



RightWON IEC 61850 Protocol Manual V1.5

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Revision History

Date (yy-mm-dd)	Comments	Author
2011-07-22	V1.0: Initial release.	C. Archambault
2011-11-11	V1.2: Update and addition of sections on IEC 61850 Client/Server configuration.	C. Archambault
2012-04-25	V1.3: Addition of program configuration using the SBOes, DOs and DOes control models.	M. Raymond
2012-08-01	V1.4: Update of IEC 61850 protocol configuration.	C. Archambault
2013-06-11	V1.5: Update of DOs model.	C. Archambault

Document Applicability

This document applies to the following RightWON Configuration Suite software versions:

Document version	Product version	Comments
V1.0	1.6.x	
V1.2 to V1.3	1.7.x	
V1.4 and higher	1.8.0 and higher	<ul style="list-style-type: none">• Supports Editions 1.0 and 2.0 of the IEC 61850 standard, but certified for Edition 1.0 only.• Supports the IEC 61400-25 standard for monitoring and control of wind power plants.



Introduction

1.1. About the IEC 61850 protocol

The IEC 61850 protocol is used to exchange data reliably between servers and clients over an Ethernet link. This protocol has been designed to meet the needs of distributed energy systems. The RightWON supports the IEC 61850 communication protocol in the following ways:

1. The IEC 61850 server allows the RightWON to make information available to multiple clients. A maximum of 16 clients can be simultaneously connected to a server.
2. The IEC 61850 client allows the RightWON to gather information from several servers. Typically, the server is a data generator whereas the client is a data consumer.
3. The GOOSE publisher/subscriber protocol allows the RightWON to exchange data rapidly with one or more Intelligent Electronic Devices (IEDs) during an event such as a change in a data value.

Each server or IEC 61850 GOOSE publisher has an [SCL file](#) that describes the specifications and capabilities of the Intelligent Electronic Devices used at the substations. To create a SCL file, refer to document *RWM000010-MA-en, RightWON Configuration Suite Manual*. [Variables](#) are created when the SCL file is imported into the IEC 61850 client or subscriber. Commands generated by the IEC 61850 client must be handled by an IEC 61131-3 PLC program using [control models](#) that are defined in the protocol. Data from these models must be handled using function blocks from IEC 61850 libraries. An IEC 61131-3 PLC program developed by the integrator typically reads the inputs/outputs on devices connected to the RightWON (for example an input/output system accessible via MODBUS or CANopen protocol) and feeds into the variables associated with the IEC 61850 protocol. The variables are grouped in a communication profile that permits timestamps and status/test bits, among others. Refer to the topic *Developing an IEC 61131-3 PLC automation program* in the document *RWM000010-MA-en, RightWON Configuration Suite Manual*.

1.1.1. SCL file description

Each server has an SCL (Substation Configuration Language) file that describes the specifications and capabilities of the Intelligent Electronic Devices (IEDs) used at the substations. This file is constructed using a specialized SCL editor. When imported by the client, the SCL file permits configuring the database without having to transcribe the information. All IEC 61850 applications are developed from the SCL file that describes the product functionalities (XCBR, GGIO, MMXU, etc.) and the data handled by the unit.

The IED description includes the following properties, as defined in the IEC 61850 standard:

Property	Description
Header	The header identifies the SCL configuration file, its version and the name of the software used to create it. The header also specifies options for mapping names to signals.
Substation	Describes the substation entity or equipment to which the configuration applies. For example, this could be a power transformer or a circuit breaker.
Communications	Defines how the IEDs are connected to sub-networks, the communication access points, and describes the communication links between IEDs.
Services	Defines the services that are offered. Refer to the IEC 61850-6 standard for their descriptions.
Intelligent Electronic Devices, or IEDs	Includes the complete configuration of the Intelligent Electronic Devices (IEDs), including the various IED access points, LDevices and LNs (groups of functions). This section also contains IED data and reports, including the data retrieved or published by the GOOSE protocol.
Logical Device (LDevice)	Provides information (nameplate and service quality) about the physical peripheral devices used as hosts or the external devices they control.
Logical Nodes (LNs)	<p>The logical nodes of the logical device are combinations of predefined functions that are performed in the IED.</p> <p>The logical nodes that must be defined in every logical device are LLNO and LPHD:</p> <ul style="list-style-type: none"> • LLNO: Each logical device has only one logical node, LLNO, that represents the usual data of the logical device, for example SYNCHROTEQ. • LPHD1: Each logical device has only one logical node for the physical device (LPHD). It represents the usual data of the physical device that hosts the logical device. <p><u>There must also be at least one other logical node related to the application type.</u></p> <p>The IEC 61850-7-4 standard defines 91 logical nodes divided into 13 logical groups. The first letter of a node defines its group. The example uses the following logical nodes:</p> <ul style="list-style-type: none"> • GGIO is a logical node used to represent a primary or auxiliary generic device. It publishes analog and/or digital signals. • MMXU is a logical node used to publish electrical measurements such as the RMS voltage, power or frequency. These values are normally used for operations such as supervision and management of power, screen display, status estimates, etc. The precision required for these functions must be specified.
Data Set	Each logical node includes datasets which permit grouping the data and data attributes.
Report Control Block	Describes the conditions for generating reports and logs based on parameters configured by the client. Reports can be sent immediately or delayed. Logs can be queried for later retrieval.
Data Object (DO) and Data Attribute (DA)	A data object (DO) is contained in a logical node and describes the data attributes (DAs). For a complete list of DAs refer to the IEC 61850-7-3 standard. For the DOs, refer to IEC 61850-7-4.
GOOSE type GSE control block	Logical nodes can support a fast and reliable distribution system for data input and output values in GOOSE format. GSE: Generic Substation Event.
Data Type Templates	Permits specifying the Data Object (DO) and Data Attribute (DA) types that are in an IED. The different values of these types can also be listed. A logical node as specified in the data type template is a model that can have multiple instances.

1.1.2. Identification of data objects and data attributes

The variables are grouped into logical nodes and are composed of data objects and data attributes. The IEC 61850 protocol uses an XML data structure to describe them. The hierarchical structure used for naming and identifying the objects is the following:

Hierarchical structure

Logical device

Logical node

Data object (DO)

Data attribute (DA)

Example of an object ID

Synchroteq/XCBR.Pos.stVal

Note: For a complete list of DAs refer to the IEC 61850-7-3 standard. For DOs, refer to IEC 61850-7-4.

Table 1: Partial list of data object abbreviations

Abbreviation	Data object
AirFlwRte	Air flow rate
Beh	Behavior
Cancel	Cancel
EEName	External equipment name
Health	Health
Loc	Local mode
mag	Magnitude
mod	Operating mode
NamPlt	Nameplate
oper	Operation
origin	Origin
SBOw	Selection value

Table 2: Partial list of data attribute abbreviations

Abbreviation	Type(s)	Attribute
Check	UDINT	Check
configRev	STRING(255)	Configuration revision
ctlModel	SINT	Control model
ctlNum	USINT	Control number
ctlVal	SINT, BOOL	Control value
d	STRING(255)	Device
dataNs	STRING(255)	Name space
db	UDINT	Deadband
f	REAL	Floating point
hwRev	STRING(255)	Hardware revision
Location	STRING(255)	City/region/country
model	STRING(255)	Model

multiplier	SINT	Multiplier
orCat	SINT	Origin category
orIdent	STRING(255)	Origin identification
sboClass	SINT	SBO class
serNum	STRING(255)	Serial number
SIUnit	SINT	SI unit
stSeld	BOOL	Select
stVal	SINT, BOOL	Present status
swRev	STRING(255)	Software revision
T	LREAL	Timestamp
Test	BOOL	Test
vendor	STRING(255)	Vendor

1.1.3. Description of control models for operating the equipment

The IEC 61850 protocol provides several control models for operating the equipment. The following models are supported by the RightWON:

- **Direct operation model with normal security (DOns):** This control model is the simplest. There is no need to select the object before executing an operation. There is no verification of the success or failure of the operation.
- **Direct operation model with execution status (DOes):** This control model permits executing an operation without prior selection of the object. In addition, it verifies the success of the operation. If the operation fails, an error message is sent.
- **Select-before-operate model with normal security (SBOns):** This control model requires that the client first select the object to be controlled before operating it within a specified time. If the time period elapses and the operation command has not been issued, the object is automatically deselected and cannot be operated unless the client selects it again and executes before the allotted time. Only one client at a time can select and operate an object. This model does not verify the success or failure of the operation.
- **Select-before-operate model with execution status (SBOes):** This model is identical to the SBOns model, but in addition verifies the success of the operation. If the operation fails, an error message is sent. The model supported by the RightWON is the dual point of control (DPC) type, which is used for implementing the XCBR (circuit breaker) type of logical node. DPC supports 2 outputs for controlling the circuit breaker (opening and closing) and two inputs for obtaining its position (open, closed, in transit, discordance).

1.1.4. Support of IEC 61850 features

The International Electrotechnical Commission (www.iec.ch) recognizes that it is not necessary to support all of the features offered by the IEC 61850 protocol. Only a certain number are required and all others are optional. The RightWON supports most of these features. Thus it is important to read the manufacturer's MICS, PICS, PIXIT and TICS. It is recommended to read the IEC 61850 standard for a better understanding of its integration.

1.1.5. Support of the IEC 61400-25 standard

The IEC 61400-25 standard is a communication standard for the monitoring and control of wind power plants. It is recommended to read the IEC 61400-25 standard for a better understanding of its integration.

1.2. Document scope

This document describes the integration of the IEC 61850 communication protocol in the RightWON system using the RightWON Configuration Suite software.

Note: You must register the license key on the platform before you can use it. You can obtain the license key from your sales representative.

1.2.1. Other documents

For further details on the information in this document, refer to the specific manuals below:

Reference No.	Document Name
RWM000010-MA	RightWON Configuration Suite Manual
RWM000050-MA	RightWON Satellite – User Guide
RWM000060-MA	RightWON Engine IEC61850-3 – User Guide
RWM000061-MA	RightWON Engine Rackmount – User Guide
RWM000062-MA	RightWON Engine Standalone – User Guide
RWM000080-MA	RightWON Configuration Suite – Application Guide

1.3. Document conventions

To facilitate the reading of this document the following conventions are used:

- Menu/dialog controls and items are in **bold**, e.g. **Options/Advanced settings...**, as are buttons, e.g. **OK**
- Names that are defined by the system integrators are in *italics*, e.g. *John Smith, Generator*
- [Hyperlinks](#) are in blue
- The ⚠ symbol is used to raise the reader's attention.

1.4. Safety precautions

To ensure the safety of personnel and products, and to prevent the risk of accident, you must strictly follow the cautions and warnings written on product labels, in the manuals and on the RightWON product packaging.

To ensure proper operations of the RightWON product, read this manual in its entirety before proceeding to the other stages of learning, hardware installation, configuration or operation. Make sure that you fully understand the product and all information provided in this manual. For further information or if you require assistance, contact your sales representative (certain fees and conditions may apply, depending on the type of service requested).

1.4.1. Warnings

RightWON products are not designed for safety management applications or as security devices. Mishandling of this product could cause critical situations leading to personal, equipment or property damage, network failure, loss of data, electrical shock, serious injury or even death. To prevent such events from occurring:

- Take all possible measures to ensure the security of your systems through the use of appropriate equipment that meets the requirements of the application. This will help preserve the integrity of your systems in the event of product failure or other external factors.
- To prevent the risk of explosion, do not use RightWON products in areas where explosives are stored without taking appropriate measures as defined by the standards and regulations in effect, obtained from the proper local authorities.
- To prevent damage to electronic components, do not expose this product to open flame or submit it to environmental factors that exceed the recommended levels.
- Batteries may explode if they are not handled with care. Do not recharge, disassemble or dispose of in fire. We recommend that you recycle these items by taking them to the appropriate collection service.

1.4.2. Cautions

- Make sure that RightWON products are managed by qualified personnel who have been properly trained to install, configure and troubleshoot them.
- Always configure and operate this product within the technical specifications and operating criteria recommended by Vizimax, as cited in this manual and the other technical documents available.
- Use homologated external emergency devices, including but not limited to: emergency stop, emergency signaling, interlock and safety circuitry.
- Properly connect and secure removable cables and connectors. Loose connections could overheat and catch fire.
- Protect all power supplies and connect to ground on the equipment using an appropriate connection. Failure to protect and/or ground the equipment could lead to fatal electrical shock.
- Take all possible measures to prevent foreign materials from falling into the product interior (liquids, flammable materials, metal objects, etc.).
- Turn the equipment off and disconnect all sources of power before undertaking any procedure whatsoever on the equipment.



Prerequisites for Configuring the IEC 61850 Protocol

Before configuring the IEC 61850 protocol, make sure that the following steps have been carried out:

1. To configure a port and an Ethernet link, refer to the topic *Configuring the unit* in the document *RWM0000010, RightWON Configuration Suite Manual*.
The RightWON supports the IEC 61850 protocol on an Ethernet communication link using TCP/IP.
2. Configure an SCL file using your SCL editor or the editor in the Configuration Suite. Refer to the document *RWM0000010, RightWON Configuration Suite Manual*.
The editor must comply with the rules regarding data and SCL files defined in the IEC 61850-6 standard.
3. [Configure the project properties](#) to use status bits and user bits, and configure the compilation settings for IEC 61850.
4. Add the library of function blocks for the IEC 61850 server, referring to the document *RWM0000010-MA-en, RightWON Configuration Suite Manual*. Contact your sales representative to obtain the library.

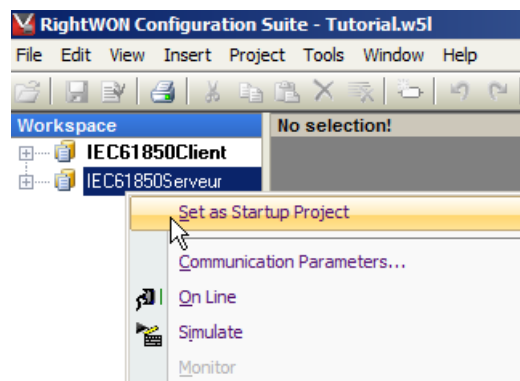
Note: A license is required to use the IEC 61850 protocol in the RightWON unit, but is not required to configure this protocol using the RightWON Configuration Suite. Refer to the topic *Activating your advanced feature license* in the document *RWM0000010-MA-en, RightWON Configuration Suite Manual*.

2.1. Configuring the project properties

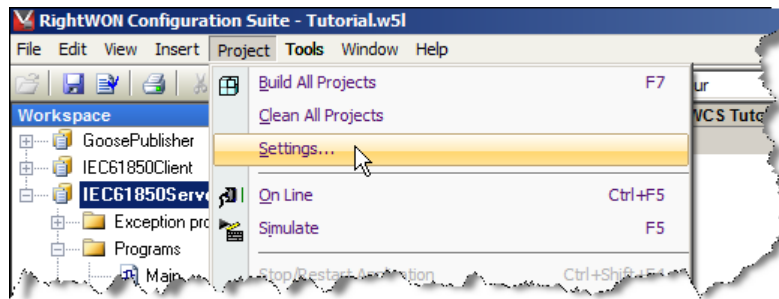
The IEC 61850 protocol supports timestamps and status bits associated with the data. By default, the project settings do not activate these functions.

To configure the status bits and user bits, and configure the compilation settings for IEC 61850, carry out the following steps:

- 1- If several projects are displayed in the Workspace, right-click the project and click **Set as Startup Project**.

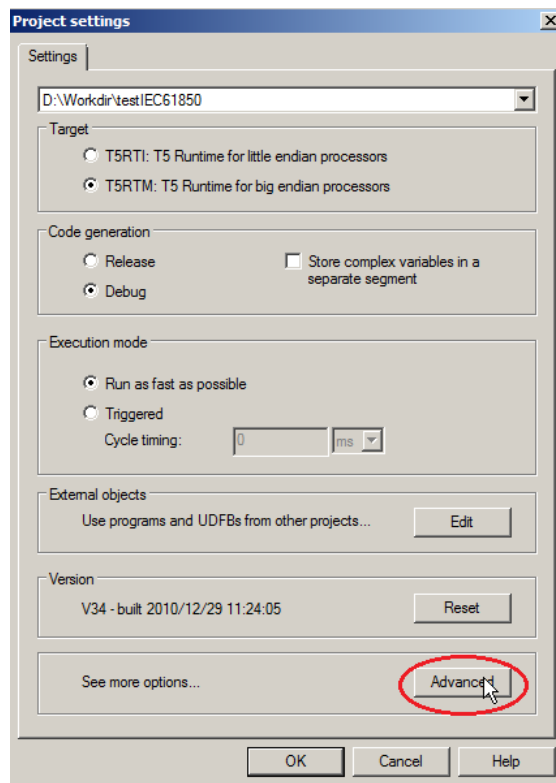


- 2- Under the **Project** menu, click **Settings...**



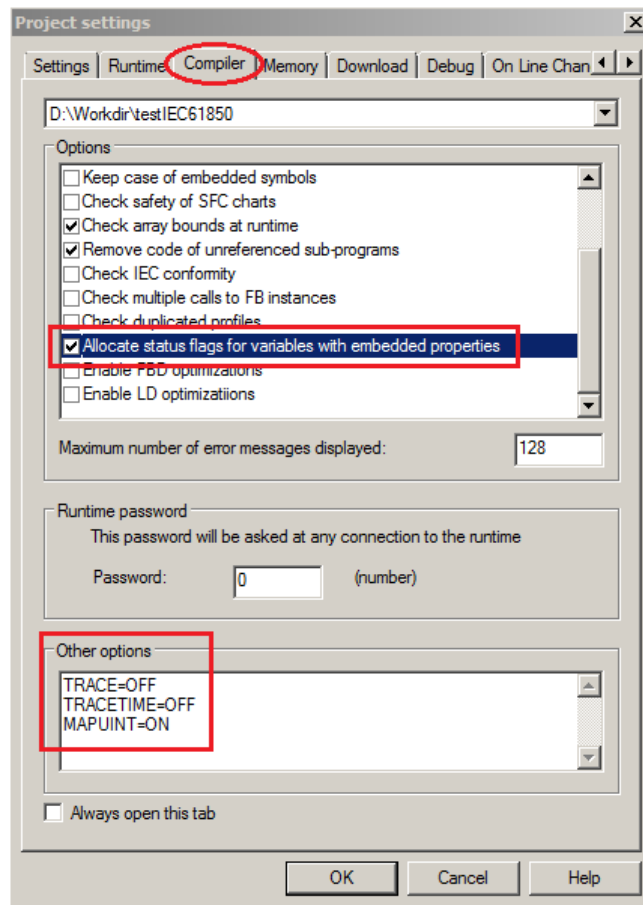
The *Project settings* window appears.

- 3- Click on **Advanced**.



- 4- Click the **Compiler** tab.
- 5- To use the VSI and user bits, click on the **Allocate status flags for variables with embedded properties** checkbox.

- 6- To configure the compilation settings for IEC 61850, enter **MAPUINT=ON** in the **Other options** box.



- 7- Click **OK**.





Configuring the IEC 61850 Server Protocol

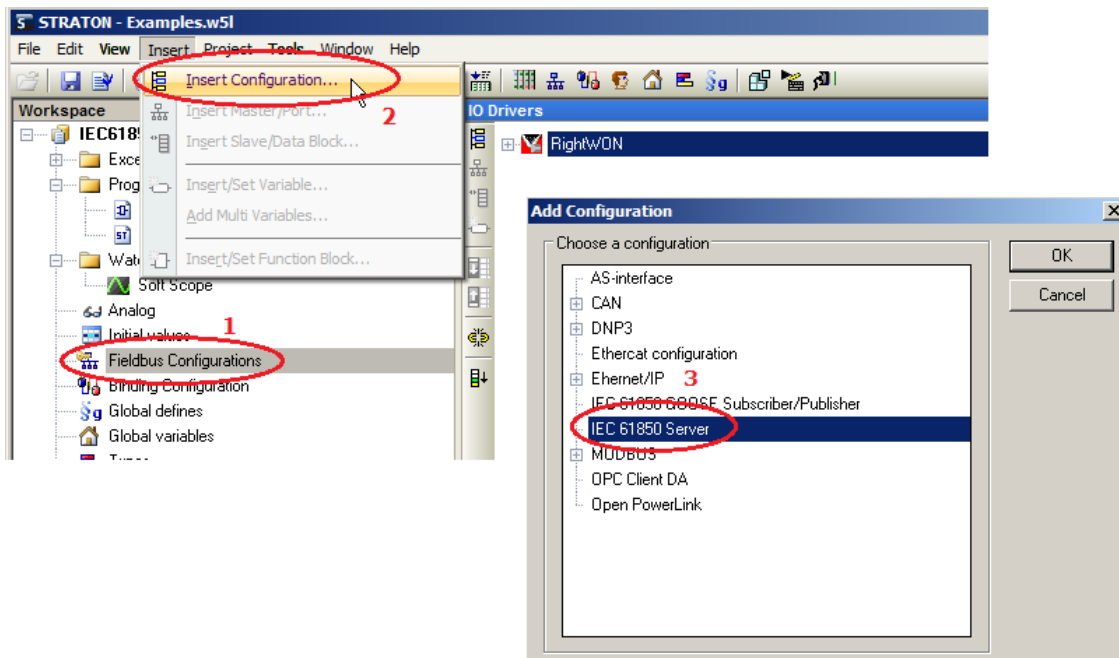
Configuration of an IEC 61850 Server in the RightWON requires the following steps:

- 1- Review the [prerequisites for configuring the IEC 61850 protocol](#)
- 2- [Add the IEC 61850 Server protocol](#) to the RightWON configuration
- 3- [Import the SCL file](#) to create the variables
- 4- [Configure the IEC 61850 Server protocol properties](#)
- 5- [Operate the equipment](#) according to a control model

3.1. Adding the IEC 61850 Server protocol

If the IEC 61850 Server protocol was not added during creation of a new project, carry out the following steps to add it:

- 1- Double click on **Fieldbus configurations** .
- 2- Under the **Insert** menu, click **Insert Configuration...** .
- 3- Click on the **IEC 61850 Server** protocol.
- 4- Click **OK**.



