



AXON TEST V3.8
IKELOS

Simulator



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1. CHANGE CONTROL

Date	Description	Manual Version	Software Version
14/07/14	Initial Version	20140714AT30UG0E	V3.0.1.1
28/07/15	General Revision and actualization according version 3.8.	20150728AT38UG0E	V3.8.1.22

2. INTRODUCTION

Axon Test, software for simulation and analysis of protocols such as DNP3, IEC 60870-5-101, IEC 60870-5-104 and Modbus. It has several tools for the analysis of traces, an editor that allows the mapping of signals, sending commands, and filters that allow you to show the signals of interest as well.

Axon Test is designed to work on Microsoft operating systems Windows XP SP3, Windows 7 and Windows 8 with processor architecture of 32 or 64 bits.

The purpose of this manual is to provide the best use working with Axon Test, speeding up your tests making them more objective, quick and easy.

At the end of the manual is expected that you reach a great understanding of the software and fully aware of the characteristics of both the tools and modules, so you can develop your projects in a versatile manner, with great ease and success. Welcome!

3. ABOUT THE VERSION V2.0 IKELOS

For this new version of Axon Test, the following protocols are integrated into a single simulator:

- DNP3 LAN/WAN (Master/Slave)
- DNP3 serial (Master)
- IEC 60870-5-104 (Master/Slave)
- IEC 60870-5-101 (Master/Slave)
- Modbus LAN/WAN (Master/Slave)
- Modbus Serial (Master/Slave)

Another important change is the provision of two versions, a free version completely functional for a 45 days period and a licensed version.

Limitations after 45 days (Freeware):

- ✓ Allows simulation of one IED at once.
- ✓ Waiting to start the simulator.
- ✓ Does not allows saving the configured project.

4. INSTALLATION

Axon Test Simulator requires prior installation of Microsoft.NET software. This chapter aims to show the installation process of Microsoft NET Framework 4.0 and Axon Test, a simple application with low consumption requirements in both software and hardware.

4.1. REQUIREMENTS FOR SOFTWARE INSTALLATION

The computer where the installation of Axon Test will take place must meet the following minimum requirements:

- Operating System: Windows XP SP3 or higher.
- Hard Drive: 200MB free storage.
- Processor: 1.5GHz
- Memory RAM: 1GB
- Framework: Microsoft .NET 4.0

4.2. INSTALLATION OF MICROSOFT .NET FRAMEWORK 4

The .NET platform from Microsoft is a software component that is optionally installed, and in conjunction with the Windows operating system provides an extensive set of solutions, each of these are preset for the general needs of the application programming, including the administration, the execution of programs written specifically for the platform. Framework .NET can be installed on Windows Server 2008, Windows Vista and Windows 7. Similarly, the current version of that component can be installed on Windows XP, and the family of Windows Server 2003 operating systems. This feature set provides support for Axon Test that can be implemented on any computer regardless of hardware platforms.

For installation you need to previously download the latest version of the software Axon Test from the Axon Group Website:

(http://www.axongroup.com.co/axon_descargas.php) and the .NET Framework 4 from the link: (<http://msdn.microsoft.com/en-us/netframework/aa569263>).

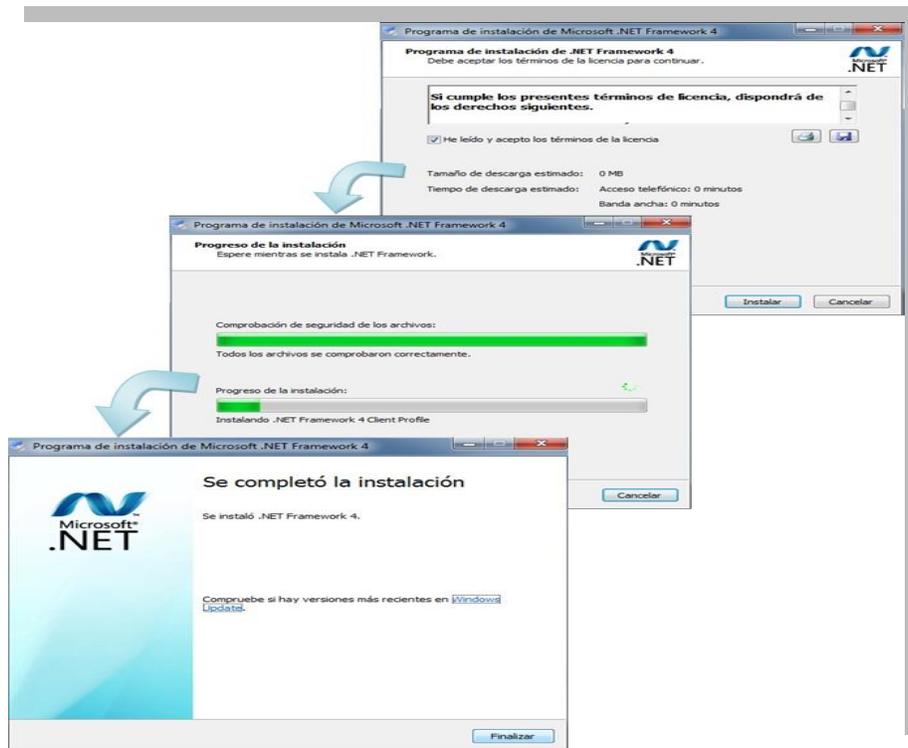


Figure 4.2-1 Installation process Microsoft .Net Framework 4

Next double click on the downloaded file, this action will start Setup.

To continue the installation you must accept the license terms by checking "I accept the license terms" and press the Install button. Then a window with the progress of the installation of the platform is shown. Once the installation process completes a window is displayed with the message "Installation is complete" completes the process by clicking the *Finish* button. The above process is shown in Figure 4.2-1.

4.3. INSTALLING AXON TEST

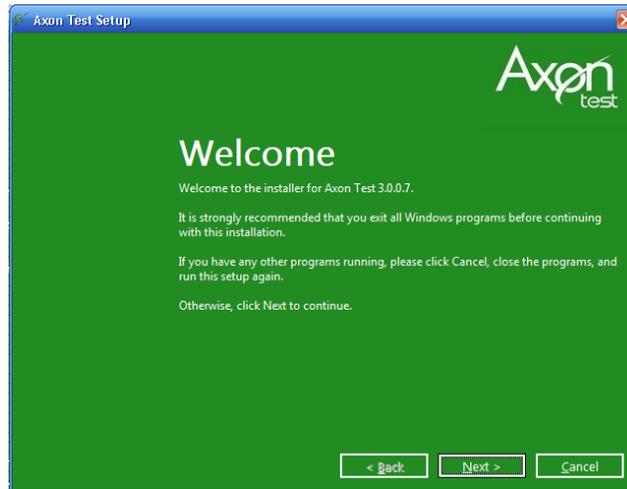


Figure 4.3-1 Starting installation of Axon Test

Here you must run the installation program Axon Test; this action will display the welcome screen for the installation of the application consecutively must click on the *Next* button.

Next another screen with the license terms is shown. To start the installation must accept the terms of the license and click on the *Agree* button.



Figure 4.3-2 Software License Agreement

By accepting the license terms a window will be displayed, in which you have to enter the data of the computer or terminal user where it will be installed Axon Test (Name, Company, and Email).

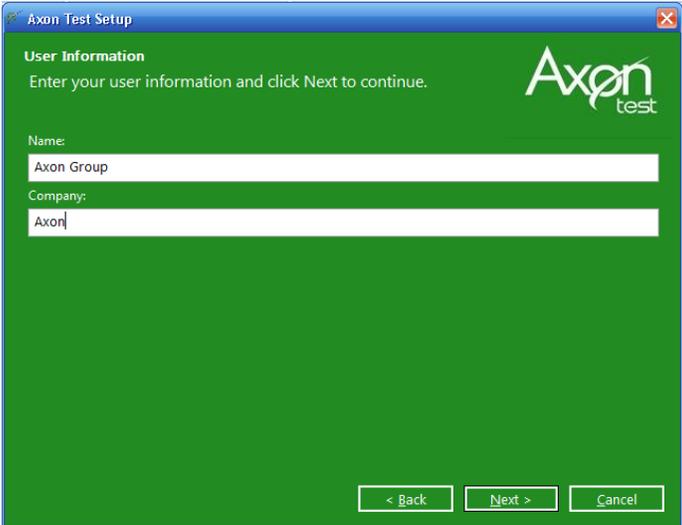


Figure 4.3-3 Names and Company

Afterwards a window with the path to the folder where the software will be installed is displayed. However, this can be changed by clicking the *Change...* button. Then click the *Next* button.

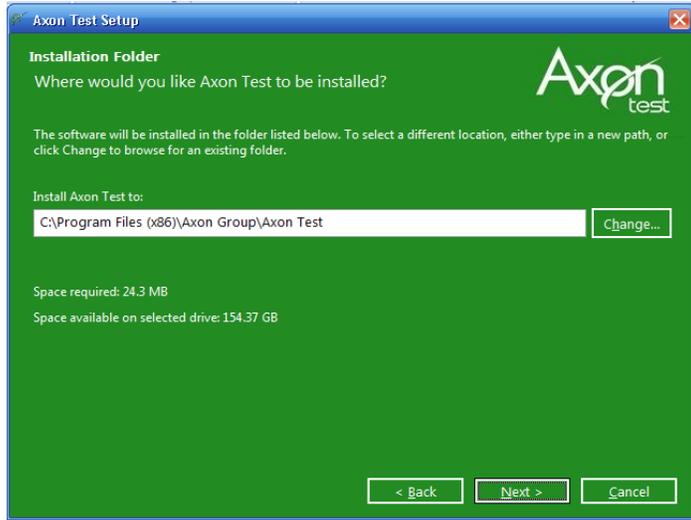


Figure 4.3-4 Folder where the software will be installed

The next screen will display a summary of the configured features for simulator installation on the computer.

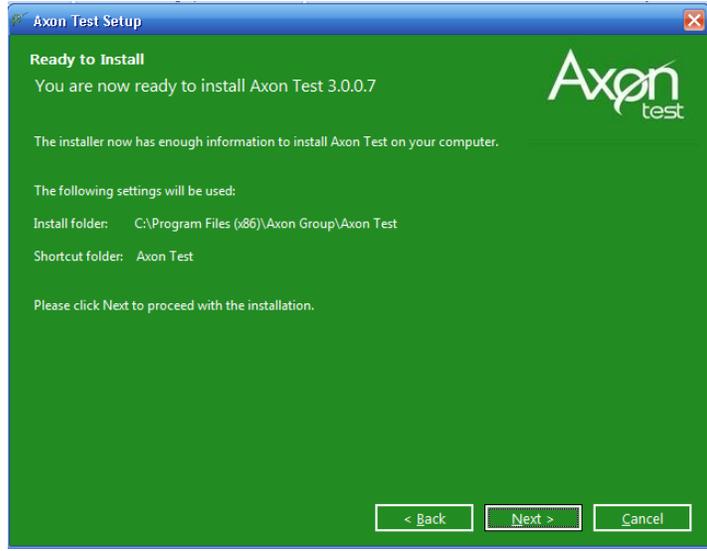


Figure 4.3-5 Data Confirmation

Next the installer starts. Once the installation is complete a window indicating that the installation was successful is displayed. To complete the Axon Test installation process you have click the *Finish* button.

