

PowerXL DG1 Configuration to Rockwell PLC

Introduction

The purpose of this application note is to demonstrate how to operate a PowerXL DG1 drive via Ethernet/IP and a Rockwell CompactLogix PLC. The PowerXL drive has an onboard Ethernet port that supports both Ethernet/IP and Modbus TCP. The drive needs to be configured with an IP address for Ethernet communications, but it auto senses the protocol and the I/O Assemblies used on Ethernet/IP. In other words, as long as the Ethernet/IP master polls the PowerXL drive using valid I/O assemblies, the drive will respond.

While this application example uses a CompactLogix controller with embedded Ethernet/IP scanner port to control and monitor the PowerXL DG1 drive over Ethernet/IP, any Ethernet/IP scanner may be used for this purpose, including the 1756 Ethernet/IP modules with a ControlLogix PLC. RSLogix5000, version 20 programming software is used to create the CompactLogix project and create the Ethernet/IP network. The CompactLogix PLC will be configured to poll the PowerXL drive to operate the drive and monitor drive parameters.

Beginning with version 20 of RSLogix5000, Ethernet/IP EDS files can be imported into the software tool allowing Eaton motor control products to be easily added to a project by name. It also allows the I/O assemblies to be chosen from a list for each device, making this process straight-forward as well.

Eaton also has a software tool called EIP-Assist that will be described in more detail later in this document that creates an I/O tag file for Eaton Ethernet/IP products that can then be imported into RSLogix5000. The tags in this tag file are automatically aliased to the generic I/O tags created by RSLogix5000 for the Eaton motor control products such as the PowerXL DG1 drive. These descriptive tags can then be used directly in the user program for controlling and monitoring the Eaton motor control products. This tag generation software tool called EIP-Assist can be used to generate tags for up to 100 Eaton motor control products in a single spread sheet file to be imported into an RSLogix5000 project. These devices must already be included in the project.

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Configuring the PowerXL DG1 Drive

The IP addresses for the devices used in this example will be as follows:

PowerXL Drive:	192.168.1.8
CompactLogix PLC:	192.168.1.5
Computer:	192.168.1.51
Subnet mask:	255.255.255.0

Connect your computer, PLC and the PowerXL drive to an Ethernet switch. To configure the IP address of the PowerXL drive via its keypad/display, power the drive and navigate to the Active IP Address to set the IP address for the drive. As noted above, the IP address for the drive in this example is 192.168.1.8.

To access the Ethernet parameters from the drives keypad/display:

1. Start by selecting Parameters with the up/down arrow keys.
2. Then press the right arrow key which will display Basic Parameters
3. Press the up arrow key twice until Communications is displayed
4. Press the right arrow key once, then the down arrow key twice so Ethernet/IP/Modbus TCP is displayed
5. Press the right arrow key to access the following Ethernet parameters:
 - a. Static IP Address (P20.3.6), 192.168.1.8 is entered for this example
 - b. Static Subnet Mask (P20.3.7), 255.255.255.0 is entered for this example
 - c. Address Mode (P20.3.1), select Static IP, click the Left Soft key to Reset drive.
 - d. Navigate back to IP settings to verify Active IP Address (P20.3.2), and Active Subnet Mask (P20.3.3)

Refer to the Communication manual for this drive for additional details. Publication MN040010EN.

The drive must also be configured to accept remote control and speed via the network.

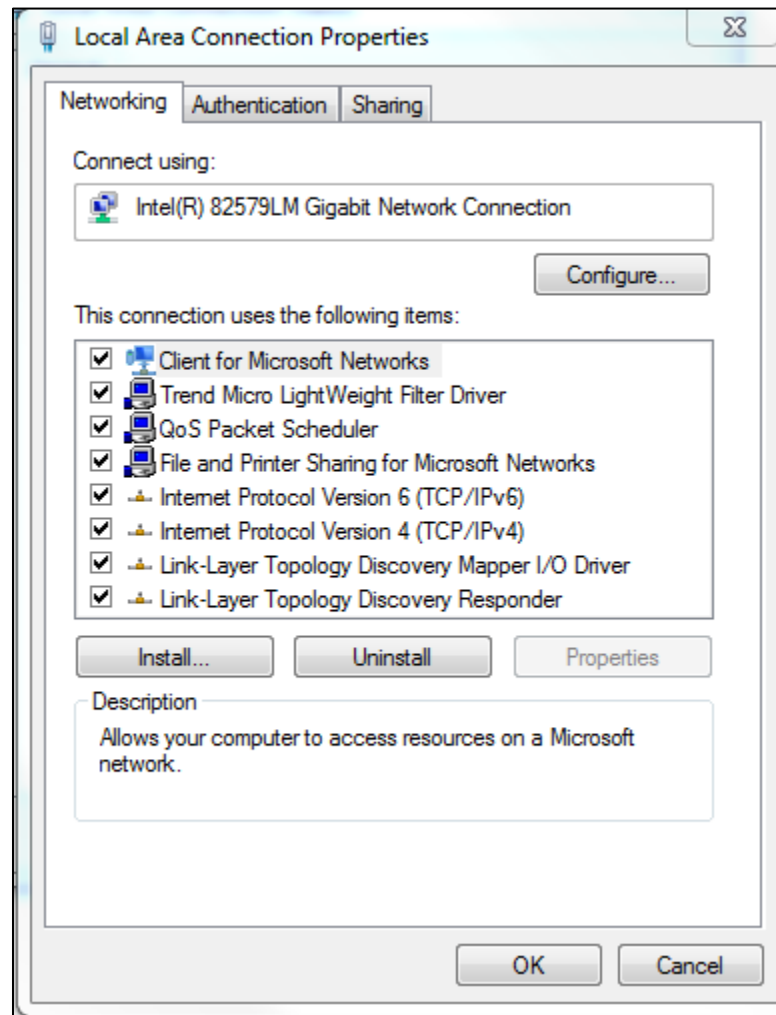
- Set Remote1 Control Place (P1.11) to: Fieldbus
- Set Remote1 Reference (P1.11) to: Fieldbus Ref

Both of these parameters can be found under: Parameters / Basic Parameters from the drive's keypad/display.

