1m. CONFIGURING THE NETWORK

RSLinx Classic for Rockwell Automation Networks and Devices is a comprehensive factory communications solution for use with Microsoft Windows operating systems. It is mainly used to configure network parameters, DDEOPC servers and to program and communicate with PLC controllers. Th RSLinx Classic cooperates with all Rockwell Automation programming and configuration applications such as RSLogix, RSNetWorx, RSView32 (HMI), FactoryTalk View SE, and FactoryTalk View ME Station. It's also possible to build your own data monitoring and acquisition applications using third party applications: MATLAB/Simulink, LabView, Microsoft Office etc. RSLinx Classic also incorporates advanced data optimization techniques and contains a set of diagnostics.

This section outlines the main tasks you will need to configure and test the Ethernet/IP network using the RSLinx Classic software. Table 1m.1 contains the information necessary to correctly configure the network nodes.

Table 1m.1. Ethernet/IP parameters of the laboratory setup modules

	CompactLogix L35E	**1734-AENT**	**PanelView Plus 600**	**PowerFlex40**	**WAGO 750-341**
IP Address	192.168.1.1	192.168.1.2	192.168.1.3	192.168.1.5	192.168.1.182
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0
Gateway IP Address	none	none	none	none	none

The first step is to configure a driver. A driver is the software interface to the hardware device that will be used to communicate between RSLinx Classic and PLC controller (processor). To configure a driver, run the RSLinx Classic software and click the **Run** button. The RSLinx Classic application main window appears. Next click the **Communications > Configure Drivers** option in the main menu. The Configure Drivers dialog box appears, which is used for adding, editing, or deleting drivers. Choose an **Ethernet/IP Driver** from the pop-up menu and next click **Add New…**, and complete the information required in the driver configuration dialog box that is shown in Fig. 1m.1.

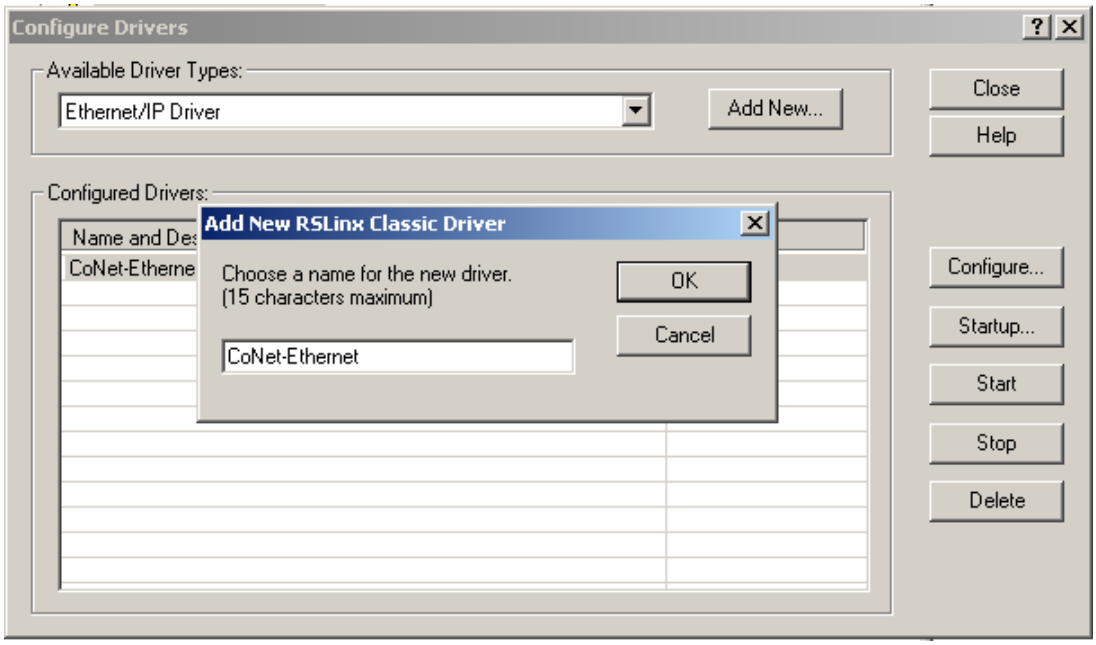

Fig. 1m.1. The *Configure Drivers* main window

Now the RSWho option can be activated to discover and check the existing Ethernet/IP network. RSWho displays networks and devices in a style similar to Windows Explorer. A variety of integrated configuration and monitoring tools are accessible from the right mouse button. The left pane of RSWho is the tree control, which shows networks and devices. The right pane is the list control, which shows all members of a collection. A collection is a network, or a device that is a bridge. The RSWho browses a network to check the status of each node. If the icon marked by picture  is animated, the network is being browsed. Network browsing can be done in automatic (**Autobrowse** checkbox is enabled) or manual mode (**Autobrowse** is cleared, the **Refresh** button is active). The RSWho's main window for a developed Ethernet/IP network is presented in Fig. 1m.2.

NB!!! A device that appears with a red X indicates that RSWho previously recognized this device, but now it cannot. The red X indicates a communication status error, such as unplugging a recognized device. These devices can be removed from the RSWho display by right-clicking the device and clicking Remove.