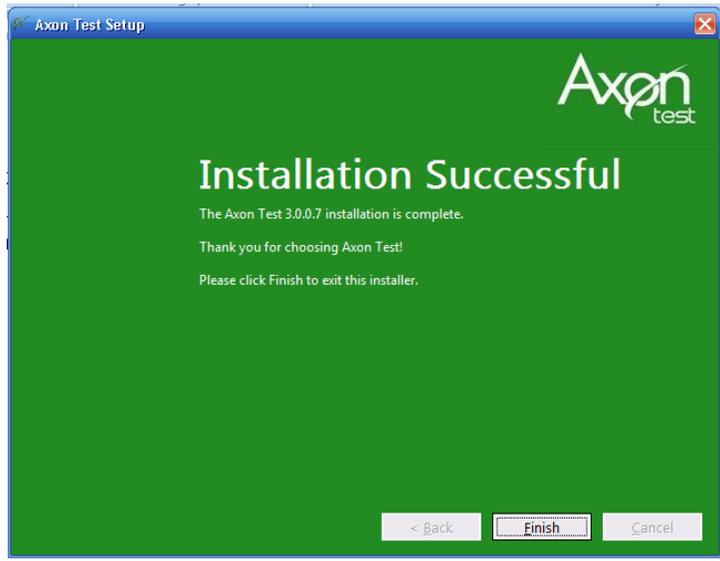


Figure 4.3-6 Confirmation that the installation has been successful

5. FUNCTIONAL COMPONENTS

Axon Test has a series of tools for the management of any automation project, once you access the application all windows and specific components are displayed, such as:

5.1. WORK AREA

The workspace is the central window; you can set the parameters of each and every one of the slave and/or master devices through this window, parameters which are enabled to be configured at the moment of a simulation, as well as the communication configuration of each of them, and the configuration of the personalized applications.

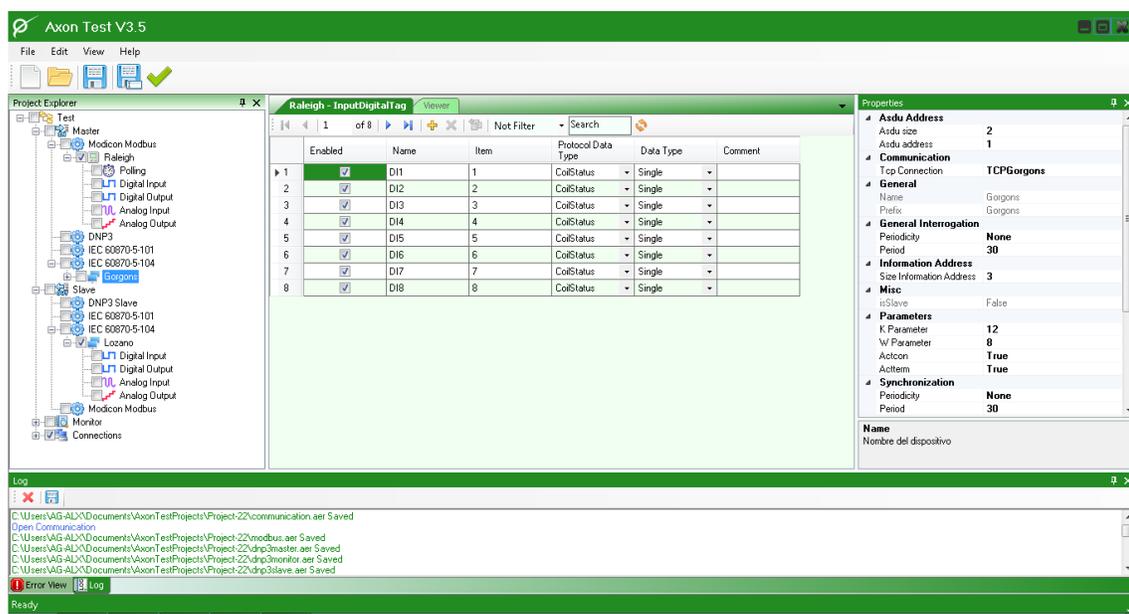


Figure 5.1-1 Workspace Axon Test

5.2. MENU BAR

Axon Test contains a main bar at the top of the software with five menus containing the necessary tools for project settings.



Figure 5.2-1 Menu Bar

5.3. TOOLBAR

Axon Test offers an array of main icons organized in the top of the screen, below the menu bar, its function is to allow quick access to basic functions such as *Open* and *Save*, as well as make the *Validation* function of the project to determine errors.



Figure 5.3-1 Toolbar

5.4. FILE MENU

Axon Test provides functions to generate a new project, open an existing project, save the project, open recent projects and exit the application.

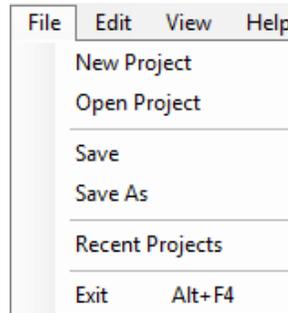


Figure 5.4-1 File Menu

- a) *New Project*: Once you click on *New Project* a window will show up to configure the new project.

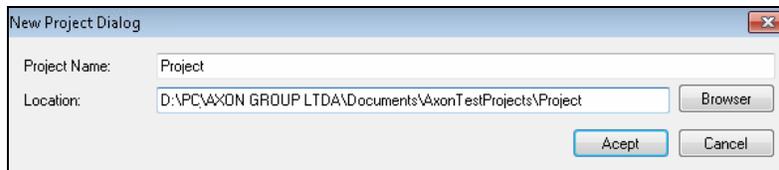


Figure 5.4-2 File Menu

Once the window is displayed in order to create a new project with **Axon Test**, the user must assign the name and the directory path where the project will be saved. Finally the information is confirmed by clicking the *Accept* button. If you want to discard the creation of the project you must click the *Cancel* button.

- b) *Open Project*: Allows searching for a previously saved project by clicking the *Open Project*.
- c) *Save*: Allows saving the changes made in the project.
- d) *Recent project*: Shows the latest projects created and configured.

- e) *Exit*: Allows to close the application, however, before exit Axon Test displays a message informing the user that the application is going to close and asking if want to conserve the changes.

5.5. EDIT MENU

Contains text editing features for easy editing of the fields where the signal parameters are fixed, through these you can select, copy and paste signals from one device to simulate on **Axon Test**.

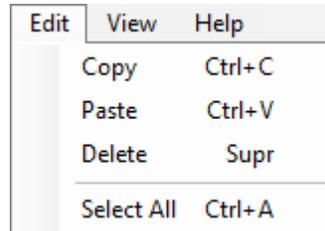


Figure 5.5-1 Edit Menu in Axon Test

You can use the hotkeys for these functions:

- **Copy:** *Ctrl + C*
- **Paste:** *Ctrl + V*
- **Select All:** *Ctrl + A*

5.6. VIEW MENU

Provides the user another chance to access the different tools and windows in **Axon Test** such as Properties, Log, slaves and/or masters Device Configuration and Error Panel.

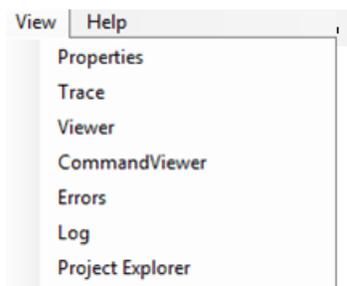


Figure 5.6-1 View Menu

5.7. TOOL MENU

Gives users the ability to access the extra functionality tools of the protocols offered by the simulator Axon Test, these will be useful at the moment of making the management of network connections, which in this case has a serial emulations terminal like TCP.

Through these terminals you can see the traffic connection in ASCII and hexadecimal format; an example would be when connecting to a Modbus device, in the window will be displayed the traces for the connection under this protocol.

Another function is to determine the interconnection of other devices through the IP Scanner tool in a network.

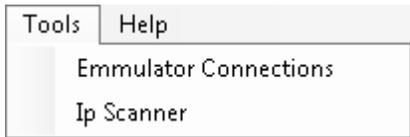


Figure 5.7-1 Item Tools

5.7.1. CONNECTIONS EMULATOR

5.7.1.1. SERIAL CONNECTIONS EMULATOR

Through the connections emulator serial can be managed point-to-point and/or connections with the RS232 protocol.

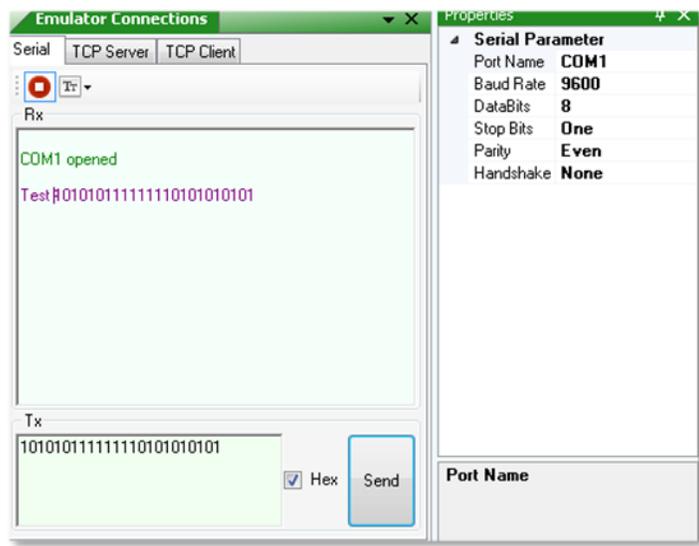


Figure 5.7-2 Terminal Emulation Serial

5.7.1.2. CONNECTIONS EMULATOR “TCP Server”

Through the connections emulator TCP Server you will be able to manage clients/server connections, and send messages and ensure the integrity of the connection.

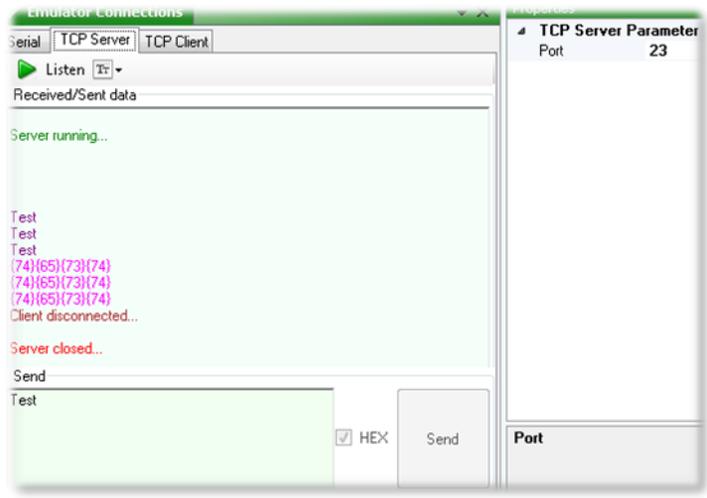


Figure 5.7-3 Terminal Emulation TCP Server

5.7.1.3. CONNECTIONS EMULATOR “TCP Client”

Through the connections emulator TCP Client you will be able to manage clients/server connections, and send messages and ensure the integrity of the connection.

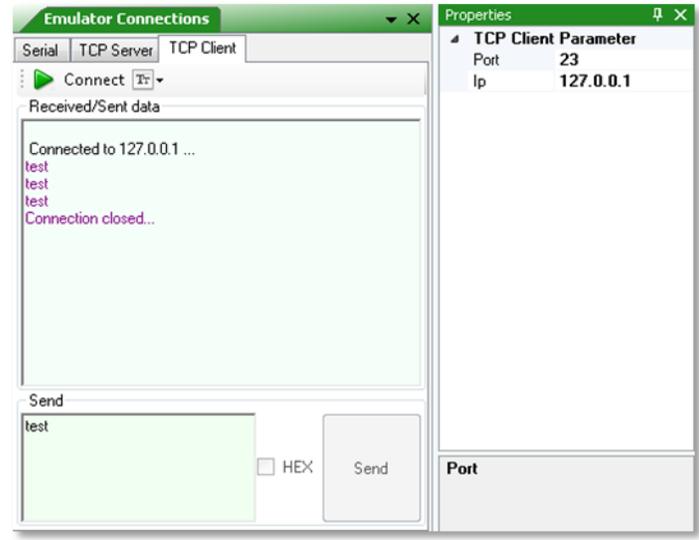


Figure 5.7-4 Terminal Emulation TCP Client

5.7.2. IP SCANNER

It is a tool that allows tracking devices interconnected on an intranet, the results obtained by the IPScanner are IP Address, Host Name and MAC address.

