Operating an SVX Drive with a Siemens PLC via PROFIBUS

Introduction

The purpose of this application note is to demonstrate how to operate and monitor an SVX drive via a PROFIBUS network with a Siemens Simatic PLC. Either the OPTC3 or OPTC5 PROFIBUS option card may be used to interface the SVX drive to the PROFIBUS network. The only difference between the 2 option cards is the PROFIBUS network connector. The OPTC3 has a connector with screw terminals and the OPTC5 has the traditional 9-pin D-shell connector.

A GSD file is required for the PROFIBUS option cards. This file may be downloaded from: www.eaton.com/drives

The Slave Address, Baud Rate, PPO Type and Operation Mode for the SVX drive PROFIBUS option cards may be configured via the keypad on the drive in the Expander boards section.

While this application example uses a Siemens Simatic S7-1200 PLC with a PROFIBUS master module to control and monitor the SVX drive, any PROFIBUS master may be used for this purpose. Siemens Simatic Step 7 Basic, V13 programming software was used for this application example. The Simatic S7 PLC will be configured to poll the SVX drive to operate and monitor it.

This document will demonstrate how to configure the PROFIBUS master to monitor status parameters from the SVX drive as well as to control the drive.

System Overview

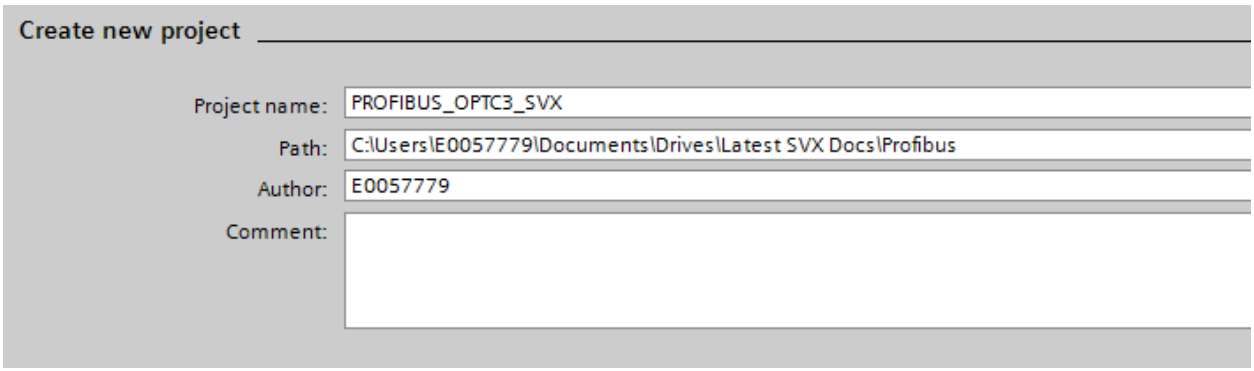
The devices used for this application example are as follows:

(1) OPTC3 PROFIBUS option card
(1) SVX drive
(1) Siemens S7 PLC with a PROFIBUS master module
(1) Siemens Totally Integrated Automation Portal software

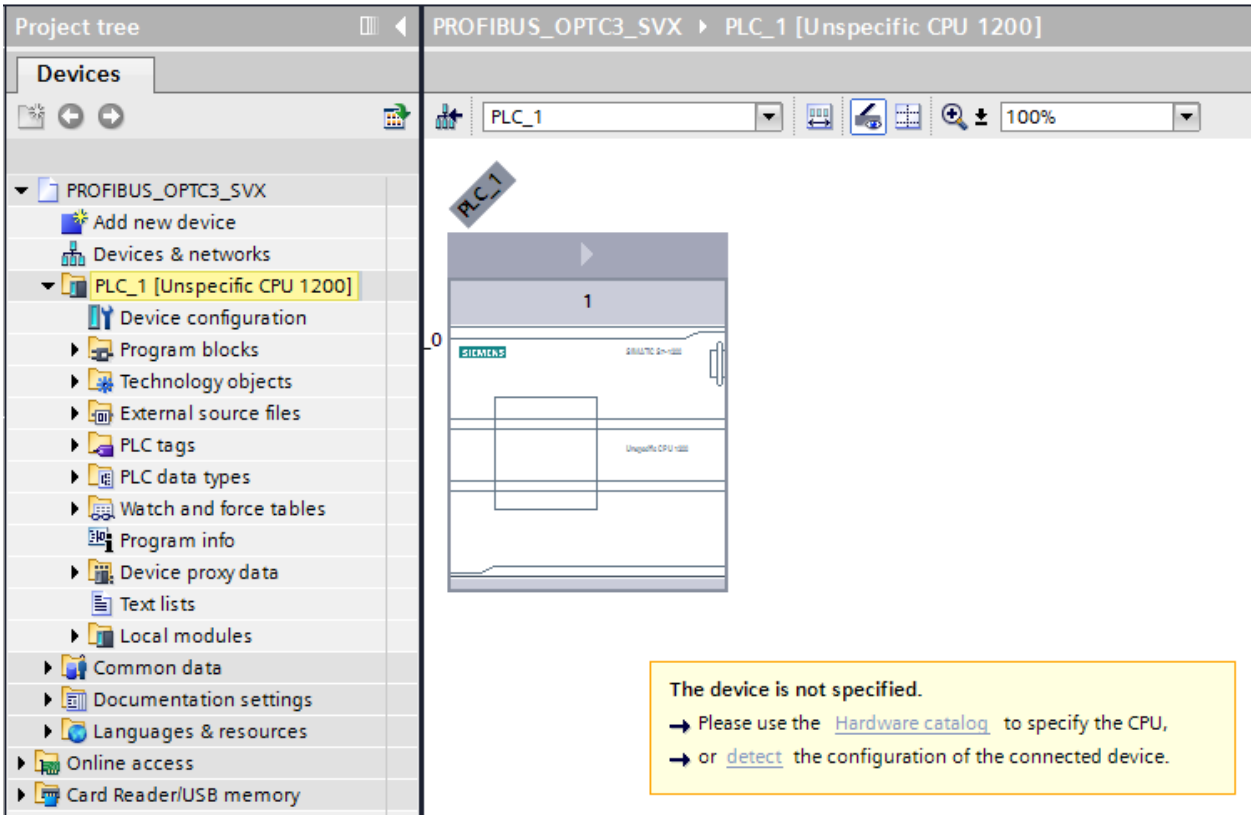
Creating a Project in Siemens Simatic Software

Create a project in Simatic software by starting the software and selecting Create New Project.