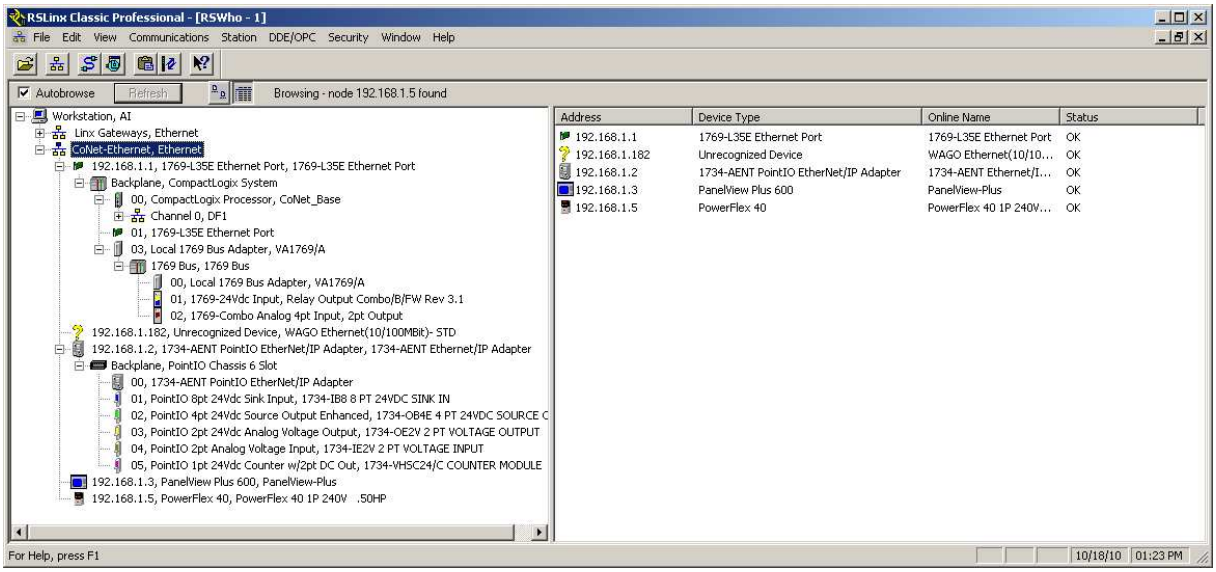

Fig. 1m.2. The RSWho main window

1m.1 Creating a new project and configuring the Ethernet/IP nodes in RSLogix5000

This section focuses on creating a new project and configuring the CompactLogix L35E controller with RSLogix5000 development software. The 1734-AENT I/O adapter, the *PowerFlex40E* inverter and the WAGO coupler are accessible as remote I/O nodes via Ethernet/IP. It is assumed that you have an overall understanding of Allen-Bradley hardware and software. The RSLinx Classic program must be run before configuring the hardware in a new project !

Creating a new project

1) To create a new project start *RSLogix5000* software. The *RSLogix5000* main window is shown in Fig. 1m.3.

