

SVX and SPX Drive Configuration to Rockwell PLC

Introduction

The purpose of this application note is to demonstrate how to operate an SVX drive via Ethernet/IP with a Rockwell CompactLogix PLC. The SVX drive uses the OPTCQ Ethernet/IP Option board. The drive needs to be configured with an IP address for Ethernet communications, along with the I/O Assemblies used on Ethernet/IP. This is accomplished via the keypad/display on the drive.

While this application example uses a CompactLogix controller with embedded Ethernet/IP scanner port to control and monitor the SVX drive over Ethernet/IP, any Ethernet/IP scanner may be used for this purpose, including the 1756-ENBT 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 SVX 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 very straight-forward as well.

Eaton also has a software tool 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 SVX 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 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.

Configuring the SVX Drive

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

- SVX 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 SVX drive to an Ethernet switch.

To configure the IP address and I/O Assemblies for the SVX drive via its keypad/display, power the drive.

To access the Ethernet parameters and I/O assemblies from the drives keypad/display navigate to:

Expander Boards/OPTCQ/Parameters:

1. IP Part 1: 192

2. IP Part 2: 168
3. IP Part 3: 1
4. IP Part 4: 8
5. Do the same for the Subnet mask P1-4: 255.255.255.0.
6. Input Instance: 71
7. Output Instance: 21

Then navigate back to the beginning then to the following:

Parameters/Basic Parameters and configure the 2 parameters for the following:

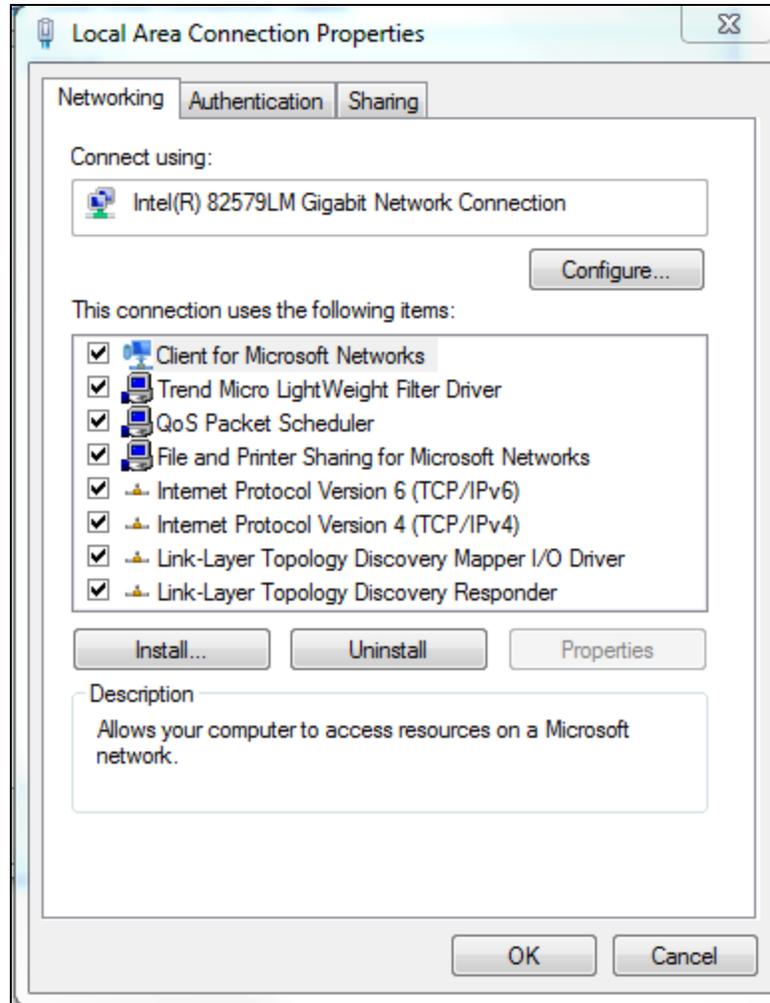
1. Remote Ctl, Place: Fieldbus
2. Remote Ref: Fieldbus

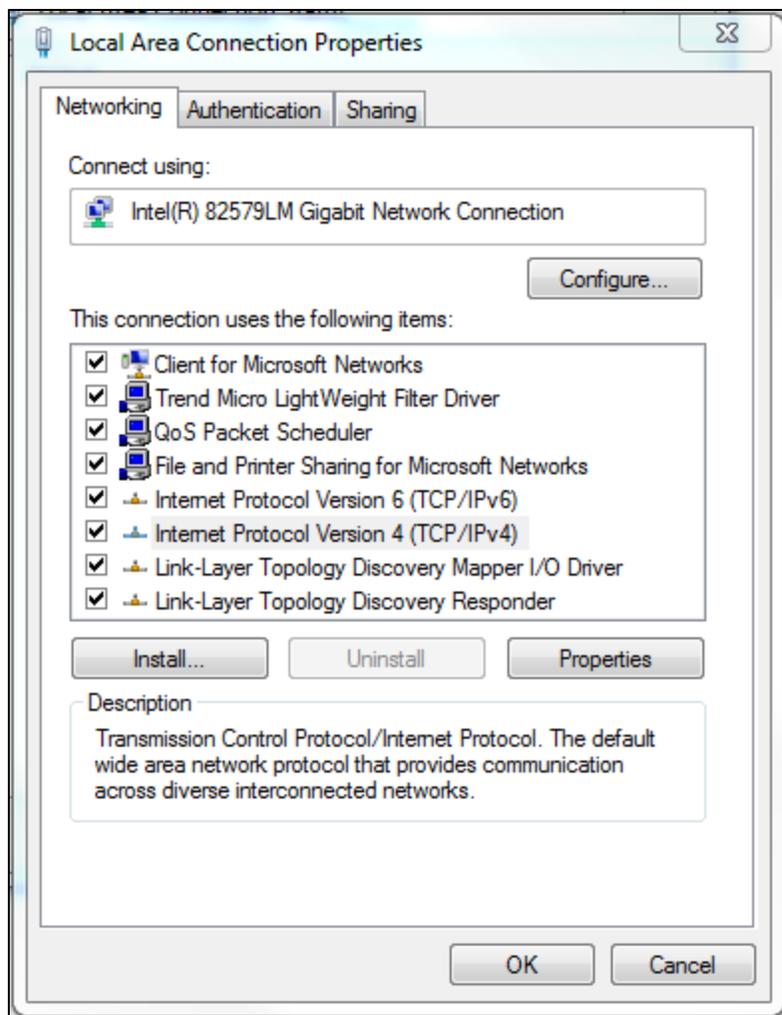
Power cycle the drive to activate these new Ethernet parameters.

Change the IP Address of your Computer

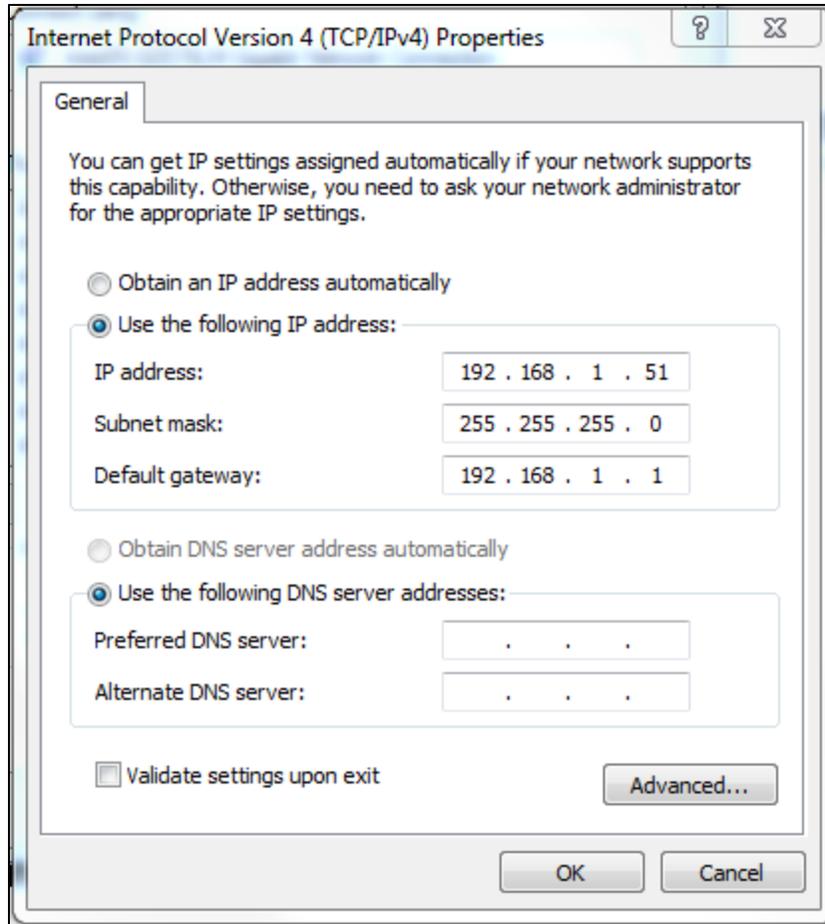
To change the IP address for a computer running Windows 7, follow the procedure below:

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.





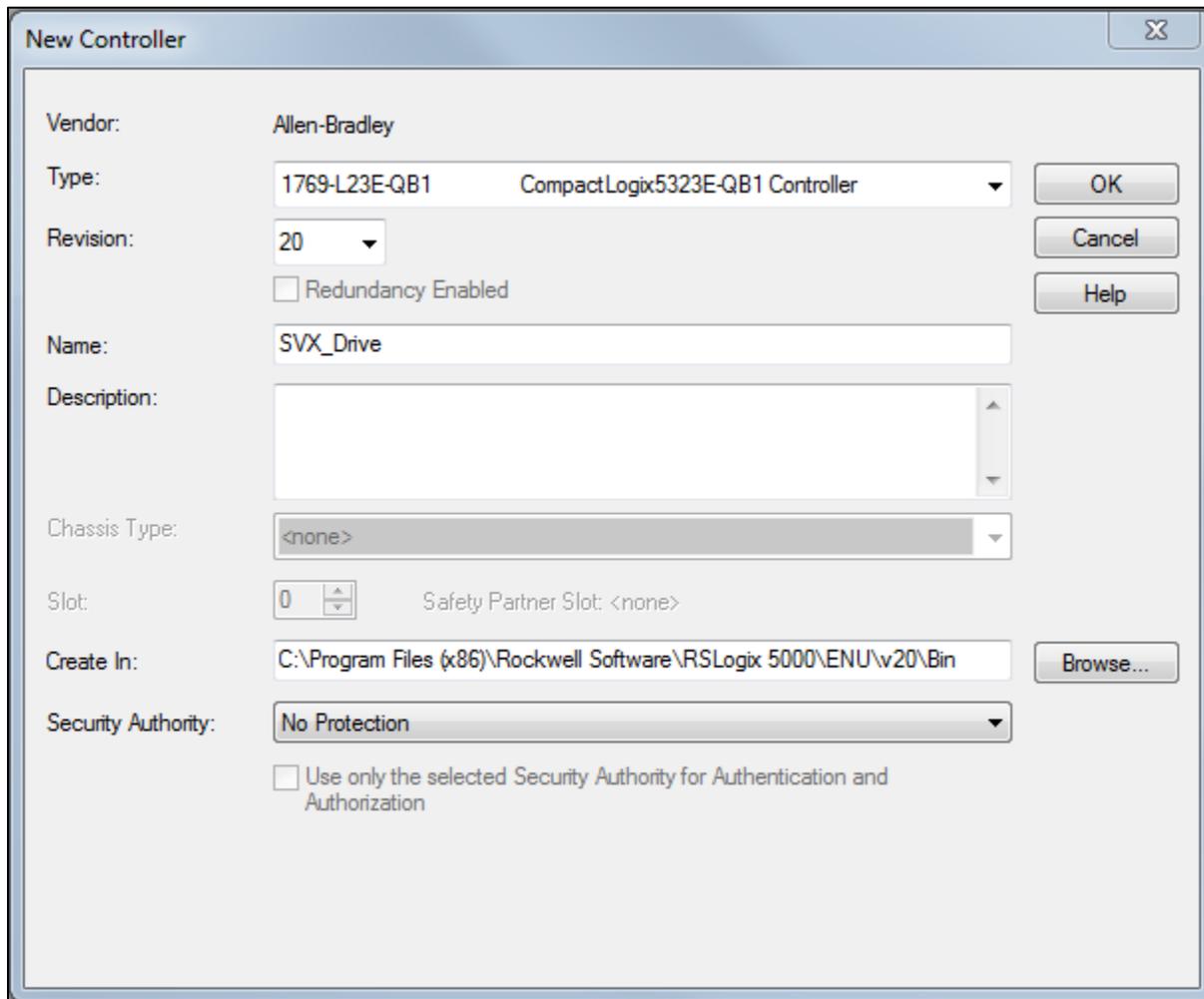
5. Per the following window, select Use the following IP Address, then enter an IP address, Subnet mask and a Default gateway if it applies.