-  **Scan** Run the functionality of scanning devices in the network.
-  **Stop** Cancel the functionality of scanning devices in the network.
-  Saved in a .csv file the devices found on the network.

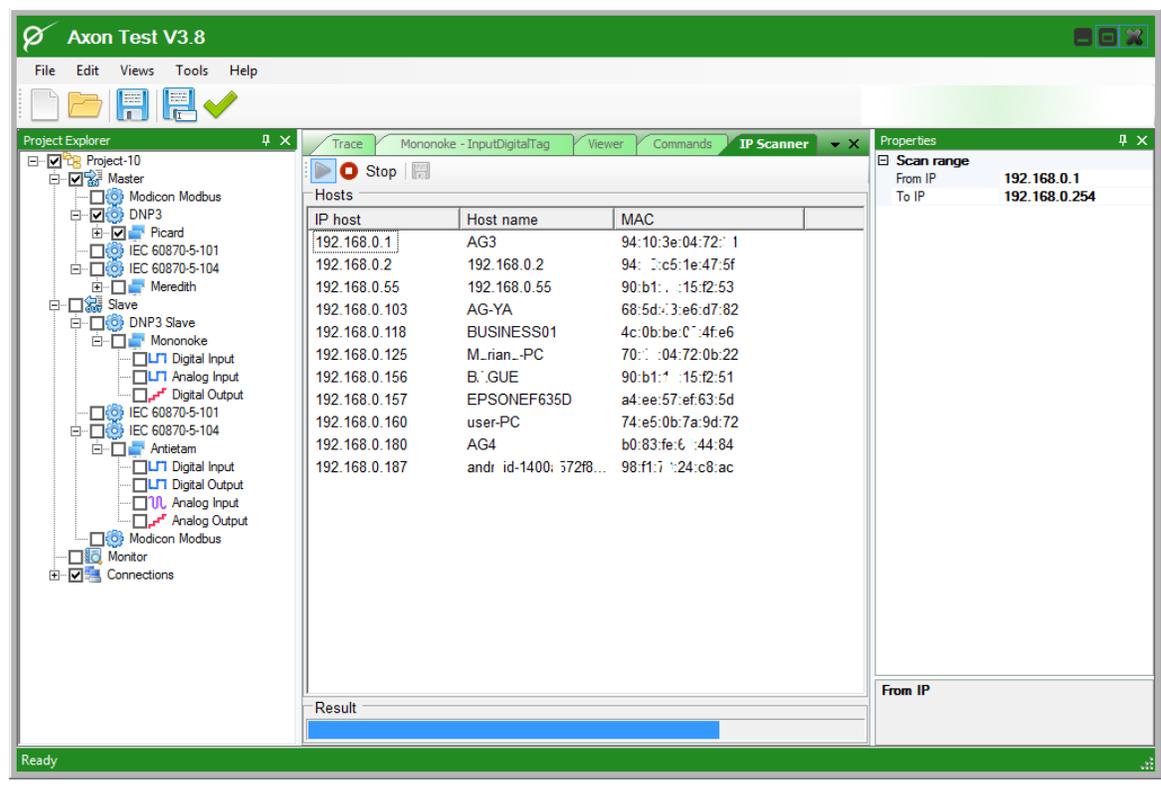


Figure 5.7-5 IPScanner Window

5.8. HELP MENU

Contains information about the version of Axon Test and also allows users to access the software manual, watch online video tutorials, and choose the language in which the application will be displayed, also make automatic program updates if you have an internet connection available through the *Update* option.

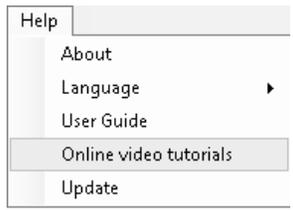


Figure 5.8-1 Help Menu

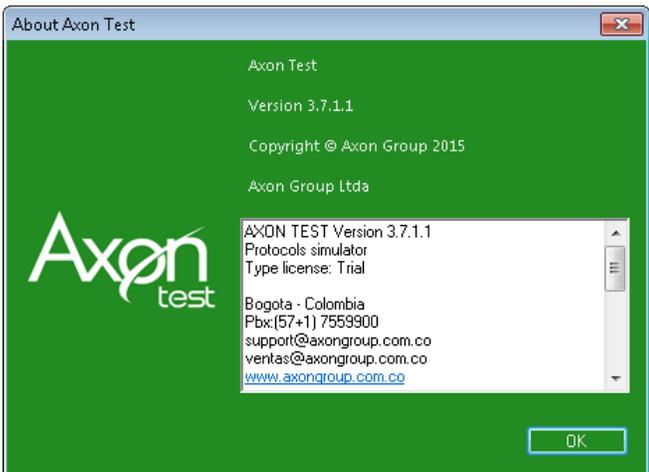


Figure 5.8-2 About Window

5.9. PROJECT EXPLORER

The explorer or project tree is the component where you will find the devices integrated into the master protocols and slave protocols, this component is located on the left side window and contains the component for additional services where is the tool for configuring communications on both serial connections such as TCP/IP

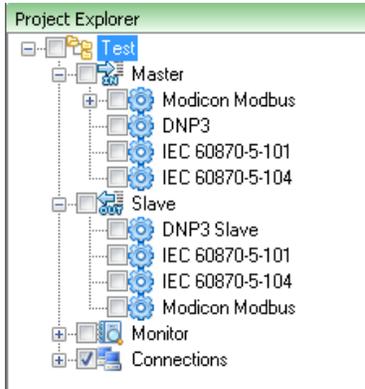


Figure 5.9-1 Project Explorer

5.10. CONFIGURATION OF CONNECTIONS "Connections"

In this section you create the connections of each of the devices, whether serial or TCP connections.

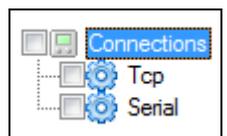


Figure 5.10-1 Connections

Note: When a device is created, is created automatically a default configuration with connection parameters as shown in the table below, it is important to note that must be customized according to the parameters of real connection.

PROTOCOL	IP	PORT
IEC 60870-5-104	127.0.0.1	2404
DN3	127.0.0.1	20000
MODBUS	127.0.0.1	502

5.11. TCP CONNECTIONS

In the TCP connections you defined the IP address of the slave device to which you are connecting and the TCP port.



Figure 5.11-1 TCP Connections

- NAME: TCP Connection name
- IP: IP address of the slave device
- Port: TCP port connection

5.12. SERIAL CONNECTIONS

Name	Baud Rate	Parity	Stop Bits	Data Bit	Port	Enable RTS	Time between	Time between last byte and release RTS
CONN_IED1_MOD	9600	None	One	8	COM1	<input checked="" type="checkbox"/>	10	10
CONN_IED2_MOD	9600	None	One	8	COM1	<input checked="" type="checkbox"/>	10	10

Figure 5.12-1 Serial Connections

In serial connections all connection parameters are configured, as *Name*; *Baud Rate*; *Parity*; *Stop Bit*; *Port*; *Enable RTS*; *Time between*; and *Time between last byte and release RTS*

5.13. IED MENU

Right clicking shown the menu of each IED, where you will find options: *Run*, *Stop*, *Rename*, *Clone Device*, *Delete* and *Properties*.

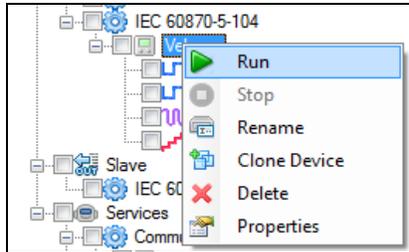


Figure 5.13-1 Menu IED

	Run	Run the device simulation created
		Device without running
		Running but not connected with the slave device
		Running and connected with the slave device
	Stop	Cancel the simulation of the device created
		Duplicate the device
		Rename the device

Keep in mind that in the free version is only possible to run the simulation of a single IED

Rename: Modify the IED Name and the prefix created by default. To change the name of the IED or the prefix is necessary that the connection is in STOP.

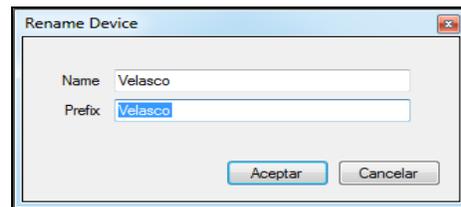


Figure 5.13-2 Changing the device name

Clone Device: It allows you to clone a device multiple times automatically, in this window the name of the new IED and prefix to use are displayed, besides the possibility to set the number of times you want to duplicate the device as shown in the figure below.

Delete: Deletes the selected device

Properties: Displays the properties of the connection.

5.14. TYPES OF SIGNALS

Within each IED are 4 types of signals:

- Digital Input
- Digital Output
- Analog Input
- Analog Output

For each of these types are allowed to create the signals to simulate, these signals can be added manually in the master device.

To map signals use toolbar by this you can create new signs, clone, select, delete, cut, copy and paste them.

The advantage of creating signals, when one of the created signals is received, this will be reported with the name and description of the signal, facilitating control tests.

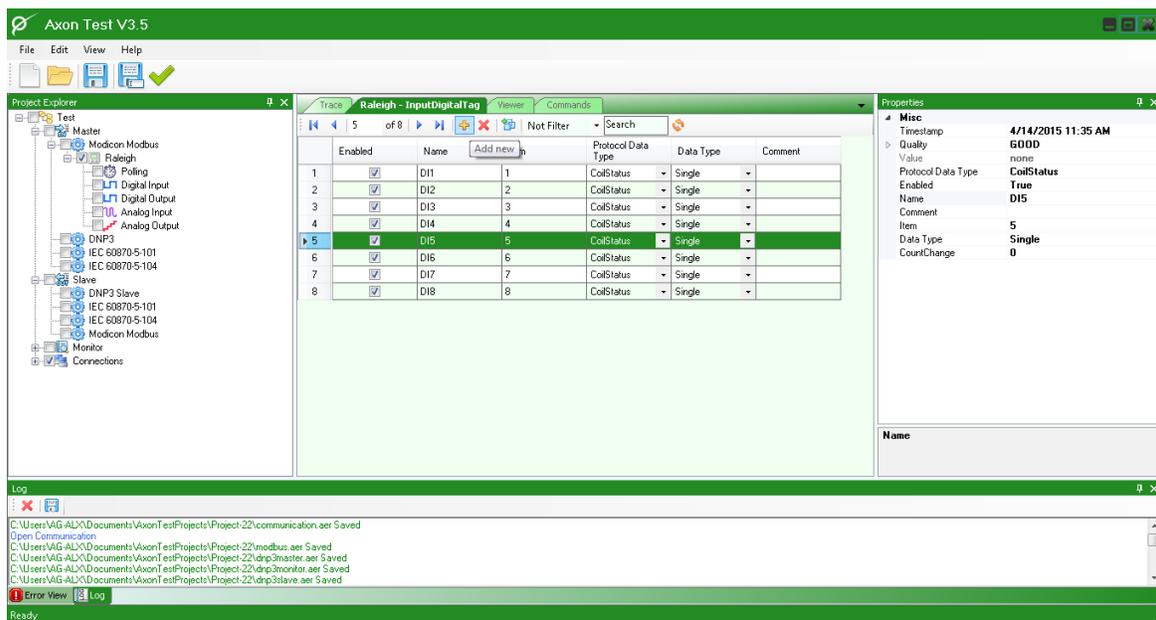


Figure 5.14-1 Creating signals

5.14.1. DIGITAL INPUTS

With the election of Digital Input we have the ability to simulate signals SINGLE POINT, DOUBLE POINT STEP POSITION type, know its binary state and have the ability to assign a time stamp.

In slave devices you can also simulate independently each signal or set of signals. Through this feature you can simulate changes and send them to a master device, to

do this, click on the column *Enable Simulate* of the desired signal, or choose several signals and from the properties window enable them to perform multiple simulations and thus speed up the simulation process, you can also choose how to go over the rows through the option *Go To Name* describing which row must be moved consecutively in the simulation.

