
COM600 series 5.1

SPA Master (OPC) User's Manual



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1. About this manual

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The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties. All persons responsible for applying the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are complied with. In particular, any risks in applications where a system failure and/ or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment, and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks.

This product is designed to be connected and to communicate information and data via a network interface, which should be connected to a secure network. It is sole responsibility of person or entity responsible for network administration to ensure a secure connection to the network and to establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB is not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

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be responsible or liable for any loss or damage resulting from the use of this manual or the application of the equipment.

1.3.

Conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-1 and EN 60255-27 for the low voltage directive. The product is designed in accordance with the international standards of the IEC 60255 series.

1.4.

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1.5.

General information

This manual provides thorough information on the SPA Master Protocol (OPC) 1.0 (later referred to as SPA OPC Server) and the central concepts related to it. You find instructions on how to configure SPA OPC Server related objects. The basic operation procedures are also discussed.

Information in this user's manual is intended for application engineers who configure the SPA OPC Server.

As a prerequisite, you should understand the basic principles and the IEC 61850 technology and standard.

As a prerequisite, you should have some previous knowledge of SPA devices.

This user's manual is divided into following sections:

Introduction

This section gives an overview of the SPA OPC Server and its features.

Configuration

In this section you will find an overview of configuration. You are given instructions on how to configure SPA OPC Server related objects and the model of a substation or system.

Operation

This section covers the basic operation procedures you can carry out when transferring or activating Grid Automation Controller COM600 (later referred to as COM600) with new configurations.

You are also given instructions on how to monitor and control the conditions of SPA Devices.

1.6.

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: **MenuItemName > 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

1.7.

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.

1.8.

Terminology

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.
COM600 Series; COM600	COM600 as a generic name for COM600S IEC and COM600F ANSI products
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.

Term	Description
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.
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.

1.9. Abbreviations

Abbreviation	Description
AE	Alarms and Events
DA	Data Access
DO	Data Object
GW	Gateway, component connecting two communication networks together
WebHMI	Web Human Machine Interface
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
LAN	Local Area Network
LD	Logical Device
LN	Logical Node

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Abbreviation	Description
NCC	Network Control Center
OLE	Object Linking and Embedding
OPC	OLE for Process Control
P&C	Protection & Control
PLC	Programmable Logic Controller
POU	Program Organization Unit
RTS	Request To Send
SA	Substation Automation
SCD	Substation Configuration Description
SCL	Substation Configuration Language
SFC	Sequential Function Chart
SLD	Single Line Diagram
XML	eXtended Markup Language

1.10.**Related documents**

Name of the manual	MRS number
COM600 User's Manual	1MRS756125

1.11.**Document revisions**

Document version/date	Product revision	History
A/30.6.2004	1.0	Document created
B/16.10.2006	3.0	Document revised
C/22.1.2007	3.0	Document revised
D/21.12.2007	3.1	Document revised
E/17.6.2008	3.2	Document revised
F/13.2.2009	3.3	Document revised
G/06.11.2009	3.4	Document revised
H/30.6.2011	3.5	Document revised
J/31.5.2012	4.0	Document revised
K/13.3.2015	4.1	Document revised
L/24.5.2017	5.0	Document revised

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Document version/date	Product revision	History
M/6.3.2018	5.1	Document revised

2. Introduction

2.1.

General information about the COM600 series

The COM600 product series are versatile Substation Management Units that help realize smart substation and grid automation solutions in industrial and utility distribution networks.

They get deployed together with protection and control IEDs, substation devices such as RTUs, meters and PLCs in dedicated cabinets and switchgear.

The COM600 product is an all-in-one unit that functions as:

- Communication gateway
- Web Human Machine Interface (WebHMI)
- Automation controller
- Real-time and historical data management unit

The COM600 product series use process information and device data, acquired over Ethernet or serial communication protocol interfaces to execute specific substation functions and applications. Thus, they are critical building blocks to realize substation secondary system solutions and in the process solving diverse customer needs.

2.2.

COM600 product series variants and rationale

To facilitate substation and grid automation solutions in IEC and ANSI market areas, a variant-based system similar to Relion® 615 and 620 series is being followed from COM600 5.0 release.

The main reasons for such an approach are the following:

- To ensure all COM600 product series features are advantageously used in end-customer projects in the medium voltage substation automation domain.
- To ensure an optimum feature set to be bundled together to realize specific applications required in IEC and ANSI market areas.
- To ensure a future-proof product approach.

This release then comprises of two variants, based on the primary intent or application are defined as follows:

- COM600S IEC – COM600 for substation automation, analysis and data management (for IEC markets)
 - COM600S IEC is a substation automation, analyzer and data management unit that integrates devices, facilitates operations, manages communication and runs analysis applications pertinent to equipment or operations in utility or industrial distribution substations.
- COM600F ANSI – COM600 as distribution automation controller (for ANSI markets)

- COM600F is a dedicated distribution automation controller unit that runs distributed grid and feeder applications for ANSI power networks and inherits all core features of the COM600 series.

2.3. Functional overview

The SPA OPC Server provides methods for OPC clients to exchange data with devices communicating via the SPA protocol. The SPA protocol is a proprietary method of ABB communicating with protection and control relays that support the SPA protocol version 2.5 or earlier.

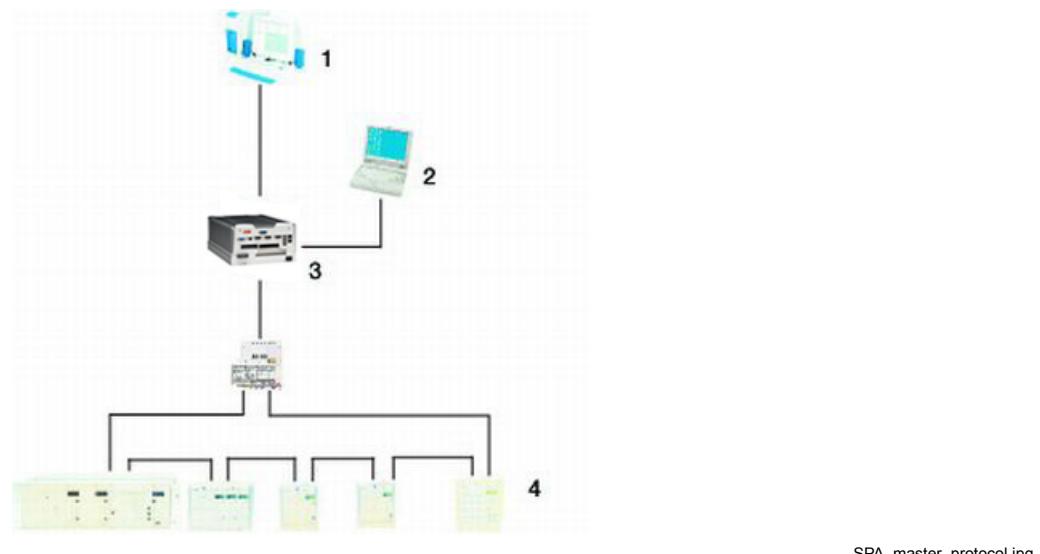


Figure 2.3-1 SPA OPC Server system overview

- (1) NCC (Network Control Center)
- (2) Station Automation Builder 600 (SAB600)
- (3) COM600 with SPA OPC Server
- (4) Protection and control devices communicating through the SPA protocol

To create a common and protocol independent data interface between the OPC server and client, the process data from the SPA devices is remodeled using the IEC 61850 data modeling.

The configuration data is stored in the SCL format. After the SPA OPC Server has been launched, it reads the configuration file and establishes communication with the SPA devices through the SPA protocol stack.

Configured SPA devices and data modeled according to the IEC 61850 model (see 5.2.1, General information about IEC 61850 data modeling) are then exposed to OPC clients through a Data Access (DA) server.

2.4.

SPA OPC Server features

The SPA OPC Server supports the following features:

- OPC Data Access v. 1.0/2.0
- OPC Alarms and Events specifications v. 1.10
- IEC 61850 data modeling
- SPA Parameter access:
 - Configured with Parameter Filtering Tool
- System supervision:
 - SPA channel communication
 - SPA device communication
- Supported SPA data types and functions:
 - Event based single and double indications, initial values requested when the server starts up
 - Cyclically updated measurements
 - Direct and secure commands
 - Transparent SPA support for sending and receiving SPA messages directly from an OPC client
 - Time synchronization
 - Dial-up support for SPA devices connected through public telephone network.



