Station Automation COM600 3.5
HMI Configuration Manual

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1.3. General

This manual provides thorough information on Station Automation COM600 (later referred to as COM600) Human Machine Interface (HMI) and the central concepts related to it. Information in this manual is intended for operators performing configurations using the HMI.

1.4. 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 - 30  .
```

- You can be asked 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

1.5. 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 may 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.

1.6. Terminology

The following is a list of terms associated with COM600 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 Access; DA	An OPC service for providing information about process data to OPC clients.
Data Object; DO	Part of a logical node object representing specific information, for example, 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; that is, they are data structures.
Data Set	The data set is the content basis for reporting and logging. The data set contains references to the data and data attribute values.
Device	A physical device that behaves as its own communication node in the network, for example, 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.
Logical Device; LD	Representation of a group of functions. Each function is defined as a logical node. A physical device consists of one or several LDs.
Logical Node; LN	The smallest part of a function that exchanges data. An LN is an object defined by its data and methods.
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.

Term	Description
OPC	Series of standards specifications aiming at open connectivity in industrial automation and the enterprise systems that support industry.
OPC item	Representation of a connection to the data source within the OPC server. An OPC item is identified by a string <object path>:<property name>. Associated with each OPC item are Value, Quality, and Time Stamp.
Property	Named data item.
Report Control Block	The report control block controls the reporting processes for event data as they occur. The reporting process continues as long as the communication is available.
SPA	ABB proprietary communication protocol used in substation automation.
SPA device	Protection and/or Control Product supporting the SPA protocol version 2.5 or earlier.
Substation Configuration Language; SCL	XML-based description language for configurations of electrical substation IEDs. Defined in IEC 61850 standard.

1.7. Abbreviations

The following is a list of abbreviations associated with COM600 that you should be familiar with. See also 1.6, Terminology.

Abbreviation	Description
AE	Alarms and Events
ASDU	Application Service Data Unit
BRCB	Buffered Report Control Block
DA	Data Access
DMCD	Data Message Code Definition
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
LD	Logical Device

Abbreviation	Description
LMK	LonMark interoperable device communicating in LonWorks network. In this document, the term is used for devices that do not support the ABB LON/LAG communication.
LN	Logical Node
LSG	LON SPA Gateway
NCC	Network Control Center
NUC	Norwegian User Convention
NV	Network Variable
OLE	Object Linking and Embedding
OPC	OLE for Process Control
P&C	Protection & Control
RTS	Request To Send
SA	Substation Automation
SAB600	Station Automation Builder 600
SCL	Substation Configuration Language
SLD	Single Line Diagram
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SOAP	Simple Object Access Protocol
RCB	Report Control Block
URCB	Unbuffered Report Control Block
XML	eXtended Markup Language

1.8. Related documents

Name of the manual	MRS number
COM600 User’s Manual	1MRS756125
COM600 Operator's Manual	1MRS756705
COM600 Data Historian Operator's Manual	1MRS756739
DNP LAN/WAN Master (OPC)	1MRS756566
DNP Serial Master (OPC)	1MRS756567
DNP LAN/WAN Slave (OPC)	1MRS755496
DNP Serial Slave (OPC)	1MRS755495
IEC 60870-5-101 Slave (OPC)	1MRS755382

Name of the manual	MRS number
IEC 60870-5-101 Master (OPC)	1MRS756703
IEC 60870-5-103 Master (OPC)	1MRS752278
IEC 60870-5-104 Slave (OPC)	1MRS755384
IEC 60870-5-104 Master (OPC)	1MRS756704
IEC 61850 Master (OPC)	1MRS755321
Logic Processor User's Manual	1MRS756738
LON-LAG Master (OPC)	1MRS755284
MNS *i*S Connectivity (OPC)	1MRS756569
Modbus Serial Master (OPC)	1MRS756126
Modbus Serial Slave (OPC)	1MRS756913
Modbus TCP Master (OPC)	1MRS756445
Modbus TCP Slave (OPC)	1MRS756914
SPA Master (OPC)	1MRS752275
SPA Router (OPC)	1MRS755497

1.9. Document revisions

Document version/date	Product revision	History
A/13.2.2009	3.3	Document created
B/06.11.2009	3.4	Document revised
C/30.6.2011	3.5	Document revised

2. Introduction

2.1. Overview of COM600

COM600 provides gateway functions for mapping signals between protection and control IEDs in industrial or utility substations and higher-level systems. It further includes an optional HMI that provides data and information from the substation to the users.

COM600 gathers data from protection and control IEDs and from process devices using different communication protocols. The supported protocols can be combined freely in one station computer, limited only by the number of hardware interfaces and the license. COM600 uses web technology to display data to different users in a professional and user-friendly manner. The web technology is further used to transfer information to a network control centre (NCC) or distributed control system (DCS).

COM600 benefits from the potential of the IEC 61850 standard by using the IEC 61850-6 substation configuration language (SCL) and IEC 61850 -7 communications modeling regardless of protocol used. As the IEC 61850 data modeling is used for all communication protocols the gateway cross-reference is done in the same way regardless of the protocol, for example IEC 61850-8-1 or DNP3.

With the optional web HMI, COM600 can be used for efficient substation visualization, monitoring, and control. The supported browsers are Microsoft Internet Explorer (requires Adobe SVG viewer 3.03), Mozilla Firefox®, and Opera. Measured values from process devices are displayed on the HMI. Single-line diagrams can be used to view any available measured values from the process devices.

2.2. 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, change the password before you proceed using HMI. If you forget the new password, restore the factory settings with the Management tool in SAB600. After the factory settings have been restored, you can only log in with the predefined administrator password mentioned above.

3. Configuration

3.1. About this section

This section describes the configuration tasks for HMI.

3.2. Operating system access permissions using local browser

When using COM600 browser locally in the COM600 computer, it can be specified whether the browser locks down the access to the operating system functions for non-administrator users.

The C:\Program Files\COM610 GW SW\WebBrowser folder in the COM600 computer contains a `config.ini` file, which has an option called `useLockedMode`. By default it is set to value 0, which means that no locking is done. When set to 1, the access to operating system functions is disabled from non-administrator users.

3.3. Prerequisites

Before you start configuring the HMI, pay attention to the following:
1. Prepare the communication structure as instructed in COM600 User's Manual.
2. Make sure that you have the necessary connectivity packages or SCL description files that can help you in the configuration process.
3. Outline the Single Line Diagram structure you want to create for your system.

Use the Management function to update the COM600 communication configuration at least once before you start the substation configuration. If you do not update the configuration, the statuses of objects in HMI Single Line Diagram can be bad or uncertain.

To fix the statuses of objects in Single Line Diagram:
1. Save the substation configuration.
2. Update the COM600 configuration with the Management function by changing any property in SLD Editor and by clicking **Apply**.
3. Update the COM600 configuration again using with the Management function.

3.4. Creating substation structure and communication structure

3.4.1. Creating substation and communication structures with SCL descriptions or connectivity packages

To create the substation and communication structures with SCL descriptions or connectivity packages:

1. Create Substation and Voltage level objects to the substation structure.
2. Create the OPC Server and communication channel objects to the communication structure.
3. Create the IED object below the communication channel and use either the connectivity package or IED SCL description file to populate automatically the structure below the IED. The substation structure is automatically populated with primary apparatus objects described in the connectivity package or SCL descriptions. You may be prompted to give some information to guide the process, for example choose a voltage level or give a bay name.
4. Repeat step 3 for each IED.
5. Fine-tune the SLD layout (assign colors, specify incoming/outgoing feeders, and so on) by modifying or adding objects. Additionally you might need to create busbar connections, see 3.4.2, Creating substation structure manually .
6. Download the configuration to the COM600 computer.

3.4.2. Creating substation structure manually

The following is an overview of creating a substation structure manually. For a more detailed description, see 3.4.3, Adding Gateway object, 3.4.4, Adding Substation, 3.4.5, Adding voltage level object, 3.4.6, Adding bay object and 3.4.7, Adding busbar object.

