

COM600 Station Automation Series

COM615 3.2

Operator's Guide



ABB

Contents:

1. About this manual	5
1.1. Copyrights	5
1.2. Trademarks	5
1.3. General	5
1.4. Use of symbols	5
1.5. Document conventions	6
1.6. Terminology	7
1.7. Abbreviations	8
1.8. Related documents	8
1.9. Document history	8
2. Introduction	9
2.1. Product overview	9
3. CET operations	10
3.1. Opening a project in CET	10
3.2. Gateway management	10
3.3. License handling	10
3.4. Diagnostics	11
3.4.1. General about diagnostics	11
3.4.2. Data object diagnostics	13
3.4.3. Diagnostic services of OPC servers and clients	13
3.4.4. Signal diagnostics	14
3.4.5. Diagnostic Web Server	15
4. HMI operations	17
4.1. General about HMI	17
4.2. Predefined user account	17
4.3. User management	17
4.3.1. General about managing users	17
4.3.2. Adding new users	18
4.3.3. Modifying user properties	18
4.3.4. Changing user's password	19
4.4. Connecting HMI to the COM600 computer	19
4.5. Substation and communication structures	19
4.5.1. Substation structure	19
4.5.2. Communication structure	21
4.6. Single Line Diagram	22
4.6.1. General about Single Line Diagram	22
4.6.2. Switch Device Control	22
4.6.3. Tap Changer	24
4.6.4. Busbar coloring	26
4.7. Alarms	27

4.7.1.	General about alarms	27
4.7.2.	Monitoring and handling alarms	28
4.7.3.	Acknowledging alarms	28
4.7.4.	Filtering alarms	28
4.8.	Events	29
4.8.1.	General about events	29
4.8.2.	Monitoring and handling events	29
4.8.3.	Filtering events	30
4.9.	Disturbance data upload	31
4.9.1.	Disturbance recordings	31
4.10.	Parameter setting	32
4.10.1.	Changing parameters	32
4.11.	Measurements	34
4.11.1.	Viewing measurements	34
Appendix 1	35
Single Line Diagram symbols	35
Index	39

1. About this manual

1.1. Copyrights

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1.2. Trademarks

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1.3. General

This manual provides thorough information on the Station Computer COM615 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 Station Computer COM615 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.
Data Object; DO	Part of a logical node object representing specific information, e.g., status or measurement. From an object-oriented point of view a data object is an instance of a class data object. DOs are normally used as transaction objects; i.e., they are data structures.
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.
LON	A communication protocol developed by Echelon.
LON Application Guideline for substation automation; LAG	A proprietary method of ABB on top of the standard LON protocol.
OPC	Series of standards specifications aiming at open connectivity in industrial automation and the enterprise systems that support industry.
Property	Named data item.
SPA	ABB proprietary communication protocol used in substation automation.

1.7. Abbreviations

The following is a list of abbreviations associated with the Station Computer COM615 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
HMI	Human Machine Interface
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
LAG	LON Application Guideline for substation automation
LAN	Local Area Network
NCC	Network Control Center
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

Station Computer COM615 acts both as an embedded communication gateway between substation automation protection and control devices and Network Control Centers (NCC), and allows easy access to the protection and control devices of a substation either locally or remotely with the HMI functionality.

COM615 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.

Gateway Functionality

The gateway functionality provides a framework that enables the use of OPC server and client components, such as OPC Client for IEC 60870-5-101 and OPC Server for LON LAG 1.4. For more information, refer to COM600 User's Guide.

HMI

The features of HMI include a Single Line Diagram, Busbar coloring, lists of events and alarms, disturbance data upload, system supervision, control of breakers and switches, parameter settings, measurement display, and user management. For more information, refer to COM600 User's Guide.

3. CET operations

3.1. Opening a project in CET

To open a project in CET:

1. Select **File > Open/Manage Project...**
2. In the Open/Manage Project dialog, select the required location for the project:
 - Projects on my computer
 - Projects on network
3. Expand the projects list, by clicking on the + symbol, to select the required project.
4. Click **Open Project**

3.2. Gateway management

The Gateway Management tool enables you to transfer the configurations of the objects to the COM600 computer.

To be able to use the Gateway Management Tool, the engineering computer must be connected to the COM600 computer. The IP address of the used ethernet port in the COM600 computer must be entered to the corresponding Gateway object property. For more information, see COM600 User's guide.

To open the Gateway Management tool, right-click the Gateway object in Communication Engineering Tool (CET) and select **Management**.

- To copy the configurations of all servers and clients to the Gateway computer, click **Update configuration**.
- To restart all servers and clients with the latest configurations, click **Reload configuration**.
- To transfer only the changed configurations and to restart only the changed server or client with new configurations, click **Update & reload configuration**.

3.3. License handling

The Gateway Management tool displays the license information for COM600 under License Information. The license and the protocols it supports have been predefined before the COM600 computer has been handed over by ABB.

The following information is shown in the window:

- owner of the license
- product revision
- protocols supported by the license.
- number of servers supported by the license.

- number of clients supported by the license.
- if WebHMI is enabled.

To update the license with a new set of protocols, order a new license from ABB and update it to COM600 with Communication Engineering Tool.

To update the license:

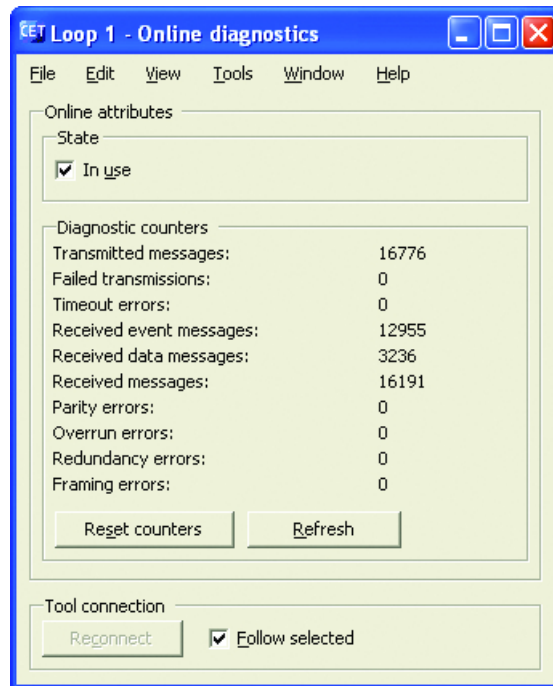
1. Open the Gateway Management tool.
2. Click **Update License**.
3. Browse for the new license file and click **Open**.

The license is COM600 specific and the COM600 computer verifies the compatibility of the license. Also the servers and clients verify the license.