3.2. Importing the SCL file

The variables are created when you import the SCL file. To do this, carry out the following steps:

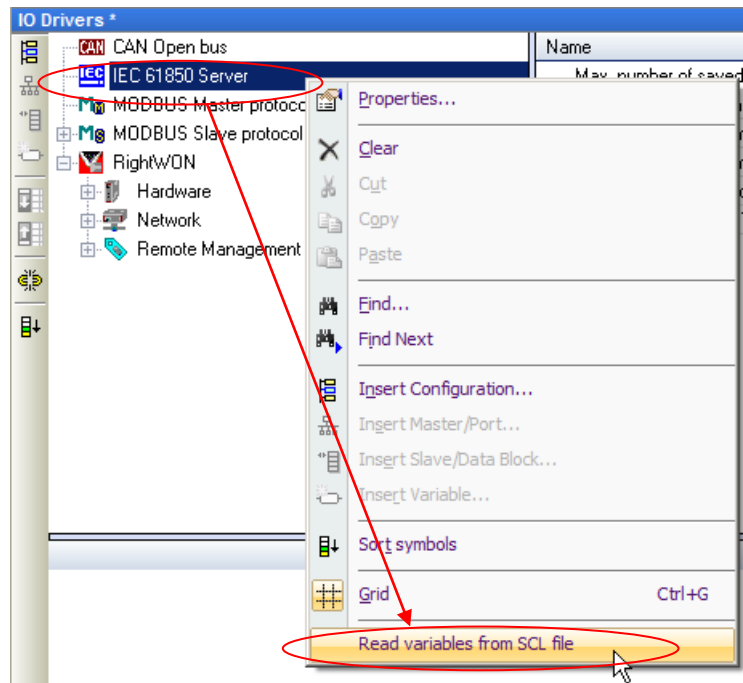
⚠ The latest file to be imported is the one that will be used. If variables from an old file are still present in the IEC 61850 profile when they are no longer used, the RightWON will issue errors and will not start the application. Thus you must delete the old variables first.

1- Double-click on **Fieldbus configurations** .

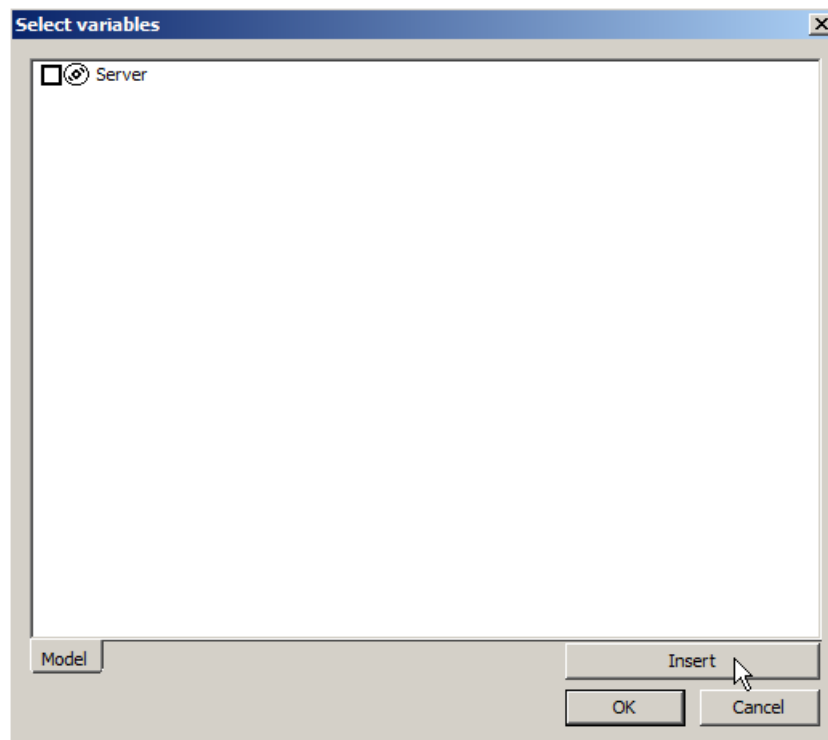
The IO Drivers window opens.

2- Right-click on **IEC 61850 Server**.

3- Click **Read variables from SCL file**.

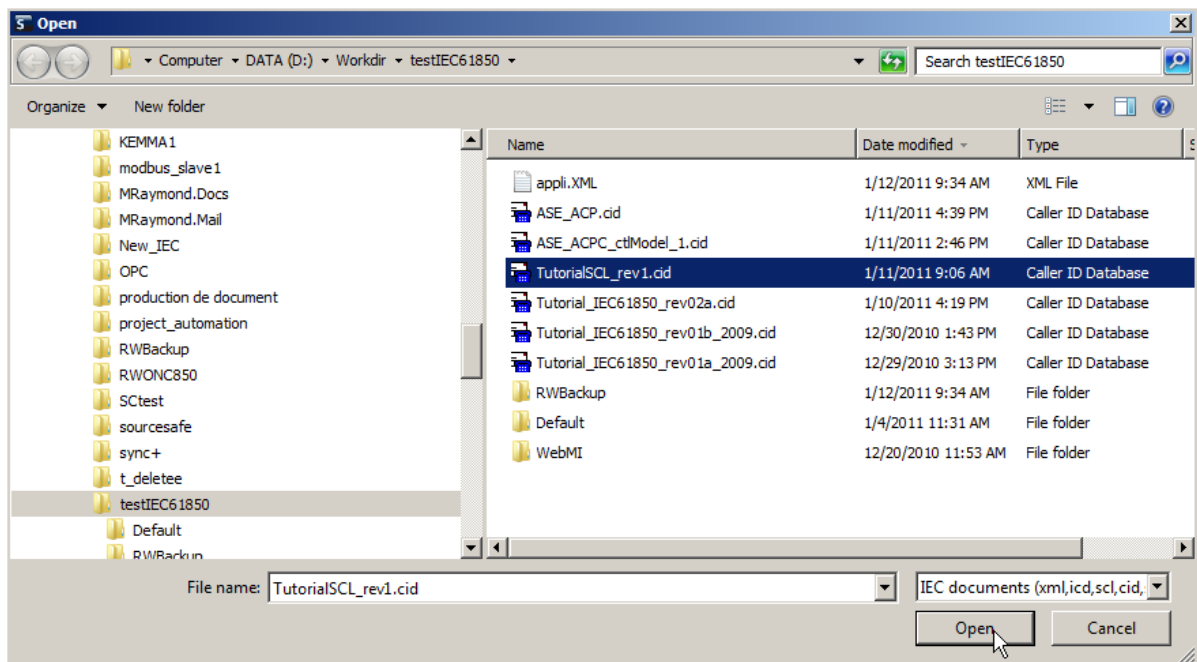


4- Click **Insert**.



5- Select your SCL file.

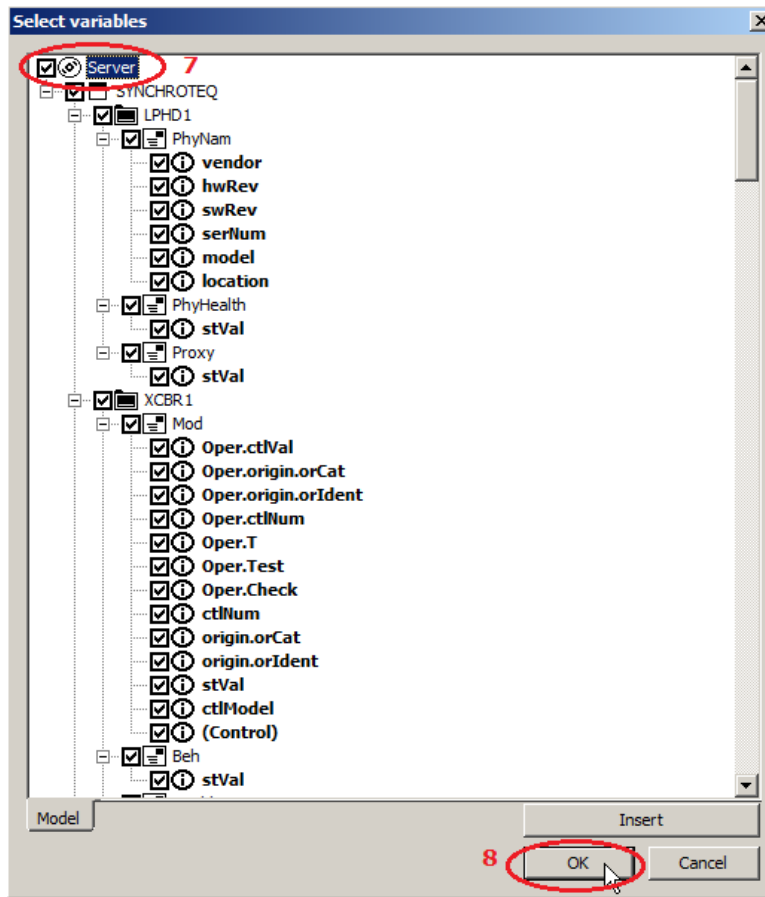
6- Click **Open**.



7- To insert all of the variables, check the **Server** checkbox.

If you are loading a new version of the file, the items that are already present are checked and in bold.

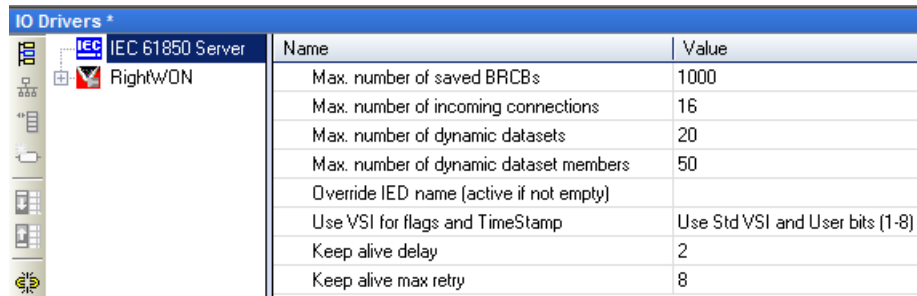
8- Click **OK**.



3.3. Configuring the IEC 61850 Server protocol properties

After adding the IEC 61850 Server protocol, configure its properties by carrying out the following steps:

- 1- Click on the **IEC 61850 Server**.
- 2- To configure the parameters that follow:
 - a. Double-click on the parameter field.
 - b. Enter the value according to the requirements of the application. Refer to the following table for parameter descriptions.
 - c. Press the **Enter** key.



Name	Value
Max. number of saved BRCBs	1000
Max. number of incoming connections	16
Max. number of dynamic datasets	20
Max. number of dynamic dataset members	50
Override IED name (active if not empty)	
Use VSI for flags and TimeStamp	Use Std VSI and User bits (1-8)
Keep alive delay	2
Keep alive max retry	8

Parameter	Description
Max. number of saved BRCBs (Buffered Report Control Blocks)	Maximum number of control blocks for buffered reports (from 1 to 1000).
Max. number of incoming connections	Maximum number of simultaneous incoming connections (from 1 to 16). This defines the maximum number of clients.
Max. number of dynamic datasets	Maximum number of dynamic datasets (from 1 to 16).
Max. number of dynamic dataset members	Maximum number of members in a dynamic dataset (from 1 to 50)
Override IED name	Permits replacing the IED name defined in the SCL file with the name specified in this field. This parameter is inactive when the field is empty.
Use VSI for flags and TimeStamp	Permits the use of quality/test bits and timestamps according to the following options: <ul style="list-style-type: none"> If you do not wish to use the status bits associated with the variables (VSI), click Don't use VSI. To use the status bits associated with the variables (VSI), click Use Std VSI. To use the status bits associated with the variables (VSI) and the user bits (1-8), click Use Std VSI and User bits (1-8).
Keep alive delay	Delay between keep alive signals for keeping the communication link up.
Keep alive max retry	Maximum number of retries after the failure of a keep alive signal.

3.4. Operating the equipment

To be able to operate the equipment, you must use the model that was defined in the SCL file configuration:

1. Add a new program in the **FBD-Function block diagram** language. Refer to the topic *Developing IEC 61131-3 PLC automation applications* in the document *RWM000010-MA-en, RightWON Configuration Suite Manual*.
2. In the Workspace, double-click on the FBD program in the **Programs** folder.

3. Select the control model to be used:

NOTE: For further information on the types of nodes, DOs and DAs, refer to the IEC 61850-7-3 and IEC 61850-7-4 standards.

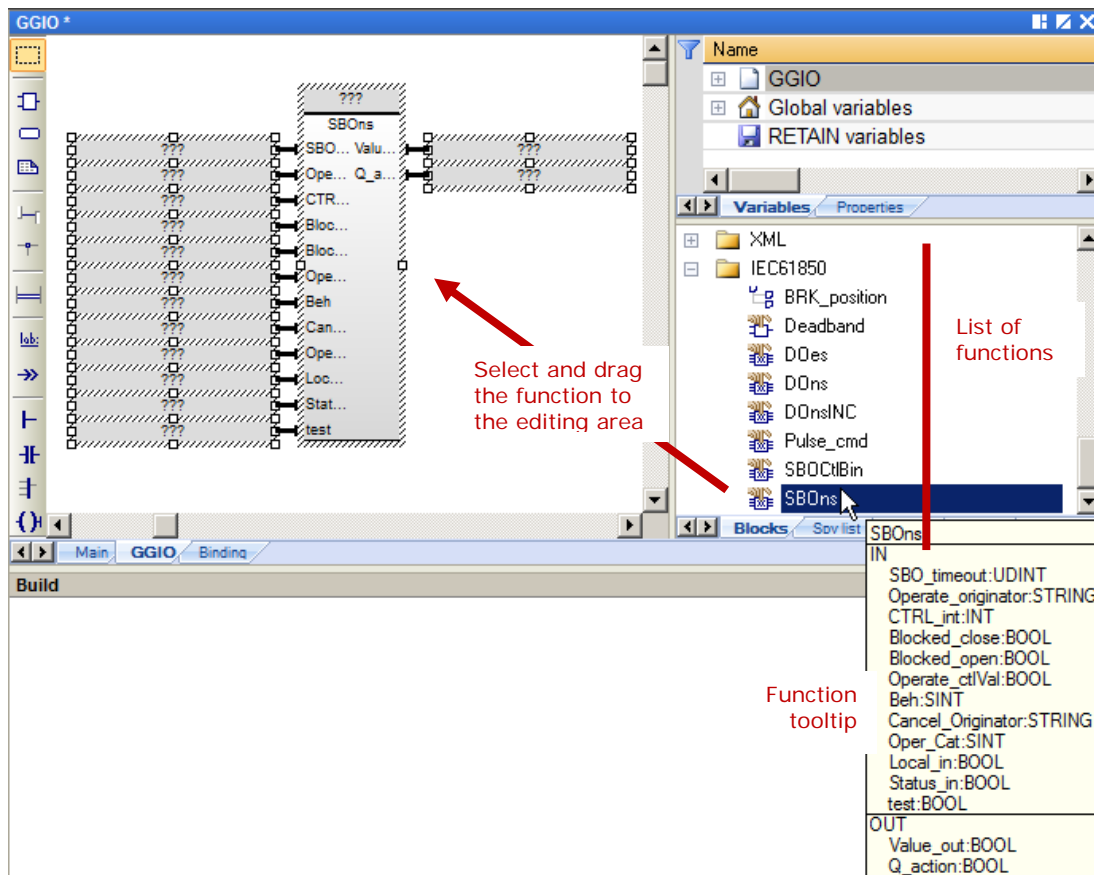
- Configuring the SBOs model.
- Configuring the SBOes model.
- Configuring the DOs model.
- Configuring the DOes model.

4. Control the output in order to operate the equipment.

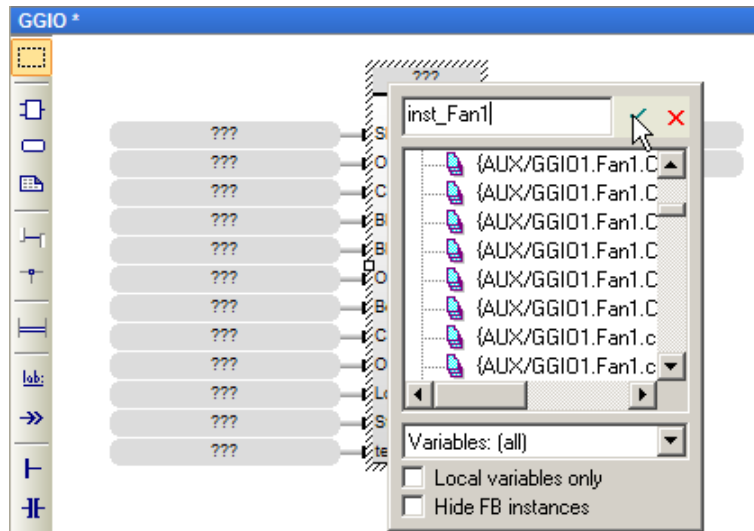
3.4.1. Configuring the SBOs model

To configure the SBOs model, carry out the following steps:

- 1- Select and drag the **SBOs** function in the IEC61850 folder from the list of functions to the editing area of the program.

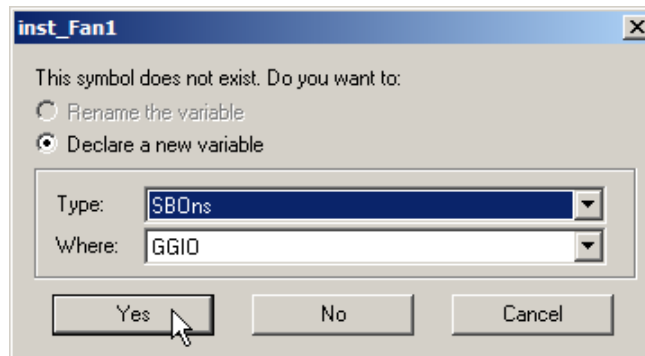


- 2- Double-click on the **???** box at the top of the block.
- 3- Enter a variable name in the block, for example *inst_Fan1*.
- 4- Click on the green checkmark.



If the variable does not exist, a window appears for declaring a new variable.

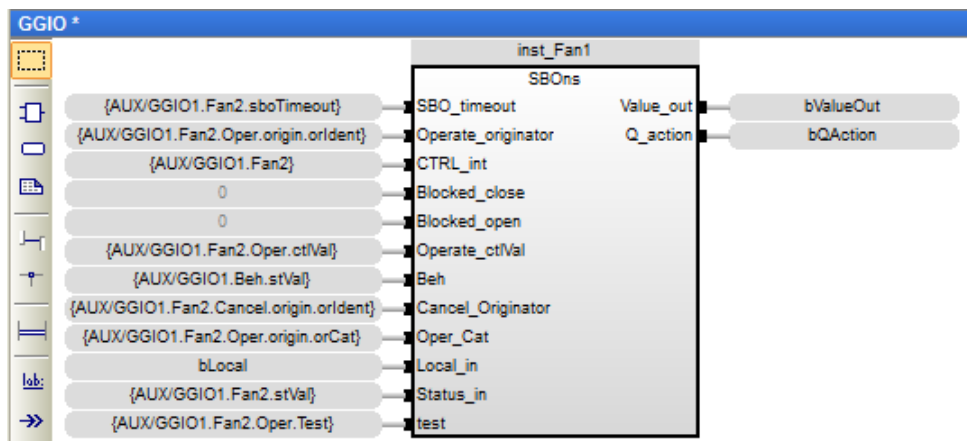
- 5- Click **Yes** to declare the new variable.



- 6- To configure the inputs and outputs of the block:
 - a. Double-click the **???** of an input or output.
 - b. Select the variable or enter the name of a new variable according to the following table.
 - c. Click on the green checkmark.

Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
SBO_timeout	Input	<i>LDevice_XCBR1_Pos_sbo_Timeout</i>
Operate_originator	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orIdent</i>
CTRL_int	Input / Output	<i>LDevice_XCBR1_Pos</i>
Blocked_close	Input	<i>LDevice_XCBR1_BlkCls.stVal</i> or enter 0 to not use.
Blocked_open	Input	<i>LDevice_XCBR1_BlkOpn.stVal</i> or enter 0 to not use.
Operate_ctlVal	Input	<i>LDevice_XCBR1_Pos_Oper_ctlVal</i>
Beh	Input	<i>LDevice_XCBR1_Beh_stVal</i>
Cancel_Originator	Input	<i>LDevice_XCBR1_Pos_Cancel_origin_orIdent</i>
Oper_Cat	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orCat</i>
Local_in	Input	To determine whether the unit is in local or remote mode, enter the name of a new Boolean variable, for example <i>bLocal</i> .
Status_In	Input	<i>LDevice_XCBR1_Pos_stVal</i>
Test_oper	Input	<i>LDevice_XCBR1_Pos_Oper_Test</i>
Value_Out	Output	Enter the name of a new Boolean variable, for example <i>bValueOut</i> . This output is the value that you wish to control.
Q_action	Output	Enter the name of a new Boolean variable, for example <i>bQAction</i> . This output sends a one-second pulse in high state when a valid command goes through. Thus it must be associated with a new variable that will be used to trigger a change in value on output.