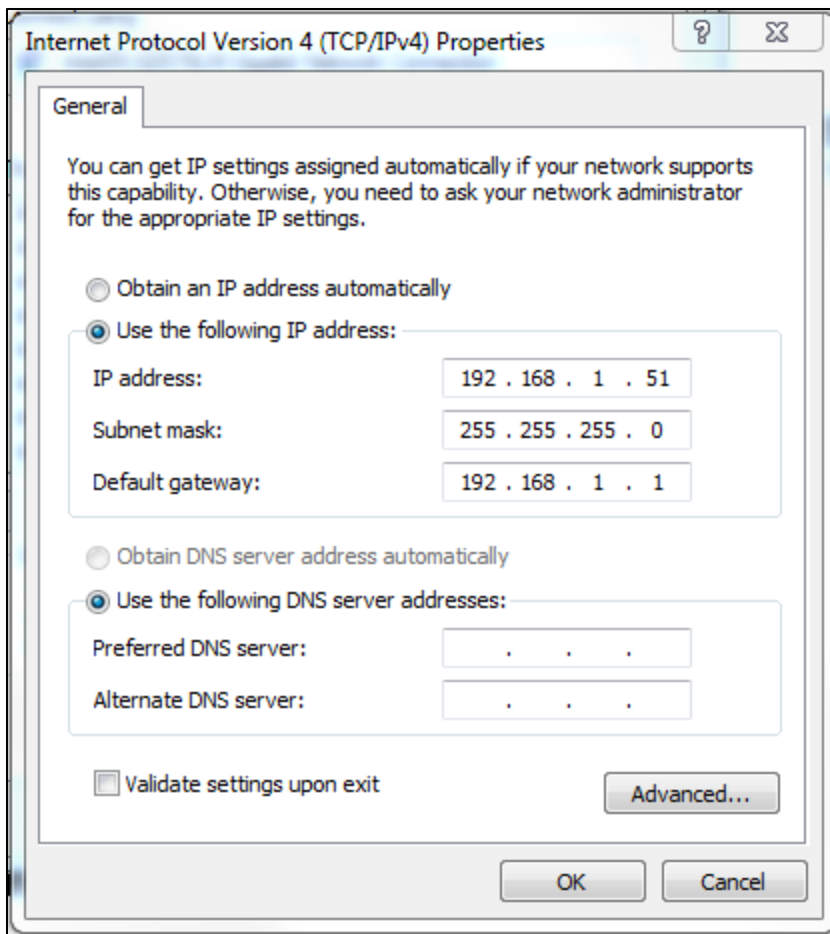
Change the IP Address of Your Computer

To change the IP address for a computer running Windows 7, follow the procedure below:

1. From the Start menu, choose Control Panel. From the Control Panel, choose Network and Sharing Center.
2. With the computer connected to an Ethernet network, select the Local Area Connection. Unless the computer is connected to a network, this Local Area Connection will not be present.
3. The Local Area Connection Status window will be displayed. Select Properties.
4. From the window shown below, select Internet Protocol Version 4 (TCP/IPv4) to highlight it, then select Properties.



5. Per the following window, select Use the following IP Address, then enter an IP address, Subnet mask and a Default gateway if it applies.



6. When finished, select OK and close all the windows used along the way. Your computer's Ethernet port will now be actively using the IP address and Subnet mask you just entered.

Creating a Project in RSLogix5000

Create a project in RSLogix5000. Give the project a name and select the controller type, per the following:

The screenshot shows the 'New Controller' dialog box in RSLogix5000. The fields are filled with the following information:

- Vendor: Allen-Bradley
- Type: 1769-L23E-QB1 CompactLogix5323E-QB1 Controller
- Revision: 20
- Redundancy Enabled:
- Name: PowerXL_DG1
- Description: (empty text area)
- Chassis Type: <none>
- Slot: 0 Safety Partner Slot: <none>
- Create In: C:\RSLogix 5000\Projects
- Security Authority: No Protection
- Use only the selected Security Authority for Authentication and Authorization:

Buttons for OK, Cancel, Help, and Browse... are visible on the right side of the dialog.

Select OK to create the project.