The use of the dial-up feature requires an external application (for example an external OPC Client) to activate the dial-up by writing to specific OPC items of the SPA OPC Server.

3. Configuration

3.1. About this section

This section guides you in the configuration tasks required before you can start using the SPA OPC Server. For information on the IEC 61850 data modeling, refer to COM600 User's Manual.

Start SAB600 to open and name a project.

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. Select **New Project** on the left.
 - Enter a Project Name. The Description is optional.
4. Click **Create**.
5. Click **Open Project**.

3.2. Overview of configuration

Before you can start using the SPA OPC Server , you need to build and configure an object tree in SAB600 to define the Communication structure.

The possible objects are:

- Gateway
- SPA OPC Server
- SPA Channel
- SPA Device/ SPA Rack
- SPA Module (with SPA Rack object only)
- Logical Device objects
- Logical Node objects
- Data objects

Figure 3.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' #

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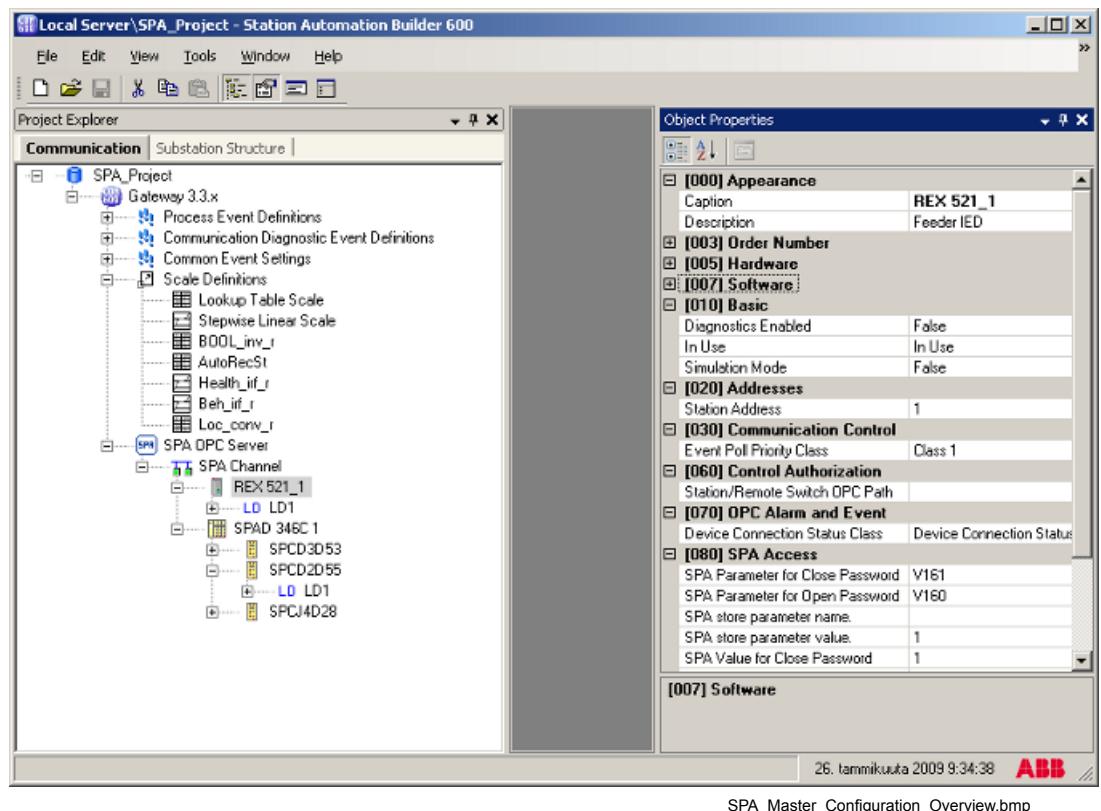


Figure 3.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

First, you need to build an object tree. This is done by adding objects to the object tree, see 3.3.1, General information about building object tree . Connectivity Packages for certain Protection and Control products usually contain preconfigurations and tools to facilitate the building of the object tree.

Figure 3.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the SPA OPC Server object and its child objects like channels, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 3.4.1, General information about configuring objects.

Table 3.2-1 describes the objects shown in the object tree (Figure 3.2-1).

Table 3.2-1 SPA OPC Server related objects

Object	Description
SPA OPC Server	An object representing the SPA OPC Server.
SPA Channel	An object representing a physical communication channel. You can define up to three channels per OPC server.
SPA Device	An object representing a physical SPA protection and control. You should not have more than 30 devices per each channel and 200 devices per server.
SPA Rack	Collection of SPA modules in one physical rack.
SPA Module (with SPA Rack object only)	An object representing a physical SPA protection and control module placed in a relay rack, for example, SPA-COM modules.
Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A physical device consists of one or several LDs.
Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.
Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, e.g. value, quality, and control.

3.3. Building object tree

3.3.1.

General information about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 3.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree:

- You can right-click the object to which you want to add a child object. Select **New > Object type group > Object name**, for example **New > SPA > SPA Device**.
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. SPA OPC Server
3. SPA Channel
4. SPA Device or SPA Rack
5. SPA Module (with SPA Rack object only)
6. Logical Device objects

7. Logical Node objects
8. Data objects

For information on building a substation structure, refer to COM600 HMI Configuration Manual.

3.3.2.

Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

3.3.3.

Adding SPA OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding a SPA OPC Server object.

To add a SPA OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Add a SPA OPC Server object.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

Connectivity Packages for certain protection and control devices can also support other ways to build this structure, depending on the configuration of an individual device, for example device-related object types and wizards. Typically, Connectivity Packages include SCL description files which must be installed. For further information on these Connectivity Packages, see the Connectivity Package of a certain device in the product documentation.

3.3.4.

Adding SPA Channel objects

To add a SPA Channel object:

1. Select a SPA OPC Server object and right-click it.
2. Add a SPA Channel object.
3. Rename the new object. The names of the SPA Channels have to be unique.

3.3.5.

Adding SPA Device or SPA Rack objects

To add a SPA Device or SPA Rack object:

1. Select a SPA Channel object and right-click it.

2. Add a SPA Device or SPA Rack object.
3. Rename the new object. The names of the SPA Devices and SPA Racks within a SPA OPC Server have to be unique.



When you create a SPA Rack object, you must create a SPA Module object below the rack.

3.3.6.

Adding SPA Module objects

With SPA Racks, you must add SPA Module objects.

To add a SPA Module object:

1. Select a SPA Rack object and right-click it.
2. Add a SPA Module object.
3. Rename the new object. The names of the SPA Modules within a SPA Rack have to be unique.

3.3.7.

Adding Logical Device objects

To add a Logical Device object:

1. Select a SPA Device or SPA Module object and right-click it.
2. Add a Logical Device object.
3. Rename the new object.



Each SPA physical device must have at least one Logical Device object as a child object.

3.3.8.

Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

3.3.9.**Adding data objects**

To add a data object:

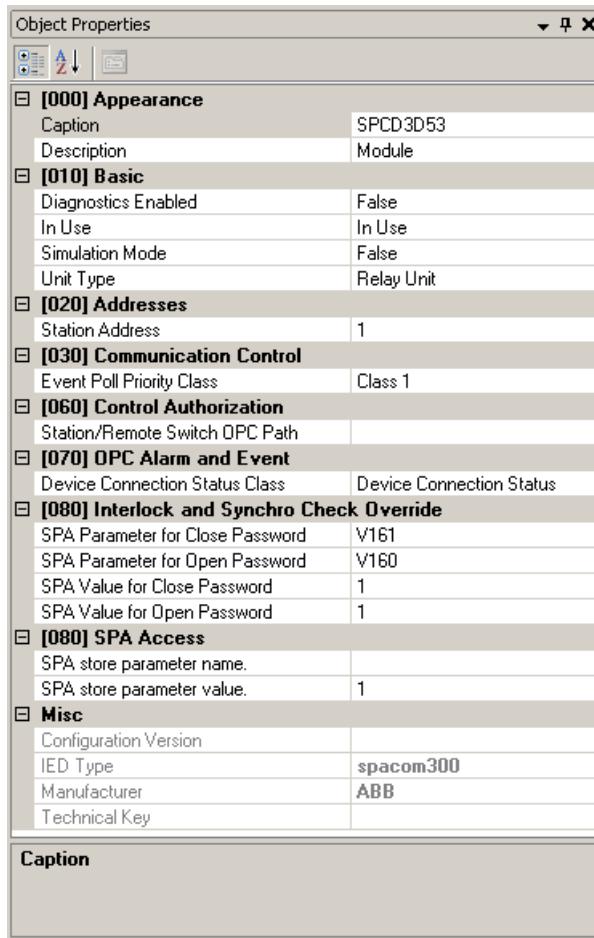
1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique.