- When finished, select OK and close all the windows used along the way to get to this window. 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:

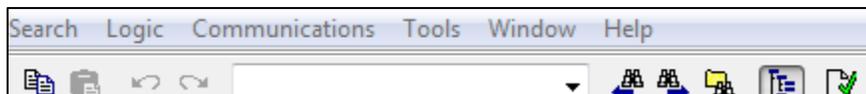


Select OK to create the project.

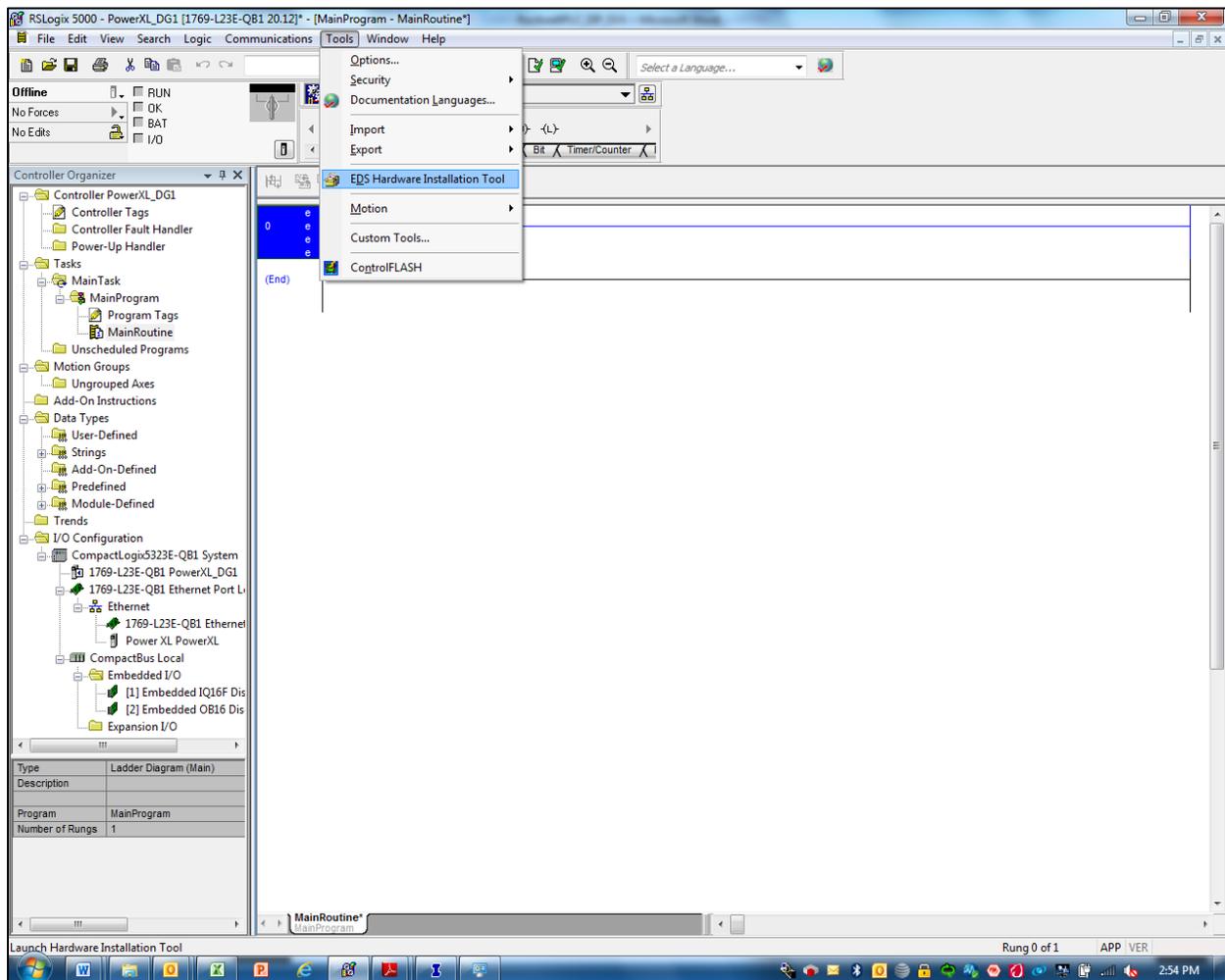
Install EDS Files for Eaton Products into RSLogix5000

