



# **Eclipse Modbus Simulator User's Manual**



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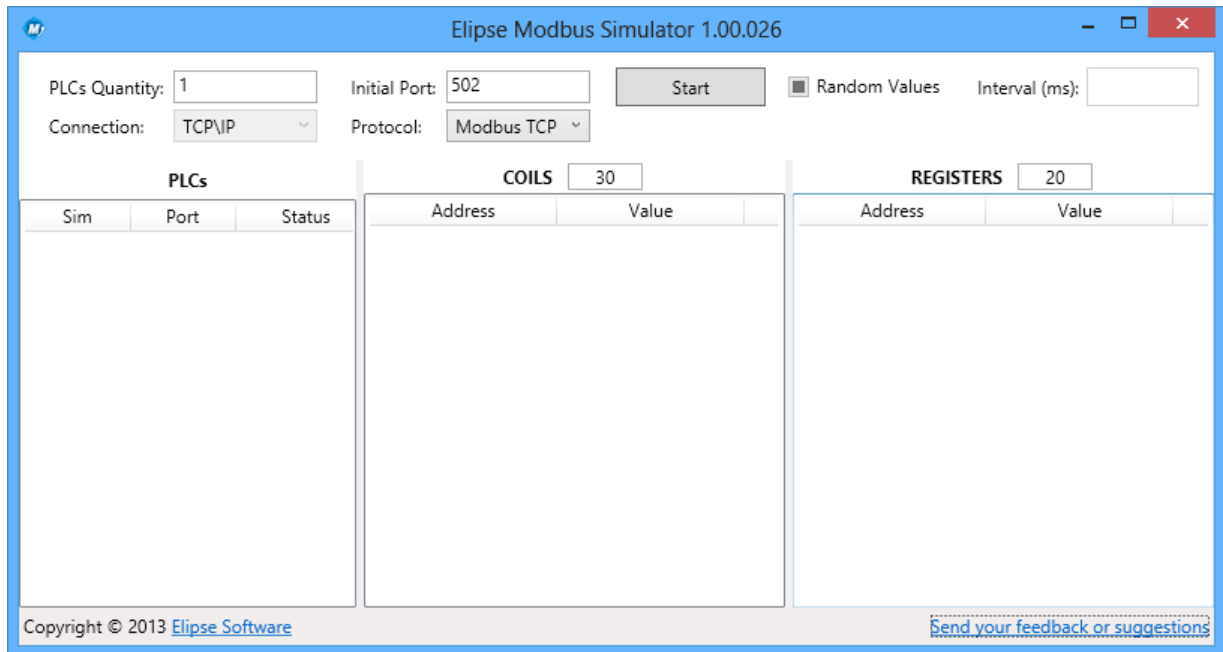
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**Eclipse Modbus Simulator** is a generator of random values for applications compatible with **Modbus RTU** and **Modbus TCP** protocols. In addition, it also allows to receive writing messages performed by these applications.

When the Simulator is started, the working area is then opened, as shown on the next figure.



Elipse Modbus Simulator's main window

The available options on the main window are described on the next table.

Available options on the Elipse Modbus Simulator's main window

OPTION	DESCRIPTION
PLCs Quantity	Number of PLCs to simulate. <b>NOTE:</b> In the <b>Demo</b> version this field is limited to 10 PLCs.
Initial Port	Base port used for communication.
Random Values	Enables or disables a random generation of values.
Interval (ms)	Variation interval of values, in milliseconds.
Connection	Type of connection to simulate (currently this option only accepts the value <b>TCP/IP</b> ).
Protocol	Protocol to simulate ( <b>Modbus RTU</b> or <b>Modbus TCP</b> ).
COILS	Number of <b>Coils</b> to simulate per PLC (maximum limit is 255).
REGISTERS	Number of <b>Registers</b> to simulate per PLC (maximum limit is 255).

After selecting the desired values, start the simulation by clicking **Start**.

The Simulator creates PLCs on ports consecutive to the value configured in the **Initial Port** field. For example, when configuring three PLCs starting at port 502, the first PLC is available at port 502, the second one at port 503, and the third one at port 504.

**NOTE:** PLCs created consecutively to the value configured in the **Initial Port** field only use the available ports. In the previous example, if port 503 is in use by another application, then the PLCs are created in ports 502, 504, and 505.