Enabled	Name	Group Number	Binary Data Type	Timestamp	Quality	Value	Item	Stamped	EnableSimulate	Operator Simulate	Time	Comment	CountChange
<input checked="" type="checkbox"/>	DI1	Global	Single				1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Ramdon	5		0
<input checked="" type="checkbox"/>	DI2	Global	Single				2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Ramdon	5		0
<input checked="" type="checkbox"/>	DI3	Global	Single				3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Ramdon	5		0
<input checked="" type="checkbox"/>	DI4	Global	Single				4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Ramdon	5		0
<input checked="" type="checkbox"/>	DI5	Global	Single				5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Ramdon	5		0

Figure 5.14-2 Digital Inputs window

The properties window may provide a better description of the parameters of a selected signal. This window is displayed to the right of Axon Test, through these properties you can get a better description of the characteristics of the signal or signals mapped on the simulator.

Note carefully that the simulation can be enabled in this window via the *EnableSimulate* option.

Properties	
Autosimulacion	
EnableSimulate	False
Operator Simulate	Ramdon
Time Simulate	5
Misc	
Group Number	Global
Binary Data Type	
Timestamp	
Quality	
Value	
Item	
Stamped	True
Enabled	True
Name	
Comment	
CountChange	0
Autosimulacion	

Figure 5.14-3 Digital Inputs properties window

5.14.2. ANALOG INPUTS

Corresponds to the general mapping of the signals that the slave has, it is possible to simulate analog inputs through the *Analog Inputs* option in a very easy way, customizing them at our own criteria, and specify the type of data to simulate as belonging to this group as well as add time stamp.

Enabled	Name	SignalFamilyName	Item	Binary Data Type	Group Number	ScaledFactor	DeadBand	Comment
<input checked="" type="checkbox"/>	AI1	AI	7	Measured Normalised	Global	1	0	
<input checked="" type="checkbox"/>	AI7	AI	8	Measured Scaled	Global	1	0	
<input checked="" type="checkbox"/>	AI8	AI	9	Measured Floating	Global	1	0	

Figure 5.14-4 Analog Inputs Window

The properties window may provide a better description of the parameters of a selected signal. This window is displayed to the right of Axon Test

Misc	
SignalFamilyName	AI
Binary Data Type	Measured Normalised
Group Number	Global
Enabled	True
Name	AI1
Comment	
Item	7
ScaledFactor	
ScaledFactor	1
DeadBand	0

Figure 5.14-5 Analog Inputs Properties Window

5.14.3. DIGITAL OUTPUTS

Corresponds to the general mapping of the signals that the slave has, Digital outputs can be simulated through the Digital Outputs option customizing them at our own criteria, these are the signals that the slave must respond, for these you can specify the data type and the confinement of the control SELECT, EXECUTE, SELECT/EXECUTE, as well as the default action for each signal.

Enabled	Name	SignalFamilyName	Item	Binary Data Type	Control Type	Select Required	Comment
<input checked="" type="checkbox"/>	DO1	DO	1	Single Comm...	Short Pulse	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	DO2	DO	2	Double Com...	Short Pulse	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	DO3	DO	3	Regulating C...	Long Pulse	<input checked="" type="checkbox"/>	

Figure 5.14-6 Digital Inputs Window

The properties window may provide a better description of the parameters of a selected signal. This window is displayed to the right of Axon Test

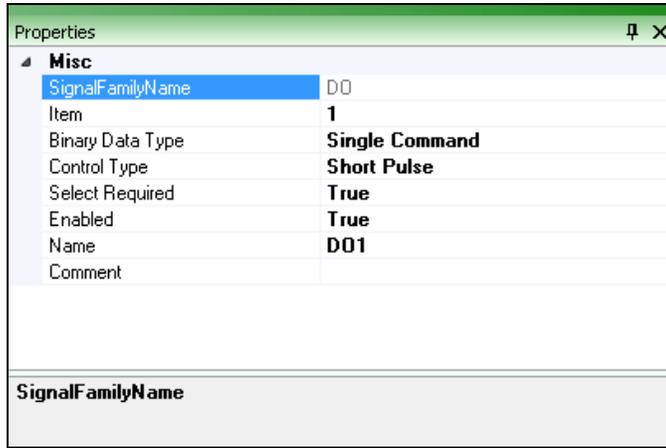


Figure 5.14-7 Digital Inputs Properties Window

5.14.4. ANALOG OUTPUTS

Through *Analog output* control, commands can be simulated towards a master device. With this option you can enable or disable signal simulation, customize it with a specific name, confirm with actions such as SELECT, EXECUTE, SELECT / EXECUTE and define the type of data you wish for a specific type of signal.

The screenshot shows a table titled 'Achilles - Analog Output' with the following data:

Enabled	Name	SelectRequired	SignalFamilyName	Item	Binary Data Type	ScaledFactor	DeadBand	Comment
<input checked="" type="checkbox"/>	AO11	<input type="checkbox"/>	AO	11	Setpoint Nor...	1	0	
<input checked="" type="checkbox"/>	AO12	<input type="checkbox"/>	AO	12	Setpoint Scal...	1	0	
<input checked="" type="checkbox"/>	AO13	<input type="checkbox"/>	AO	13	Setpoint Floa...	1	0	
<input checked="" type="checkbox"/>	AO14	<input type="checkbox"/>	AO	14	Bitstring Com...	1	0	

Figure 5.14-8 Analog Outputs Window

The Properties window provides a better description of the parameters of a selected signal. This window is displayed to the right of Axon Test

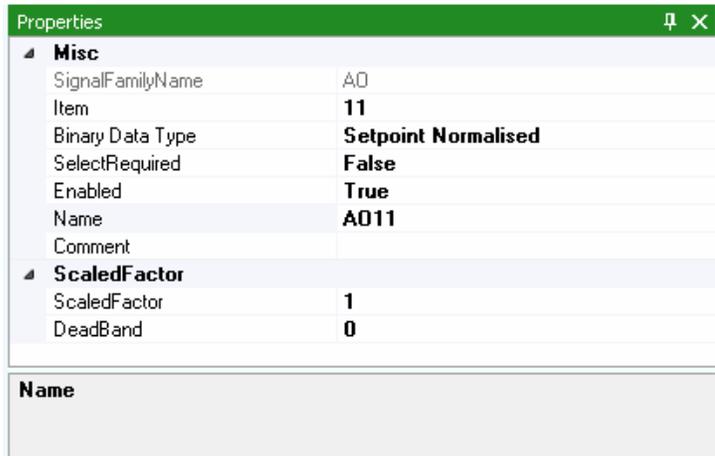


Figure 5.14-9 Analog Outputs Properties Window

5.15. PARAMETERS AND PROPERTIES

Axon Test allows you to configure the device to be simulated according to the needs and characteristics depending on each protocol you want to try, for it simply must enter the parameters on the properties windows.

The properties window is located to the right of the main screen. Its function is to achieve a better visualization of the parameterization of the devices and integrated signals within the project, depending on the protocol to configure this window will display all the features to configure a specific protocol.

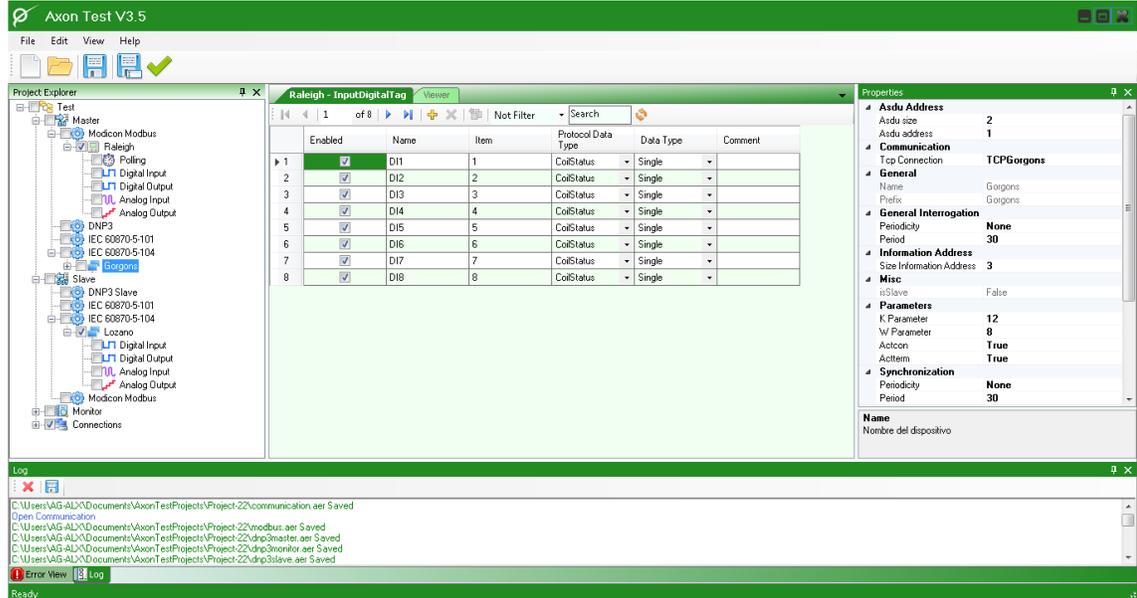


Figure 5.15-1 Properties Window

Allows you to enter the different parameters for establishing a connection according to the protocol to simulate. Using this tool the device parameters are configured to be connected, either serial or LAN / WAN.

Here you can configure parameters such as IP address and port of the remote computer, depending on protocol parameters to simulate.

6. TOOLS

This section describes each of the tools in Axon Test, which facilitates testing or analysis of communications.

6.1. TRACE

The Trace tool is very useful for viewing and analyzing the traces exchanged between the two devices.

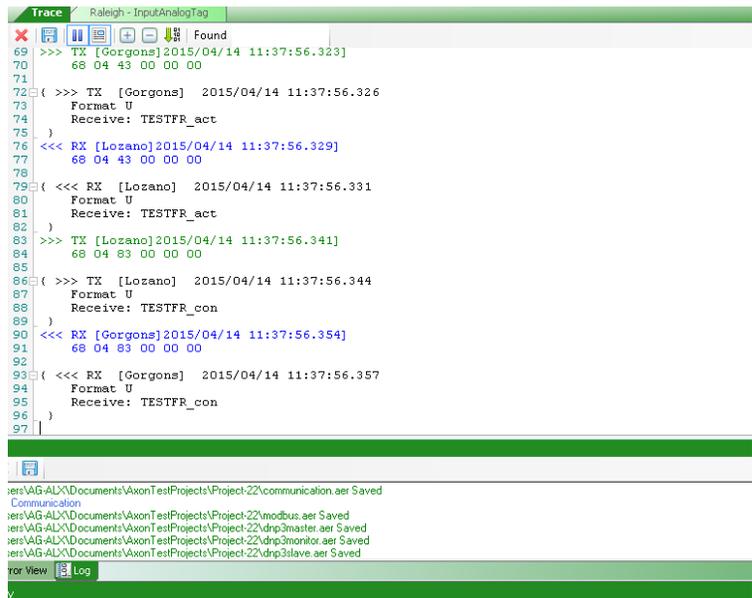


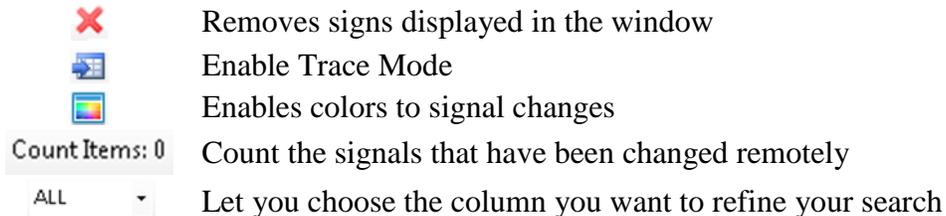
Figure 6.1-1 Trace Window

In the upper part it has a toolbar that will be described below.