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

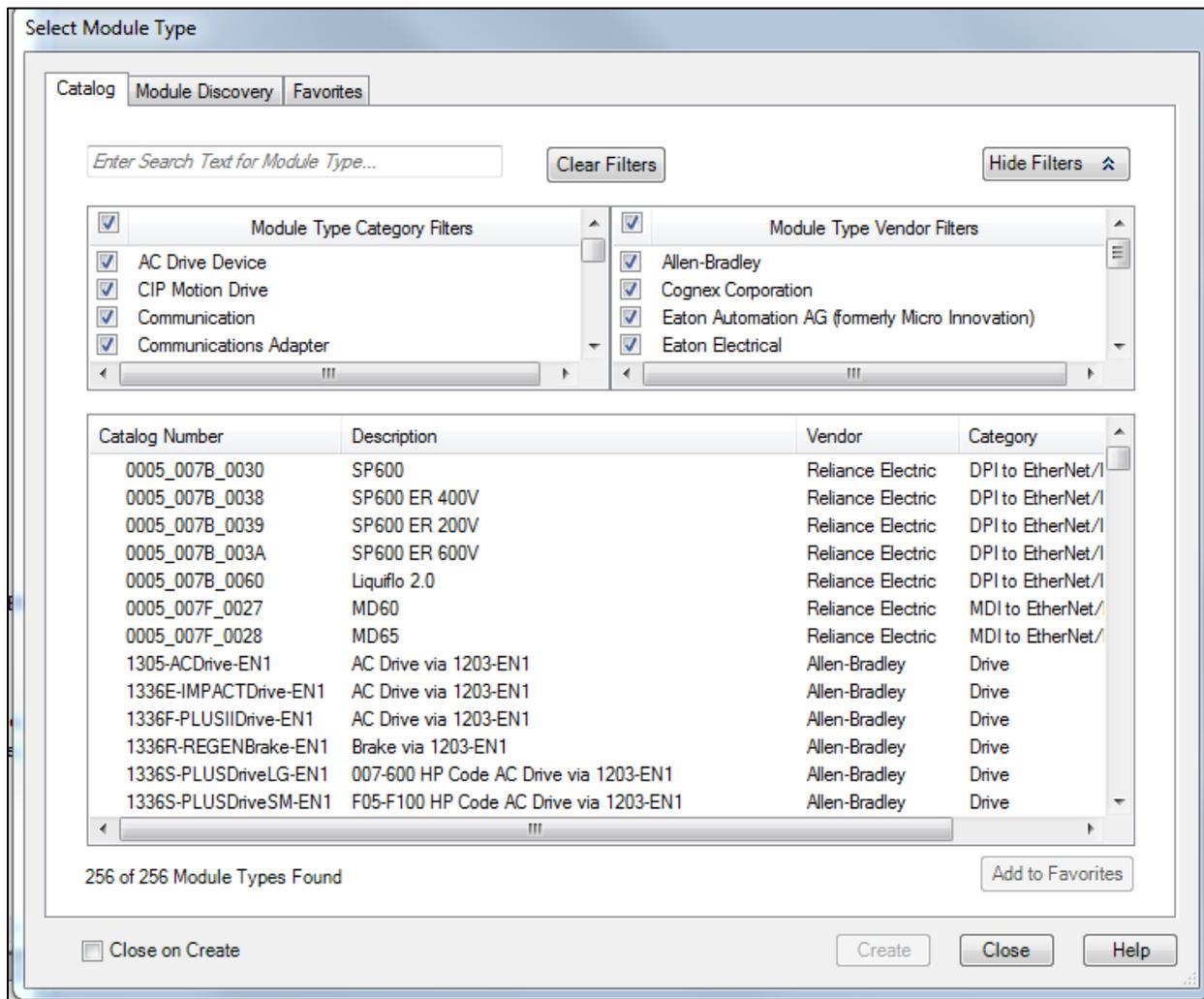


4. Follow the installation wizard, browsing for the EDS files previously saved to your hard drive.

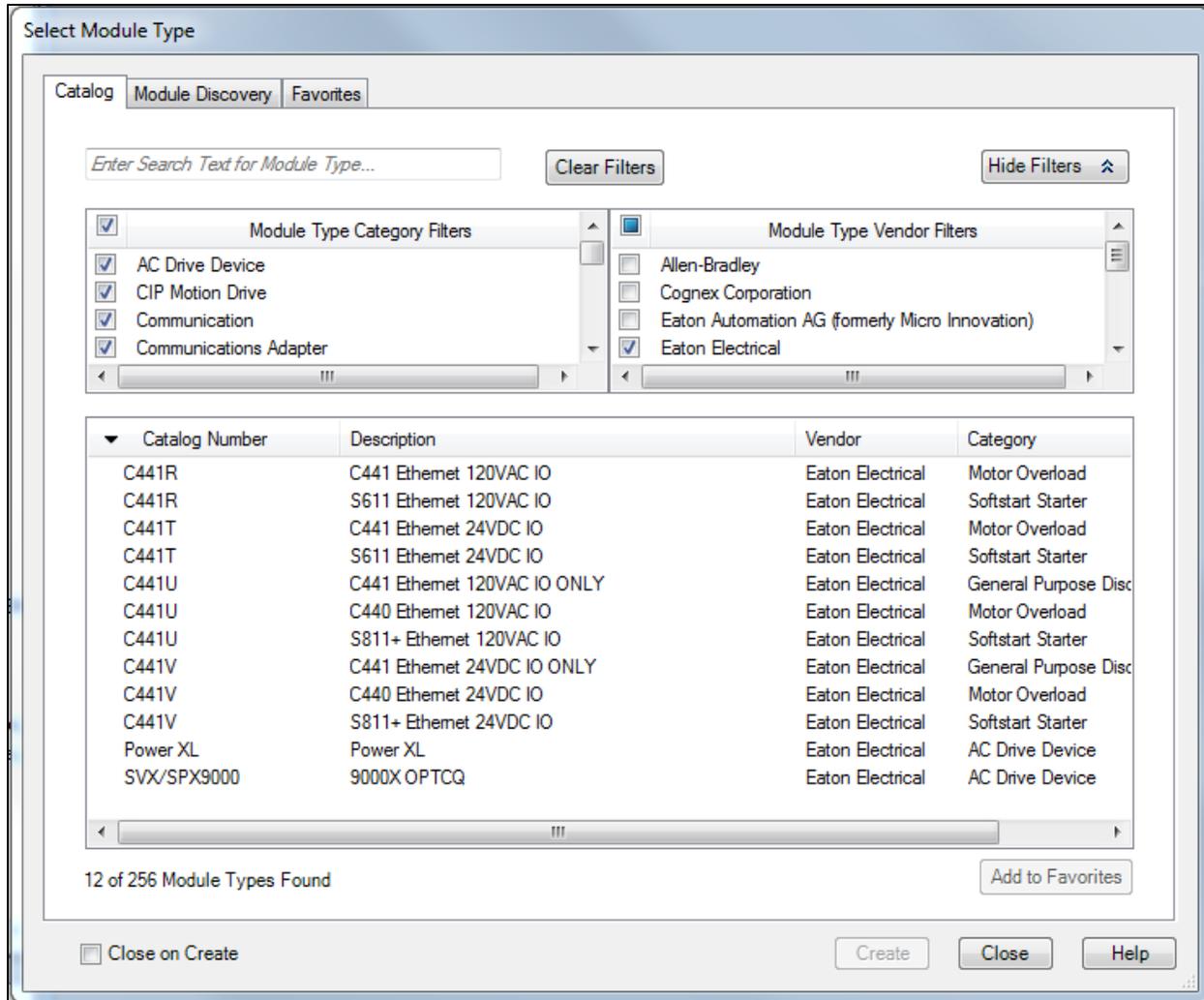
Once the EDS files have been installed into RSLogix5000., the SVX drive can be added to an Ethernet/IP network, per the following.

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:

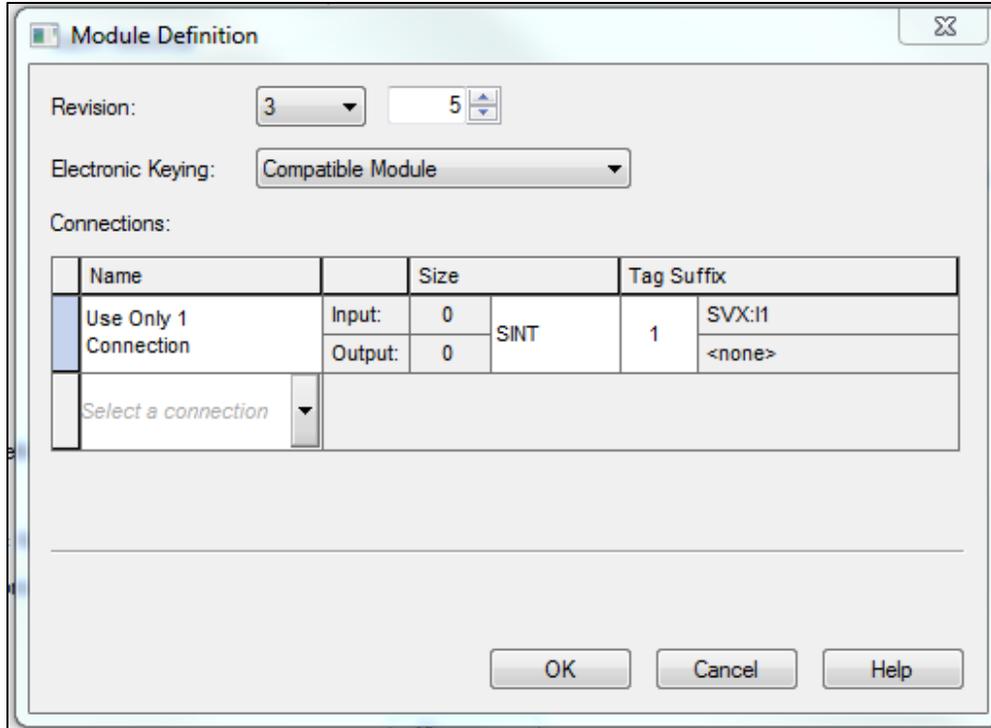


Select the check mark to the left of Module Type Vendor Filters to remove the check mark. Then select the box to the left of Eaton Electrical in the top right section to add a check mark and the Select Module Type screen should now look like the following. Notice it is now displaying only the Eaton motor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

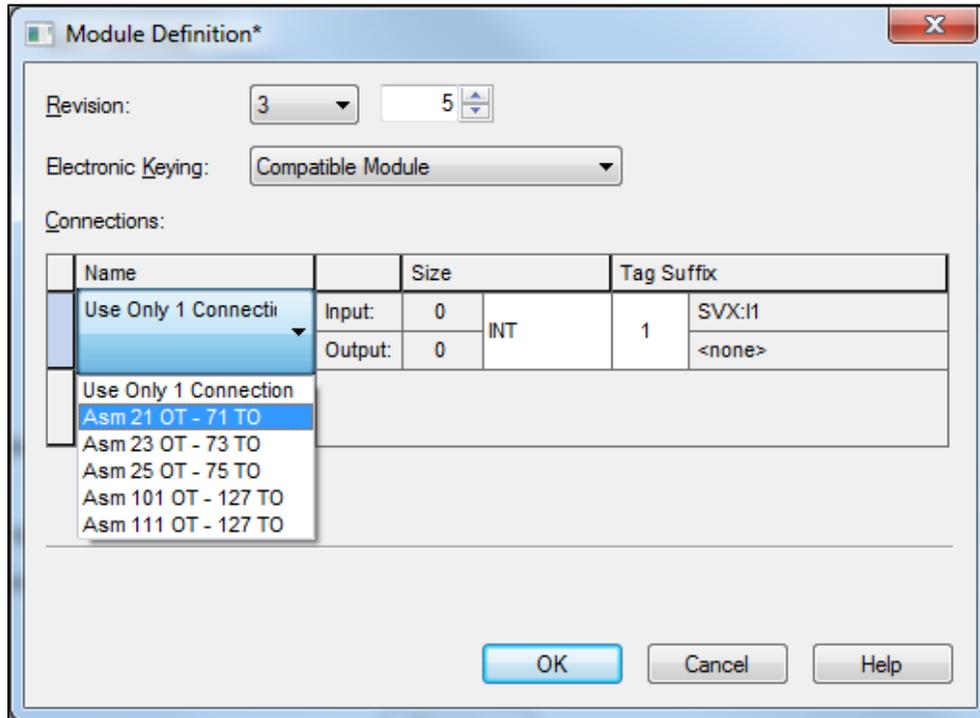


For this example, we will select the SVX drive, then select the Create button. Give the drive a name and an IP address. The Name must not exceed 10 characters to work with the Tag Creation Tool later. This name is used in the Tag Creation Tool for this particular device. It must be entered exactly the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

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



Since SVX 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, 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 SVX 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 Assembly 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:

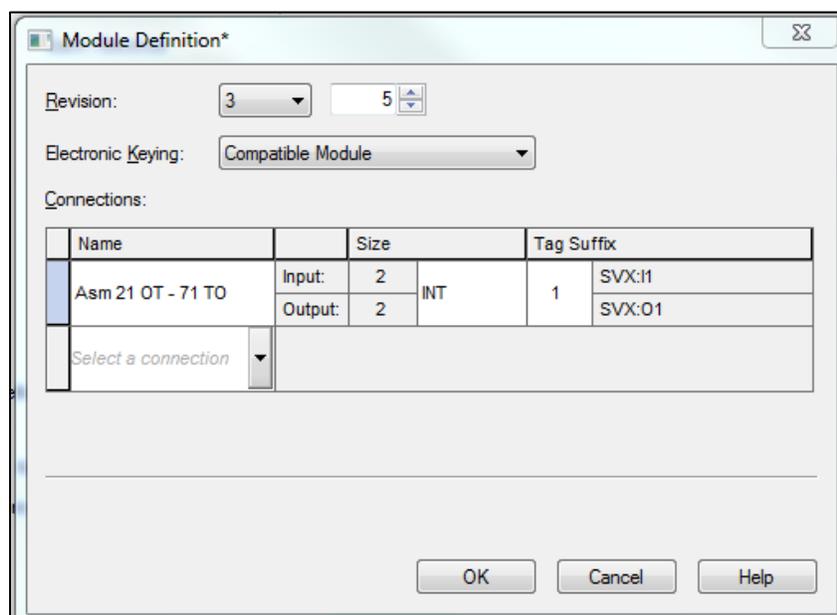
Assembly Instance 21 (Default)

Instance 21 (Output)/Length = 4 Bytes

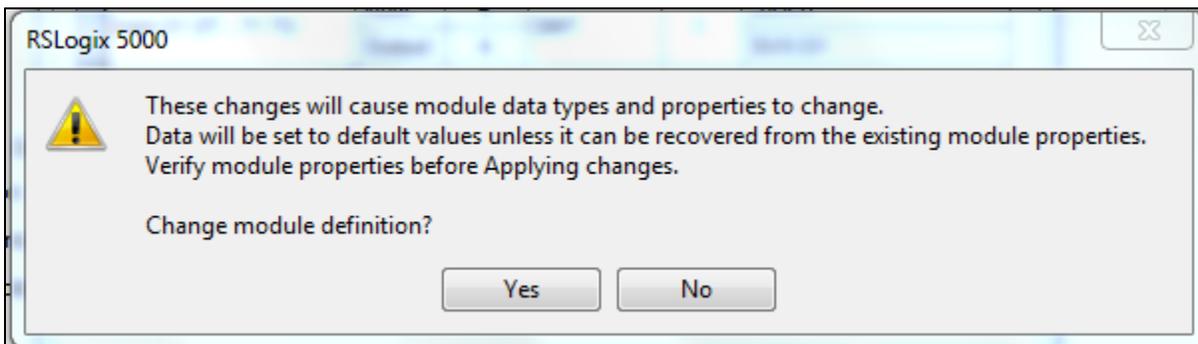
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	—	NetRef	NetCtrl	—	—	FaultReset	RunRev	RunFwd
1	—	—	—	—	—	—	—	—
2	Speed reference (low byte), RPM							
3	Speed reference (high byte), RPM							

This allows the drive to be controlled to Run in either direction and at a speed from 0-100.00% (0-10,000). 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 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.