The Simulator provides 30 digital records (**Coils**) and 20 analog records (**Registers**) by default. Writing values directly to the Simulator is allowed, by using the **Value** column on the respective grids, when the variation of values for the PLC is turned off. The total amount of digital and analog registers can be configured, respectively, in the **COILS** and **REGISTERS** fields. The maximum allowed value for both cases is 255.

With the **Random Values** option selected, random values are generated in all memories every two seconds, as defined in the **Interval** field. The address of each PLC is always 1 (*Device ID*).

## 4.1 Coil

**Coils** are digital memories (**Bit**) available for reading through the **Modbus 01** (*Read Coils*) function and for writing through the **Modbus 15** (*Write Multiple Coils*) function or through the **Modbus 05** (*Write Single Coil*) function.

## 4.2 Register

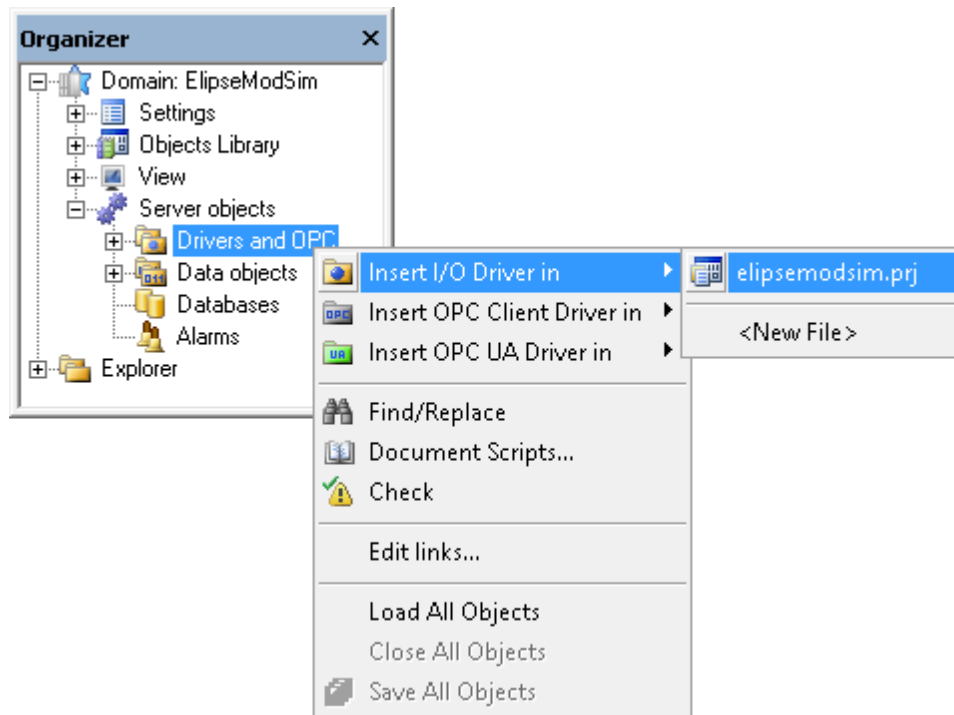
**Registers** are analog memories that range from 0 to 65535 (**Word**). They are available for reading through the **Modbus 03** (*Read Holding Registers*) function and for writing through the **Modbus 06** (*Write Single Register*) function or through the **Modbus 16** (*Write Multiple Registers*) function.

An **I/O Driver** is an E3 module responsible for communicating with a certain device, by using Drivers provided by Elipse Software.

To communicate Elipse Modbus Simulator with E3 the Modbus Driver will be used, which is available for download at [www.elipse.com.br](http://www.elipse.com.br).