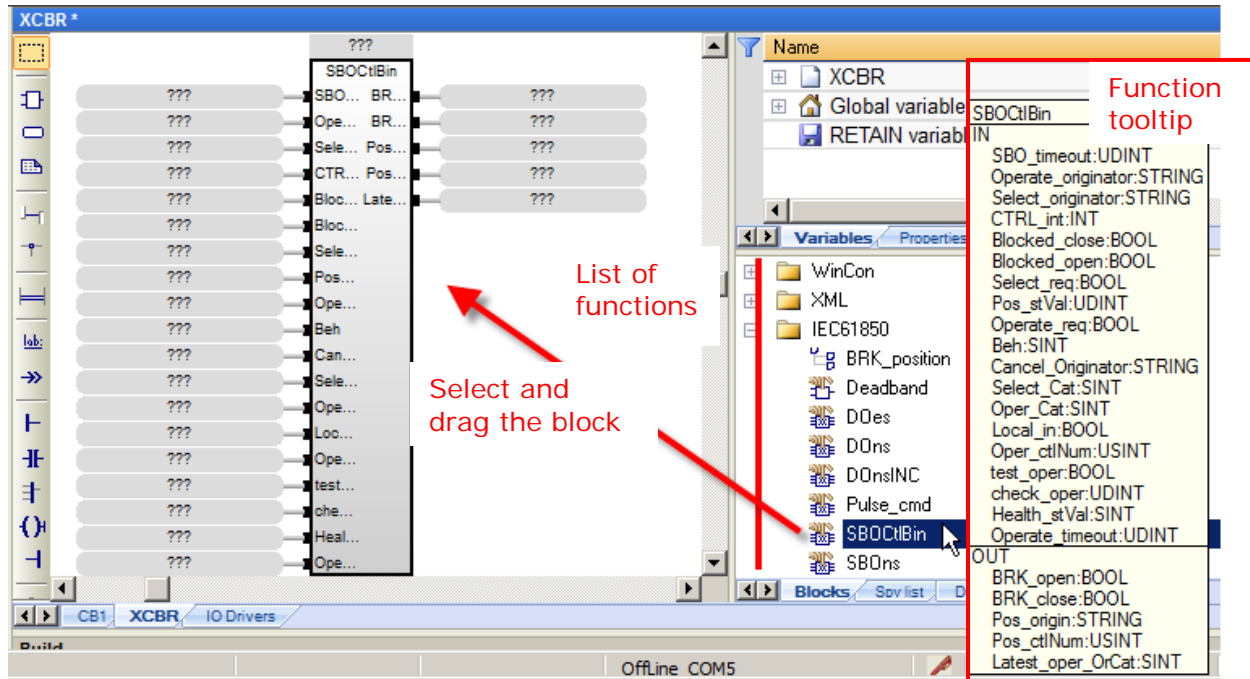
7- The SBOs block is now configured; see the example in the figure below.



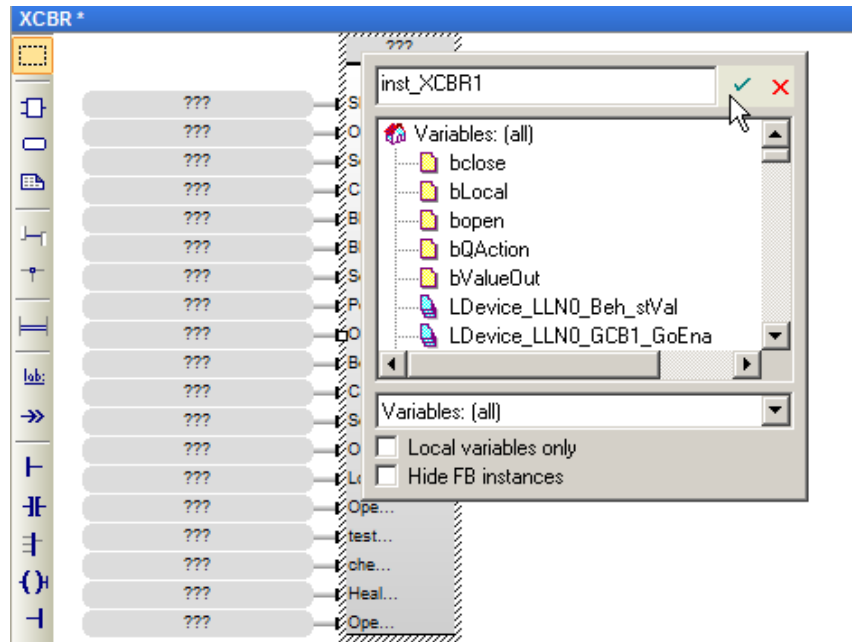
3.4.2. Configuring the SBOes model

To configure the SBOes model, carry out the following steps:

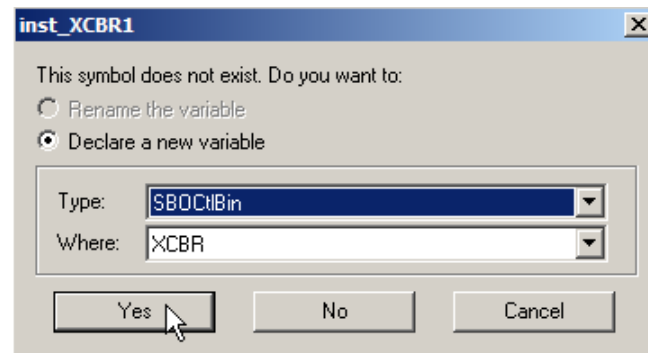
- 1- Select and drag the **SBOCtlBin** function in the IEC61850 folder from the list of functions to the editing area of the *XCBR* program.



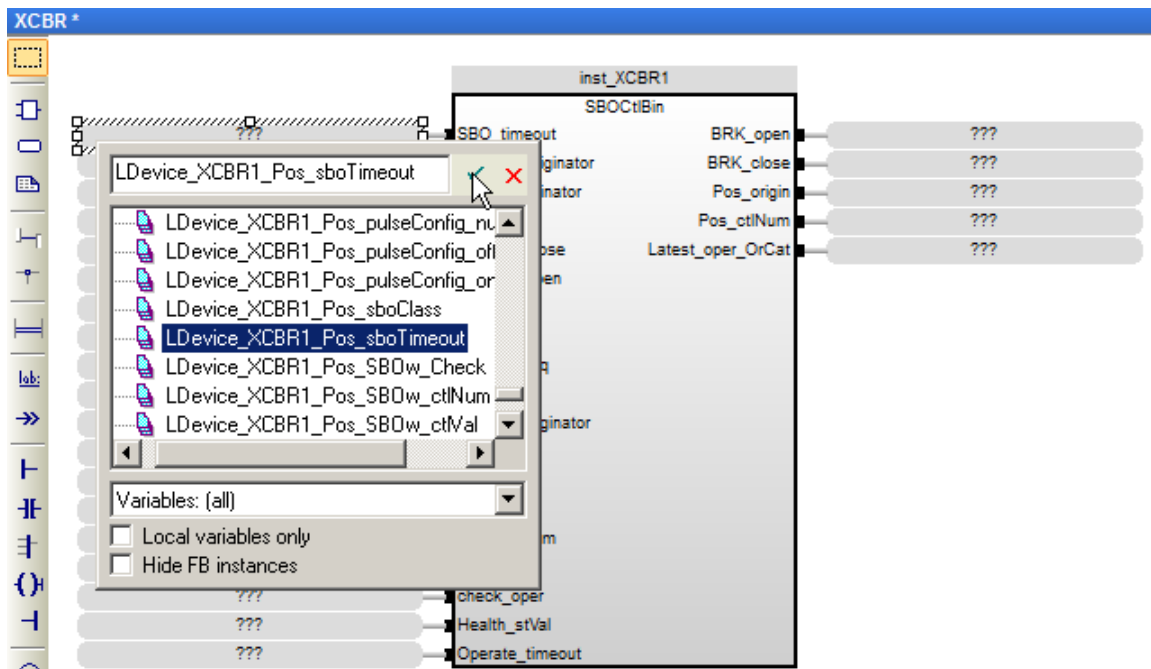
- 2- Double-click on the **???** box at the top of the block.
- 3- Enter a variable name in the block, for example *inst_XCBR1*.
- 4- Click on the green checkmark.



- 5- Click **Yes** to accept creation of the variable.

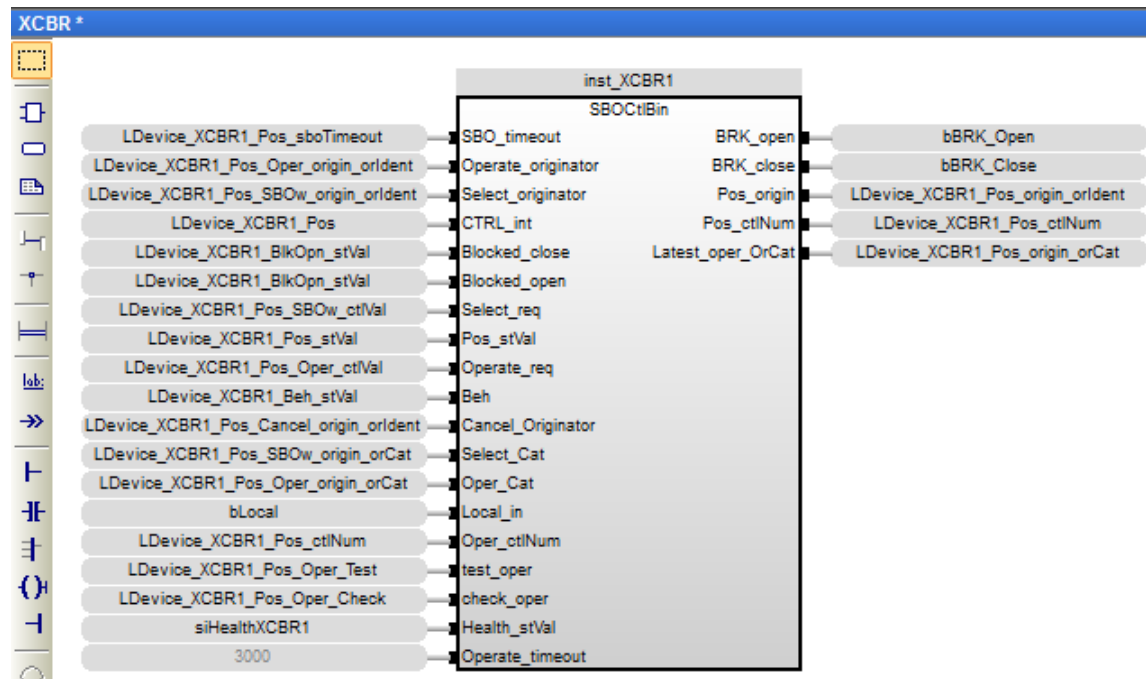


- 6- To configure the inputs and outputs of the block:
- Double-click the **???** of an input or output.
 - Select the variable or enter the name of a new variable according to the following table.
 - Click on the green checkmark.



Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
SBO_timeout	Input	<i>LDevice_XCBR1_Pos_sbo_Timeout</i>
Operate_originator	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orIdent</i>
Select_originator	Input	<i>LDevice_XCBR1_Pos_SBOw_origin_orIdent</i>
CTRL_int	Input / Output	<i>LDevice_XCBR1_Pos</i>
Blocked_close	Input	<i>LDevice_XCBR1_BlKcls.stVal</i>
Blocked_open	Input	<i>LDevice_XCBR1_BlKOpn.stVal</i>
Select_req	Input	<i>LDevice_XCBR1_Pos_SBOw_ctlVal</i>
Pos_stVal	Input	<i>LDevice_XCBR1_Pos_stVal</i>
Operate_req	Input	<i>LDevice_XCBR1_Pos_Oper_ctlVal</i>
Beh	Input	<i>LDevice_XCBR1_Beh_stVal</i>
Cancel_Originator	Input	<i>LDevice_XCBR1_Pos_Cancel_origin_orIdent</i>
Select_Cat	Input	<i>LDevice_XCBR1_Pos_SBOw_origin_orCat</i>
Oper_Cat	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orCat</i>
Local_in	Input	To determine whether the unit is in local or remote mode, enter the name of a new Boolean variable, for example <i>bLocal</i> .
Oper_ctlNum	Input	<i>LDevice_XCBR1_Pos_ctlNum</i>
Test_oper	Input	<i>LDevice_XCBR1_Pos_Oper_Test</i>
Check_oper	Input	<i>LDevice_XCBR1_Pos_Oper_Check</i>
Health_stVal	Input	<i>LDevice_XCBR1_Health_stVal</i>
Operate_timeout	Input	Enter a number in milliseconds, for example <i>3000</i> .
BRK_open	Output	Enter the name of a new Boolean variable, for example <i>bBRK_Open</i> . This output goes to high state during a circuit breaker opening command.
BRK_close	Output	Enter the name of a new Boolean variable, for example <i>bBRK_Close</i> . This output goes to high state during a circuit breaker closing command.
Pos_origin	Output	<i>LDevice_XCBR1_Pos_origin_orIdent</i>
Pos_ctlNum	Output	<i>LDevice_XCBR1_Pos_ctlNum</i>
Latest_oper_OrCat	Output	<i>LDevice_XCBR1_Pos_origin_orCat</i>

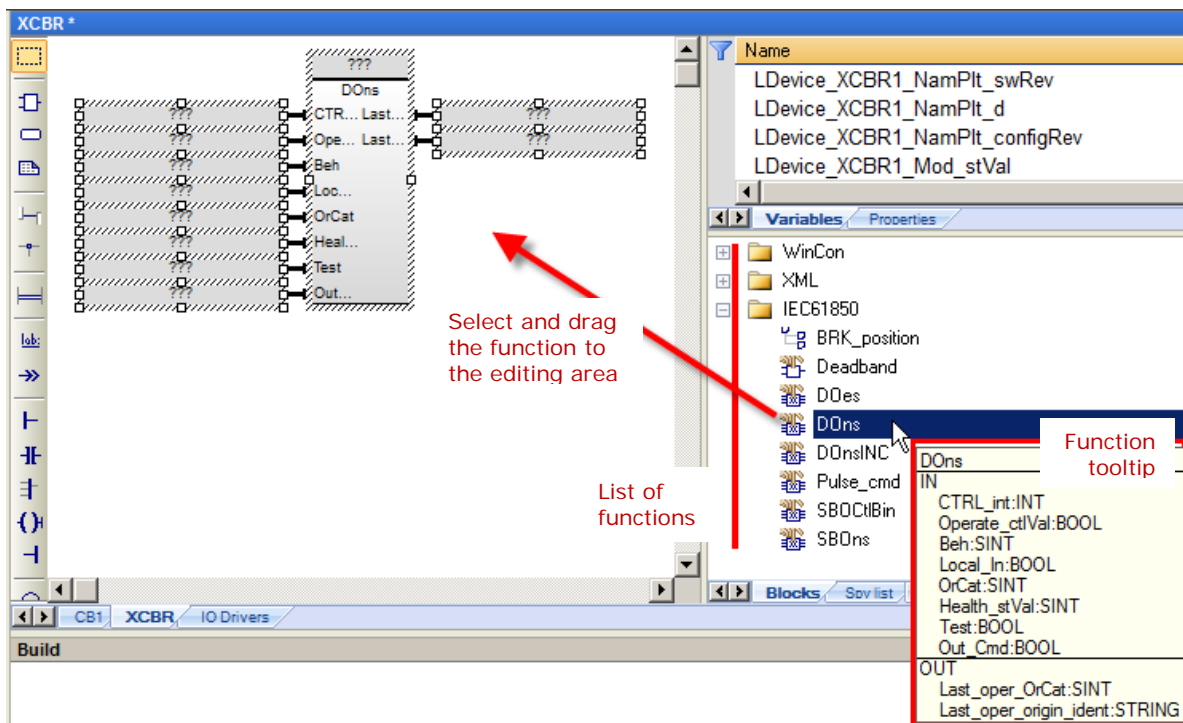
7- The SBOes block is now configured; see the example in the figure below.



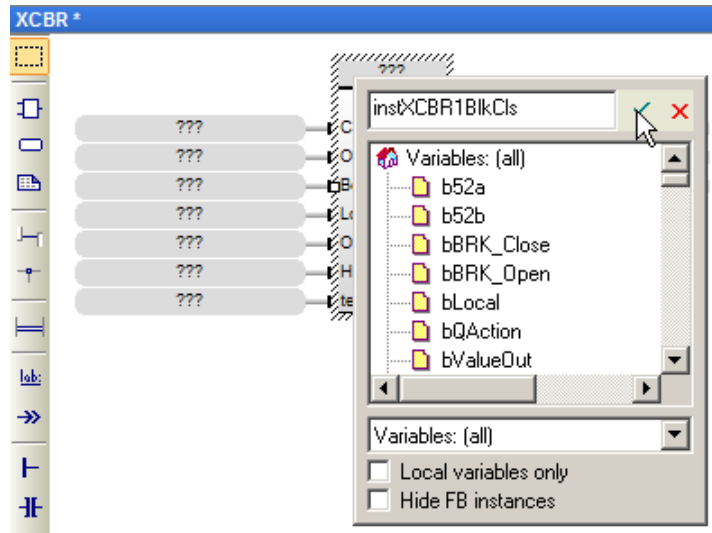
3.4.3. Configuring the DOns model

To configure the DOns model, carry out the following steps:

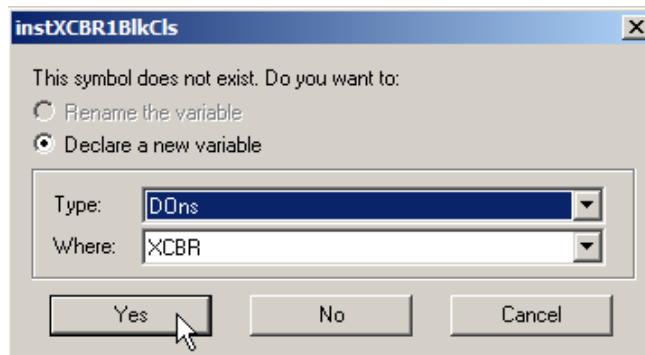
- 1- Select and drag the **DOns** function in the IEC61850 folder from the list of functions to the editing area of the *XCBR* program.



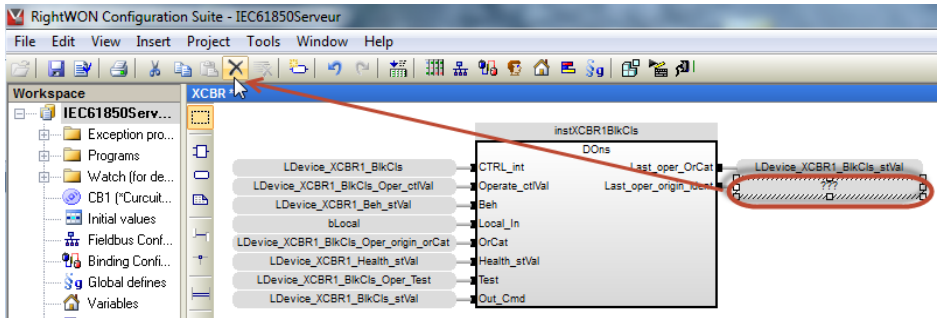
- 2- Double-click on the **???** box at the top of the block.
- 3- Enter a variable name in the block, for example *instXCBR1BlkCls*.
- 4- Click on the green checkmark.



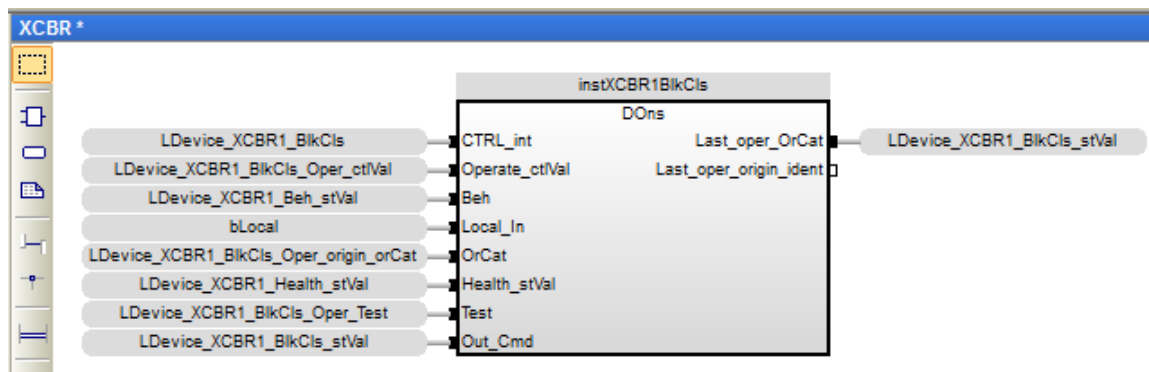
- 5- Click **Yes** to accept creation of the variable.



- 6- To configure the inputs and outputs of the block:
 - a. Double-click the **???** of an input or output.
 - b. Select the variable or enter the name of a new variable according to the following table.
 - c. Click on the green checkmark.

Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
CTRL_int	Input / Output	<i>LDevice_XCBR1_BlkCls</i>
Operate_ctlVal	Input	<i>LDevice_XCBR1_BlkCls_Oper_ctlVal</i>
Beh	Input	<i>LDevice_XCBR1_Beh_stVal</i>
Local_in	Input	To determine whether the unit is in local or remote mode, enter the name of a new Boolean variable, for example <i>bLocal</i> .
OrCat	Input	<i>LDevice_XCBR1_BlkCls_Oper_origin_orCat</i>
Health_stVal	Input	<i>LDevice_XCBR1_Health_stVal</i>
Test_oper	Input	<i>LDevice_XCBR1_BlkCls_Oper_Test</i>
Out_cmd	Input / Output	<i>LDevice_XCBR1_BlkCls_stVal</i>
Last_oper_OrCat	Output	<i>LDevice_XCBR1_BlkCls_origin_orCat</i>
Last_oper_origin	Output	Select the variable and delete it. 