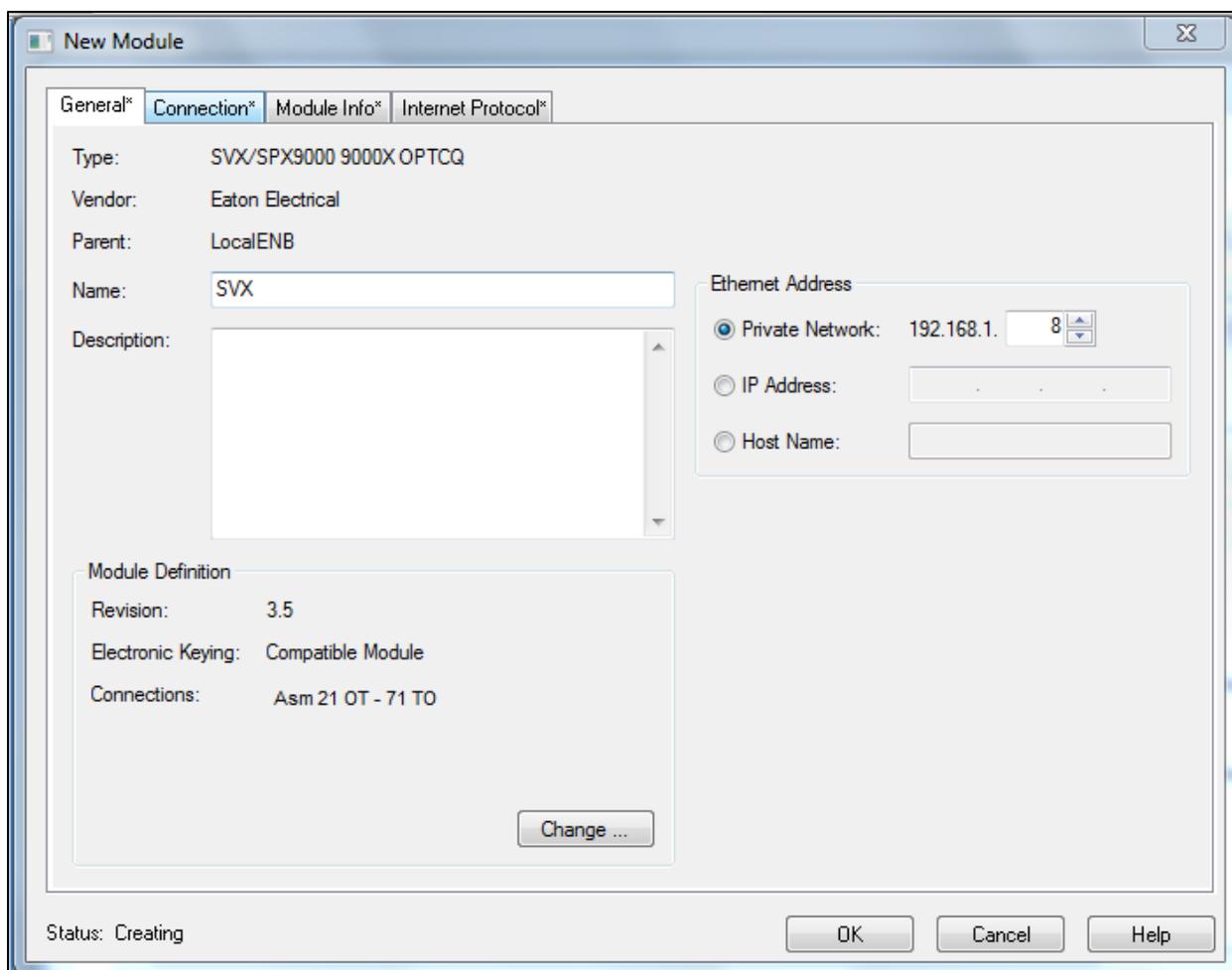
The Module Definition window will look like the following:



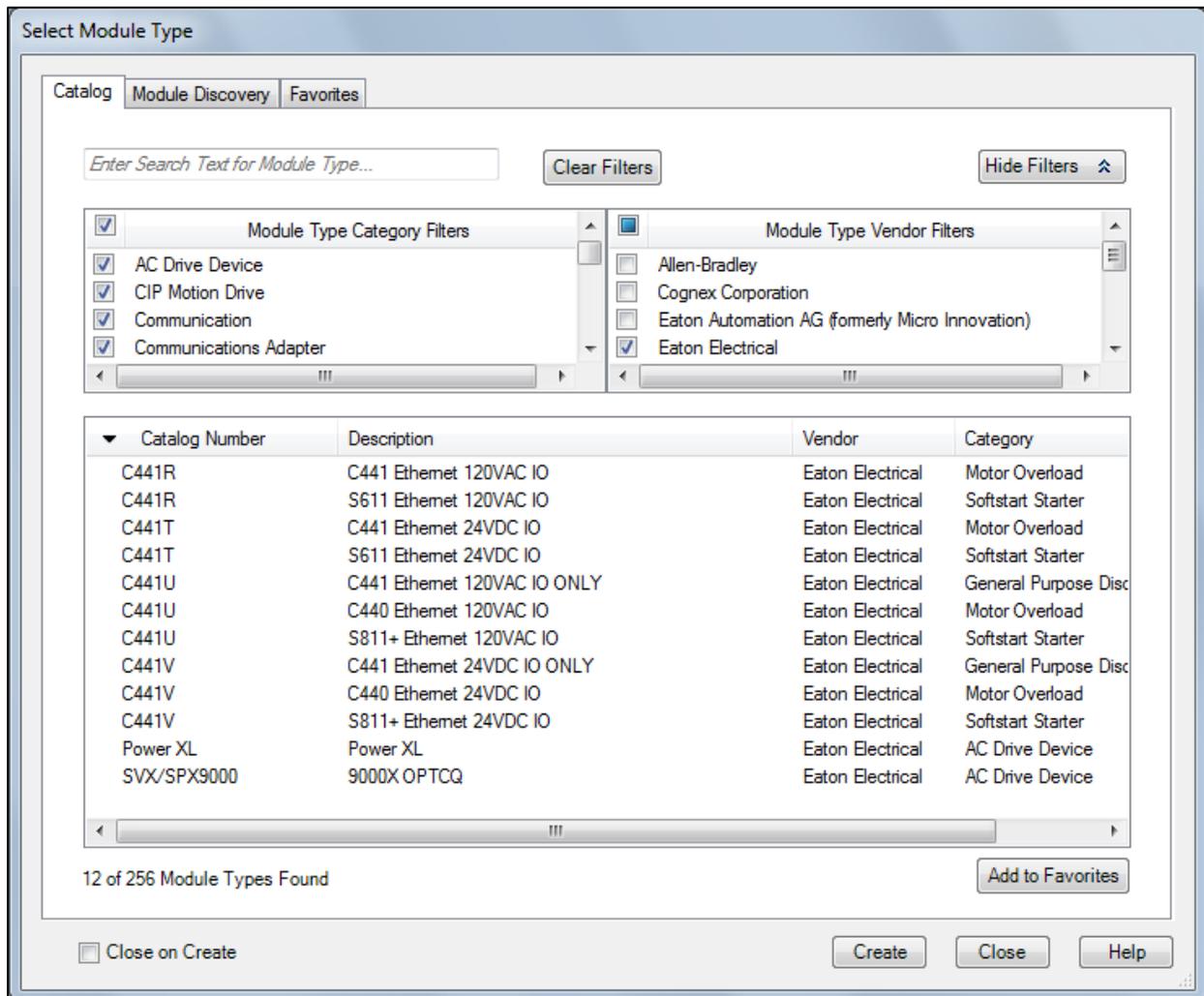
Select OK, then Yes for the information screen.



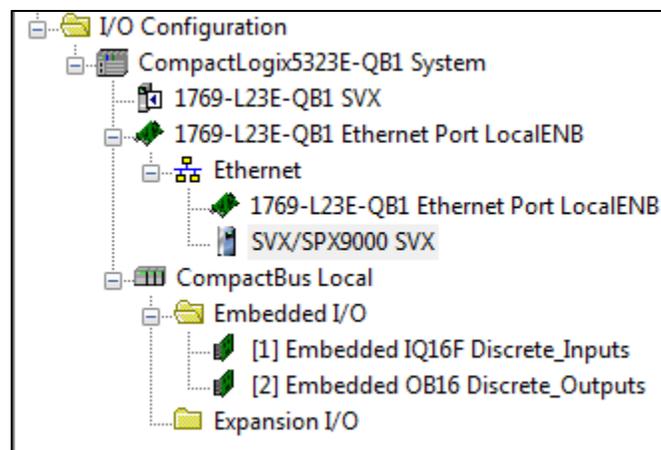
Then select OK for the Module Properties screen for the SVX drive.



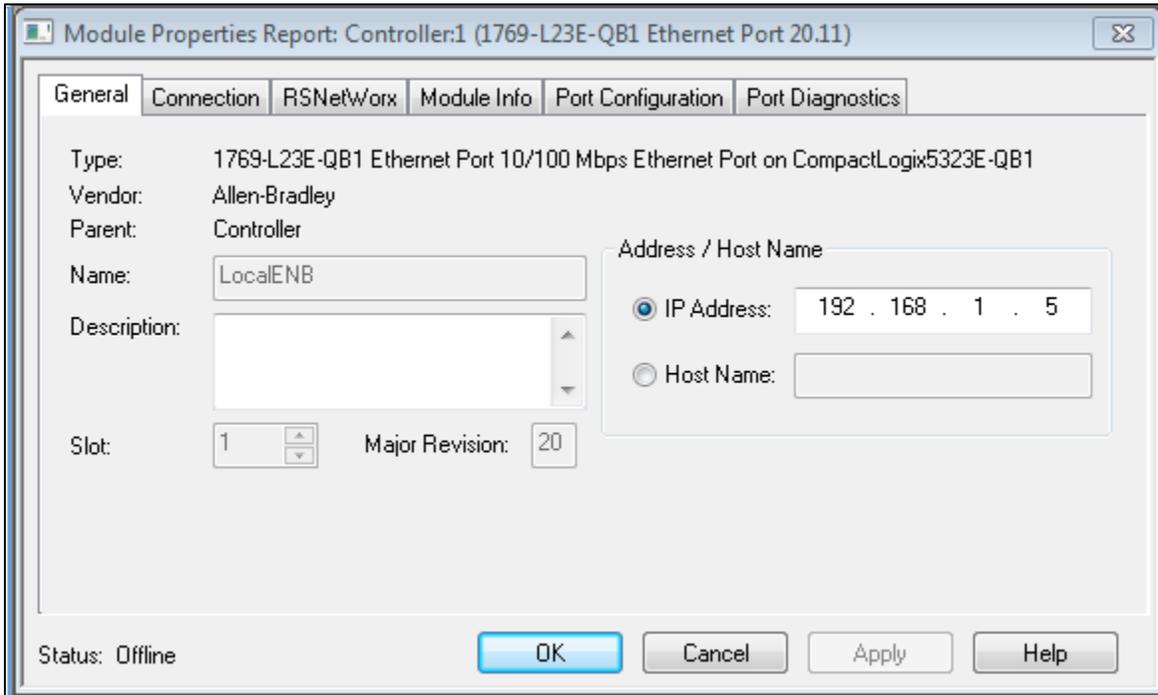
And close the Select Module Type window.



The SVX Drive will then appear under the Ethernet/IP master on the lower left portion of the project as follows:

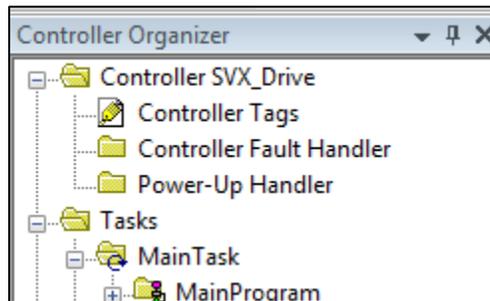


Next double click the 1769-L23E-QB1 Ethernet Port LocalENB located directly above the SVX drive. Set the IP address for this port from its Properties screen as shown below.



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 SVX drive per the following:

[-] SVX:I1	{...}	{...}		_0044:SVX:SPX9000_76270E88:I:0
SVX:I1.ConnectionFaulted	0		Decimal	BOOL
[-] SVX:I1.Data	{...}	{...}	Decimal	INT[2]
[+] SVX:I1.Data[0]	0		Decimal	INT
[+] SVX:I1.Data[1]	0		Decimal	INT
[-] SVX:O1	{...}	{...}		_0044:SVX:SPX9000_73778DB4:O:0
[-] SVX:O1.Data	{...}	{...}	Decimal	INT[2]
[+] SVX:O1.Data[0]	0		Decimal	INT
[+] SVX:O1.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 SVX must also be used for this device in the Tag Generation tool to uniquely identify it.