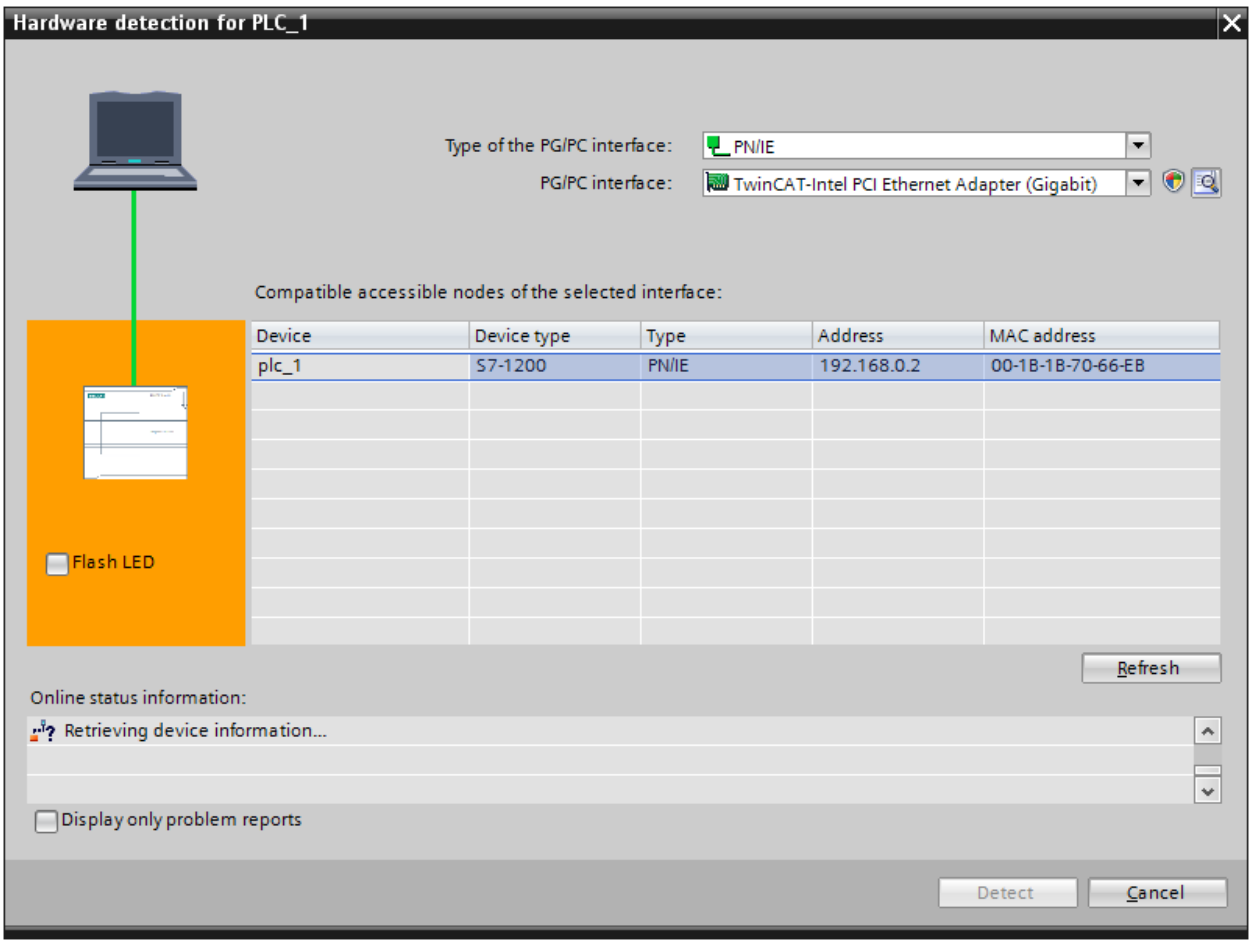
Enter a Project name and Path where the project will be stored, then select the Create button per the following:



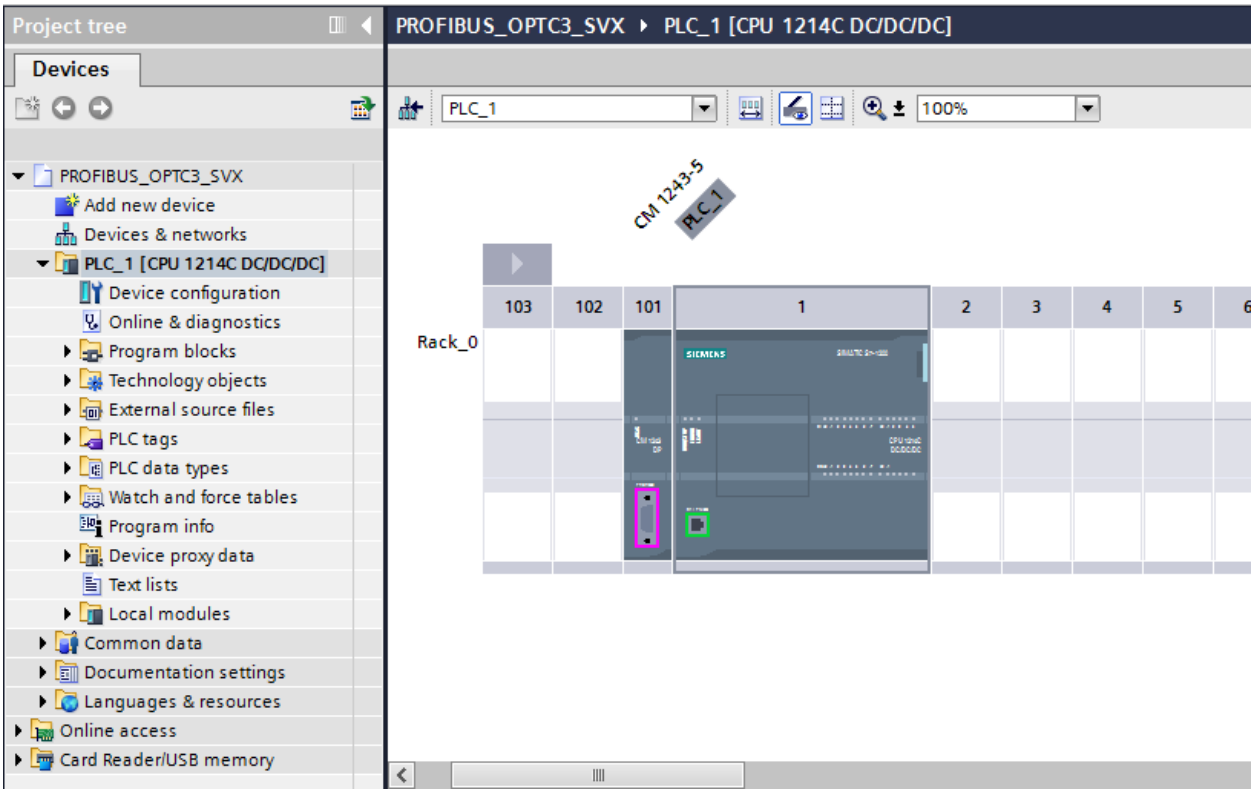
From the next screen, select Configure a device, then select Add new device. An S7-1200 PLC is being used for this application. Select the CPU under Unspecified CPU 1200. Choose the correct version (V3.0 for this example) and select the ADD button. The following Project View will be displayed, showing a generic CPU.