Before you can create a substation structure, you have to create a communication structure with OPC Server and communication channel objects, IEDs, Logical Devices, Logical Nodes and Data objects.

To create the substation structure manually:

1. Create Gateway, Substation and Voltage level objects to the substation structure.
2. Add bays and busbars, and design their layout using the SLD Editor. Connect your substation structure objects to communication structure (logical nodes) using the data connection function, see 3.6.1, General about Data connection .

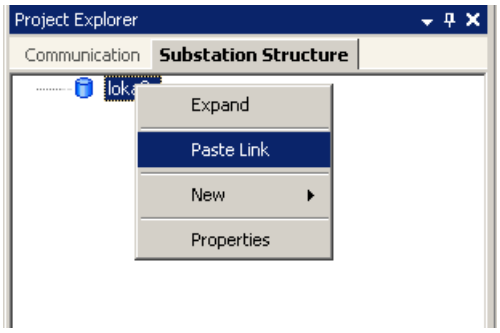
If the configurations of the bays are similar, you can copy the bay object and the data it contains. This way you do not have to add each bay separately to the substation structure.

3. Design your voltage level layout by connecting busbars and bays and relocating them with the SLD Editor. Open the SLD Editor by right-clicking the voltage level object.
4. Design your substation layout by connecting possible transformer windings between voltage levels. Relocate voltage levels with the SLD Editor. Open the SLD Editor by right-clicking the substation.
5. Fine-tune SLD settings, for example fonts and colors, see 3.6.2, Settings .

3.4.3. Adding Gateway object

To link the Gateway object to the substation structure:

1. Select the Gateway object in the Communication structure.
2. Copy the Gateway object by selecting **Edit > Copy** or by right-clicking the object and selecting **Copy**.
3. Open the Substation structure.
4. Select the project name and right-click it.
5. Select **Paste Link**, see Figure 3.4.3-1.
6. Modify the Gateway properties if necessary.



linkGW.bmp

Figure 3.4.3-1 Linking a Gateway object

The object properties for the Gateway are presented in Table 3.4.3-1.

Table 3.4.3-1 Object properties for Gateway

Property/Para-meter	Vale or Value range/Default	Description
Basic		

Property/Parameter	Vale or Value range/Default	Description
COM600 Audio Alarm	True False Default: True	Defines if local audio alarm is enabled in COM600 hardware.
COM600 Version	Default: 3.3	Version of COM600.
Event File Path	Default: none	Defines the path where event list log is store.
Event List Capacity	0...65535 Default: 1000	Defines the capacity of Event List in WebHMI.
Station/remote IP Address		Defines which Web HMI client IP addresses are reserved for local use inside station. This information is used for the station/remote switch handling. E.g. "192.168.7."
Watch Dog Enabled	True False Default: True	Defines if Watch Dog is enabled.
Web Client Audio Alarm	True False Default: True	Defines if audio alarm is enabled for the Web HMI clients.
External Watchdog		
Command OPC Item Path		The full path of the command OPC item. E.g. "ABB.SPA_OPC_DA_Server.Instance[1]#SPAChannel\SPA-COM\SACO16D2B\LD1\LLN0\Wd\ctlVal".
Command Write Interval	0...65535 Default: 5	The interval in seconds that determines how often the command is executed.
Command Write Value	0...65535 Default: 1	The value that is written to the command OPC item.
DCOM		
IP Address		IP address of COM600 computer.

3.4.4. Adding Substation

After the Gateway object has been successfully added, you can continue building the object tree by adding substation objects.

To add a substation object:
1. Select the Gateway object and right-click it.
2. Add a substation object by selecting **New** > **Functional** > **Substation**.
3. Rename the new object. The names of the substation objects have to be unique.
4. Modify substation properties if necessary.

You can define only one substation per project.

3.4.5. Adding voltage level object

After the substation object has been successfully added, you can continue building the object tree by adding voltage level objects.

To add a voltage level object:
1. Select the substation object and right-click it.
2. Add a voltage level object by selecting **New** > **Functional** > **Voltage Level**.
3. Rename the new object. The names of the voltage level objects have to be unique.
4. Modify voltage level properties if necessary.

The object properties for voltage level are presented in Table 3.4.5-1.

Table 3.4.5-1 Object properties for voltage level

Property/Para-meter	Vale or Value range/Default	Description
Basic		
Multiplier	Default: kilo	Multiplier
Voltage	20	Nominal voltage.

3.4.6. Adding bay object

After the voltage level object has been successfully added, you can continue building the object tree by adding bay objects.

To add a bay object:
1. Select the voltage level object and right-click it.
2. Add a bay object by selecting **New** > **Functional** > **Bay**.
3. Rename the new object. The names of the busbar objects have to be unique.
4. Modify bay properties if necessary.
5. Design the bay layout using SLD editor, see 3.5.1, Using the SLD Editor.
6. Use the data connection function, see 3.6.1, General about Data connection.

3.4.7. Adding busbar object

After the voltage level object has been successfully added, you can continue building the object tree by adding busbar objects.

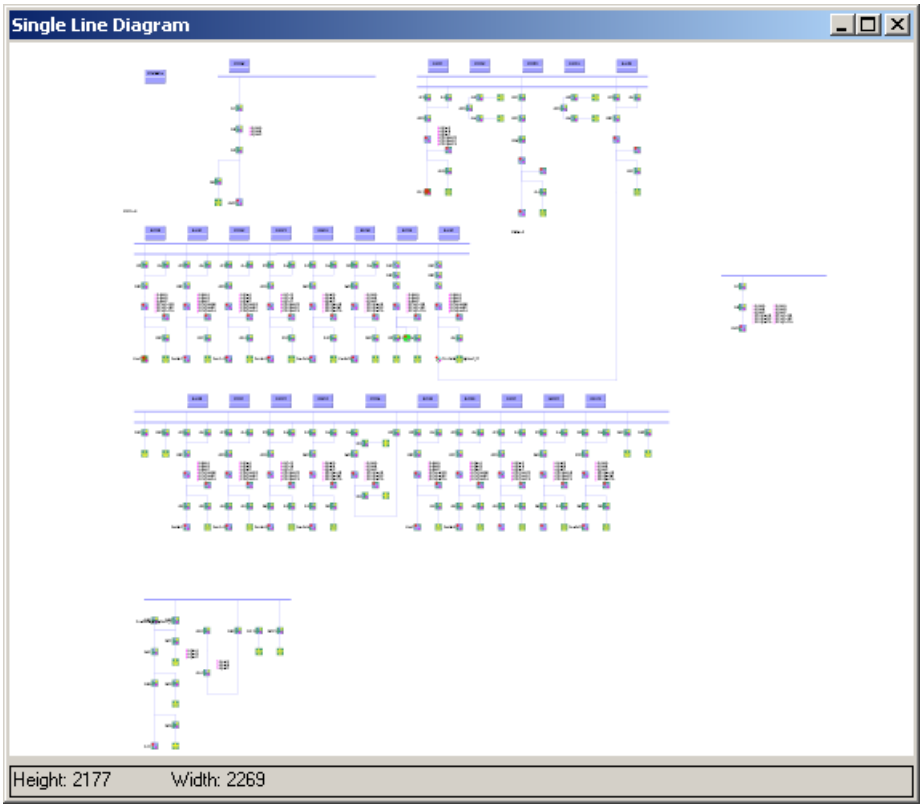
To add a busbar object:
1. Select the voltage level object and right-click it.
2. Add a busbar object by selecting **New > Functional > BusBar**.
3. Rename the new object. The names of the busbar objects have to be unique.
4. Modify busbar properties if necessary.
5. Design the busbar layout using SLD editor, see 3.5.1, Using the SLD Editor.

3.5. Single Line Diagram

3.5.1. Using the SLD Editor

To open the SLD Editor, select substation, voltage level, bus, or bay object and right-click them. Then select SLD Editor from the menu. The higher level contains the layout of the lower levels.

