





**Contents:**

<b>1. About this manual .....</b>	<b>7</b>
1.1. Copyrights .....	7
1.2. Trademarks .....	7
1.3. General .....	7
1.4. Document conventions .....	8
1.5. Use of symbols .....	9
1.6. Terminology .....	9
1.7. Abbreviations .....	10
1.8. Related documents .....	12
1.9. Document revisions .....	12
<b>2. Introduction .....</b>	<b>13</b>
2.1. Functional overview .....	13
2.2. Modbus OPC Server features .....	14
<b>3. Configuration .....</b>	<b>16</b>
3.1. About this section .....	16
3.2. Overview of configuration .....	16
3.3. Building object tree .....	18
3.3.1. General about building object tree .....	18
3.3.2. Adding Gateway object .....	18
3.3.3. Adding OPC Server object .....	18
3.3.4. Adding Subnetwork objects .....	19
3.3.5. Adding Modbus IED objects .....	19
3.3.6. Adding Logical Device objects .....	20
3.3.7. Adding Logical Node objects .....	20
3.3.8. Adding data objects .....	20
3.4. Configuring objects .....	20
3.4.1. General about configuring objects .....	20
3.4.2. Configuring Modbus TCP OPC Server properties .....	21
3.4.3. Configuring Modbus OPC Server Subnetwork properties .....	22
3.4.4. Configuring Modbus TCP Device .....	23
3.4.5. Configuring Logical Device properties .....	24
3.4.6. Configuring Logical Node properties .....	25
3.4.7. Configuring data objects for internal OPC data .....	25
3.4.7.1. General about configuring data objects for Internal OPC Data .....	25
3.4.7.2. Integer status (INS) .....	26
3.4.7.3. Controllable single point (SPC) for OPC internal data .....	26
3.4.7.4. Single point status (SPS) .....	27
3.4.8. Configuring data objects .....	28

3.4.8.1.	Directional protection activation information .....	28
3.4.8.2.	Protection activation information (ACT) .....	29
3.4.8.3.	Analogue set point (APC) .....	29
3.4.8.4.	Binary counter reading (BCR) .....	31
3.4.8.5.	Binary controlled step position information (BSC) .....	32
3.4.8.6.	Complex measured value (CMV) .....	33
3.4.8.7.	Delta (DEL) .....	35
3.4.8.8.	Controllable double point (DPC) .....	38
3.4.8.9.	Device name plate (DPL) .....	49
3.4.8.10.	Double point status (DPS) .....	51
3.4.8.11.	Controllable integer status (INC) .....	53
3.4.8.12.	Integer status (INS) .....	55
3.4.8.13.	Integer controlled step position information (ISC) .....	56
3.4.8.14.	Logical node name plate (LPL) .....	58
3.4.8.15.	Measured value (MV) .....	59
3.4.8.16.	Controllable single point (SPC) .....	60
3.4.8.17.	Single point status (SPS) .....	63
3.4.8.18.	WYE .....	64
3.4.9.	Topic Generator .....	69
<b>4.</b>	<b>Operation .....</b>	<b>71</b>
4.1.	About this section .....	71
4.2.	Activating COM600 with new configurations .....	71
4.3.	OPC Server diagnostics .....	71
4.4.	Modbus Channel diagnostics .....	72
4.5.	Monitoring and controlling Modbus Device communication .....	72
<b>5.</b>	<b>Technical reference .....</b>	<b>74</b>
5.1.	About this section .....	74
5.2.	IEC 61850 data modeling .....	74
5.2.1.	General about IEC 61850 data modeling .....	74
5.2.2.	Data objects for status information .....	74
5.2.2.1.	Single point status (SPS) .....	74
5.2.2.2.	Double point status (DPS) .....	75
5.2.2.3.	Integer status (INS) .....	75
5.2.2.4.	Protection activation information (ACT) .....	75
5.2.2.5.	Binary counter reading (BCR) .....	76
5.2.2.6.	Device name plate (DPL) .....	76
5.2.2.7.	Logical node name plate (LPL) .....	77
5.2.3.	Data objects for measured information .....	77
5.2.3.1.	Measured value (MV) .....	77
5.2.3.2.	WYE .....	78
5.2.3.3.	Delta (DEL) .....	80
5.2.4.	Data objects for controllable status information .....	81

---

5.2.4.1.	Controllable single point (SPC) .....	81
5.2.4.2.	Controllable double point (DPC) .....	82
5.2.4.3.	Controllable integer status (INC) .....	82
5.2.4.4.	Binary controlled step position information (BSC) .....	83
5.2.4.5.	Integer controlled step position information (ISC) .....	83
5.2.5.	Data objects for controllable analogue information .....	83
5.2.5.1.	Analogue set point (APC) .....	83
5.3.	Attributes .....	84
5.3.1.	Server attributes .....	84
5.3.2.	Modbus channel attributes .....	85
5.3.3.	Modbus Device attributes .....	86
5.4.	Status codes .....	87
5.4.1.	Status codes .....	87
<b>Index</b>	.....	<b>89</b>



## 1. About this manual

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### 1.2. Trademarks

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### 1.3. General

This manual provides thorough information on the Modbus OPC Server and the central concepts related to it. You find instructions on how to configure Modbus 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 Modbus OPC Server.

This user's manual is divided into following sections:

#### **Introduction**

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

## Configuration

In this section you will find an overview of configuration. You are given instructions on how to configure Modbus 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 Modbus network.

## 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

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.

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.
LON	A communication protocol developed by Echelon.
LON Application Guideline for substation automation; LAG	A proprietary method of ABB on top of the standard LON protocol.
OPC	Series of standards specifications aiming at open connectivity in industrial automation and the enterprise systems that support industry.
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

Abbreviation	Description
AE	Alarms and Events
ASDU	Application Service Data Unit

Abbreviation	Description
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
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
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
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SOAP	Simple Object Access Protocol
RCB	Report Control Block

Abbreviation	Description
URCB	Unbuffered Report Control Block
XML	eXtended Markup Language

## 1.8. Related documents

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

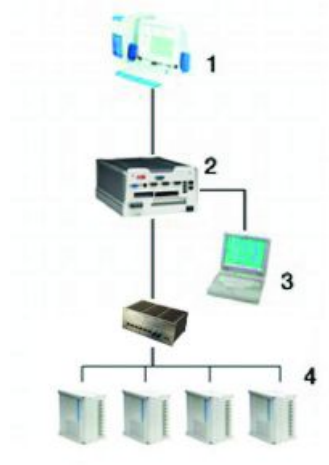
## 1.9. Document revisions

Document version/date	Product revision	History
A/21.12.2007	3.1	Document created
B/17.6.2008	3.2	Document updated
C/13.2.2009	3.3	Document revised
D/06.11.2009	3.4	Document revised
E/30.6.2011	3.5	Document revised
F/31.5.2012	4.0	Document revised

## 2. Introduction

### 2.1. Functional overview

The Server provides methods for OPC clients to exchange data with devices communicating via the Modbus protocol.



Modbus\_tcp\_protocol.jpg

Figure 2.1-1 Modbus system overview

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

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

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

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

## 2.2. Modbus OPC Server features

The Modbus OPC Server is intended for connecting simple Modbus devices like energy meters and input/output modules. As the protocol is based on scanning the state of the inputs of the device, it depends on the scan rate how short signal transients are registered. No events or time stamps are supported.

The Modbus messaging service provides a client/server communication between devices connected on an Ethernet TCP/IP network. This model is based on four types of messages: request, confirmation, indication, and response.

A system using Modbus TCP/IP can include different types of devices. There can be ModbusTCP/IP client and server devices connected to an TCP/IP network. There can also be devices such as bridges, routers and gateways for connections between the TCP/IP network and a serial line sub-network, permitting connections to Modbus serial line client and server end devices.

The Modbus 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
- System supervision:
  - Modbus channel communication
  - Modbus device communication

Supported transmission modes:

- Modbus RTU
- Modbus ASCII

**Table 2.2-1 The function codes supported by Modbus OPC Server**

Function code	Description	Memory area
01	Read coil status	00001 - 09999
02	Read input status	10001 - 19999
03	Read holding register	40001 - 49999
04	Read input registers	30001 - 39999
05	Force single coil	00001 - 09999
06	Write single register	40001 - 49999
16	Write multiple registers	40001 - 49999
21	Write General Reference	60001 - 65535

The following data formats are supported:

- Bit, one coil, or input status
- Word, one register in IED's memory. The data is used in an unsigned form
- Integer, one register in IED's memory. The MSB bit is used as a sign bit

- Long MSW last, signed 32-bit object, which needs two registers from IED's memory in lsw-msw order
- Long MSW first, signed 32-bit object which needs two registers from IED's memory in msw-lsw order.
- Float MSW last, floating point type which needs two input registers from IED's memory in lsw-msw order
- Float MSW first, floating point type which needs two input registers from IED's memory in msw-lsw order.

## 3. Configuration

### 3.1. About this section

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

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 Modbus OPC Server, you need to build and configure an object tree in SAB600 to define the Communication structure.