3.4.**Configuring objects****3.4.1.****General information about configuring objects**

After the objects have been added, configure the object properties. Figure 3.4.1-1 shows an example of how to use SAB600 to configure the object properties for SPA Device.

To configure an object:

1. Select an object in the object tree of the communication structure.
 - The object properties appear now in the Object Properties window. The properties and their values can be viewed as shown in Figure 3.4.1-1.



SPA_Object_Prop.bmp

Figure 3.4.1-1 Example of object properties in the Objects Properties window

2. Select the property you want to configure. Depending on the property value type, configuring is always done either by
 - selecting a predefined value from a drop-down menu, or
 - entering a text string or a numerical value in a text field.

The available properties for different objects are listed in the following subsections.

3.4.2.

SPA OPC Server properties

Table 3.4.2-1 lists the SPA OPC Server properties, their value ranges, defaults, and descriptions. These properties are not configurable.

Table 3.4.2-1 SPA OPC Server properties

Name	Value or Value range/ Default	Description
Basic		
AE Prog ID	Default: None	Prog ID for OPC Alarm and Event Server

Name	Value or Value range/ Default	Description
DA Prog ID	Default: None	Prog ID for OPC Data Access Server

3.4.3.

Configuring SPA Channel properties

The SPA Channel properties that can be configured and value ranges for them can be found in Table 3.4.3-1. The actual configuration by using SAB600 is performed as described in 3.4.1, General information about configuring objects.

Table 3.4.3-1 SPA Channel properties

Name	Value or Value range/ Default	Description
Basic		
In Use	In Use Not In Use Default: In Use	Controls whether the channel is initially in use or not.
Communication Port		
Bit Rate	300 bits/s 600 bits/s 1200 bits/s 2400 bits/s 4800 bits/s 9600 bits/s 19200 bits/s Default: 9600 bits/s	Bit rate of the communication channel
Communication Port	COM1...COM8 Default: COM1	Serial port used by the SPA protocol Number of ports depends on the used hardware
Communication Control		
Dial-up Mode	Dial-up channel, dial-up modem is connected Fixed channel, dial-up modem is not connected Default: Fixed channel, dial-up modem is not connected	States whether a dial-up modem is connected to the channel or not. This property is not currently supported in COM600.
Polling		
Data Poll Ratio	0...10 Default: 1	Number of data polls during poll cycle
Polling Delay	0...65535 Default: 0	Delay between polling telegrams in milliseconds Older SPACOM devices require a longer polling delay, for example 10 milliseconds.

Name	Value or Value range/ Default	Description
Priority Class 1 Event Poll Ratio	0...10 Default: 4	Number of priority class 1 event polls during poll cycle. The priority class of a device is set with the device configuration event poll priority class parameter.
Priority Class 2 Event Poll Ratio	0...10 Default: 2	Number of priority class 2 event polls during poll cycle. The priority class of a device is set with the device configuration event poll priority class parameter.
Time Synchronization		
Time Synchronization Mode	Time synchronization not used Time synchronization used Default: Time synchronization used	Time synchronization mode for channel

3.4.4.

Configuring SPA Device and SPA Module properties

Table 3.4.4-1 lists the value ranges and/or default values for the SPA Device and SPA Module properties that you can define. The actual configuration by using SAB600 is performed as described in 3.4.1, General information about configuring objects.

Table 3.4.4-1 SPA Device/SPA Module properties

Name	Value or Value range/ Default	Description
Basic		
In Use	In Use Not In Use Default: In Use	Controls whether the device communication is initially in use or not.
Simulation Mode	True False Default: False	Specifies whether the device is in simulation mode or not.
Addresses		
Station Address	1...899 Default: 1	The station address of the SPA device
Communication Control		
Event Poll Priority Class	Class 1 Class 2 Default: Class 1	The event poll priority class of the device. Polling ratios for different classes can be configured with channel polling ratio parameters.

Name	Value or Value range/ Default	Description
Control Authorization		
Station/Remote Switch OPC Path	Default: None	OPC path of the station remote switch position is used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name for example GW#ABB.SPA_OPCT_DA_Server.Instance[1]\#Channel1\IED1\LD1\GGIO1\loc

3.4.5.

Data objects for OPC internal data

3.4.5.1.

General about data objects for OPC internal data

SPA OPC Server supports three internal data object types that provide status information:

- Integer status (INS)
- Controllable single point (SPC)
- Single point status (SPS)

The parameters are stored in Object Properties of SAB600, see the tables for each data object type. The actual configuration using SAB600 is performed as described in 3.4.1, General information about configuring objects.

3.4.5.2.

Integer status (INS)

Table 3.4.5.2-1 Configurable INS properties for OPC servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850
Addresses		

Property/Parameter	Value or Value range/ Default	Description
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

3.4.5.3.**Controllable single point (SPC)****Table 3.4.5.3-1 Configurable SPC properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages

3.4.5.4.

Single point status (SPS)

Table 3.4.5.4-1 Configurable SPS (for OPC internal data) properties for OPC servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

3.4.6.

Data objects for status information

3.4.6.1.

General about data objects for status information

SPA OPC Server supports eight data object types that provide status information:

- 3.4.6.2, Single point status (SPS)
- 3.4.6.3, Double point status (DPS)
- 3.4.6.4, Integer status (INS)
- 3.4.6.6, Protection activation information (ACT)
- 3.4.6.5, Enumerated Status (ENS)
- 3.4.6.7, Directional protection activation information (ACD)
- 3.4.6.8, Binary counter reading (BCR)
- 3.4.6.9, Device name plate (DPL)
- 3.4.6.10, Logical node name plate (LPL)

The parameters are stored in Object Properties of SAB600, see the tables for each data object type. The actual configuration using SAB600 is performed as described in 3.4.1, General information about configuring objects.

3.4.6.2.**Single point status (SPS)*****Table 3.4.6.2-1 Configurable SPS properties for OPC Servers***

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	Common data class according to IEC 61850
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication
SPA Off Event Code	0...999999 Default: 0	SPA off event code
SPA On Event Code	0...999999 Default: 0	SPA on event code
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.6.3.**Double point status (DPS)*****Table 3.4.6.3-1 Configurable DPS properties for OPC servers***

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPS	Common data class according to IEC 61850

Property/Parameter	Value or Value range/ Default	Description
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication
SPA Intermediate Event Code	0...999999 Default: 0	SPA intermediate event code
SPA Invalid Event Code	0...999999 Default: 0	SPA invalid event code
SPA Off Event Code	0...999999 Default: 0	SPA off event code
SPA On Event Code	0...999999 Default: 0	SPA on event code
Use Reversed	True False Default: False	Use reversed values
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.6.4.

Integer status (INS)

Table 3.4.6.4-1 Configurable INS properties for OPC servers

Property/ Parameter	Value or Value range / Default	Description
Basic		

Property/ Parameter	Value or Value range / Default	Description
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.6.5.**Enumerated Status (ENS)****Table 3.4.6.5-1 Configurable ENS properties for OPC Servers**

Property /Parameter	Value or Value range / Default	Description
Basic		
Common Data Class	ENS	Common data class according to IEC61850
Addresses		
SPA Channel Number	0...999 Default: 0	Data format of the control and the indication.

Property /Parameter	Value or Value range / Default	Description
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication.
SPA Data Number	0...999 Default: 0	SPA data number for indication.
Scale and unit		
Scale	Default: none	Scale to be used with indication value.

3.4.6.6.