With the SLD Editor you can add objects to the Single Line Diagram, modify existing objects, and specify electrical connections. You can also fine-tune the layout of the diagram and add and modify descriptive texts. You can drag and drop symbols needed in the SLD from the symbol library. Click **Preview** to preview the layout of the diagram. The supported browsers are Microsoft Internet Explorer (requires Adobe SVG viewer 3.03), Mozilla Firefox®, and Opera.



SLDPreview.bmp

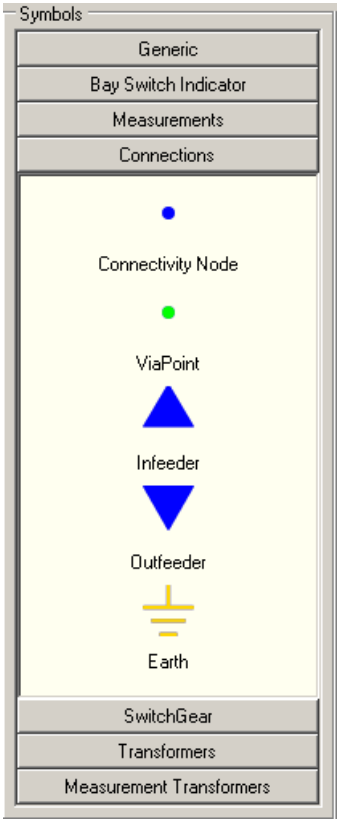
Figure 3.5.1-1 SLD Editor preview

To open the SLD Editor Tool:
1. Click the Substation structure tab.
2. Select the Bay or the Busbar object.
3. Right-click on the Bay or the Busbar object and select **SLD Editor**.
   or
   From the main toolbar, select **Tools > SLD Editor**.

Creating a diagram with the SLD Editor

To create a diagram with the SLD Editor:
1. In the Symbols view, click the tabs to view the different sets of symbols, see Figure 3.5.1-2.
2. Click a symbol you want to use and drag it with the mouse to the Single Line Diagram view.
3. Place Connectivity Nodes between switches and transformers that will be connected.
4. Select the Direct Link tool from the SLD toolbar. Link the symbols together by clicking first the start and then the end point of a connection.

Symbols can be graphically grouped by drawing a rectangle border around them by selecting the **Rectangle** button. This feature is only a visual aid and does not affect the functionality of the SLD.



SLD_symbols.bmp

Figure 3.5.1-2 SLD symbols

Bay SLD

To create a bay SLD:

1. Add primary objects (Switchgear objects, measurement transformers, and power transformers).
2. Rename the primary object using the name property in the property grid. This name is used in HMI for the object.
3. Add primary Connection objects (for example, feeders, earth symbols).
4. Add Connectivity Nodes.
   - Switchgears are connected to each other with a connectivity node.
   - Feeder objects are connected to switchgear objects with a connectivity node.
   - Transformer objects are connected to switchgear objects with a connectivity node.

Do not add connectivity nodes to the connection between the busbar and the bay switchgears.

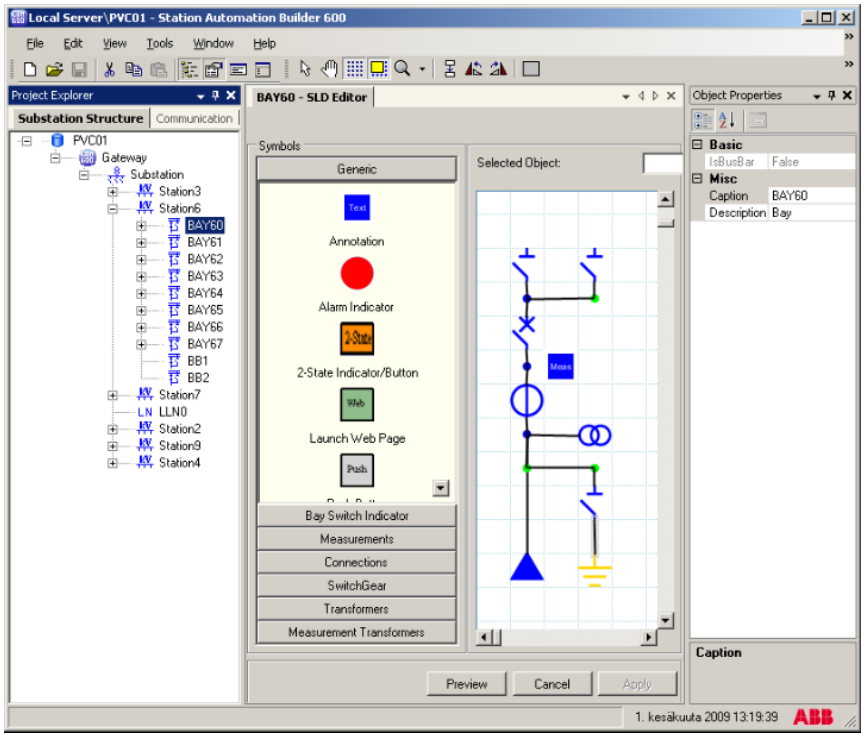
Do not add connectivity nodes between the earth symbol and the switchgear object (disconnector).

To connect a power transformer to another bay, create a connectivity node in the target bay (not in the bay where the power transformer is located).

Default relative sizes of the symbols can be configured using the Settings tool of the Gateway object. Default values can be overriden for individual symbol instances with the Relative Size property of the symbol instance. This makes it possible to have individual sizes for symbols in the SLD.

5. Add Via points, if you want the line to follow a certain route.
6. Connect objects
   - Activate the Direct Link tool from the tool bar.
   - Link two objects together by selecting their link points.

   Additionally you can add for example a Bay Switch indicator, annotations, and measurement text boxes.



Bay_SLD_34.bmp

Figure 3.5.1-3 The Bay SLD view

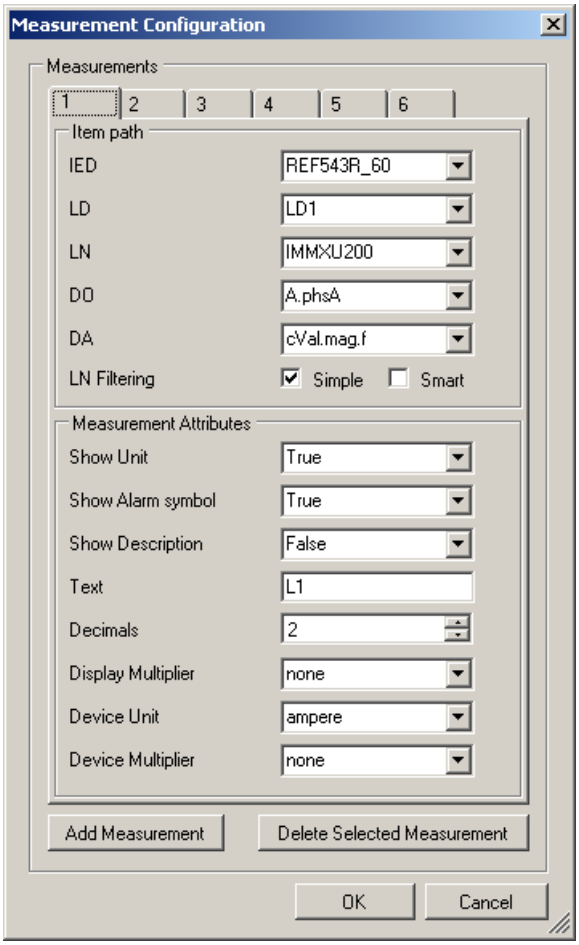
Measurement text box configuration

To configure the Measurement text box, use the Data Connect function to connect the measurement logical nodes from the communication structure to the bay.

To configure the Measurement text box:

1. Right-click the object and select Configure Measurement function from the menu.
2. Using the configuration dialog, select the measurements to be shown in HMI.

If the IED does not provide a unit for the measurement, it is possible to specify the unit here.



