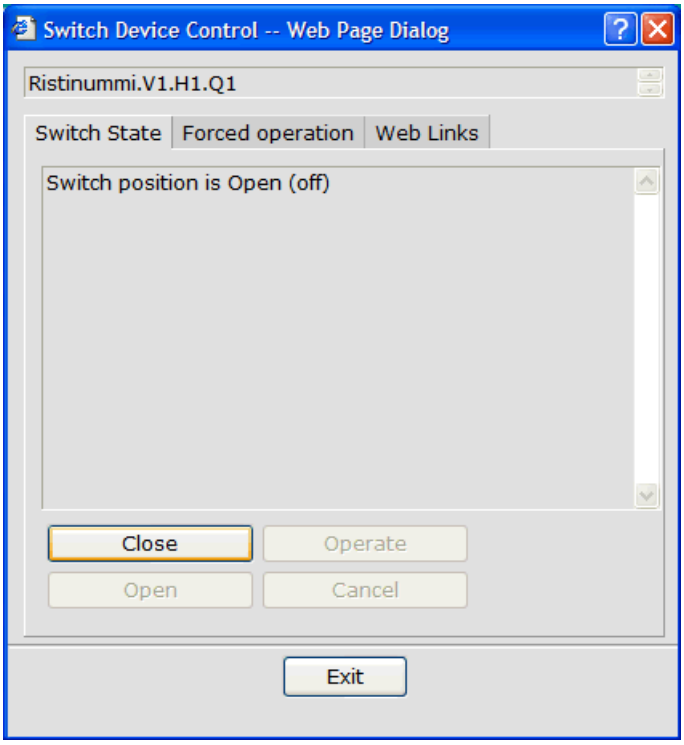
The Switch state tab displays information on the substation, voltage level and bay under operation and the object name of the switch device. Also status information for example on the interlockings and selection state of the object are displayed.

To control a switch:
1. Select the control direction by clicking **Open** or **Close**.
2. Click **Operate** to activate the selection or **Cancel** to cancel the operation. Note that some of the buttons may be disabled depending on the state of the switch.

It is possible to perform a forced cancel operation. This is necessary for example if HMI is accidentally closed after you have activated a selection. Normally the object would stay in the selected position until timeout, and the object must be released if any operations have to be performed before timeout. To perform a forced operation, select the Forced operation tab of the Switch device control dialog and click **Cancel**.

To add, edit or delete web links, select the Web links tab and click **Edit**.

To close the Switch device control dialog, click **Exit**.

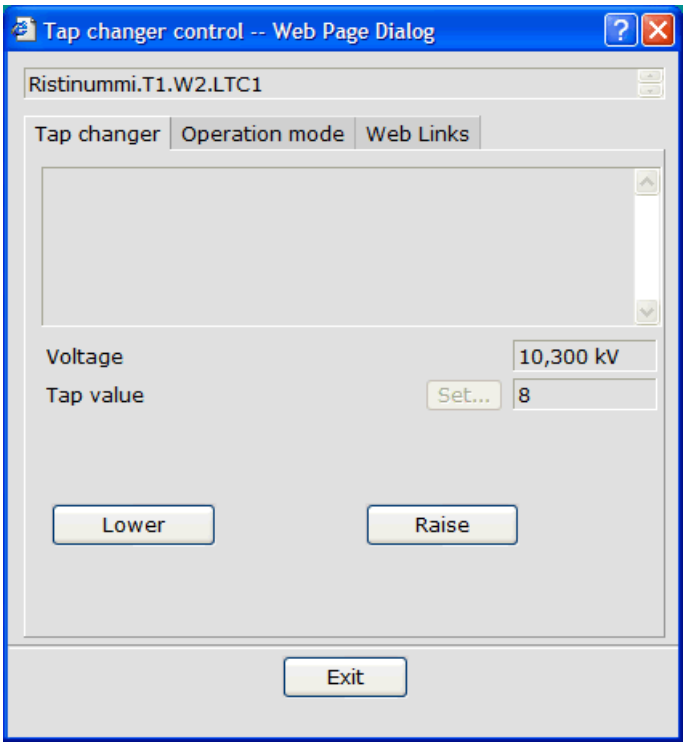


switch_control.bmp

Figure 3.6.2-1 Switch Device Control dialog

3.6.3. Tap Changer

Clicking a power transformer with tap changer opens a control dialog. In the dialog you can monitor the voltage and the current tap changer position.