3.4. Diagnostics

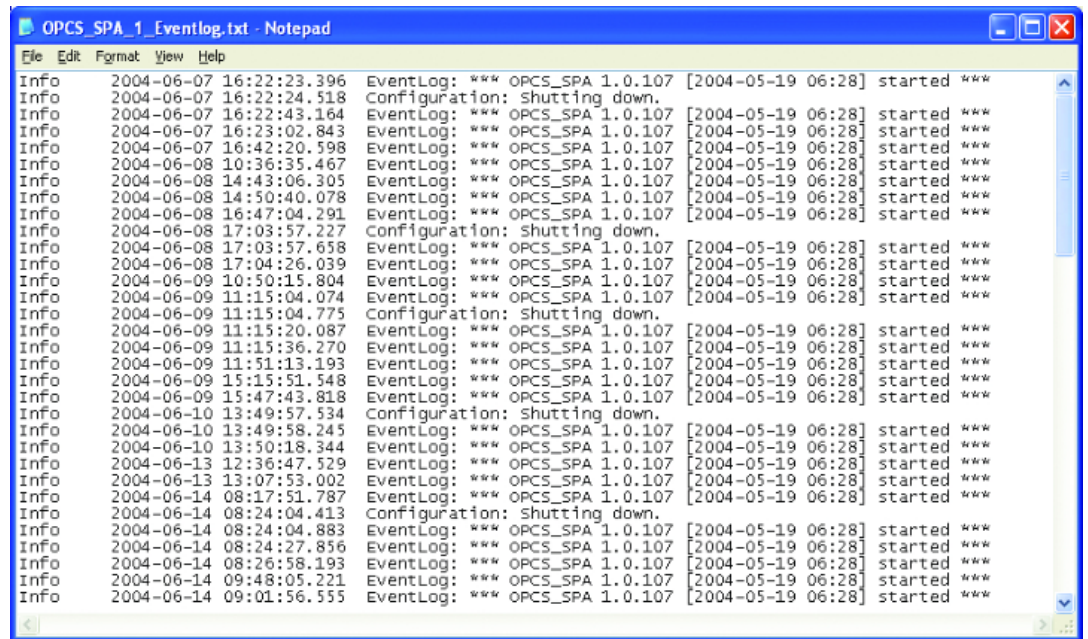
3.4.1. General about diagnostics

Communication Engineering Tool (CET) provides comprehensive functions for diagnosing the operation of the Gateway. This includes communication diagnostics with monitoring the communication channel, diagnostic counters and IED specific communication status and diagnostic counters. It is also possible to monitor and control process data and follow the data flow on the Gateway using diagnostic functions of CET. Figure 3.4.1-1 displays a sample view of a diagnostic counter dialog. An example of an event log file is displayed in Figure 3.4.1-2



SPACHnlDiag.jpg

Figure 3.4.1-1 An example of a SPA channel diagnostic counter dialog



EventDial.jpg

Figure 3.4.1-2 An example of a SPA event log file

3.4.2. Data object diagnostics

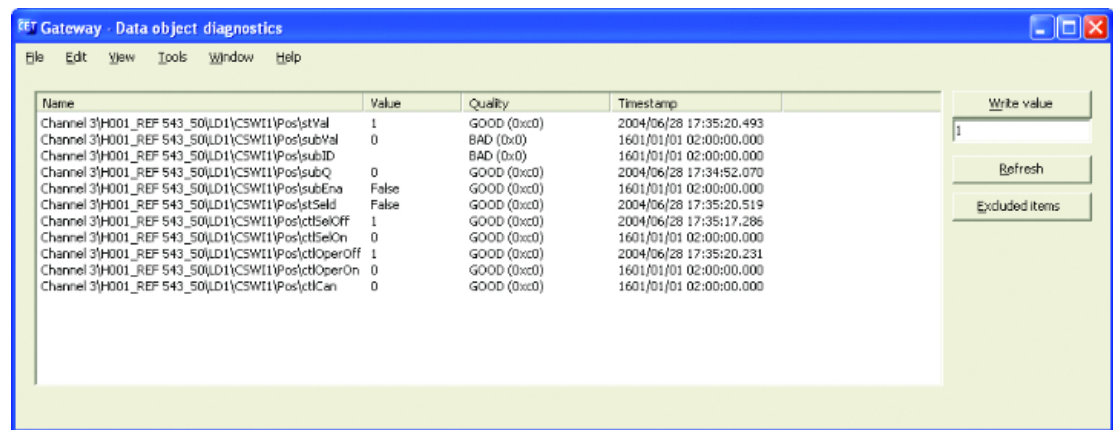
You can monitor and control the data objects under the Gateway's object tree with Data object diagnostics.

To monitor and control the data objects:

1. Right-click the Gateway.
2. Select **Data object diagnostics** from the shortcut menu, see Figure 3.4.2-1. The Data object diagnostic dialog opens.
3. Drag and drop data objects from the object tree to the Data object diagnostics.

or

1. Select a specific data object from the object tree.
2. Select **Tools > Online diagnostics**.



DataObjDiagnos.jpg

Figure 3.4.2-1 Data object diagnostics

To change the value of a data object attribute:

1. Select a specific attribute.
2. Write a new value to the text box under the **Write value** button.
3. Click **Write value** to change the value.

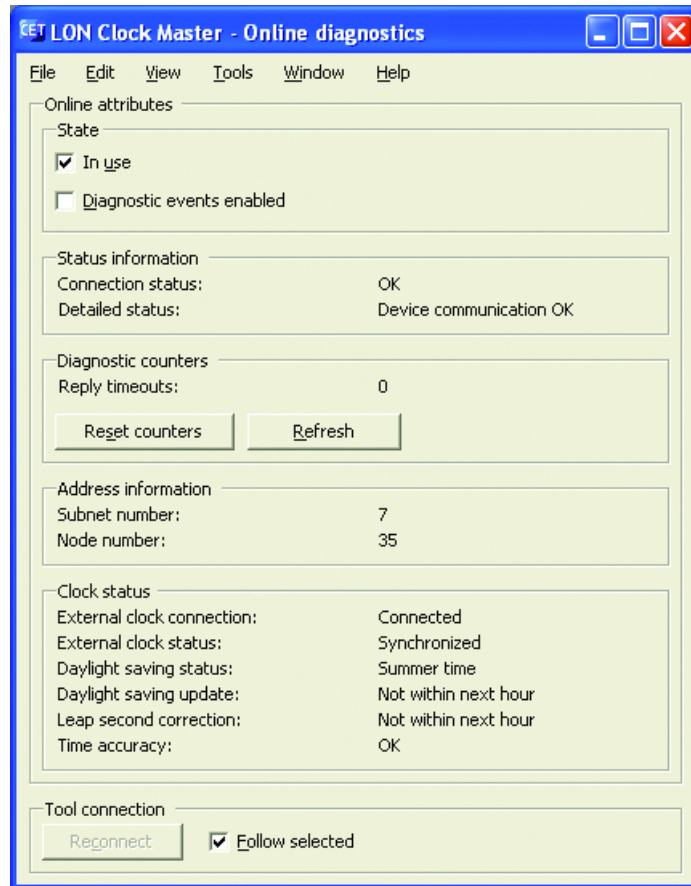
To filter the displayed data object:

1. Click **Excluded items**.
2. Notepad opens. Write to Notepad the data object types you want to exclude from the Data object diagnostics view.
3. Save the Notepad file by selecting **File > Save**.