Measurement_configuration.jpg

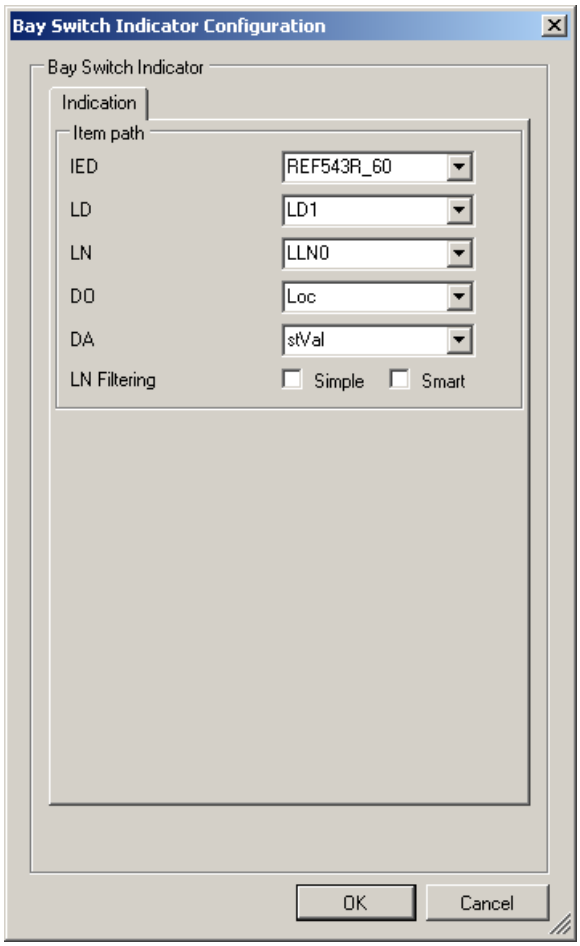
Figure 3.5.1-4 The Measurement Configuration dialog

Bay Switch Indicator configuration

To configure the Bay Switch Indicator, use the Data Connect function to connect the logical node containing the Loc information (LLN0) from the communication structure to the bay.

To configure the Bay Switch Indicator:

1. Right-click the object and select **Configure Bay Switch Indicator** from the menu.
2. Using the configuration dialog, select the source for the local remote switch indication (for example LLN0.Loc.stVal) to be used in HMI.



Bay_Switch_indicator_configuration.jpg

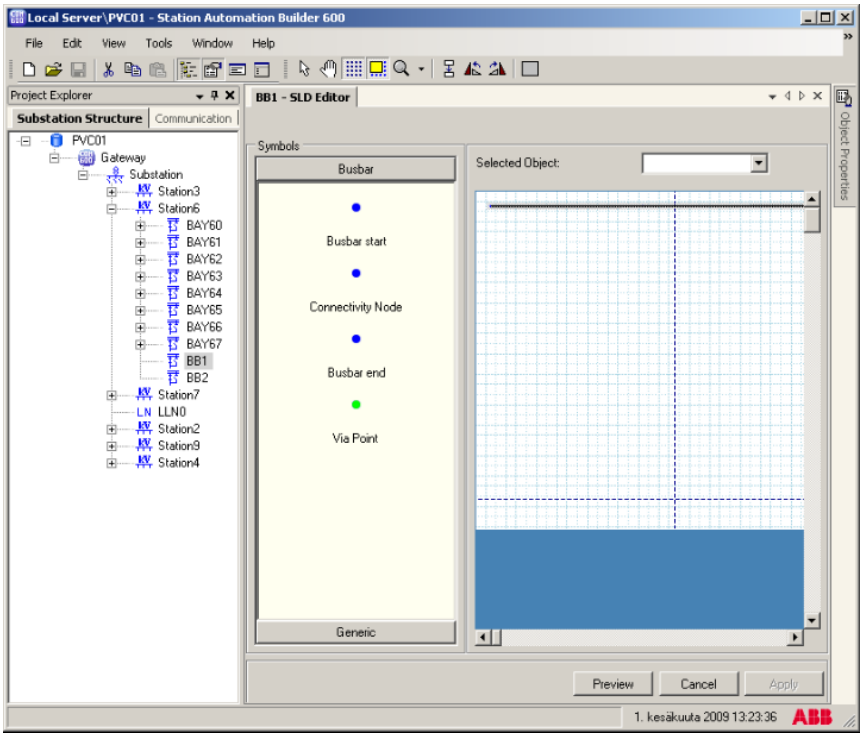
Figure 3.5.1-5 The Bay Switch Indicator configuration dialog

Busbar SLD

To create a busbar SLD:

1. Add Busbar start and end objects (only one start and end point is allowed).
2. Add a Connectivity Node (one connectivity node is enough to connect all bays to this busbar).
3. Connect the objects.
   - Activate the Direct Link tool from the tool bar.
   - Two objects linked together by selecting their link points.

You can adjust the size of busbar in the bay and voltage level views as well as the busbar view. You can also add annotations.



Busbar_SLD_34.bmp

Figure 3.5.1-6 The Busbar SLD view

Busbar Coloring

Busbar Coloring is automatically configured when the SLD is drawn. Connecting switchgear objects together specifies their electrical connections, which is used during runtime to calculate the proper coloring. **Settings** tool in the substation gateway object has tab page for the Busbar coloring, where, for example, the used colors can be modified. The value of the voltage property on the voltage level object is used for the voltage level based busbar coloring mode.

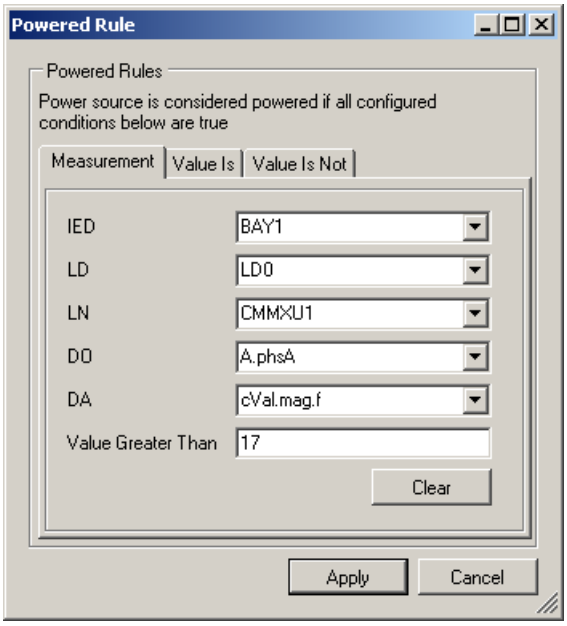
Configuring the powered state for incoming feeder and generator

1. Select the IFL or GEN object in the SLD editor.
2. Right-click it, and select **Configure Powered Rule** from the menu.

There are three different rules for detecting the powered state. Configure at least one of the following three rules so that the busbar coloring works correctly.

- A measurement value must be greater than the configured value.
- A data object value is equal to the configured value.
- A data object value is unequal to the configured value.

If the result of all configured rules is true, the object is considered as powered by the busbar coloring logic.