## 5.1 Configuration

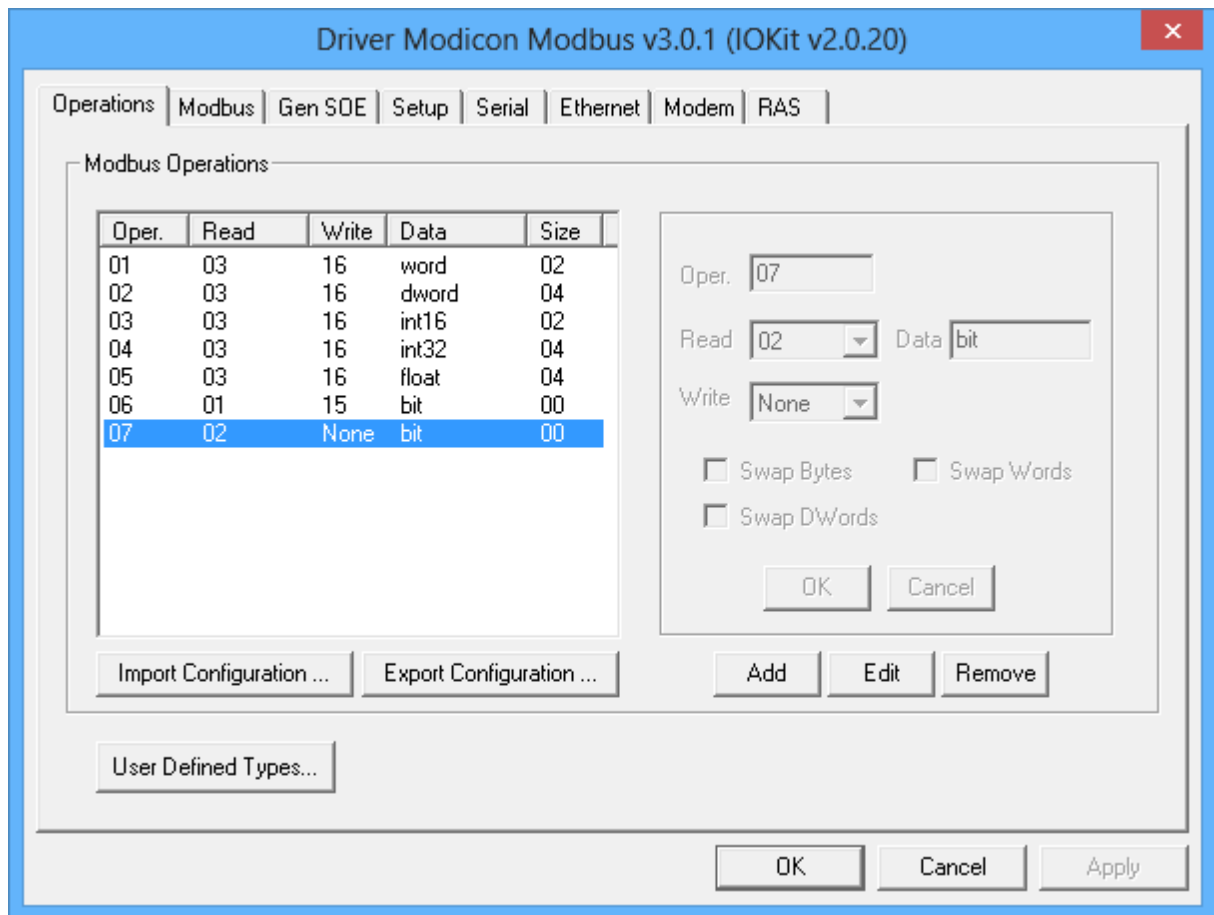
1. Right-click the Drivers and OPC folder, select the **Insert I/O Driver in** option, and then select the project to insert the Driver.