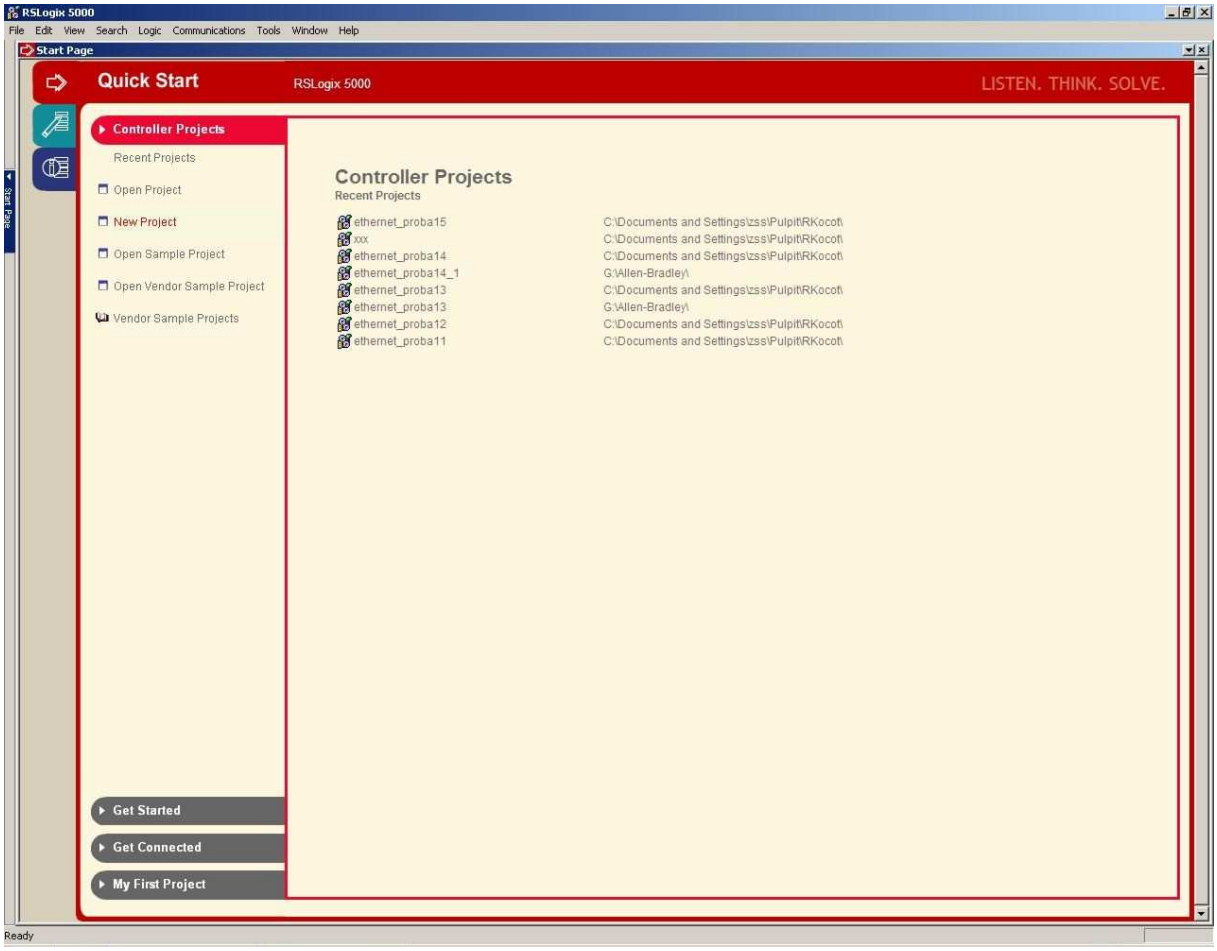

Fig. 1m.3. The *RSLogix5000* new project main window

2) Create a new project by selecting the **New Project** item (or the **File\New** menu item). The *New Controller* dialog window is displayed (see Fig. 1m.4). The following parameters must be set:

- Type: 1769-L35E CompactLogix5335E Controller
- Revision: 16
- Name: Enter an appropriate name (here CoNet_Base)
- Description: Enter an appropriate description
- Chassis Type: <none>
- Slot: 0
- Created In: Enter an appropriate folder

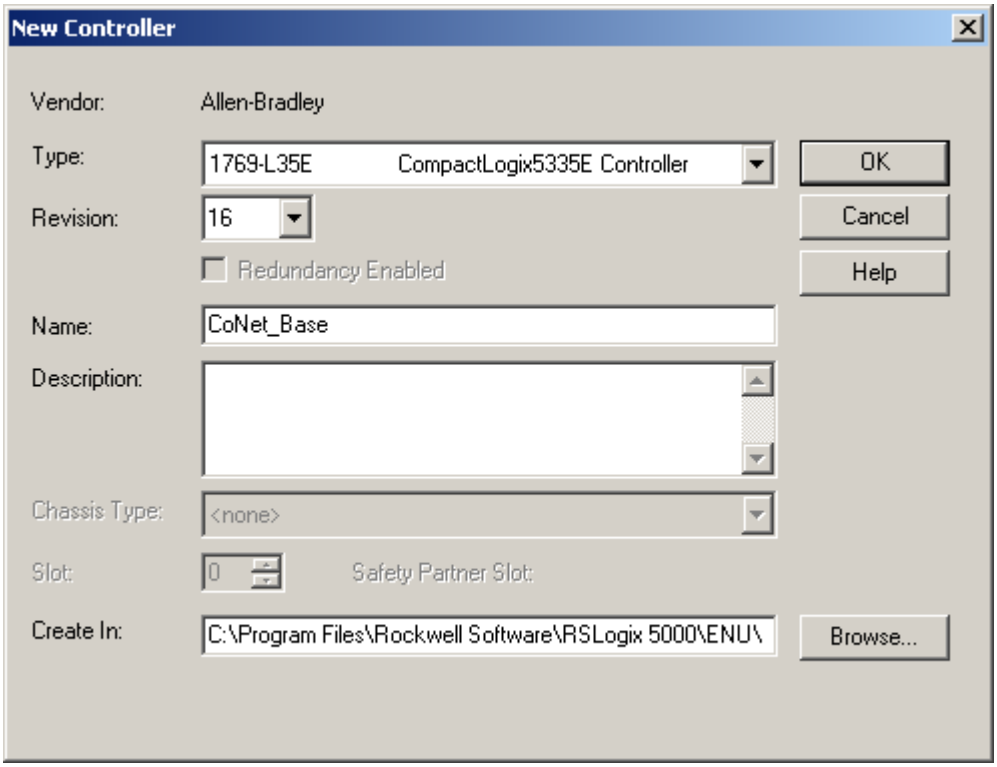

Fig. 1m.4. The *New Controller* dialog window

3) Press the **OK** button

4) Open the **I/O Configuration** folder in the project window tree. Expand the tree and find **CompactBusLocal** item. Right click on **CompactBusLocal** and select the **New Module...** menu item. The **Select Module** window is displayed.

5) Select **1769-IQ6XOW4/B** from the list and click **OK**.