Protection activation information (ACT)

Table 3.4.6.6-1 Configurable ACT properties for OPC servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACT	Common data class according to IEC 61850
General Addresses		
General SPA Channel Number	0...999 Default: 0	General SPA channel number for communication
General SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	General SPA data category for communication
General SPA Data Number	0...999 Default: 0	General SPA data number for communication

Property/Parameter	Value or Value range/ Default	Description
SPA Off Event Code	0...999999 Default: 0	SPA off event code
SPA On Event Code	0...999999 Default: 0	SPA on event code
Phase A Addresses		
Phase A SPA Channel Number	0...999 Default: 0	Phase A SPA channel number for communication
Phase A SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase A SPA data category for communication
Phase A SPA Data Number	0...999 Default: 0	Phase A SPA data number for communication
SPA Off Event Code	0...999999 Default: 0	SPA off event code
SPA On Event Code	0...999999 Default: 0	SPA on event code
Phase B Addresses		
Phase B SPA Channel Number	0...999 Default: 0	Phase B SPA channel number for communication
Phase B SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase B SPA data category for communication

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Property/Parameter	Value or Value range/ Default	Description
Phase B SPA Data Number	0...999 Default: 0	Phase B SPA data number for communication
SPA Off Event Code	0...999999 Default: 0	SPA off event code
SPA On Event Code	0...999999 Default: 0	SPA on event code
Phase C Addresses		
Phase C SPA Channel Number	0...999 Default: 0	Phase C SPA channel number for communication
Phase C SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase C SPA data category for communication
Phase C SPA Data Number	0...999 Default: 0	Phase C SPA data number for communication
Phase C SPA Off Event Code	0...999999 Default: 0	Phase C SPA off event code
Phase C SPA On Event Code	0...999999 Default: 0	Phase C SPA on event code
Neutral Addresses		
Neutral SPA Channel Number	0...999 Default: 0	Neutral SPA channel number for communication

Property/Parameter	Value or Value range/ Default	Description
Neutral SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Neutral SPA data category for communication
Neutral SPA Data Number	0...999 Default: 0	Neutral SPA data number for communication
Neutral SPA Off Event Code	0...999999 Default: 0	Neutral SPA off event code
Neutral SPA On Event Code	0...999999 Default: 0	Neutral SPA on event code

3.4.6.7.**Directional protection activation information (ACD)****Table 3.4.6.7-1 Configurable ACD properties for OPC servers**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACD	Common data class according to IEC 61850
General Addresses		
General SPA Channel Number	0...999 Default: 0	General SPA channel number for communication
General SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	General SPA data category for communication

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Property/ Parameter	Value or Value range/ Default	Description
General SPA Data Number	0...999 Default: 0	General SPA data number for communication
General SPA Off Event Code	0...999999 Default: 0	General SPA off event code
General SPA On Event Code	0...999999 Default: 0	General SPA on event code
Phase A Addresses		
Phase A SPA Channel Number	0...999 Default: 0	Phase A SPA channel number for communication
Phase A SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase A SPA data category for communication
Phase A SPA Data Number	0...999 Default: 0	Phase A SPA data number for communication
Phase A SPA Off Event Code	0...999999 Default: 0	Phase A SPA off event code
Phase A SPA On Event Code	0...999999 Default: 0	Phase A SPA on event code
Phase B Addresses		
Phase B SPA Channel Number	0...999 Default: 0	Phase B SPA channel number for communication

Property/ Parameter	Value or Value range/ Default	Description
Phase B SPA Data Category for communication	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase B SPA data category for communication
Phase B SPA Data Number for communication	0...999 Default: 0	Phase B SPA data number for communication
Phase B SPA Off Event Code	0...999999 Default: 0	Phase B SPA off event code
Phase B SPA On Event Code	0...999999 Default: 0	Phase B SPA on event code
Phase C Addresses		
Phase C SPA Channel Number	0...999 Default: 0	Phase C SPA channel number for communication
Phase C SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase C SPA data category for communication
Phase C SPA Data Number	0...999 Default: 0	Phase C SPA data number for communication
Phase C SPA Off Event Code	0...999999 Default: 0	Phase C SPA off event code
Phase C SPA On Event Code	0...999999 Default: 0	Phase C SPA on event code
Neutral Addresses		

Property/ Parameter	Value or Value range/ Default	Description
Neutral SPA Channel Number	0...999 Default: 0	Neutral SPA channel number for communication
Neutral SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Neutral SPA data category for communication
Neutral SPA Data Number	0...999 Default: 0	Neutral SPA data number for communication
Neutral SPA Off Event Code	0...999999 Default: 0	Neutral SPA off event code
Neutral SPA On Event Code	0...999999 Default: 0	Neutral SPA on event code
Direction Addresses		
Bit number for direction	Default: 0	Bit number for indicating protection activation direction
SPA parameter for direction	Default: None	SPA parameter string protection activation direction

3.4.6.8.

Binary counter reading (BCR)

Table 3.4.6.8-1 Configurable BCR properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	BCR	Common data class according to IEC 61850
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication

Property/ Parameter	Value or Value range/ Default	Description
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication

3.4.6.9.**Device name plate (DPL)****Table 3.4.6.9-1 Configurable DPL properties for OPC Servers**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPL	Common data class according to IEC 61850
Vendor		
Vendor	ABB	SPA parameter or simple text string, describing the vendor.
Vendor as a SPA Parameter	True False Default: False	Specifies whether the vendor parameter shall be interpreted as a SPA parameter.
Hardware Revision		
Hardware Revision	0	SPA parameter or simple textstring, describing the hardware revision.
Hardware Revision as a SPA Parameter	True False Default: False	Specifies whether the hardware revision parameter shall be interpreted as a SPA parameter.
Software Revision		
Software Revision	0	SPA parameter string or simple textstring, describing the software revision.

Property/ Parameter	Value or Value range/ Default	Description
Software Revision as a SPA Parameter	True False Default: False	Specifies whether the software revision parameter shall be interpreted as a SPA parameter.
Serial Number		
Serial Number	0	SPA parameter string or simple textstring, describing the serial number.
Serial Number as a SPA Parameter	True False Default: False	Specifies whether the serial number parameter shall be interpreted as a SPA parameter.
Location		
Location	0	SPA parameter string or simple textstring, describing the location.
Location as a SPA Parameter	True False Default: False	Specifies whether the location parameter shall be interpreted as a SPA parameter.

3.4.6.10.

Logical node name plate (LPL)

Table 3.4.6.10-1 Configurable LPL properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	LPL	Common data class according to IEC 61850
Vendor		
Vendor	ABB	SPA parameter or simple textstring, describing the vendor.
Vendor as a SPA Parameter	True False Default: False	Specifies whether the vendor parameter shall be interpreted as a SPA parameter.
Software Revision		
Software Revision	0	SPA parameter string or simple textstring, describing the software revision.

Property/ Parameter	Value or Value range/ Default	Description
Software Revision as a SPA Parameter	True False Default: False	Specifies whether the software revision parameter shall be interpreted as a SPA parameter.
Description		
Description	0	SPA parameter string or simple textstring, describing the description for logical node.
Description as a SPA Parameter	True False Default: False	Specifies whether the description parameter shall be interpreted as a SPA parameter.

3.4.7. Data objects for measurand information

3.4.7.1. General about data objects for measurand information

There are four different data object types that provide measurand information:

- 3.4.7.2, Measured value (MV)
- 3.4.7.3, Complex measured value (CMV)
- 3.4.7.4, WYE
- 3.4.7.5, Delta (DEL)

The parameters are stored in Object Properties of SAB600, see the tables for each data object type. The actual configuration using SAB600 is performed as described in 3.4.1, General information about configuring objects.

3.4.7.2. Measured value (MV)

Table 3.4.7.2-1 Configurable MV properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	MV	Common data class according to IEC 61850
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication

Property/ Parameter	Value or Value range/ Default	Description
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.7.3.