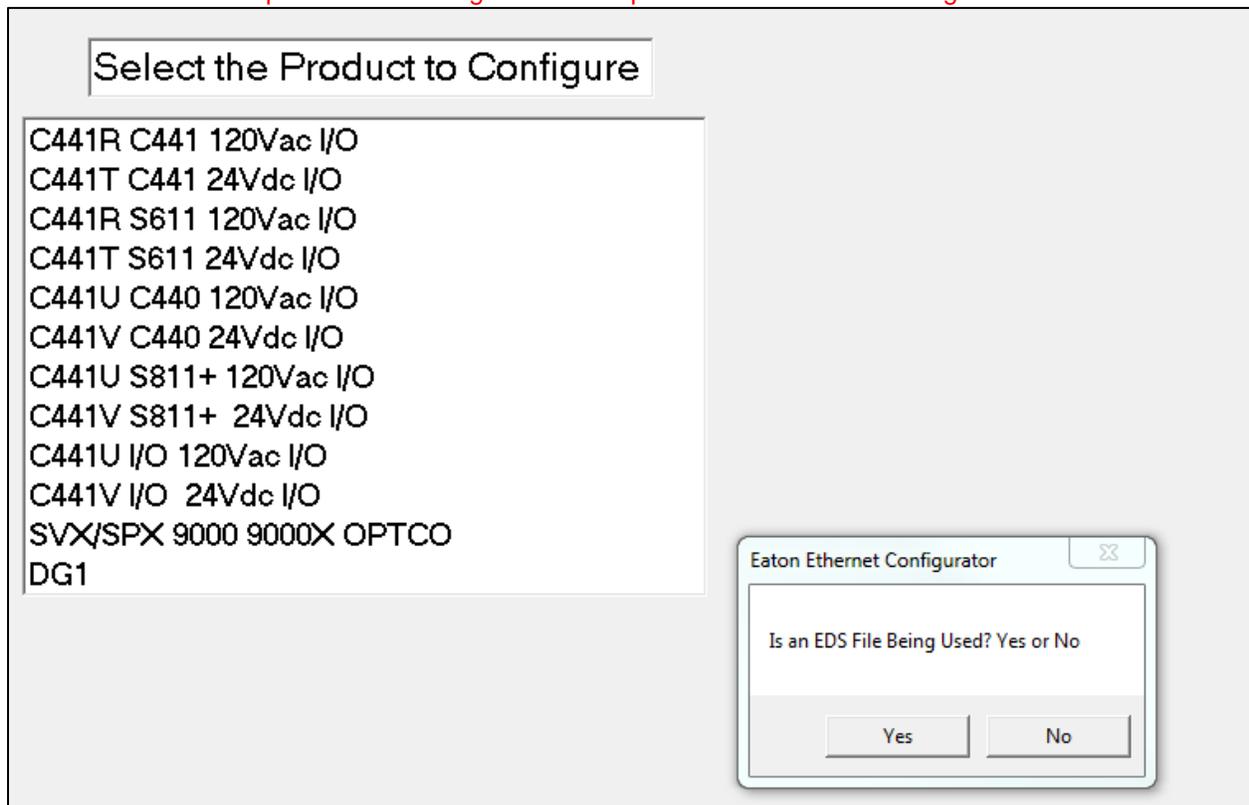
Creating CSV file for SVX Drive's I/O with Eaton's Tag Creation Tool

The Tag Creation 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.

*****Replace the following screen dump when DG1 name is changed*****



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 Device selection. Since all Eaton Ethernet/IP products have a current EDS file and since we installed the EDS file for the SVX drive earlier and used it, we will select Yes to the question: Is an EDS File Being Used?.

Then select the SVX/SPX 9000 9000X OPTCO 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.

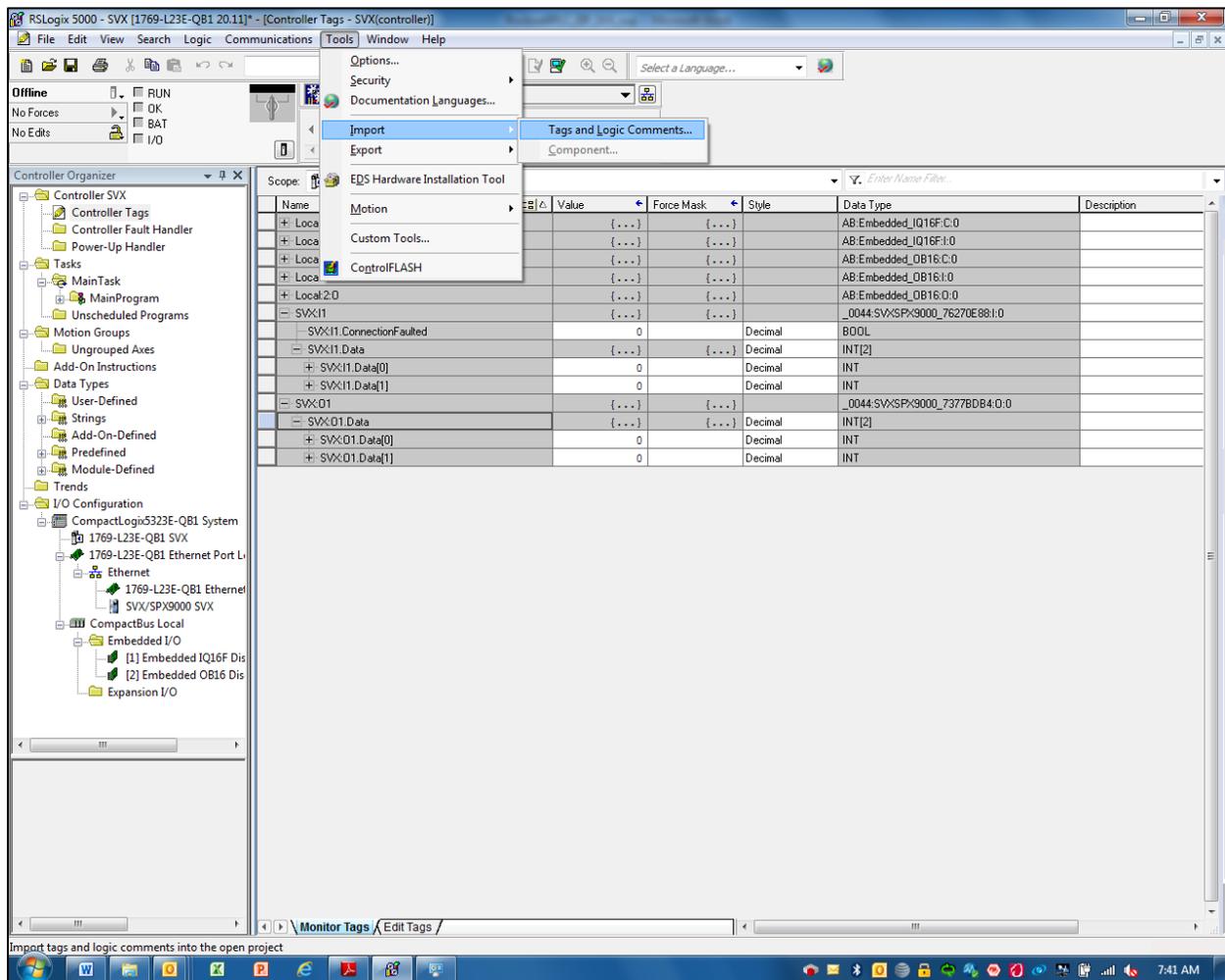
A Browse for Folder window will then be displayed. Browse for a folder where you want to save the CSV Tag file this tool will generate. Also, provide a name for that file when the next window appears.

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 used. 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 SVX.

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 CSV File created for SVX Drive using the Tag Creation Tool

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 the Tag Generation Tool, then select the Import button. The descriptive tags for the SVX drive will be imported and aliased to the generic I/O tags for the drive. The tags are linked by the name given the SVX drive in both software tools. The descriptive tags shown below for the SVX drive can now be used in the PLC program. No tags need to be manually entered into RSLogix5000 for any Eaton Ethernet/IP products.

*****screen shot for the drive's tags*****

Optional: Use I/O Assembly Pair 101/127 for the SVX Drive

If the application requires monitoring more data from the SVX drive than status bits and actual speed, using I/O assemblies 101 and 127 will allow for monitoring 8 additional parameters, such as Motor Torque, Motor Current, Motor Voltage, Motor Power and more. A list of these parameters with a unique ID number for each of them can be found in Chapter 6 of Publication MN04004001E, the 9000X AF Drives Application Manual.

The SVX drive must be configured for these I/O Assemblies. Where to find this in the drive's Keypad/display is described earlier in this paper.

Note: In order to use these I/O assemblies and configure the drive to monitor additional parameters, the Multi-Purpose Control Application must be used.

The default ID numbers set in the drive for **FB Data Out1 Sel** through **FB Data Out8 Sel** are 1-8. These ID numbers are referenced to the following parameters on page 6-5 of the above referenced Application Manual.

1: Output Frequency in Hz

2: Motor Speed in rpm

3: Motor Current in amps

4: Motor Torque in %

5: Motor Power in %

6: Motor Voltage in volts

7: DC-bus Voltage in volts

8: Unit Temperature in degrees C

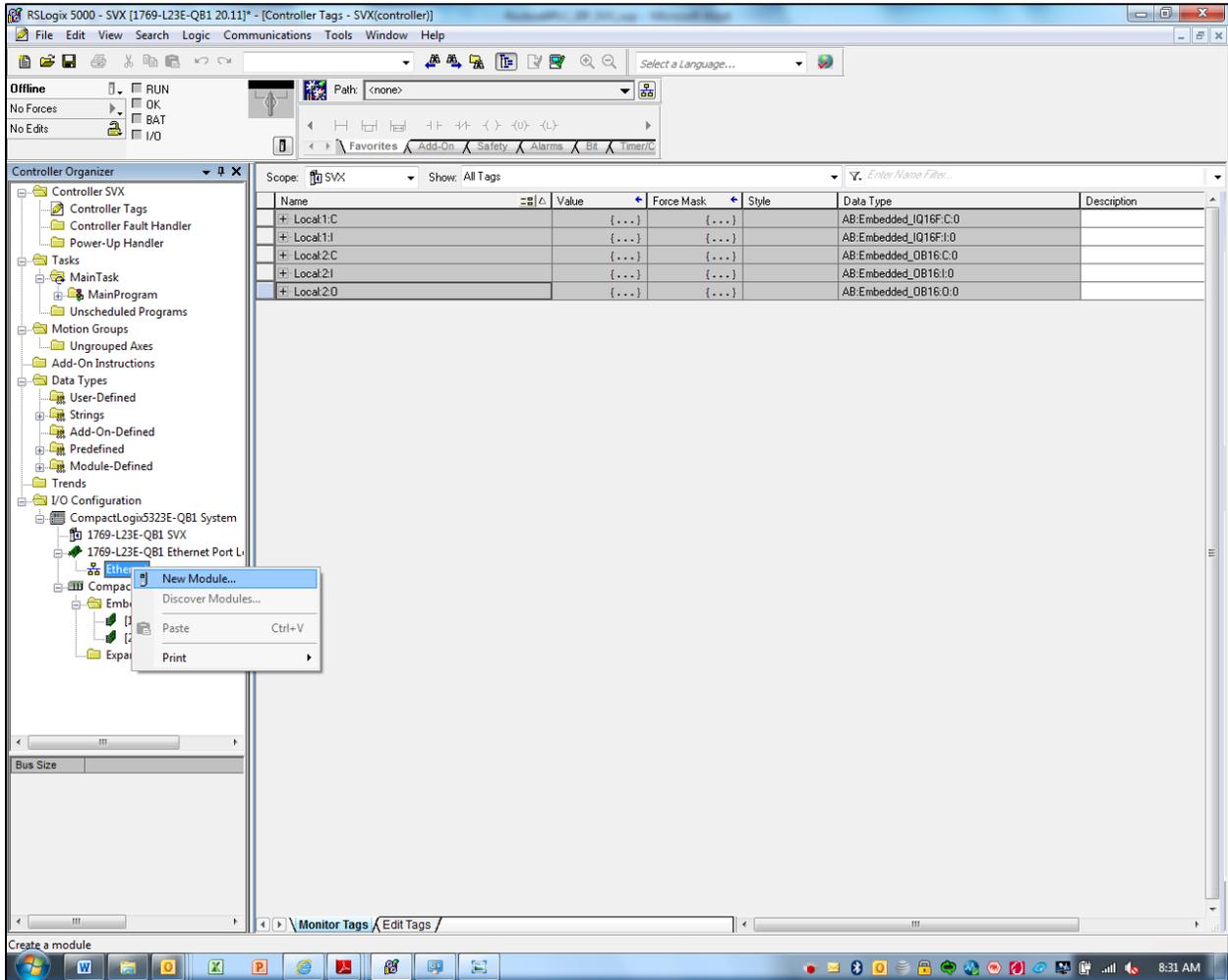
These can be modified using the drive's keypad/display as follows:

Parameters / Fieldbus / Navigate to FB Data Out1 Sel through FB Data Out8 Sel

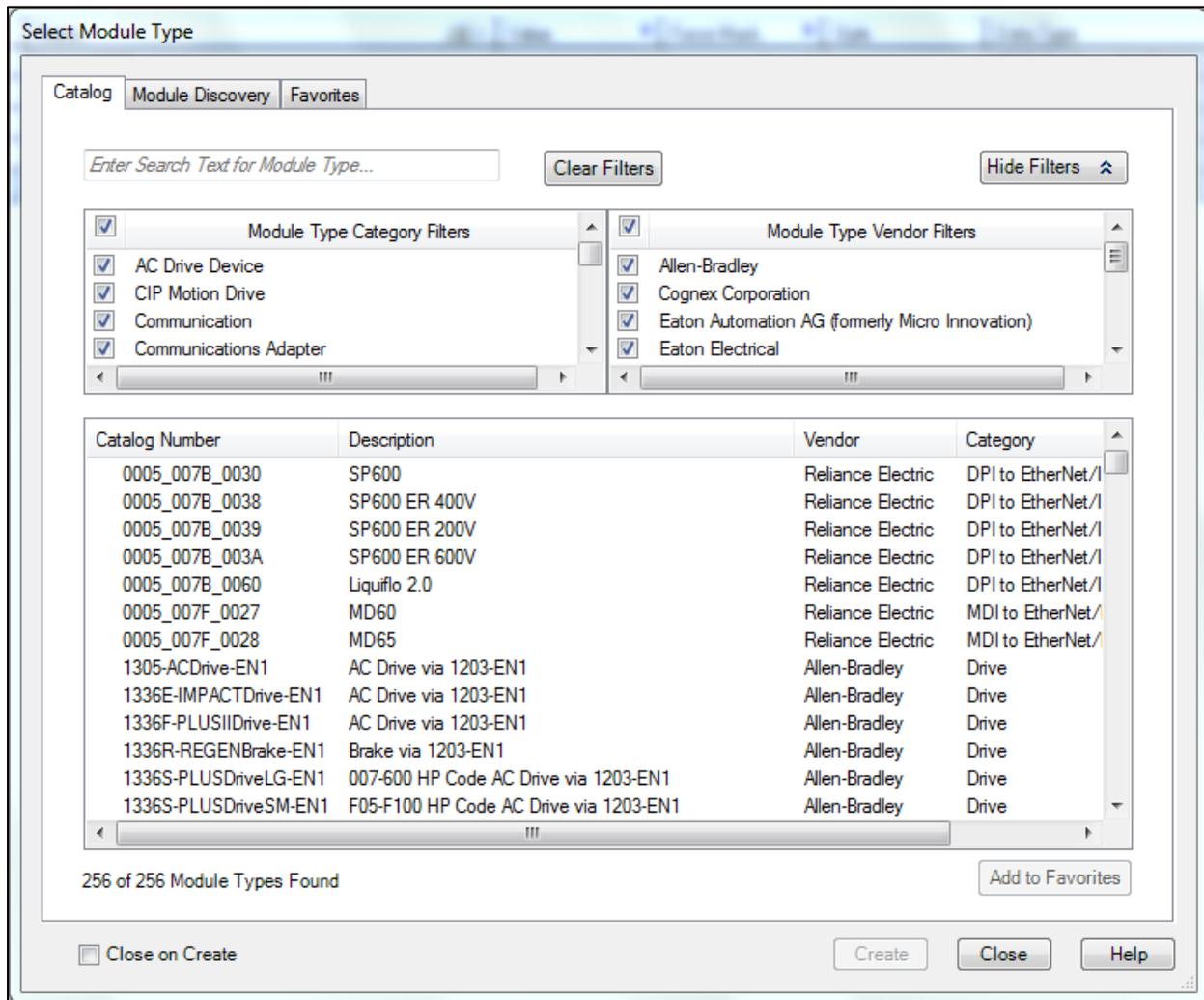
These 8 parameters can be modified to any of the ID numbers linked to specific parameters in Chapter 6 of the Application Manual.

Using I/O Assembly pair 101/127 in RSLogix5000

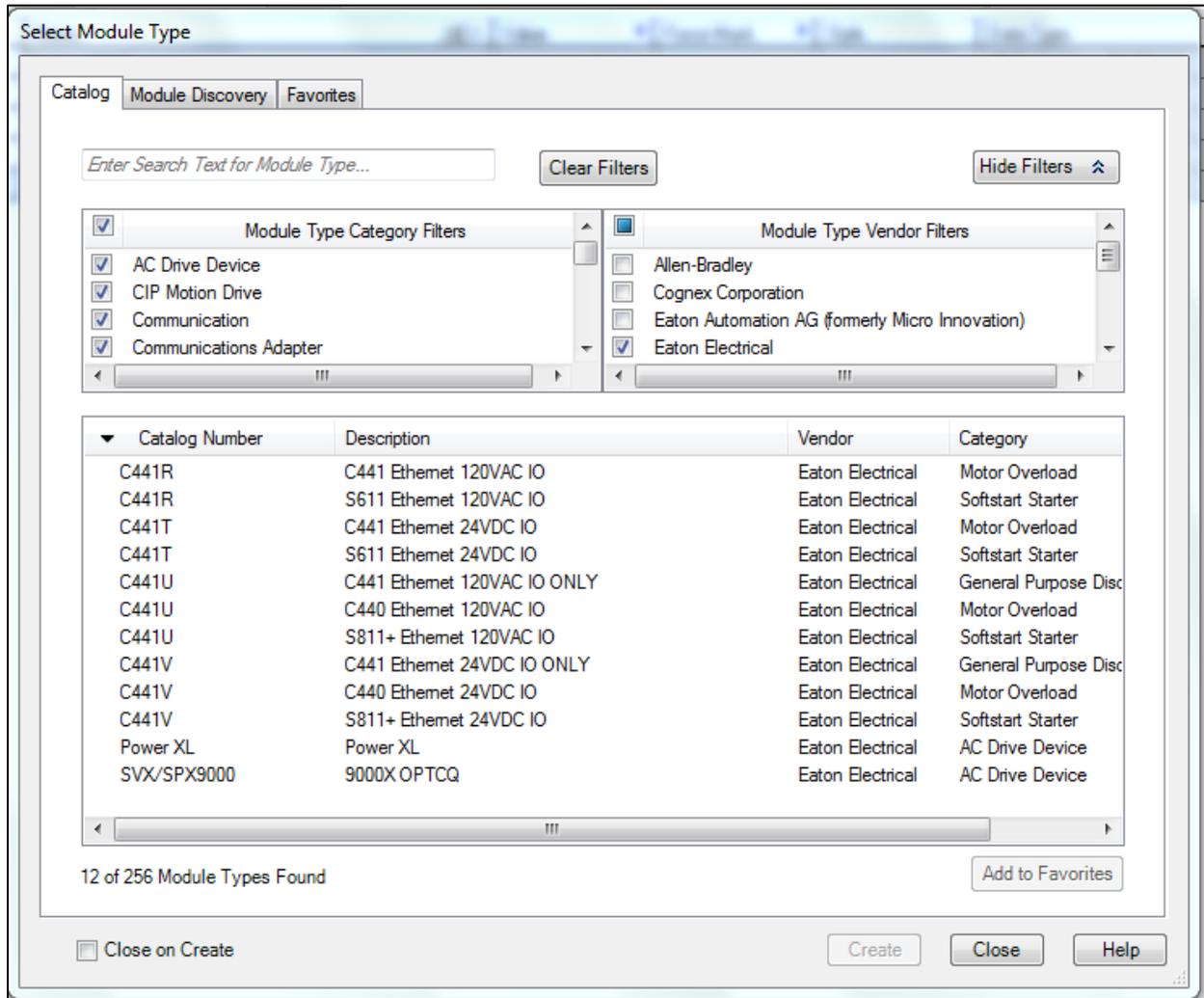
In the RSLogix5000 project created earlier in this paper, right click on Ethernet in the Controller Organizer on the left and choose New Module, per the following:



The following window will open:



De-select the check mark to the left of Module Type Vendor Filters, then select to add a check mark to the left of Eaton Electrical and the window should look like the following:



Select the SVX drive and then click the Create button to open the New Module window as follows:

New Module

General | Connection | Module Info | Internet Protocol

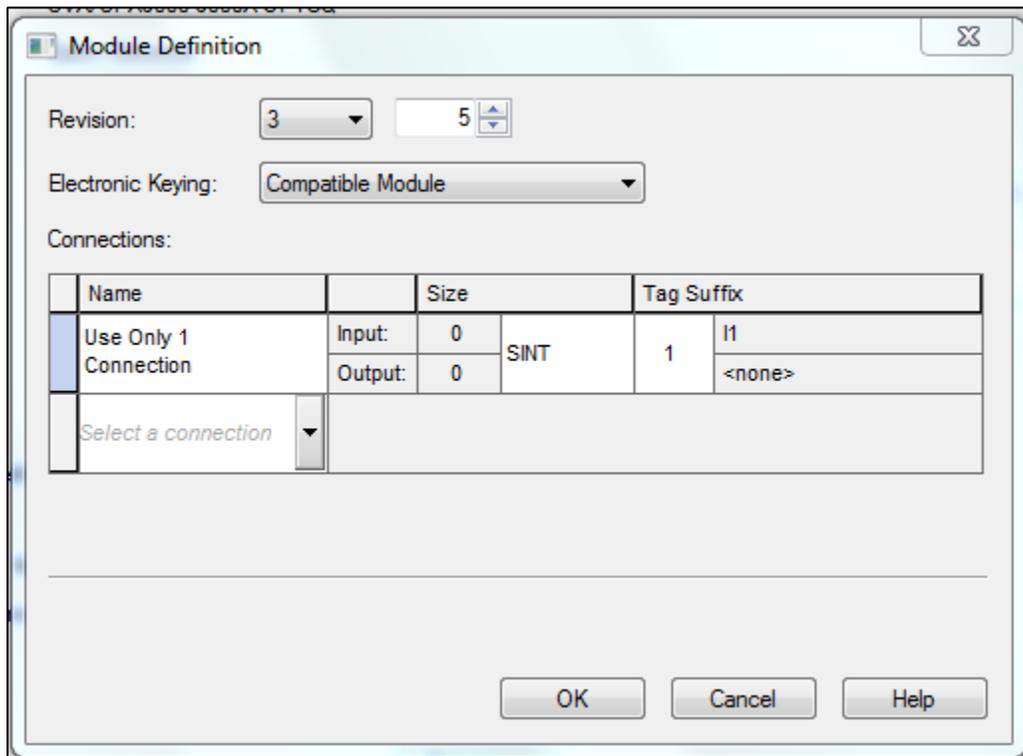
Type: SVX/SPX9000 9000X OPTCQ
Vendor: Eaton Electrical
Parent: LocalENB
Name:
Description:

Ethernet Address
 Private Network: 192.168.1.
 IP Address:
 Host Name:

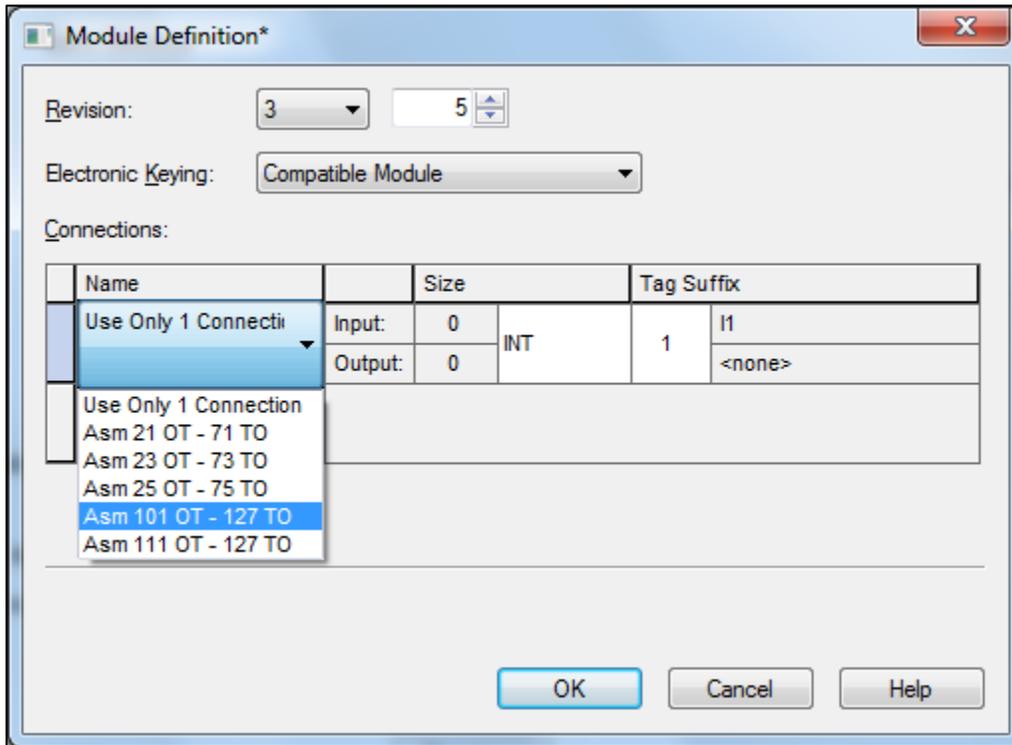
Module Definition
Revision: 3.5
Electronic Keying: Compatible Module
Connections: Use Only 1 Connection

Status: Creating

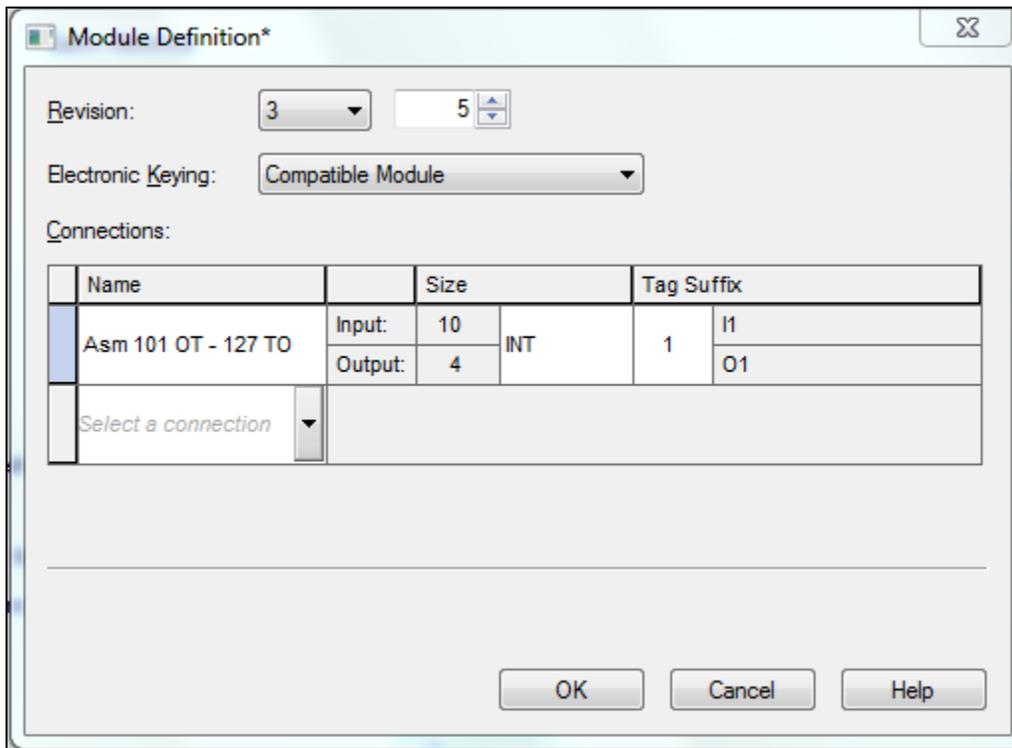
Enter the same name for this device as used in the Tag Generation Tool. SVX is used for this example. Modify the IP address then select the Change... button to open the following window:



Change SINT to INT for the data type, then click in the white space in the area to the right of the words: Use Only 1 Connection to reveal the I/O Assembly pair choices as follows:



Select Asm 101 OT – 127 TO as shown. This window should now look like the following:



Note that the size of the input data is 10 words. The first word contains the status bits. The second word is the actual speed and the next 8 words are the 8 additional parameters we previously configured in the drive keypad with for FB Data Out1 Sel through FB Data Out8 Sel. For more information refer to the OPTCQ Option Card User Manual, publication MN04002005E.

The Input Assembly layout is as follows:

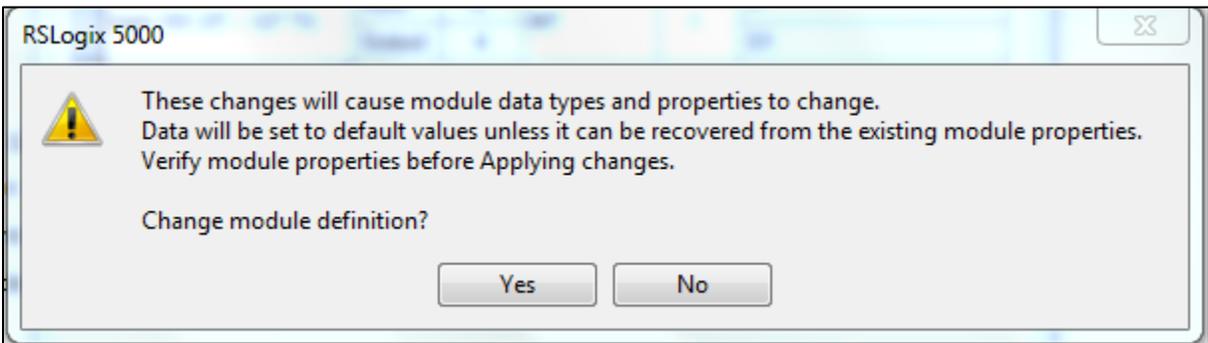
Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0					Status Word (low byte)			
1					Status Word (high byte)			
2				Speed Actual (low byte) in % of maximum speed				
3				Speed Actual (high byte) in % of maximum speed				
4				Process Data Out 1 (low byte)				
5				Process Data Out 1 (high byte)				
6				Process Data Out 2 (low byte)				
7				Process Data Out 2 (high byte)				
8				Process Data Out 3 (low byte)				
9				Process Data Out 3 (high byte)				
10				Process Data Out 4 (low byte)				
11				Process Data Out 4 (high byte)				
12				Process Data Out 5 (low byte)				
13				Process Data Out 5 (high byte)				
14				Process Data Out 6 (low byte)				
15				Process Data Out 6 (high byte)				
16				Process Data Out 7 (low byte)				
17				Process Data Out 7 (high byte)				
18				Process Data Out 8 (low byte)				
19				Process Data Out 8 (high byte)				

Output Assembly Layout is as follows:

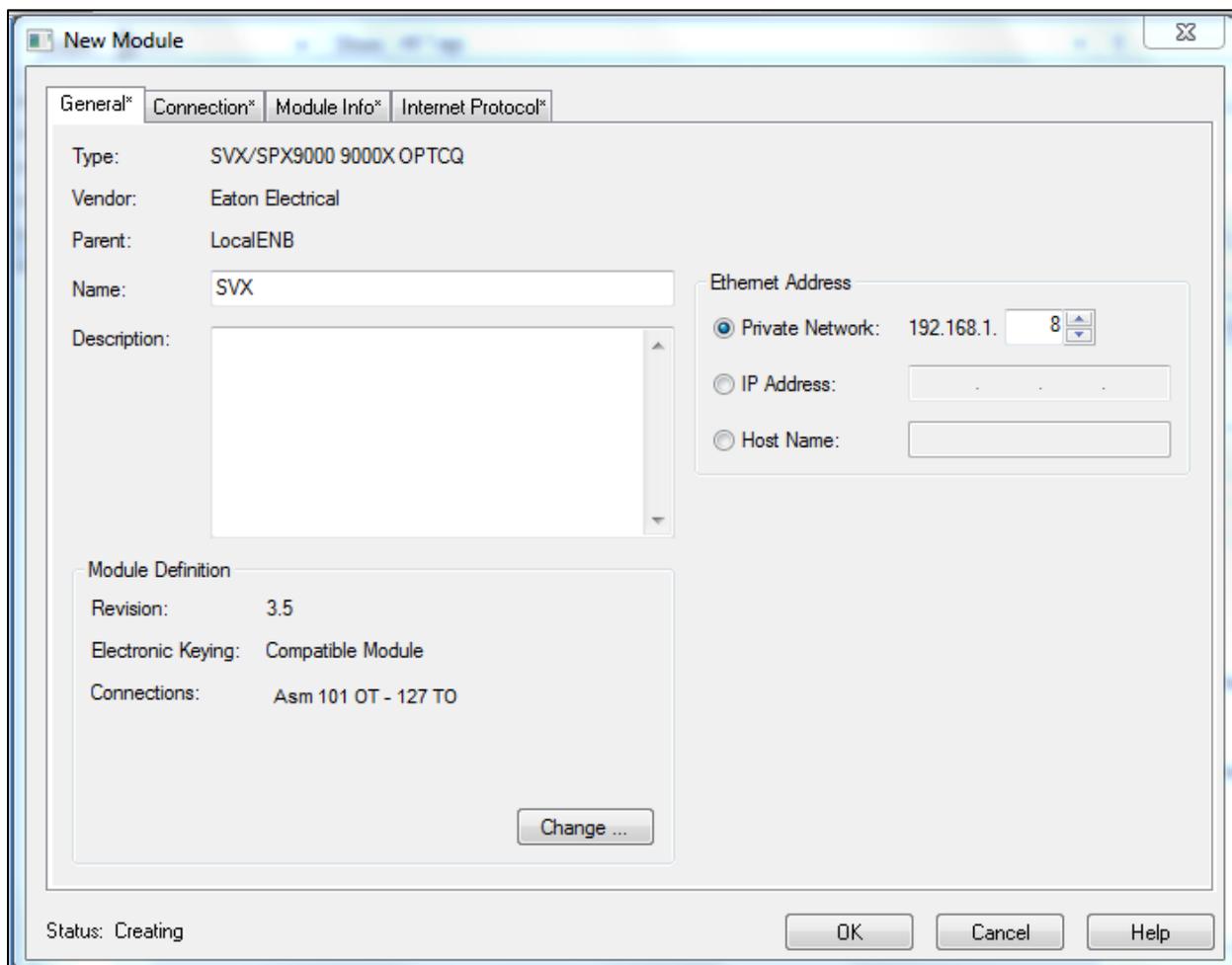
Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	—	NetRef	NetCtrl	—	—	FaultReset	RunRev	RunFwd
1					—			
2				FBSpeed reference (low byte), RPM				
3				FBSpeed reference (high byte), RPM				
4				FBProcessDataIn1 (low byte)				
5				FBProcessDataIn1 (high byte)				
6				FBProcessDataIn2 (low byte)				
7				FBProcessDataIn2 (high byte)				