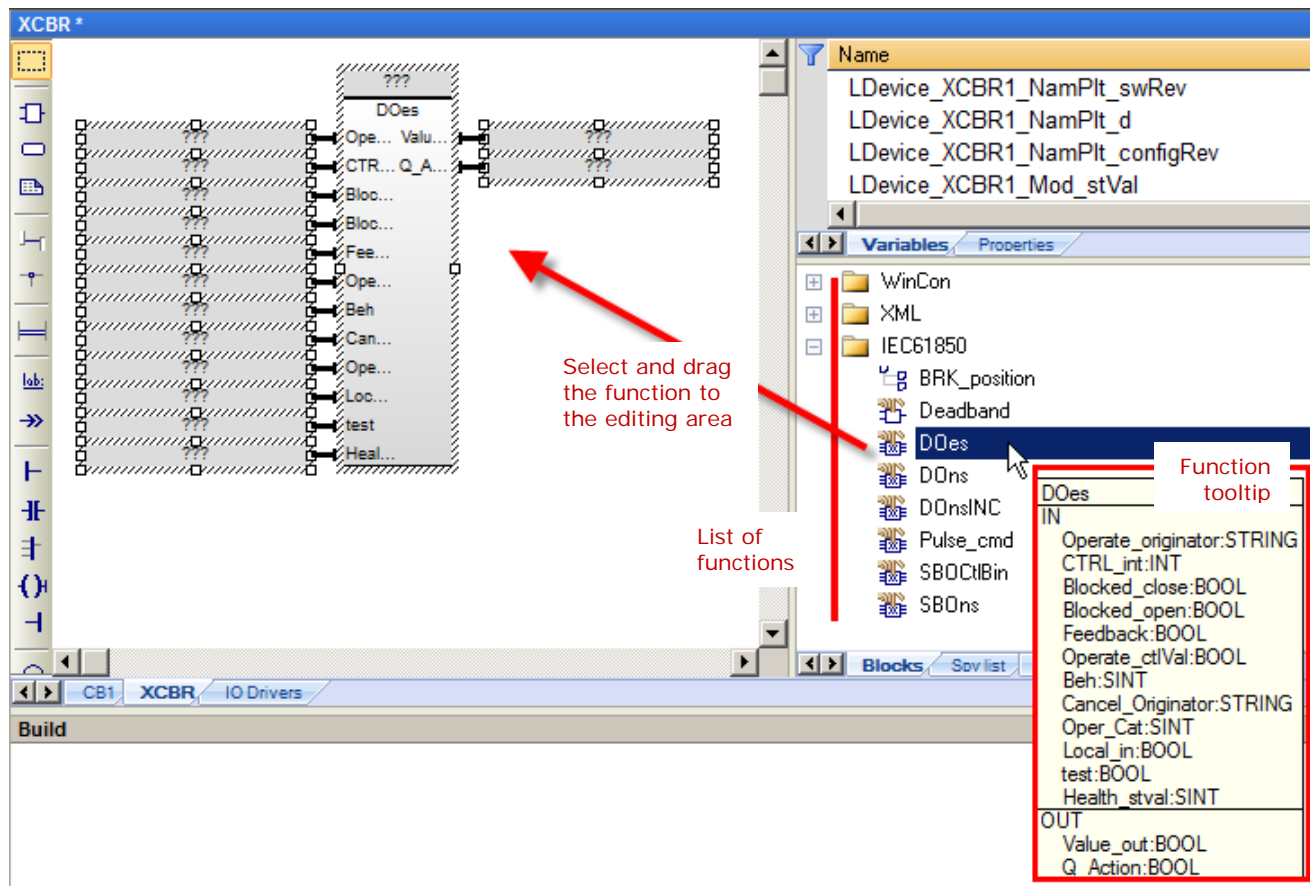
7- The DOs block is now configured; see the example in the figure below.



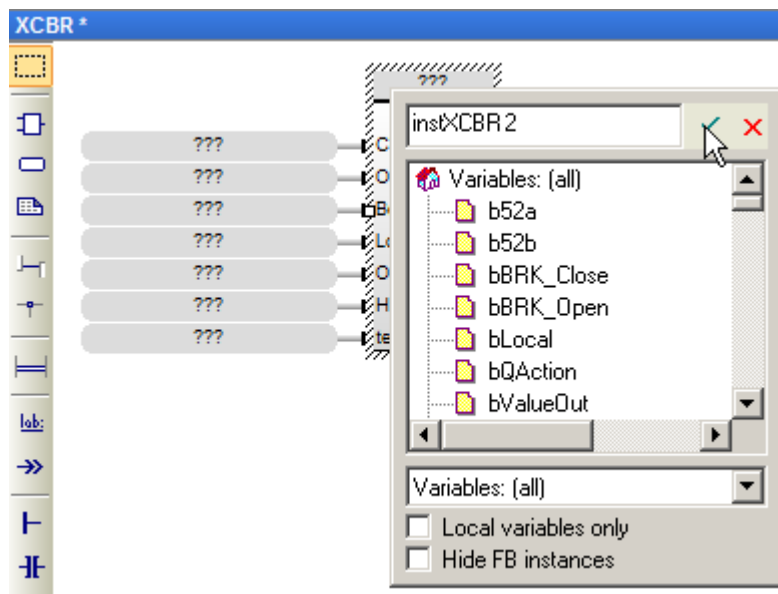
3.4.4. Configuring the DOes model

To configure the DOes model to control the equipment, carry out the following steps:

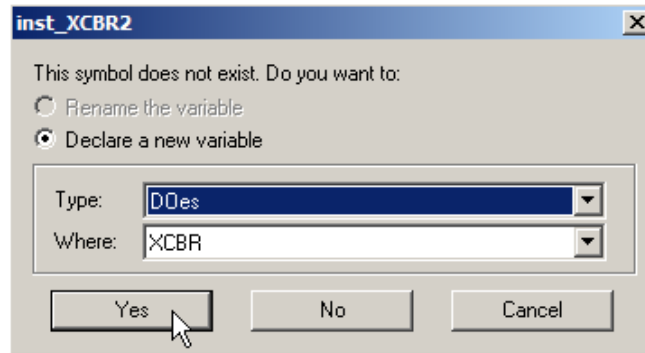
- 1- Select and drag the **DOes** function in the IEC61850 folder from the list of functions to the editing area of the *XCBR* program.



- 2- Double-click on the ??? box at the top of the block.
- 3- Enter a variable name in the block, for example *inst_XCBR2*.
- 4- Click on the green checkmark.



5- Click **Yes** to accept creation of the variable.

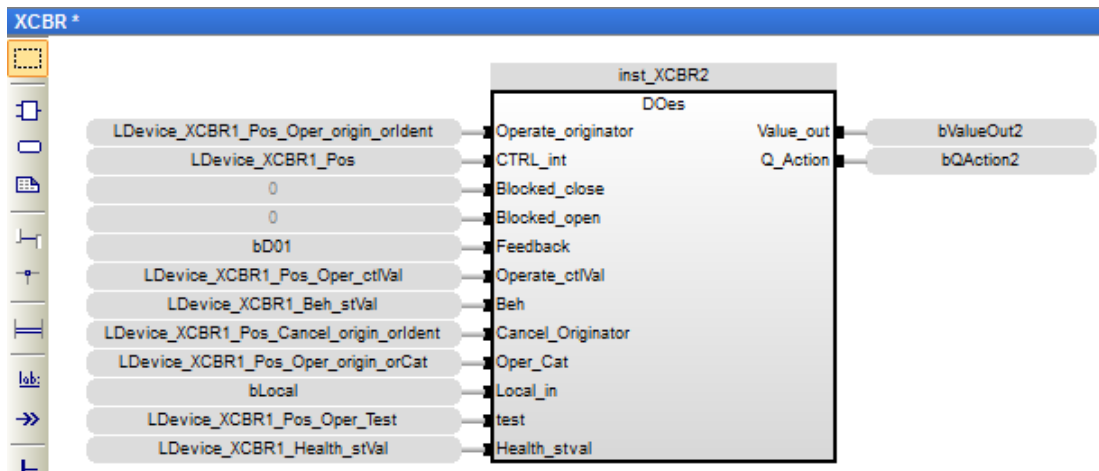


6- To configure the inputs and outputs of the block:

- a. Double-click the **???** of an input or output.
- b. Select the variable or enter the name of a new variable according to the following table.
- c. Click on the green checkmark.

Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
Operate_originator	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orIdent</i>
CTRL_int	Input / Output	<i>LDevice_XCBR1_Pos</i>
Blocked_close	Input	<i>LDevice_XCBR1_BlkcIs.stVal</i> or enter 0 to not use.
Blocked_open	Input	<i>LDevice_XCBR1_Blkopn.stVal</i> or enter 0 to not use.
Feedback	Input	Enter a variable name, for example <i>bD01</i> .
Operate_ctlVal	Input	<i>LDevice_XCBR1_Pos_Oper_ctlVal</i>
Beh	Input	<i>LDevice_XCBR1_Beh.stVal</i>
Cancel_Originator	Input	<i>LDevice_XCBR1_Pos_Cancel_origin_orIdent</i>
Oper_Cat	Input	<i>LDevice_XCBR1_Pos_Oper_origin_orCat</i>
Local_in	Input	To determine whether the unit is in local or remote mode, enter the name of a new Boolean variable, for example <i>bLocal</i> .
Test	Input	<i>LDevice_XCBR1_Pos_Oper_Test</i>
Health_stVal	Input	<i>LDevice_XCBR1_Health_stVal</i>
BRK_open	Output	Enter the name of a new Boolean variable, for example <i>bBRK_Open</i> . This output goes to high state during a circuit breaker opening command.
Value_Out	Output	Enter the name of a new Boolean variable, for example <i>bValueOut</i> . This output is the value that you wish to control.
Q_action	Output	Enter the name of a new Boolean variable, for example <i>bQAction</i> . This output sends a one-second pulse in high state when a valid command goes through. Thus it must be associated with a new variable that will be used to trigger a change in value on output.

7- The DOes block is now configured; see the example in the figure below.



3.4.5. Determining the circuit breaker position

To determine the circuit breaker position from an input/output or via remote inputs, carry out the following steps:

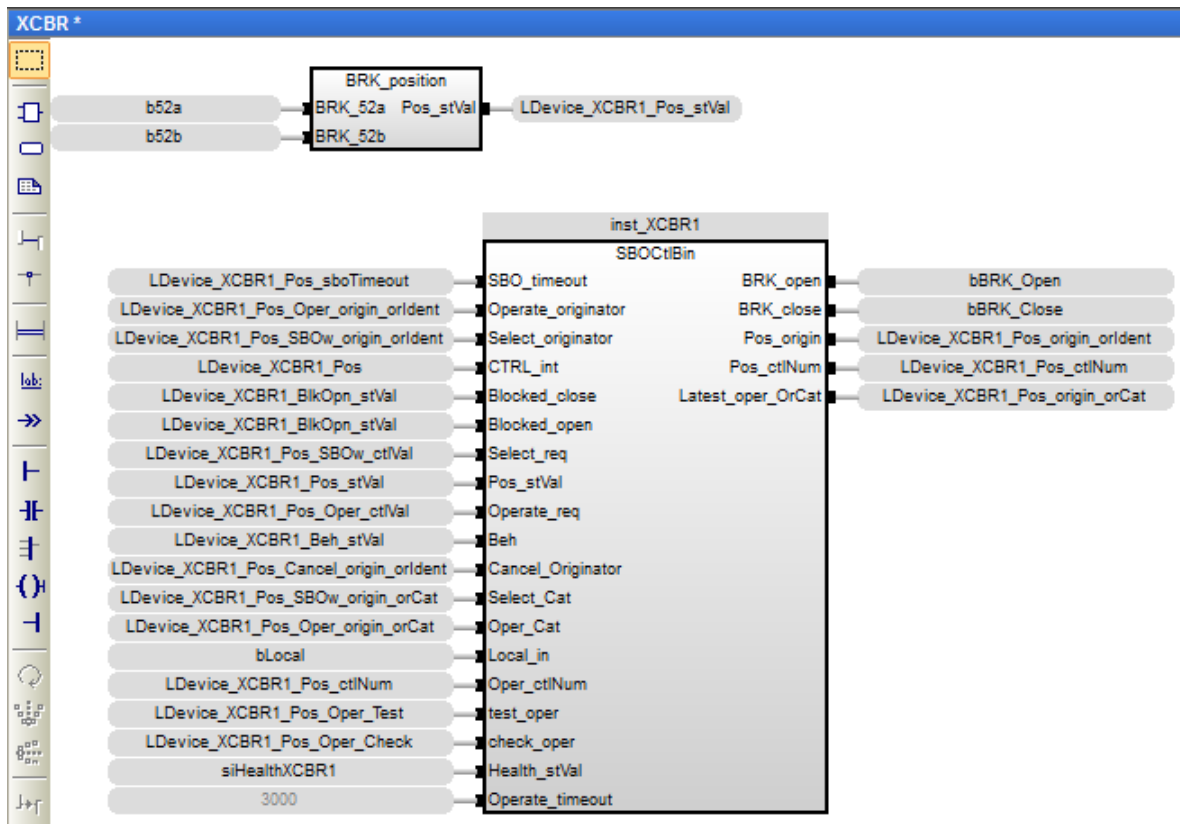
- 1- Select and drag the **BRK_position** function in the IEC61850 folder from the list of functions to the top of the *XCBR* program editing area.

You must put this function above the other blocks that use the **Pos_stVal** variable, so that it will be executed first.

- 2- To configure the inputs and outputs of this function:
 - a. Double-click the **???** of an input or output.
 - b. Select the variable or enter the name of a new variable according to the following table.
 - c. Click on the green checkmark.

Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
BRK_52a	Input	Choose the input variable that corresponds to contact 52a on the circuit breaker, for example <i>b52a</i> .
BRK_52b	Input	Choose the input variable that corresponds to contact 52b on the circuit breaker, for example <i>b52b</i> .
Pos_stVal	Output	<i>LDevice_XCBR1_Pos_stVal</i>

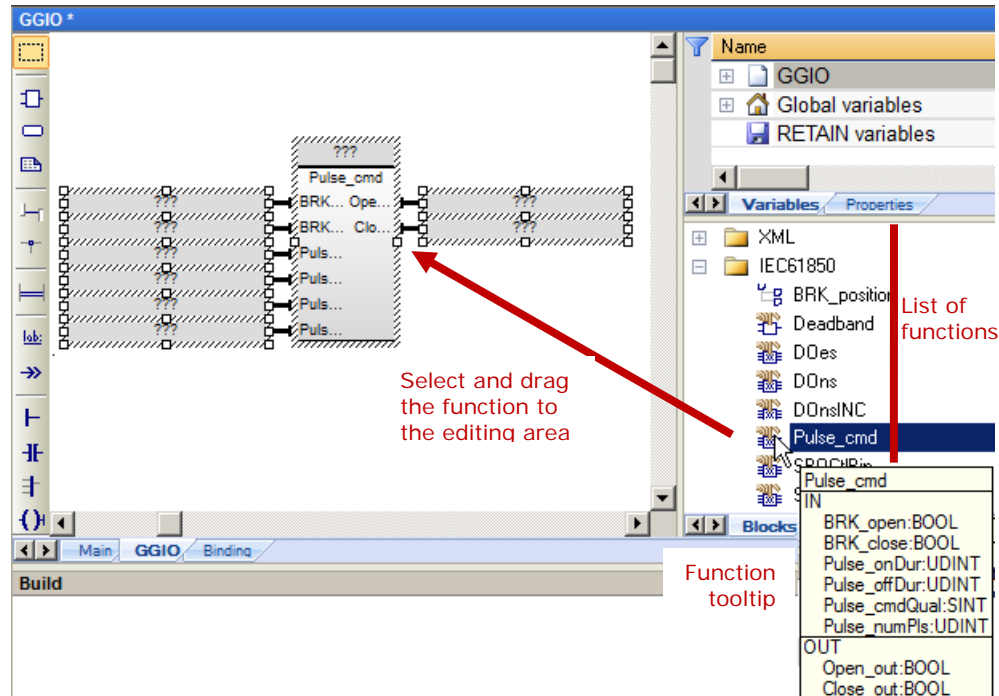
3- The block is now configured; see the example in the figure below.



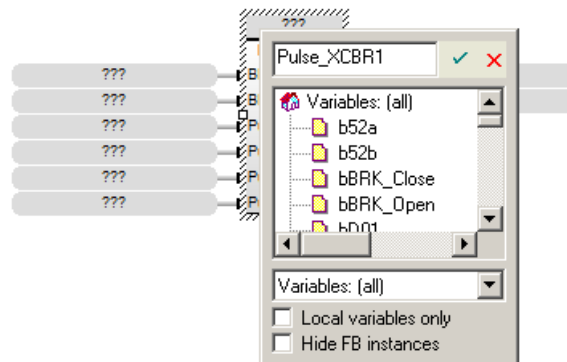
3.4.6. Controlling pulse outputs

To control pulse outputs, carry out the following steps:

- 1- Select and drag the **Pulse_cmd** function in the IEC61850 folder from the list of functions to the editing area of the program.

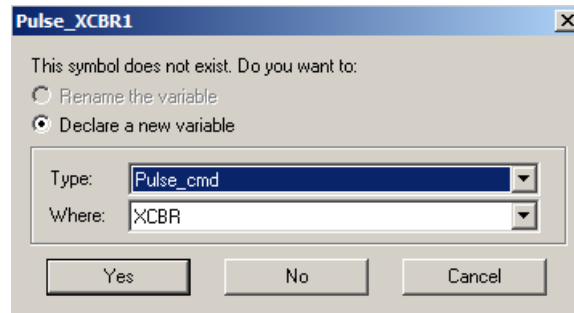


- 2- Double-click on the ??? box at the top of the block.
- 3- Enter a variable name in the block, for example *Pulse_XCBR1*.
- 4- Click on the green checkmark.



If the variable does not exist, a window appears for declaring a new variable.

- 5- Click **Yes** to declare the new variable.

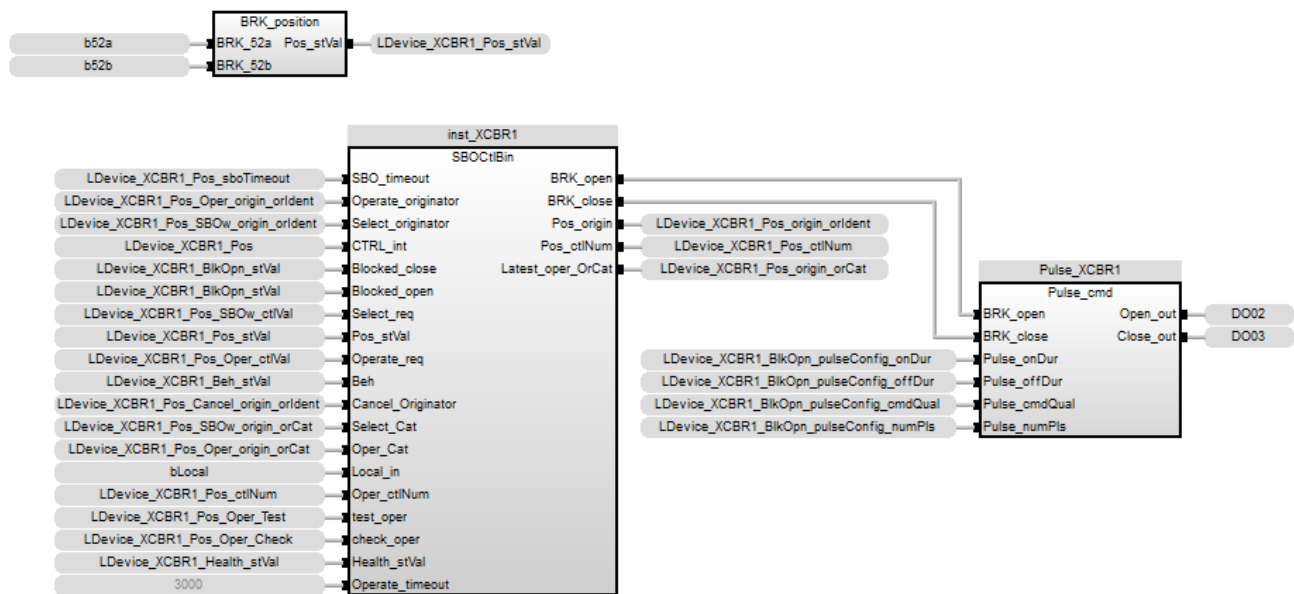


- 6- To configure the inputs and outputs of the block:

- Double-click the **???** of an input or output.
- Select the variable or enter the name of a new variable according to the following table.
- Click on the green checkmark.

Parameter	Type	Global variable to insert, varies depending on the data object (for example <i>Pos</i>) to be controlled and the configuration of the <i>LDevice</i> and <i>XCBR1</i> names in the SLC file
BRK_open	Input	Click Add arc and connect the <i>BRK_open</i> output on a control model block to the <i>BRK_open</i> input on the <i>Pulse_cmd</i> block.
BRK_close	Input	Click Add arc and connect the <i>BRK_close</i> output on a control model block to the <i>BRK_close</i> input on the <i>Pulse_cmd</i> block.
Pulse_onDur	Input	<i>LDevice_XCBR1_Pos_pulseConfig_onDur</i>
Pulse_offDur	Input	<i>LDevice_XCBR1_Pos_pulseConfig_offDur</i>
Pulse_cmdQual	Input	<i>LDevice_XCBR1_Pos_pulseConfig_cmdQual</i>
Pulse_numPls	Input	<i>LDevice_XCBR1_BlkOpn_pulseConfig_numPls</i>
Open_Out	Output	Enter the name of a new Boolean variable, for example <i>DO02</i> . This output sends a pulse according to the ON duration (<i>Pulse_onDur</i>) and OFF duration (<i>Pulse_offDur</i>).
Close_Out	Output	Enter the name of a new Boolean variable, for example <i>DO03</i> . This output sends a pulse according to the ON duration (<i>Pulse_onDur</i>) and OFF duration (<i>Pulse_offDur</i>).

7- The block is now configured; see the example in the figure below.