Install EDS Files for Eaton Products into RSLogix5000

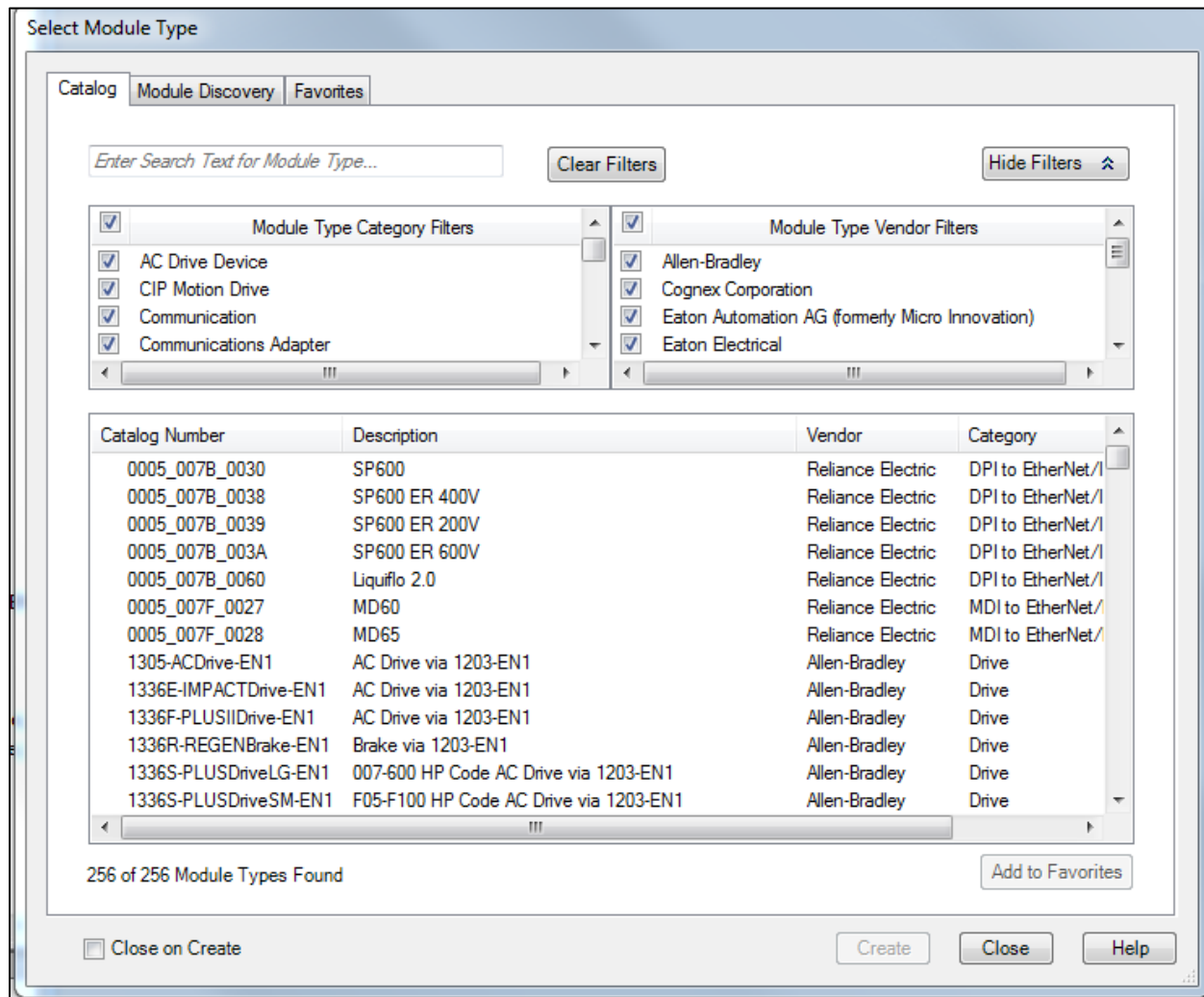
There is an Ethernet/IP EDS file for all Eaton Ethernet/IP products, compatible with RSLogix5000, version 20 or later. These files can be installed into the RSLogix5000 software via the following:

1. Download the EDS files for Eaton Ethernet/IP products from the following link: www.eaton.com/software and store them on your hard drive.
2. Select the Tools drop down menu in RSLogix5000
3. Select EDS Hardware Installation Tool
4. Follow the installation wizard, browsing for the EDS files previously saved to your hard drive.