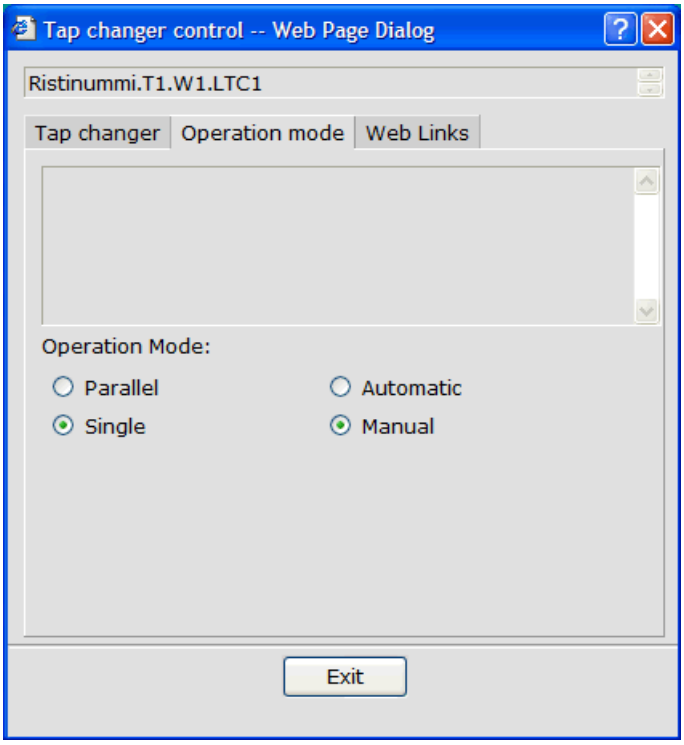
tap_changer_control.bmp

Figure 3.6.3-1 Tap Changer Control dialog

Depending the device and the configuration, you can manually lower or raise the relative position of the tap changer or assign a specific position by entering a numeric value.

You must have the required user permissions to perform these changes, and local/remote switch must allow the operation. The tap changer must also be in manual operating mode.

The **Operation mode** tab shows the auto/manual and single/parallel operation modes of the tap changer. You can change the modes of the tap if you have the required user permissions. The operation modes must be supported by the IED support and allowed by the local/remote. If they are not, the options are not available in the dialog.



tap_changer_mode.bmp

Figure 3.6.3-2 Tap Changer Mode dialog

3.6.4. Busbar coloring

Busbar coloring can be used to indicate the status of busbar sections in several different ways. It can indicate which busbar sections are powered, unpowered or in certain other states, or which voltage level each busbar section has, see Figure 3.6.4-1. Alternatively, each voltage source or voltage source type can have a color that is used for sections they are connected to. Busbar coloring can also be used to indicate if two or more voltage sources form a loop.