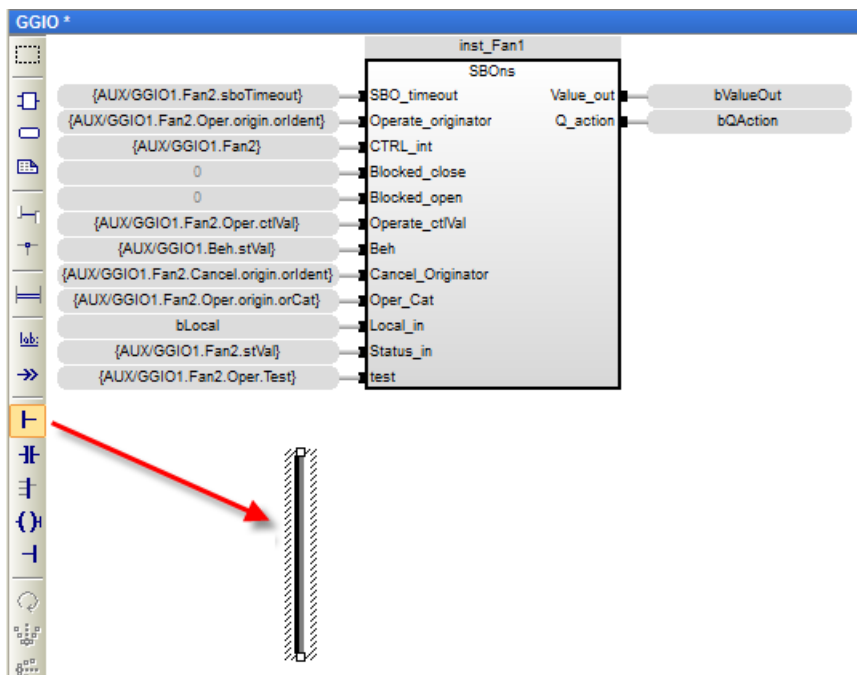


3.4.7. Controlling an output through detection of rising edge

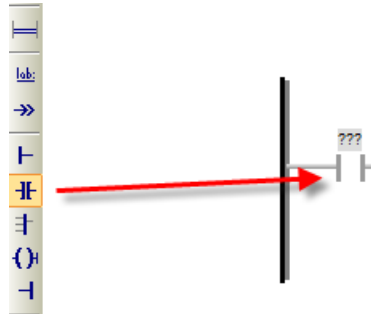
When a rising edge is detected on the *Q_Action* output of a control model, set an output variable, for example *bQ01*, to the value of the *Value* output of the model.

To do this, carry out the following steps:

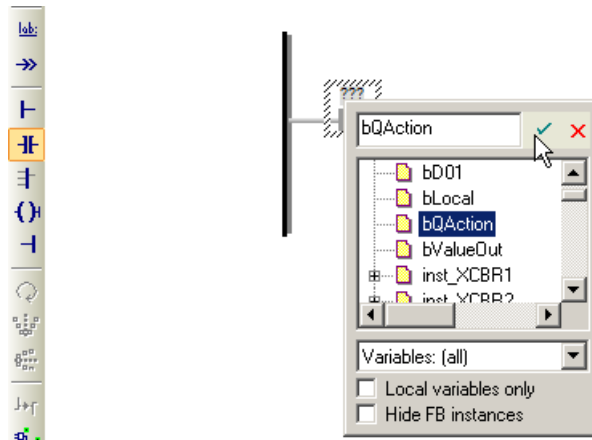
- 1- Click the **Add left power rail** icon.
- 2- Click and drag the power rail below the control model block in the editing window of the program.



- 3- Click the **Add direct contact** icon.
- 4- Click and drag the contact to the desired location in the editing window of the program. It will attach itself to the power rail. Otherwise, click the **Add arc** icon and connect the power rail to the contact.



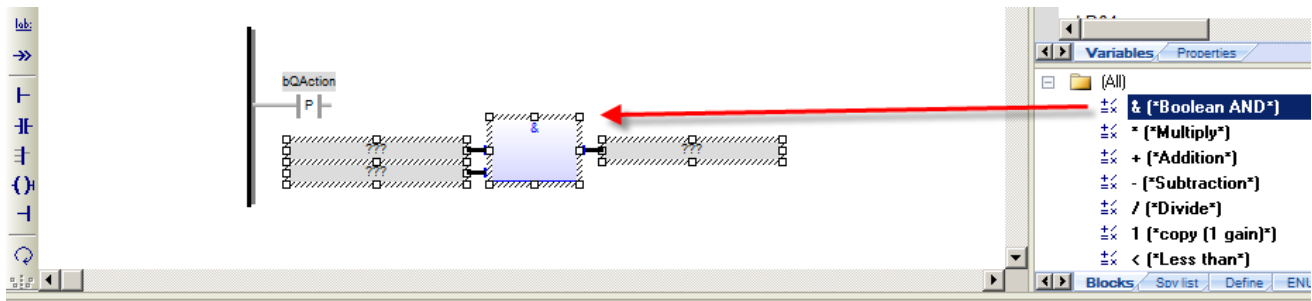
- 5- To configure this contact:
 - a. Double-click on the contact.
 - b. Assign the name of the variable that is associated with the *Q_action* output of the SBOs or DOes model function block.
 - c. Click on the green checkmark.



- d. While the contact is selected, press the **Space** key repeatedly until the letter **P** appears in the middle of the contact.

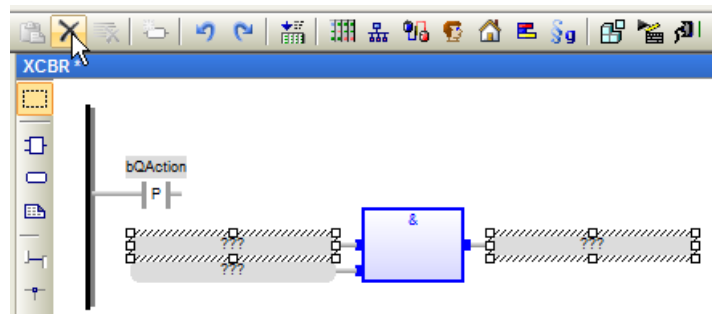


6- Add an **& (*Boolean AND*)** function.

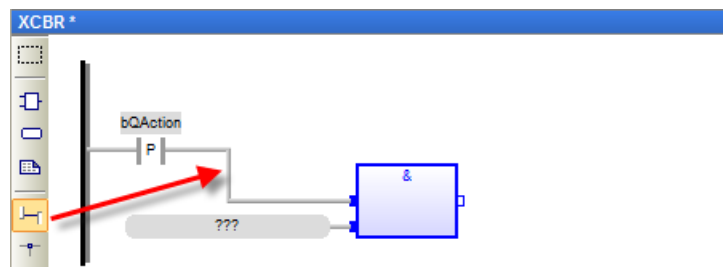


7- Configure the function:

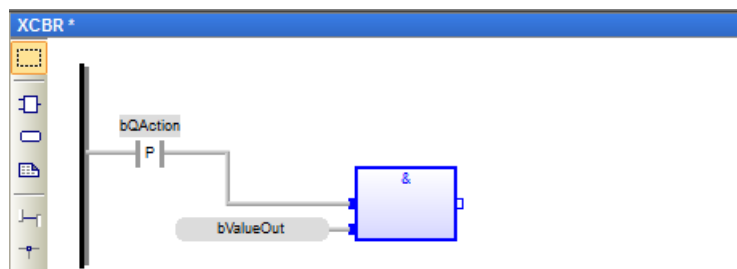
- a. Delete the variables for the first input and the output of the function.



- b. Click the **Add arc** icon and connect the contact to the first input of the function.

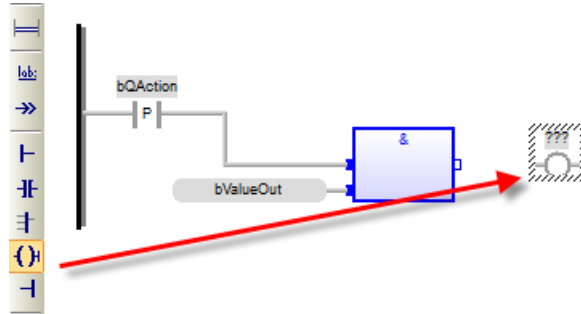


- c. Double-click the second input of the function and assign the name of the variable that is associated with the *Value_Out* output of the SBOs or DOes model function block. Click on the green checkmark.



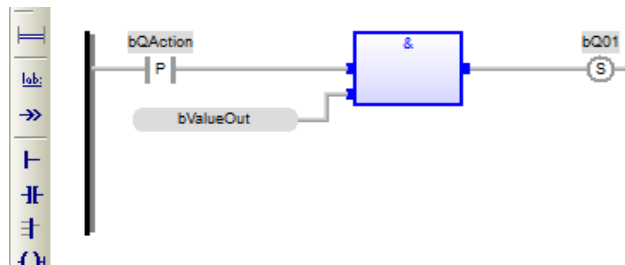
8- Click the **Add direct coil** icon.

9- Click and drag the coil to the desired location in the editing window of the program.

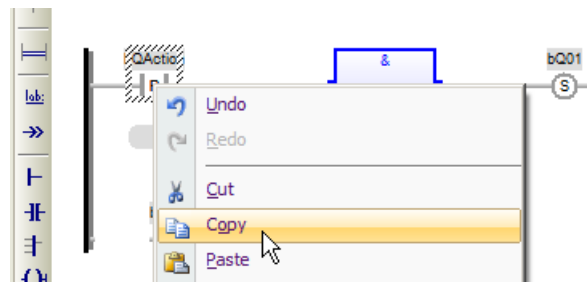


10-Configure the coil:

- Click the **Add arc** icon and connect the output of the function to the coil.
- Double-click the coil and enter the name of the output variable, for example *bQ01*. Click on the green checkmark.
- While the coil is selected, press the **Space** key repeatedly until the letter **S** appears in the middle of the coil.

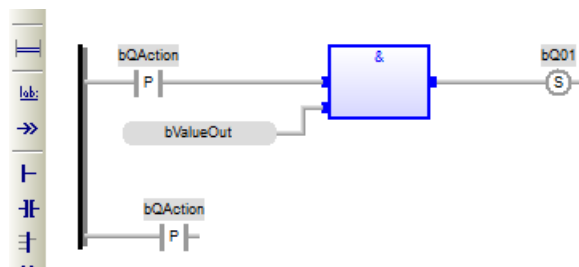


11-Right-click on the contact and click **Copy**.

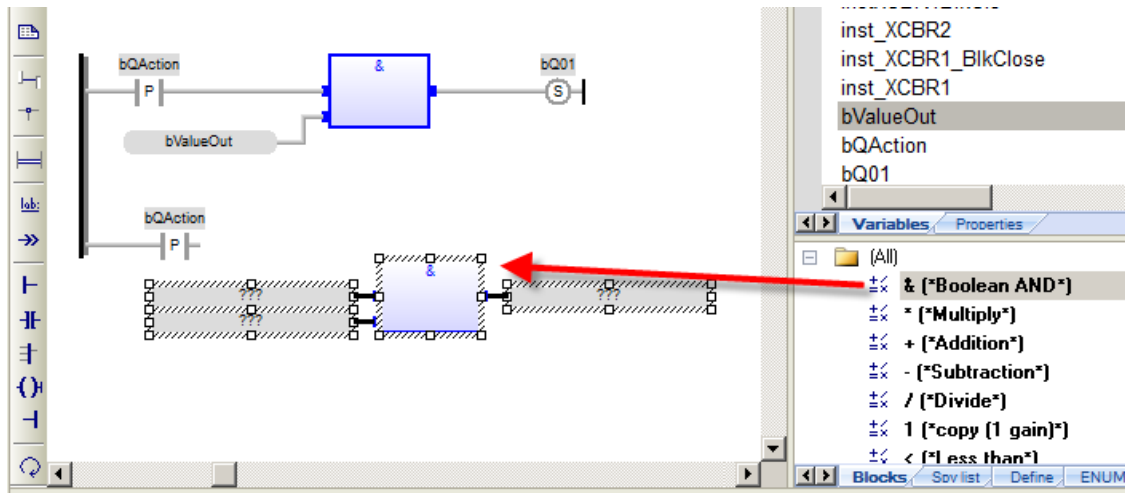


12-Right-click in the editing window and click **Paste**. Click in the window and move the contact to the desired location in the editing window of the program.

It will attach itself to the power rail. Otherwise, click the **Add arc** icon and connect the power rail to the contact.

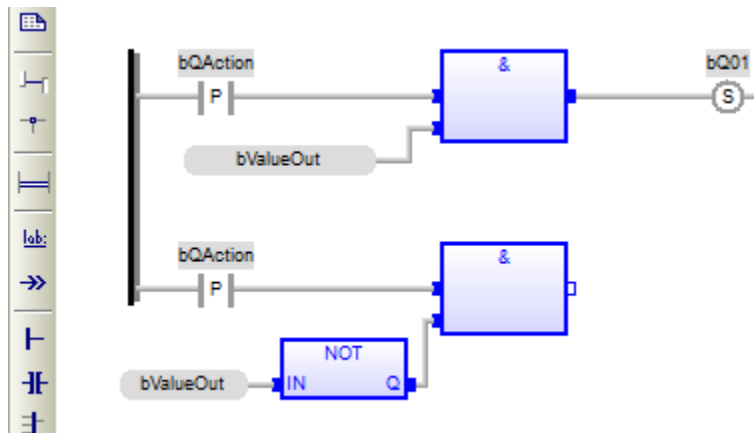


13-Add an **& (*Boolean AND*)** function.



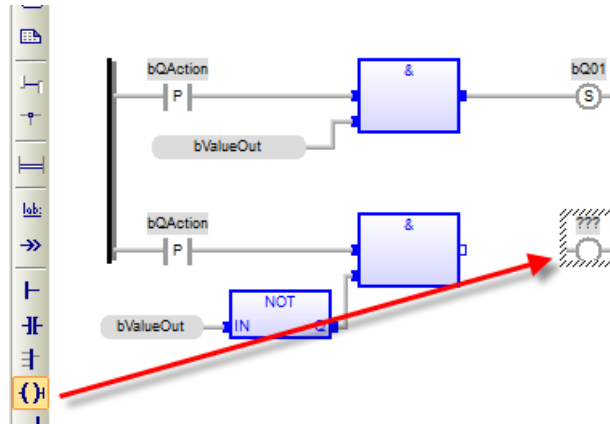
14-Configure the function:

- Delete all the input and output variables of the function.
- Click the **Add arc** icon and connect the first input of the function to the second contact.
- Add a **NOT (*Boolean inversion*)** function and delete the output variable.
- Click the **Add arc** icon and connect the output of the NOT function to the second input of the & function.
- In the input of the NOT function, assign the name of the variable that is associated with the *Value_Out* output of the SBOs or DOEs model function block.



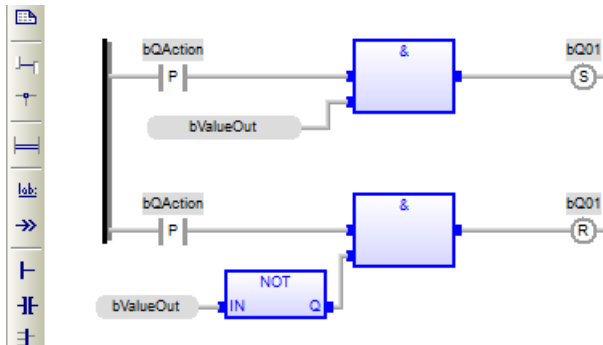
15-Click the **Add direct coil** icon.

16-Click and drag the coil to the desired location in the editing window of the program.



17-Configure the coil:

- Click the **Add arc** icon and connect the output of the function to the coil.
- Double-click the coil and assign the same output variable name as for the other coil. Click on the green checkmark.
- While the coil is selected, press the **Space** key repeatedly until the letter **R** appears in the middle of the coil.





Configuring the IEC 61850 Client Protocol



Configuration of an IEC 61850 Client in the RightWON requires the following steps:

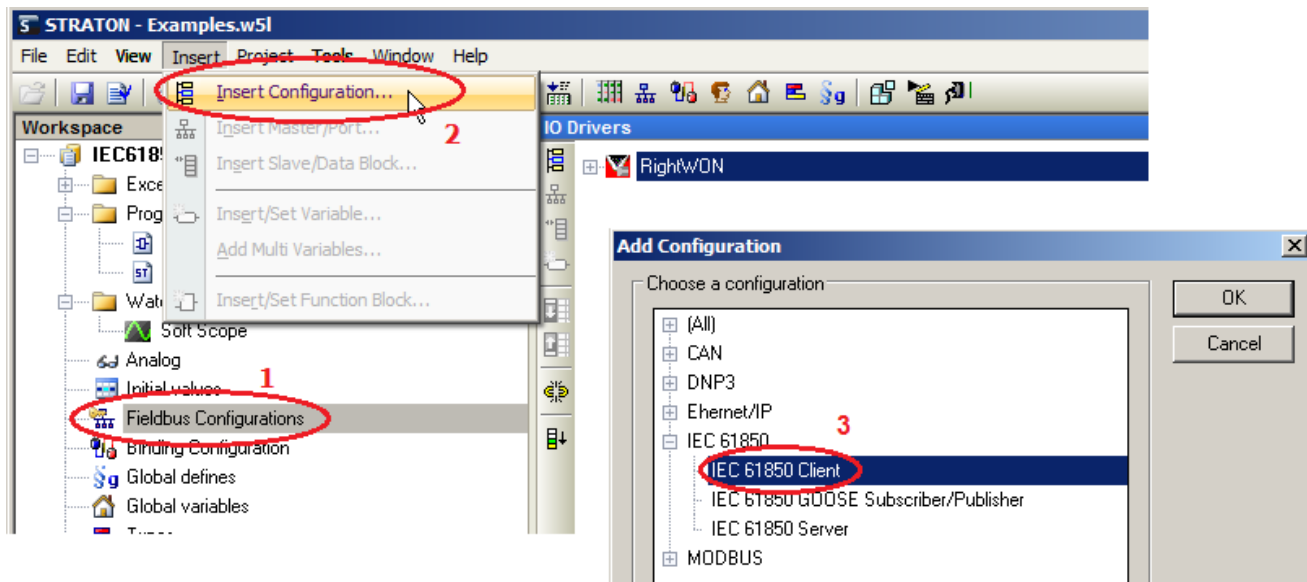
- 1- Review the [prerequisites for configuring the IEC 61850 protocol](#)
- 2- [Add the IEC 61850 Client protocol](#)
- 3- [Insert an IEC 61850 Server](#)
- 4- [Add the variables](#)
- 5- [Configure the program](#)

For further information, refer to the IEC 61850-7 standard.

4.1. Adding the IEC 61850 Client protocol

If the IEC 61850 Client protocol was not added during creation of a new project, carry out the following steps to add it:

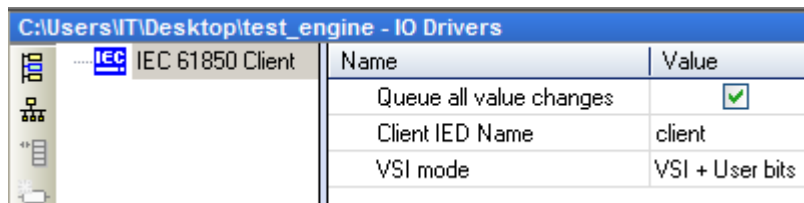
- 1- Double click on **Fieldbus configurations** .
- 2- Under the **Insert** menu, click **Insert Configuration...** .
- 3- Click on the **IEC 61850 Client** protocol.
- 4- Click **OK**.



- 5- To configure the parameters that follow:

- a. Double-click on the parameter.
- b. Enter the value in accordance with the requirements of the application. Refer to the following table for parameter descriptions.
- c. Press the **Enter** key.

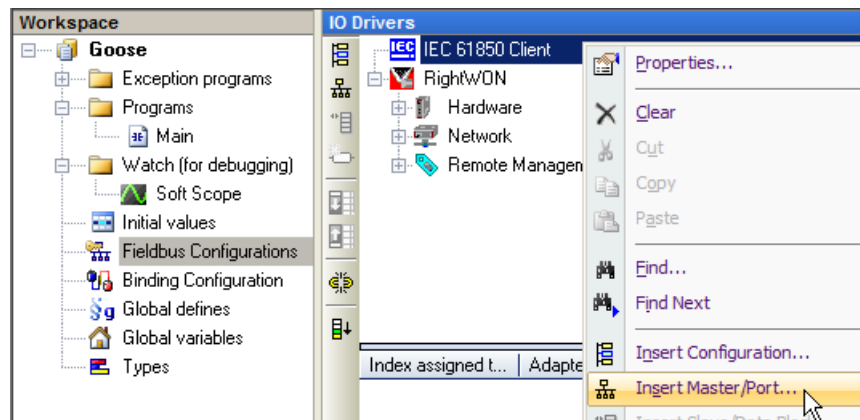
Parameter	Description
Queue all value changes	Check the box to use queuing of state changes.
Client IED Name	Enter the name of the client IED.
VSI Mode	Permits the use of quality/test bits and timestamps according to the following options: <ul style="list-style-type: none"> If you do not wish to use the status bits associated with the variables (VSI), click No VSI. To use the status bits associated with the variables (VSI), click VSI. To use the status bits associated with the variables (VSI) and the user bits (1-8), click VSI + User bits.



4.2. Inserting a port

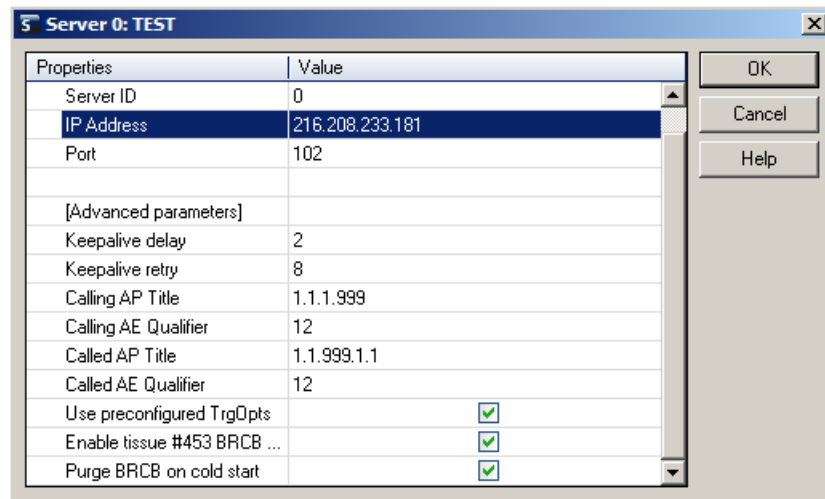
The port permits establishing a connection to the IEC 61850 Server. To add and configure it, carry out the following steps:

- 1- In the **IO Drivers** window, right-click on **IEC 61850 Client** and click **Insert Master/Port...**



- 2- Double-click on the **Server ID** property.
- 3- Enter the server ID.
- 4- Press the **Enter** key.
- 5- Double-click on the **IP Address** property.
- 6- Enter the IP address of the server.
- 7- Then press the **Enter** key.

Note: For information on parameter descriptions refer to the **IEC61850 Client** topic in the RightWON Configuration Suite Help, accessed by pressing the **F1** key.