**Adding an I/O Driver**

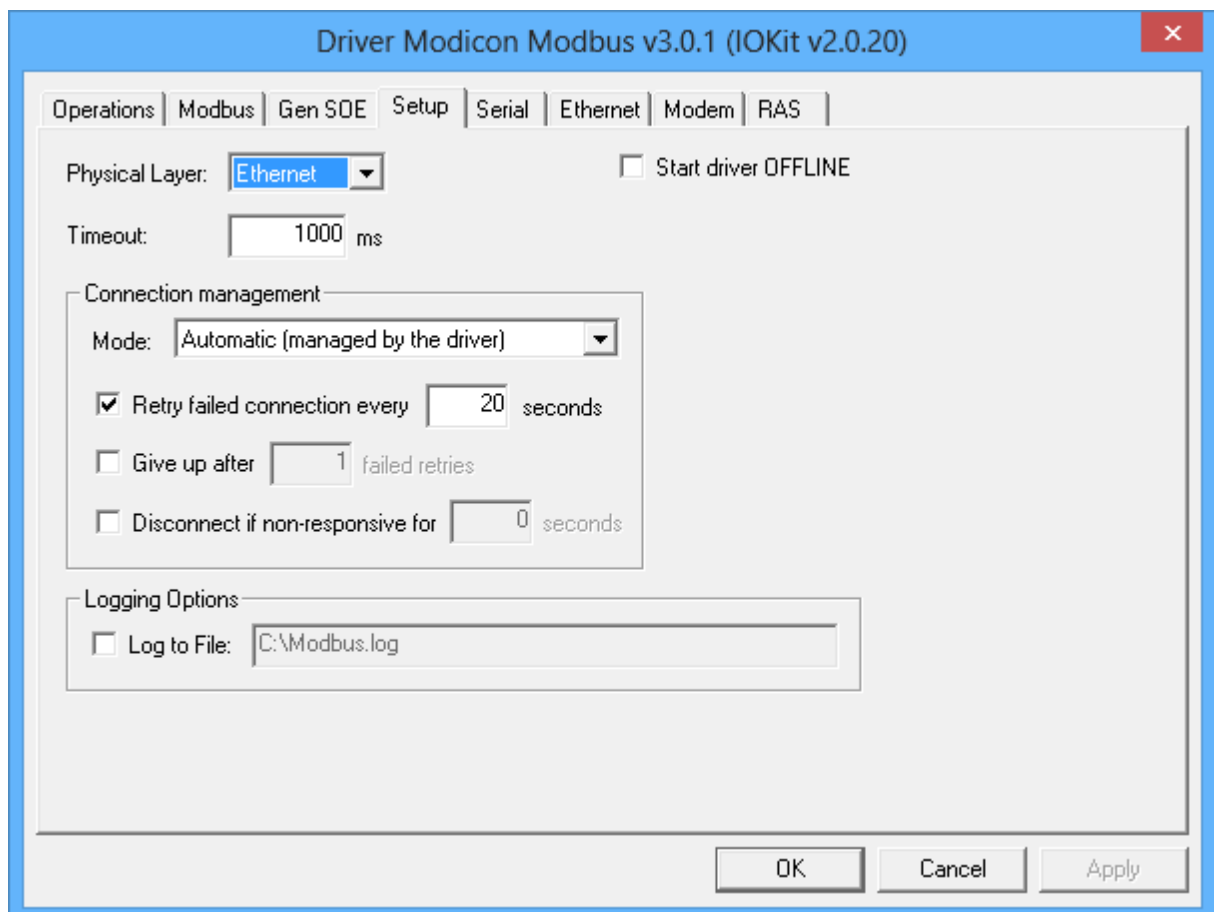
2. Select the Driver file (Modbus.dll) on the dialog box that opens for file selection. The following window is then opened to configure the Modbus Driver.





Operations tab

- On the **Setup** tab, configure the time the Driver waits for a response from the device in the **Timeout** field (for example, 1000 ms). Choose, on the list of options of the **Physical Layer** property, the **Ethernet** physical layer.



Setup tab

- After selecting the **Physical Layer** option, all other tabs are disabled, and only the chosen interface must be configured. On the **Ethernet** tab, type the IP of the computer running the Simulator. If the Simulator is running on the same computer as E3,

type "127.0.0.1".

Driver Modicon Modbus v3.0.1 (IOKit v2.0.20)

Operations | Modbus | Gen SOE | Setup | Serial | Ethernet | Modem | RAS

Transport: TCP/IP

☐ Listen for connections on port: 0 ☐ Local IP: (All Interfaces)

☐ Share listen port with other drivers/processes

Connect to:

IP: 127.0.0.1 Port: 504

☐ Specify local port: 0

☐ PING before connecting

Timeout: 4000 ms

Retries: 1

☐ Backup address

IP: Port: 0

☐ Specify local port: 0

☐ Enable 'ECHO' suppression

OK Cancel Apply

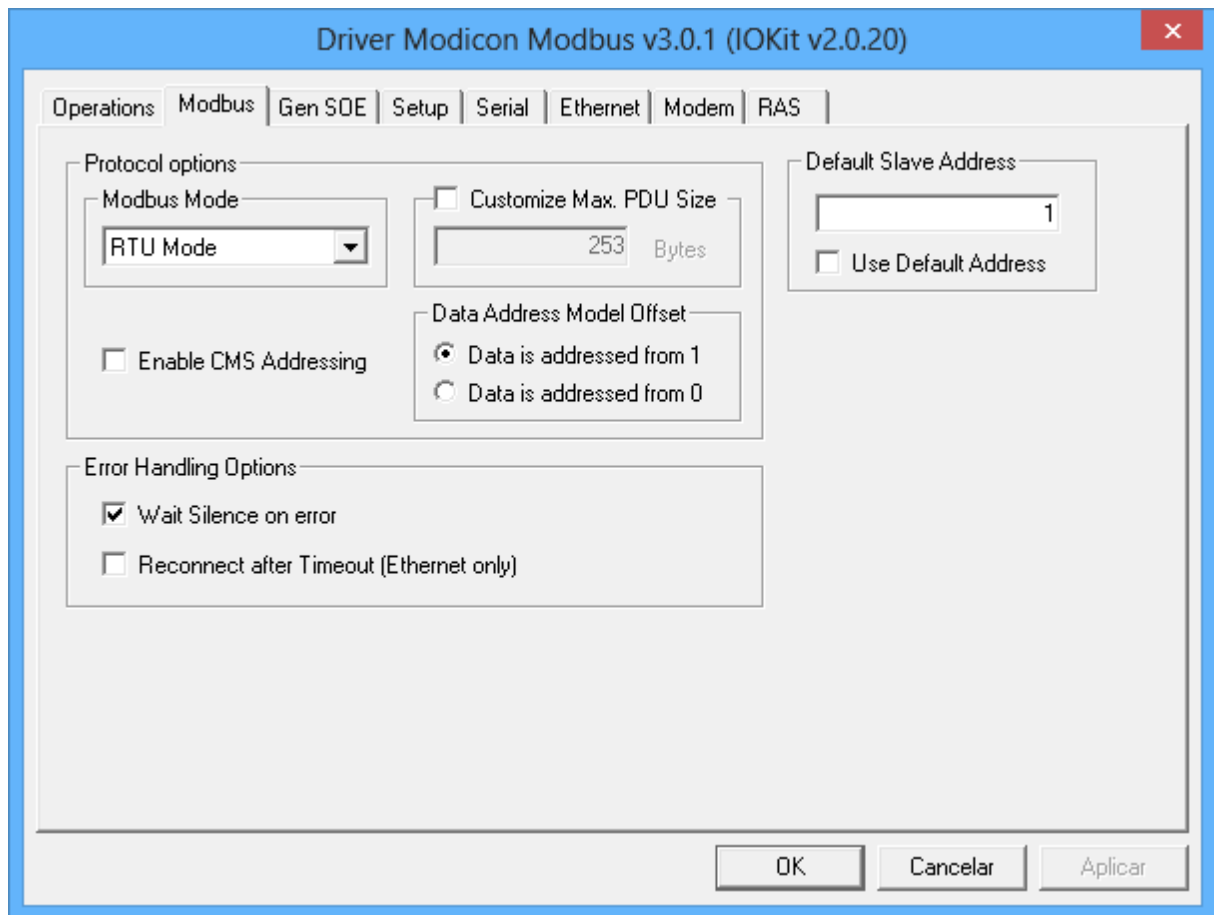
Ethernet tab

5. In the **Port** field, type the number of the communication port. For example, type "504" to access the third Simulator's PLC.

PLCs Quantity: 3 Initial Port: 502

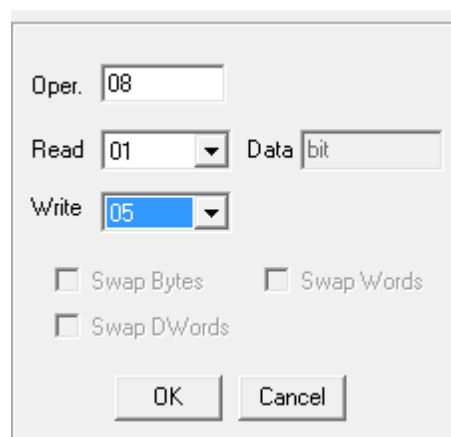
PLC Quantity

6. On the **Modbus** tab, select the **RTU Mode** or **Modbus TCP** (depending on the selected item in the **Protocol** option) item on the **Modbus Mode** section and, on the **Data Address Model Offset** section, select the **Data is addressed from 1** item, because the first address of the Simulator is 1 (one).