6) The **Module Properties** dialog window is displayed.

7) Enter the following parameters:

- Name: Local_DIO,
- Slot: 1 (slot of the scanner).

8) Repeat steps 4-7 for the **1769-IF4XOF2/A** module. The module properties are:

- Name: Local_AIO,
- Slot: 2.

9) Select the **Communications -> Download** program menu item. After downloading, if everything was setup correctly, the "I/O OK" indicator is green.

1m.2 Configuring the Ethernet/IP nodes

The proposed network structure contains at least four nodes: CompactLogix L35E controller, 1734-AENT POINT-IO, PowerFlex 40 inverter and WAGO I/O adapter. The CompactLogix L35E controller is a local one and it is configured when a new project is created. All the others are distributed nodes and must be separately added to the project.

1734-AENT POINT-IO

1) Open the **I/O Configuration** folder in the project window tree. Expand the tree and find **1769-L35E Ethernet Port LocalENB**. Right click on **Ethernet** and select the **New Module…** menu item. The **Select Module** window is displayed.

2) Select **1734-AENT/A** from the list and click **OK**.

3) The **Module Properties** dialog window is displayed (see Fig. 1m.5).

4) Choose the **General** tag and enter the following parameters:

- Name: Distributed_IO,
- IP Address: 192.168.1.2,
- Chassis Size: 6,
- Revision: 2.3,
- Electronic Keying: Compatible Keying.

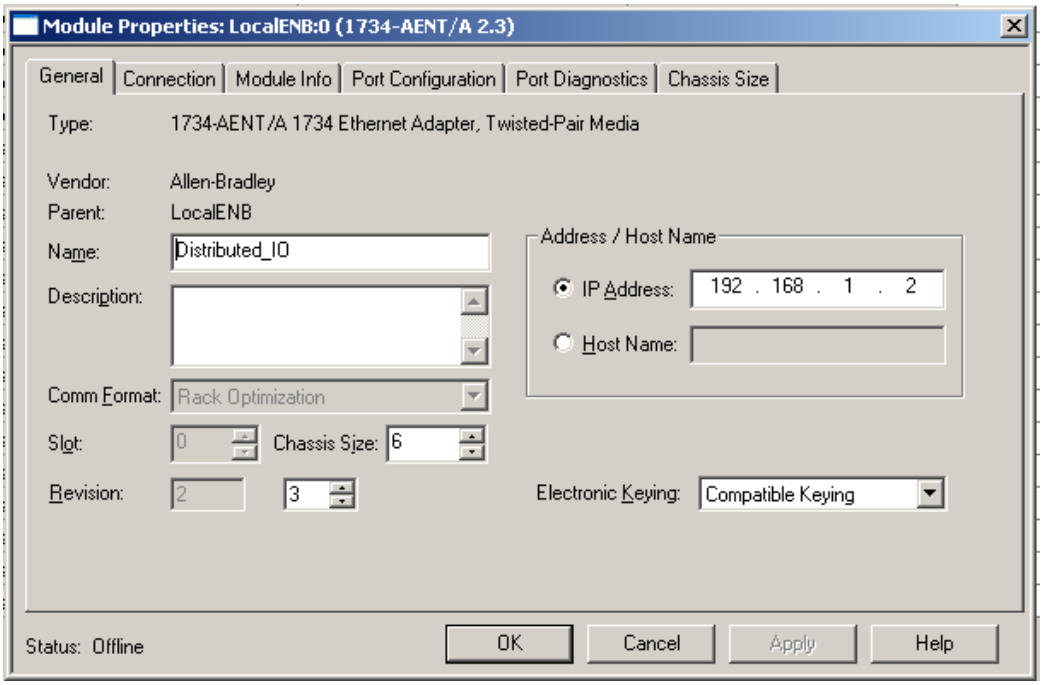

Fig. 1m.5. Module properties of 1734-AENT/A Ethernet Adapter

5) Select the **Connection** tag and set the **Requested Packed Interval (RPI)** to 100.0 ms (Fig. 1m.6). This parameter sets the refreshing of I/O data over the Ethernet/IP network.