With the computer connected to the PLC via Ethernet, click the CPU box to select it, then select “detect” in the yellow area below it. The Hardware Detection screen will be displayed as follows:



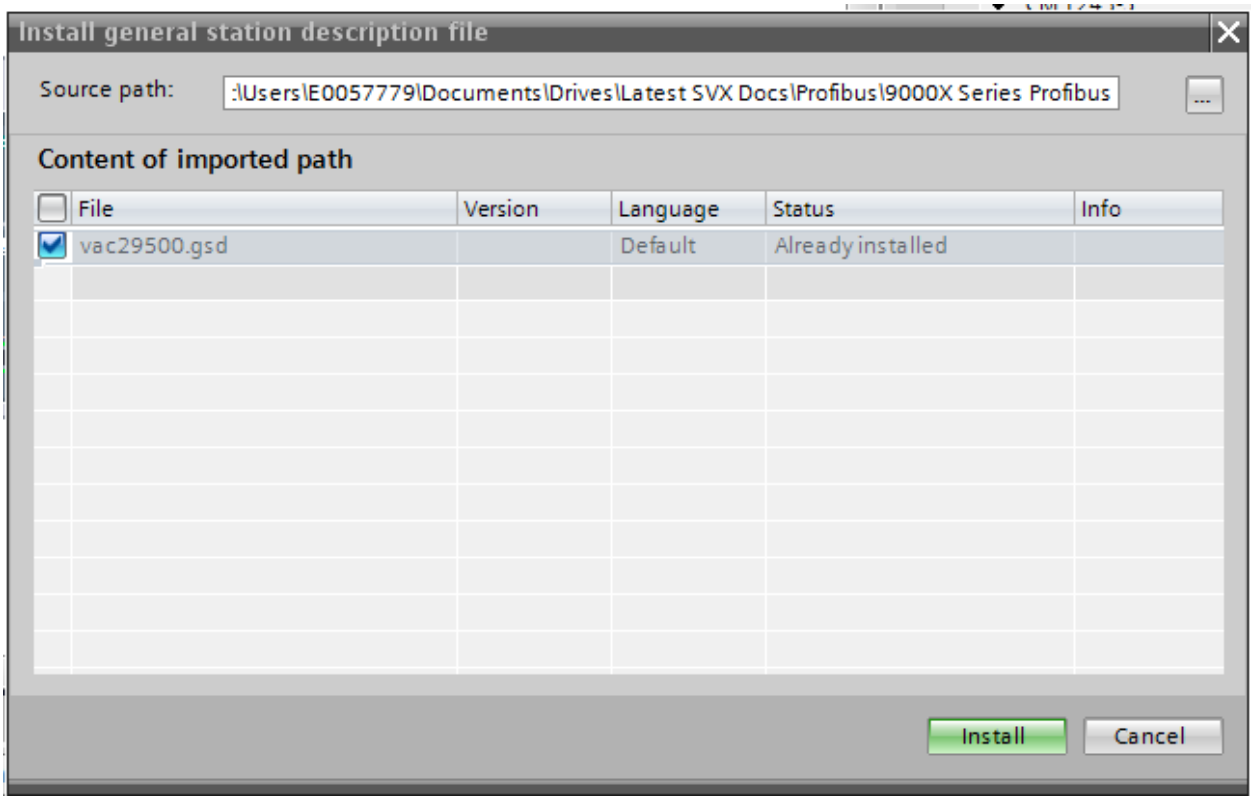
For this example, the Ethernet port on the computer is being used to communicate with the PLC. It will also be used to upload/download the project. Set up your computer and software to communicate with your PLC. Once communications is properly set up, select the Detect button and the software will detect the actual controller type as follows:



Connect the SVX drive (OPTC3 card) to the PROFIBUS master module in the Siemens PLC system using standard PROFIBUS cable.

Importing the SVX drive GSD file into Siemens Software

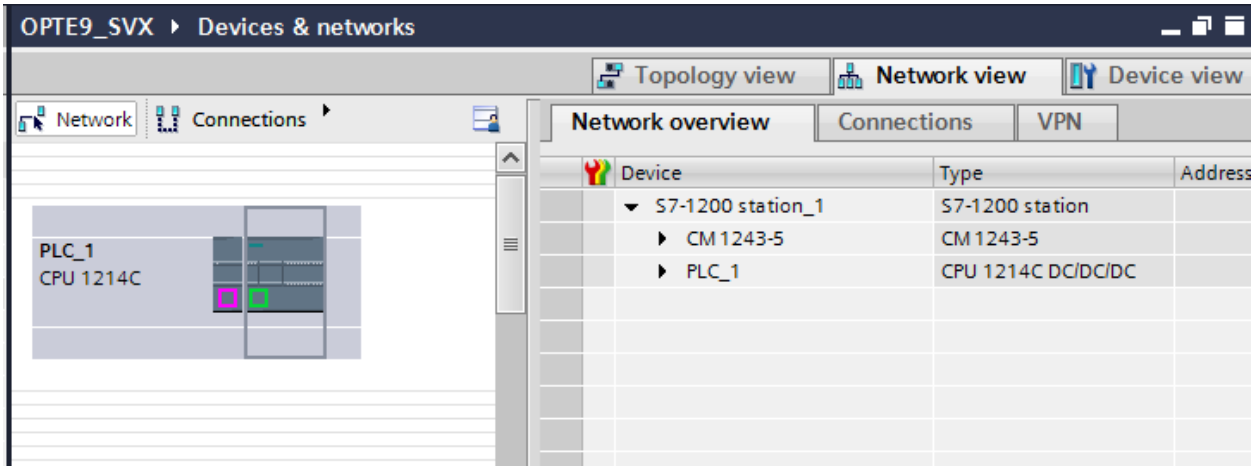
In the Simatic software, select the Options drop down menu and choose: “Install general station description file (gsd)”. Install the GSD file downloaded from the Eaton website. To accomplish this, search for it on your hard drive by selecting the ellipses in the upper right hand corner of the following screen:



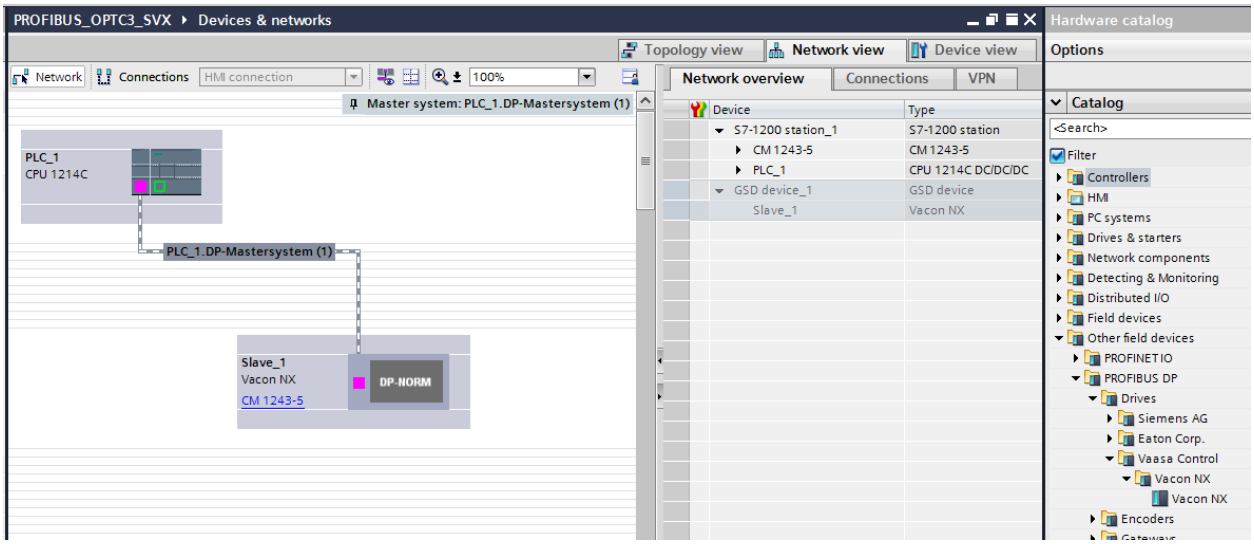
Select the 2 boxes by selecting the box next to File and next to the GSD file, then select Install and follow the directions to install the GSD file for the SVX drive.