3.4.3. Diagnostic services of OPC servers and clients

You can control and monitor the server and client channel and device communication in the communication structure of the Project Explorer. You can take channels/subnet-

works and devices into use or out of use via the respective diagnostics function. You can also monitor the channel/subnetwork and device communication with the help of various diagnostic counters, and check the device status information, see Figure 3.4.3-1.



LONClockMaster.jpg

Figure 3.4.3-1 An example of LON Clock Master online diagnostics

For more detailed information and instructions on controlling and monitoring channel and device communication, refer to the respective user's guide for the client or server (see 1.8, Related documents).

3.4.4. Signal diagnostics

OPC clients have a diagnostic function which makes it possible to monitor the flow of process data changes and commands. Activate the function by marking the Diagnostic Events Enabled check box, located in the Online diagnostics function of the IEC101/IEC104 Device. When the diagnostic function is activated, the IEC101 OPC Client Alarm & Event server generates events with information about data changes and commands.

Operator's Guide

Time	Type	Source	Value	Quality	Cause	Address	ASDU	COT	Qualifier
2004.05.25 13:00:12.662	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	60	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:00:14.771	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	0	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:12.859	DM - Command	LON Channel(LON REX IED)Logical Device(LLNO)DPC	2			1000	C_DC_NA_1	6	S/E=1 Q=
2004.05.25 13:01:12.906	DM - Command	LON Channel(LON REX IED)Logical Device(LLNO)DPC				1000	C_DC_NA_1	7	
2004.05.25 13:01:15.031	DM - Command	LON Channel(LON REX IED)Logical Device(LLNO)DPC	2			1000	C_DC_NA_1	6	S/E=0 Q=
2004.05.25 13:01:15.109	DM - Command	LON Channel(LON REX IED)Logical Device(LLNO)DPC				1000	C_DC_NA_1	7	
2004.05.25 13:01:15.109	DM - Command	LON Channel(LON REX IED)Logical Device(LLNO)DPC				1000	C_DC_NA_1	7	
2004.05.25 13:01:15.141	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	13	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:15.141	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)DPCstVal	2	GOOD (0xc0)	Spontaneous	14000	M_DP_TE_1	3	
2004.05.25 13:01:15.181	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	61	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:15.231	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	114	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:17.250	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	106	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:27.667	DM - Applka...	IEC101 Balanced Channel IEC101 IED				0	C_IC_NA_1	6	Q05=20
2004.05.25 13:01:27.667	DM - Command	IEC101 Balanced Channel IEC101 IED				0	C_IC_NA_1	7	
2004.05.25 13:01:15.141	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)DPCstVal	2	GOOD (0xc0)	Refreshed	14000	M_DP_NA_1	20	
2004.05.25 13:01:17.250	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	106	GOOD (0xc0)	Refreshed	22001	M_ME_NA_1	20	
2004.05.25 13:01:27.703	DM - Command	IEC101 Balanced Channel IEC101 IED				0	C_IC_NA_1	10	
2004.05.25 13:01:26.735	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	104	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:01:35.843	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	105	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	
2004.05.25 13:02:09.095	DM - Indication	LON Channel(LON REX IED)Logical Device(LLNO)Mmag	104	GOOD (0xc0)	Spontaneous	22001	M_ME_NA_1	3	

IEC101AEClient.jpg

Figure 3.4.4-1 IEC101 Slave OPC Client Diagnostic AE client

3.4.5.

Diagnostic Web Server

The Diagnostic Web Server of the Gateway provides an overall view of the communication status of the Gateway and the possibility to monitor the diagnostic counters of the communication channels/subnetworks and IED communication. Figure 3.4.5-1 displays the gateway objects in a tree view.

A red cross over the Gateway icon in the object tree indicates that there is a fault in the communication structure. Expand the tree to view the hierarchy deeper and to identify the device with a missing configuration or causing the error. The properties of a certain object in the communication structure can be seen on the right when clicking on the object in the tree view.

Operator's Guide

The screenshot displays the ABB diagnostic web server interface in Microsoft Internet Explorer. The browser title is "ABB :: COM 610 (User: admin(Administrator), Connection: local) - Microsoft Internet Explorer". The page shows a tree view on the left with a selected path: "PVC-COM-600 > IEC61850 OPC Server > IEC61850 Subnetwork > REC670_92". The main content area is divided into two sections: "Communication Status" and "Diagnostic Counters".

Communication Status

Description	Value
Connection status	OK
Detailed status	RCB: Reading data set (97)

Diagnostic Counters

Description	Value
Sent connection requests	286
Received connection replies ok	286
Received connection replies error	0
Sent connection concludes	285
Received connection concludes	0
Sent requests	28331
Received replies ok	28330
Received replies error	0
Sent variable read requests	287
Received variable read replies ok	287
Received variable read replies error	0
Sent variable write requests	3421
Received variable write replies ok	3421
Received variable write replies error	0
Received information reports	286
Received status request	111

Webserver_a.jpg

Figure 3.4.5-1 An example of a web page from the Gateway diagnostic web server

4. HMI operations

4.1. 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.

4.2. 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.

4.3. User management

4.3.1. 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

Operator's Guide

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.

4.3.2. 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.

4.3.3. 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**.

4.3.4. 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**.

4.4. 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.