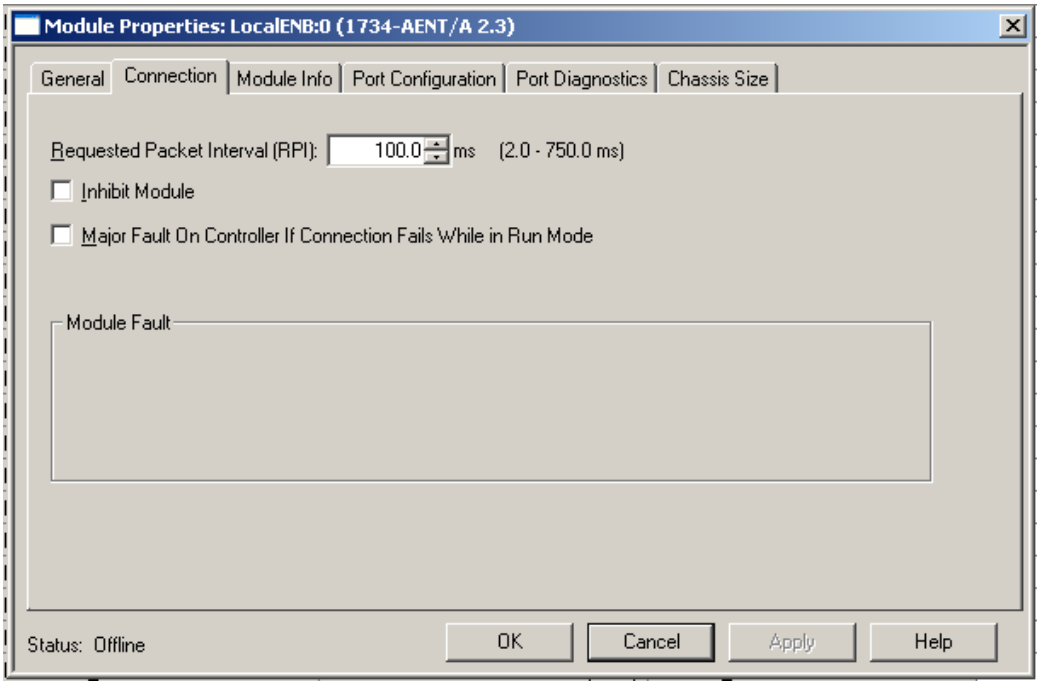

Fig. 1m.6. Connection tag of module properties

NB!!! The RPI is a common parameter configuration for all the modules connected to a network. It specifies the period at which data is updated over a connection. For example, an input module sends data to a controller at the RPI that is assigned to the module. Typically an RPI is configured in milliseconds (ms). The range is 0.2 ms to 750 ms. If an Ethernet/IP network connects the devices, the RPI reserves a slot in the stream of data flowing across the network. The timing of this slot may not coincide with the exact value of the RPI, but the control system guarantees that the data transfers at least as often as the RPI.

6) Press the **OK** button. The new **1734-AENT/A Distributed_IO** item and **PointIO 6 Slot Chassis** sub-item in the project tree are displayed.

7) Right click on **PointIO 6 Slot Chassis** and select the **New Module…** menu item. The **Select Module** window is displayed.

8) Select **1734-IB8** from the list and click **OK**.

9) The **Module Properties** dialog window is displayed (see Fig. 1m.7).

10) Choose the **General** tag and enter the following parameters:

- Name: Remote_DI8,
- Slot: 1,
- Revision: 3.1.

11) Select the **Connection** tag and set the **Requested Packed Interval (RPI)** to 100.0 ms.

12) Press the **OK** button.

13) 8) Repeat steps 7-12 for **1734-OB4E**, **1734-OE2V**, **1734-IE2V** and **1734-VHSC24** modules respectively. Parameters of the modules are collected in Table 1m.2.

Table 1m.2. Parameters of the modules connected via 1734-AENT POINT_IO

	1734-OB4E	**1734- OE2V**	**1734-IE2V**	**1734-VHSC24**
Name	Remote_DO4	Remote_AO2	Remote_AI2	Remote_VHSC
Slot	2	3	4	5
Revision	3.1	3.1	3.1	3.1
RPI	100 ms	100 ms	100 ms	100 ms

If the configuration was setup correctly the branch **1734-AENT/A Distributed_IO** of the project window tree will look like Fig. 1m.7.

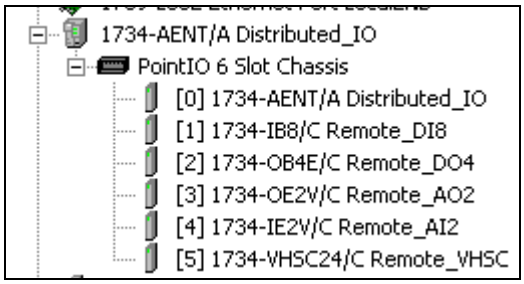

Fig. 1m.7. The branch 1734-AENT/A Distributed_IO of the project window

750-341 WAGO I/O adapter

1) Open the **I/O Configuration** folder in the project window tree. Expand the tree and find the **1769-L35E Ethernet Port LocalENB** item. Right click on **Ethernet** and select the **New Module...** menu item. The **Select Module** window is displayed.

2) Select **Generic Ethernet Module** from the list and click **OK**. The **Module Properties**. dialog window is presented in Fig. 1m.8. Enter the following parameters:

- Name: WAGO_IO,
- Comm Format: Data - SINT (8-bit signed integer value; -128 to +127),
- IP Address: 192.168.1.182 (IP Address of WAGO 750-341),
- Input Assembly Instance: 107 (CIP Assembly Instance),
- Input Size: 1 (1 bytes of Input Process Data),
- Output Assembly Instance: 101 (CIP Assembly Instance),
- Output Size: 1 (1 bytes of Input Process Data),
- Configuration Assembly Instance: 1 (Not used by system),
- Configuration Size: 0 (Not used by system).