The possible objects are:

- Gateway
- Modbus OPC Server
- Modbus Subnetwork
- Modbus IED
- Logical Device objects
- Logical Node objects
- Data objects

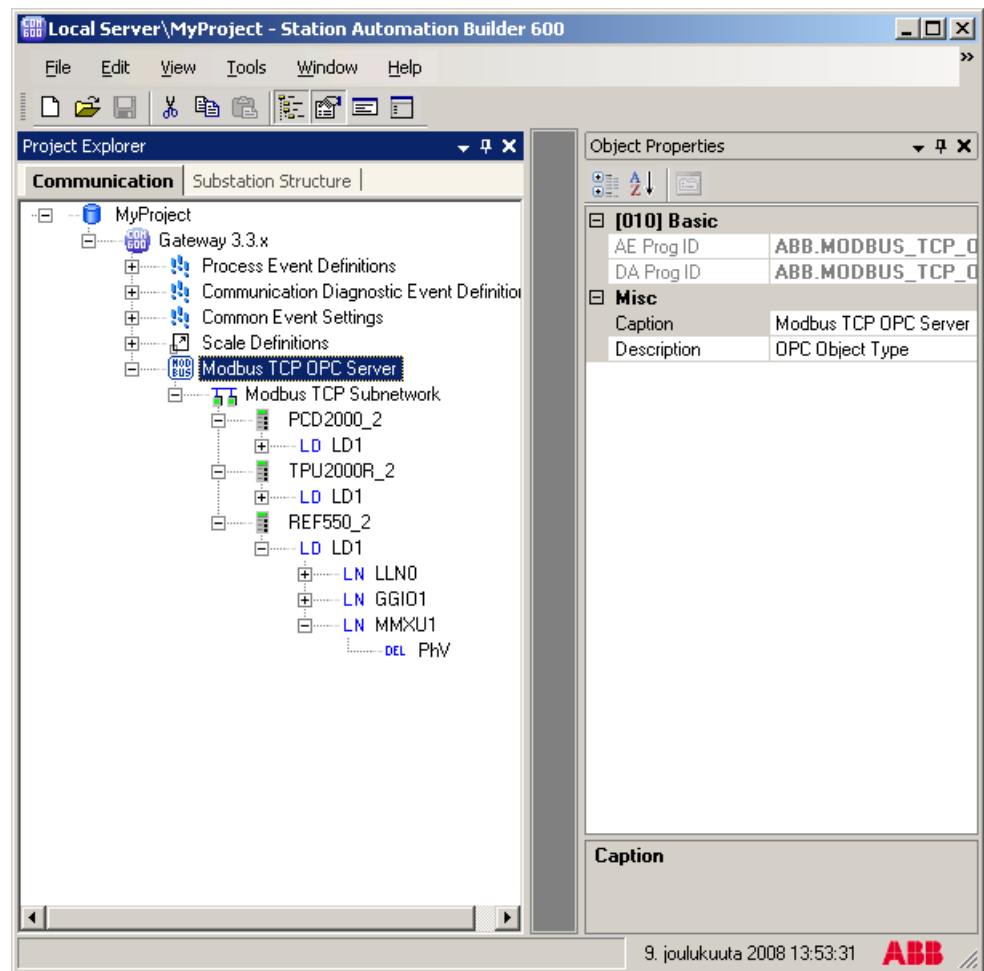
Figure 3.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



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

For information about configuring parameters for Parameter Setting in HMI, see COM600 HMI Configuration Manual.





TM\_Example\_Modbus\_TCP\_Communication\_structure.png

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 about building 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 Modbus 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 about configuring objects.

### 3.3. Building object tree

#### 3.3.1. General 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 in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example
- 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. Modbus TCP OPC Server
3. Logical Device objects
4. Logical Node objects
5. 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 OPC Server object

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

To add a Modbus OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Add a Modbus 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 Subnetwork objects

After the server object has been successfully added, you can continue building the object tree by adding Modbus subnetwork objects.

To add a Modbus subnetwork object:

1. Select a Modbus OPC Server object.
2. Right-click the Modbus OPC Server object.
3. Add a Modbus subnetwork object.
4. Rename the new object. The names of the Modbus subnetwork objects have to be unique.

### 3.3.5. Adding Modbus IED objects

After adding a subnetwork you can add device objects.

To add a Device object:

1. Select a Subnetwork object.
2. Add a Modbus IED object.
3. Rename the new object. The names of the devices within a Modbus channel have to be unique.

The maximum number of devices per each subnetwork is 30.

With SCL import function, you can import new objects with configurations from an existing file. Right-click the device and select **SCL Import** from the shortcut menu

To import a new configuration file:

1. Click **Select File**.
2. Browse to a new configuration file from the appearing dialog.
3. Select the file and click **Open**.
4. Select the device to import from the drop-down list. You can preview the configuration on the right.
5. Click **Import**.

The new preconfigured objects appear in the object tree. If the configuration file is large, the import may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

### 3.3.6. Adding Logical Device objects

To add a Logical Device object:

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



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

### 3.3.7. 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.

### 3.3.8. 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.

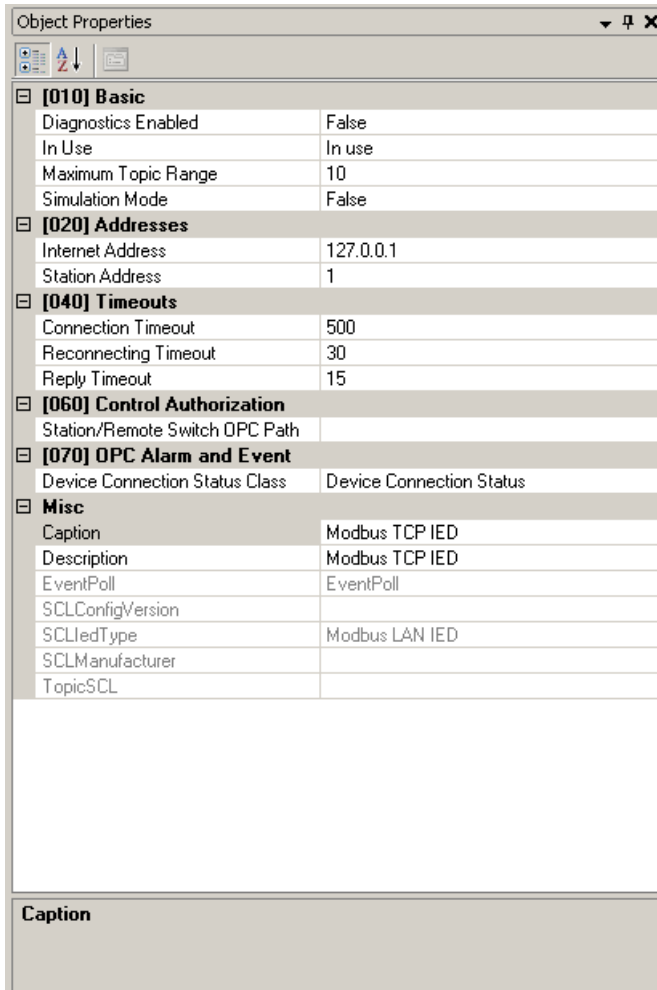
## 3.4. Configuring objects

### 3.4.1. General 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 Modbus OPC Server.

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.



ObjPropModbusTCP.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. **Configuring Modbus TCP OPC Server properties**

**Table 3.4.2-1 OPC Server properties**

Property/Parameter	Value or Value range/Default	Description
<b>Basic</b>		

Property/Parameter	Value or Value range/Default	Description
AE Prog ID		Instance identification of diagnostic OPC alarm and event server.
DA Prog ID		Instance identification of diagnostic OPC data access server.

### 3.4.3.

### Configuring Modbus OPC Server Subnetwork properties

The Modbus OPC Server subnetwork 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 about configuring objects.



Each Modbus OPC Server node of the system must have a unique subnet/node address.

**Table 3.4.3-1 Modbus Subnetwork properties**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
In use	In Use Not In Use Default: In Use	Specifies if channel is in use or not.
Local Address	127.0.0.1	Specifies the IP address used by communication line.
<b>Communication Control</b>		
Buffer Pool Size	0..255 Default: 12	Specifies the number of message buffers reserved for the line.
Response Timeout	0..65535 Default: 2	Specifies the time (in seconds) that the Modbus 3.0 link waits for the end of the received message.
Header Timeout	0..65535 Default: 700	Specifies the maximum waiting time (in milliseconds within which the first byte of a link layer response should have been received).
<b>Polling</b>		
Poll Delay	0..65535 Default: 40	Delay between polling messages in milliseconds.

Property/Parameter	Value or Value range/ Default	Description
Polling Period	0..255 Default: 3	The polling frequency of suspended stations.  1 = each polling cycle, 2 = Every 2nd polling cycle, etc.

### 3.4.4.

### Configuring Modbus TCP Device

Table 3.4.4-1 lists the configurable properties for Modbus Devices and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 3.4.1, General about configuring objects.

**Table 3.4.4-1 Modbus TCP IED properties**

Name	Value or Value range/ Default	Description
<b>Basic</b>		
Diagnostics enabled	True False Default: False	Diagnostics Enabled
In Use	In use Not in use Default: In use	Controls whether the device communications initially in use or not.
Maximum Topic Range	1..1000 Default: 10	The maximum length of address between first and last address index in one Topic.
Simulation Mode	True False Default: False	Specifies whether the device is in simulation mode or not.
<b>Addresses</b>		
Internet Address	127.0.0.1	Defines the internet address of this IED. Port number can be configured by using semicolon (GW 4.0 or newer). For example, "127.0.0.1;8080".
Station Address	0..255 Default: 1	Modbus address of the device.
<b>Timeouts</b>		
Connection Timeout	0..3600 Default: 500	Defines the timeout.