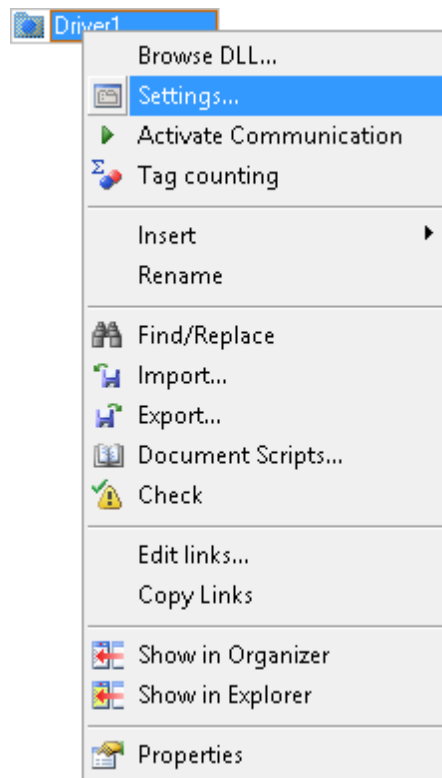
Modbus tab

7. On the **Operations** tab, check the code of the operations for reading and writing that are needed for reading PLC's registers:
  - **Registers:** Reading analog values (**Word**) through the **Modbus 03** (*Read Holding Registers*) function and writing through the **Modbus 06** (*Write Single Register*) or **Modbus 16** (*Write Multiple Registers*) functions. The operation **01** executes the **Modbus 03** (*Read*) reading and **Modbus 16** (*Write*) writing of **Word**-type values (*data*).
  - **Coils:** Reading digital values (**Bit**) through the **Modbus 01** function and writing through the **Modbus 15** (*Write Multiple Coils*) function. The operation **06** executes the **Modbus 01** reading and **Modbus 15** writing of **Bit**-type values. It is also possible to create a new operation that executes the **01** reading and the **05** writing, **Bit**-type values as well, as shown on the next figure.



Adding an operation

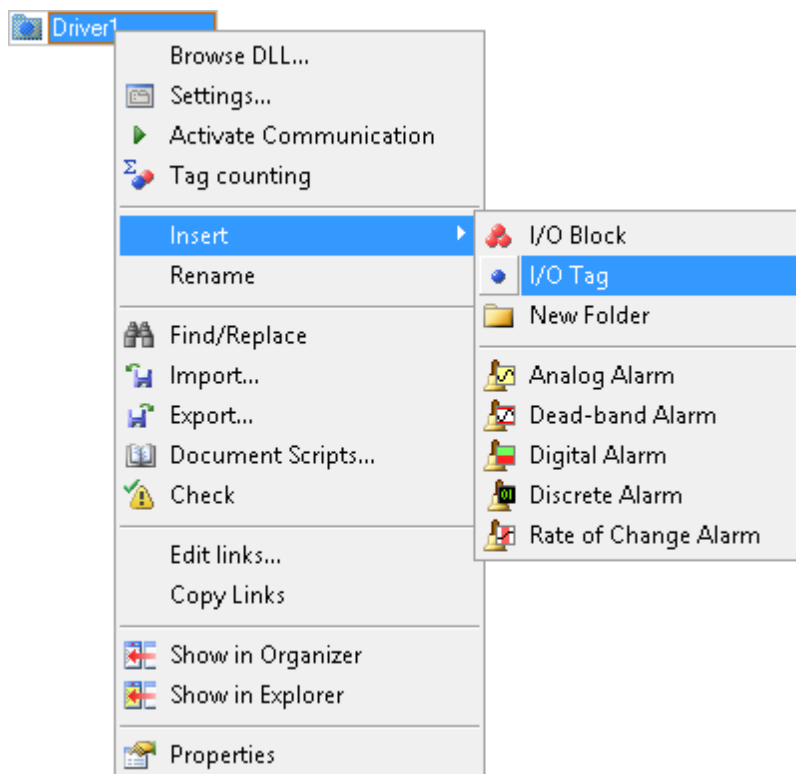
8. The operation codes **06** (*Coils*) and **01** (*Registers*) are used later when configuring the I/O Tags.
9. After configuring the Modbus Driver, click **OK** to close the window. If users need to reconfigure the Driver, right-click the object and select the **Settings** item.