Configure the PROFIBUS Network with the Siemens software

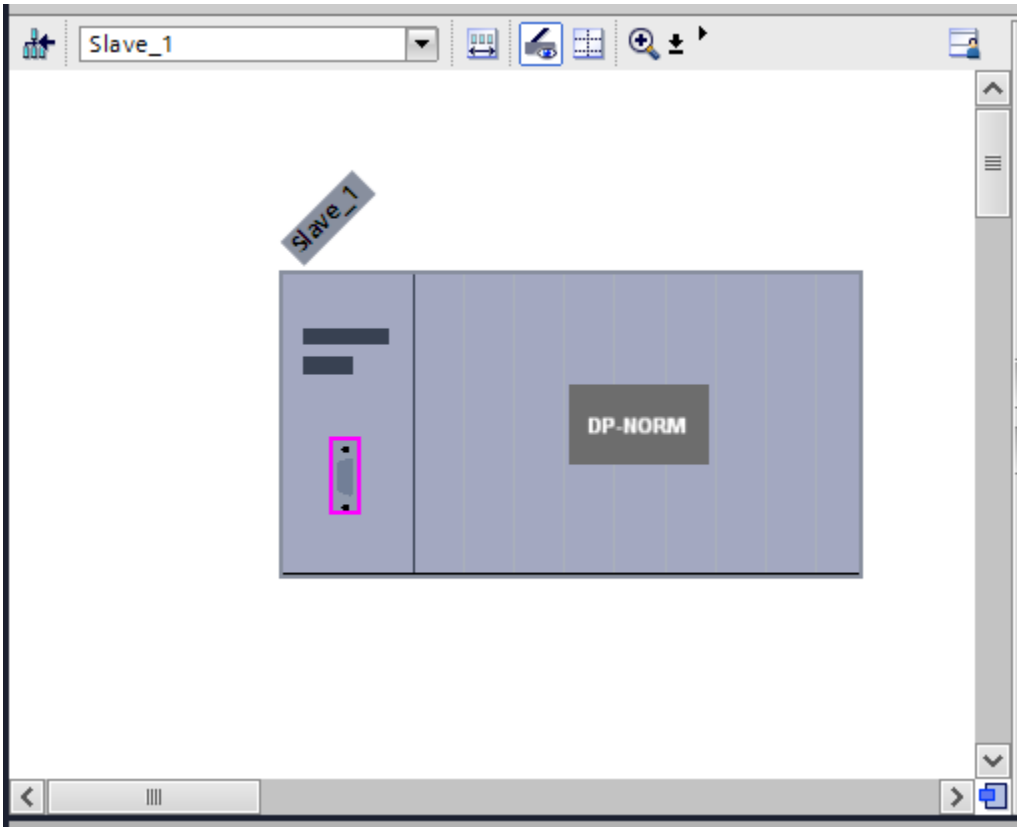
Per the following, select the Network View tab.



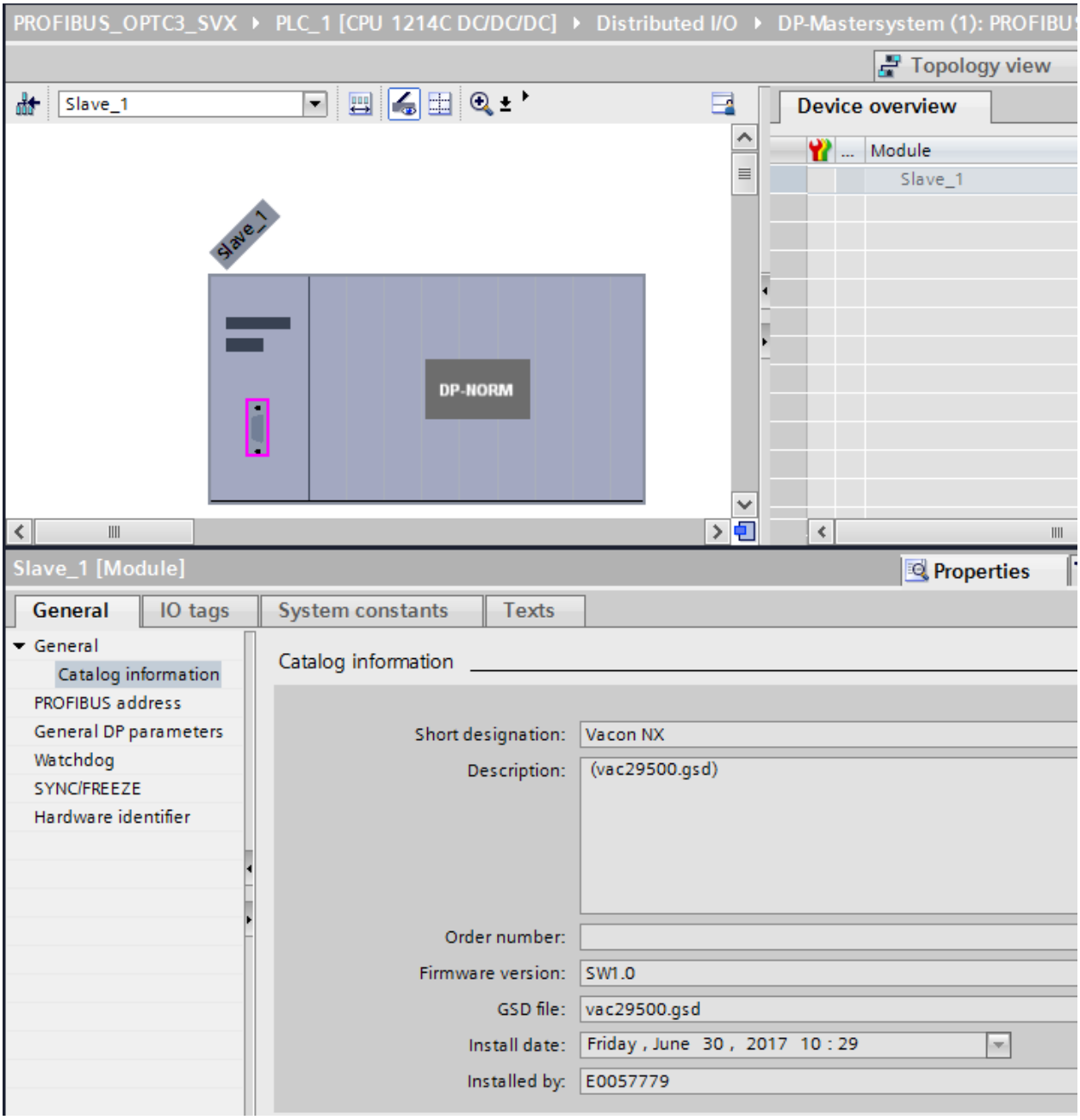
The PLC will be displayed. In the Catalog at the far right, select the arrow next to “Other field devices”, then next to PROFIBUS DP / Drives / Vaasa Control/Vacon NX/Vacon NX. Drag and drop the device called Vacon NX below the controller/PROFINET master on the Network View screen. Then select the purple square on the PROFIBUS master and drag it to the purple square on the OPTC3 and release the mouse button. The following should now be displayed:



The PROFIBUS network has been created in the offline project. Double click the OPTC3 card and the following will be displayed:



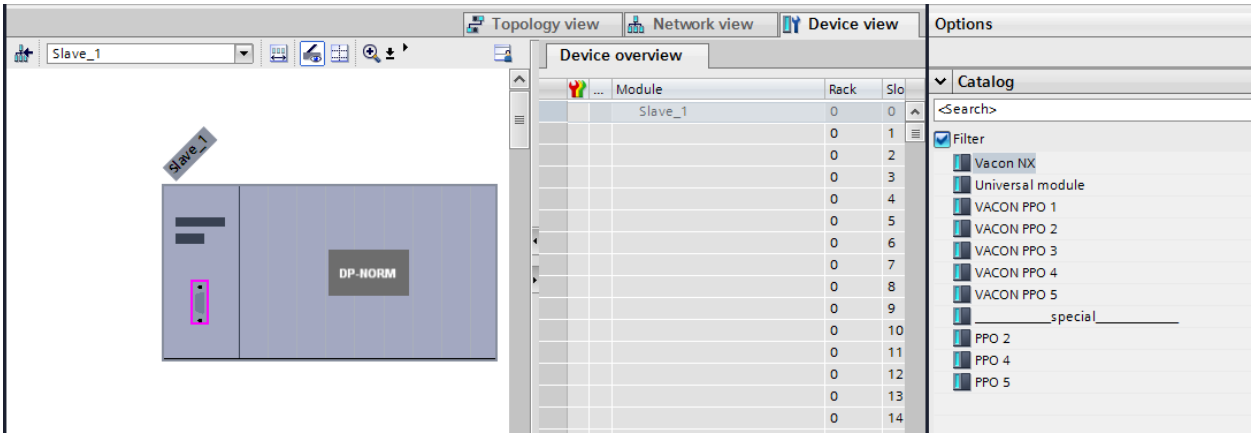
Double click the OPTC3 box and its Properties will open below it as follows:



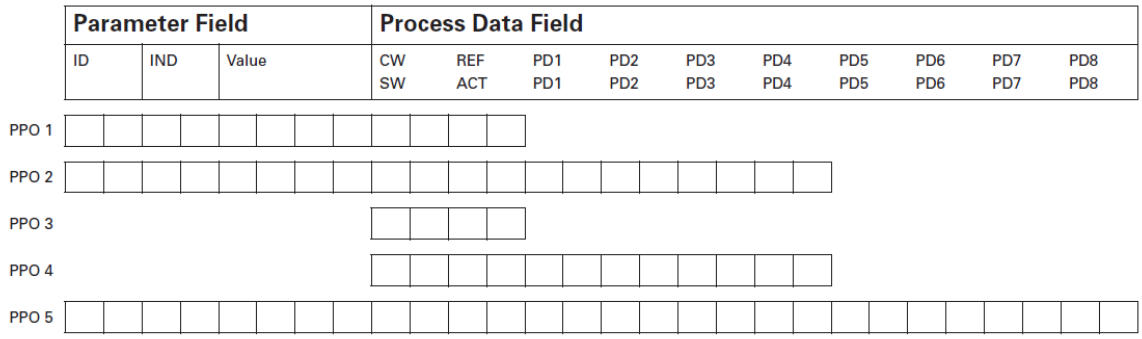
Select Profibus address on the left, then change the address to match the address selected for the OPTC3. Address 3 is used for this example.

Select the I/O for the OPTC3

The I/O selections for the OPTC3 are shown below and are accessed from the catalog on the right.



The I/O selections include the 5 PPOs shown below:



The data in the fields above represent:

Descriptions:

☐	Byte
ID	Parameter type and number
IND	Parameter subindex
VALUE	Parameter value
CW	Control Word
SW	Status Word
REF	Reference Value 1
ACT	Actual Value 1
PD	Process Data

The Parameter Field is used to read or write any parameter in the SVX drive. To use this feature, refer to Chapter 7 of the PROFIBUS DP Option Board for 9000X Drives, publication MN04003006E.

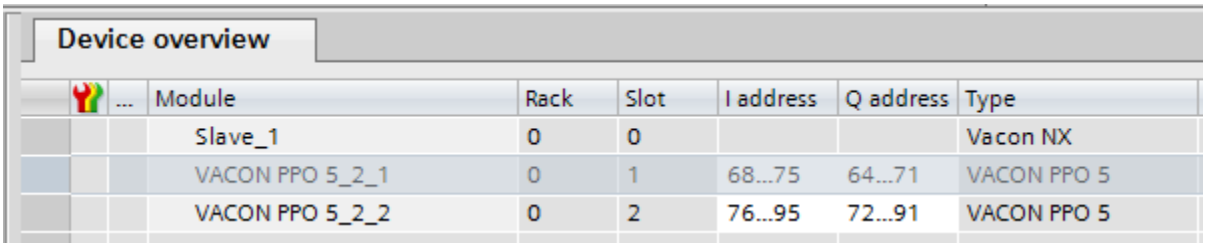
The Process Data Field contains the Control Word and Speed Reference as a minimum for the data sent to the drive. The data monitored from the drive is the Status Word and the Speed Actual as a minimum. Based on the PPO selected, more or less data can be monitored. For this example PPO 5 is used, which allows monitoring the maximum amount of data.