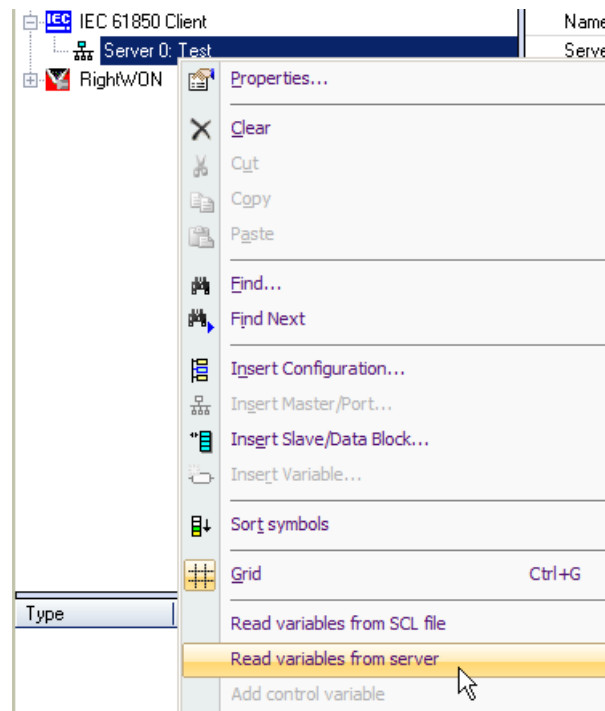
4.3. Adding the variables

Variables can be added by either [reading them directly from the server](#) or from a copy of the [server's SCL file](#).

4.3.1. Reading the variables from the server

To have the variables read from the server, carry out the following steps:

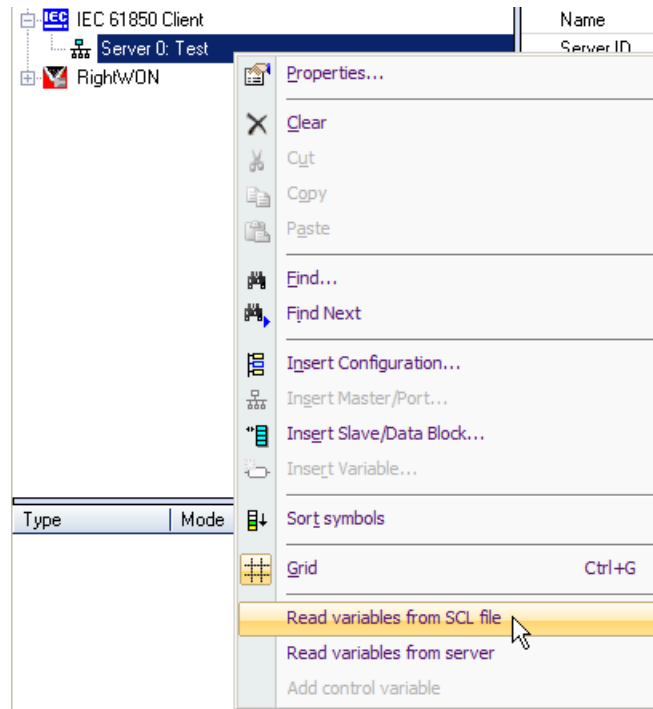
1. Make sure that the server is up and running, and that it is on the same network. Contact your network administrator, if required.
2. Right-click on the **Server** and click **Read variables from server**.



4.3.2. Reading the variables from the SCL file configured on the server

To use a copy of the SCL file configured on the server, carry out the following steps:

1. Right-click on the **Server**.
2. Click **Read variables from SCL file**.



4.4. Sending commands to the server

To send commands to the server, the control model defined by the server must be used. To do this, carry out the following steps:

- 1- Add a new program in the **FBD-Function block diagram** language. Give it a name, for example *Select_Oper*. Refer to the topic *Developing an IEC 61131-3 PLC automation program* in the document *RWM000010-MA-en, RightWON Configuration Suite Manual*.
- 2- Send a command by configuring the program in accordance with the control model of the data object (DO):
 - When the data attribute's DO follows the SBOs or SBOes control model: [Select the data attribute of the DO before operating it](#).
 - When the data attribute's DO follows the DOns or DOes control model: [Operate the data attribute of the DO directly](#).
 - When the data attribute's DO follows no control model, [write the value to a DA](#).

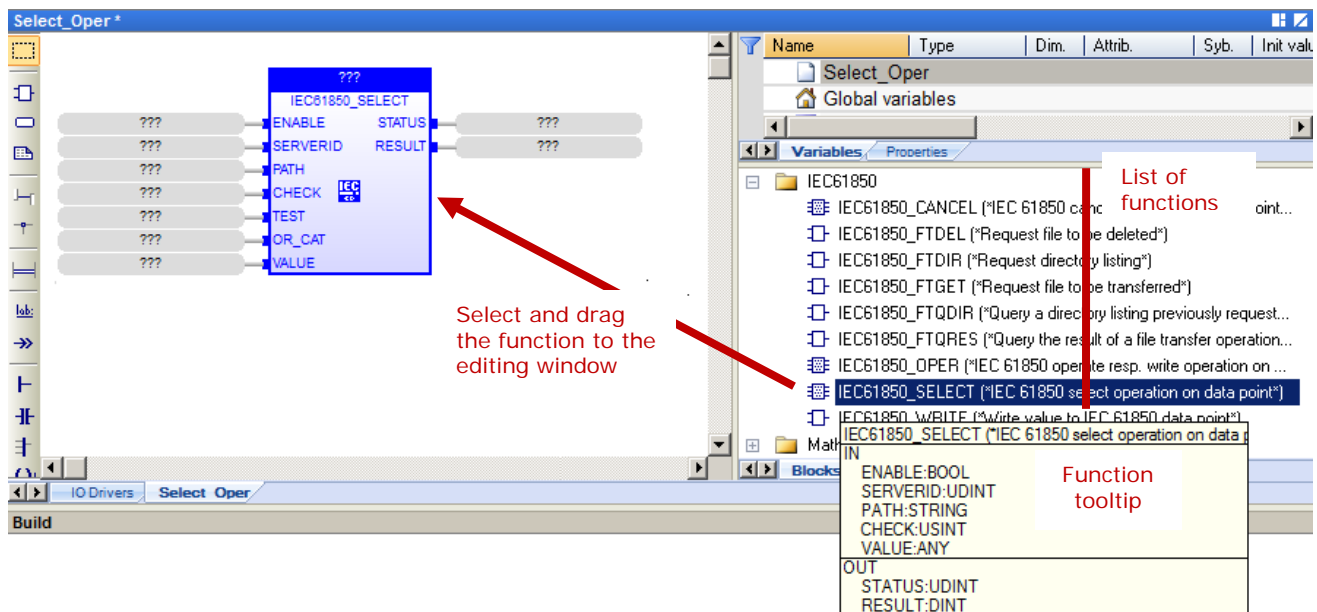
4.4.1. Selecting a data attribute

In order to select an object, carry out the following steps to configure the IEC61850_SELECT function block.

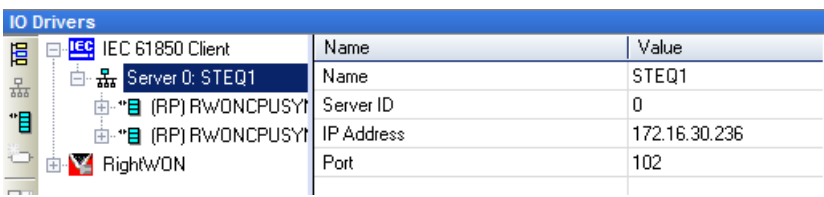
Note: Depending on your application, it may be possible to select the object directly with the IEC61850_OPER operating function without having to use the IEC61850_SELECT function. Consult the section [Operating a data attribute](#).

- 1- Select and drag the **IEC61850_SELECT** function block from the list of blocks to the editing window of the program.

This function block permits selecting an operation on the data point.



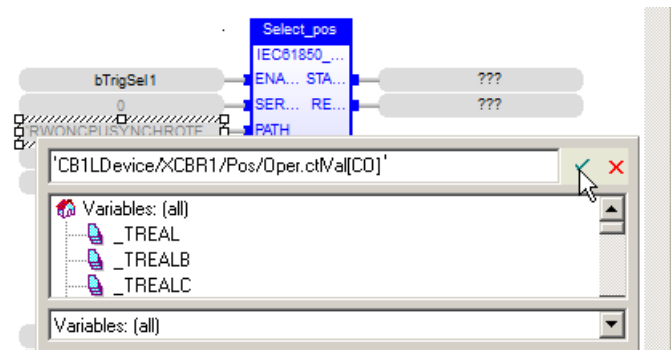
- 2- Double-click on the **???** box at the top of the IEC61850_SELECT block. Enter the name of the block, for example *Select_pos*. Then click on **✓**.
- 3- Click **Yes** to declare the new variable.
- 4- Configure the inputs and outputs of the function block:
 - a. Double-click on the **???** of an input or output.
 - b. Select the variable or enter the name of a new variable according to the following table.
 - c. Click on the green checkmark.

Parameter	Type	Data type	Parameter configuration																	
ENABLE	Input	BOOL	Enter <i>true</i> to enable the function, otherwise enter <i>false</i> to disable it.																	
SERVERID	Input	UDINT	Enter the Server ID number. <div><table><thead><tr><th colspan="2">IO Drivers</th></tr><tr><th></th><th>Name</th><th>Value</th></tr></thead><tbody><tr><td></td><td>Name</td><td>STEQ1</td></tr><tr><td></td><td>Server ID</td><td>0</td></tr><tr><td></td><td>IP Address</td><td>172.16.30.236</td></tr><tr><td></td><td>Port</td><td>102</td></tr></tbody></table></div>	IO Drivers			Name	Value		Name	STEQ1		Server ID	0		IP Address	172.16.30.236		Port	102
IO Drivers																				
	Name	Value																		
	Name	STEQ1																		
	Server ID	0																		
	IP Address	172.16.30.236																		
	Port	102																		
PATH	Input	STRING	Enter the path for the <i>Oper.ct/Val</i> variable of the data object (DO) to be selected. To do this: <div><div>a. In the IO Drivers window, click on a variable.</div><div>b. Take note of the Path field.</div></div>																	

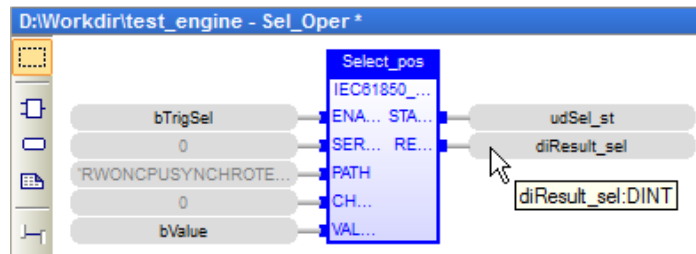
D:\Workdir\RightWON documents\RWCS Tutoriel\IEC61850\IEC61850Client - IO Drivers *

Name	Value
Name	Server_CB1LDevice_XCBR1_Pos_Oper.ctVal_CO
Variable Type	Data Attribute
Path	CB1LDevice/XCBR1/Pos/Oper.ctVal[CO]
IEC Type	BOOL

- In the program, double-click on the ??? box next to the **PATH** field.
- Enter the path between single quotes (') and without the server name, for example 'PATH', so that it will be recognized as a character string.
- Then click on ✓.



CHECK	Input	USINT	Enter the type of verification that an object must carry out before executing a control operation. See the topic <i>IEC 61850 Check value definitions</i> in the OEM Library . (For further information, refer to the IEC 61850-7-2 standard.)
VALUE	Input	All types	Enter the name of a global variable whose value must be written to the data point (DO) in order to operate. In the example, the <i>Pos</i> DO is to be controlled and is a Boolean data type.
STATUS	Output	UDINT	Enter the name of the variable that indicates the present status of the command. For a list of status indications, see the topic <i>Result for the status output of 61850 master command blocks</i> in the OEM Library .
RESULT	Output	DINT	Enter the name of the output variable for the result of the command to be executed, in accordance with the IEC 61850 control model. For a list of results, see the topic <i>Result for the result output of 61850 master command blocks</i> in the OEM Library .



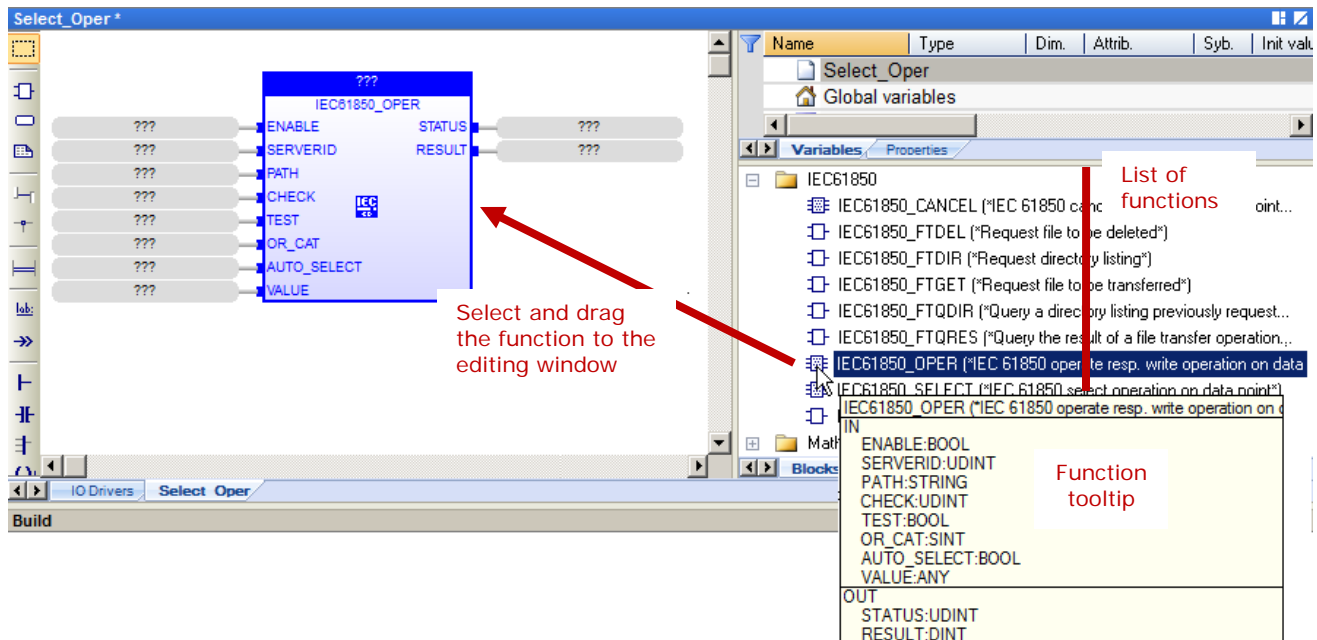
5- Operate the data attribute.

4.4.2. Operating a data attribute

To operate the object, carry out the following steps:

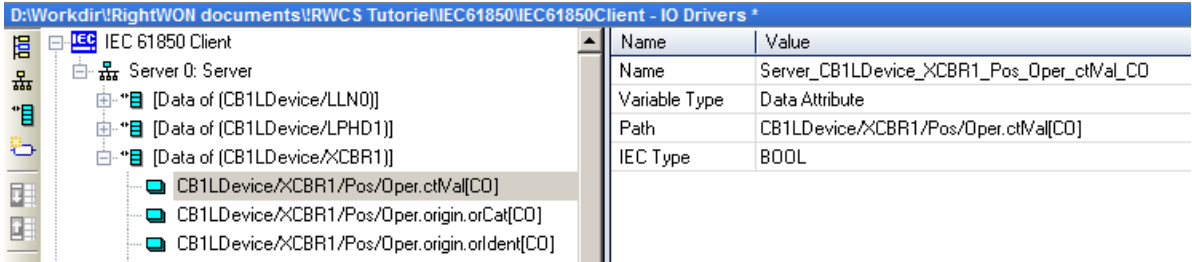

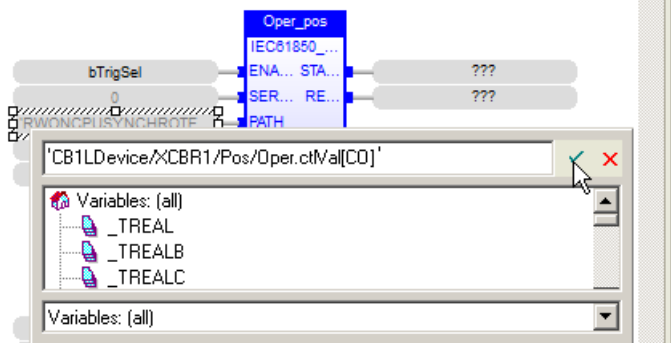
- 1- Select and drag the **IEC61850_OPER** function block from the list of blocks to the editing window of the program.

This function block permits executing an operation on the data point.



- 2- Double-click the **???** box at the top of the IEC61850_OPER function block. Enter the name of the block, for example *Oper_pos*. Then click on **✓**.
- 3- Click **Yes** to declare the new variable.
- 4- Configure the inputs and outputs of the function block:
 - a. Double-click on the **???** of an input or output.
 - b. Select the variable or enter the name of a new variable according to the following table.
 - c. Click on the green checkmark.

Parameter	Type	Data type	Parameter configuration										
ENABLE	Input	BOOL	Enter <i>true</i> to enable the function, otherwise enter <i>false</i> to disable it.										
SERVERID	Input	UDINT	Enter the Server ID number. <div><div>IO Drivers</div><div><div><div>IEC 61850 Client</div><div>Server 0: STEQ1</div><div>(RP) RWONCPUSY↑</div><div>(RP) RWONCPUSY↑</div><div>RightWON</div></div><div><table><tr><th>Name</th><th>Value</th></tr><tr><td>Name</td><td>STEQ1</td></tr><tr><td>Server ID</td><td>0</td></tr><tr><td>IP Address</td><td>172.16.30.236</td></tr><tr><td>Port</td><td>102</td></tr></table></div></div></div>	Name	Value	Name	STEQ1	Server ID	0	IP Address	172.16.30.236	Port	102
Name	Value												
Name	STEQ1												
Server ID	0												
IP Address	172.16.30.236												
Port	102												

PATH	Input	STRING	<p>Enter the path for the <i>Oper.ctVal</i> variable of the data object (DO) to be selected. To do this:</p> <ol style="list-style-type: none"> In the IO Drivers window, click on a variable. Take note of the Path field.  <ol style="list-style-type: none"> In the program, double-click on the ??? box next to the PATH field. Enter the path between single quotes (') and without the server name, for example <i>'PATH'</i>, so that it will be recognized as a character string. Then click on . 
CHECK	Input	USINT	<p>Enter the type of verification that an object must carry out before executing a control operation. See the topic <i>IEC 61850 Check value definitions</i> in the OEM Library. (For further information, refer to the IEC 61850-7-2 standard.)</p>
TEST	Input	BOOL	<p>Set to <i>true</i> to process the command as a test, otherwise set to <i>false</i> for normal functioning.</p>
OR_CAT	Input	SINT	<p>Enter the <i>Bay-control</i> category for a RightWON IEC 61850 Server: IEC61850_ENUM_ORCAT_BAY_CONTROL</p> <p>Specify the category of the initiator that caused a change in value. The list of values is defined in the topic <i>IEC61850 Enums definitions</i> -> <i>ID=ORCAT</i> in the OEM Library. (For further information, consult the IEC 61850-7-3 standard.)</p>
AUTOSELECT	Input	BOOL	<ul style="list-style-type: none"> Set to <i>true</i> to use the select-before-operate (SBO) function. In this case, the IEC61850_SELECT function must not be used. Set to <i>false</i> to use the direct-operate function (DO and SBO models). For the SBO model, prior usage of the IEC61850_SELECT function is required.

VALUE	Input	All types	Enter the name of a global variable whose value must be written to the data point (DO) in order to operate (for example 1 → Close, 0 → Open). In the example, the <i>Pos</i> DO is to be controlled and is a Boolean data type.
STATUS	Output	UDINT	Enter the name of the variable that indicates the present status of the command. For a list of status indications, see the topic <i>Result for the status output of 61850 master command blocks</i> in the OEM Library .
RESULT	Output	DINT	Enter the name of the output variable for the result of the command to be executed, in accordance with the IEC 61850 control model. For a list of results, see the topic <i>Result for the result output of 61850 master command blocks</i> in the OEM Library .

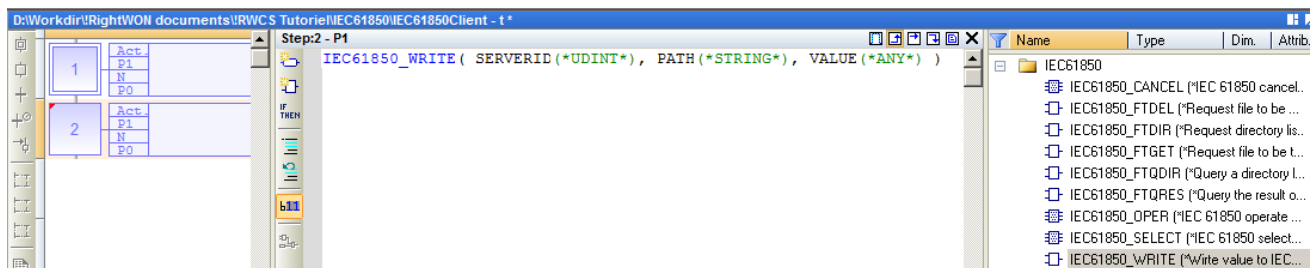
4.4.3. Writing a value to a data attribute

To write a value to a data attribute (DA) that has no control model, carry out the following steps:

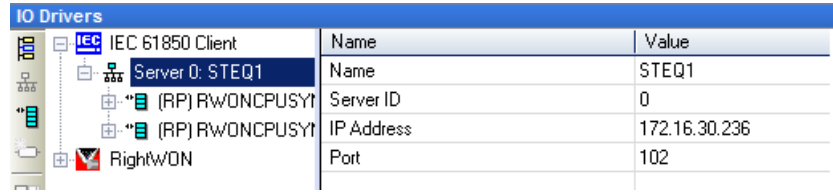
- 1- Add a new program in the **SFC** language. Refer to the topic *Developing an IEC 61131-3 PLC automation program* in the document *RWM000010-MA-en, RightWON Configuration Suite Manual*.