sldPoweredRule.bmp

Figure 3.5.1-7 The Powered rule dialog

Voltage level SLD

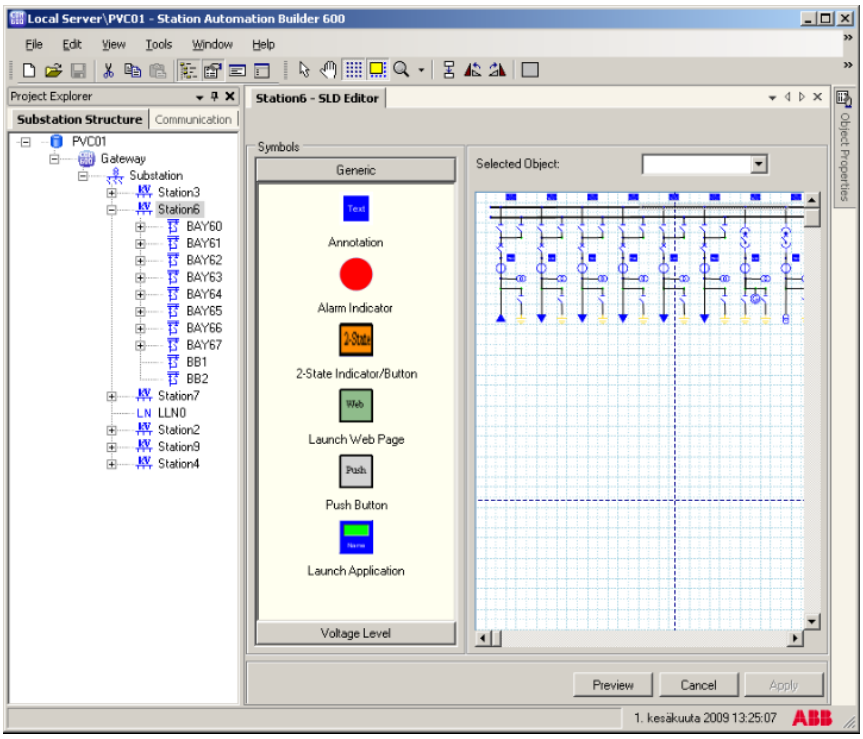
To create a voltage level SLD:

1. Drag the bays to correct locations in the SLD (name of the selected bay can be seen in the property grid).
2. Connect bays to busbars. Select a bay, right-click it and select **Connect to a Busbar** from the menu.
3. In the configuration dialog, select the corresponding switchgear and the busbar object to connect them.
4. If you need to connect a bay to another directly, select a bay, right-click it, and select **Connect to a Bay**.
   By doing this the bays will be connected via regular line.

   The SLD Editor shows the lines between the bays and the busbar connected to the same point in the busbar. However, the lines are drawn to separate locations in HMI.

5. If you want to fine-tune the SLD Editor layout for the connection lines, you can add a StopAt object from menu of the line. Move the StopAt point to the correct location in the busbar.

You can also add annotations.



Voltage_level_SLD_34.bmp

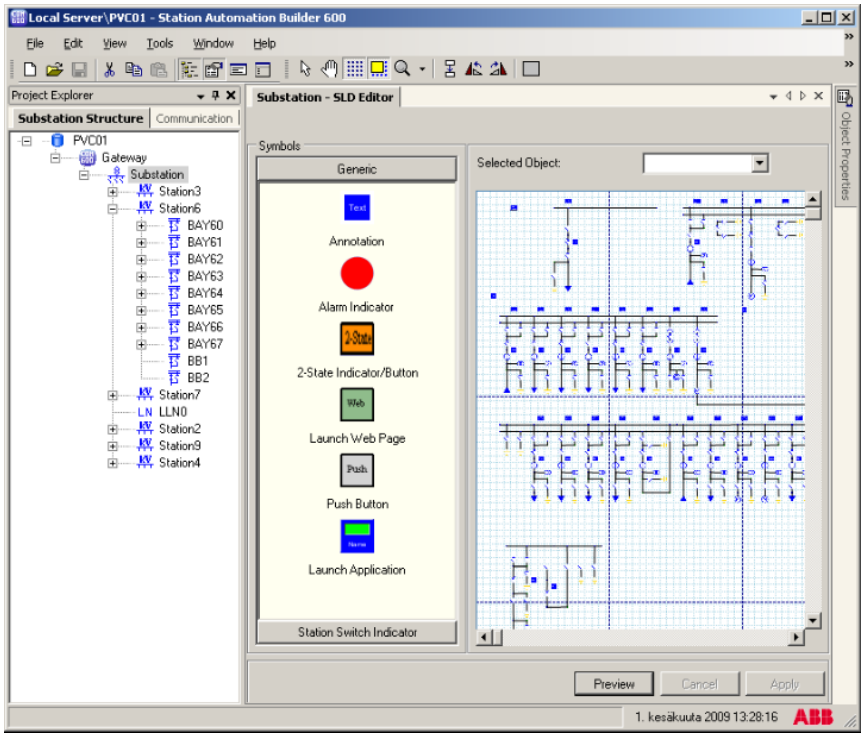
Figure 3.5.1-8 The voltage level SLD view

Substation SLD

To create a substation SLD:

1. If you have more than one voltage level object, drag the objects to correct locations in the SLD.
2. Voltage levels are connected to each other via a power transformer. Select a voltage level containing the transformer, right-click it and select **Connect Winding** to a bay function from the menu.
3. Using the configuration dialog, you can select winding and the target bay/connectivity node.
4. Add Station switch indicator (local/remote) Configuration.

To configure the Station Switch Indicator, use the Data Connect function to connect the logical node containing the information (SPS CDC) from the communication structure to the substation.



SLD_Editor_Tool_34.bmp

Figure 3.5.1-9 Substation SLD view

3.6. Data connection

3.6.1. General about Data connection

The Data Connection function is used to connect the substation structure objects to the communication structure. Process data values based on the communication structure objects are used to update the symbol states in HMI. It is also used to get object descriptions based on the substation structure names to the alarm and event lists.

Any data object that has event class defined in the communication structure, must be linked to the substation structure to get the proper description to the alarm and event.

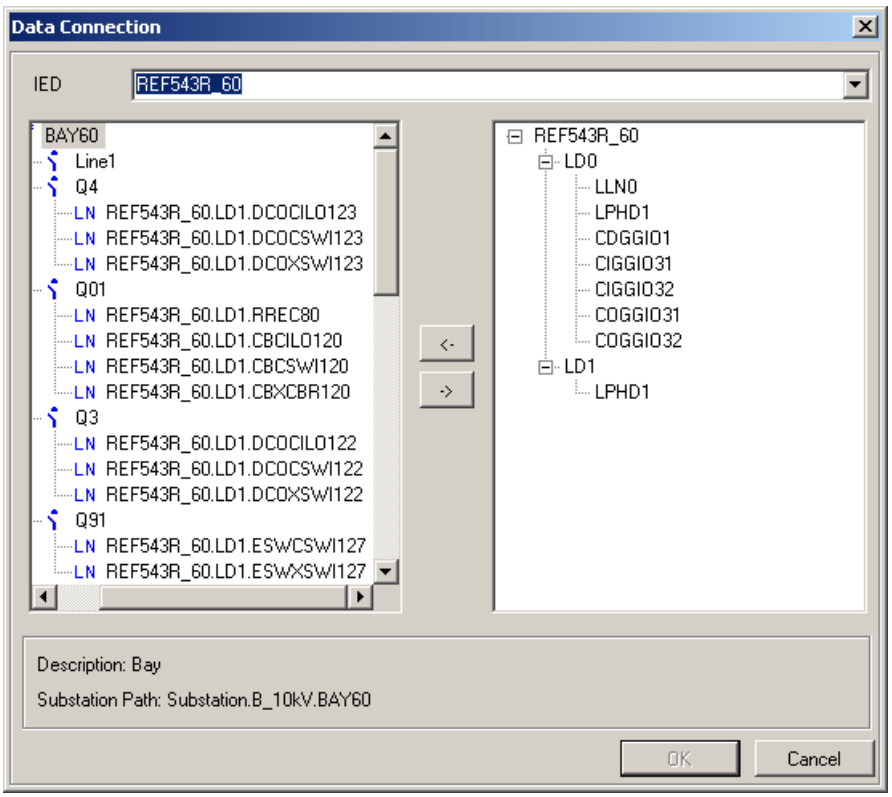
Before you can use the Data connection function, create the communication structure, see 3.4.1, Creating substation and communication structures with SCL descriptions or connectivity packages.

To connect the substation structure objects to the communication structure:

1. In the Substation structure select a Substation, Bay, or Voltage level object and right-click it. Select **Data Connection** to open the Data connection function.

The objects in the substation structure are shown on the left side of the Data connection window. The logical nodes that can be attached to the objects are shown on the right side of the Data connection window.