While this data is shown in bytes, it will be in 16-bit integers (INTs) in the Controller Tags area in RSLogix5000, because we configured the connection for INTs rather than SINTs. This makes viewing and displaying the data easier, without the need to use additional logic to put 2 bytes together into a word for each parameter.

Click OK to close the Module Definition window. The select Yes to the following popup:



The Module Definition window should now look like the following:



Select OK to close and save this New Module window. Then select the Close button to close the Select Module Type window.

Double click the Controller Tags in the Controller Organizer per the following to open the Controller tags screen.



The generic tags created for the SVX drive for I/O Assemblies 101/127 are shown below:

[-] SVX:I1	{...}	{...}		_0044:SVXSPX9000_7E5A1DEB:I:0
[-] SVX:I1.ConnectionFaulted	0		Decimal	BOOL
[-] SVX:I1.Data	{...}	{...}	Decimal	INT[10]
[+] SVX:I1.Data[0]	0		Decimal	INT
[+] SVX:I1.Data[1]	0		Decimal	INT
[+] SVX:I1.Data[2]	0		Decimal	INT
[+] SVX:I1.Data[3]	0		Decimal	INT
[+] SVX:I1.Data[4]	0		Decimal	INT
[+] SVX:I1.Data[5]	0		Decimal	INT
[+] SVX:I1.Data[6]	0		Decimal	INT
[+] SVX:I1.Data[7]	0		Decimal	INT
[+] SVX:I1.Data[8]	0		Decimal	INT
[+] SVX:I1.Data[9]	0		Decimal	INT
[-] SVX:O1	{...}	{...}		_0044:SVXSPX9000_A52E5EA9:O:0
[-] SVX:O1.Data	{...}	{...}	Decimal	INT[4]
[+] SVX:O1.Data[0]	0		Decimal	INT
[+] SVX:O1.Data[1]	0		Decimal	INT
[+] SVX:O1.Data[2]	0		Decimal	INT
[+] SVX:O1.Data[3]	0		Decimal	INT

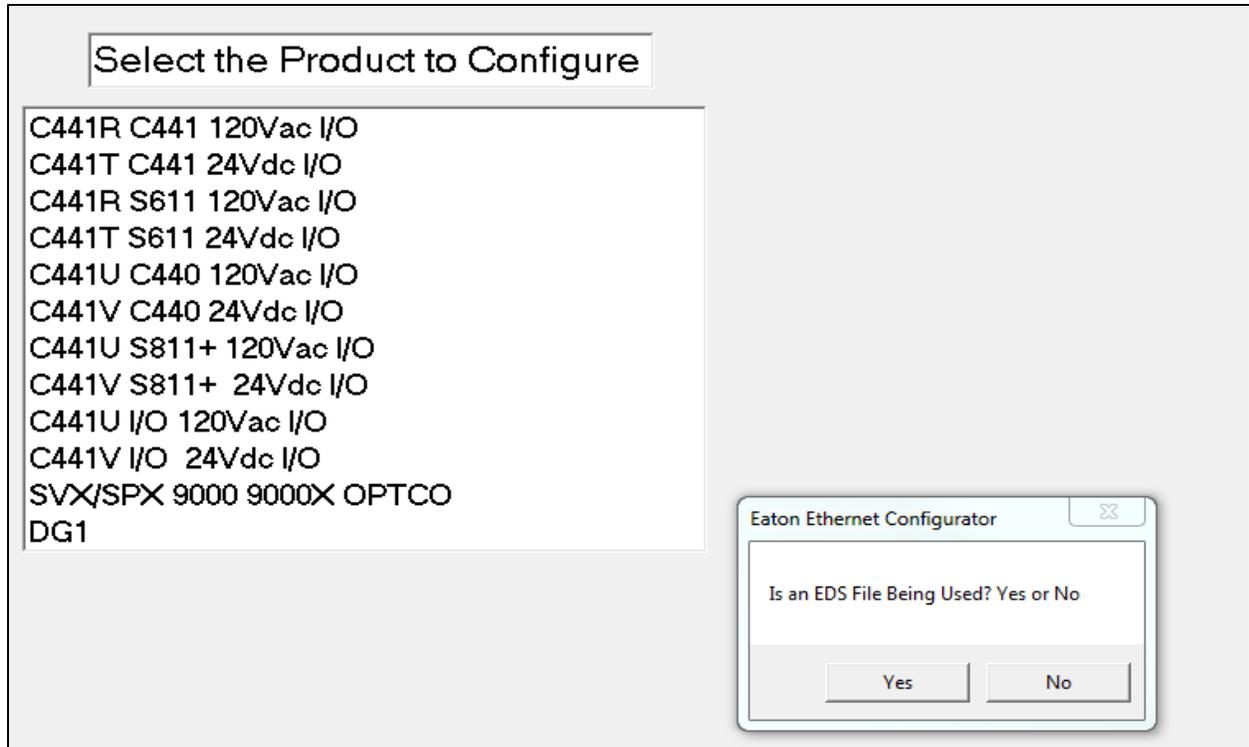
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*****Replace the following screen dump when DG1 name is changed*****



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Then select the SVX/SPX 9000 9000X OPTCQ drive from the list and enter a quantity of 1 when the next window appears. Then select the I/O pair of your choice, 101/127 is used for this example.

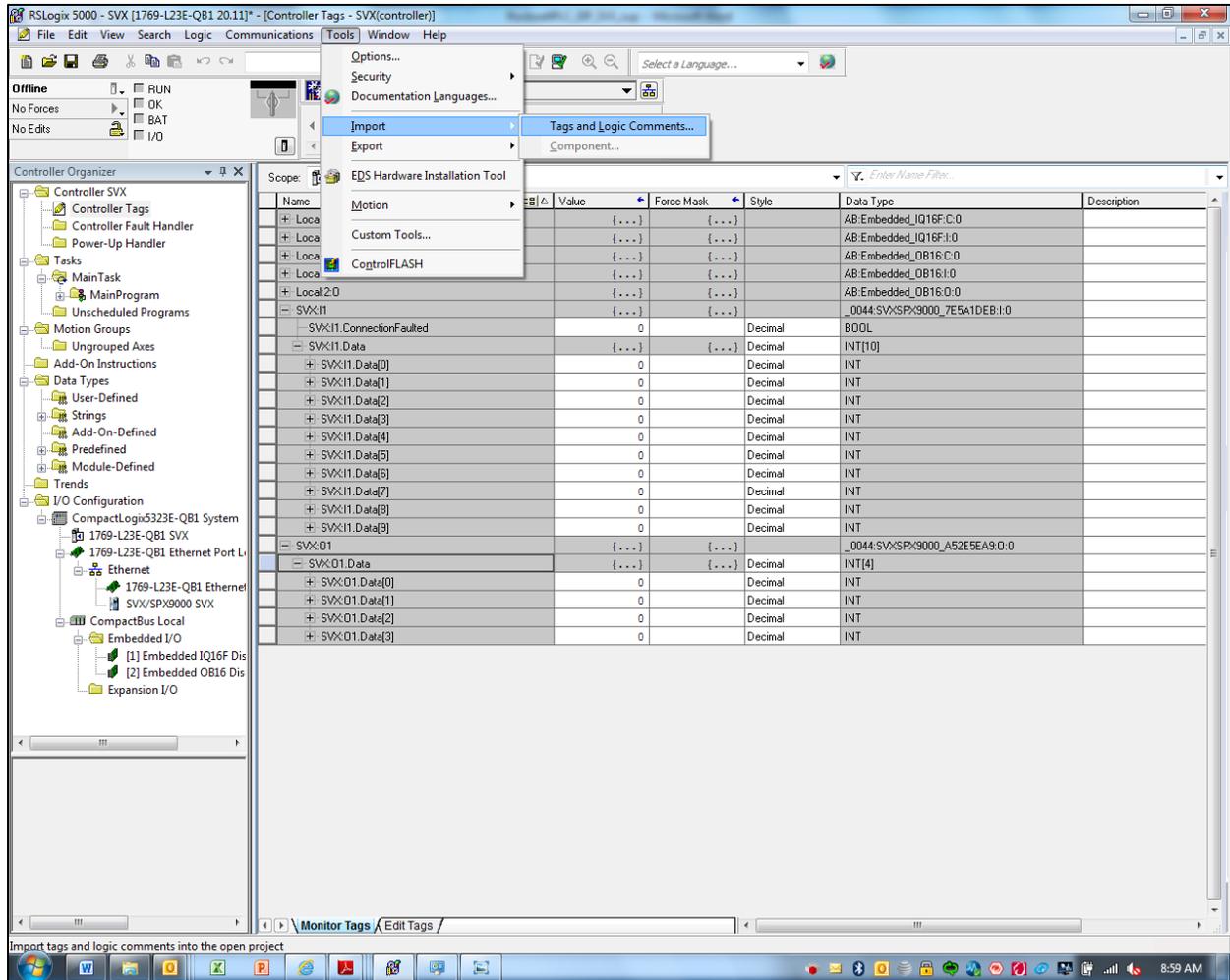
A Browse for Folder window will then be displayed. Browse for a folder where you want to save the CSV Tag file this tool will generate. Also, provide a name for that file when the next window appears.

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 used. 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 SVX.

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 CSV File created for SVX Drive using the Tag Creation Tool

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 the Tag Generation Tool, then select the Import button. The descriptive tags for the SVX drive will be imported and aliased to the generic I/O tags for the drive. The tags are linked by the name given the SVX drive in both software tools. The descriptive tags shown below for the SVX drive can now be used in the PLC program. No tags need to be manually entered into RSLogix5000 for any Eaton Ethernet/IP products.

*****screen shot for the drive's tags*****

References

1. The SVX drive user manual is Publication MN04001004E
2. The SVX Ethernet user manual for the OPTCQ Option Board is Publication MN04002005E
3. The 9000X AF Drives Application Manual is Publication MN04004001E

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