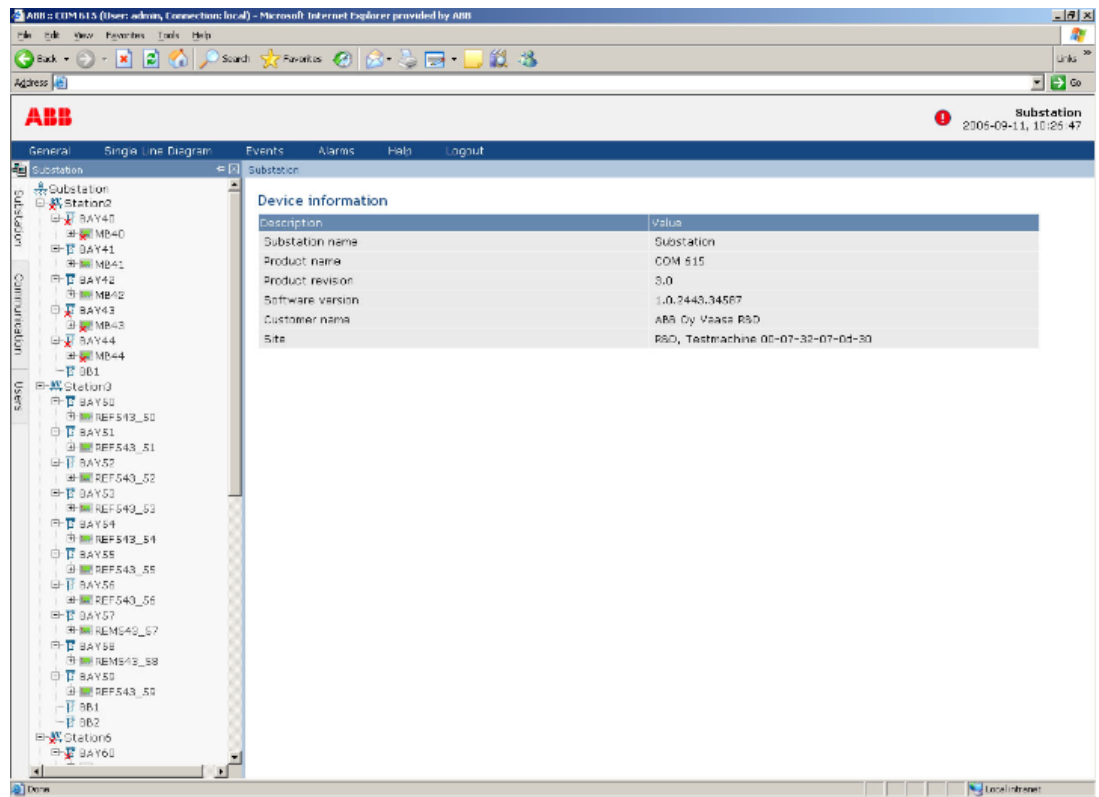
4.5. Substation and communication structures

4.5.1. 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.

Operator's Guide

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 4.5.1-1 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.

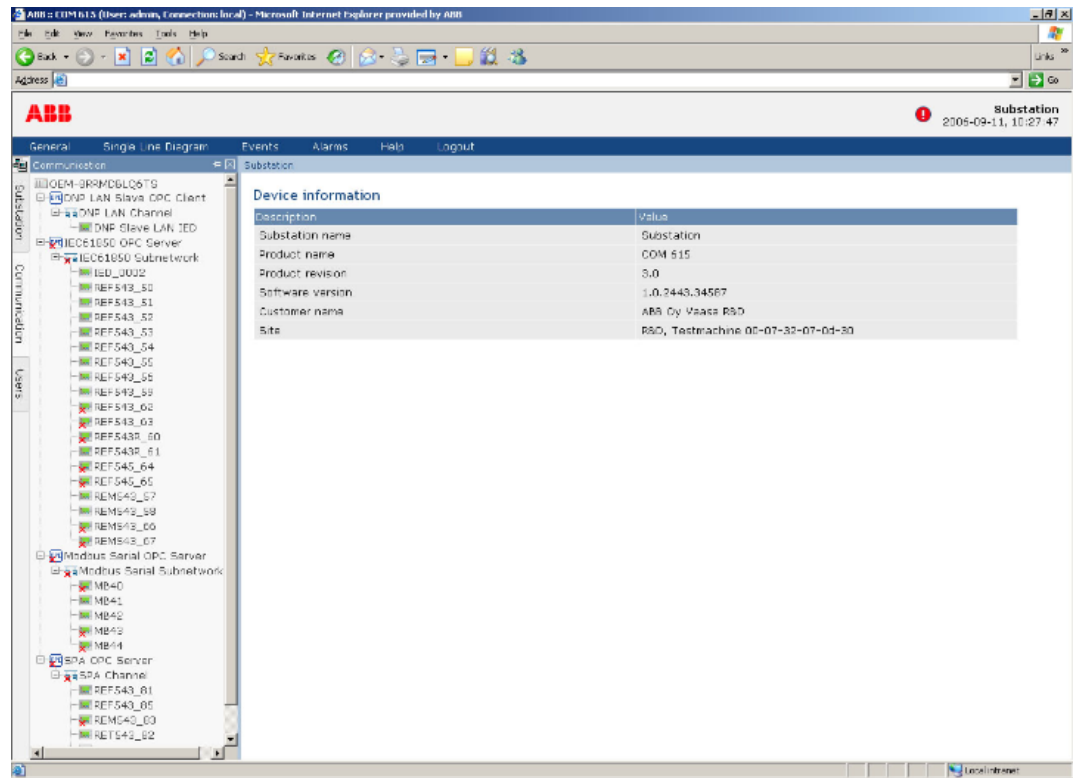


It depends on the IED configuration, whether Disturbances, Parameters or Measurements are shown in the substation structure.

4.5.2. 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 4.5.2-1 The communication view to HMI

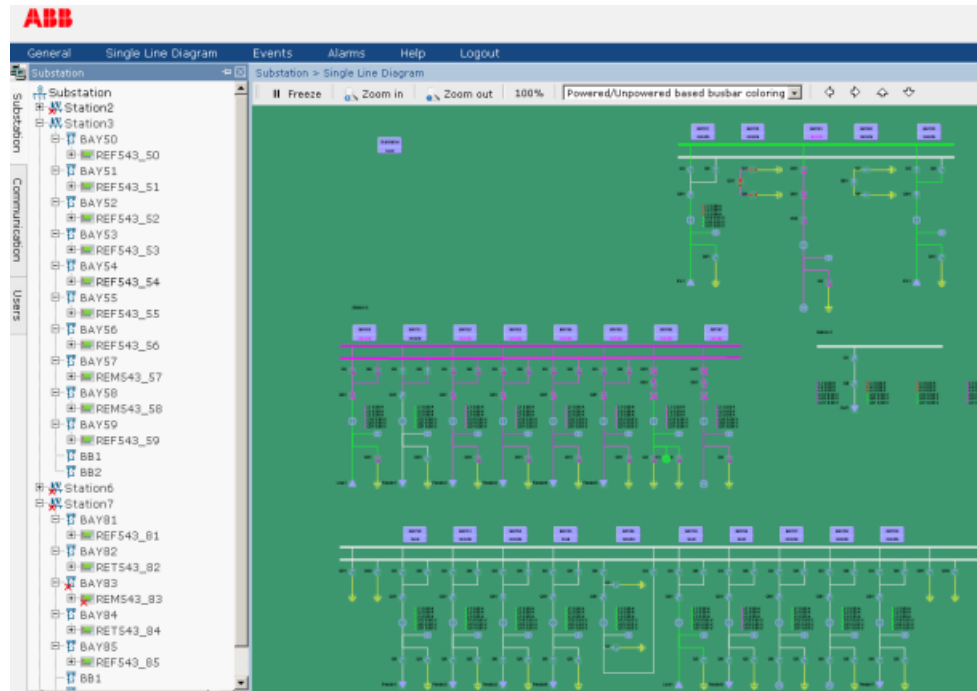
Device and diagnostics information

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.