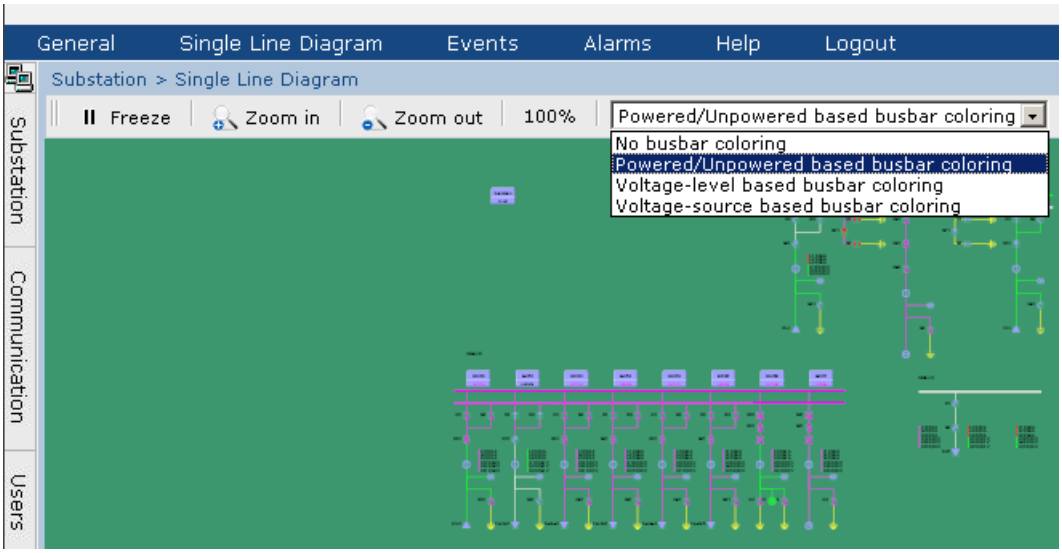


Figure 3.6.4-1 Busbar coloring drop-down menu

Busbar coloring modes

Busbar coloring modes can be selected from the drop-down menu on the top of the Single Line Diagram View. There are four modes of busbar coloring:

1. **No busbar coloring.** All sections are displayed in a default color.
2. **Powered/Unpowered based busbar coloring.** One color is used for all powered sections.
3. **Voltage level based busbar coloring.** Different voltage levels have different colors.
4. **Voltage-source based busbar coloring.** The coloring of powered sections depends on the voltage source.

3.7. Alarms

3.7.1. General about alarms

The Alarm List displays a summary of the present alarm situation of the supervised process. Each alarm is presented as an alarm text line, which describes the cause of the alarm in the process. The alarm text line includes date, time, bay, device, object text, state and status.

The blinking symbol in the upper right corner of HMI indicates that there are unacknowledged alarms in the substation. There is also an audio alarm, if it has been enabled on workstation. By clicking the symbol, the Alarm view opens. When all alarms have been acknowledged, the alarm indicator disappears and the audio alarm stops.

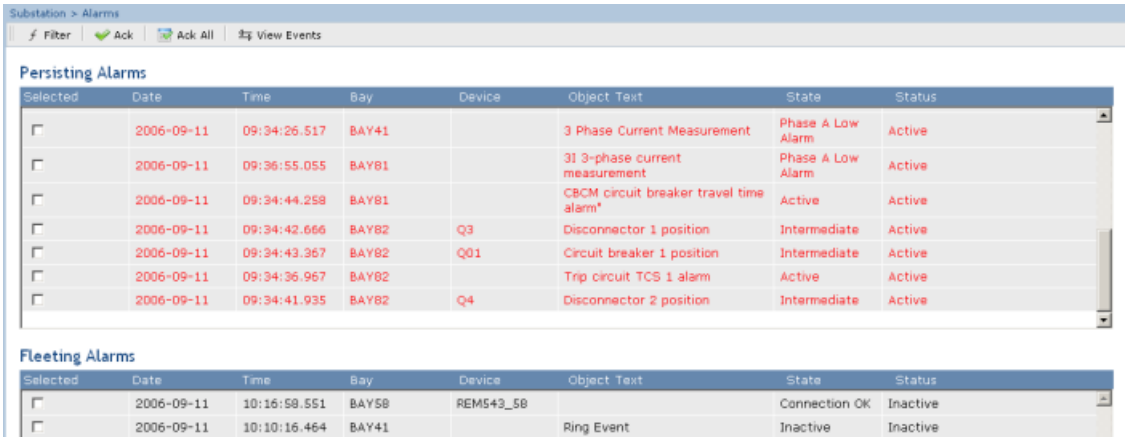
3.7.2. Monitoring and handling alarms

To monitor and handle alarms in the substation, click **Alarms** in the menu bar at the top of the screen. To view the alarms concerning a specific bay, click on the appropriate object in the substation tree.