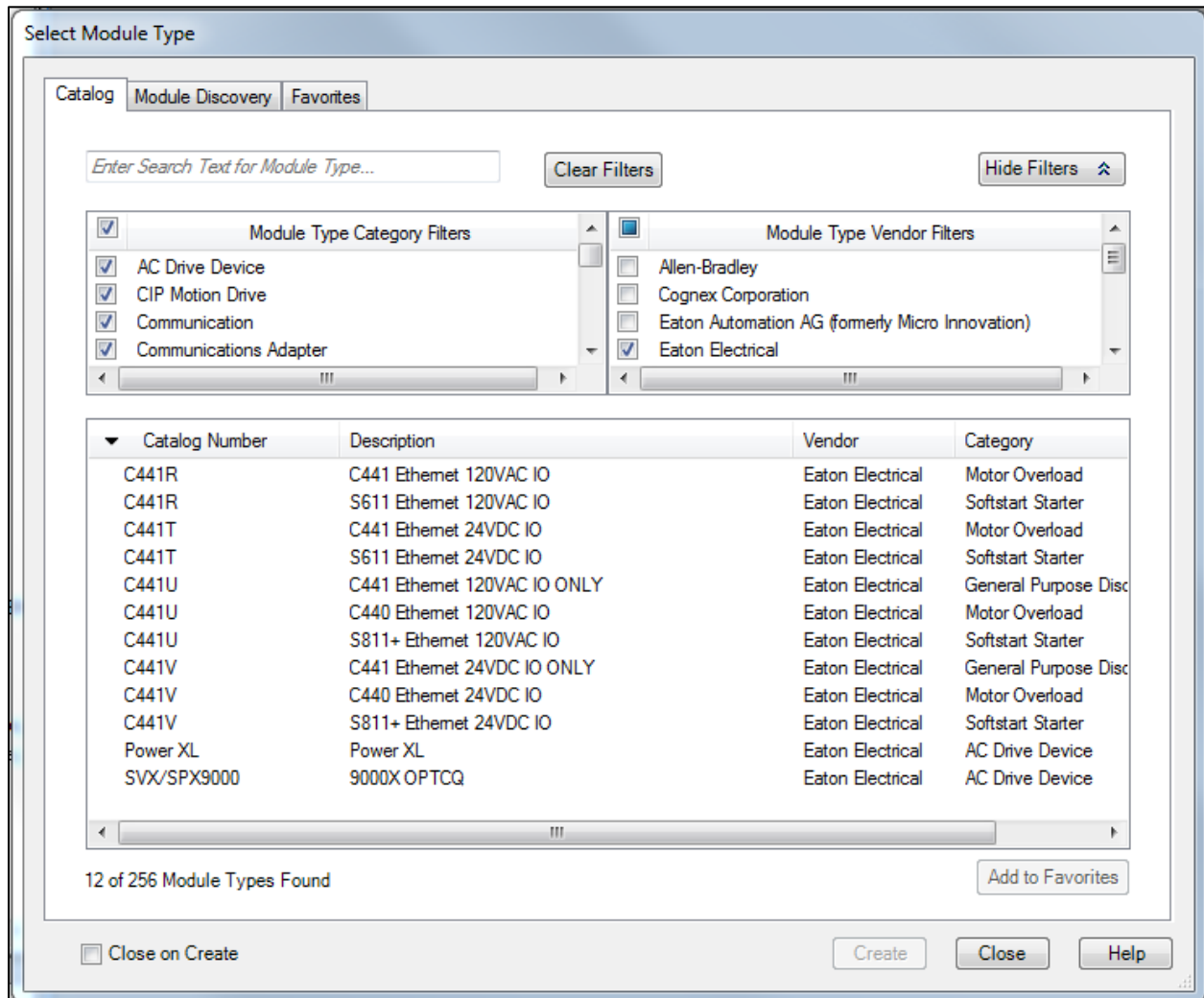
Once the EDS files have been installed into RSLogix5000., the PowerXL drive can be added to an Ethernet/IP network, per the following.

Creating an Ethernet/IP Network in RSLogix5000

On the left portion of the project screen in RSLogix5000, under I/O Configuration right click on Ethernet and select New Module. The following screen will open:



Select the check mark to the left of Module Type Vendor Filters to remove the check mark. Then select the box to the left of Eaton Electrical in the top right section to add a check mark and the Select Module Type screen should now look like the following. Notice it is now displaying only the Eaton motor control products with EDS files installed in this software.



For this example, we will select the PowerXL drive, then select the Create button. Give the drive a name and an IP address. The Name must not exceed 10 characters to work with the Tag Creation Tool later. This name will be used in the Tag Creation Tool for this particular device. It must be entered exactly the same in the Tag Creation Tool as it is entered here. We will use PowerXL for the name for this example.

Next, select the Change... button on this Module Properties screen to open the Module Definition screen as follows:

Module Definition

Revision: 1 1

Electronic Keying: Compatible Module

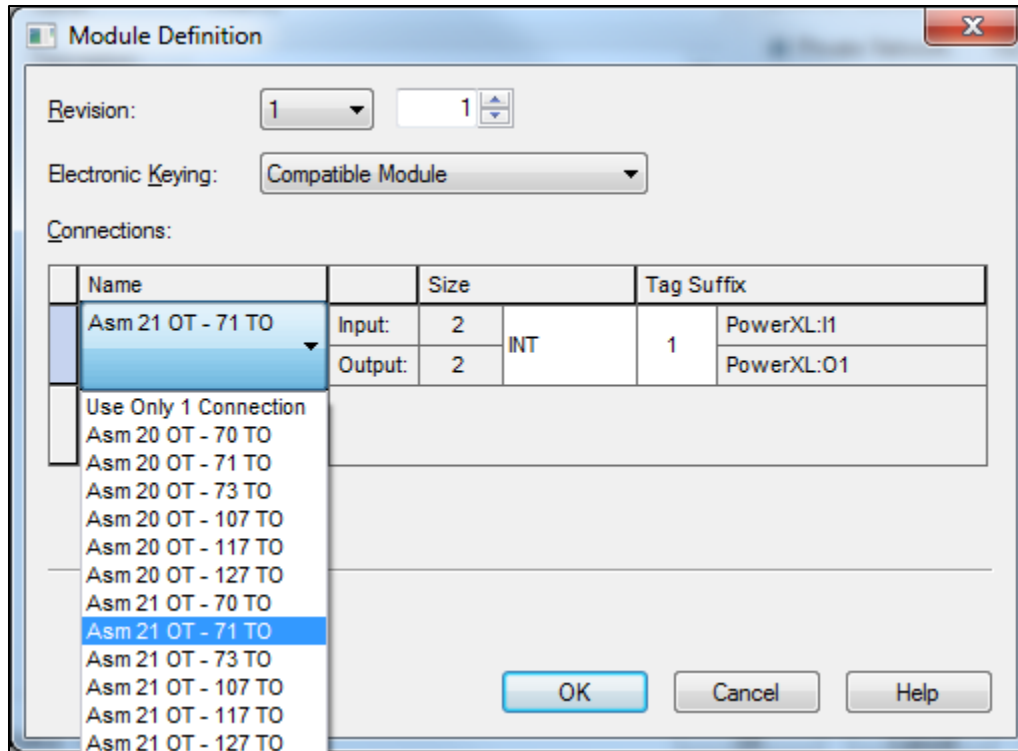
Connections:

Name	Input	Output	Size	SINT	Tag Suffix
Use Only 1 Connection	0	0	0	SINT	PowerXL:1
					<none>

Select a connection

OK Cancel Help

Since drives have even numbers of bytes for the I/O assemblies, data type INT can be used for them. Change SINT to INT. This allows parameters such as motor speed, torque, motor current, voltage and so on that are 16-bit word values to be displayed and entered as 16-bit values that are not split into 2 byte tags. Then click in the white space next to the words: Use Only 1 Connection to reveal all the I/O assembly pairs supported by the PowerXL DG1 drive as follows:



For this example, Input Assembly 71 and Output Assembly 21 are chosen. Each assembly is 4 bytes, or 2 words (INTs). The data layouts for the Input and Output Assemblies are as follows. They're shown in bytes, but will be 2 INTs in RSLogix5000 for each assembly.

Assembly Instance 71 (Default)

Instance 71 (Input)/Length = 4 Bytes

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	AtReference	RefFromNet	CtrlFromNet	Ready	Running2	Running1	Warning	Faulted
1	Drive state, see Page 24							
2	Speed actual (low byte), RPM							
3	Speed actual (high byte), RPM							

The data layout for the Output Assembly is as follows:

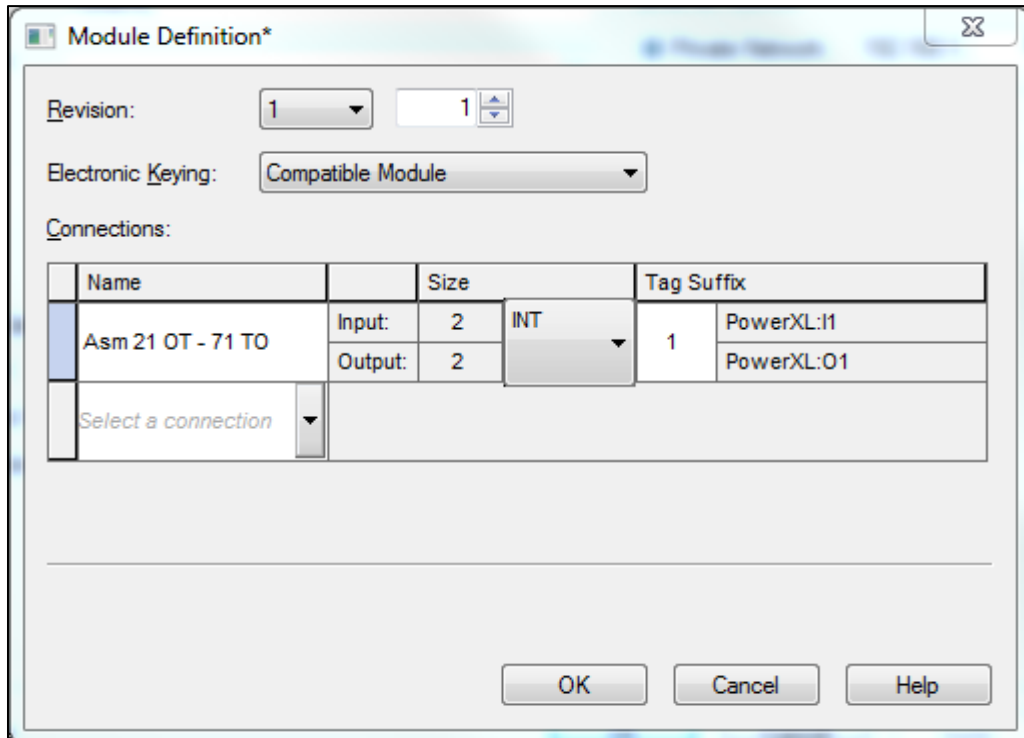
Assembly Instance 21 (Default)

Instance 21 (Output)/Length = 4 Bytes

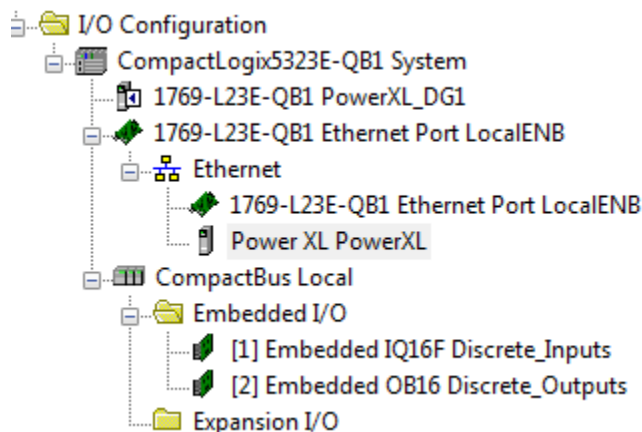
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	—	NetRef	NetCtrl	—	—	FaultReset	RunRev	RunFwd
1	—	—	—	—	—	—	—	—
2	Speed reference (low byte), RPM							
3	Speed reference (high byte), RPM							

This allows the drive to be controlled to Run Forward or Reverse and at a speed from 0 – 1800rpm (or the maximum rpm set in the drive) or 0-100.00% (0-10000 decimal), depending on the I/O assemblies selected. The NetCtrl and NetRef bits (5 and 6) in the first word must be set prior to operating the drive via the network. The tags imported from the Tag Generation Tool will be bits (BOOLS) aliased to the generic tags created for the first integer for both input and output data, with the same tag names as shown above. The Speed actual and Speed reference will be 16-bit values representing the actual speed and speed reference in the input and output data. Tags with these names will also be created then imported from the Tag Generation Tool and aliased to the generic 16-bit integer tags created by RSLogix5000. This will be more apparent later in this application note when the CSV file is imported into the RSLogix5000 project.