4.6. Single Line Diagram

4.6.1. 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 4.6.1-1



SLD_example.png

Figure 4.6.1-1 An example of the Single Line Diagram

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

4.6.2. 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.

Operator's Guide

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.

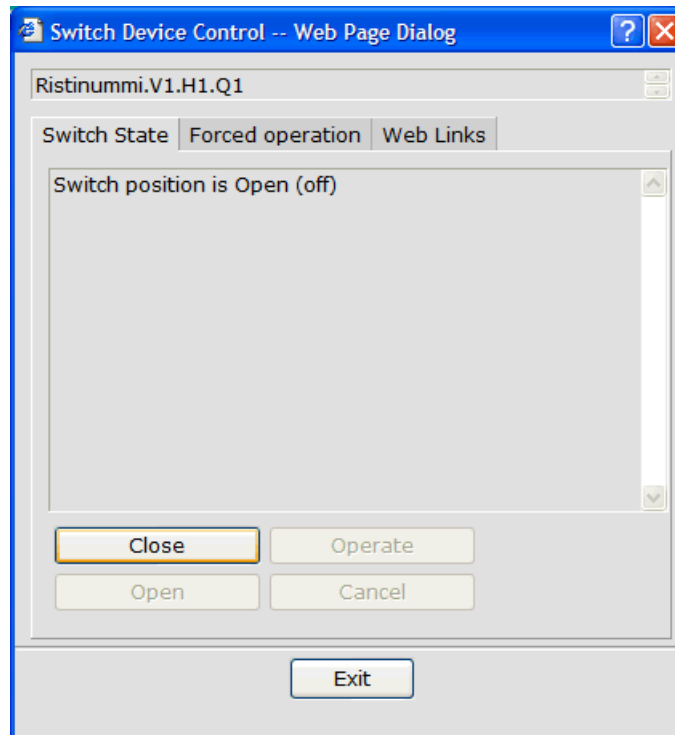
To control a switch:

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**.



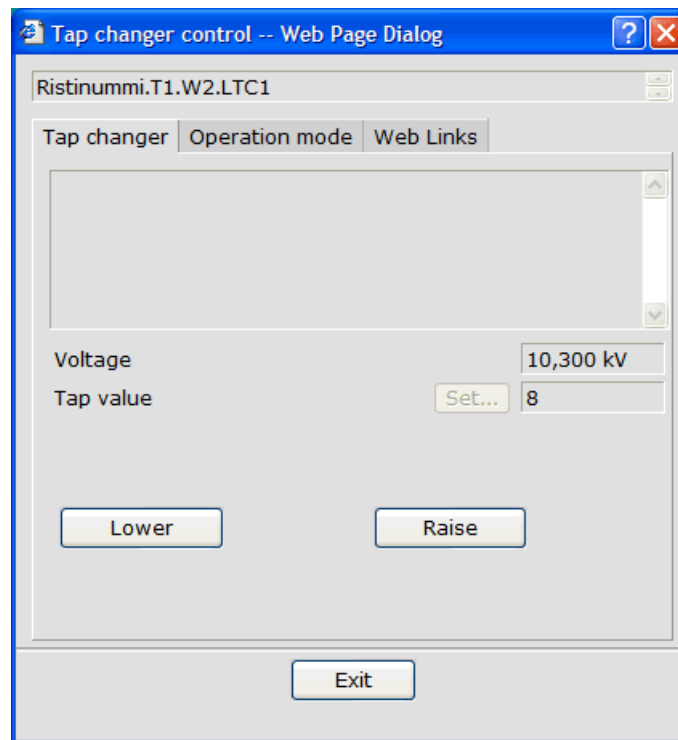
switch_control.bmp

Figure 4.6.2-1 Switch Device Control dialog

4.6.3.

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

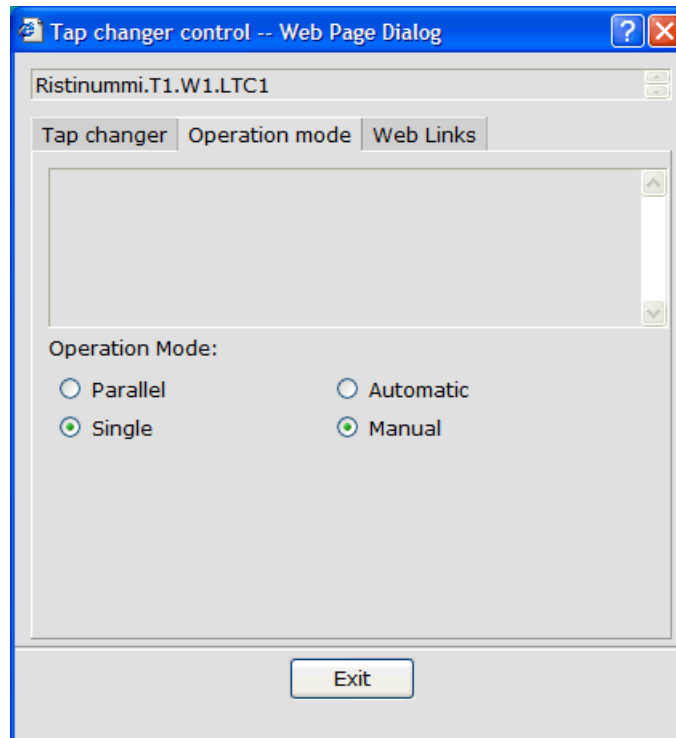
Figure 4.6.3-1 Tap Changer Control dialog

Depending on 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 4.6.3-2 Tap Changer Mode dialog

4.6.4. 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 4.6.4-1. 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.