Complex measured value (CMV)

Table 3.4.7.3-1 Configurable CMV properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	CMV	Common data class according to IEC 61850
Addresses		
SPA Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Data Number	0...999 Default: 0	SPA data number for indication

Property/ Parameter	Value or Value range/ Default	Description
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.7.4.**WYE****Table 3.4.7.4-1 Configurable WYE properties for OPC servers**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	WYE	Common data class according to IEC 61850
Phase A Addresses		
Phase A SPA Channel Number	0...999 Default: 1	Phase A SPA channel number for communication
Phase A SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase A SPA data category for communication
Phase A SPA Data Number	0...999 Default: 1	Phase A SPA data number for communication
Phase B Addresses		
Phase B SPA Channel Number	0...999 Default: 1	Phase B SPA channel number for communication

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Property/ Parameter	Value or Value range/ Default	Description
Phase B SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase B SPA data category
Phase B SPA Data Number	0...999 Default: 1	Phase B SPA data number
Phase C Addresses		
Phase C SPA Channel Number	0...999 Default: 1	Phase C SPA channel number for communication
Phase C SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase C SPA data category for communication
Phase C SPA Data Number	0...999 Default: 1	Phase C SPA data number for communication
Neutral Addresses		
Neutral SPA Channel Number	0...999 Default: 1	Neutral SPA channel number for communication

Property/ Parameter	Value or Value range/ Default	Description
Neutral SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Neutral SPA data category for communication
Neutral SPA Data Number	0...999 Default: 1	Neutral SPA data number for communication
Scale and Unit		
Scale for Neutral	Default: None	Scale for neutral to be used with this data object
Scale for Phases	Default: None	Scale for phases to be used with this data object

3.4.7.5. Delta (DEL)

Table 3.4.7.5-1 Configurable DEL properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DEL	Common data class according to IEC 61850
Phase AB Addresses		
Phase AB SPA Channel Number	0...999 Default: 1	Phase AB SPA channel number for communication

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Property/ Parameter	Value or Value range/ Default	Description
Phase AB SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase AB SPA data category for communication
Phase AB SPA Data Number	0...999 Default: 1	Phase AB SPA data number for communication
Phase BC Addresses		
Phase BC SPA Channel Number	0...999 Default: 1	Phase BC SPA channel number for communication
Phase BC SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase BC SPA data category for communication
Phase BC SPA Data Number	0...999 Default: 1	Phase BC SPA data number for communication
Phase CA Addresses		
Phase CA SPA Channel Number	0...999 Default: 1	Phase CA SPA channel number for communication

Property/ Parameter	Value or Value range/ Default	Description
Phase CA SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	Phase CA SPA data category for communication
Phase CA SPA Data Number	0...999 Default: 1	Phase CA SPA data number for communication
Scale and Unit		
Scale for Phases	Default: None	Scale for phases to be used with this data object

3.4.8.

Data objects for controllable status information

3.4.8.1.

General about data objects for controllable status information

There are five different data objects providing controllable status information:

- 3.4.5.3, Controllable single point (SPC)
- 3.4.8.3, Controllable double point (DPC)
- 3.4.8.4, Controllable integer status (INC)
- ???
- 3.4.8.5, Binary controlled step position information (BSC)
- 3.4.8.6, Integer controlled step position information (ISC)

The parameters are stored in Object Properties of SAB600, see the tables for each data object type. The actual configuration using SAB600 is performed as described in 3.4.1, General information about configuring objects.

3.4.8.2.

Controllable single point (SPC)

Table 3.4.8.2-1 Configurable SPC properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		

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Property/ Parameter	Value or Value range/ Default	Description
Common Data Class	SPC	Common data class according to IEC 61850
Subtype of the current data object: One SPA point for operation		
Command Addresses		
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for command
SPA Command Data Number	0...999 Default: 0	SPA data number for command
SPA Command Operate Off Value	0...999999 Default: 0	Value for operate off
SPA Command Operate On Value	0...999999 Default: 0	Value for operate on
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication

Property/ Parameter	Value or Value range/ Default	Description
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code
Subtype of the current data object: Two SPA points for operation		
Command Addresses		
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for command
SPA Command Operate Off Data	0...999999 Default: 0	Data number for operate off
SPA Command Operate On Data	0...999999 Default: 0	Data number for operate on

Property/ Parameter	Value or Value range/ Default	Description
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code

3.4.8.3.

Controllable double point (DPC)

Table 3.4.8.3-1 Configurable DPC properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPC	Common data class according to IEC 61850
Subtype of the current data object: Indication only		
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication

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Property/ Parameter	Value or Value range/ Default	Description
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Intermediate Event Code	0...999999 Default: 0	SPA intermediate event code
SPA Indication Invalid Event Code	0...999999 Default: 0	SPA invalid event code
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code
Use Reversed	True False Default: False	Use reversed values
Scale and Unit		
Scale	Default: None	Scale to be used with this data object
Subtype of the current data object: One SPA point for operation		
Command Addresses		
SPA Command Cancel Value	0...999999 Default: 0	Value for cancel
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command

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Property/ Parameter	Value or Value range/ Default	Description
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Data Number	0...999 Default: 0	SPA data number for command
SPA Command Operate Off Value	0...999999 Default: 0	Value for operate off
SPA Command Operate On Value	0...999999 Default: 0	Value for operate on
SPA Command Select Off Value	0...999999 Default: 0	Value for select off
SPA Command Select On Value	0...999999 Default: 0	SPA command value for select on
Selected Addresses		
SPA Selected Channel Number	0...999 Default: 0	SPA channel number for selected information. If both the channel and data number are set to 0, then selection information is simulated.
SPA Selected Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for selected information
SPA Selected Data Number	0...999 Default: 0	SPA data number for selected information. If both the channel and data number are set to 0, then selection information is simulated.

Property/ Parameter	Value or Value range/ Default	Description
SPA Selected Off Event Code	0...999999 Default: 0	SPA off event code for selected information
SPA Selected On Event Code	0...999999 Default: 0	SPA on event code for selected information
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Intermediate Event Code	0...999999 Default: 0	SPA intermediate event code
SPA Indication Invalid Event Code	0...999999 Default: 0	SPA invalid event code
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code
Use Reversed	True False Default: False	Use reversed values
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

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Property/ Parameter	Value or Value range/ Default	Description
Subtype of the current data object: Four SPA points for operation		
Command Addresses		
SPA Command Cancel Data	0...999999 Default: 10	Data number for cancel
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Operate Off Data	0...999999 Default: 11	Data number for operate off
SPA Command Operate On Data	0...999999 Default: 11	Data number for operate on
SPA Command Select Off Data	0...999999 Default: 6	Data number for select off
SPA Command Select On Data	0...999999	Data number for select on
Selected Addresses		
SPA Selected Channel Number	0...999 Default: 0	SPA channel number for selected information. If both the channel and data number are set to 0, then selection information is simulated.

Property/ Parameter	Value or Value range/ Default	Description
SPA Selected Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for selected information
SPA Selected Data Number	0...999 Default: 0	SPA data number for selected information. If both the channel and data number are set to 0, then selection information is simulated.
SPA Selected Off Event Code	0...999999 Default: 0	SPA off event code for selected information
SPA Selected On Event Code	0...999999 Default: 0	SPA on event code for selected information
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Intermediate Event Code	0...999999 Default: 0	SPA intermediate event code
SPA Indication Invalid Event Code	0...999999 Default: 0	SPA invalid event code

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Property/ Parameter	Value or Value range/ Default	Description
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code
Use Reversed	True False Default: False	Use reversed values
Scale and Unit		
Scale	Default: None	Scale to be used with this data object
Subtype of the current dataobject: Three SPA point for operation		
Addresses		
Selection SPA Channel Number	0..999 Default: 1	SPA channel number for selection
Selection SPA Data Category	Input data Output data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for selection
Selection SPA Data Number	0..9999999 Default: 5105	SPA data number for selection
Operation SPA Channel Number	0..999 Default: 1	SPA channel number for Operation

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Property/ Parameter	Value or Value range/ Default	Description
Operation SPA Data Category	Input data Output data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for operation
Operation SPA Data Number	0..9999999 Default: 5106	SPA data number for operation
Cancel SPA Channel Number	0..999 Default: 1	SPA channel number for cancel
Cancel SPA Data Category	Input data Output data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for cancel
Cancel SPA Data Number	0..9999999 Default: 5107	SPA data number for cancel
Selected Addresses		
SPA Selected Channel Number	0...999 Default: 0	SPA channel number for selected information. If both the channel and data number are set to 0, then selection information is simulated.