You can also filter the alarms concerning a specific voltage level or bay with the **Filter** function.

In the Persisting alarms list you can see active alarms. The Fleeting alarms list displays a list of inactive unacknowledged alarms. The alarm list is continuously updated to present the actual state of the alarm signals.

To view the event list, click **View events**.



alarms.png

Figure 3.7.2-1 An example view of alarms

3.7.3. Acknowledging alarms

Click **Ack** to indicate that you have registered and identified the alarm. Acknowledging an alarm does not remove the alarm, but changes the alarm state. An acknowledged alarm is displayed in blue in the Persisting alarms list. Inactive alarms are displayed in the Fleeting alarms list.

To acknowledge alarms:

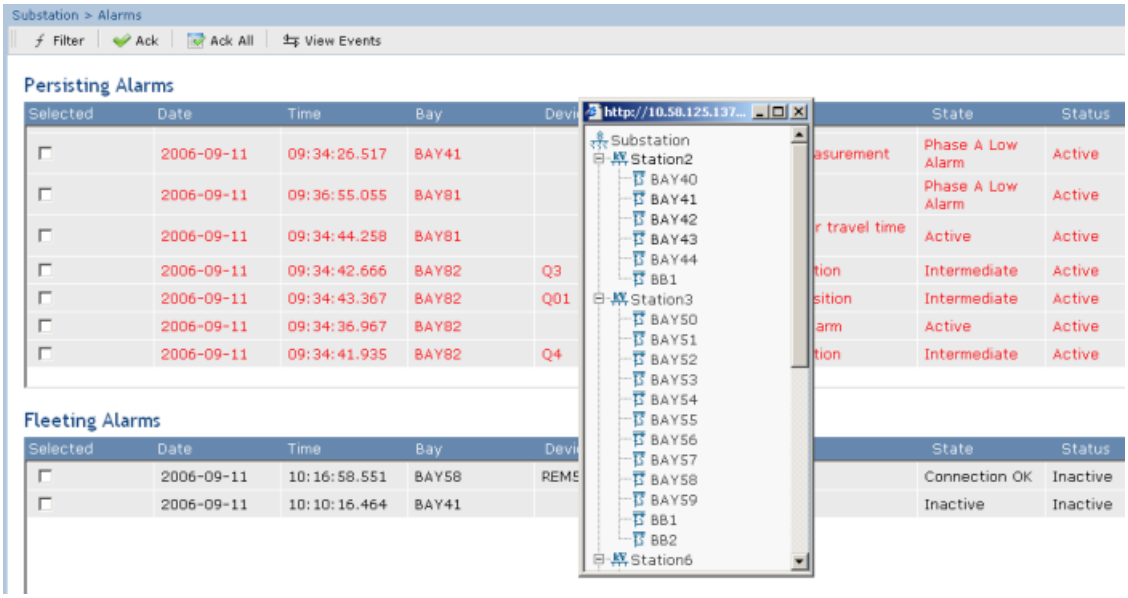
1. Select the check box of the alarms you want to acknowledge in the Alarms list.
2. Click **Ack** on the menu bar.
3. To acknowledge all alarms at the same time, click **Ack all**.

3.7.4. Filtering alarms

Filters can be used when you want to display only specific information.

To filter alarms:

1. Click **Filter** in the toolbar of the Alarms view. A window displaying the substation structure opens.
2. Click on the object whose alarms you want to view. Now the Alarms list displays only the alarms of the object that was selected, and the objects below it.



HMI_filtering_alarms.jpg

Figure 3.7.4-1 An example view of filtering alarms

3.8. Events

3.8.1. General about events

With the Event List you can monitor the information about events that have occurred in the system. Only a certain number of events is visible, and the number of visible events can be configured in the Communication Engineering Tool. You can also receive information about activities carried out by other users, operations of objects, acknowledging of alarms, logging in, and so on. The Events list includes the following information: date, time, bay, device, object text and event.

3.8.2. Monitoring and handling events

You can monitor the events of the substation by clicking **Events** in the command bar at the top of the screen. To monitor the events of specific bays, click on the appropriate object in the substation tree. The event list is updated automatically.