Name	Value or Value range/ Default	Description
Reconnecting Timeout	0..3600 Default: 30	Defines the timeout before attempting reconnection.
Reply Timeout	0..3600 Default: 15	Specifies the maximum time (in seconds)for waiting a reply to a command. If the time is exceeded, the command is considered as failed.
<b>Control Authorization</b>		
Station/Remote Switch OPC Path		OPC path of the station remote switch position 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 E.g. GW#ABB.MOD-BUS_LAN_OPC_DA_Server.Instance[1]#Channel[1]\IED1\LD1\GGIO1\loc
<b>OPC Alarm and Event</b>		
Device Connection Status Class	Device Connection Status	Device Connection Status Class

## 3.4.5.

**Configuring Logical Device properties****Table 3.4.5-1 Logical Device properties**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be 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 e.g. GW#ABB.Mod-bus_LAN_OPC_DA_Server.Instance[1]#Channel[1]\IED1\LD1\GGIO1\loc



### 3.4.6. Configuring Logical Node properties

**Table 3.4.6-1 Configuring Logical Node properties**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
<b>LLN0</b>		
Logical Node Class	LLN0	Logical node class
<b>GGIO1</b>		
Logical Node Class	ANCR, ARCO, ATCC, AVCO, LPHD, CALH, CCGR, CILO, CPOW, CSWI, GAPC, GGIO, GSAL, IARC, IHMI, ITCI, ITMI, MDIF, MHAI, MHAN, MMTR, MMXN, MMXU, MSQI, MSTA, PDIF, PDIR, PDIS, PDOP, PDUP, PFRC, PHAR, PHIZ, PIOC, PMRI, PMSS, POPF, PPAM, PSCH, PSEF, PTEF, PTOC, PTOF, PTOV, PTRC, PTTR, PTUC, PTUV, PUPF, PTUF, PVOC, PVPH, PZSU, RDRE, RADR, RBDR, RDRS, RBRF, RDIR, RFLO, RPSB, RREC, RSYN, SARC, SIMG, SIML, SPDC, XCBR, XSWI, TCTR, TVTR, YEFN, YLTC, YPSH, YPTR, ZAXN, ZBAT, ZBSH, ZCAB, ZCAP, ZCON, ZGEN, ZGIL, ZLIN, ZMOT, ZREA, ZRRC, ZSAR, ZTCF, ZTCR  Default: GGIO	Logical node class
Logical Node Instance	LN Inst Range is from 1 - 2147483647	Logical node instance number
Logical Node Prefix	Default: None	Prefix for logical node

### 3.4.7. Configuring data objects for internal OPC data

#### 3.4.7.1. General about configuring data objects for Internal OPC Data

Internal data objects describe internal status information of an OPC server, for example whether the connection between the Modbus OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

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

- 3.4.7.2, Integer status (INS)
- 3.4.7.4, Single point status (SPS)
- 3.4.7.3, Controllable single point (SPC) for OPC internal data

### 3.4.7.2. Integer status (INS)

**Table 3.4.7.2-1 Configurable INS (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
Common Data Class	INS	Common data class according to IEC 61850
<b>Addresses</b>		
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.
<b>OPC Alarm and Event</b>		
Indication Event	Default: None	Indication event used with this data object

### 3.4.7.3. Controllable single point (SPC) for OPC internal data

**Table 3.4.7.3-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
61850-Type	SPC	61850-Type
<b>Sub-Type</b>		

Property/Parameter	Value or Value range/ Default	Description
Sub Type		Sub type of object
<b>Addresses</b>		
Control Coil	0...65535	Coil address for the control. Coil (0X reference) address range 1...9999. Address 0 equals to no information available.
Indication Coil/Input	0...65535	Coil or input address for the indication. Coil = 0X reference address range 1...9999 or input = 1X reference address range 10001...19999. Address 0 equals to no information available.
<b>OPC Alarm and Event</b>		
Control Event Class	Default: 0	Event class to be used for the control events.
Indication Event Class	Default: None	Event class to be used for the indication events.

#### 3.4.7.4.

#### Single point status (SPS)

**Table 3.4.7.4-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
<b>Basic</b>		
Common Data Class	SPS	Common data class according to IEC 61850
<b>Addresses</b>		
Item Tag Path		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.
<b>Alarm and Event</b>		
Indication Event	Default: Empty string	Indication event used with this data object.

### 3.4.8. Configuring data objects

#### 3.4.8.1. Directional protection activation information

**Table 3.4.8.1-1 Configurable ACD properties for OPC Servers with Modbus IED Device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	ACD	61850-Type
Sub Type	BIT	Sub type for the object
<b>Addresses</b>		
General Coil/Input	0 to 65535 Default: 0	Coil or input address for General information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for Neutral information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase A Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase A information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase B Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase B information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase C Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase C information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

### 3.4.8.2. Protection activation information (ACT)

**Table 3.4.8.2-1 Configurable ACT properties for OPC Servers with Modbus IED Device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	ACT	61850-Type
Sub Type	BIT	Sub Type for the object
<b>Addresses</b>		
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for General information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for Neutral information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase A Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase A information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase B Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase B information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase C Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase C information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

### 3.4.8.3. Analogue set point (APC)

**Table 3.4.8.3-1 Configurable ACP properties for OPC servers with Modbus IED, subtype REGISTERED\_BASE**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	APC	61850-Type

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Subtype</b>	REGISTERED_BASE_CONTROL	
<b>Addresses</b>		
Format	Float MSW first Float MSW last Default: Float MSW first	Data format for the value.
Set Point Register	0 to 65535 Default: 0	Holding register address for the set point. Holding register (4X reference) address range 40001 to 49999. Address 0 equals to no information available.

**Table 3.4.8.3-2 Configurable ACP properties for OPC servers with Modbus IED, subtype DPU\_REGISTERED\_BASE**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	APC	61850-Type
<b>Subtype</b>	DPU_REGISTERED_BASE_CONTROL	
<b>Addresses</b>		
Format	Float MSW first Float MSW last Default: Float MSW first	Data format for the value.
Set Point Register	0 to 65535 Default: 0	Holding register address for the set point. Holding register (4X reference) address range 40001 to 49999. Address 0 equals to no information available.
Execute Register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535)
Address for password 1	0 to 65535	ASCII – 2 Characters Leftmost Digits 6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535)
Address for password 2	0 to 65535	ASCII – 2 Characters rightmost Digits 6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535)

Property/Parameter	Value or Value range/ Default /Example	Description
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

### 3.4.8.4. Binary counter reading (BCR)

**Table 3.4.8.4-1 Configurable BCR properties for OPC servers with Modbus IED device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	BCR	61850-Type
<b>Addresses</b>		
Counter Register	0 to 65535 Default: 0	Holding or input register address for the counter value. Holding register (4X reference) address range 40001..49999 or input register (3X reference) address range 30001..39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
<b>Scale and Unit</b>		
Multiplier	Default: No multiplier	Multiplier
Unit	Default: Dimensionless	SI unit for measurement as described in IEC61850.

**3.4.8.5.****Binary controlled step position information (BSC)**

Binary Controlled Step Position Information (BSC) for OPC server with Modbus IED supports two subtypes:

- COILED\_BASE\_CONTROL
- DPU\_REGISTER\_BASE\_CONTROL

**Table 3.4.8.5-1 Configurable BSC properties for OPC servers with Modbus device, subtype COILED\_BASE\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	BSC	61850-Type
Subtype	COILED_BASE_CONTROL	
<b>Addresses</b>		
Higher Coil	0 to 65535 Default: 0	Coil address for the higher command. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Lower Coil	0 to 65535 Default: 0	Coil address for the lower command. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Position Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the value.
Position Register	0 to 65535 Default: 0	Holding or input register address for the position. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Stop Coil	0 to 65535 Default: 0	Coil address for the stop command. Coil (0X reference) address range 1 to 9999. 0 equals to no information available.



Property/Parameter	Value or Value range/ Default /Example	Description
<b>Scale and Unit</b>		
Scale for position	Default: None	Scale used with position information.

**Table 3.4.8.5-2 Configurable BSC properties for OPC servers with Modbus device, subtype DPU\_REGISTER\_BASE\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	BSC	61850-Type
Subtype	DPU_REGISTER_BASE_CONTROL	
<b>Addresses</b>		
Execute Register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Higher register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Lower register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Address for password 1	0 to 65535 ASCII – 2 Characters rightmost Digits	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Address for password 2	0 to 65535 ASCII – 2 Characters rightmost Digits	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Password	Default: empty string Length: 4 characters	IED device 4 character password. Default is empty string.

### 3.4.8.6.

### Complex measured value (CMV)

**Table 3.4.8.6-1 Configurable CMV properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
61850-Type	CMV	61850-Type
<b>Sub Type</b>		
Sub Type	MV/CMV simple MV_LIMIT_CHECK Default: MV/CMV simple	Sub type for MV/CMV.
<b>Addresses</b>		
Measurement Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
Measurement Register	0 to 65535 Default: 0	Holding or input register address for the measurement. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
<b>Scale and Unit</b>		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used with this type.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC61850.
<b>Limit Value Supervision</b>		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

### 3.4.8.7. Delta (DEL)

**Table 3.4.8.7-1 Configurable DEL properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DEL	61850-Type
<b>Sub-Type</b>		
Sub Type	DEL full DEL simple Default: DEL full	Sub type for DEL.
<b>Phase AB Addresses</b>		
Phase AB Angle	0 to 65535 Default: 0	Holding or input register address for the phase AB angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase AB Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase AB angle.
Phase AB Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase AB Magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase AB Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase AB magnitude.
<b>Phase BC Addresses</b>		
Phase BC Angle	0 to 65535 Default: 0	Holding or input register address for the phase BC angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase BC Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase BC angle.
Phase BC Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase BC magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase BC Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase BC magnitude.
<b>Phase CA Addresses</b>		
Phase CA Angle	0 to 65535 Default: 0	Holding or input register address for the phase CA angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase CA Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase CA angle.
Phase CA Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase CA magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase CA Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase CA magnitude.
<b>Scale and Unit</b>		
Multiplier	Default: Kilo	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used for the measurements.
Unit	Default: Volt	SI unit for measurement as described in IEC61850.
<b>Phase Limit Value Supervision</b>		
High	Default: 0	High limit for measurement. Event is created, when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created, when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created, when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created, when value crosses the limit.
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