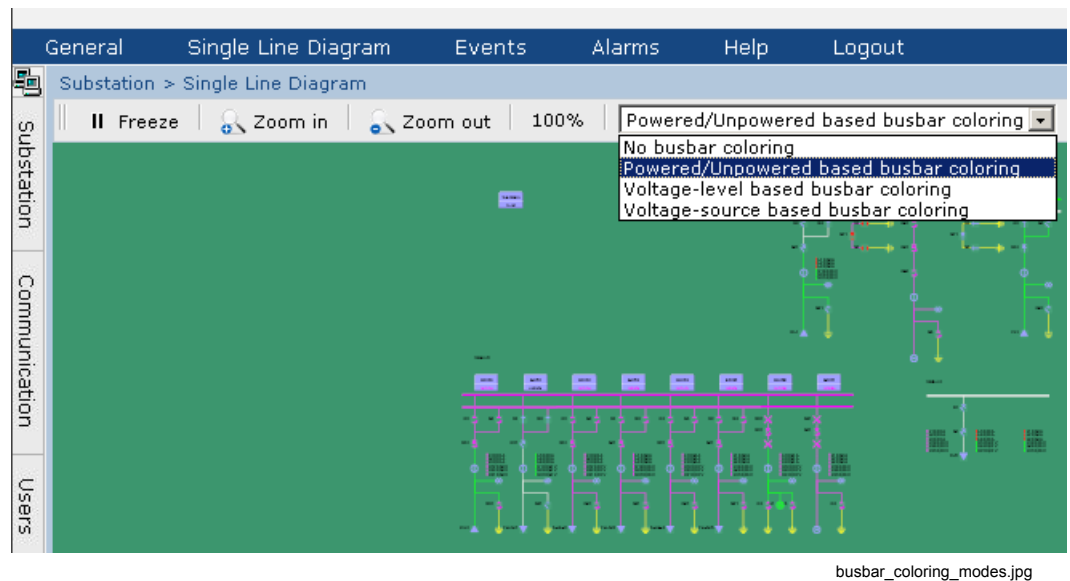


Figure 4.6.4-1 Busbar coloring drop-down menu

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.

4.7. Alarms

4.7.1. 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.

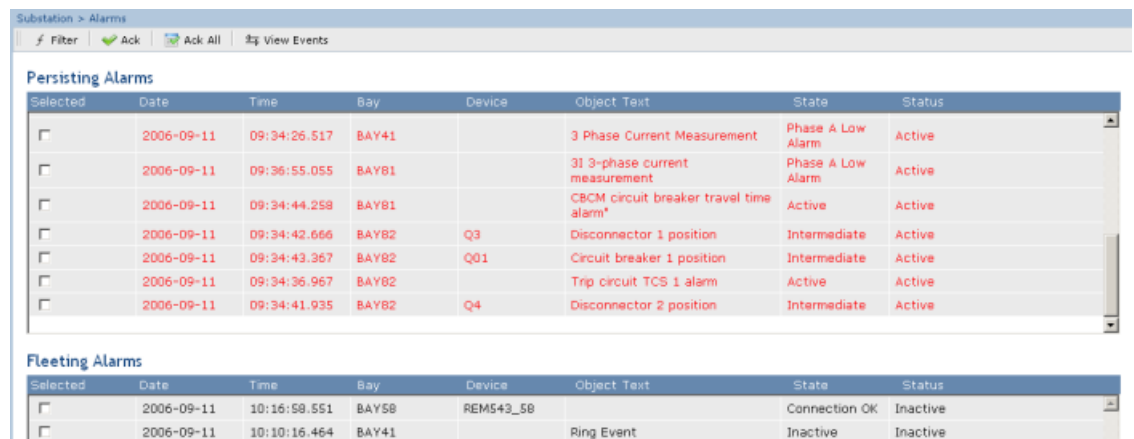
4.7.2. Monitoring and handling alarms

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**.



The screenshot shows a software interface for monitoring alarms. At the top, there is a menu bar with 'Substation > Alarms' and buttons for 'Filter', 'Ack', 'Ack All', and 'View Events'. Below the menu bar, there are two main sections: 'Persisting Alarms' and 'Fleeting Alarms'. Each section contains a table with columns for 'Selected', 'Date', 'Time', 'Bay', 'Device', 'Object Text', 'State', and 'Status'. The 'Persisting Alarms' table lists several active alarms, including '3 Phase Current Measurement', '3I 3-phase current measurement', 'CBCM circuit breaker travel time alarm*', 'Disconnecter 1 position', 'Circuit breaker 1 position', 'Trip circuit TCS 1 alarm', and 'Disconnecter 2 position'. The 'Fleeting Alarms' table lists two inactive alarms: 'Connection OK' and 'Ring Event'.

Persisting Alarms							
Selected	Date	Time	Bay	Device	Object Text	State	Status
<input type="checkbox"/>	2006-09-11	09:34:26.517	BAY41		3 Phase Current Measurement	Phase A Low Alarm	Active
<input type="checkbox"/>	2006-09-11	09:36:55.055	BAY81		3I 3-phase current measurement	Phase A Low Alarm	Active
<input type="checkbox"/>	2006-09-11	09:34:44.258	BAY81		CBCM circuit breaker travel time alarm*	Active	Active
<input type="checkbox"/>	2006-09-11	09:34:42.666	BAY82	Q3	Disconnecter 1 position	Intermediate	Active
<input type="checkbox"/>	2006-09-11	09:34:43.367	BAY82	Q01	Circuit breaker 1 position	Intermediate	Active
<input type="checkbox"/>	2006-09-11	09:34:36.967	BAY82		Trip circuit TCS 1 alarm	Active	Active
<input type="checkbox"/>	2006-09-11	09:34:41.935	BAY82	Q4	Disconnecter 2 position	Intermediate	Active

Fleeting Alarms							
Selected	Date	Time	Bay	Device	Object Text	State	Status
<input type="checkbox"/>	2006-09-11	10:16:58.551	BAY58	REM543_58		Connection OK	Inactive
<input type="checkbox"/>	2006-09-11	10:10:16.464	BAY41		Ring Event	Inactive	Inactive

alarms.png

Figure 4.7.2-1 An example view of alarms

4.7.3. 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**.