The EtherNet/IP settings for the WAGO 750-341 are configured through the built-in web pages. Using a web browser like Microsoft Internet Explorer, Mozilla Firefox etc. The following parameters were set:

- The IP address: 192.168.1.182,
- The EtherNet/IP protocol. Both the Modbus/TCP and Modbus/UDP protocols must be disabled in order to map the input and output process image to an EtherNet/IP fieldbus master.

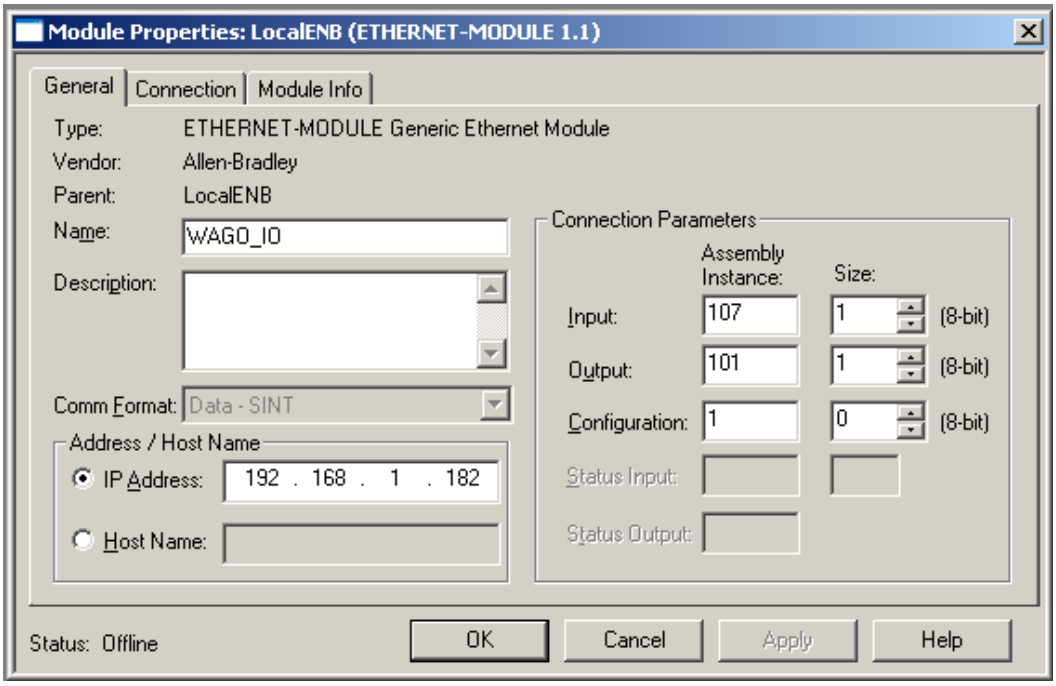

Fig. 1m.8. Module properties of the WAGO I/O Adapter

PowerFlex 40E inverter

1) Open the **I/O Configuration** folder in the project window tree. Expand the tree and find the **1769-L35E Ethernet Port LocalENB** item. Right click on **Ethernet** and select the **New Module...** menu item. The **Select Module** window is displayed.

2) Select **PowerFlex 40-E** from the list and click **OK**. The **Module Properties**. dialog window is presented in Fig. 1m.9. Enter the following parameters:

- Name: PowerFlex,
- IP Address: 192.168.1.5,
- Revision: 3.3.