You can filter the events concerning a specific voltage level or bay with the **Filter** function.

You can stop the updating of the event list by clicking **Freeze**. To resume the flow of events, click **Continue**. You can save events locally on your computer by clicking **Save**. The list is saved in .csv format and can be opened in MS Excel.

To view the alarms list, click **View alarms**.

HMI_events.png

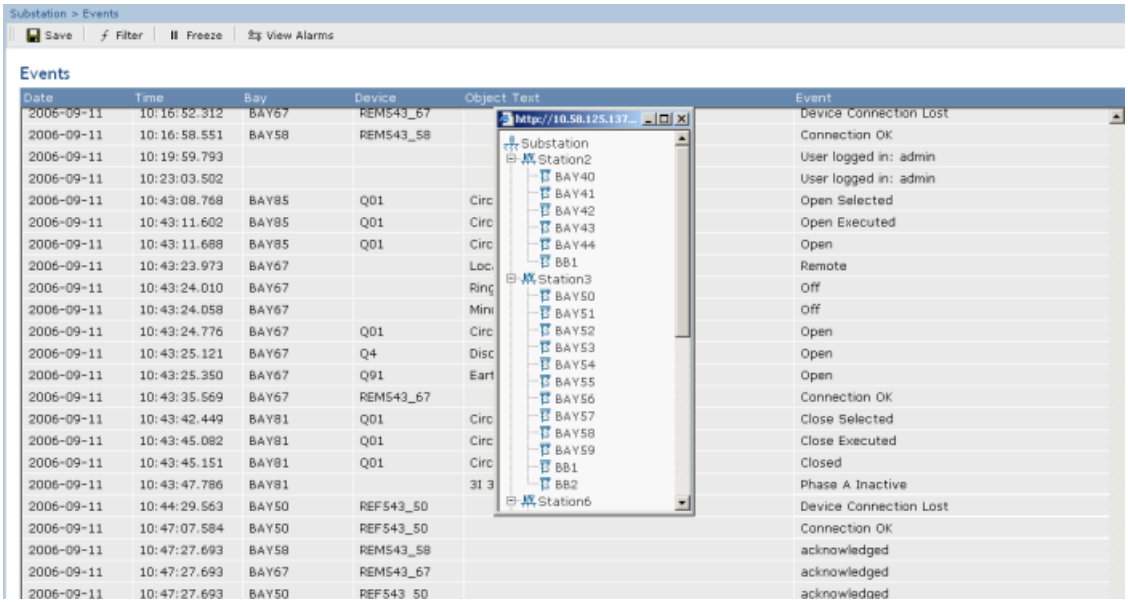
Figure 3.8.2-1 An example view of events

3.8.3. Filtering events

Filters can be used when you want to display only specific information.

To filter events:

1. Click **Filter** in the toolbar of the Events view. A window displaying the substation structure opens.
2. Click on the object whose events you want to view. Now the Events list displays only the events of the object that was selected, and the objects below it.



HMI_filtering_alarms.png

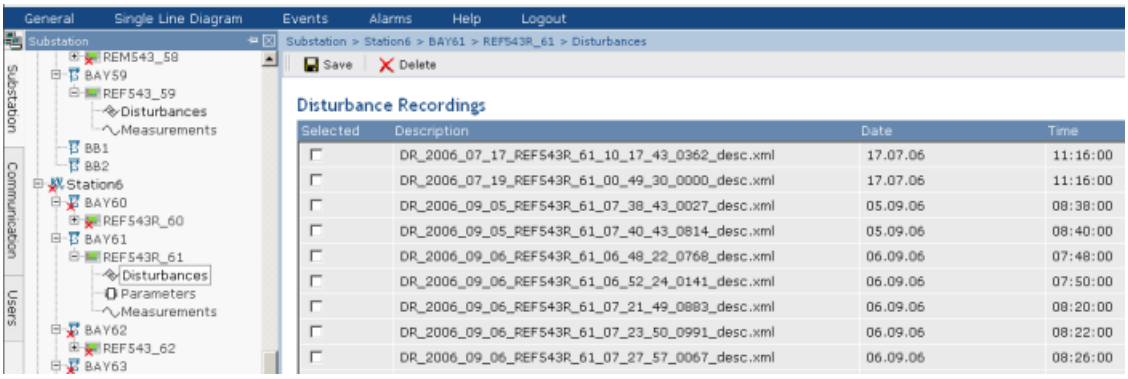
Figure 3.8.3-1 An example view of filtering events