**3.4.8.8.****Controllable double point (DPC)**

Controllable Double Point (DPC) for OPC servers with Modbus IED supports the following subtypes:

- BIT\_DO
- SACE
- GENERIC\_CONTROL
- BIT\_DPU\_SBO

- BIT\_DPU\_MCD\_SBO
- BIT\_DPU\_IN\_REGISTER\_SBO

**Table 3.4.8.8-1 Configurable DPC properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPC	61850-Type
<b>Sub-Type</b>		
Sub Type	BIT_DO SACE	Sub type for command.
<b>Addresses</b>		
Address For Command	0 to 65535 Default: 0	Holding register address for the control. Holding register (4x reference) address range 40001 to 49999. Address 0 equals to no information available.
Address For Status and Intermediate	0 to 65535 Default: 0	Holding or input register address for the open, close, and intermediate indication. Holding register = 4x reference address range 40001 to 49999 or input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available.
Bit Mask For Intermediate Status	0 to 65535 Default: 0	Bit mask for intermediate status.
Bit Mask For Status	0 to 65535 Default: 0	Bit mask for status.
Close Command Type	0 to 65535 Default: 0	Close command type.
Close Control Coil	0 to 65535 Default: 0	Coil address for the close control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Close Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the close indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Command Parameter	0 to 65535 Default: 0	Command parameter.

Property/Parameter	Value or Value range/ Default /Example	Description
Fail Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the fail indication (optional). Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Open Command Type	0 to 65535 Default: 0	Open command type.
Open Control Coil	0 to 655359 Default: 0	Coil address for the open control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Open Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the open indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

**Table 3.4.8.8-2 Configurable DPC properties for OPC servers with Modbus device, subtype *GENERIC\_CONTROL***

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPC	61850-Type
Subtype	GENERIC_CONTROL	
<b>Addresses</b>		
Address for password 1	0 to 65535 Up to 4 ASCII Characters Leftmost Digits	starting address of password 1
Address for password 2	0 to 65535 Up to 4 ASCII Characters rightmost Digits	Starting address of password 2
Password 1	Default: empty string.	IED device password. Default is empty string. This password is written to up to 2 register starting from the one specified from Address for password 1.  Example: 1234
Password 2	Default: empty string.	IED device password. Default is empty string. This password is written to up to 2 register starting from the one specified from Address for password 2.  Example: 1234



Property/Parameter	Value or Value range/ Default /Example	Description
Open Control Address	0 to 65535	Change initiate input mask for open command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Open Control Value	0 to 65535 Default: 1	Value written to open control address.  Example: 1 = Control bit state 0 = No Control
Open Confirm Address	0 to 65535	Confirm initiate input mask for open command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Open Confirm Value	0 to 65535 Default: 1	Value written to open confirms address.  Example: 1 = Control bit state 0 = No Control
Open Execute Address	0 to 65535	Execute register for open command.  Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Open Execute Value	0 to 65535 Default: 1	Value written to open executes address.  Example: 1 = Execute 0 = No Action
Open Control 4	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Open Control 4	0 to 65535 Default: 1	Value to write to control 4 address
Open Control 5	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Open Control 5 value	0 to 65535 Default: 1	Value to write to control 5 address
Close Control Address	0 to 65535	Change initiate input mask for close command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Close Control Value	0 to 65535 Default: 1	Value written to Close control address.  Example: 1 = Control bit state 0 = No Control
Close Confirm Address	0 to 65535	Confirm initiate input mask for Close command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Close Confirm Value	0 to 65535 Default: 1	Value written to Close confirms address.  Example: 1 = Control bit state 0 = No Control
Close Execute Address	0 to 65535	Execute register for Close command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)
Close Execute Value	0 to 65535 Default: 1	Value written to Close executes address.  Example: 1 = Execute 0 = No Action
Close Control 4	0 to 65535 Default: 0	Address 0 equals to no information available (0 to 65535)
Close Control 4 value	0 to 65535 Default: 1	Value to write to control 4 address
Close Control 5	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register.  Address 0 equals to no information available (0 to 65535)

Property/Parameter	Value or Value range/ Default /Example	Description
Close Control 5 value	0 to 65535 Default: 1	Value to write to control 5 address
Password 1 ordinal	0 to 7 Default: 1	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, password 2 is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth
Password 2 ordinal	0 to 7 Default: 2	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, password 2 is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth

Property/Parameter	Value or Value range/ Default /Example	Description
Control ordinal	0 to 7 Default: 3	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, initiate input mask is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth
Confirm ordinal	0 to 7 Default: 4	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, initiate input mask is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth
Execute ordinal	0 to 7 Default: 5	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, initiate input mask is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth

Property/Parameter	Value or Value range/ Default /Example	Description
Command 4 ordinal	0 to 7 Default: 0	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, command 4 initiate input mask is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth
Command 5 ordinal	0 to 7 Default: 0	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5)  0 = Not in use. (When this value is 0, command 5 initiate input mask is not used)  1 = First in command chain  2 = Second  3 = Third  4 = Forth  5 = Fifth  6 = Sixth
Address For Fail Alarm	0 to 65535 Default: 0	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)
Address For Inverse Status	0 to 65535 Default	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)

Property/Parameter	Value or Value range/ Default /Example	Description
Address For Status	0 to 65535 Default	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)
Bit Mask for Fail Alarm	0 to 65535 Default	Bit mask for fail alarm
Bit Mask for Inverse status	0 to 65535 Default	Bit mask for inverse status
Bit Mask for status	0 to 65535 Default	Bit mask for status

**Table 3.4.8.8-3 Configurable DPC properties for OPC servers with Modbus device, subtype BIT\_DPU\_SBO/ BIT\_DPU\_MCD\_SBO**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPC	61850-Type
Subtype	BIT_DPU_SBO BIT_DPU_MCD_SBO	
<b>Addresses</b>		
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Open command value	0 to 65535 Default: 0	Open command type
Close command value	0 to 65535 Default: 0	Close command type

Property/Parameter	Value or Value range/ Default /Example	Description
Status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Inverse status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Fail alarm Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	Bit mask
Address for Password 1	0 to 65535 Default: 0	Holding address for password 1. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address for Password 2	0 to 65535 Default: 0	Holding address for password 2. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

**Table 3.4.8.8-4 Configurable DPC properties for OPC servers with Modbus device, subtype BIT\_DPU\_IN\_REGISTER\_SBO**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPC	61850-Type
Subtype	BIT_DPU_IN_REGISTER_SBO	
<b>Addresses</b>		

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Open command value	0 to 65535 Default: 1	Open command type
Close command value	0 to 65535 Default: 2	Close command type
Status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Inverse status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Fail alarm Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Bit mask for status	0 to 65535 Default: 0	Bit mask for status
Bit mask for inverse status	0 to 65535 Default: 0	Bit mask for inverse status
Bit mask for fail alarms	0 to 65535 Default: 0	Bit mask for fail alarms
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available



Property/Parameter	Value or Value range/ Default /Example	Description
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	
Address for Password 1	0 to 65535 Default: 0	Holding address for in password 1. Holding register = 4x reference address Range 40001 to 49999. Address 0 equals to no information available.
Address for Password 2	0 to 65535 Default: 0	Holding address for in password 2. Holding register = 4x reference address Range 40001 to 49999. Address 0 equals to no information available.
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

### 3.4.8.9. Device name plate (DPL)

Device Name Plate (DPL) for OPC server with Modbus IED supports two subtypes:

- PLATE\_FIXED
- PLATE\_IED\_DPU

**Table 3.4.8.9-1 Configurable DPL properties for OPC servers with Modbus device, subtype PLATE\_FIXED**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPL	61850-Type
Sub Type	PLATE_FIXED	
<b>Vendor</b>		
Vendor		Vendor as text.
<b>Hardware revision</b>		
Hardware Revision		Hardware revision as text.
<b>Software Revision</b>		
Software Revision	0	Software revision as text.
<b>Serial Number</b>		
Serial Number	0	Serial number as text.
<b>Location</b>		

Property/Parameter	Value or Value range/ Default /Example	Description
Location		Location as text.

**Table 3.4.8.9-2 Configurable DPL properties for OPC servers with Modbus device, subtype PLATE\_FIXED**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPL	61850-Type
Sub Type	PLATE_IED_DPU	
<b>Address</b>		
Leftmost Register for Vendor name	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Rightmost Register for Vendor name	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Hardware Revision Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Software Revision Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Serial Number Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Topic format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication

Property/Parameter	Value or Value range/ Default /Example	Description
Leftmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Rightmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Indication scale	Lookup table scale Stepwise Linear scale Default: NONE	Scale to be used with the indication value

**3.4.8.10.**

**Double point status (DPS)**

Double Point Status (DPS) for OPC server with Modbus IED supports the following subtypes:

- BIT
- BIT\_IN\_REGISTER\_WITH\_INTERMEDIATE\_BIT
- BIT\_DPU
- BIT\_DPU\_MCD
- BIT\_DPU\_INREGISTER

**Table 3.4.8.10-1 Configurable DPS properties for OPC servers with Modbus device, subtype BIT, BIT\_IN\_REGISTER\_WITH\_INTERMEDIATE\_BIT, BIT\_DPU, BIT\_DPU\_MCD**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPS	61850-Type
Subtype	BIT BIT_DPU BIT_DPU_MCD BIT_IN_REGISTER_WITH_INTERMEDIATE_BIT BIT_DPU_INREGISTER	
<b>Addresses</b>		
Address For Status and Intermediate	0 - 65535 Default: 0	Address for status and intermediate.