2. Click a substation structure object on the left side of the Data connection window. The logical nodes that can be attached to the objects are listed in the structure on the right side of the window.
3. Double-click the logical node to attach/detach it to the correct substation structure object.
4. Click **OK** to save the changes.



Data_connection.bmp

Figure 3.6.1-1 The Data connection window

3.6.2. Settings

You can define SLD settings in the **Settings** dialog. To open the **Settings** dialog, right-click the **Gateway** object and select **Settings**.

The Settings dialog contains the following tabs:

- **Generic**: You can define general settings, for example the symbol set (ANSI or IEC) and element size.
- **Alarm Settings**: You can define color settings and appearance for the alarms.
- **Measurement Status**: You can define color settings for different alarm levels.

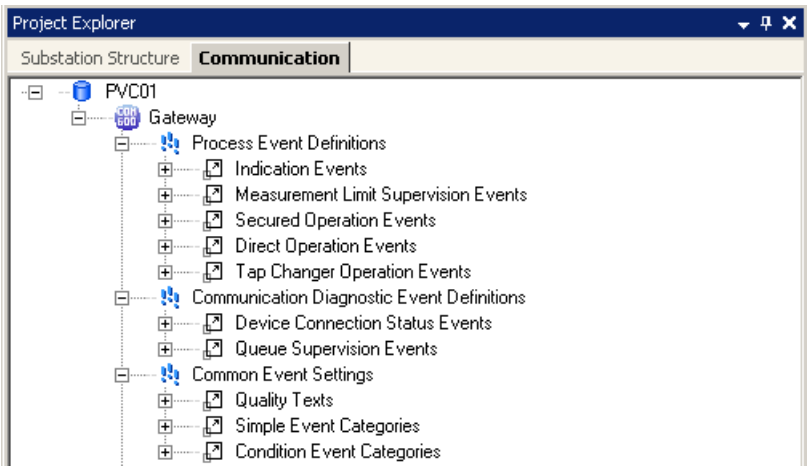
- **Default Colors**: You can modify the default colors of devices.
- **Fonts**: You can modify the font definitions.
- **Measurement Precisions**: You can adjust the precision settings of the measurements.
- **Bus Bar Coloring**: You can define busbar colors and busbar settings.
- **Name Display**: You can define name display settings. These settings define how and if name is displayed next to the symbol.
- **Resource Text Sets**: You can modify measurement, quality, or local/remote resource texts. Measurement texts affect the Measurements page of HMI. Quality texts affect Alarm and Event Lists in HMI. Local/Remote texts are displayed with the Bay and Station Indicator.

3.7. Alarm and event handling

3.7.1. General about alarm and event objects

Alarm and event objects define the types of events and alarms that are generated and the alarm and event messages displayed in HMI. It is possible to modify existing alarm and event objects (see 3.7.2, Modifying existing alarm and event objects) and to create new objects (see 3.7.3, Creating new alarm and event objects).

The communication structure contains the following event groups:
- Process Event Definitions
- Communication Diagnostic Event Definitions
- Common Event Settings



event_classes.bmp

Figure 3.7.1-1 Event groups

3.7.2. Modifying existing alarm and event objects

To modify existing alarm and event objects:
1. Select the event class in the communication tree structure.
2. Select the desired event object from the list.
3. Right-click the event object and select **Properties**.
4. Make the necessary modifications to the event object in the **Object Properties** window.

3.7.3. Creating new alarm and event objects

To create new alarm and event objects:
1. Select the event class group in the communication structure and right-click it.
2. Select **New > Event Classes**.
3. Select the desired event class type from the list. The new object is added to the communication structure. Rename the object.
4. Right-click the event object and select **Properties**.
5. Make the necessary modifications to the event object in the **Object Properties** window.

3.7.4. Connecting alarm or event objects to data objects

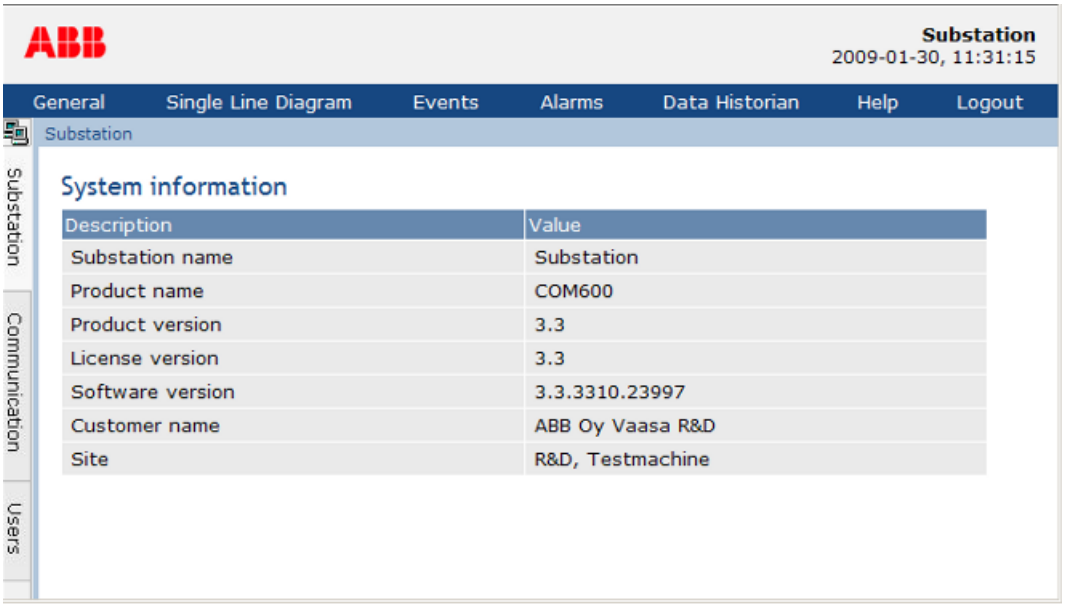
Data objects are connected to event classes by selecting the used event class from the properties of the data object. Depending on the data class, the object can have an event class property both for indication and control events or only one of them. These properties define the event classes that are used with the data object.

3.8. Data Historian

The COM600 data historian is a real-time database designed and optimized for process information management and extensive history recording. The data historian is based on ABB’s cpmPlus Knowledge Manager software. It combines the benefits of an easy-to-use real-time database with industrial reliability, performance, and real-time functionality to provide an excellent platform for process information management.

The data historian can be used for accurate process performance monitoring by following process and equipment performance calculations with real-time and history values. Better understanding of the process behaviour by joining time-based process measurements with production and maintenance events helps the user to understand the process dynamics. It further provides required information for learning how to keep the process running. High performance and reliability, together with maintenance-free operation, provide a solid platform for trending.

The optional data historian functionality offers means of storing, analyzing and presenting process data.



HMI_Data_Historian_menu.bmp

Figure 3.8-1 Data Historian menu item shown in Web HMI

For more information about configuring the data historian, see section Configuring Data historian in COM600 User's Manual. For information about the actual usage of data historian information, see COM600 Data Historian Operator's Manual.