By default, PD1 – PD8 for the data monitored from the drive are:

Value	Unit	Scale
Output frequency	Hz	0.01 Hz
Motor speed	rpm	1 rpm
Motor current	A	0.1A
Motor torque	%	0.1%
Motor power	%	0.1%
Motor voltage	V	0.1V
DC link voltage	V	1V
Active fault code	—	—

Map the I/O Tags for the OPTC3 option card in the Siemens Programming Software

Grab the “Vacon PPO 5” and drop it under the ‘Slave_1’ as shown below:



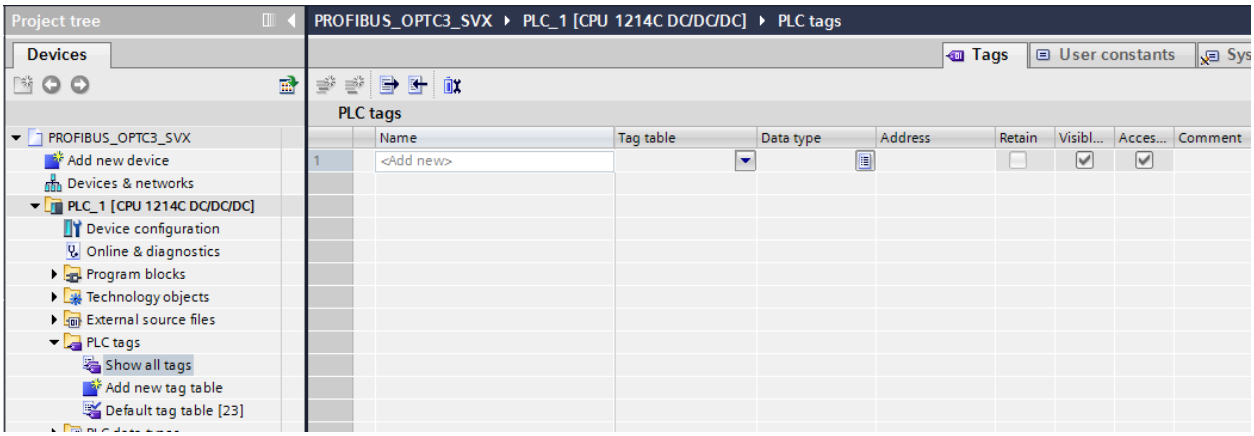
Note that the ‘Vacon PPO 5_2_1’ I/O addresses contain the Parameter Field data and the ‘Vacon PPO 5_2_2’ contains the Process Data Field I/O addresses.

Controlling and Monitoring the SVX Drive with the Siemens PLC

In place of a user program, this example will add the I/O tags for the SVX Drive to the Tag database, then to a Watch List and control the device by modifying the Output tags and monitoring the input data.

Adding I/O tags

Under the Project tree, open “PLC tags” and select “Show all tags” and the following will be displayed:

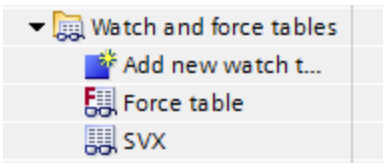


Add the I/O tags and their I/O address as assigned by the PLC, per the following:

PLC tags

	Name	Tag table	Data type	Address	Retain	Visibl...	Acces...	Comment
1	SVX_Control	Default tag table	Word	%QW72		☑	☑	
2	SVX_Speed_Ref	Default tag table	Word	%QW74		☑	☑	
3	SVX_Status	Default tag table	Word	%IW76		☑	☑	
4	SVX_Speed_Actual	Default tag table	Word	%IW78		☑	☑	
5	SVX_Hertz	Default tag table	Word	%IW80		☑	☑	
6	SVX_RPM	Default tag table	Word	%IW82		☑	☑	
7	SVX_Amps	Default tag table	Word	%IW84		☑	☑	
8	SVX_Percent_Torque	Default tag table	Word	%IW86		☑	☑	
9	SVX_Percent_Power	Default tag table	Word	%IW88		☑	☑	
10	SVX_Volts	Default tag table	Word	%IW90		☑	☑	
11	SVX_DC_Link_V	Default tag table	Word	%IW92		☑	☑	
12	SVX_Active_Fault Code	Default tag table	Word	%IW94		☑	☑	
13	SVX_ID_Input	Default tag table	Word	%IW68		☑	☑	
14	SVX_IND_Input	Default tag table	Word	%IW70		☑	☑	
15	SVX_Value1_Input	Default tag table	Word	%IW72		☑	☑	
16	SVX_Value2_Input	Default tag table	Word	%IW74		☑	☑	
17	SVX_ID_Output	Default tag table	Word	%QW64		☑	☑	
18	SVX_IND_Output	Default tag table	Word	%QW66		☑	☑	
19	SVX_Value1_Output	Default tag table	Word	%QW68		☑	☑	
20	SVX_Value2_Output	Default tag table	Word	%QW70		☑	☑	

Next, double click “Add new watch table” under “Watch and Force tables” in the Project Tree on the left per the following:

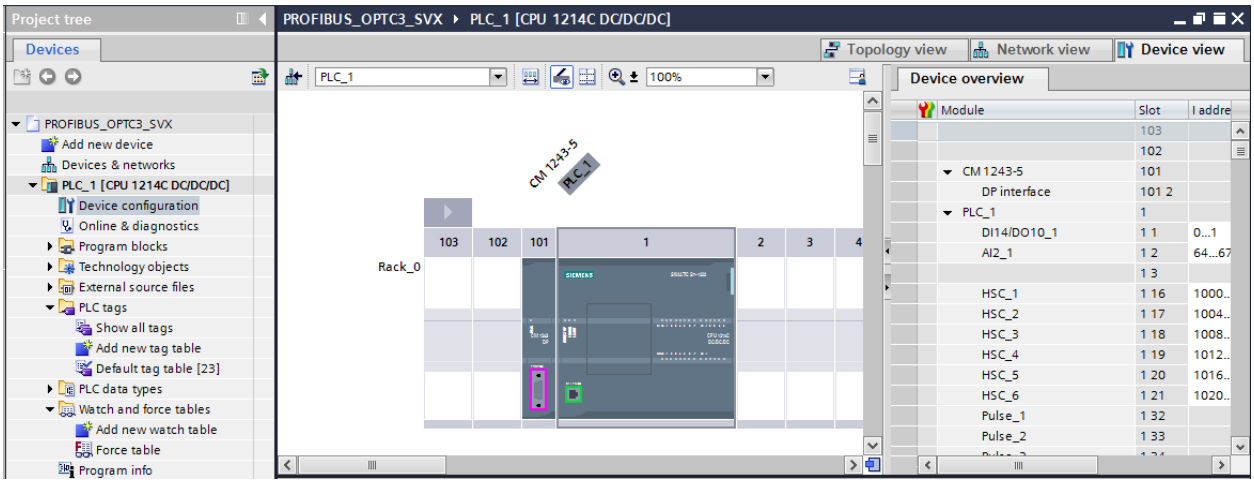


The new watch table is named “SVX” for this example. Add the I/O addresses for the SWD devices as shown below. Note that the addresses for these tag names that you entered into the PLC Tags area are automatically populated as the tag names are selected by double clicking each row one at a time. This watch table will allow testing the SVX drive over PROFIBUS without writing a program. This will allow monitoring the input data from the SVX drive, while also operating it.