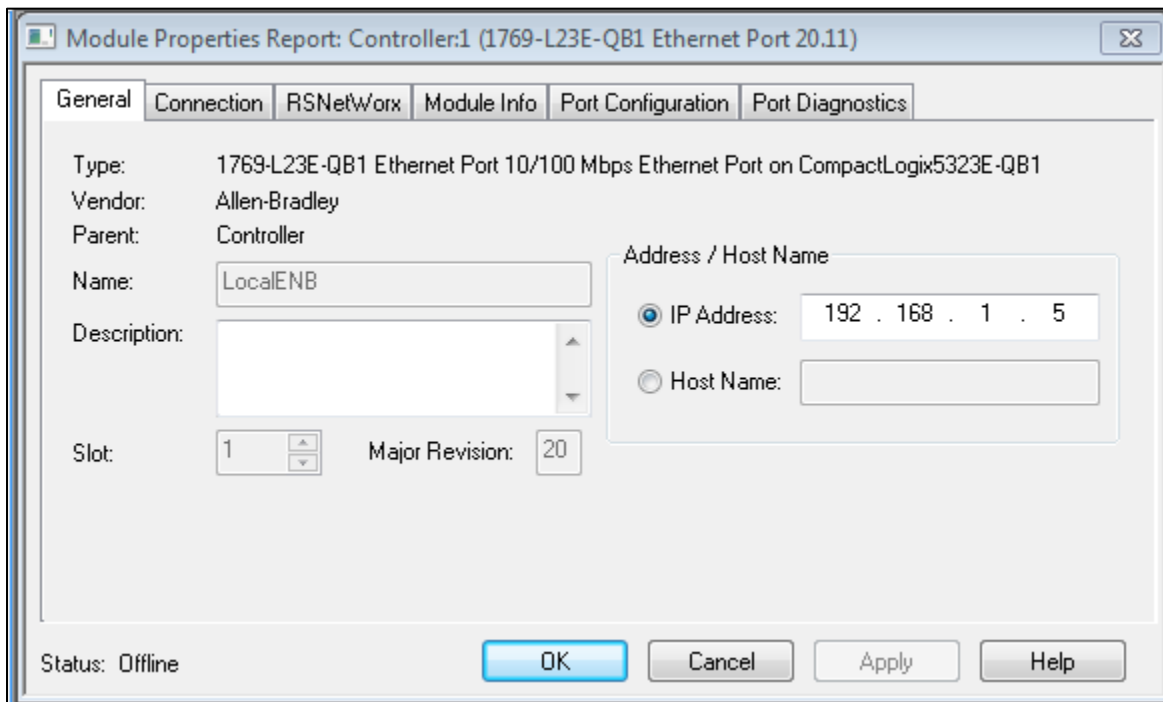
The Module Definition window will look like the following:



Select OK, then Yes for the information screen. Then select OK for the Module Properties screen for the PowerXL drive and close the Select Module Type screen. The drive will then appear under the Ethernet/IP master on the lower left portion of the project as follows:



Next double click the 1769-L23E-QB1 Ethernet Port LocalENB located directly above the Power XL drive (or whatever Rockwell Ethernet/IP scanner being used). Set the IP address for this port from its Properties screen as shown below.



Click OK to save and close this screen.

Double click Controller Tags near the top of the Controller Organizer to open the Controller Tags window. There will be 2 INT tags of input and output data created for the PowerXL per the following:

[-] PowerXL:11	{...}	{...}		_0044:PowerXL_76270E88:1:0
[-] PowerXL:11.ConnectionFaulted	0		Decimal	BOOL
[-] PowerXL:11.Data	{...}	{...}	Decimal	INT[2]
[+] PowerXL:11.Data[0]	0		Decimal	INT
[+] PowerXL:11.Data[1]	0		Decimal	INT
[-] PowerXL:01	{...}	{...}		_0044:PowerXL_7377BDB4:0:0
[-] PowerXL:01.Data	{...}	{...}	Decimal	INT[2]
[+] PowerXL:01.Data[0]	0		Decimal	INT
[+] PowerXL:01.Data[1]	0		Decimal	INT