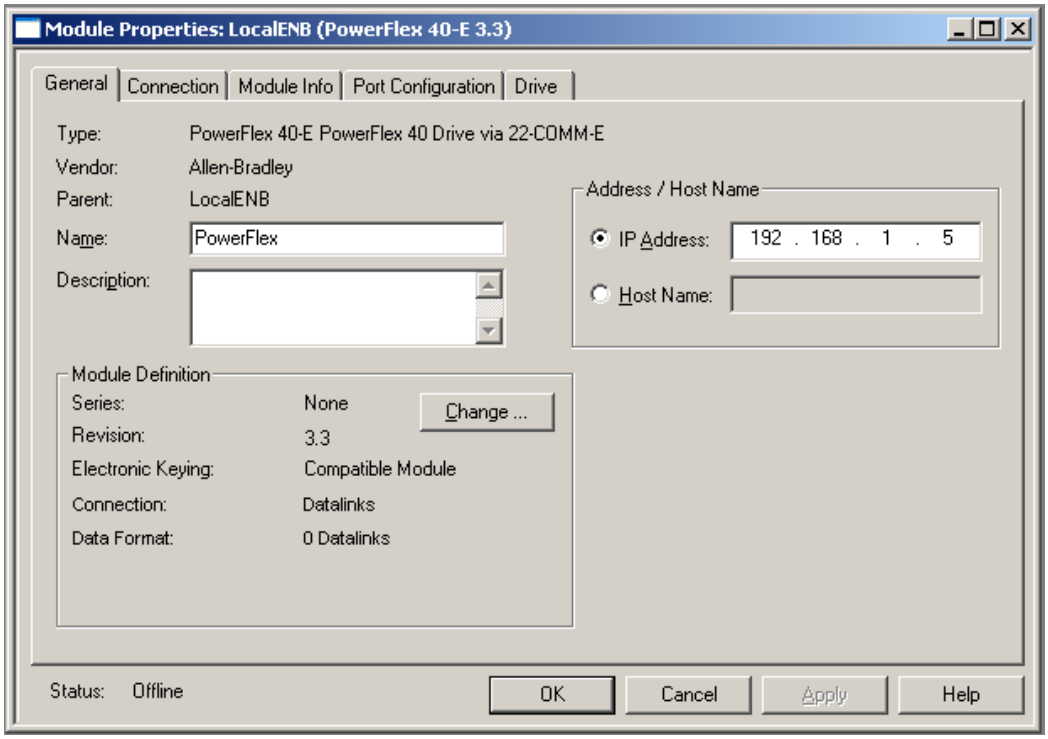

Fig. 1m.9. Properties of the PowerFlex 40E inverter

3) Press **OK** button. The item **PowerFlex 40E PowerFlex** will be added to the project tree.

If the configuration of all nodes in the network is done correctly, the RSLogix 5000 main window should look like Fig. 1m.10.

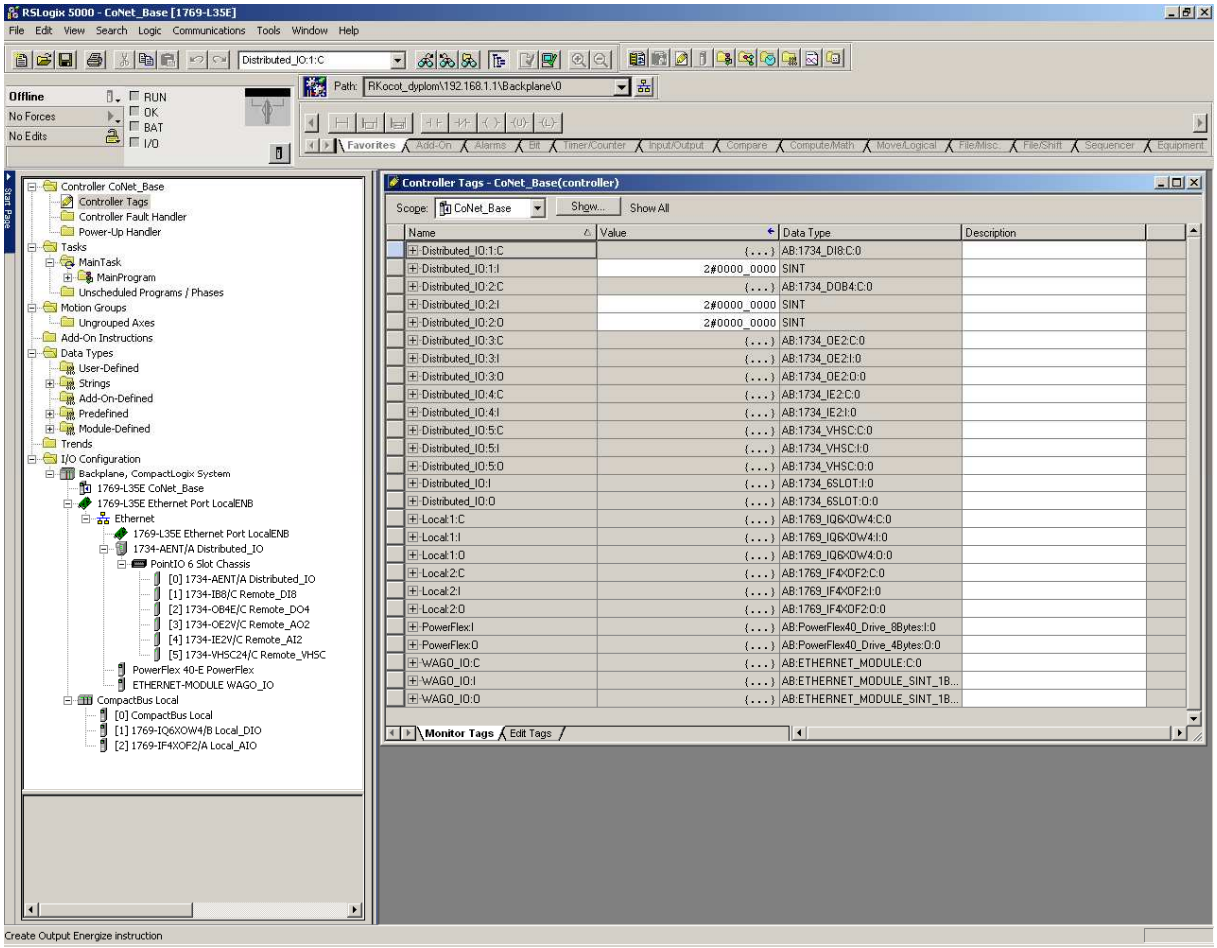

Fig. 1m.10. The main window of RSLogix5000 project

The program/configuration can now be downloaded to the CompactLogix controller. Select the **Communications -> Download** program menu item. After downloading, if everything was setup correctly, the "I/O OK" indicator is green. If an error does occur, it means the improper connection size and/or communication format was entered for either the input or output parameters.