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Property/ Parameter	Value or Value range/ Default	Description
SPA Selected Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for selected information
SPA Selected Data Number	0...999 Default: 0	SPA data number for selected information. If both the channel and data number are set to 0, then selection information is simulated.
SPA Selected Off Event Code	0...999999 Default: 0	SPA off event code for selected information
SPA Selected On Event Code	0...999999 Default: 0	SPA on event code for selected information
Indication Addresses		
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
SPA Indication Intermediate Event Code	0...999999 Default: 0	SPA intermediate event code
SPA Indication Invalid Event Code	0...999999 Default: 0	SPA invalid event code

Property/ Parameter	Value or Value range/ Default	Description
SPA Indication Off Event Code	0...999999 Default: 0	SPA off event code
SPA Indication On Event Code	0...999999 Default: 0	SPA on event code
Use Reversed	True False Default: False	Use reversed values

3.4.8.4.**Controllable integer status (INC)****Table 3.4.8.4-1 Configurable INC properties for OPC servers**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INC	Common data class according to IEC 61850
Addresses		
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Data Number	0...999 Default: 0	SPA data number for command
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication

Property/ Parameter	Value or Value range/ Default	Description
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.8.5.

Binary controlled step position information (BSC)

Table 3.4.8.5-1 Configurable BSC properties for OPC servers

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	BSC	Common data class according to IEC 61850
Subtype of the current data object: One SPA point for operation		
Addresses		
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command

Property/ Parameter	Value or Value range/ Default	Description
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Data Number	0...999 Default: 0	SPA data number for command
SPA Command Higher Value	0...65535 Default: 0	SPA data number for operate higher
SPA Command Lower Value	0...65535 Default: 0	SPA data number for operate lower
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object
Subtype of the current data object: Two SPA points for operation		
Addresses		

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Property/ Parameter	Value or Value range/ Default	Description
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Higher Data	0...65535 Default: 0	SPA data number for operate higher
SPA Command Lower Data	0...65535 Default: 0	SPA data number for operate lower
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.8.6.**Integer controlled step position information (ISC)*****Table 3.4.8.6-1 Configurable ISC properties for OPC servers***

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ISC	Common data class according to IEC 61850
Addresses		
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command
SPA Command Data Number	0...999 Default: 0	SPA data number for command
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication
Scale and Unit		
Scale	Default: None	Scale to be used with this data object

3.4.9. Data objects for controllable analogue information

3.4.9.1. Analog set point

SPA OPC Server supports one data object class for controllable analogue information: Analogue set point (APC). It is described in Table 3.4.5.8.1-1.

The parameters are stored in Object Properties of SAB600, see the tables for each data object type. The actual configuration using SAB600 is performed as described in 3.4.1, General about configuring objects.

Table 3.4.9.1-1 Configurable APC properties for OPC Servers

Property/Parameter	Value or Value range / Default	Description
Basic	Type new para here	
Common Data Class	APC	Common data class according to IEC61850
Addresses		
SPA Channel Number	0...999 Default: 0	
SPA Command Channel Number	0...999 Default: 0	
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command.
SPA Command Data Number	0...999 Default: 0	SPA data number for command.

SPA Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication.
SPA Data Number	0...999 Default: 0	
Scale and Unit		
Command Scale	Default: none	Scale to be used with control value.
Indication Scale	Default: none	Scale to be used with indication value.

3.4.10. Event definitions

For information on event definitions, refer to COM600 User's Manual.

3.4.11. Using scales

For information on using scales, refer to COM600 User's Manual.

4. Operation

4.1. About this section

This section describes the basic operation procedures you can carry out after the SPA OPC Server has been configured.

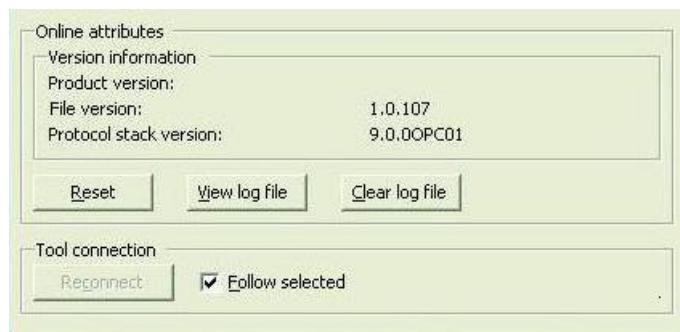
After this, you can, for example, monitor and control the condition of connections in a SPA network. This is done by using the Online diagnostics function in SAB600.

4.2. Activating COM600 with new configurations

For information about activating COM600 with new configuration, see COM600 User's Manual.

4.3. SPA OPC Server diagnostics

To view the SPA OPC Server diagnostics, right-click the SPA OPC Server object and select **Online diagnostics**, see Figure 4.3-1 .



SPA_OPCT_Server_Online_diagnostics.jpg

Figure 4.3-1 SPA OPC Server Online diagnostics

You have the following alternatives:

- to view version information
- to reset the SPA OPC Server
- to view the event log file , see Figure 4.3-2
- to clear the log file

```

OPCS_SPA_1_Eventlog.txt - Notepad
File Edit Format View Help

Info 2004-06-07 16:22:23.396 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-07 16:22:41.518 Configuration: shutting down.
Info 2004-06-07 16:22:43.164 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-07 16:23:02.843 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-07 16:42:20.598 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 10:36:35.467 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 14:43:06.305 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 14:50:40.078 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 16:47:04.291 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 17:03:57.227 Configuration: shutting down.
Info 2004-06-08 17:03:57.658 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-08 17:04:26.039 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 10:50:15.804 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 11:15:04.074 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 11:15:04.775 Configuration: shutting down.
Info 2004-06-09 11:15:20.087 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 11:15:36.270 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 11:51:13.193 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 15:15:51.548 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-09 15:47:43.818 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-10 13:49:57.534 Configuration: shutting down.
Info 2004-06-10 13:49:58.245 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-10 13:50:18.344 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-13 12:36:47.529 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-13 13:07:53.002 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 08:17:51.787 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 08:24:04.413 Configuration: shutting down.
Info 2004-06-14 08:24:04.883 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 08:24:27.856 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 08:26:58.193 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 09:48:05.221 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***
Info 2004-06-14 09:01:56.555 EventLog: *** OPCS_SPA 1.0.107 [2004-05-19 06:28] started ***

```

Eventlog_SM.jpg

Figure 4.3-2 Event log file

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function, see Figure 4.3-3 . Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

1. Right-click the device.
2. Select **Online diagnostics**.
3. Mark the Diagnostic events enabled check box. See Figure 4.3-3 for example.

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Time	Type	Source	Message	Address	Value	
2004/06/22 10:12:25.661	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	Refresh
2004/06/22 10:12:25.862	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	Settings
2004/06/22 10:12:30.939	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	Clear
2004/06/22 10:12:30.939	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	Reconnect
2004/06/22 10:12:35.056	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	<input type="checkbox"/> Active
2004/06/22 10:12:35.856	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	<input checked="" type="checkbox"/> Auto scroll
2004/06/22 10:12:41.034	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	
2004/06/22 10:12:41.034	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	
2004/06/22 10:12:43.918	System Message	Loop 1\H008_Rem 543_57	Status code: 13252			
2004/06/22 10:12:43.928	Device Connection Status	Loop 1\H008_Rem 543_...	Device Connection Lost			
2004/06/22 10:12:52.730	System Message	Loop 1\H008_Rem 543_57	Status code: 13253			
2004/06/22 10:12:53.892	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	54	
2004/06/22 10:12:53.892	System Message	Loop 1\H008_Rem 543_57	OK (0)			
2004/06/22 10:12:53.892	Device Connection Status	Loop 1\H008_Rem 543_...	Connection OK			
2004/06/22 10:12:54.022	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	
2004/06/22 10:12:54.022	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	
2004/06/22 10:12:54.343	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	
2004/06/22 10:12:54.343	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	
2004/06/22 10:12:55.894	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12404	
2004/06/22 10:12:55.895	Unmapped Address Update	Loop 1\H008_Rem 543_57		36864	12405	

SPA_OP_C_Server_Diagnostic_AE_client.jpg

Figure 4.3-3 SPA OPC Server Diagnostic AE client

4.4.

Monitoring and controlling SPA Channel Activity

The SPA Channel activity can be monitored with the Online diagnostics function.

You can also take a channel into use or out of use as described in this section.

To monitor and control SPA Channel activity:

1. Select the channel you want to monitor in the object tree of SAB600.
2. Right-click the channel.
3. Select **Online diagnostics**.