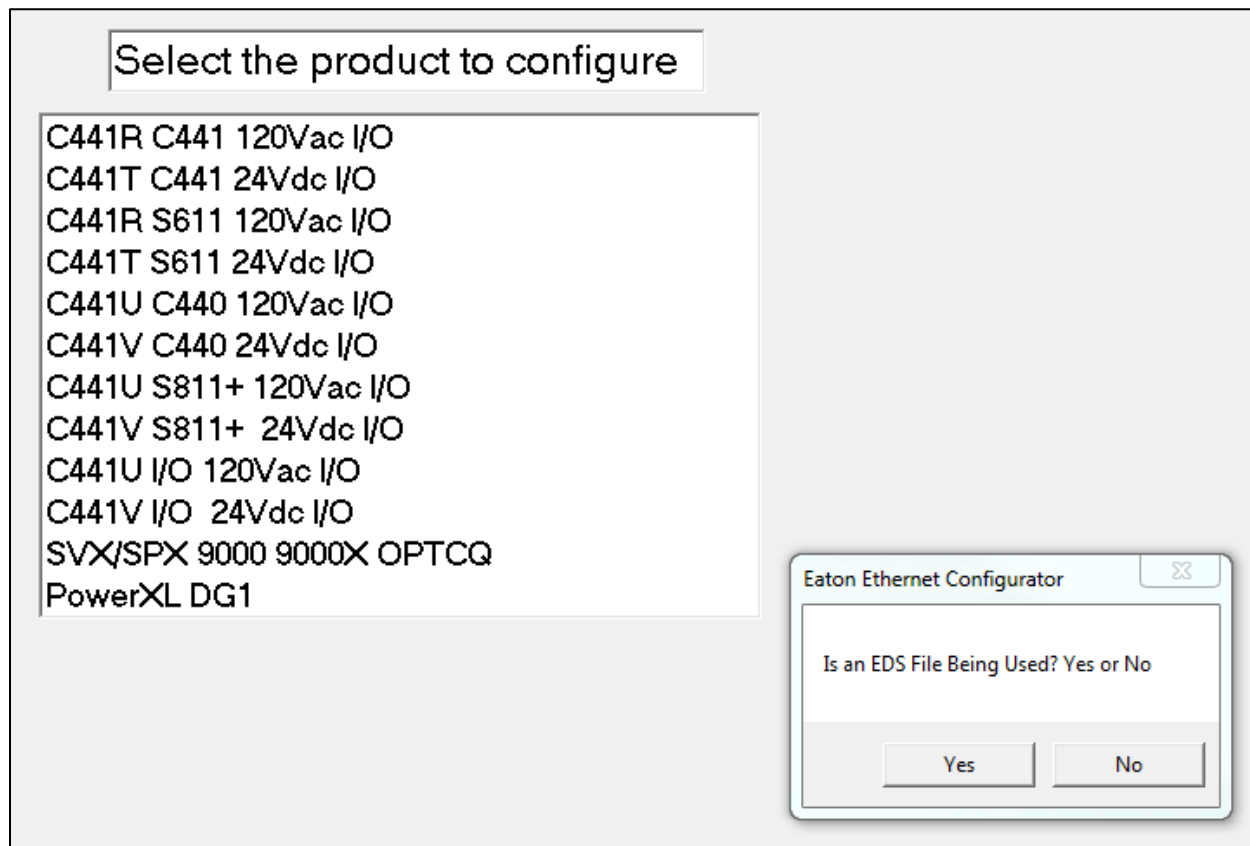
These are generic tags with the name previously entered into its Ethernet/IP Properties used to identify the tags. This same name, in this case PowerXL must also be used for this device in the Tag Generation tool to uniquely identify it.

Creating a CSV file for Drive's I/O Tags using Eaton's EIP-Assist Tool

The EIP-Assist Tool and a user manual for it can be found at the following link:

www.eaton.com/software

Once downloaded, double click its icon. The splash screen will open for a few seconds, then the following window will be displayed.



Ethernet/IP slave devices can be added to a network in RSLogix5000 by importing and using EDS files for each device or by using a Generic Ethernet Module selection. Since all Eaton Ethernet/IP products have a current EDS file and since we installed the EDS file for the PowerXL DG1 drive earlier and used it, we will select Yes to the question: Is an EDS File Being Used?.

Then select the PowerXL DG1 drive from the list and enter a quantity of 1 when the next window appears. Then select the I/O pair of your choice, 21/71 is used for this example.

A Browse for Folder window will then be displayed. Browse for a folder where you want to save the CSV Tag file this tool will generate. Also, provide a name for that file when the next window appears.

You will then be prompted for a Module Device Name. It is very important that the name you provided for this device in RSLogix5000 is also used here. The name cannot exceed 10 characters. If the name you provided for this device in RSLogix5000 was longer than 10 characters, you must go back and change it before continuing with this tool. The name used for this example is PowerXL.

You will then be prompted if you wish to add additional products. Select No for this example, but this tool supports up to 100 Eaton Ethernet/IP slave devices per CSV file. If more are needed, the tool may be

executed again to include those devices in another CSV file, which can also be imported into the same RSLogix5000 project.

Importing the CSV File created for the Drive using EIP-Assist

While viewing the Controller Tags in RSLogix5000, select the Tools drop down menu, then select Import/Tags and Logic Comments. Browse for the CSV file previously created with EIP-Assist, then select the Import button. The descriptive tags for the PowerXL drive will be imported and aliased to the generic I/O tags for the drive. The tags are linked by the name given the PowerXL drive in both software tools. The descriptive tags shown below for the PowerXL drive can now be used in the PLC program. No tags need to be manually entered into RSLogix5000 for any Eaton Ethernet/IP products.