Property/Parameter	Value or Value range/ Default /Example	Description
Bit Mask for Fail Alarm	0 - 65535 Default 0	Bit mask for fail alarm
Bit Mask for Inverse status	0 - 65535 Default 0	Bit mask for inverse status
Bit Mask For Intermediate Status	0 - 65535 Default: 0	Bit mask for intermediate status.
Bit Mask For Status	0 - 65535 Default: 0	Bit mask for status.
Close Indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the close indication. Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.
Fail Alarm register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Fail Indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the fail indication (optional). Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.
Indication Register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Inverse status register	0 - 65535	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Open indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the open indication. Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.

**Table 3.4.8.10-2 Configurable DPS properties for OPC servers with Modbus device, subtype BIT\_DPU\_IN\_REGISTER**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	DPS	61850-Type
Subtype	BIT_DPU_IN_REGISTER	
<b>Addresses</b>		
Bit Mask for Fail Alarm	0 - 65535 Default 0	Bit mask for fail alarm
Bit Mask for Inverse status	0 - 65535 Default 0	Bit mask for inverse status
Bit Mask For Status	0 - 65535 Default: 0	Bit mask for status.
Fail Alarm register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Indication Register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Inverse status register	0 - 65535	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.

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

Controllable Integer Status (INC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER\_BASED\_CONTROL
- DPU\_REGISTER\_BASED\_CONTROL

**Table 3.4.8.11-1 Configurable INC properties for OPC servers with Modbus device, subtype REGISTER\_BASED\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	INC	61850-Type
Subtype	REGISTER_BASED_CONTROL	
<b>Addresses</b>		
Control Register	0 - 65535 Default: 0	Holding register address for the control. Holding register (4X reference) address range 40001 - 49999 . Address 0 equals to no information available.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
<b>Scale and Unit</b>		
Indication Scale	Default: None	Scale to be used with the indication value.

**Table 3.4.8.11-2 Configurable INC properties for OPC servers with Modbus device, subtype DPU\_REGISTER\_BASED\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	INC	61850-Type
Subtype	DPU_REGISTER_BASED_CONTROL	
<b>Addresses</b>		

Property/Parameter	Value or Value range/ Default /Example	Description
Control register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Execute register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Indication register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication
Address for password 1	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Address for password 2	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

**3.4.8.12.**

**Integer status (INS)**

**Table 3.4.8.12-1 Configurable INS properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	INS	61850-Type

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Addresses</b>		
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
<b>Scale and Unit</b>		
Scale	Default: None	Scale to be used with the indication value.

**3.4.8.13. Integer controlled step position information (ISC)**

Integer controlled step position information (ISC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER\_BASED\_CONTROL
- DPU\_REGISTER\_BASED\_CONTROL

**Table 3.4.8.13-1 Configurable ISC properties for OPC servers with Modbus device, subtype REGISTER\_BASED\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	ISC	61850-Type
Subtype	REGISTER_BASED_CONTROL	
<b>Addresses</b>		



Property/Parameter	Value or Value range/ Default /Example	Description
Control Register	0 - 65535 Default: 0	Holding register address for the control. Holding register (4X reference) address range 40001 - 49999 . Address 0 equals to no information available.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
<b>Scale and Unit</b>		
Indication Scale	Default: None	Scale to be used with the indication.

**Table 3.4.8.13-2 Configurable ISC properties for OPC servers with Modbus device, subtype DPU\_REGISTER\_BASED\_CONTROL**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	ISC	61850-Type
Subtype	DPU_REGISTER_BASED_CONTROL	
<b>Addresses</b>		
Control register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Execute register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )

Property/Parameter	Value or Value range/ Default /Example	Description
Indication register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication
Address for password 1	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535. Address 0 equals to no information available (0 - 65535 )
Address for password 2	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535 )
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

## 3.4.8.14.

**Logical node name plate (LPL)****Table 3.4.8.14-1 Configurable LPL properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	LPL	61850-Type
Sub Type	PLATE_FIXED	
<b>Vendor</b>		
Vendor		Vendor as text.
<b>Software Revision</b>		
Software Revision	Default: 0	Software revision as text

**Table 3.4.8.14-2 Configurable LPL properties for OPC servers with Modbus device, subtype PLATE\_IED\_DPU**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	LPL	61850-Type
Sub Type	PLATE_IED_DPU	
<b>Addresses</b>		
Leftmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Rightmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Software Revision Address	40001 to 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 .  Address 0 equals to no information available.
Indication scale	Default: none	Scale to be used with the indication value

**3.4.8.15.****Measured value (MV)****Table 3.4.8.15-1 Configurable MV properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	MV	61850-Type
<b>Sub-Type</b>		
Sub Type	MV/CMV simple  MV_LIMIT_CHECK  Default: MV/CMV simple	Sub type for MV/CMV.
<b>Addresses</b>		

Property/Parameter	Value or Value range/ Default /Example	Description
Measurement Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
Measurement Register	0 to 65535 Default: 0	Holding or input register address for the measurement. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
<b>Scale and Unit</b>		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used with this type.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC61850.
<b>Limit Value Supervision</b>		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

**3.4.8.16.****Controllable single point (SPC)**

Controllable single point (SPC) for OPC server with Modbus IED supports the following subtypes:

- BIT\_DO
- SACE
- BIT\_DPU\_SBO
- BIT\_DPU\_MCD\_SBO
- BIT\_DPU\_IN\_REGISTER\_SBO

**Table 3.4.8.16-1 Configurable SPC properties for OPC servers with Modbus device, subtype BIT\_DO, and SACE**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	SPC	61850-Type
<b>Sub-Type</b>		
Sub Type	BIT_DO SACE	Sub type of object.
<b>Addresses</b>		
Address For Command	0 to 65535 Default: 0	Address for command.
Address For Status	0 to 65535 Default: 0	Address for status.
Bit Mask For Status	0 to 65535 Default: 0	Bit mask for status.
Command Parameter	0 to 65535 Default: 0	Command parameter.
Control Coil	0 to 65535 Default: 0	Coil address for the control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Off Command Type	0 to 65535 Default: 0	Command type for OFF command.
On Command Type	0 to 65535 Default: 0	Command type for ON command.

**Table 3.4.8.16-2 Configurable SPC properties for OPC servers with Modbus device, subtype BIT\_DPU\_SBO, BIT\_DPU\_MCD\_SBO, and BIT\_DPU\_IN\_REGISTER\_SBO**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	SPC	61850-Type

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Subtype	BIT_DPU_SBO BIT_DPU_MCD_SBO BIT_DPU_IN_REGISTER_SBO SACE	
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Open command value	0 to 65535 Default: 1	Open command type
Close command value	0 to 65535 Default: 2	Close command type
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999.  Address 0 equals to no information available
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	

Property/Parameter	Value or Value range/ Default /Example	Description
Address for Password 1	0 to 65535 Default: 0	Holding address for password 1. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Address for Password 2	0 to 65535 Default: 0	Holding address for password 2. Holding register = 4x reference address range 40001 to 49999.  Address 0 equals to no information available
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

### 3.4.8.17. Single point status (SPS)

Single Point Status (SPS) for OPC server with Modbus IED supports the following subtypes:

- BIT
- BIT\_DPU\_MCD
- BIT\_IN\_REGISTER

**Table 3.4.8.17-1 Configurable SPS properties for OPC servers with Modbus device, subtype BIT AND BIT\_IN\_REGISTER**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	SPS	61850-Type
Sub-Type	BIT BIT_IN_REGISTER Default: BIT	Sub type for SPS.
<b>Addresses</b>		
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

**Table 3.4.8.17-2 Configurable SPS properties for OPC servers with Modbus device, subtype BIT\_DPU\_MCD**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	SPS	61850-Type
Subtype	BIT BIT_DPU_MCD	
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999  Address 0 equals to no information available
Bit mask	0 to 65535	Bit mask for indication

**3.4.8.18.****WYE****Table 3.4.8.18-1 Configurable WYE properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
<b>Basic</b>		
61850-Type	WYE	61850-Type
<b>Sub Type</b>		
Sub Type	WYE full WYE simple Default: WYE full	Sub type for WYE.
<b>Phase A Addresses</b>		
Phase A Angle	0 to 65535 Default: 0	Holding or input register address for the phase A angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.



Property/Parameter	Value or Value range/ Default /Example	Description
Phase A Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase A angle.
Phase A Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase A magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase A Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase A Magnitude.
<b>Phase B Addresses</b>		
Phase B Angle	0 to 65535 Default: 0	Holding or input register address for the Phase B angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase B Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase B angle.
Phase B Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase B magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase B Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Ib magnitude.
<b>Phase C Addresses</b>		
Phase B Angle	0 to 65535 Default: 0	Holding or input register address for the Phase C angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase C Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase C angle.
Phase C Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase C magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase C Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for I <sub>c</sub> magnitude.
<b>Neural Addresses</b>		
Neutral Angle	0 to 65535 Default: 0	Holding or input register address for the neutral angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

## Modbus TCP Master (OPC) User's Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for neutral angle.
Neutral Magnitude	0 to 65535 Default: 0	Holding or input register address for the Neutral magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Neutral Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for In magnitude.
<b>Scale and Unit</b>		
Neutral Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Neutral Scale	Default: None	Scale for neutral to be used with this data object.
Neutral Unit	Default: Dimensionless	Unit for neutral.
Phase ABC Scale	Default: None	Scale used with ABC phases.
Phase ABC Unit	Default: Dimensionless	Unit for ABC phases.
Phase Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
<b>Phase Limit Value Supervision</b>		

Property/Parameter	Value or Value range/ Default /Example	Description
High	0	High limit measurement. Event is created, when value crosses the limit.
High-High	0	High-high limit for measurement. Event is created, when value crosses the limit.
Low	0	Low limit for measurement. Event is created, when value crosses the limit.
Low-Low	0	Low-low limit for measurement. Event is created, when value crosses the limit.
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.
<b>Neutral Limit Value Supervision</b>		
Neutral High	0	High limit for measurement. Event is created, when value crosses the limit.
Neutral High-High	0	High-high limit for measurement. Event is created, when value crosses the limit.
Neutral Low	0	Low limit for measurement. Event is created, when value crosses the limit.
Neutral Low-Low	0	Low-low limit for measurement. Event is created, when value crosses the limit.
Neutral Max	20000	Maximum value for measurement.
Neutral Min	0	Minimum value for measurement.