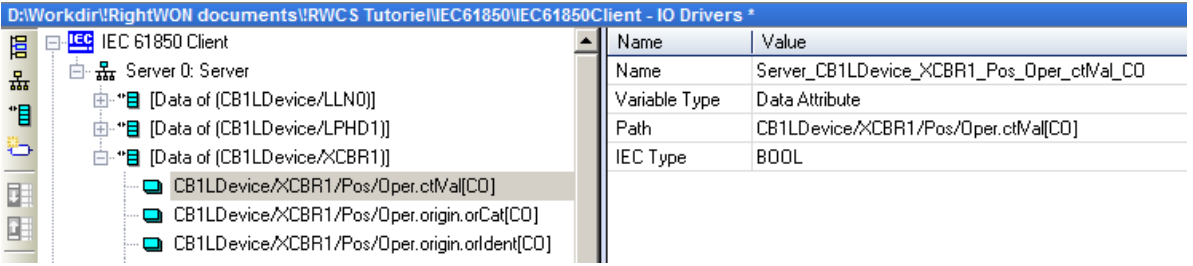
Since the IEC61850_WRITE function does not have an **Enable** parameter, it cannot be used in function block format.

- 2- Select and drag the **IEC61850_WRITE** function block from the list of blocks to the editing window of the program.

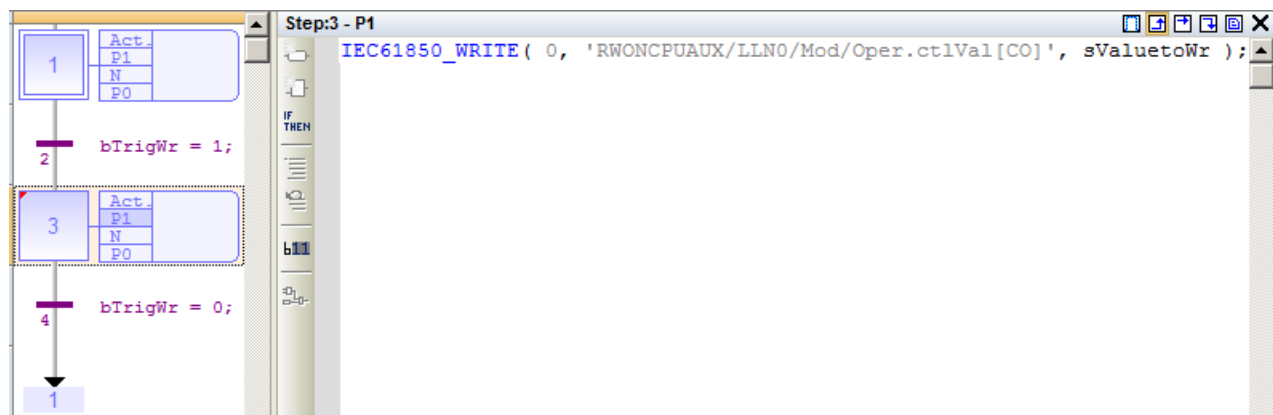


- 3- Replace the function parameters according to the following configuration:

Parameter	Type	Data type	Parameter configuration
SERVERID	Input	UDINT	<div>Enter the Server ID number.</div> <div></div>
PATH	Input	STRING	<div>Enter the path for the <i>Oper.ct/Val</i> variable of the data object (DO) to be selected. To do this:</div> <div><div>a. In the IO Drivers window, click on a variable.</div><div>b. Take note of the Path field.</div></div>

			
			c. In the program, enter the path between single quotes (') and without the server name, for example ' <i>PATH</i> ', so that it will be recognized as a character string.
VALUE	Input	All types	Enter the name of a global variable whose value must be written to the data point (DO) in order to operate (for example 1 → Close, 0 → Open). In the example, the <i>Pos</i> DO is to be controlled and is a Boolean data type.
Q	Output	BOOL	The output is <i>true</i> as soon as the function is executed.

In the example below, when the *bTrigWr* variable has the value 1, the IEC61850_WRITE command is executed once. When *bTrigWr* returns to 0, the variable returns to its initial state.





Configuring the IEC 61850 GOOSE Publisher or Subscriber Protocol

IEC 61850 GOOSE is an advanced version of the UCA GOOSE protocol. The primary difference is that IEC 61850 GOOSE does not have a static number of bits or bit pairs.

A GOOSE message is used to exchange data between several IEDs (Intelligent Electronic Devices) when a change in value occurs.

For further information, refer to the IEC 61850-8 standard and the following Internet sites:

- http://en.wikipedia.org/wiki/GOOSE#Generic_Object_Oriented_Substation_Events_.28GOOSE.29
- <http://webstore.iec.ch/webstore/webstore.nsf/mysearchajax?Openform&key=GOOSE&sorting=&start=1&onglet=1>

Configuration of the IEC 61850 GOOSE protocol in the RightWON requires the following steps:



- 1- Review the [prerequisites for configuring the IEC 61850 protocol](#)
- 2- [Add the IEC 61850 GOOSE protocol](#) to the RightWON configuration
- 3- Search the [RightWON system information](#)
- 4- [Insert a communication port](#)
- 5- Add a GOOSE [publisher](#) and/or [subscriber](#)
- 6- [Create the variables for unassigned objects](#)

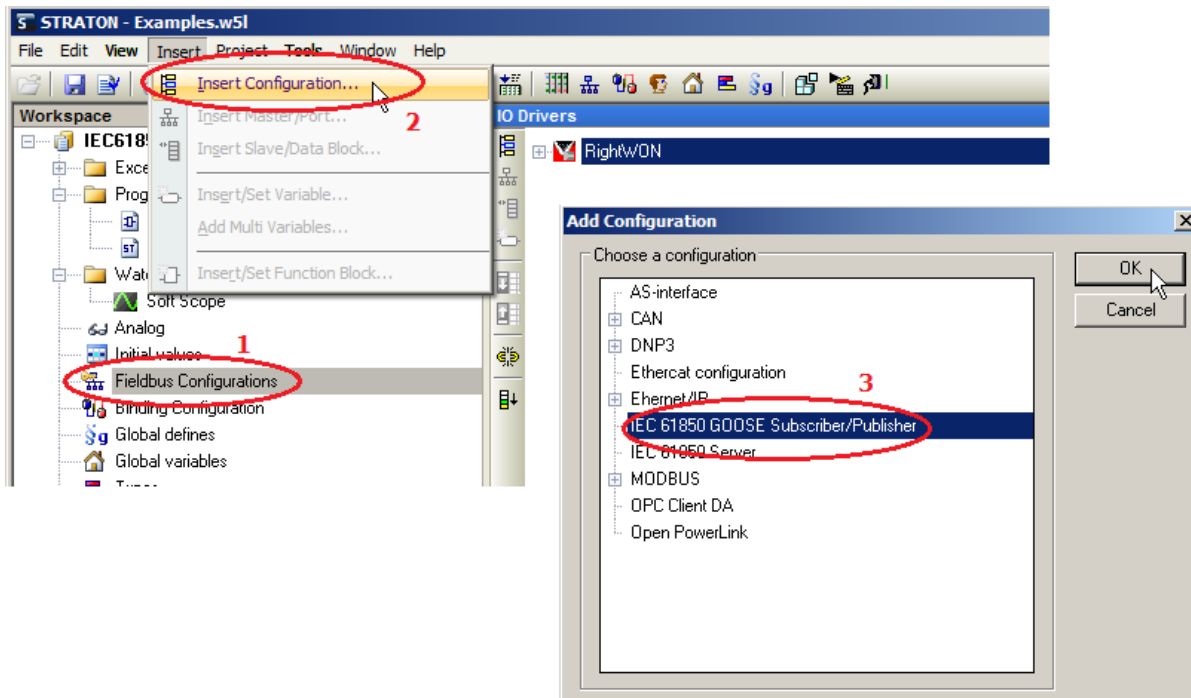
The data blocks and variables are configured by default. To see how they are defined:

- 7- [Description of data block parameters for the publisher and the subscriber](#)
- 8- [Description of variable parameters](#)

5.1. Adding the IEC 61850 GOOSE protocol

The IEC 61850 GOOSE protocol can be added to the RightWON configuration during creation of a new project or by carrying out the following steps:

- 1- Double click on **Fieldbus configurations** .
- 2- Under the **Insert** menu, click **Insert Configuration...** .
- 3- Click on the **IEC 61850 GOOSE Subscriber/Publisher** protocol.
- 4- Click **OK**.



5.2. Searching the MAC address of an Ethernet port

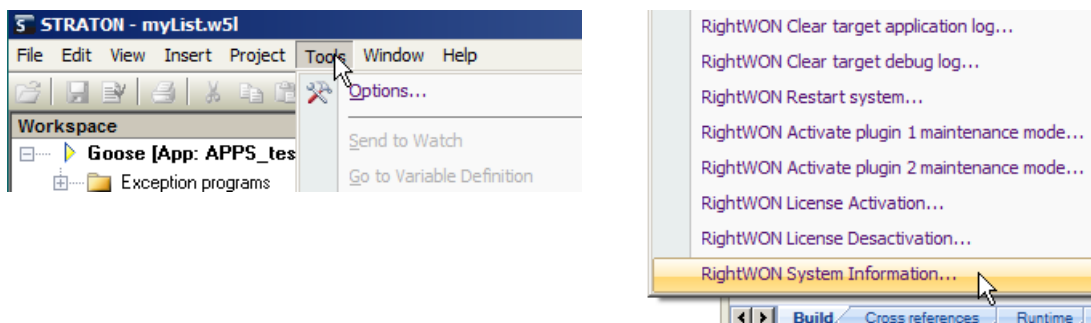
To be able to configure a port you must know the physical address of the Ethernet port. Follow the steps below:

Note: To connect with the RightWON, refer to the topics on the environment, tools and execution mode in the document *RWM000010-MA-en, RightWON Configuration Suite Manual*.

- 1- Click the **Online** icon in the toolbar to connect to the RightWON.



- 2- Click on the **Tools** menu. Then click **RightWON System Information...**



- 3- The **System Information** window permits viewing the physical MAC addresses (**MAC Address**) of the RightWON system. Take note of the address of the Plug-in that has the Ethernet port you wish to use for GOOSE communications (e.g. 00:25:65:00:00:64).

System Information	
Register	
Model	RWU010000
Version	RWU010000-PR-APP
Serial Number	1010-10126-2
Hardware Revision	1
Plugin [Front-1] Model	RWC0V00xx
Plugin [Front-1] Serial Number	1000-10000-02
Plugin [Front-1] Hardware Revision	0
Plugin [Front-1] MAC Address	00:25:65:00:00:64
Plugin [Front-2] Model	RWC0G00x
Plugin [Front-2] Serial Number	0945U15851

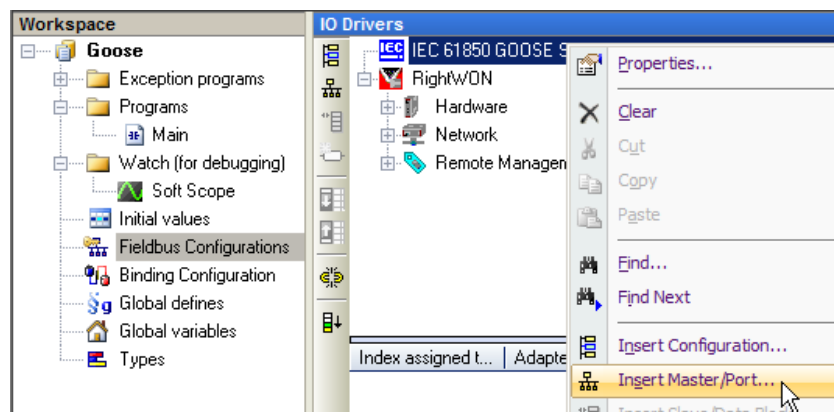
- 4- Close the window.
- 5- Click the **Online** icon in the toolbar to stop execution mode.



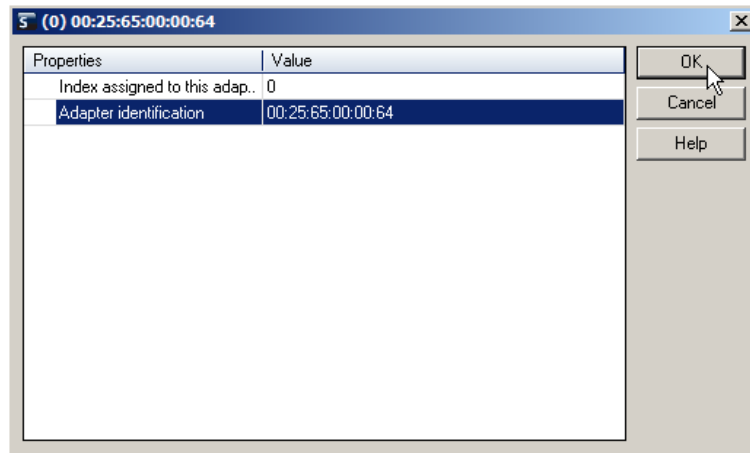
5.3. Inserting a communication port

To add a communication port, carry out the following steps:

- 1- In the **IO Drivers** window, right-click on **IEC 61850 GOOSE Subscriber/Publisher** and click **Insert Master/Port...**



- 2- Double-click on the **Adapter identification** field, enter the **MAC address of the Ethernet Plug-in**, then press the **Enter** key. Click **OK**.

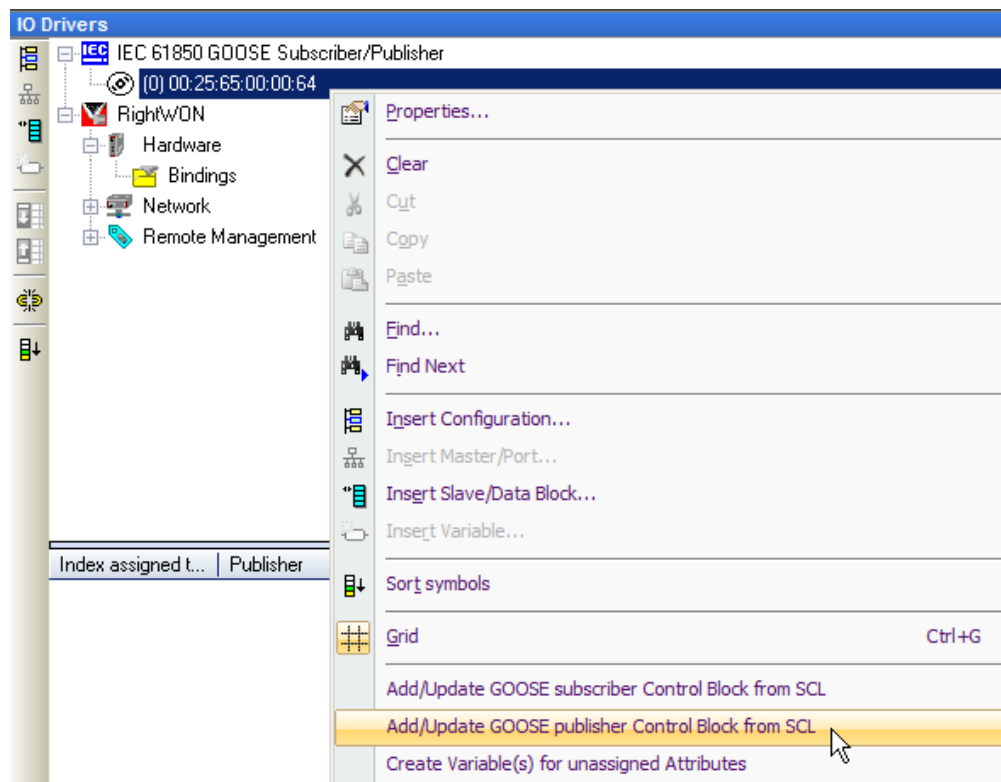


- 5- Add a GOOSE [publisher](#) or [subscriber](#).

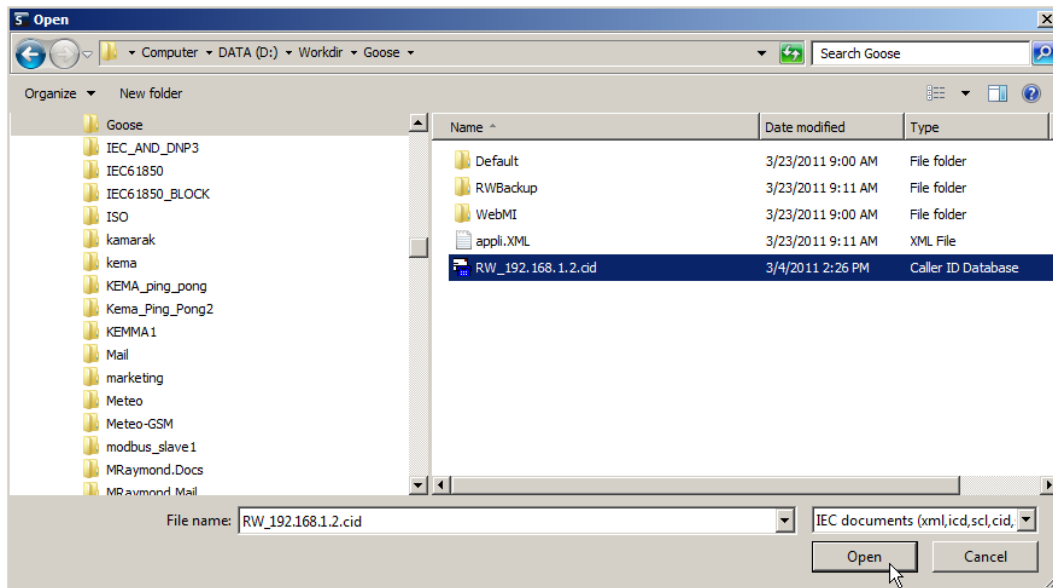
5.4. Adding a GOOSE publisher

To add a GOOSE publisher, carry out the following steps:

- 1- In the **IO Drivers** area, right-click on the newly created port. Click **Add/Update GOOSE publisher Control Block from SCL**.

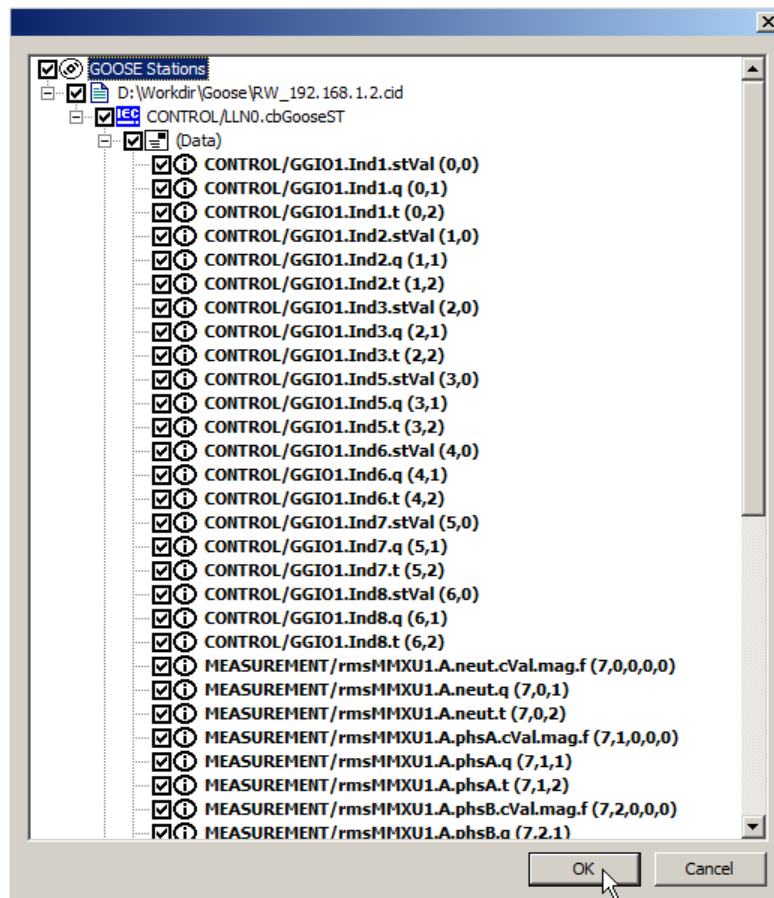


- 2- Select the SCL file you wish to use, then click **Open**.



3- Check the **GOOSE Stations** checkbox.

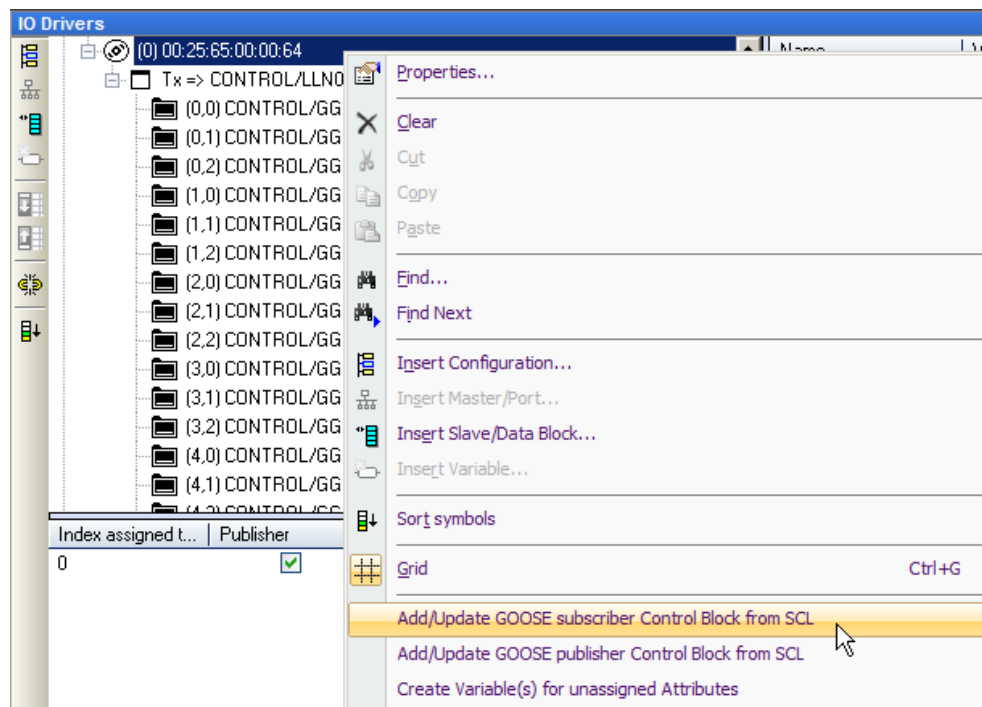
- ⚠ You cannot select only some of the items in the GOOSE control block. Subscribers that use the same SCL file expect to be able to obtain the data from all objects.