3.9. Customizing IED parameter settings

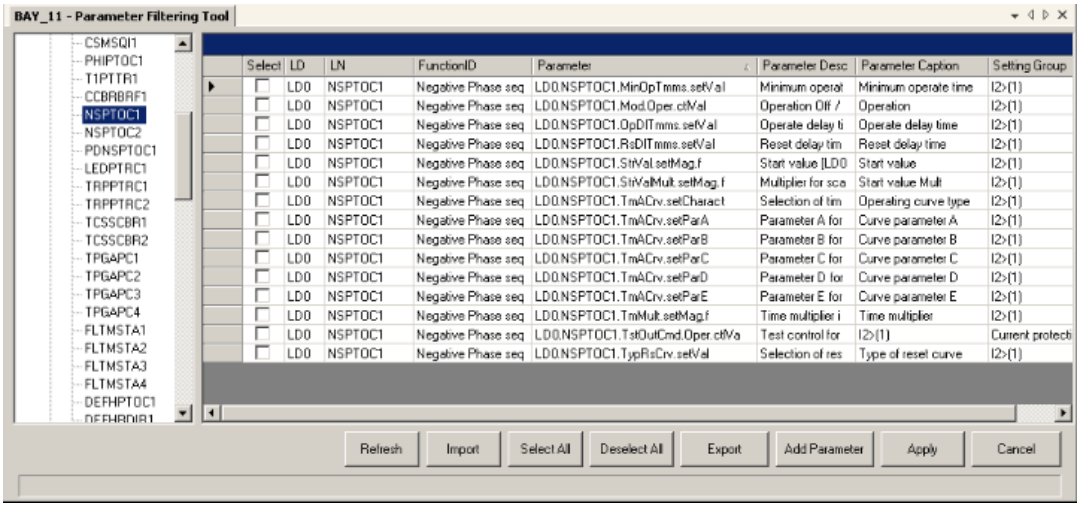
To have the parameters of an IED added automatically to the selections list, the connectivity package for the IED that supports the parameter information must be installed.

With the Parameter Selection tool of SAB600, you can select the parameters that are shown in the Parameter Setting view in HMI. This option helps you to create a user-friendly view for HMI.

Selecting parameters

To select parameters:

1. Click the Communication tab on the left.
2. Right-click the IED object and select **Parameter Filtering Tool**. A Parameter Filtering view opens. All the logical nodes the device contains are displayed on the left side of the Parameter Filtering view.
3. Click a logical node to view all the possible parameters.
4. Select the check box of the parameters you want to be displayed in the Parameter Setting view of HMI, see Figure 3.9-1. To select all parameters, click **Select All**. To unselect all parameters, click **Deselect All**.
5. Click **Apply** to save the selected parameters.



parameter_filtering_tool.bmp

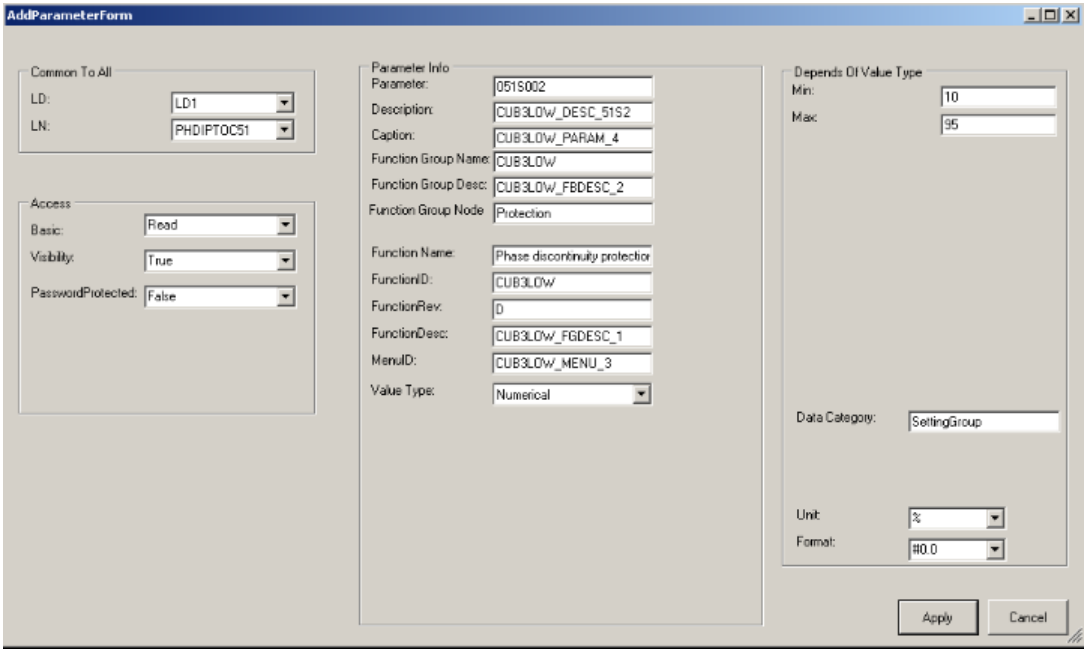
Figure 3.9-1 Parameter Filtering Tool

Adding new parameters

You can add a new parameter to the Parameter Filtering view. If no connectivity package is available or the connectivity package does not contain a specific parameter for your needs, you can add new parameters using the Add Parameter Form.

To add a new parameter:

1. Click **Add Parameter** in the Parameter Filtering view. The **Add Parameter Form** window opens, see Figure 3.9-2.
   In the **Add Parameter Form** window you can fill in the information on the parameter you want to add or select a suitable option from a drop-down list.
2. After you have added all necessary information, click **Apply** to add the parameter to the Parameter Filtering view.



Add_parameter_form.bmp

Figure 3.9-2 The Add Parameter Form window

If a parameter row has been selected in the Parameter Filtering view, the **Add Parameter** button opens the selected parameter. The changes are made to the selected parameter.

When using SPA parametrisation, the **Parameter** field in the tool specifies the used SPA parameter (for example 052S002). The syntax is [SPA Channel][SPA Data Category][SPA Data Number].

When using IEC61850 parametrisation, the **Parameter** field in the tool specifies the used IEC61850 Data (for example LD0.PHIPTOC1.StrValMult.setMag.f). The syntax is [Logical Device].[Logical Node].[Data Object].[Data Attribute].

Adding new parameters for Modbus IEDs

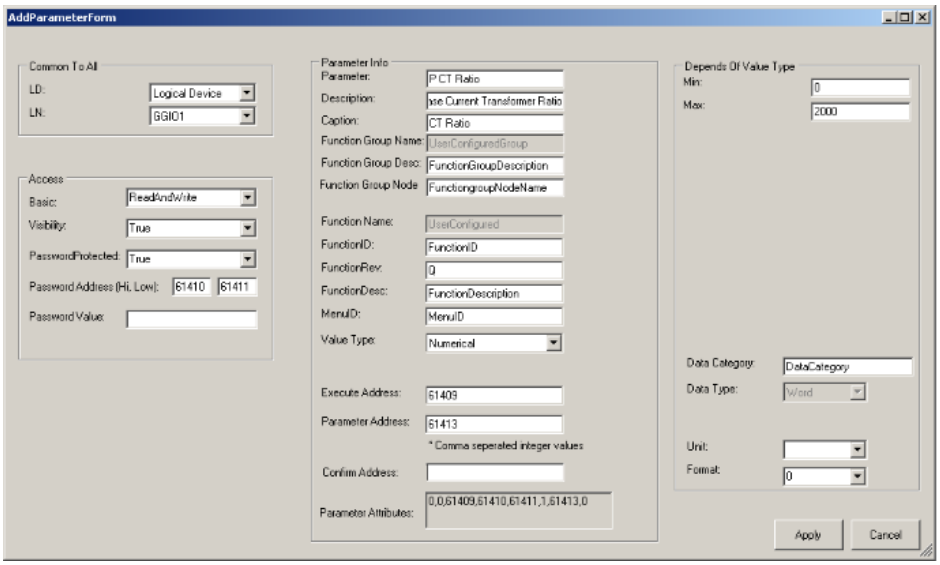
If a connectivity package is not available for Modbus IEDs, the parameters can be added manually. When Parameter Filtering Tool is launched from Modbus IED on SAB600 for the first time, there are no configured parameters in Parameter Filtering Tool. You can add new parameters using the **Add Parameter Form** window.

To add a new parameter:

1. Click **Add Parameter** in the Parameter Filtering view. The **Add Parameter Form** window opens, see Figure 3.9-3.
2. In the **Add Parameter Form** window, fill in the information of the parameter.

- For the Modbus IED Read only parameter, specify only the parameter address.
- For Write and Read And Write parameter, in addition to the parameter address, you may need to specify the password address and value, if the password is enabled in the IED. You may also need to specify the execute address and confirm address, if required by the IED.