In the Diagnostic counters field, you can monitor the channel activity. To reset Diagnostic counters, click **Reset counters**.

You can take a SPA Channel into use by marking the **In use** check box. If you unmark the check box, the channel is taken out of use. Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.

For more information on the channel online diagnostics with the Analyzer function, see COM600 User's manual.

4.5.

Monitoring and controlling SPA Device or SPA Module communication

The SPA device or SPA module communication can be monitored with the Online diagnostics function. You can also take a device or module into use or out of use as described in this section.

To monitor and control SPA Device or SPA Module communication:

1. Select the device/ module you want to monitor in the object tree of SAB600.

2. Right-click the device/module.
3. Select **Online diagnostics**.

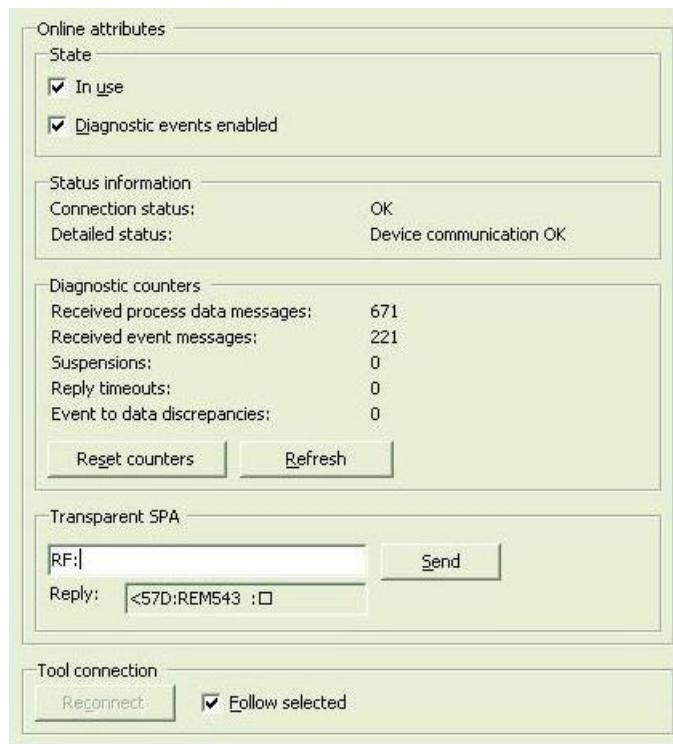
In the Status information field, you can monitor the device status.

The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**.

The Address information field shows the values for the subnet number, node number, and SPA unit number as shown in Figure 4.5-1 .

You can take a SPA device into use by marking the **In use** check box. If you unmark the check box, the device is taken out of use.

Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.



SPA_Device_Online_diagnostics.jpg

Figure 4.5-1 SPA Device Online diagnostics

Transferring Transparent SPA data

You can read and write SPA parameters of the SPA devices. To do this, enter a Transparent SPA message in the text field of the Online diagnostics function, see Figure 4.5-1. Click Send to send the Transparent SPA message to the SPA device. The answer from the SPA device is shown in the Reply field.

4.6.**Data object diagnostics**

For information on data object diagnostics, refer to COM600 User's Manual.

5. Technical reference

5.1. About this section

This section provides reference information about the following issues:

- IEC 61850 data modeling
- Attributes
- Status codes

5.2. IEC 61850 data modeling

5.2.1. General information about IEC 61850 data modeling

The relationship between the IEC 61850 data modeling and SPA OPC Server is described in this section.

For each data class, there is a table giving a detailed description about the relation between the SPA data and IEC 61850 data object attributes and services. The tables also describe how the data is presented on the OPC Server name space.

The columns in the tables have the following content types:

- **Name** specifies the OPC item name of the attribute/service.
- **Type** specifies the IEC 61850 type of the attribute.
- **Value/ Value range** specifies the allowed values and ranges of the attribute/service.
- **Mandatory/Optional** specifies whether the attribute is considered as mandatory or optional according to the IEC 61850 standard.
- **OPC data types** specify the OPC data type used for the OPC item.

5.2.2. Data objects for status information

5.2.2.1. Single point status (SPS)

Table 5.2.2.1-1 Single point status (SPS) information

Name	Type	Value/ Value range	Mandatory /Optional	Protocol information element	OPC data types
stVal	BOOLEAN	TRUE FALSE	M	OV	VT_BOOL
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.2. Double point status (DPS)

Table 5.2.2.2-1 Double point status (DPS) information

Name	Type	Value/ Value range	Mandatory/ Optional	Protocol information element	OPC data types
stVal	CPT	Intermediate-state (0) off(1) on(2) bad-state(3)	M	OV	VT_I4
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.3. Integer status (INS)

Table 5.2.2.3-1 Integer status (INS) information

Name	Type	Value/ Value range	Mandatory/Optional	Protocol information element	OPC data types
stVal	INTEGER		M	OV	VT_I4
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.4. Enumerated Status (ENS)

Name	Type	Value/ Value range	Mandatory/Optional	Protocol information element	OPC data types
stVal	ENUMERATED		M		
q	Quality		M		VT_I4
t	Timestamp		M		VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.5.**Protection activation information (ACT)***Table 5.2.2.5-1 Protection activation information (ACT)*

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
general	BOOLEAN		M	OV	VT_BOOL
phsA	BOOLEAN		O	OV	VT_BOOL
phsB	BOOLEAN		O	OV	VT_BOOL
phsC	BOOLEAN		O	OV	VT_BOOL
neut	BOOLEAN		O	OV	VT_BOOL
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.6.**Directional protection activation information (ACD)***Table 5.2.2.6-1 Directional protection activation information (ACD)*

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
general	BOOLEAN		M	OV	VT_BOOL
dirGeneral	ENUMERATED	unknown forward backward	M	Separate signal	VT_I4
phsA	BOOLEAN		O	OV	VT_BOOL
dirPhsA	ENUMERATED	unknown forward backward	O	-	VT_I4
phsB	BOOLEAN		O	OV	VT_BOOL
dirPhsB	ENUMERATED	unknown forward backward	O	-	VT_I4
phsC	BOOLEAN		O	OV	VT_BOOL
dirPhsC	ENUMERATED	unknown forward backward	O	-	VT_I4
neut	BOOLEAN		O	OV	VT_BOOL
dirNeut	ENUMERATED	unknown forward backward	O	-	VT_I4
q	Quality			OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.7. Binary counter reading (BCR)

Table 5.2.2.7-1 Binary counter reading (BCR) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
actVal	INTEGER		M	OV	VT_I4
units	Unit		O	Config	See Unit
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.2.8. Device name plate (DPL)

Table 5.2.2.8-1 Device name plate (DPL) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
vendor	VisibleString		M	Separate signal	VT_BSTR
hwRev	VisibleString		O	Separate signal	VT_BSTR
swRev	VisibleString		O	Separate signal	VT_BSTR
serNum	VisibleString		M	Separate signal	VT_BSTR
location	VisibleString		O	Separate signal	VT_BSTR

5.2.2.9. Logical node name plate (LPL)

Table 5.2.2.9-1 Logical node name plate (LPL) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
vendor	VisibleString		M	Separate signal	VT_BSTR
swRev	VisibleString		M	Separate signal	VT_BSTR
d	VisibleString		M	Separate signal	VT_BSTR

5.2.3. Data objects for measurand information

5.2.3.1. Measured value (MV)

Table 5.2.3.1-1 Measured value (MV) information

Name	Type	Value/Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
mag	AnalogueValue		M	OV	VT_R4
range	Range		O		VT_I4
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
rangeC	RangeConfig		O	Config	See RangeConfig
units	Unit		O	Config	See Unit
d	Description	Text	O	Separate signal	VT_BSTR

5.2.3.2. Complex measured value (CMV)

CMV is configured in the same way as MV.