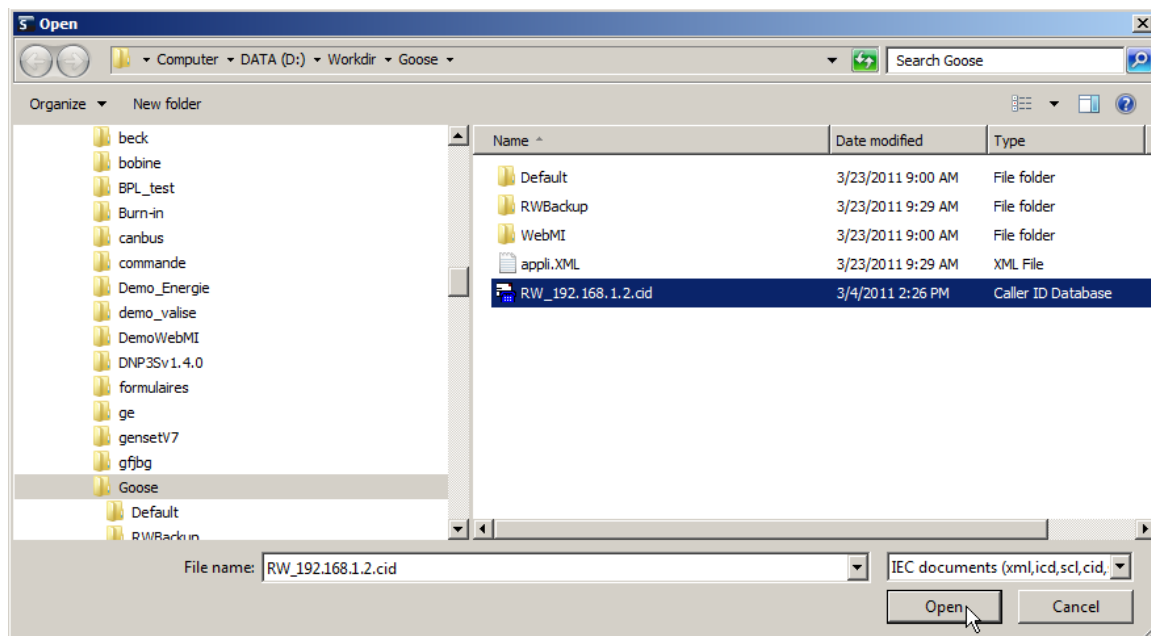
4- To finish, click **OK**.

5.5. Adding a GOOSE subscriber

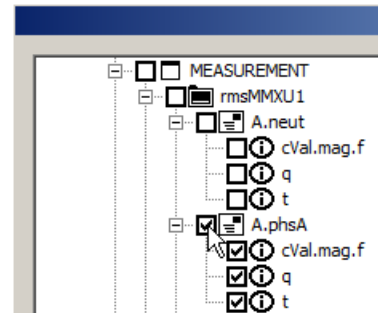
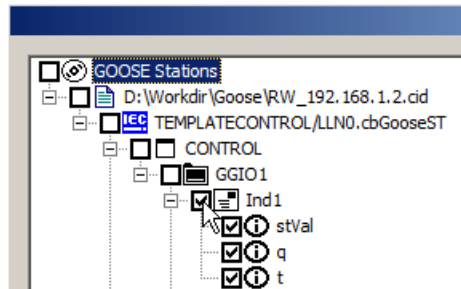
- 1- In the **IO Drivers** area of the fieldbus configurator, right-click on the GOOSE port and select **Add/Update GOOSE subscriber Control Block from SCL**.



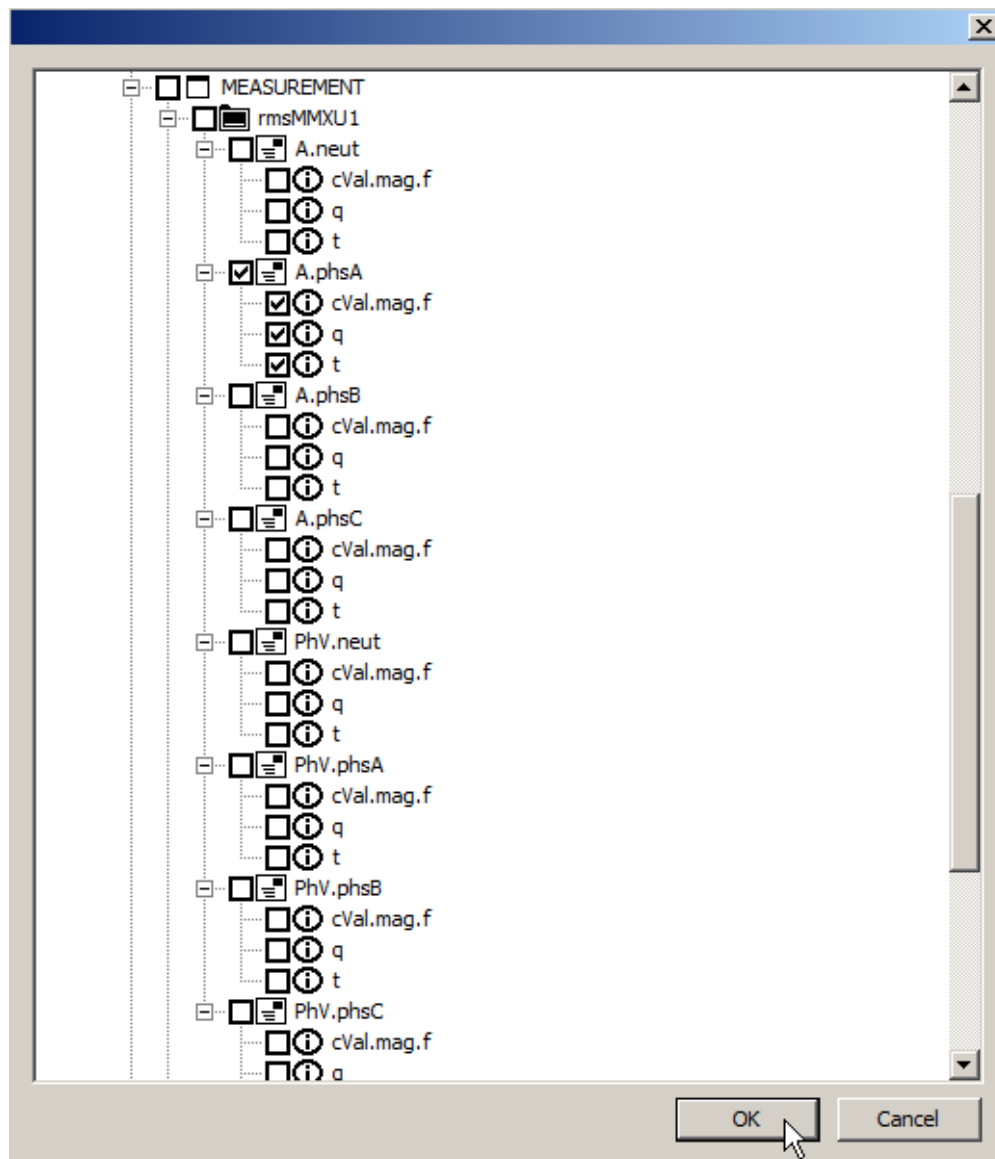
- 2- Select the file that you wish to use, then click **Open**. This file is often the same as the one used by the GOOSE publisher.



- 3- In our example, we have selected only Indicator 1 and Phase A current measurements.



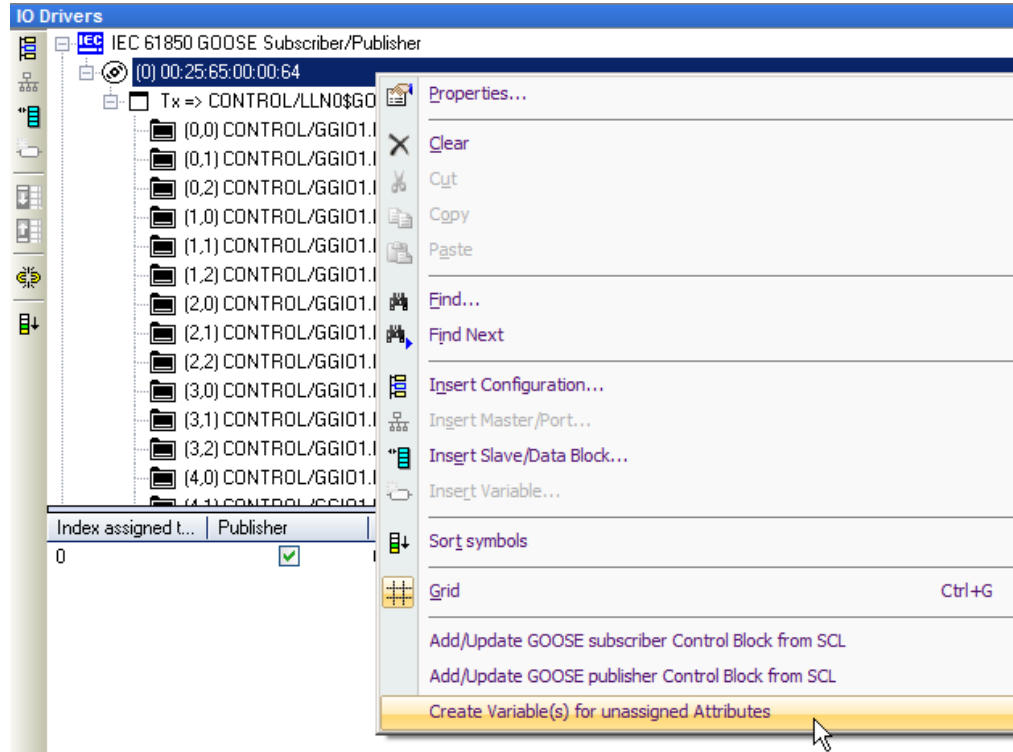
4- To finish, click **OK**.



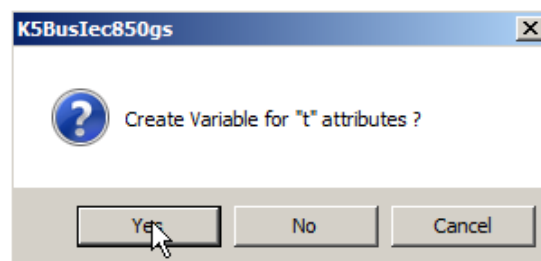
5.6. Creating variables for unassigned objects

To create the variables for one publisher and one subscriber, carry out the following steps:

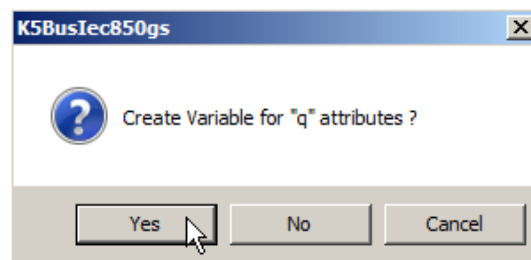
- 1- In the **IO Drivers** area, right-click on the GOOSE port (e.g. 00:25:65:00:64).
- 2- Click **Create Variable(s) for unassigned Attributes**.



- 3- A window opens to permit creating a variable for the "t" attributes. Click **Yes**.



- 4- A window opens to permit creating a variable for the "q" attributes. Click **Yes**.



- 5- In the variables area, the newly created variables are displayed in the **Global variables** section.

Name	Type
Global variables	
{CONTROL/GGIO1.Ind1.stVal}	BOOL
{CONTROL/GGIO1.Ind1.q}	UDINT
{CONTROL/GGIO1.Ind1.t}	LREAL
{CONTROL/GGIO1.Ind2.stVal}	BOOL
{CONTROL/GGIO1.Ind2.q}	UDINT
{CONTROL/GGIO1.Ind2.t}	LREAL
{CONTROL/GGIO1.Ind3.stVal}	BOOL
{CONTROL/GGIO1.Ind3.q}	UDINT
{CONTROL/GGIO1.Ind3.t}	LREAL
{CONTROL/GGIO1.Ind5.stVal}	BOOL
{CONTROL/GGIO1.Ind5.q}	UDINT
{CONTROL/GGIO1.Ind5.t}	LREAL
{CONTROL/GGIO1.Ind6.stVal}	BOOL
{CONTROL/GGIO1.Ind6.q}	UDINT
{CONTROL/GGIO1.Ind6.t}	LREAL
{CONTROL/GGIO1.Ind7.stVal}	BOOL
{CONTROL/GGIO1.Ind7.q}	UDINT

6- Repeat from [step 1](#) for all publishers and all subscribers.

5.7. Description of data block parameters

In the **IO Drivers** area, click on the publisher (**Tx**) or subscriber (**Rx**) data block to view the list of parameters.

Note: The values of these parameters come from the SCL file.

- **Index assigned to this GOOSE control block:** The index number of the GOOSE block. Two data blocks cannot have the same index number.
- **Publisher:** If the block is a publisher, the box is checked. If the block is a subscriber, the box is unchecked.
- **GOOSE Control block reference:** Name and location of the control block in the object model.
- **APPID:** Application ID. This number must be the same on a publisher and its subscribers.
- **VLAN priority:** Specifies the priority of packets over the network.
- **DataSet:** Name and location of the dataset in the object model.
- **NbDSEntries:** Number of data objects in the subscriber block.

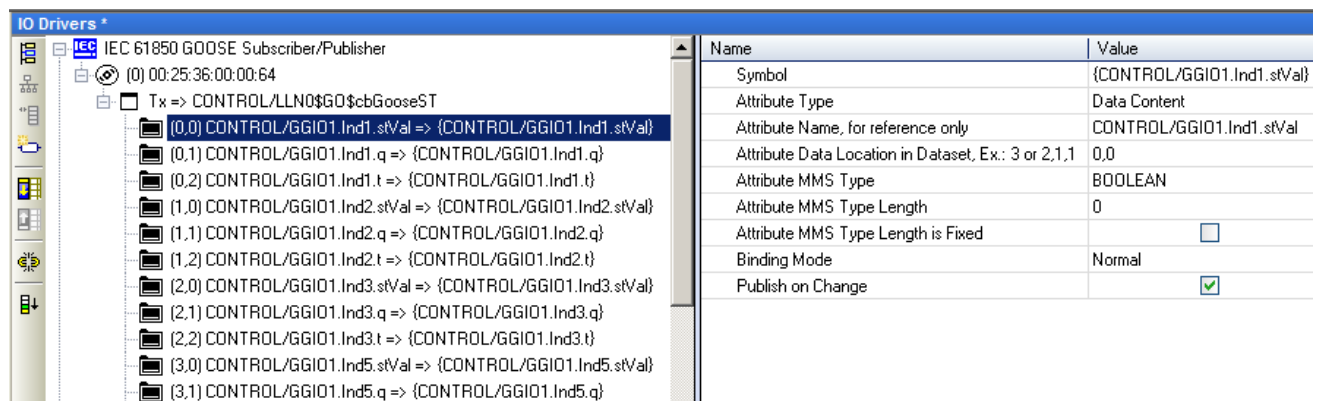
Name	Value
Index assigned to this GOOSE control block	0
Publisher	<input checked="" type="checkbox"/>
GOOSE Control block reference	CONTROL/LLN0\$GO\$cbGooseST
APPID (Rx:ignored if -1)	12288
GOOSE Multicast address	01:0C:CD:01:00:00
VLAN priority	4
DatSet (Rx:ignored if empty)	CONTROL/LLN0\$dsGooseST
GoID (Rx:ignored if empty)	C264_1_ST
ConfRev (Rx:ignored if -1)	1
NbDSEntries (Rx:ignored if -1)	0
Additional wait time after TAL (ms)	0
Additional wait time after TAL (% of last rcvd TAL)	0
publish TAL Sequence (ms)	300,600,1200,2400,4800,9600,16400,20000
publish Tx Delay Sequence (ms)	290,590,1190,2390,4790,9590,16390,19990

5.8. Description of variable parameters

The variables created for unassigned attributes have been associated with publisher and subscriber data. Click on an object in a data block to view the associated parameters in the table on the right.

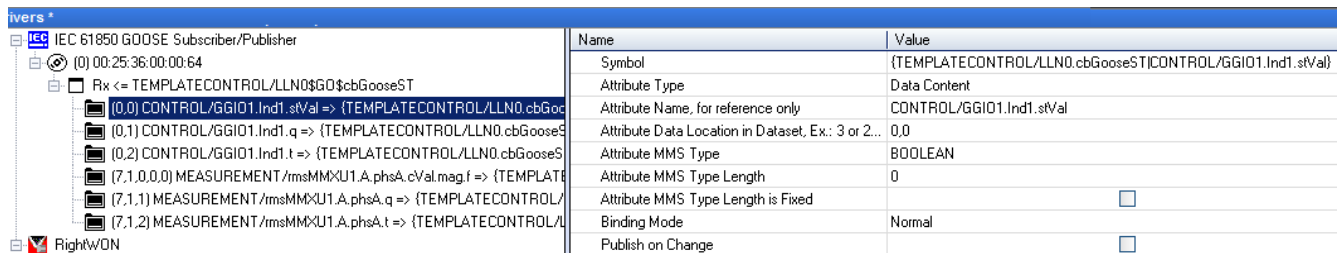
Note: The values of these parameters come from the SCL file.

- **Symbol:** Name and location of the object in the object model.
- **Attribute Type:** The type of attribute.
- **Attribute Data Location in Dataset:** The location of the attribute in the object model.
- **Publish on Change:**
 - For a **publisher (Tx)** the box is checked, so that a GOOSE message will be sent when the value of the object changes.



Name	Value
Symbol	{CONTROL/GGIO1.Ind1.stVal}
Attribute Type	Data Content
Attribute Name, for reference only	CONTROL/GGIO1.Ind1.stVal
Attribute Data Location in Dataset, Ex.: 3 or 2,1,1	0,0
Attribute MMS Type	BOOLEAN
Attribute MMS Type Length	0
Attribute MMS Type Length is Fixed	<input type="checkbox"/>
Binding Mode	Normal
Publish on Change	<input checked="" type="checkbox"/>

- For a **subscriber (Rx)** the box is unchecked, since a subscriber cannot send a GOOSE message. The subscriber receives its objects from the publisher.



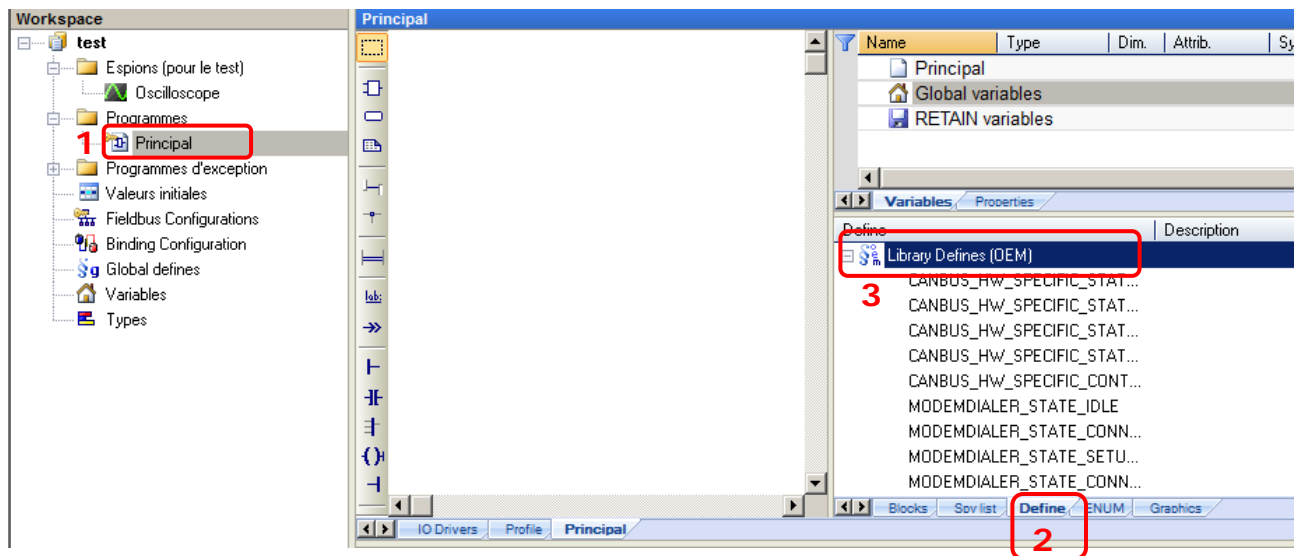
Name	Value
Symbol	{TEMPLATECONTROL/LLN0.cbGooseST}{CONTROL/GGIO1.Ind1.stVal}
Attribute Type	Data Content
Attribute Name, for reference only	CONTROL/GGIO1.Ind1.stVal
Attribute Data Location in Dataset, Ex.: 3 or 2,1,1	0,0
Attribute MMS Type	BOOLEAN
Attribute MMS Type Length	0
Attribute MMS Type Length is Fixed	<input type="checkbox"/>
Binding Mode	Normal
Publish on Change	<input type="checkbox"/>



Appendix: Accessing the OEM Library

Definitions of the codes for IEC 61850 global variables are provided in the OEM Library. To access the Global Variable definitions file, carry out the following steps:

- 1- Double-click on a program in the Workspace.
- 2- In the Variables area, click on the **Define** tab.
- 3- Double-click on **Library Defines (OEM)**.





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