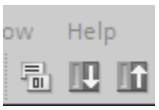
	Name	Address	Display format	Monitor value	Modify value	
1	"SVX_Control"	%QW72	Hex		16#047E	☑ ⚠
2	"SVX_Speed_Ref"	%QW74	DEC		5000	☑ ⚠
3	"SVX_Status"	%IW76	Bin			☐
4	"SVX_Speed_Actual"	%IW78	DEC			☐
5	"SVX_Hertz"	%IW80	DEC			☐
6	"SVX_RPM"	%IW82	DEC			☐
7	"SVX_Amps"	%IW84	DEC			☐
8	"SVX_Percent_Torque"	%IW86	DEC			☐
9	"SVX_Percent_Power"	%IW88	DEC			☐
10	"SVX_Volts"	%IW90	DEC			☐
11	"SVX_DC_Link_V"	%IW92	DEC			☐
12	"SVX_Active_Fault Code"	%IW94	DEC			☐
13	"SVX_ID_Output"	%QW64	DEC			☐
14	"SVX_IND_Output"	%QW66	DEC			☐
15	"SVX_Value1_Output"	%QW68	DEC			☐
16	"SVX_Value2_Output"	%QW70	DEC			☐
17	"SVX_ID_Input"	%IW68	DEC			☐
18	"SVX_IND_Input"	%IW70	DEC			☐
19	"SVX_Value1_Input"	%IW72	DEC			☐
20	"SVX_Value2_Input"	%IW74	DEC			☐

Downloading the program to the Siemens S7 PLC

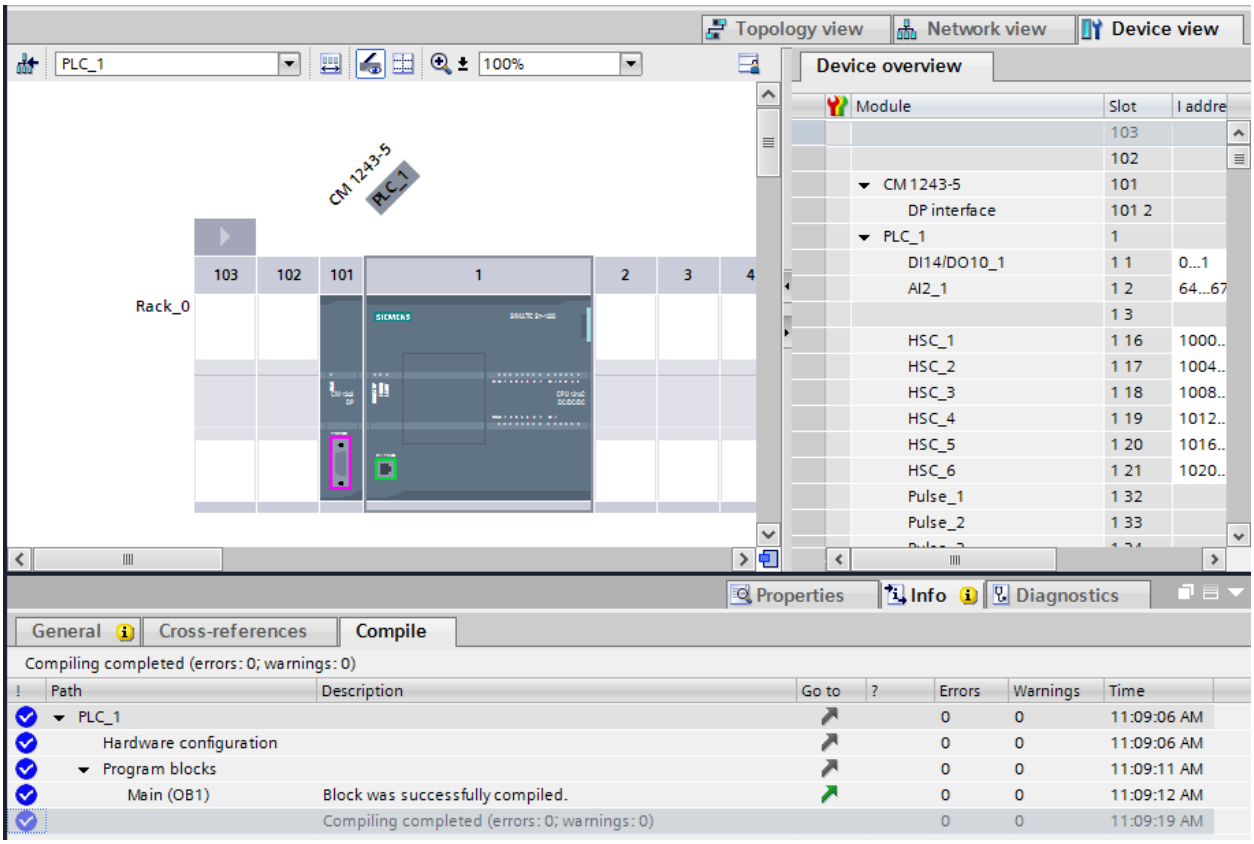
The project must first be compiled with no errors before it is downloaded to the PLC. In the Project Tree under PLC_1 [CPU….], double click “Device configuration” as follows to display the Device View containing the PLC.



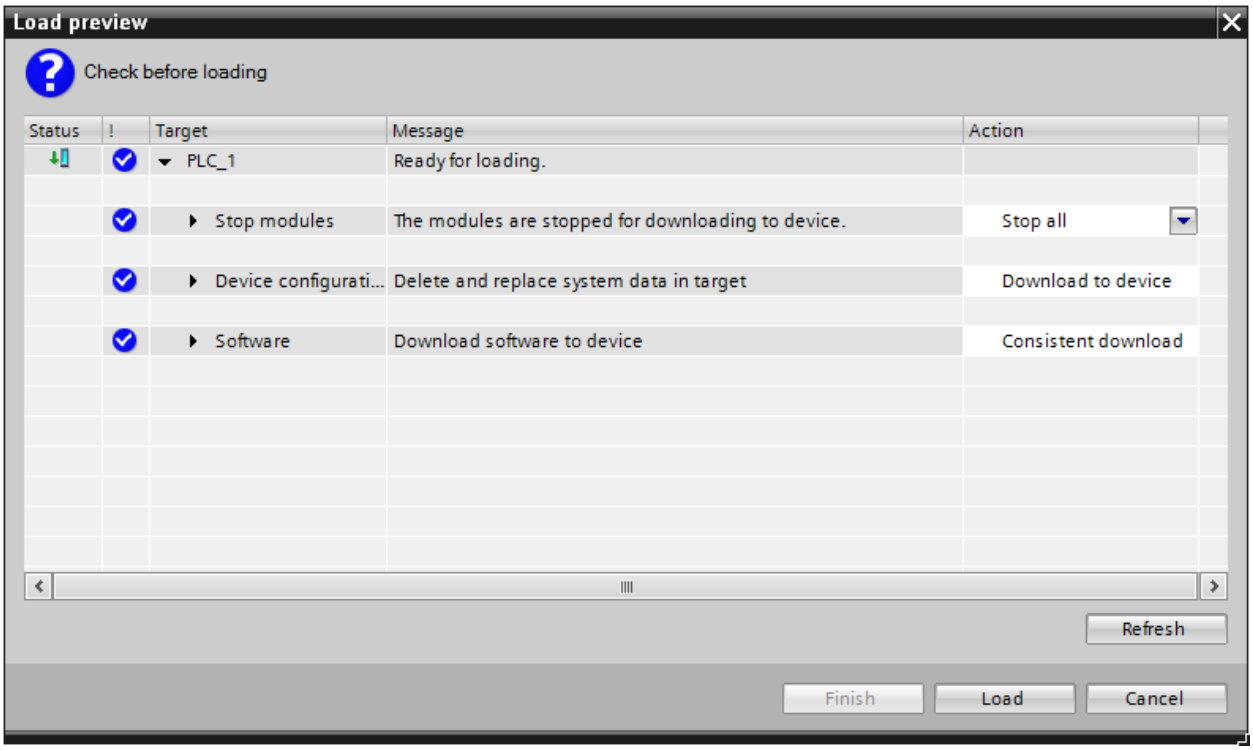
Select the PLC then click the Compile button. The compile button is just to the left of the Download button on the tool bar. Shown below are, from left to right: Compile button, download button and the upload button. As you hover over each of these buttons in the software, it will display its function.