Driver configuration

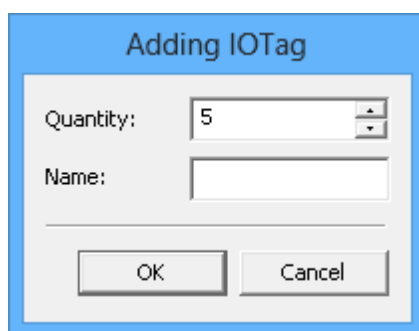
## 5.2 I/O Tag

1. Right-click the Driver and select the **Insert - I/O Tag** option, or click **Add +** on the Driver's toolbar.



Adding an I/O Tag

2. The next dialog box is then displayed, allowing to inform the amount and name of the I/O Tag or Tags. Create five Tags and name them "Digital1", "Digital2", "Analog1", "Analog2", and "Analog3", respectively.



The dialog box titled "Adding IOTag" has a blue header. It contains two input fields: "Quantity:" with a value of 5 and a spin button, and "Name:" with an empty text box. At the bottom are "OK" and "Cancel" buttons.

Configuring the amount of Tags

3. To configure these I/O Tags, users must fill in the **N1**, **N2**, **N3**, and **N4** properties, according to the instructions in the **Modbus Driver User's Manual**.

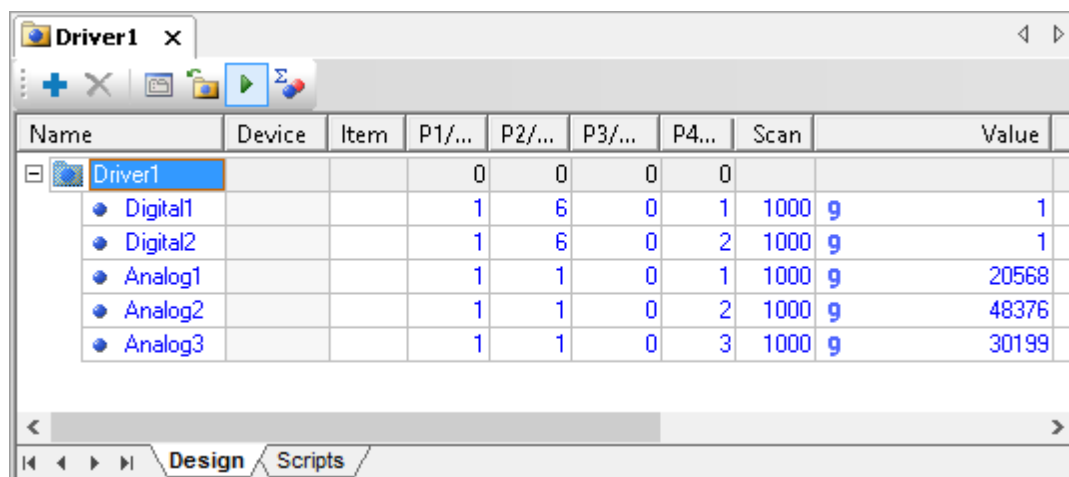
- **N1**: Address of the slave device (PLC) on the network. This address may range from 1 to 255
- **N2**: Operation code. References a writing or reading operation added on the Driver's configuration window
- **N3**: Additional parameter
- **N4**: Address of the register or variable in the slave device (PLC) to read or write

4. For the previously mentioned variables, the values for these properties are displayed on the following table.

Values for I/O Tag properties

TAG	N1	N2	N3	N4
Digital1	1	6	0	1
Digital2	1	6	0	2
Analog1	1	1	0	1
Analog2	1	1	0	2
Analog3	1	1	0	3

5. Right-click the Driver again and choose the **Activate Communication** item to test the configurations, or click **Activate/deactivate communication**. If the configurations are correct, the Tag's row should appear in blue.



I/O Tags activated

## 5.2.1 Scale

The Simulator generates analog values ranging from 0 to 65535. If users need values inside another range, enable the scale function. For example, for the Analog1 Tag ranging from 0 to 100 and the Analog2 Tag ranging from -20 to 20, these Tags must be configured according to the next figure.

Driver1											
Name	D...	Item	P1/...	P2/...	P3/...	P4...	Wri...	Sc...	EU ...	EU Max	
Driver1			0	0	0	0					
• Digital1			1	6	0	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	1000	
• Digital2			1	6	0	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	1000	
• Analog1			1	1	0	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	100	
• Analog2			1	1	0	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	-20	20	
• Analog3			1	1	0	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	1000	

I/O Tag scale



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