3.9. Disturbance data upload

3.9.1. Disturbance recordings

Most of the IEDs are equipped with a Disturbance recording function that locally stores the values of currents, voltages, frequencies and binary signals and so on in a disturbance file before, during and after a protection event. These disturbance files can be copied to the COM600 computer automatically, if the function has been configured in CET.

You can see the list of disturbance recordings by clicking on **Disturbances** below the desired IED in the substation structure.



disturbances.png

Figure 3.9.1-1 Example view of disturbance recordings

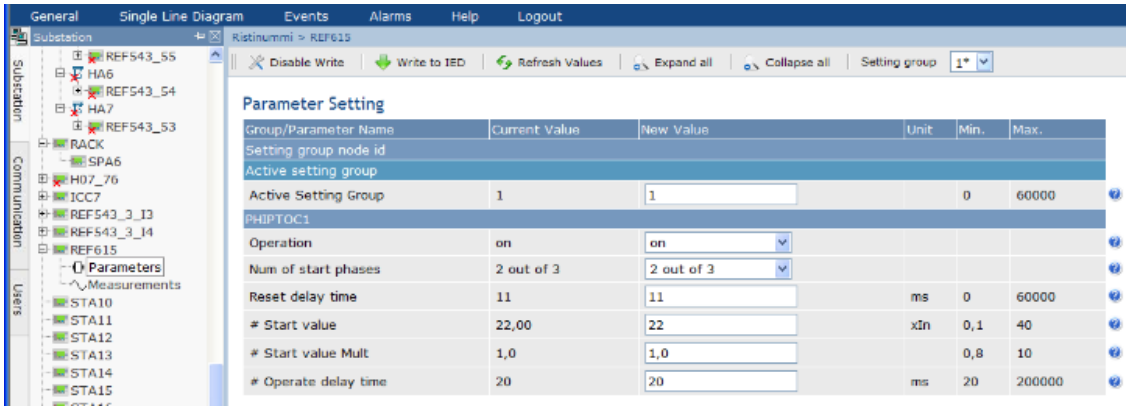
The disturbance recordings list shows you the description, date and time of the disturbance. When you want to save the list locally on your computer, select it and download it by clicking **Save**. The list is saved in .csv format and can be opened in MS Excel. You can also delete disturbance recordings from the COM600 computer by clicking **Delete**.

3.10. Parameter setting

3.10.1. Changing parameters

You can view parameter information by clicking on **Parameters** below the desired IED in the substation structure, if this functionality is supported by the IED. In this view you can also change parameter settings.

Click the icon next to the parameter to open the corresponding help text for each parameter.



parameters2.png

Figure 3.10.1-1 An example of the Parameter Setting view

To change parameter settings:

1. Click **Enable Write** on the top of the Parameter Setting view.
2. Select a new value from the drop down menu or type in a value in the **New Value** field. To apply changes, click **Write to IED**.
   If the new values are accepted, the background of the modified parameters turns green. If the new values are incorrect, a message "Some settings are not in correct range" is displayed and the background of the modified parameters turns red. Type in values that are in the correct value range.
3. To manually update the values, click **Refresh Values**.
4. After you have made all necessary changes, click **Disable Write**.
   If the IED has been configured with a store option, a store dialog will appear. In the dialog you can store the parameter changes permanently to the IED non volatile memory. If you click **OK**, the parameter changes are stored permanently. If you

click **Cancel**, the parameter changes are only saved temporarily, and they will be lost after next reset of the IED.