-  Clears the contents of the trace window
-  Save the traces displayed on the Trace window
-  Starts or stops the simulation
-  Enables detailed description of the traces
-  Allows to expand the detailed information of the traces
-  Allows to collapse the detailed information of the traces
-  Lead you to the end of the line of the displayed traces
- Found** Textbox that lets you find information on the trace

6.2. VIEWER

Axon Test is designed to display the signals in a more user friendly way. Through the *Viewer* tool it is possible to display and force the change in the signals;



For advanced settings this can be done through *Mapping*, one of the advantages of doing this configuration, is the customization of the signals, changing these characteristics make simulation a more helpful and enjoyable experience, fields can be modified as the name, data type.

Moreover, the *Viewer* has the ability to search for signals your need; this action is performed through the filters by column, when any character is entered this option will display alphabetical characters entered for the search

After simulate the device, will be observed in the *Viewer* parameters such as personalized name, state, address, group, value, quality, time stamp and the type or according to the specific characteristics for each protocol (See Figure 6.12-1).

Viewer						
Status						
Advance Filter Count Items: 124						
name	status	Time Stamp	Quality	item	BinaryDataType	Count Update
Lozano_DI1	True	2015/04/14 11:58:35.215 *	GOOD	1	Single	4
Lozano_DI2	False	2015/04/14 11:58:35.215 *	GOOD	3	Single	4
Lozano_DI3	True	2015/04/14 11:58:35.215 *	GOOD	5	Single	4
Lozano_DI5	False	2015/04/14 11:58:35.215 *	GOOD	7	Single	4
Lozano_DI7	False	2015/04/14 11:58:35.215 *	GOOD	9	Single	4
Lozano_DI9	True	2015/04/14 11:58:35.215 *	GOOD	11	Single	4
Lozano_DI11	False	2015/04/14 11:58:35.215 *	GOOD	13	Single	4
Lozano_DI13	False	2015/04/14 11:58:35.217 *	GOOD	15	Single	4

Figure 6.2-1 Viewer Window with mapping signals

Note: If no setting made in the Mapping, the signals that are deployed in the *Viewer*, the name and the type of signal take default values (See Figure 6.12-2).

name	status	Time Stamp	Quality	item	BinaryDataType
Rica_Unknow4	False	17/07/2014 10:19:03	GOOD	4	Binary
Rica_Unknow5	True	17/07/2014 10:19:06	GOOD	5	Binary
Rica_Unknow6	47	17/07/2014 10:19:09	GOOD	6	FLOAT
Rica_Unknow1	True	17/07/2014 10:19:12	GOOD	1	Binary
Rica_Unknow3	115	17/07/2014 10:19:18	GOOD	3	FLOAT

Figure 6.2-2 Viewer window

6.2.1. FORCE SIGNALS CHANGES OF STATUS

Axon Test allows changing the state of the signals at the time of the simulation, for it must locate the signal of interest and make the change in its properties. In the properties you can configure features such as quality, time stamp and the status or value of the signal.

Misc	
Name	All
Type	Measured Normalised
Item	41
Quality	
Invalid	False
Substituted	False
Blocked	False
Overflow	False
NotTopical	False
Online	False
Restart	False
Communication_lost	False
Remote_Forced	False
Chatter	False
Time	10/02/2015 9:38:39
Status	0
iRuntimeDevice	

Figure 6.2-3 Signal properties

name	status	Time Stamp	Quality	item	BinaryDataType	Count Update
Provence_All	0	2015/02/10 09:38:39.397	GOOD	41	Measured Normalised	1

Figure 6.2-4 Signal state

6.2.2. COMMAND

With this tool it is possible to simulate the commands to the remote slave device, from these commands we have, depending on the type of master protocol could be executed according to its standardization.

These commands are:

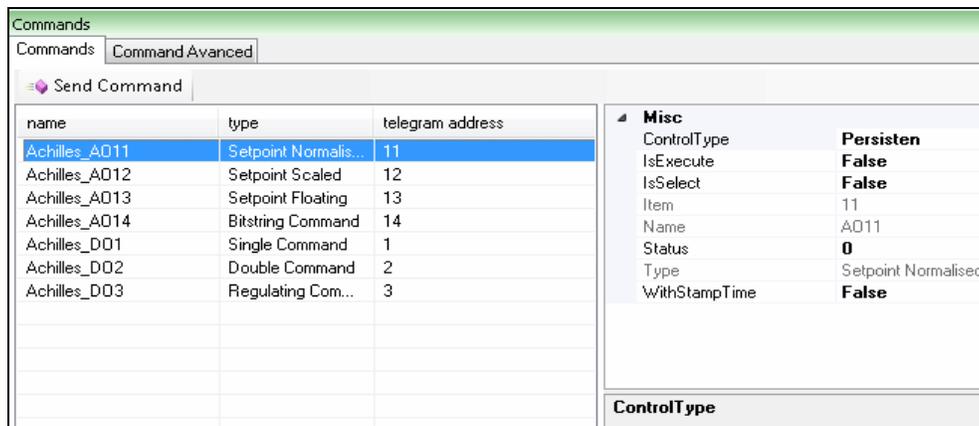


Figure 6.2-5 Command Window

IEC 60870-5-101 Commands

For the protocol IEC 60870-5-101 you can execute single, double, regulating commands.

IEC 60870-5-104 Commands

For the protocol IEC 60870-5-104 you can execute single, double, regulating commands.

DNP3 Commands

For the protocol DNP 3.0 you can execute Binary commands,

MODBUS Commands

For the protocol ModBus you can write the status for Coil Status and Holding Registers.

6.2.3. DESCRIPTIVE COMMAND WINDOW

In this section, the signals are displayed by name, type and address (Telegram Address) for the commands, on the right side panel it is possible to force the signals that are mapped in the slave devices.

name	type	telegram address
Achilles_A011	Setpoint Normalis...	11
Achilles_A012	Setpoint Scaled	12
Achilles_A013	Setpoint Floating	13
Achilles_A014	Bitstring Command	14
Achilles_D01	Single Command	1
Achilles_D02	Double Command	2
Achilles_D03	Regulating Com...	3

Figure 6.2-6 Descriptive Window

6.2.4. COMMAND PROPERTIES

It is a window that allows you to configure some parameters for a command (Timestamp, name, state, type, selection and execution)

Misc	
ControlType	Persisten
IsExecute	False
IsSelect	False
Item	11
Name	A011
Status	0
Type	Setpoint Normalised
WithStampTime	False

Figure 6.2-7 Command Properties window

6.2.5. SENDING COMMANDS

Let you send a command on specific signal chosen among deployed in the description window.



Figure 6.2-8 Send Commands

6.2.6. COMMAND ADVANCED

It is a much specialized window when it comes to commands; by this you can set more specific parameters for executing commands in Axon Test

- **Data acquisition by polling.** Acquire data from a specific address.
- **General Interrogation.** Allows making a general interrogation.
- **Clock Synchronization.** Sends a synchronization signal.
- **Command transmission.** Allows sending a command with specific parameters such as direction, signal value, category, type of command, and even data type timestamp.
- **Control Mode.** Specifies the execution mode of command.

Figure 6.2-9 Advanced Command Window

Note: To view the commands on the descriptive window, signals must be created before, prior to this step should stop the device by right clicking on the device and stops clicking option  Stop, consecutively you should start the device again; to start the device click on the option  Run in this way the signals are deployed on the descriptive window and then can execute commands to simulate.

6.3. LOG

It is located in the bottom of the application, this allows viewing of all events during the project configuration, including recording of operations of interest such as project creation, changes made to the configuration. This tool will report all events occurring in the time of the task and/or testing diagnosis.

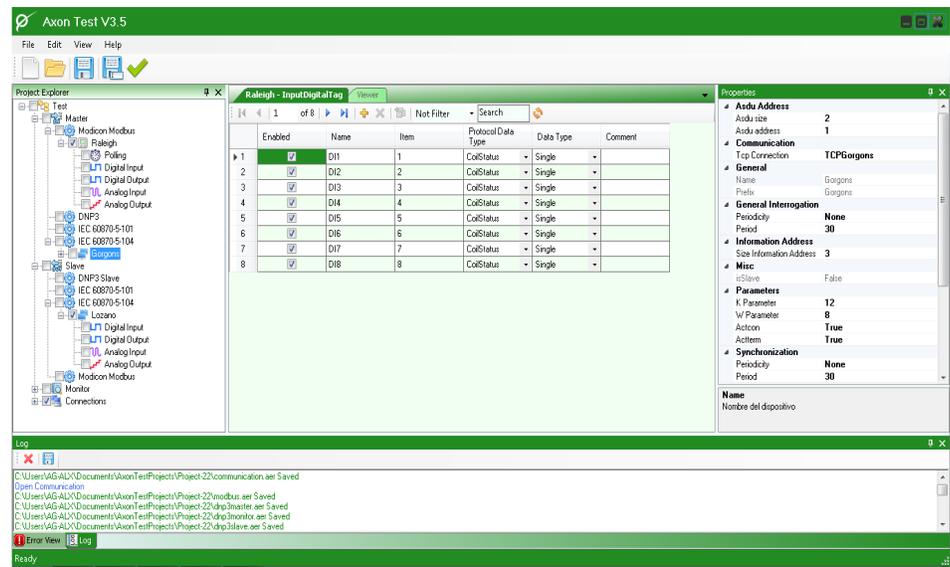


Figure 6.3-1 Events Panel (LOG)

6.4. ERROR PANEL

It is located in the bottom of the application allows visualizing various errors generated when performing the validation of the project, among which can be found:

- Syntax errors.
- Parameter configuration errors of protocol or connection.
- Errors fields or duplicate devices.
- Errors of empty fields.

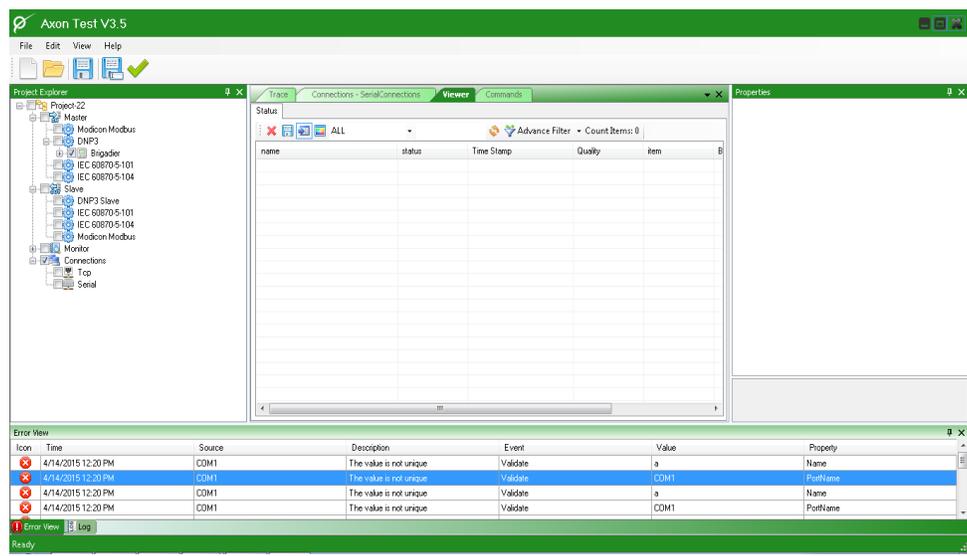


Figure 6.4-1 Error Panel

6.5. FILTER BAR

The filter bar is at the top of the device created, through the filter you can do custom searches for signals that are mapped in the Axon Test, you can filter between the comments, scaled measures, standards, floating, step positions, or bitstrings.

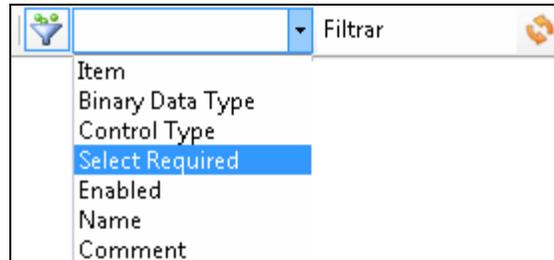


Figure 6.5-1 Filters

Note: You need that the signal be mapped (created) so that it can be displayed in the Viewer. When is properly mapped, when the signal is received, it appears with the name, description and features which facilitate the identification of both the signal and the changes in this during the simulation.