### 3.4.9.

#### Topic Generator

When data objects have been configured with addresses, use the Topic Generator function to specify how data is requested from devices. A topic definition for an indication address specifies start and end of address, data format, deadband, and polling interval in milliseconds. However, a topic definition for a controllable point only specifies address range and its data format

To generate topic definitions:

1. Select the Communication tab on the Project Explore window.
2. Right-click a OPC Server node or a IED node and select the Topic Generator function on the context menu.

In most cases, modifications to the automatically generated topics are not required. However, some topic definitions may need to be changed, polling interval for example, for some devices to work properly.

To add a new topic:

1. Open the Topic Generator from a OPC Server node or a IED node.
2. Click the **Add Topic** button.
3. Click the **Add** button to add the new topic to the data grid. New topic is added to the data table and the dialog is closed.
4. Click **Apply** to save.



Each time a change is made to data object addresses or a new address is added, use the Topic Generator to update the topic definitions.

## 4. Operation

### 4.1. About this section

This section describes the basic operation procedures you can carry out after the object properties for the Modbus OPC Server have been configured.

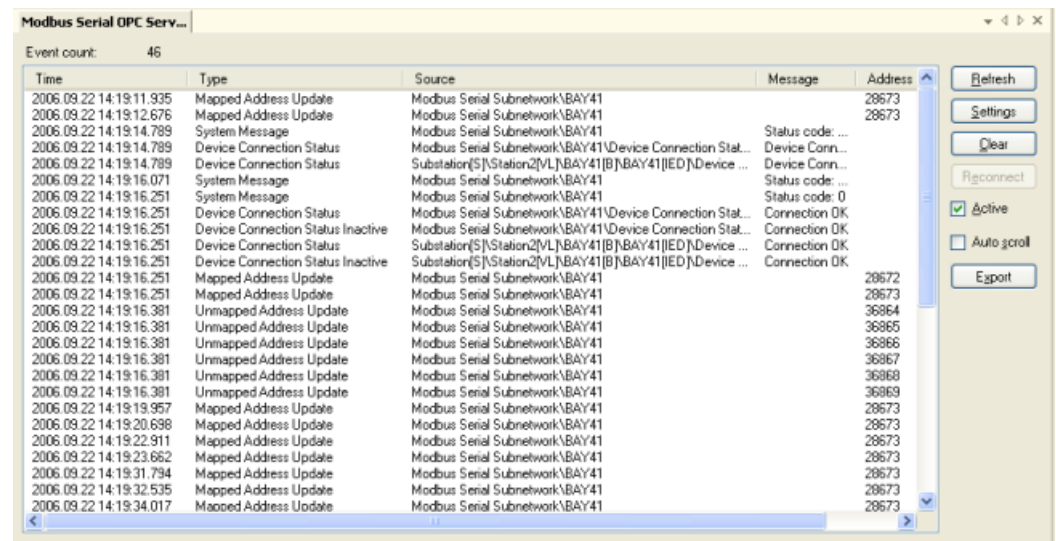
After this, you can, for example, monitor and control the condition of connections in a Modbus network. This is done by using the Online diagnostics function in SAB600.

### 4.2. Activating COM600 with new configurations

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

### 4.3. OPC Server diagnostics

To view the OPC Server diagnostics, right-click the OPC Server object and select **Online diagnostics**.



AE\_diagnostic\_client.bmp

Figure 4.3-1 OPC Server diagnostics

You have the following alternatives:

- to view version information
- to reset the OPC Server
- to view the event log file
- to clear the log file

## 4.4. Modbus Channel diagnostics

The Modbus 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 Modbus 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 Modbus Channel into use by marking the **In use** check box. If you unmark the check box, the channel is taken out of use.

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

## 4.5. Monitoring and controlling Modbus Device communication

The Modbus device 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 Modbus Device communication:

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

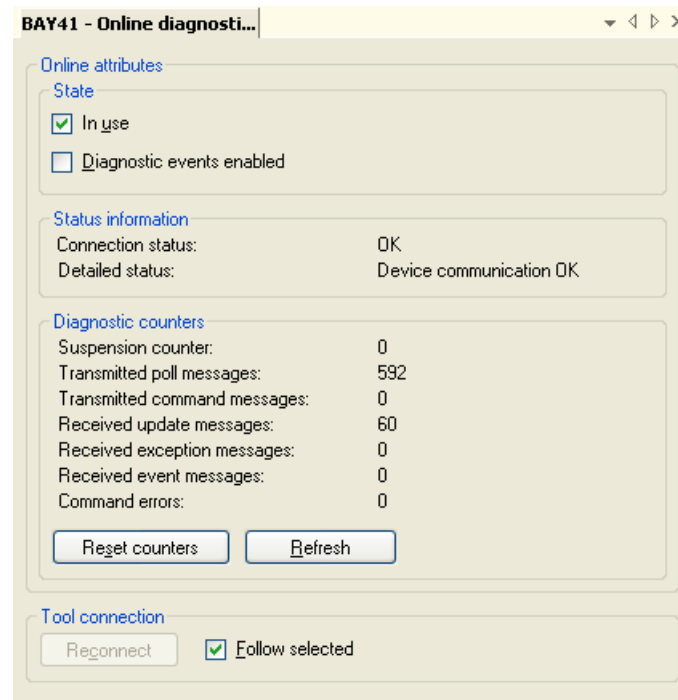
In the Status information field, you can monitor the device status.

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

You can take a Modbus 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**.





Modbus\_Device\_online\_diagnostics.bmp

*Figure 4.5-1 Modbus Device Online diagnostics*

## 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 about IEC 61850 data modeling

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

For each data class, there is a table giving a detailed description about the relation between the Modbus 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		OPC data types
stVal	BOOLEAN	TRUE   FALSE	M	0x, 1x, 3x, 4x	VT_BOOL
q	Quality		M	generated by OPC Server	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE

Name	Type	Value/ Value range	Mandatory /Optional		OPC data types
d	Description	Text	O	-	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		OPC data types
stVal	CPT	Intermediate-state (0) optional off(1) on(2) bad-state(3)optional	M	0x, 1x, 3x, 4x	VT_I4
q	Quality		M	generated by OPC Server	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE
d	Description	Text	O		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		OPC data types
stVal	INTEGER		M	3x, 4x	VT_I4
q	Quality		M	generated by OPC Server	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE
d	Description	Text	O		VT_BSTR

### 5.2.2.4. Protection activation information (ACT)

Modbus value	Value from stack	OPC/IEC 61850 value
0: OFF	0: OFF	FALSE

Modbus value	Value from stack	OPC/IEC 61850 value
1: ON	1: ON	TRUE

**Table 5.2.2.4-1 Protection activation information (ACT)**

Name	Type	Value/ Value range	Mandat-ory/Optional		OPC data types
general	BOOLEAN		M	0x, 1x	VT_BOOL
phsA	BOOLEAN		O	0x, 1x	VT_BOOL
phsB	BOOLEAN		O	0x, 1x	VT_BOOL
phsC	BOOLEAN		O	0x, 1x	VT_BOOL
neut	BOOLEAN		O	0x, 1x	VT_BOOL
t	TimeStamp		M	generated by OPC Server	
d	Description	Text	O	Separate signal	VT_BSTR

### 5.2.2.5. Binary counter reading (BCR)

BCR information is obtained from any valid Modbus register. Consult the Modbus protocol document for the register address and if they are available for each relay.

**Table 5.2.2.5-1 Binary counter reading (BCR) information**

Name	Type	Value/ Value range	Mandat-ory/Optional		OPC data types
actVal	INTEGER		M	3x, 4x	VT_I4
q	Quality		M	generated by OPC Server	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE
d	Description	Text	O		VT_BSTR

### 5.2.2.6. Device name plate (DPL)

**Table 5.2.2.6-1 Device name plate (DPL) information**

Name	Type	Value/ Value range	Mandat-ory/Optional		OPC data types
vendor	VisibleString		M	Internal config	VT_BSTR
hwRev	VisibleString		O	Internal config	VT_BSTR
swRev	VisibleString		O	Internal config	VT_BSTR
serNum	VisibleString			Internal config	VT_BSTR

Name	Type	Value/ Value range	Mandatory/Optional		OPC data types
location	VisibleString		O	Internal config	VT_BSTR

### 5.2.2.7. Logical node name plate (LPL)

Information numbers 2 - 5 are received for identification data.