1m.3 Address I/O data of configured modules

Information about all the I/O modules is presented as a set of tags. Each tag uses a data structure. The structure depends on the specific features of the I/O module. The name of the tags is based on the location of the I/O module in the system. An I/O address follows the format shown in Fig. 1m.11.

Fig. 1m.11. Address format of tags

Location **LOCAL** = local chassis of the controller.

ADAPTER_NAME = identifies remote communication adapter or bridge module.

:Slot Slot number of I/O module in its chassis.

:Type Type of data (**I** = input, **O** = output, **C** = configuration, **S** = status).

.Member Specific data from the I/O module; depends on what type of data the module can store. For a digital module, a Data member usually stores the input or output bit values. For an analog module, a Channel member (CH#) usually stores the data for a channel.

.SubMember Specific data related to a Member.

.Bit Specific point on a digital I/O module; depends on the size of the I/O module.

The relationship between I/O configuration and the tag address is shown in Fig. 1m.12. To expand a structure and display its members, click the „+" sign.

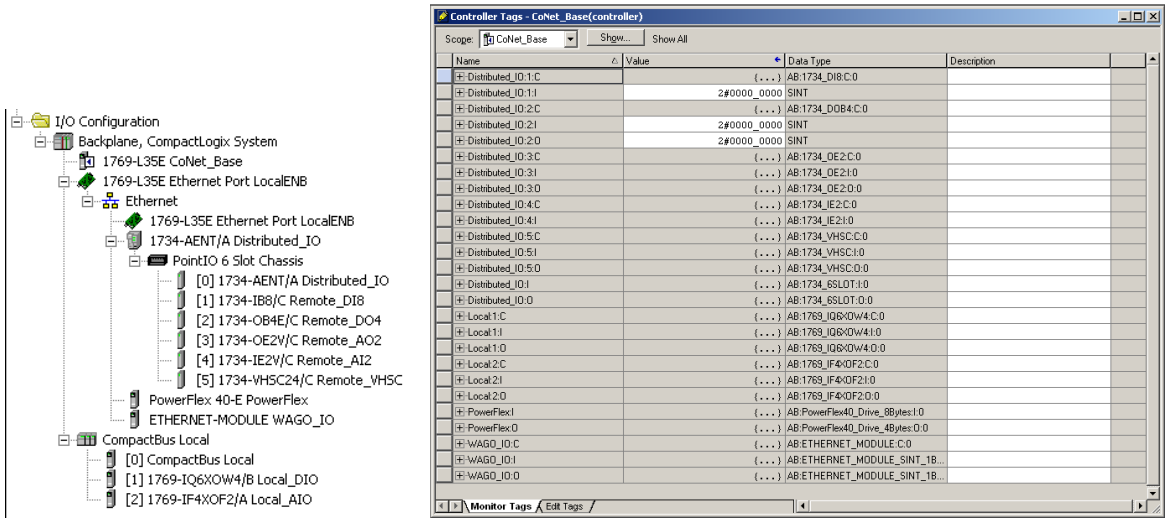

Fig. 1m.12. Connection between I/O Configuration tree and the tag address

Table 1m.3 lists all the configured I/O modules and corresponding tag addresses.

Table 1m.3. I/O data tag addresses

I/O module	Tag address
[1] 1769-IQ6XOW4/B Local_DIO	Local1:C – configuration Local1:I – input Local1:O – output
[2] 1769-IF4XOF2/A Local_AIO	Local2:C – configuration Local2:I – input Local2:O – output
[1] 1734-IB8/C Remote_DI8	Distributed_IO:1:C – configuration Distributed_IO:1:I – input
[2] 1734-OB4E/C Remote_DO4	Distributed_IO:2:C – configuration Distributed_IO:2:I – input Distributed_IO:2:O – output
[3] 1734-OE2V/C Remote_AO2	Distributed_IO:3:C – configuration Distributed_IO:3:I – input Distributed_IO:3:O – output
[4] 1734-IE2V/C Remote_AI2	Distributed_IO:4:C – configuration Distributed_IO:4:I – input
[5] 1734-VHSC24/C Remote_VHSC	Distributed_IO:5:C – configuration Distributed_IO:5:I – input Distributed_IO:5:O – output
PowerFlex 40-E PowerFlex	PowerFlex:I – input PowerFlex:O – output
ETHERNET-MODULE WAGO_IO	WAGO_IO:C – configuration WAGO_IO:I – input WAGO_IO:O – output

All tags presented in Table 1m.3 are located in **Controller Tag** scope (top of the project tree). Hence all programs have access to the member data of these tags.

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[3] Allen-Bradley, RSLinx Classic. Getting Results Guide, PUBLICATION LINX-GR001G-EN-E, September 2010.

[4] WAGO Kontakttechnik GmbH & Co. KG, 750-341 Modular ETHERNET TCP/IP I/O-System. User's Manual, Ver. 1.1.1, Germany, 2007.

[5] WAGO Kontakttechnik GmbH & Co. KG, Using the WAGO 750-341 as Remote I/O with a ControlLogix Ethernet/IP Bridge Module, Application Note, Germany, 2004.

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