6.6. IMPORTING .XML FILES FROM SICAM PAS

Axon Test has the functionality to import XML files, such as those exported by the Siemens SICAM PAS software for protocols IEC 60870-5-101, IEC 60870-5-104; to do this, right-click on the protocol instance to simulate, therefore a menu will open and click on the *Import XML* option thus you must seek the path where the XML file to import is, which before had to be exported from the SICAM PAS. Upon completion of the process will be imported the device and will appear in the list of the Axon Test projects tree.

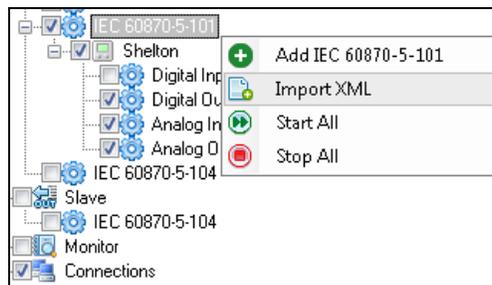


Figure 6.6-1 Import XML

7. AXON TEST CONFIGURATION

7.1. STARTING AXON TEST

Once the AXON TEST software is installed, it starts from the icon that was created on the desktop or from *Start* → *All programs* → *Axon Group*.

- a. Open the Windows **Start**.
- b. Access to **All Programs**.
- c. Go to **Axon Group** menu.
- d. Access **Axon Test** tool.
- e. Open the application **Axon Test**.

Note: You can access any of the components of Axon Test via the icon that is installed by default on the desktop, including in embedded operating systems.

7.2. GETTING STARTED - CREATING A PROJECT

By using **Axon Test** will take place a series of steps to successfully run the tests for the development of any project of integration and automation of electrical substations and control centers to local or remote SCADA systems.

Setting up any project with Axon Test requires the following steps:

- a. Create a new project and define the name and directory where you want to save.
- b. Create a connection (IED) of a master or slave protocol to simulate within the system.
- c. Set the communication parameters of each of the devices.
- d. Simulate signals of the devices to test.

To start the configuration create a new project, click on the Menu *File* → *New Project*, then set a name that identify the project and then click *OK*, as it is shown in Figure 7.2 1.

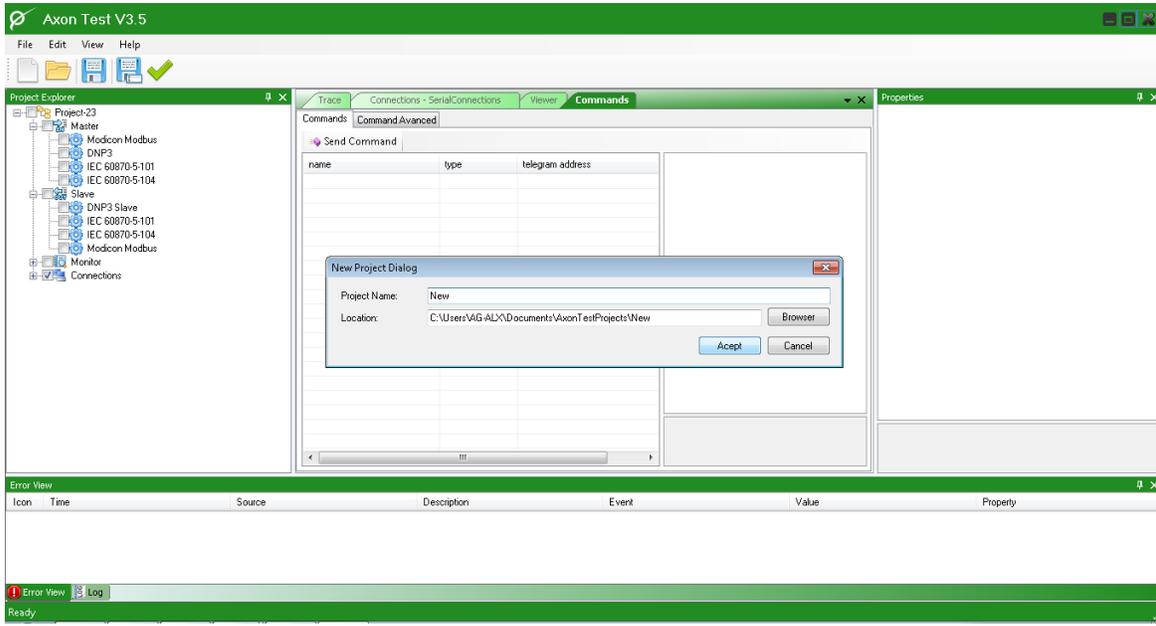


Figure 7.2-1 Save the new project.

When creating the project, a tree with default protocols appears, as shown in the following figure.

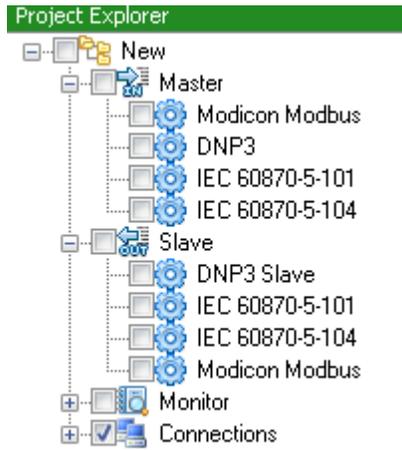


Figure 7.2-2 Project Explorer.

7.3. CREATING A DEVICE

Once the project has already been created, we create the configuration of the master or slave device to simulate

To create a device, within the Master Protocol, right click on Master/slave device and then click on *New Add Protocol* as shown in the picture below. (*Protocol* IEC 60870-5-104).

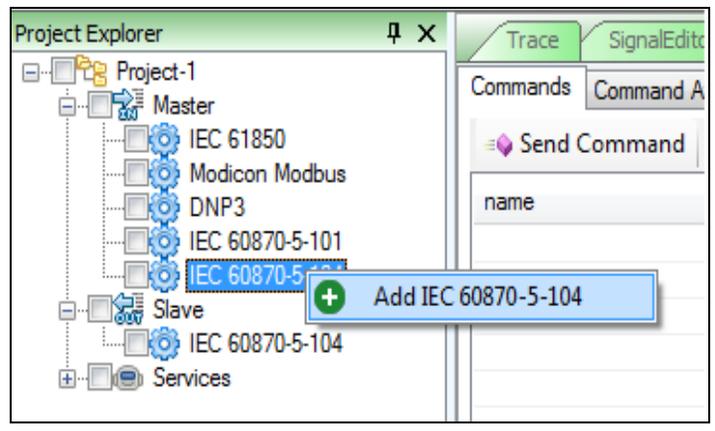


Figure 7.3-1 Create New IED

By creating a device, on the main tree appears the tools of the device according to the protocol established either master or slave. The IED name is a random name by default, but can be changed by right-clicking and then selecting *Rename*.

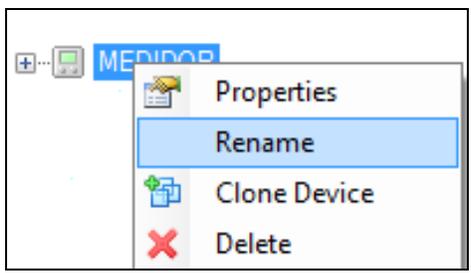


Figure 7.3-2 Editing the device name

Axon Test reduces time creating devices; the user can duplicate the configuration of a device and only have to change its properties, thereby avoiding reconfigures the signals again.

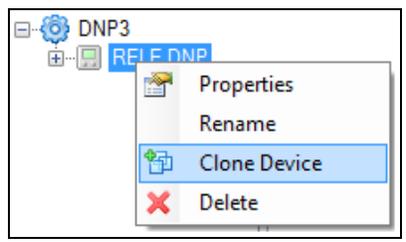


Figure 7.3-3 Duplicating Devices

By adding an object (device) in a master protocol the application will give a default name which can be modified by the user to perform a reference according to the topology of the substation. This makes it easier to search and recognition signals within slave protocols.

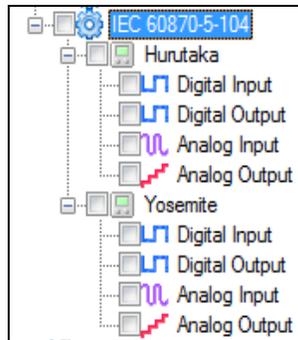


Figure 7.3-4 Tree Simulation Master

Note: Keep in mind that the free version only allows you to create one device when configuring the simulator.

7.4. CREATING A SIGNAL

When a device is created under any protocol you must perform the following procedure to create signals, signals are created by the toolbar that is located on top of the tabs **Digital Input**, **Digital Output**, **Analog Input**, **Analog Output**. These tabs are displayed when you double click on any of these types of inputs



Figure 7.4-1 Signals toolbar

1 of 1 **Scroll Bar:** Scroll through the created signals

+ **Add New button:** Create new variables in the window signal

X **Delete button:** Delete signals created earlier

+ **Duplicate button:** Allows cloning new signals from the signals created earlier.

	Enabled	Name	Item	Protocol Data	Data Type	Comment
▶ 1	<input checked="" type="checkbox"/>	D11	2	CoilStatus	Single	

Figure 7.4-2 Signal created by the button "Add New"

7.5. CLONING SIGNALS

Axon Test allows cloning signals and their characteristics from other signals created earlier, this option is made by the Duplicate button. This button displays the following window that contains the following parameters to customize the cloning of the signal or signals.

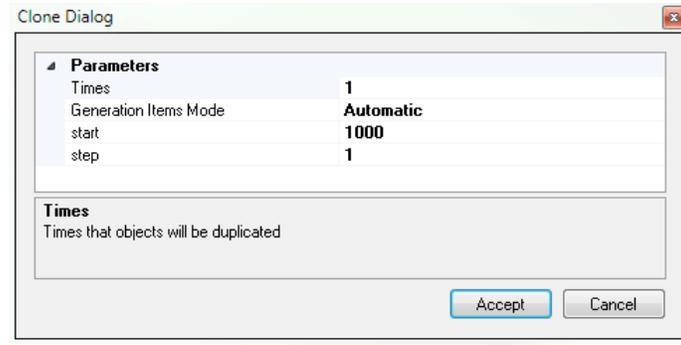


Figure 7.5-1 Signal created by the button "Duplicate"

a. Parameters

- **Times:** Specifies the number of times the signal is cloned.
- **Generation Items Mode:** Mode how addresses for each of the signals are generated, by default is automatic; this option automatically generates addresses, for example if there are already items from 1 to 10, if cloning automatically the addressing will start at 11. If you select the item generation manually, the generated values depend on the configuration options make for Start and Step
- **Start:** Defines the numbering range in which the item will start the addressing mapping for the protocol.
- **Step:** Defines the numbering range in which the item will end the addressing mapping for the protocol.

8. CONFIGURATION PROTOCOL (MASTER / SLAVE)

The properties of each device within the masters/slaves protocols instantiated can be changed according to user requirements, for that the user must:

- Access the *Properties* option by clicking on the name of the configured device.

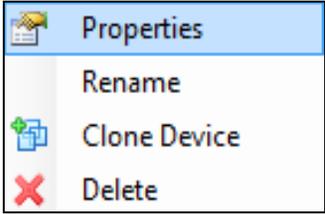


Figure 7.5-1 Configuring the properties of a slave device

- Once done, it will be displayed in the *Properties* window all configurable device parameters.

8.1. PROPERTIES FOR MASTER MODBUS DEVICES

Any object created under the MODBUS protocol presents the following properties that can be configured by the user:

Properties	
Communication	
Use Tcp Connection	TCP
Serial Connection	
Tcp Connection	TCPAnatevke
General	
ID	1
Mode	RTU
Order Byte	FirstByteLow
Order D'Word	Normal
Name	Anatevke
Prefix	Anatevke
Size of Block	
Coil Read	1600
Coil White	800
Register Read	100
Register White	100
Temporization	
Timeout	300
Name	
Nombre del dispositivo	

Figure 8.1-1 Properties for Master MODBUS devices

a. Communication

- **Use TCP Connection:** Enable or disable the TCP protocol communication.