**Table 5.2.2.7-1 Logical node name plate (LPL) information**

Name	Type	Value/ Value range	Mandatory/Optional	Protocol information element	OPC data types
vendor	VisibleString		M	Internal config	VT_BSTR
swRev	VisibleString			Internal config	VT_BSTR
d	VisibleString			Internal config	VT_BSTR

### 5.2.3. Data objects for measured information

#### 5.2.3.1. Measured value (MV)

**Table 5.2.3.1-1 Measured value**

Name	Type	Value/ Value range	Mandatory/Optional	Protocol information element	OPC data types
mag	AnalogueValue		M	3x, 4x register	VT_R4
range	Range		O	Separate Signal	VT_I4
q	Quality		M	generated by OPC Server	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE
d	Description	Text	O	Internal config	VT_BSTR
hhLim	REAL		O	Internal config	VT_R4
hlim	REAL		O	Internal config	VT_R4
lLim	REAL		O	Internal config	VT_R4
lLim	REAL		O	Internal config	VT_R4
min	REAL		O	Internal config	VT_R4
max	REAL		O	Internal config	VT_R4
siUnit	Integer		O	Internal config	VT_I4
multiplier	Integer		O	Internal config	VT_I4
unit	String		O	Internal config	VT_BSTR

## Modbus TCP Master (OPC) User's Manual

Name	Type	Value/ Value range	Mandatory/Optional	Protocol information element	OPC data types
numOfDec	Integer		O	Internal config	VT_I4

## 5.2.3.2. WYE

Table 5.2.3.2-1 WYE

Name	Type	Value/ Value range	M/O	Protocol information element	OPC data types
phsA.mag	AnalogueValue		M	3x, 4x	VT_R4
				3x, 4x	
phsA.q	Quality		M	set by OPC server	VT_I4
phsA.t	TimeStamp		M	set by OPC server	VT_DATE
phsA.range	Range		O	Internal config	VT_I4
phsA.hhLim	REAL		O	Internal config	VT_R4
phsA.hLim	REAL		O	Internal config	VT_R4
phsA.lLim	REAL		O	Internal config	VT_R4
phsA.lLim	REAL		O	Internal config	VT_R4
phsA.min	REAL		O	Internal config	VT_R4
phsA.max	REAL		O	Internal config	VT_R4
phsA.siUnit	ENUMERATED		O	Internal config	VT_I4
phsA.multiplier	ENUMERATED		O	Internal config	VT_I4
phsA.unit	String		O	Internal config	VT_BSTR
phsB.mag	AnalogueValue		O	3x, 4x	VT_R4
phsB.ang	AnalogueValue		O	3x, 4x	VT_R4
phsB.q	Quality		O	set by OPC server	VT_I4
phsB.t	TimeStamp		O	set by OPC server	VT_DATE
phsB.range	Range		O	Internal config	VT_I4
phsB.hhLim	REAL		O	Internal config	VT_R4
phsB.hLim	REAL		O	Internal config	VT_R4
phsB.lLim	REAL		O	Internal config	VT_R4
phsB.lLim	REAL		O	Internal config	VT_R4
phsB.min	REAL		O	Internal config	VT_R4
phsB.max	REAL		O	Internal config	VT_R4
phsB.siUnit	ENUMERATED		O	Internal config	VT_I4

Name	Type	Value/ Value range	M/O	Protocol information element	OPC data types
phsB.multiplier	ENUMERATED		O	Internal config	VT_I4
phsB.unit	String		O	Internal config	VT_BSTR
phsC.mag	AnalogueValue		O	3x, 4x	VT_R4
phsC.ang	AnalogueValue		O	3x, 4x	VT_R4
phsC.q	Quality		O	set by OPC server	VT_I4
phsC.t	TimeStamp		O	set by OPC server	VT_DATE
phsC.range	Range		O	Internal config	VT_I4
phsC.hhLim	REAL		O	Internal config	VT_R4
phsC.hLim	REAL		O	Internal config	VT_R4
phsC.lLim	REAL		O	Internal config	VT_R4
phsC.lLim	REAL		O	Internal config	VT_R4
phsC.min	REAL		O	Internal config	VT_R4
phsC.max	REAL		O	Internal config	VT_R4
phsC.siUnit	ENUMERATED		O	Internal config	VT_I4
phsC.multiplier	ENUMERATED		O	Internal config	VT_I4
phsC.unit	String		O	Internal config	VT_BSTR
neut.mag	AnalogueValue		O	3x, 4x	VT_R4
neut.ang	AnalogueValue		O	3x, 4x	VT_R4
neut.q	Quality		O	set by OPC server	VT_I4
neut.t	TimeStamp		O		VT_DATE
neut.range	Range		O	Internal config	VT_I4
neut.hhLim	REAL		O	Internal config	VT_R4
neut.hLim	REAL		O	Internal config	VT_R4
neut.lLim	REAL		O	Internal config	VT_R4
neut.lLim	REAL		O	Internal config	VT_R4
neut.min	REAL		O	Internal config	VT_R4
neut.max	REAL		O	Internal config	VT_R4
neut.siUnit	ENUMERATED		O	Internal config	VT_I4
neut.multiplier	ENUMERATED		O	Internal config	VT_I4
neut.unit	String		O	Internal config	VT_BSTR
d	Description		O	Internal config	VT_BSTR

**5.2.3.3. Delta (DEL)**

DEL values are extracted using the same method as MV.

**Table 5.2.3.3-1 Delta**

Name	Type	Value/ Value range	M/O	Modbus register	OPC data types
phsAB.mag	AnalogueValue		M	3x, 4x register	VT_R4
phsAB.ang	AnalogueValue		M	3x, 4x register	
phsAB.q	Quality		M	set by OPC server	VT_I4
phsAB.t	TimeStamp		M	set by OPC server	VT_DATE
phsAB.range	Range		O	Internal config	VT_I4
phsAB.hhLim	REAL		O	Internal config	VT_R4
phsAB.hLim	REAL		O	Internal config	VT_R4
phsAB.lLim	REAL		O	Internal config	VT_R4
phsAB.lLim	REAL		O	Internal config	VT_R4
phsAB.min	REAL		O	Internal config	VT_R4
phsAB.max	REAL		O	Internal config	VT_R4
phsAB.siUnit	ENUMERATED		O	Internal config	VT_I4
phsAB.multiplier	ENUMERATED		O	Internal config	VT_I4
phsAB.unit	String		O	Internal config	VT_BSTR
phsBC.mag	AnalogueValue		M	3x, 4x register	VT_R4
phsBC.ang	AnalogueValue		M	3x, 4x register	VT_R4
phsBC.q	Quality		M	set by OPC server	VT_I4
phsBC.t	TimeStamp		M	set by OPC server	VT_DATE
phsBC.range	Range		O	Internal config	VT_I4
phsBC.hhLim	REAL		O	Internal config	VT_R4
phsBC.hLim	REAL		O	Internal config	VT_R4
phsBC.lLim	REAL		O	Internal config	VT_R4
phsBC.lLim	REAL		O	Internal config	VT_R4
phsBC.min	REAL		O	Internal config	VT_R4
phsBC.max	REAL		O	Internal config	VT_R4
phsBC.siUnit	ENUMERATED		O	Internal config	VT_I4
phsBC.multiplier	ENUMERATED		O	Internal config	VT_I4
phsBC.unit	String		O	Internal config	VT_BSTR
phsCA.mag	AnalogueValue		M	3x, 4x register	VT_R4
phsCA.ang	AnalogueValue		M	3x, 4x register	VT_R4



Name	Type	Value/ Value range	M/O	Modbus register	OPC data types
phsCA.q	Quality		M	set by OPC server	VT_I4
phsCA.t	TimeStamp		M	set by OPC server	VT_DATE
phsCA.range	Range		O	Internal config	VT_I4
phsCA.hhLim	REAL		O	Internal config	VT_R4
phsCA.hLim	REAL		O	Internal config	VT_R4
phsCA.lLim	REAL		O	Internal config	VT_R4
phsCA.lLim	REAL		O	Internal config	VT_R4
phsCA.min	REAL		O	Internal config	VT_R4
phsCA.max	REAL		O	Internal config	VT_R4
phsCA.siUnit	ENUMERATED		O	Internal config	VT_I4
phsCA.multiplier	ENUMERATED		O	Internal config	VT_I4
phsCA.unit	String		O	Internal config	VT_BSTR
d	Description	Text	O	Internal config	VT_BSTR

## 5.2.4. Data objects for controllable status information

### 5.2.4.1. Controllable single point (SPC)

The command sequence for controlling points is specific to each relay. In the 2000 R products, for example, SPC is implemented using a bit mask.

TRUE/FALSE values are sent with 1 and 0 values.

Underlying protocol converter stack uses Motorola convention in binary value usage. Used OPC Server sees OFF data with value 0 and ON data with value 1 from stack.