3. After you have added all the necessary information, click **Apply** to add the parameter to the **Parameter Filtering** view.



Add Parameter for Modbus IED.bmp

Figure 3.9-3 Adding a parameter for Modbus IED

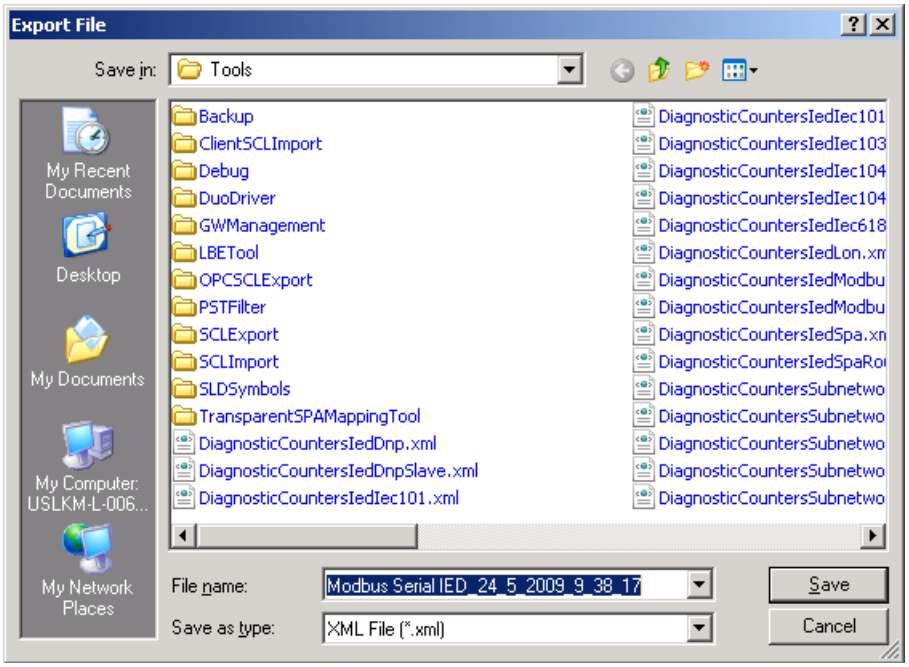
Exporting parameters

You can export the information of the selected parameters to an Excel or XML file.

You can import the XML file back to the tool for other IEDs, but you cannot import the parameters back to the tool from the Excel file.

To export the parameter selection:

1. Select the parameters you want to export.
2. Click **Export**. Select the file type (Excel or XML).
3. Select the folder where you want to export the file and click **Save**.



Export.bmp

Figure 3.9-4 Exporting XML file

Importing parameters

With the Import function it is possible to import an existing Parameter Filtering Tool configuration for example from another computer. An XML file created with the Parameter Filtering Tool can be imported into another device or project using this tool.

3.10. Disturbance data upload

The basic support for the disturbance data upload (data upload and conversion to COMTRADE format) is implemented to each OPC Server. Protocol and device-specific differences are hidden from the OPC client. The files are stored temporarily to the COM600 computer, where they can be transferred further using for example ftp. COM600 has a possibility to activate the disturbance data upload from the IED and to receive the file into the computer where HMI is run.

If the IED and the OPC server used for communication support disturbance data upload, the properties for configuring the function can be found from the corresponding OPC server user's manual, see 1.8, Related documents.

3.11. Project-specific localization

With SAB600 you can modify the project-specific texts that are displayed in HMI. Static HMI texts, for example menus and headers, can be translated by the local ABB. For more information on localization, contact your local ABB representative.

To localize objects in the substation structure or communication tree:
1. Select the object you want to modify.
2. Right-click the object and select **Rename**.
3. Modify the name of the object.

To localize object properties:
1. Select the object you want to modify in the Substation or Communication structure.
2. Right-click the object and select **Properties**. The **Object properties** window opens.
3. Modify the text properties of the object.

Appendix 1

Single Line Diagram symbols

Table A1-1 Single Line Diagram symbols

Description	ANSI representation	IEC representation	ANSI2 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, and so on). 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\COM600 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/<file-name>
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	ANSI2 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				
Three State Switch (Left, earthed)				
Three State Switch (Right, earthed)				
Load breaker – Intermediate position				
Load breaker – Open position				
Load breaker – Closed position				
Load breaker – Bad (faulty) position				

Description	ANSI representation	IEC representation	ANSI2 representation	Remarks
Contactor – Intermediate position				
Contactor – Open position				
Contactor – Closed position				
Contactor – Bad (faulty) position				
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				

Description	ANSI representation	IEC representation	ANSI2 representation	Remarks
Out-feeder				
Earth symbol				
Bay Switch Indicator				
Station Switch Indicator				
Display Voltage				

Appendix 2

SAB600 Toolbar

Symbol	Description
	Displays the Substation and Communication Structure in the Project Explorer window.
	Displays the Object Properties window.
	Displays the messages in the Output window.
	Displays a list of the object types.
	Selects an object in the SLD Editor window.
	Enables navigation of the SLD Editor window using a mouse.
	Displays a grid view in the SLD Editor window.
	Zooms in/out the SLD Editor window.
	Opens the direct link tool.
	Rotates the selected objects left in the SLD Editor window.
	Rotates the selected objects right in the SLD Editor window.
	Used to draw rectangles around grouped objects

Appendix 3

Logical nodes and primary objects

Logical nodes can be connected to primary objects according to the following table. If no specific function is written in the Comment column, the connection is used for displaying the substation structure based on identification for the events and alarms.

Table A3-1 Logical node classes and primary objects

Primary object	LN Class	Mandatory	Comment
Substation			
	LLN0		Loc data used for station/remote switch state
	SIMG		
	CALH		
	M*		
	G*		
	Q*		
Voltage Level			
	SIMG		
	CALH		
	M*		
	G*		
	Q*		
Bay			
	LLN0		Loc data used for bay local/remote switch state
	LPHD		
	SIMG		
	SARC		
	SIML		
	SPDC		
	CALH		
	M*		
	P*		
	R*		

Primary object	LN Class	Mandatory	Comment
	G*		
	T*		
	Q*		
Circuit Breaker (CBR)			
	XCBR		
	CSWI	Mandatory	Pos data used for switch device position and control.
	RREC		
	RSYN		Rel data used for synchronism-check status in control dialogs.
	CILO		EnaOpn and EnaCls data used for interlocking status in control dialogs.
	PTRC		
	SIML		
	CALH		
	G*		
Disconnector (DIS)			
	XSWI		
	CSWI	Mandatory	Pos data used for switch device position and control.
	RREC		
	RSYN		Rel data used for synchronism-check status in control dialogs.
	CILO		EnaOpn and EnaCls data used for interlocking status in control dialogs.
	PTRC		
	SIML		
	CALH		
	G*		
Voltage Transformer (VTR)			
	TVTR		

Primary object	LN Class	Mandatory	Comment
	CALH		
	G*		
Current Transformer (CTR)			
	TCTR		
	SARC SPDC CALH		
	G*		
	Q*		
Power Overhead Line (LIN)			
	ZLIN		
	CALH		
	G*		
Rotating Reactive Component (RRC)			
	ZRRC		
	CALH		
	G		
Surge Arrestor (SAR)			
	ZSAR		
	CALH		
	G		
Thyristor controlled frequency converter (TCF)			
	ZTCF		
	CALH		
	G		
Thyristor controlled reactive component (TCR)			
	ZTCR		
	CALH		
	G*		

Primary object	LN Class	Mandatory	Comment
Power Transformer Winding (PTW)			
	G*		
Incoming Feeder Line (IFL)			Powered rules for the Incoming Feeder Line can be configured in the SLD editor. See 3.5.1 Configuring the powered state for incoming feeder and generator.
	CALH		
	G*		
	Q*		
Generator (GEN)			Powered rules for the Generator can be configured in the SLD editor. See 3.5.1 Configuring the powered state for incoming feeder and generator.
	ZGEN		
	G*		

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