When writing parameters to REF 542plus:

- Parameter value changes are not activated immediately when you click **Write to IED**, but only after you have stored the values permanently by clicking **OK** or temporarily by clicking **Cancel** in the store dialog. The store dialog appears when you click **Disable Write** or when you close the parameter setting tool while a write session is open.
- Parameter Set selection will restore the old value until the new value has been stored permanently or temporarily.

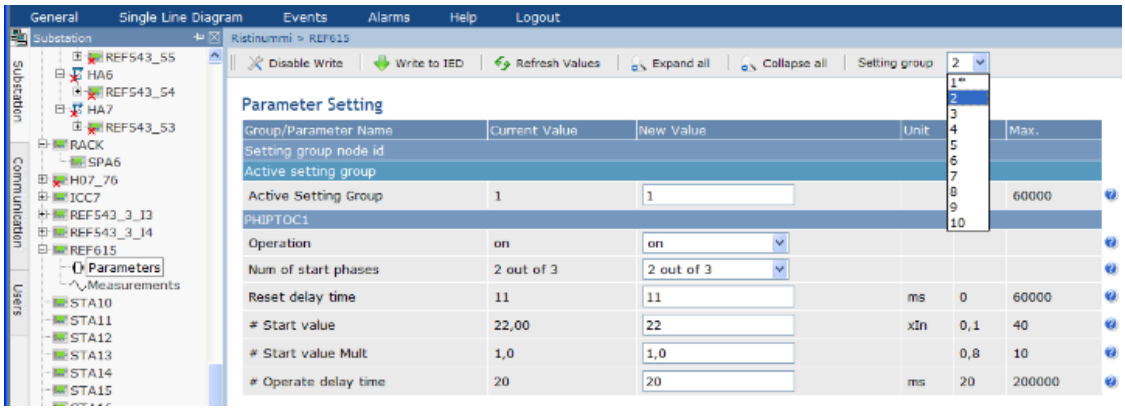
IEC 61850 setting groups and parameters

Certain IEC 61850 parameters are assigned to setting groups. These parameters can have different values in different groups. Parameters belonging to setting group have # character as a prefix in the name. You can view the parameters of each group by selecting the the Setting group number from the drop down menu. The currently active Setting group number in the IED is indicated with an asterix (*****) in the Setting Group selection drop down list.

To change the parameter values in a setting group:

1. Select the **Setting Group** to be edited
2. Click **Enable Write** on the top of the **Parameter Setting** view.
3. Enter the new values for the parameters
4. Write the changed parameter values to IED by clicking **Write to IED**.
5. Store the parameter changes permanently to IED by clicking disable write or closing the tool. Pop-up dialog will prompt for store or cancel.

The active setting group in the IED is changed with Active Setting Group parameter. To change the parameter follow the steps 2 to 5 above.