Modbus value	Value from stack	OPC/IEC 61850 value
0 (OFF default)	0:OFF	FALSE
1 (ON default)	1:ON	TRUE

Name	Type	Value / Value range	M/O		OPC Data Type
ctlVal	BOOLEAN	FALSE   TRUE	M	0x, 4x	
stVal	BOOLEAN	FALSE   TRUE	M	0x, 1x, 3x, 4x	VT_BOOL
q	Quality		M	generated by OPC Server	VT_I4

## Modbus TCP Master (OPC) User's Manual

Name	Type	Value / Value range	M/O		OPC Data Type
t	TimeStamp		M	generated by OPC Server	VT_DATE
d	Description	Text	O	Internal config	VT_BSTR

### 5.2.4.2. Controllable double point (DPC)

*Table 5.2.4.2-1 Controllable double point*

Name	SCO	Value / Value Range	M/O	Modbus information element	OPC Data Types
ctlOperOn	SPI	FALSE TRUE	O	0x, 4x	VT_BOOL
ctlOperOff		FALSE TRUE	O	0x, 4x	VT_BOOL
ctlSelOn		FALSE TRUE	O	0x, 4x	VT_BOOL
ctlSelOff		FALSE TRUE	O	0x, 4x	VT_BOOL
stVal	CPT	Intermediate-state (0)   off (1)   on (2)   bad-state (3)	M	0x, 1x, 3x, 4x	VT_I4
q	Quality		M	4x register	VT_I4
t	TimeStamp		M	generated by OPC Server	VT_DATE
ctlCan	BOOLEAN	FALSE TRUE	O	0x, 4x	VT_BOOL
stSeld	BOOLEAN	FALSE TRUE	O	generated by OPC Server	VT_BOOL
d	Description	Text	O	Separate signal	VT_BSTR

### 5.2.4.3. Controllable integer status (INC)

*Table 5.2.4.3-1 Controllable integer status (INC) information*

Name	Type	Value/ Value range	Mandatory/Optional	Modbus register	OPC data types
ctlVal	INTEGER		M	4x	VT_I4
stVal	INTEGER		M	3x, 4x	VT_I4
q	Quality		M	Generated by OPC server	VT_I4
t	TimeStamp		M	Generated by OPC server	VT_DATE
d	Description	Text	O	Internal config	VT_BSTR

#### 5.2.4.4. Binary controlled step position information (BSC)

*Table 5.2.4.4-1 Binary controlled step position information (BSC)*

Name	Type	Value/ Value range	M/O	Modbus register	OPC data types
ctlVal	ENUMERATED	stop (0)   lower (1)   higher (2)   reserved (3)	M	0x	VT_I1
valWTr	ValWithTrans		M	3x, 4x	
q	Quality		M	Generated by OPC server	VT_I4
t	TimeStamp		M	Generated by OPC server	VT_DATE
d	Description	Text	O		VT_BSTR

#### 5.2.4.5. Integer controlled step position information (ISC)

*Table 5.2.4.5-1 Integer controlled step position information (ISC)*

Name	Type	Value/ Value range	Mandat-ory/Optional	Modbus register	OPC data types
ctlVal	INTEGER	-64 ... 63	M	4x	
valWTr	ValWithTrans		M	3x, 4x	
q	Quality		M	Generated by OPC server	
t	TimeStamp		M	Generated by OPC server or INC copy	
d	Description	Text	O		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	Modbus register	OPC data types
spMag	INTEGER		M	4x	VT_REAL
q	Quality		M	Generated by OPC server	VT_I4

## Modbus TCP Master (OPC) User's Manual

Name	Type	Value/ Value range	Mandat-ory/Optional	Modbus register	OPC data types
t	TimeStamp		M	Generated by OPC server	VT_DATE
d	Description	Text	O	Internal config	VT_BSTR

## 5.3. Attributes

### 5.3.1. Server attributes

*Table 5.3.1-1 Server attributes*

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

### 5.3.2. Modbus channel attributes

**Table 5.3.2-1 Modbus channel attributes**

Name	Value or Value range/ Default	Description
<b>In use</b>	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.
<b>Diagnostic counters(TCP channel)</b>		Data type: Integer  Access: Read-only
Transmitted telegrams		The number of transmitted telegrams.
Failed transmissions		Incremented each time a message transmission to the Modbus channel fails for some reason.
Transmitted commands		The number of transmitted commands.
Transmitted replies		The number of transmitted replies.
Received messages		Incremented each time the Modbus OPC Server receives a message from the Modbus channel.
Buffer overflow errors		The number of times there has been a buffer overflow.
TCP connect		Number of TCP connection requests.
TCP accept		Number of accepted TCP connection requests

Name	Value or Value range/ Default	Description
TCP close		Number of TCP connection close requests

## 5.3.3.

## Modbus Device attributes

Table 5.3.3-1 Modbus device attributes

Name	Value or Value range/ Default	Description
<b>In use</b>	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.
<b>Object status</b>	1 = Re-transmit system message  A status code, for example:  0 = OK (communication works properly)  13801 = 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.
<b>Device connection status</b>	True = Device connection OK  False = Device connection suspended	Data type: Boolean  Access: Read-only  Indicates the status of the device connection.

Name	Value or Value range/ Default	Description
Suspension counter		Indicates the number of times the connection has been suspended.
Transmitted poll messages		The number of transmitted poll messages.
Transmitted command messages		The number of transmitted command messages.
Received update messages		The number of received update messages.
Received exception messages		The number of received exception messages.
Received event messages		Incremented each time a Modbus event message is received.
Command errors		The number of times a command error has occurred.

## 5.4. Status codes

### 5.4.1. Status codes

13800	PLCP_IN_INITIALIZE_DB_STATE
13801	PLCP_DEVICE_SUSPENDED
13802	PLCP_STOPPED
13803	PLCP_STARTTED
13804	PLCC_MESSAGE_FILLING_ERROR
13805	PLCC_INVALID_OBJECT_TYPE
13806	PLCC_INVALID_ADDRESS
13807	PLCC_INVALID_DATA
13808	PLCC_INVALID_OBJECT_INDEX
13809	PLCC_NOT_IMPLMENTED_FUNCTION
13810	PLCC_NOT_EXPECTED_FUNCTION_CODE_FROM_PLCC
13811	PLCC_ILLEGAL_PLCC_FUNCTION
13812	PLCC_ILLEGAL_PLCC_DATA_ADDRESS
13813	PLCC_ILLEGAL_PLCC_DATA_VALUE
13814	PLCC_SLAVE_DEVICE_FAILURE
13815	PLCC_ACKNOWLEDGE
13816	PLCC_SLAVE_DEVICE_BUSY

13817	PLCC_NEGATIVE_ACKNOWLEDGE
13818	PLCC_MEMORY_PARITY_ERROR
13819	PLCC_UNKNOWN_DIAGNOSTIC_COUNTER
13820	PLCC_INVALID_TOPIC_NUMBER
13821	PLCC_INVALID_OBJECT_ADDRESS
13822	PLCC_INVALID_OBJECT_FORMAT
13823	PLCC_SC_DATA_OVERFLOW
13824	PLCC_INVALID_INDEX_RANGE
13825	PLCC_UNKNOWN_ATTRIBUTE
13826	PLCC_LOCAL_RESPONSE
13827	PLCP_TIMEOUT_WHILE_WAITING_RESPONSE
13828	PLCP_EVENT_BUFFER_OK
13829	PLCP_EVENT_BUFFER_OVERFLOW
13830	PLCP_EVENT_BUFFER_ERROR
13831	PLCC_UNKNOWN_FUNCTION
13832	PLCC_NO_ADDITIONAL_DATA_AVAILABLE
13833	PLCC_INVALID_ATTRIBUTE_VALUE
13834	PLCC_INTERNAL_ERROR



## Index

### A

adding	
Data object .....	20
Gateway object .....	18
Logical device .....	20
Logical node .....	20
OPC Server object .....	18
Analogue set point (APC)	
IEC 61850 data modeling .....	83
attributes	
Modbus channel .....	85
Modbus device .....	86
server .....	84

### B

Binary controlled step position information (BSC)	
IEC 61850 data modeling .....	83
Binary counter reading (BCR)	
IEC 61850 data modeling .....	76

### C

channel	
diagnostics .....	72
common data class	
Controllable double point (DPC) .....	82
configuring	
object .....	20
Controllable double point (DPC)	
common data class .....	82
Controllable integer status (INC)	
IEC 61850 data modeling .....	82
Controllable single point (SPC)	
properties .....	26
creating	
topic .....	69

### D

Data object	
adding .....	20
device communication	
monitoring and controlling .....	72
Device name plate (DPL)	

---

IEC 61850 data modeling .....	76
diagnostics	
channel .....	72
server .....	71
Double point status (DPS)	
IEC 61850 data modeling .....	75
 <b>G</b>	
Gateway object	
adding .....	18
 <b>I</b>	
IEC 61850 data modeling	
Analogue set point (APC) .....	83
Binary controlled step position information (BSC) .....	83
Binary counter reading (BCR) .....	76
Controllable integer status (INC) .....	82
Device name plate (DPL) .....	76
Double point status (DPS) .....	75
Integer controlled step position information (ISC) .....	83
Integer status (INS) .....	75
Logical node name plate (LPL) .....	77
Measured value (MV) .....	77
Protection activation information (ACT) .....	75
Single point status (SPS) .....	74
WYE .....	78
Integer controlled step position information (ISC)	
IEC 61850 data modeling .....	83
Integer status (INS)	
properties .....	26
 <b>L</b>	
Logical device	
adding .....	20
Logical Device	
properties .....	24
Logical node	
adding .....	20
properties .....	25
Logical node name plate (LPL)	
IEC 61850 data modeling .....	77
 <b>M</b>	
Measured value (MV)	
IEC 61850 data modeling .....	77
Modbus	

---

device properties .....	23
IED object .....	19
subnetwork .....	19
Modbus channel	
attributes .....	85
Modbus device	
attributes .....	86
Modbus OPC Server	
features .....	14

## O

object	
configuring .....	20
object tree	
building .....	18
OPC Server object	
adding .....	18

## P

properties	
Controllable single point (SPC) .....	26
Integer status (INS) .....	26
Logical Device .....	24
Logical Node .....	25
Single point status (SPS) .....	27
Protection activation information (ACT)	
IEC 61850 data modeling .....	75

## S

server	
attributes .....	84
diagnostics .....	71
Single point status (SPS)	
IEC 61850 data modeling .....	74
properties .....	27
subnetwork	
configuring .....	22
Modbus .....	19

## T

Topic generator .....	69
-----------------------	----

## W

WYE

IEC 61850 data modeling ..... 78



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