[-] PowerXL:11	{...}	{...}		_004...	
[-] PowerXL:11.ConnectionFaulted	0		Decimal	BOOL	
[+] PowerXL:11.Data	{...}	{...}	Decimal	INT[2]	
[-] PowerXL:01	{...}	{...}		_004...	
[+] PowerXL:01.Data	{...}	{...}	Decimal	INT[2]	
PowerXL_StatusFaulted	0		Decimal	BOOL	Faulted
PowerXL_StatusWarning	0		Decimal	BOOL	Warning
PowerXL_StatusRunning1	0		Decimal	BOOL	Running 1
PowerXL_StatusRunning2	0		Decimal	BOOL	Running 2
PowerXL_StatusReady	0		Decimal	BOOL	Ready
PowerXL_StatusDriveCtrlFromNet	0		Decimal	BOOL	Control From Net
PowerXL_StatusRefFromNet	0		Decimal	BOOL	Reference From Net
PowerXL_StatusAtReference	0		Decimal	BOOL	At Reference
PowerXL_DriveState0	0		Decimal	BOOL	Drive State
PowerXL_DriveState1	0		Decimal	BOOL	Drive State
PowerXL_DriveState2	0		Decimal	BOOL	Drive State
PowerXL_DriveState3	0		Decimal	BOOL	Drive State
PowerXL_DriveState4	0		Decimal	BOOL	Drive State
PowerXL_DriveState5	0		Decimal	BOOL	Drive State
PowerXL_DriveState6	0		Decimal	BOOL	Drive State
PowerXL_DriveState7	0		Decimal	BOOL	Drive State
[+] PowerXL_SpeedActual	0		Decimal	INT	Speed Actual
PowerXL_RunFwd	0		Decimal	BOOL	Run Forward
PowerXL_RunRev	0		Decimal	BOOL	Run Reverse
PowerXL_FaultReset	0		Decimal	BOOL	Fault Reset
PowerXL_NetCtrl	0		Decimal	BOOL	Net Ctrl
PowerXL_NetRef	0		Decimal	BOOL	Net Reference

Monitor Tags / Edit Tags /

```

Errors
23 tags created
0 tags overwritten on collision
23 descriptions imported
0 descriptions deleted
0 new comments imported
0 comments overwritten on collision
0 comments deleted on collision
Complete - 0 errors, 0 warnings

```

Below is the same window with the Edit Tags tab selected, showing the generic I/O tags the descriptive tags are aliased to:

Name	Alias For	Base Tag	Data Type	Description	External Access	Constant	Style
PowerXL:11			_0044:Pow...		Read/Write	<input type="checkbox"/>	
PowerXL:11.ConnectionFau...			BOOL		Read/Write		Decimal
PowerXL:11.Data			INT[2]		Read/Write		Decimal
PowerXL:01			_0044:Pow...		Read/Write	<input type="checkbox"/>	
PowerXL:01.Data			INT[2]		Read/Write		Decimal
PowerXL_StatusFaulted	PowerXL:11.Data[0].0	PowerXL:11.Data[0].0	BOOL	Faulted	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusWarning	PowerXL:11.Data[0].1	PowerXL:11.Data[0].1	BOOL	Warning	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusRunning1	PowerXL:11.Data[0].2	PowerXL:11.Data[0].2	BOOL	Running 1	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusRunning2	PowerXL:11.Data[0].3	PowerXL:11.Data[0].3	BOOL	Running 2	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusReady	PowerXL:11.Data[0].4	PowerXL:11.Data[0].4	BOOL	Ready	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusDriveCtrlFrom...	PowerXL:11.Data[0].5	PowerXL:11.Data[0].5	BOOL	Control From Net	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusRefFromNet	PowerXL:11.Data[0].6	PowerXL:11.Data[0].6	BOOL	Reference From Net	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_StatusAtReference	PowerXL:11.Data[0].7	PowerXL:11.Data[0].7	BOOL	At Reference	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState0	PowerXL:11.Data[0].8	PowerXL:11.Data[0].8	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState1	PowerXL:11.Data[0].9	PowerXL:11.Data[0].9	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState2	PowerXL:11.Data[0].10	PowerXL:11.Data[0].10	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState3	PowerXL:11.Data[0].11	PowerXL:11.Data[0].11	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState4	PowerXL:11.Data[0].12	PowerXL:11.Data[0].12	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState5	PowerXL:11.Data[0].13	PowerXL:11.Data[0].13	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState6	PowerXL:11.Data[0].14	PowerXL:11.Data[0].14	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_DriveState7	PowerXL:11.Data[0].15	PowerXL:11.Data[0].15	BOOL	Drive State	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_SpeedActual	PowerXL:11.Data[1]	PowerXL:11.Data[1]	INT	Speed Actual	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_RunFwd	PowerXL:01.Data[0].0	PowerXL:01.Data[0].0	BOOL	Run Forward	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_RunRev	PowerXL:01.Data[0].1	PowerXL:01.Data[0].1	BOOL	Run Reverse	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_FaultReset	PowerXL:01.Data[0].2	PowerXL:01.Data[0].2	BOOL	Fault Reset	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_NetCtrl	PowerXL:01.Data[0].5	PowerXL:01.Data[0].5	BOOL	Net Ctrl	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_NetRef	PowerXL:01.Data[0].6	PowerXL:01.Data[0].6	BOOL	Net Reference	Read/Write	<input type="checkbox"/>	Decimal
PowerXL_SpeedReference	PowerXL:01.Data[1]	PowerXL:01.Data[1]	INT	Speed Reference	Read/Write	<input type="checkbox"/>	Decimal

Monitor Tags | Edit Tags

```

Errors
23 tags created
0 tags overwritten on collision
23 descriptions imported
0 descriptions deleted
0 new comments imported
0 comments overwritten on collision
0 comments deleted on collision
Complete - 0 errors, 0 warnings
    
```

References

- PowerXL DG1 Series VFD Installation Manual, Publication MN040002EN
- PowerXL DG1 Series VFD Application Manual, Publication MN040004EN
- PowerXL DG1 Series Option Cards Manual, Publication MN040007EN
- PowerXL DG1 Series Communication Manual, Publication MN040010EN

Additional Help

In the US or Canada: please contact the Technical Resource Center at 1-877-ETN-CARE or 1-877-326-2273 option 2, option 6.

All other supporting documentation is located on the Eaton web site at www.eaton.com/Drives