5.2.3.3. WYE

Table 5.2.3.3-1 WYE information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
phsA	CMV		M	See CMV	See CMV
phsB	CMV		O	See CMV	See CMV
phsC	CMV		O	See CMV	See CMV
neut	CMV		O	See CMV	See CMV
d	Description		O	Separate signal	VT_BSTR

5.2.3.4. Delta (DEL)

Table 5.2.3.4-1 Delta (DEL) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
phsAB	CMV		M	See CMV	See CMV

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
phsBC	CMV		M	See CMV	See CMV
phsCA	CMV		M	See CMV	See CMV
d	Description	Text	O	Separate signal	VT_BSTR

5.2.4. Data objects for controllable status information

5.2.4.1. Controllable single point (SPC)

Table 5.2.4.1-1 Controllable single point (SPC) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlVal	SPI		O		VT_BOOL
stVal		FALSE TRUE	O	OV	VT_BOOL
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.4.2. Controllable double point (DPC)

Table 5.2.4.2-1 Controllable double point (DPC) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlOperOn		control value			VT_I4
ctlOperOff		control value			VT_I4
ctlSelOn		control value			VT_I4
ctlSelOff		control value			VT_I4
stVal		intermediate-state (0) off (1) on (2) bad-state (3)	M	OV	VT_I4
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlCan		control value			VT_I4
stSelD	BOOLEAN	FALSE TRUE		Separate signal	VT_BOOL
d	Description	Text	O	Separate signal	VT_BSTR
subEna	BOOLEAN		O		VT_BOOL
subVal	CPT		O		VT_I4
subQ	Quality		O		VT_I4
subId	String		O		VT_BSTR

Control values for ctlSelOn, ctlSelOff, ctlOperOn, ctlOperOff are the following:

bit1	Normal control
bit2	Interlock override
bit3	Syncrocheck override

For example, to perform a select on operation with interlock override on, write the value 3 to the ctlSelOn item.

5.2.4.3. **Controllable integer status (INC)**

Table 5.2.4.3-1 Controllable integer status (INC) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlVal	INTEGER		M		VT_I4
stVal	INTEGER		M	OV	VT_I4
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.4.4. **Controllable enumerated status (ENC)**

Table 5.2.4.4-1 Configurable ENC properties for OPC Servers

Property /Parameter	Value or Value range / Default	Description
Basic		
Common Data Class	ENC	Common data class according to IEC61850
Addresses		

Property /Parameter	Value or Value range / Default	Description
SPA Command Channel Number	0...999 Default: 0	SPA channel number for command.
SPA Command Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Input Data	SPA data category for command.
SPA Command Data Number	0...999 Default: 0	SPA data number for command.
SPA Indication Channel Number	0...999 Default: 0	SPA channel number for indication.
SPA Indication Data Category	Input Data Output Data Setting Variable Memory Data Slave Status Default: Variable	SPA data category for indication.
SPA Indication Data Number	0...999 Default: 0	SPA data number for indication.
Scale and unit		
Scale	Default: none	Scale to be used with indication value.

5.2.4.5. Binary controlled step position information (BSC)

Table 5.2.4.5-1 Binary controlled step position information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlVal	ENUMERATED	lower (1) higher (2) reserved (3)	O		VT_I1

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
valWTr	ValWithTrans		O	OV	See ValWithTrans
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.4.6. Integer controlled step position information (ISC)

Table 5.2.4.6-1 Integer controlled step position information (ISC)

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlVal	INTEGER	-64 ... 63	O		VT_I4
valWTr	ValWithTrans		O	OV	See ValWithTrans
q	Quality		M	OS	VT_I4
t	TimeStamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.2.5. Data objects for controllable analogue information

5.2.5.1. Analogue set point (APC)

Table 5.2.5.1-1 Analogue set point (APC) information

Name	Type	Value/ Value range	Mandat- ory/Optional	Protocol informa- tion element	OPC data types
ctlVal	AnalogueValue		M		VT_R4
mxVal	AnalogueValue		M	OV	VT_R4
q	Quality		M	OS	VT_I4
t	Timestamp		M	RT	VT_DATE
d	Description	Text	O	Separate signal	VT_BSTR

5.3. Attributes

5.3.1. General information about attributes

In addition to item tags for process data (indications and commands), the SPA OPC Server also provides some item tags for controlling the devices and retrieving status information from them. These item tags are called attributes.

There are several categories of attributes, which are described in the following subsections.

5.3.2. Server attributes

Table 5.3.2-1 Server attributes

Name	Value or Value range/ Default	Description
Protocol stack version	Value: Version information	Data type: Text Access: Read-only Version information of the protocol stack
Reset		The Reset button for resetting the OPC Server
File version		File version of the executable OPC Server
Product version		Version information of the installed OPC Server

5.3.3.**SPA Bus attributes Modbus channel attributes*****Table 5.3.3-1 SPA bus attributes***

Name	Value or Value range/ Default	Description
In use	0 = Not in use, the line communication is stopped 1 = In use Default: 1	Data type: Integer Access: No limitations The state of the line - whether it is in use or not. When a line is not in use, no data can be transmitted on it, and no data is received from it. The line attributes can be read as usual. Generally, a line must be taken out of use by setting this attribute to 0 before the line attributes can be written. When a line is stopped by setting the IU attribute = 0, all data transmission on the line ceases. However, before that, the protocol stack executes to the end all on-going data transactions. For example, the polling of the station in turn is completed.
Diagnostic counters		Data type: Integer Access: Read-only
Transmitted messages		Incremented each time a message is transmitted to the SPA channel by the SPA OPC Server.
Failed transmissions		Incremented each time a message transmission to the SPA channel fails for some reason.
Timeout errors		Incremented each time a transaction-based transmission does not receive a response within a configured timeout.
Received event messages		Incremented each time a SPA event message is received.
Received data messages		Incremented each time a data message is received from the device.
Received messages		Incremented each time a message is received by the SPA OPC Server from the SPA channel.

Name	Value or Value range/ Default	Description
Parity errors		Incremented each time a parity error is detected in a message received from the SPA channel.
Overrun errors		Incremented each time an overrun error is detected in a message received from the SPA channel.
Redundancy errors		Incremented each time a redundancy error is detected in a message received from the SPA channel.
Framing errors		Incremented each time a framing error is detected in a message received from the SPA channel.

5.3.4.

SPA device and SPA module attributes

Table 5.3.4-1 SPA device and SPA module Modbus device attributes

Name	Value or Value range/ Default	Description
In use	0 = Out of use 1 = In use Default: 1	Data type: Integer Access: No limitations The operational status of the device - in use or out of use. Taking the device out of use with this attribute stops all data communication with the device. All operations that would result in data exchange are disabled. The device itself is not affected by the attribute, only the protocol stack's image of the device. Setting IU to 1 is allowed only if the device address is legal.

Name	Value or Value range/ Default	Description
Object status	1 = Re-transmit system message A status code, for example: 0 = OK (communication works properly) 13251 = Device suspended	Data type: Integer Access: No limitations Indicates the detailed information about the station device status. Writing to the OS attribute (OS = 1) of a device makes the protocol stack to re-transmit the last system message caused by the device. Possible "Stopped" and "Suspended" messages cause old marking of OPC items. By reading the OS attribute, the status code of the system message can be read. See the <i>Status Codes</i> manual for detailed information.
Device connection status	True = Device connection OK False = Device connection suspended	Data type: Boolean Access: Read-only Indicates the status of the device connection.
Transparent SPA	Value: The contents of a valid SPA message, not including the message frame (start character, unit address, checksum, and message trailer).	Data type: Text Access: No limitations Writing and reading SPA messages Makes it possible to communicate with a SPACOM unit by sending any SPA message and reading the reply as text. No check of the message is performed in the OPC Server or in the protocol stack, that is, even faulty messages are sent to the SPACOM unit.
Diagnostic counters		Data type: Integer Access: Read-only
Process data messages received		This counter is incremented each time a message containing process data is received from the device.
Event messages received		Incremented each time a SPA event message is received.

Name	Value or Value range/ Default	Description
Suspensions		This counter is incremented each time a device communication status changes from ok to suspended.
Reply timeouts		This counter is incremented each time a command to the device is not responded within a configured time.
Event to data discrepancies		This counter is incremented each time a data discrepancy is detected between the value received with the event and the consistency check data poll.

5.3.5.

Status codes

13201	Data overflow error
13202	Received reply length exceeds the allowed maximum length
13212	Unexpected response
13223	Unexpected value type
13225	Only write allowed
13226	No acknowledge reply
13227	Data discrepancy detected between data and event poll
13228	No transparent SPA reply available
13229	Out of buffers error
13251	Device suspended
13252	Device taken out of use
13253	Device taken into use
13254	Out of memory error
13255	Timeout while waiting response
13258	General interrogation finished

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