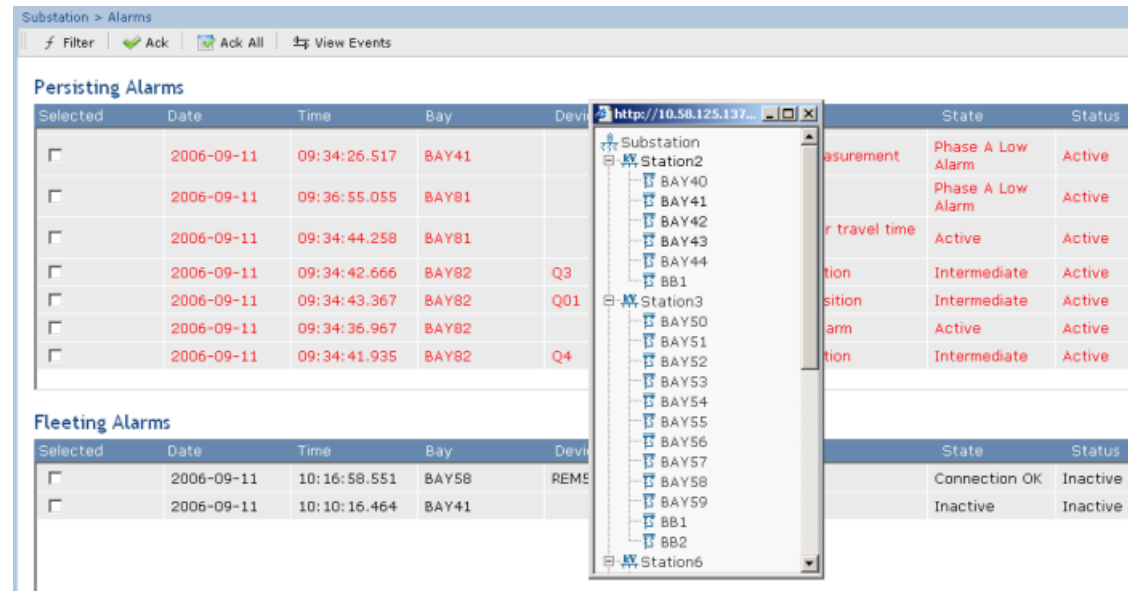
4.7.4. Filtering alarms

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

Operator's Guide

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 4.7.4-1 An example view of filtering alarms

4.8. Events

4.8.1. 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.

4.8.2. 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.

Operator's Guide

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**.

Date	Time	Bay	Device	Object Text	Event
2006-09-11	10:10:15.612	BAY54		Ring Event	Off
2006-09-11	10:10:15.612	BAY59		Ring Event	Off
2006-09-11	10:10:15.613	BAY52		Ring Event	Off
2006-09-11	10:10:15.613	BAY55		Ring Event	Off
2006-09-11	10:10:15.619	BAY53		Ring Event	Off
2006-09-11	10:10:16.464	BAY41		Ring Event	Off
2006-09-11	10:14:22.533	BAY58	REM543_58		Device Connection Lost
2006-09-11	10:16:34.526	BAY67	REM543_67		Connection OK
2006-09-11	10:16:52.312	BAY67	REM543_67		Device Connection Lost
2006-09-11	10:16:58.551	BAY58	REM543_58		Connection OK
2006-09-11	10:19:59.793				User logged in: admin
2006-09-11	10:23:03.502				User logged in: admin
2006-09-11	10:43:08.768	BAY85	Q01	Circuit breaker 1 position	Open Selected
2006-09-11	10:43:11.602	BAY85	Q01	Circuit breaker 1 position	Open Executed
2006-09-11	10:43:11.688	BAY85	Q01	Circuit breaker 1 position	Open
2006-09-11	10:43:23.973	BAY67		Local operation	Remote
2006-09-11	10:43:24.010	BAY67		Ring Event	Off
2006-09-11	10:43:24.058	BAY67		Minute Pulse	Off

HMI_events.png

Figure 4.8.2-1 An example view of events

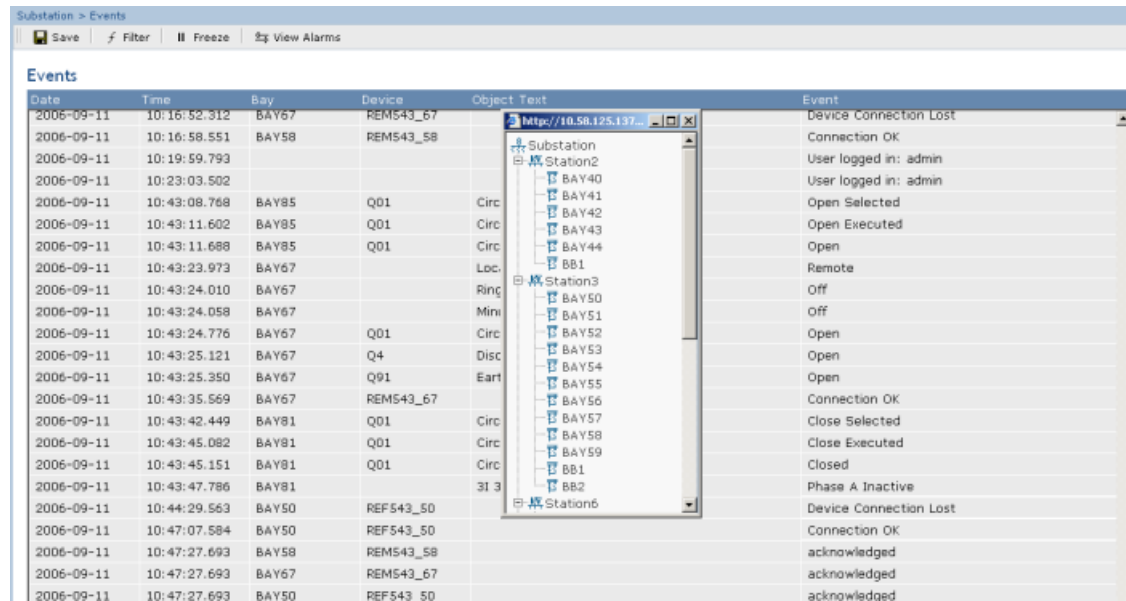
4.8.3. Filtering events

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.

Operator's Guide



HMI_filtering_alarms.png

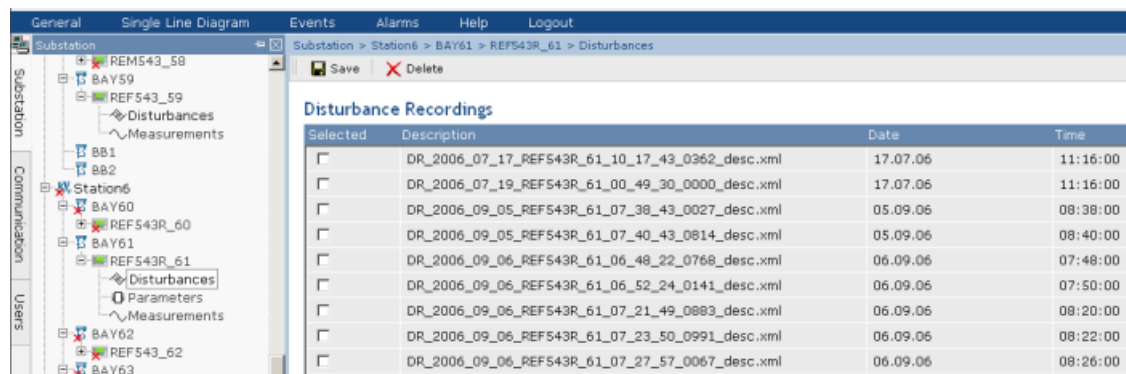
Figure 4.8.3-1 An example view of filtering events

4.9. Disturbance data upload

4.9.1. 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 4.9.1-1 Example view of disturbance recordings