- **Serial Connection:** Displays the list of all configured SERIAL connections, the user must choose a configuration previously set.
- **TCP Connection:** Displays the list of TCP connections configured, the user must choose a configuration previously set.

In the case of a serial connection must specify its parameters through *Services/Communications* (see Serial Communication):

In the case of using the TCP protocol, the user must choose this option and perform the following configuration parameters through the Project Explorer in the *Services/Communications* option (see TCP / IP Communication).

b. General: Sets the configuration for MODBUS communication specifically. These parameters are:

- ID: MODBUS slave device identifier.
- Mode: Operating mode RTU or ASCII.
- Order Byte.
- Order Word.
- Name: Slave device Name.
- Prefix: Corresponds to the prefix of the device, which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

c. Size of Block: Allows the user to set the address ranges of the MODBUS functions with which the slave device is configured. The MODBUS functions are set by default as:

- Coil Status: 0-9999
- Input Status: 10001-19999
- Input Register: 30001-39999
- Holding Register: 40001-49999

d. Temporization: The user defines the Time Out of the device, i.e. the maximum time to wait for a response from the Slave device.

8.2. PROPERTIES FOR MASTER DNP3.0 DEVICES

Any object created under the DNP 3.0 protocol will have the following properties that can be configured by the user:

Properties	
Address	
Link Address	3
Slave Link Address	4
Communication	
Use Tcp Connection	True
Serial Connection	(none)
Tcp Connection	TCPsunYatSen
General	
Enable Connection	True
Name	SunYatSen
Prefix	SunYatSen
Misc	
Runtime	Axon.Test.DNP3.Master.DNP3MasterPlugin
IsActive	False
CommandPendiente	False
tcp	
Status	0
Model	(Collection)
TraceEnabled	True
CommandAdvancedView	
Scan	
Class123	True
Loop Scan Time Pool	300000
Loop Scan Event	20000
Class0123	True
Time Sincronization	
Time Zone Offset of GMT	300000
Need Sincronization	True
Unsolicited	
Enable Unsolicited	False
Enable Class1	False
Enable Class2	False
Enable Class3	False

Figure 8.2-1 Properties for DNP3.0 devices

a. Address

- **Link Address:** Corresponds to the address of DNP3 master device, in this case the Gateway **Axon Test**.
- **Slave Link Address:** Corresponds to the DNP3 slave device address, this value should be set to the same device and must correspond to the master device.

b. Communication

- **Use TCP Connection:** Enable or disable the TCP communication protocol.
- **Serial Connection:** Displays the list of all configured SERIAL connections, the user must choose a configuration previously set.

- c. **TCP Connection:** Displays the list of TCP connections configured, the user must choose a configuration previously set.

In the case of a serial connection must specify its parameters through *Services/Communications* (see Serial Communication):

In the case of using the TCP protocol, the user must choose this option and perform the following configuration parameters through the Project Explorer in the *Services/Communications* option (see TCP / IP Communication).

- d. **General:** Allows user to enable or disable communication with the Slave device in the same way to visualize the following parameters:

- **Name:** Slave device Name.

- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

- e. **Scan:** Allows user to enable/disable and configure periods of general interrogation (Class0123) and events (Class123). These values are set in milliseconds.

- **Class 123:** Enable or disable interrogation for events.

- **Loop Scan Event:** Sets the period of interrogation event.

- **Class 0123:** Enables or disables the general interrogation.

- **Loop Scan Poll:** Sets the period of the general interrogation.

- f. **Time synchronization:** Allows user to enable and configure the synchronization of the slave device with the Greenwich meridian time in case there is no synchronization equipment.

- g. **Unsolicited:** Allows user to enable/disable the event classes you want to receive from the Slave device.

- h. **Temporization:** The user defines the Time Out of the device, i.e. the time the master device waits to establish the communication failure.

8.3.PROPERTIES FOR MASTER IEC 60870-5-104 DEVICES

Properties	
▲ Asdu Address	
Asdu size	2
Asdu address	1
▲ Communication	
Tcp Connection	TCPSacajawea
▲ General	
Name	Sacajawea
Prefix	Sacajawea
▲ General Interrogation	
Periodicity	None
Period	30
▲ Information Address	
Size Information Address	3
▲ Misc	
Status	0
Model	(Collection)
Runtime	Axon.Test.IEC104.Master.IEC104MasterProtocol
IsActive	False
SimuleToggle	True
TraceEnabled	True
▶ CommandAdvancedView	
▲ Parameters	
K Parameter	12
W Parameter	8
Actcon	True
Actterm	True
▲ Synchronization	
Periodicity	None
Period	30
▲ Temporization	
TimeoutRxTx	30
Timeout0	30
Timeout1	15
Timeout2	10
Timeout3	20
▲ Time Zone	
Time Zone	[UTC] Hora universal coordinada
▲ Transmisión Cause	
Size cause transmission	2
Originator Address	0
Name	
Nombre del dispositivo	

Figure 8.3-1 Properties for IEC 60870-5-104 devices

a. **ASDU:** Sets the address of the IEC104 slave device.

- **Size ASDU:** The user sets the value between 1 and 2 bytes, with 1 byte can address up to 254 devices with 2 Bytes and can address up to 65534 devices. By default this value is set to 2 Bytes.
- **Address ASDU:** Sets the address of the devices. Addresses 255 (for 1 Byte) and 65535 (for 2 Byte) are global addresses or Broadcast.

b. **Communication**

- **TCP Connection:** Displays the list of TCP connections configured, the user must choose one.

For the TCP protocol, the user must choose this option and perform the following configuration parameters through the Project Explorer in the *Services/Communications* option (see Communication TCP / IP).

c. General: Displays the following parameters:

- **Name:** Slave device Name.
- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

d. General Interrogation: Defines how and how often will perform general interrogation.

- **Periodicity:** Sets the frequency with which the general question will be made.
 - **Single:** It is performed only once when the connection is established with the Slave device.
 - **Cyclic:** Each time period is made according to the value set in Period.
- **Period:** In the event that the general interrogation is carried out cyclically, this parameter specifies how many seconds it will be made.

e. Information Address: It is the direction of the Information Objects (variables). Indicates the address of the variable destination information if it is a control process (sending commands), and indicates the address of the variables information source if it is a monitoring process (sending information from the slave device to the gateway). This parameter is used to configure the number of variables to handle:

- **1 Byte:** By checking this option, you can address up to 256 variables.
- **2 Byte:** By checking this option, you can address up to 65536 variables.
- **3 Byte:** By checking this option, you can address up to 16,777,215 variables.

f. Parameters

- **Actcon:** Enables if it must perform the activation confirmation of the cause of transmission, its default value is "True"
- **Actterm:** Enables if it must make confirmation of the termination of activation of the cause of transmission, its default value is "True".

- **K Parameter:** Maximum number of information messages that can be sent sequentially without receiving a confirmation, then the connection is terminated.
- **W Parameter:** Maximum number of information messages that can be received without being confirmed, must be less than the parameter k.

g. Synchronization: In this field devices are synchronized, the value is specified in minutes. Presents three settings:

- **Periodicity:** Sets the frequency that the time synchronization is going to have.
 - **None:** No synchronization is performed.
 - **Single:** The synchronization is done only once when the connection is established with the slave device.
 - **Cyclic:** Make the synchronization each time period according to the value set in Period.
- **Period:** Time for sending time synchronization, if configured as a Cyclic in Periodicity.

h. Temporization:

- **Timeout Tx/Rx:** Timeout for a response from the slave device, must be specified in seconds.
- **Timeout t0:** Timeout of **Axon Test** to establish a connection to the slave device. Its value is specified in a range from 1 to 255 seconds, the default value is 30s.
- **Timeout t1:** Timeout of **Axon Test** receive a confirmation response message sent from the slave device, its value is specified in a range from 1 to 255 seconds, and the default value is 15s.
- **Timeout t2:** Maximum time allowed to the slave device to respond to **Axon Test** if no data expected, its value is specified in a range from 1 to 255 seconds, the default value is 10s. Timeout t2 must be less than t1 Timeout.
- **Timeout t3:** Timeout of **Axon Test** before starting a test procedure of the connection because no data transfer, its value is specified in a range from 1 to 255 seconds, the default value is 20s.

i. Time Zone: Allows establishing the time zone according Greenwich meridian.

- j. **Transmission Cause:** Allows the user to determine the cause that generated the message information.
 - **1 Byte:** Option to set the sending of the cause that generated the message information.
 - **2 Byte:** Option for multiple master devices connected to the same Gateway. Checking this option besides establish the sending of the cause that generated the message information, also enables the *OriginatorAdr* option.
 - **OriginatorAdr:** Slave address where you want to send information messages.

8.4. PROPERTIES FOR MASTER IEC 60870-5-101 DEVICES

- a. **ASDU:** Sets the address of the IEC101 slave device.
 - **Size ASDU:** The user sets the value between 1 and 2 bytes, with 1 byte can address up to 254 devices with 2 Bytes and can address up to 65534 devices. By default this value is set to 2 Bytes.
 - **Address ASDU:** Sets the address of the devices. Addresses 255 (for 1 Byte) and 65535 (for 2 Byte) are global addresses or Broadcast.

b. Communication

- **TCP Connection:** Displays the list of TCP connections configured, the user must choose one. For the TCP protocol, the user must choose this option and perform the following configuration parameters through the Project Explorer in the Services/Communications option (see Communication TCP / IP).
- **Serial Connection:** Displays the list of all configured SERIAL connections, the user must choose a configuration previously set.

If the user chooses this option should make the parameter settings through the Project Explorer in the Services / Communications option (see Serial Communication).

Properties	
Asdu Address	
Size Asdu	2
Address Asdu	3
Click General Interrogation	
Periodicity	Initial
Period	30
Communication	
Use Tcp Connection	False
Serial Connection	SerialShelton
Tcp Connection	TCPShelton
Counter Interrogation	
Periodicity	Initial
Period	30
General	
Name	Shelton
Prefix	Shelton
Information Address	
Size Information Address	3
Link Address	
Size Link Address	1
Address Link	3
Misc	
Runtime	Axon.Test.IEC101.Master.IEC101MasterPlugin
IsActive	False
SimuleToggle	False
Status	0
Model	(Collection)
TraceEnabled	True
OnFreeToke	
HasToken	False
CommandAdvancedView	
Parameters	
Actcon	True
Actterm	True
Pool Cycle Time	1000
Query Retries	2
Delay Retry Query	600
Synchronization	
Periodicity	1
Period	30
Temporization	
TimeoutRxTx	30
Transmisión Cause	
Size cause transmission	2
Originator Address	4
Name	
Nombre del dispositivo	

Figure 8.4-1 Properties for master IEC 60870-5-101 devices

c. **General:** Displays the following parameters:

- **Name:** Slave device Name.
- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

d. **General Interrogation:** Defines how and how often will perform general interrogation.

- **Periodicity:** Sets the frequency with which the general question will be made.
 - **Single:** It is performed only once when the connection is established with the Slave device.
 - **Cyclic:** Each time period is made according to the value set in Period.