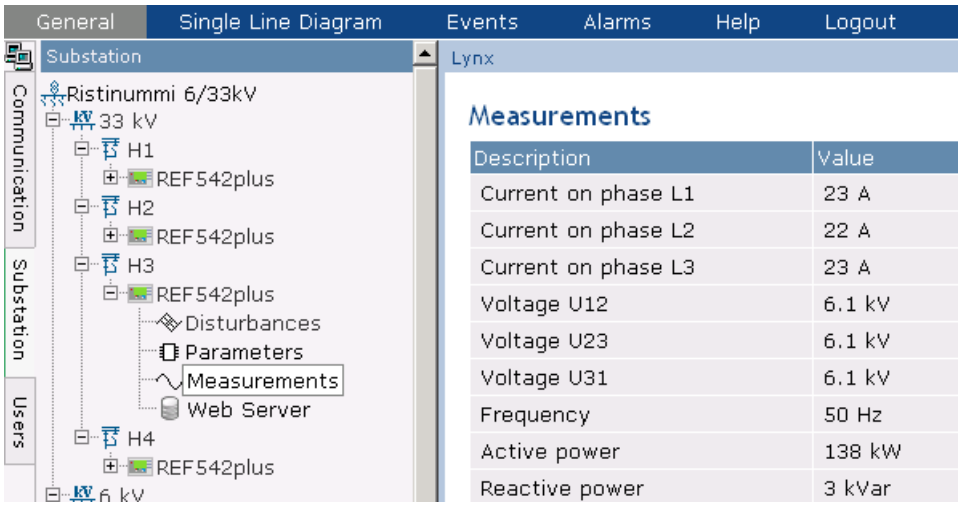
parameters3.png

Figure 3.10.1-2 Selecting a parameter group

3.11. Measurements

3.11.1. Viewing measurements

To view measurement information, click on **Measurements** below the desired IED in the substation structure. HMI updates the measurement information automatically.



measurements.png

Figure 3.11.1-1 An example view of measurements

Appendix 1

Single Line Diagram symbols

Table A1-1 Single Line Diagram symbols

Description	ANSI representation	IEC representation	Remarks
Annotation			
Alarm Indicator			Alarm indicator in a branch of the substation. Use at any level in the structure to indicate alarms generally, or a specific alarm. The indicator is not visible in the web view when there are no active alarms.
Two State Switch			Binary indicator (on/off, automatic/manual, X/not-X, etc.). It can also be used to send a command.
Launch Web Page			Hyperlink to external information source, such as a web page or a local file on COM600. Files should be stored under C:\Program Files\COM610 GW SW\WebHMI\UserDocs\. The total size of the files should not exceed 100 MB. Link syntax for local files is: http://<COM600 IP address>/HMI/UserDocs/<filename>
Push Button			Use to send a single command to one target.
Application Launch			Use to launch an application external to COM600
Measurement Text Box			
ViaPoint			
Connectivity Node			

Description	ANSI representation	IEC representation	Remarks
Circuit breaker – Intermediate position			
Circuit breaker – Open position			
Circuit breaker – Closed position			
Circuit breaker – Bad (faulty) position			
Disconnector – Intermediate position			
Disconnector – Open position			
Disconnector – Closed position			
Disconnector – Bad (faulty) position			
Truck – Intermediate position			
Truck – Open position			
Truck – Closed position			
Truck – Bad (faulty) position			
Load breaker – Intermediate position	Use IEC representation		
Load breaker – Open position	Use IEC representation		
Load breaker – Closed position	Use IEC representation		
Load breaker – Bad (faulty) position	Use IEC representation		
Contactor – Intermediate position	Use IEC representation		
Contactor – Open position	Use IEC representation		

Description	ANSI representation	IEC representation	Remarks
Contactor – Closed position	Use IEC representation		
Contactor – Bad (faulty) position	Use IEC representation		
Power Transformer with two Windings and no Tap Changer			Primary winding: on top. Secondary winding: below. All composing elements exist as individual symbols.
Power Transformer with two Windings and Tap Changer			Primary winding: on top. Secondary winding: below. All composing elements exist as individual symbols.
Power Transformer with three Windings and no Tap Changer			Primary winding: on top. Secondary winding: below left. Tertiary winding: below right. All composing elements exist as individual symbols.
Power Transformer with three Windings and Tap Changer			Primary winding: on top. Secondary winding: below left. Tertiary winding: below right. All composing elements exist as individual symbols.
Voltage Transformer (measurement)			
Current Transformer (measurement)			
Capacitor			
Reactor			
Generator			
Motor			
In-feeder		Use ANSI representation	
Out-feeder		Use ANSI representation	
Earth symbol		Use ANSI representation	

Description	ANSI representation	IEC representation	Remarks
Bay Switch Indicator		Use ANSI representation	
Station Switch Indicator		Use ANSI representation	

Index

A

B

C

D

E

I

M

P

S

T

U

1MRS756121 E/17.06.2008

ABB Oy
Distribution Automation
P.O. Box 699
FI-65101 VAASA
FINLAND
Tel. +358 10 22 11
Fax. +358 10 22 1094
www.abb.com/substationautomation

ABB Inc.
655 Century Point
Lake Mary, Florida 32746
USA
Tel: +1 407 732 2000
Fax: +1 407 732 2335