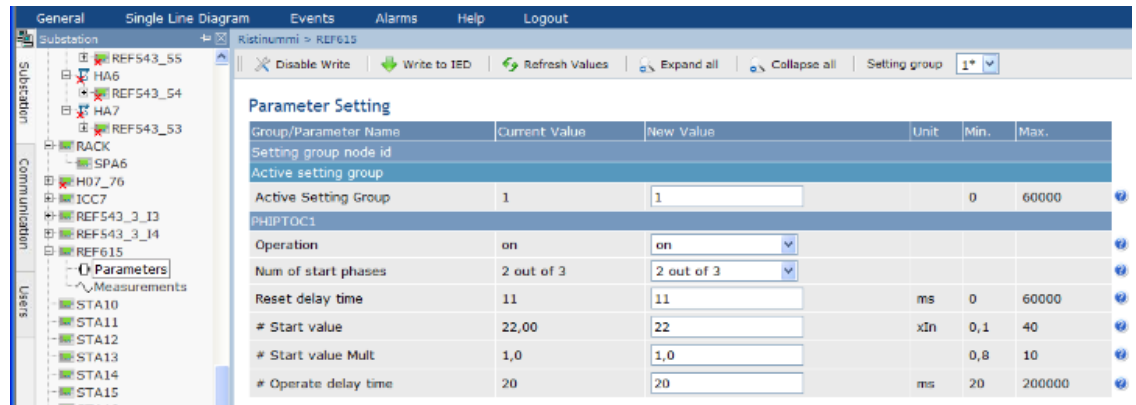
The disturbance recordings list shows you the description, date and time of the disturbance. When you want to save the list locally on your computer, select it and download it by clicking **Save**. The list is saved in .csv format and can be opened in MS Excel. You can also delete disturbance recordings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

4.10. Parameter setting

4.10.1. 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 4.10.1-1 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.

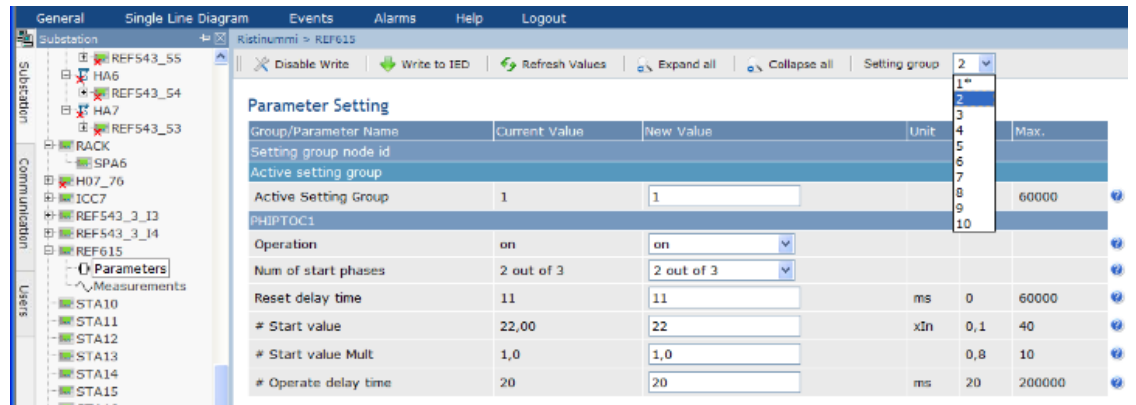
IEC 61850 setting groups and parameters

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.



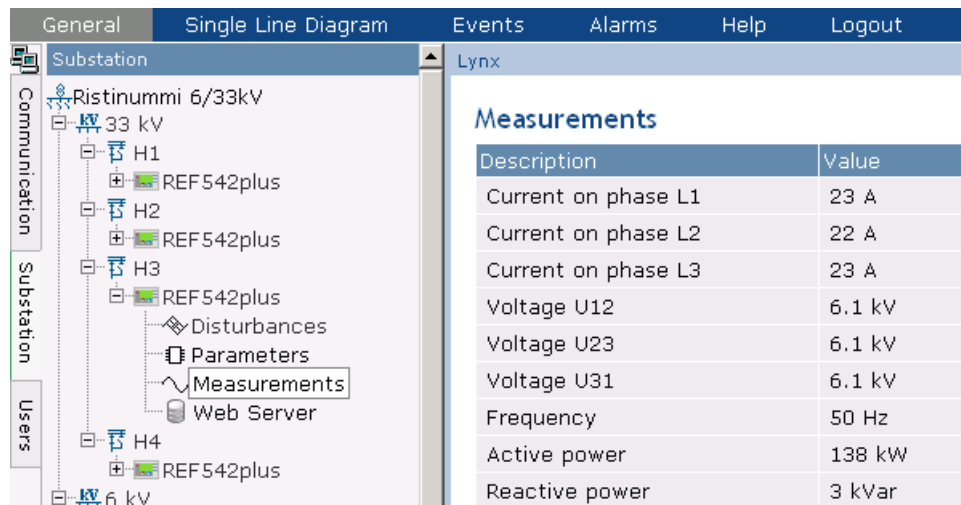
parameters3.png

Figure 4.10.1-2 Selecting a parameter group

4.11. Measurements

4.11.1. 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 4.11.1-1 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/User-Docs/<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			



Operator's Guide

Description	ANSI representation	IEC representation	Remarks
Circuit breaker – Intermediate position			
Circuit breaker – Open position			
Circuit breaker – Closed position			
Circuit breaker – Bad (faulty) position			
Disconnecter – Intermediate position			
Disconnecter – Open position			
Disconnecter – Closed position			
Disconnecter – 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		
Contactactor – Intermediate position	Use IEC representation		
Contactactor – Open position	Use IEC representation		

Operator's Guide

Description	ANSI representation	IEC representation	Remarks
Contactors – Closed position	Use IEC representation		
Contactors – 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	

Operator's Guide

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

Index

A

alarm information	20
alarms	
acknowledging	28
filtering	28
general	27

B

busbar coloring	
general	26
modes	27

C

Communication Engineering Tool	
starting	10
communication structure	21

D

data object	
attributes	13
diagnostics	13
filtering	13
device information	21
Diagnostic Web Server	15
diagnostics	
data object	13
general	11
server	13
signal	14
diagnostics information	21
disturbance recordings	31

E

event information	20
events	
filtering	28, 30
general	29

G

Gateway management	
configuration	10
license handling	10

I

IED information	20
-----------------------	----

M

measurements	
viewing	34

P

parameters	
changing	32

S

Single Line Diagram	
general	22
symbols	35
substation structure	19
Switch Device Control	22

T

tap changer	24
-------------------	----

U

updating license	11
users	
adding	18
change group	19
change password	19
managing	17
modifying properties	18



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