- **Period:** In the event that the general interrogation is carried out cyclically, this parameter specifies how many seconds it will be made.

e. Information Address: It is the direction of the Information Objects (variables). Indicates the address of the variable destination information if it is a control process (sending commands), and indicates the address of the variables information source if it is a monitoring process (sending information from the slave device to the gateway). This parameter is used to configure the number of variables to handle:

- **1 Byte:** By checking this option, you can address up to 256 variables.
- **2 Byte:** By checking this option, you can address up to 65536 variables.
- **3 Byte:** By checking this option, you can address up to 16,777,215 variables.

f. Parameters

- **Actcon:** Enables if it must perform the activation confirmation of the cause of transmission, its default value is "True"
- **Actterm:** Enables if it must make confirmation of the termination of activation of the cause of transmission, its default value is "True".
- **PollCycleTime:** Sets the period to request data.
- **QueryRetries:** Set retry data request.
- **DelaysRetryQuery:** Sets the delay time for attempts to request data.

g. Synchronization: In this field devices are synchronized, the value is specified in minutes. Presents three settings:

- **Periodicity:** Sets the frequency that the time synchronization is going to have.
 - **None:** No synchronization is performed.
 - **Single:** The synchronization is done only once when the connection is established with the slave device.
 - **Cyclic:** Make the synchronization each time period according to the value set in Period.
- **Period:** Time for sending time synchronization, if configured as a Cyclic in Periodicity.

h. Temporization:

- **Timeout Tx/Rx:** Timeout for a response from the slave device, must be specified in seconds.

- i. **Time Zone:** Allows establishing the time zone according Greenwich meridian.

- j. **Transmission Cause:** Allows the user to determine the cause that generated the message information.
 - **1 Byte:** Option to set the sending of the cause that generated the message information.

 - **2 Byte:** Option for multiple master devices connected to the same Gateway. Checking this option besides establish the sending of the cause that generated the message information, also enables the *OriginatorAdr* option.

 - **OriginatorAdr:** Slave address where you want to send information messages.

8.5. PROPERTIES FOR SLAVE MODBUS DEVICES

Any object created under the MODBUS protocol presents the following properties that can be configured by the user:

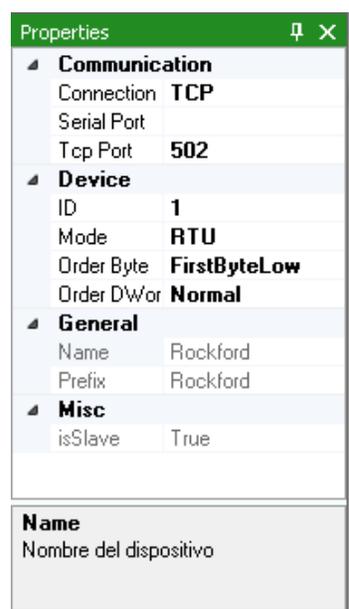


Figure 8.5-1 Properties for Slave MODBUS devices

a. Communication

- **Use TCP Connection:** Enable or disable the TCP protocol communication.
- **Serial Connection:** Displays the list of all configured SERIAL connections, the user must choose a configuration previously set.
- **TCP Connection:** Displays the list of TCP connections configured, the user must choose a configuration previously set.

In the case of a serial connection must specify its parameters through *Services/Communications* (see Serial Communication):

In the case of using the TCP protocol, the user must choose this option and perform the following configuration parameters through the Project Explorer in the *Services/Communications* option (see TCP / IP Communication).

b. General: Sets the configuration for MODBUS communication specifically. These parameters are:

- ID: MODBUS slave device identifier.
- Mode: Operating mode RTU or ASCII.
- Order Byte.
- Order Word.
- Name: Slave device Name.
- Prefix: Corresponds to the prefix of the device, which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

8.6. PROPERTIES FOR SLAVE IEC 60870-5-101 DEVICES

a. ASDU: Sets the address of the IEC101 slave device.

- **Size ASDU:** The user sets the value between 1 and 2 bytes, with 1 byte can address up to 254 devices with 2 Bytes and can address up to 65534 devices. By default this value is set to 2 Bytes.
- **Address ASDU:** Sets the address of the devices. Addresses 255 (for 1 Byte) and 65535 (for 2 Byte) are global addresses or Broadcast.

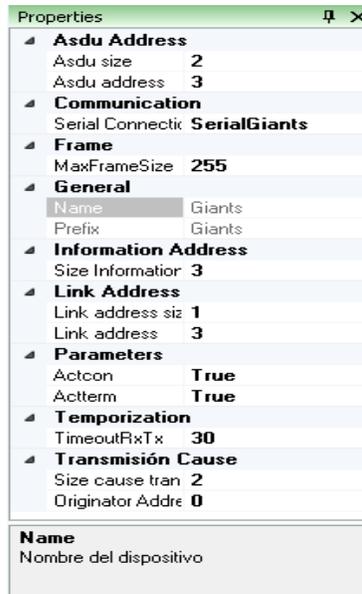


Figure 8.6-1 Properties for slave IEC 60870-5-101 devices

b. Communication:

- **Serial Connection:** Displays the list of all configured SERIAL connections, the user must choose a configuration previously set.

If the user chooses this option should make the parameter settings through the Project Explorer in the Services / Communications option (see Serial Communication).

c. Frame:

- **MaxFrameSize:** Through this option you can set the maximum frame size, the default value is 255.

d. General: Displays the following parameters:

- **Name:** Slave device Name.
- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

e. Information Address: It is the direction of the Information Objects (variables). Indicates the address of the variable destination information if it is a control process (sending commands), and indicates the address of the variables information source if it is a monitoring process (sending information from the

slave device to the gateway). This parameter is used to configure the number of variables to handle:

- **1 Byte:** By checking this option, you can address up to 256 variables.
- **2 Byte:** By checking this option, you can address up to 65536 variables.
- **3 Byte:** By checking this option, you can address up to 16,777,215 variables.

f. Link Address:

- **Link AddressSize:**
- **Link Address:**

g. Parameters

- **Actcon:** Enables if it must perform the activation confirmation of the cause of transmission, its default value is "True"
- **Actterm:** Enables if it must make confirmation of the termination of activation of the cause of transmission, its default value is "True".

h. Temporization:

- **Timeout Tx/Rx:** Timeout for a response from the slave device, must be specified in seconds.

i. Transmission Cause: Allows the user to determine the cause that generated the message information.

- **1 Byte:** Option to set the sending of the cause that generated the message information.
- **2 Byte:** Option for multiple master devices connected to the same Gateway. Checking this option besides establish the sending of the cause that generated the message information, also enables the *OriginatorAdr* option.
- **OriginatorAdr:** Slave address where you want to send information messages.

8.7. PROPERTIES FOR SLAVE IEC 60870-5-104 DEVICES

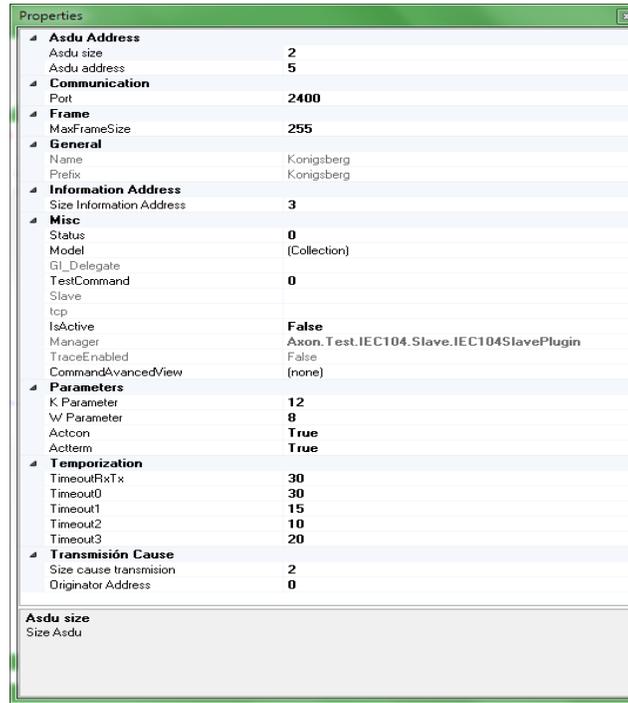


Figure 8.7-1 Properties for Slave IEC 60870-5-104 devices

a. ASDU: Sets the address of the IEC104 slave device.

- **Size ASDU:** The user sets the value between 1 and 2 bytes, with 1 byte can address up to 254 devices with 2 Bytes and can address up to 65534 devices. By default this value is set to 2 Bytes.
- **Address ASDU:** Sets the address of the devices. Addresses 255 (for 1 Byte) and 65535 (for 2 Byte) are global addresses or Broadcast.

b. Communication

- **Port:** Through this box you can configure the communication port with the IEC60870-5-104 Slave

c. Frame:

- **MaxFrameSize:** Through this option you can set the maximum frame size, the default value is 255.

d. General: Displays the following parameters:

- **Name:** Slave device Name.
- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

e. Misc: Miscellaneous properties that can be configured for the project.

f. Parameters

- **Actcon:** Enables if it must perform the activation confirmation of the cause of transmission, its default value is "True"
- **Actterm:** Enables if it must make confirmation of the termination of activation of the cause of transmission, its default value is "True".
- **K Parameter:** Maximum number of information messages that can be sent sequentially without receiving a confirmation, then the connection is terminated.
- **W Parameter:** Maximum number of information messages that can be received without being confirmed, must be less than the parameter k.

g. Temporization:

- **Timeout Tx/Rx:** Timeout for a response from the slave device, must be specified in seconds.
- **Timeout t0:** Timeout of **Axon Test** to establish a connection to the slave device. Its value is specified in a range from 1 to 255 seconds, the default value is 30s.
- **Timeout t1:** Timeout of **Axon Test** receive a confirmation response message sent from the slave device, its value is specified in a range from 1 to 255 seconds, and the default value is 15s.
- **Timeout t2:** Maximum time allowed to the slave device to respond to **Axon Test** if no data expected, its value is specified in a range from 1 to 255 seconds, the default value is 10s. Timeout t2 must be less than t1 Timeout.

- **Timeout t3:** Timeout of **Axon Test** before starting a test procedure of the connection because no data transfer, its value is specified in a range from 1 to 255 seconds, the default value is 20s.

h. Time Zone: Allows establishing the time zone according Greenwich meridian.

i. Transmission Cause: Allows the user to determine the cause that generated the message information.

- **1 Byte:** Option to set the sending of the cause that generated the message information.

- **2 Byte:** Option for multiple master devices connected to the same Gateway. Checking this option besides establish the sending of the cause that generated the message information, also enables the *OriginatorAdr* option.

- **OriginatorAdr:** Slave address where you want to send information messages.

8.8. PROPERTIES FOR SLAVE DNP3.0 DEVICES

Any object created under the DNP 3.0 protocol will have the following properties that can be configured by the user:

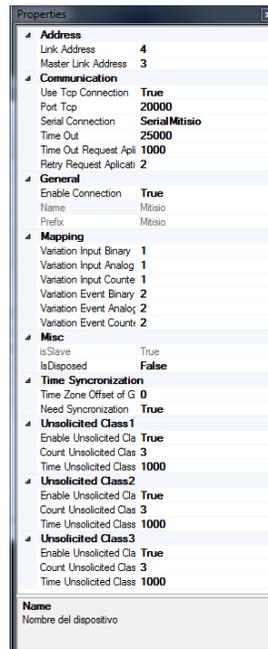


Figure 8.8-1 Properties for Slave DNP3.0 devices

a. Address

- **Link Address:** Corresponds to the address of DNP3 master device, in this case the Gateway **Axon Test**.
- **Slave Link Address:** Corresponds to the DNP3 slave device address, this value should be set to the same device and must correspond to the master device.

b. Communication

- **TimeOut:** Set the time to determine when there is a disconnection with a master and the slave device has no answer.
- **Port:** Port number to connect to the master device, the configured default port is 20000.

c. General: Allows user to enable or disable communication with the Slave device in the same way to visualize the following parameters:

- **Name:** Slave device Name.
- **Prefix:** Corresponds to the same device name which becomes a differentiator that facilitates the search for signals and allows the mapping of these more orderly.

d. Mapping:

- **Variation Input Binary:**
- **Variation Input Analog:**
- **Variation Input Counter:**
- **Variation Event Binary:**
- **Variation Event Analog:**
- **Variation Event Counter:**

e. Time synchronization: Allows user to enable and configure the synchronization of the slave device with the Greenwich meridian time in case there is no synchronization equipment.**f. Unsolicited:** Allows user to enable/disable the event classes you want to receive from the Slave device.

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