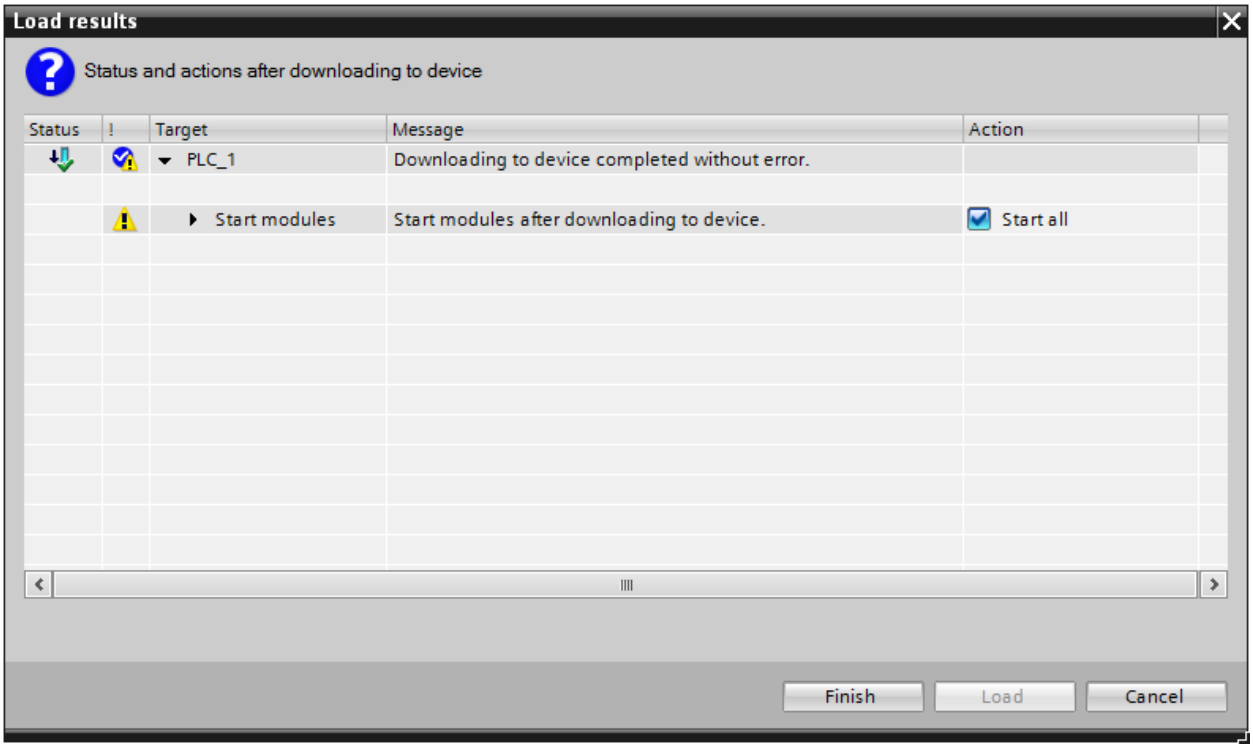
The results of the compile process will be displayed in the area below the PLC as follows:



Next, select the download button to download the project to the PLC. The following window will be displayed. If the controller was in the Run mode, it must be stopped for the download. Select “Stop all” per the following, then select the Load button.

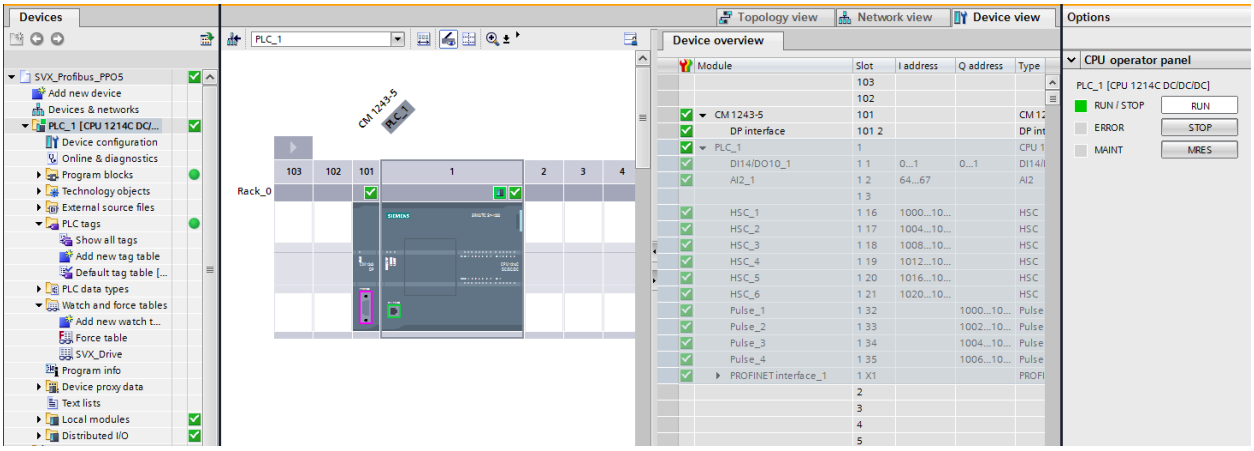


The results of the Load will be displayed in the lower portion of the project screen as shown below. “Start all” should be selected, then select the Finish button. This will complete the download and place the PLC into the Run mode per the following:



With the PLC selected, select “Go online” from the Tool Bar to go online with the project running in the PLC.

When online, the Simatic software should look like the following:



In the Project Tree on the left, double click “SVX” under “Watch and force tables” to display the following:

	Name	Address	Display format	Monitor value	Modify value
1	"SVX_Control"	%QW72	Hex		
2	"SVX_Speed_Ref"	%QW74	DEC		
3	"SVX_Status"	%IW76	Bin		
4	"SVX_Speed_Actual"	%IW78	DEC		
5	"SVX_Hertz"	%IW80	DEC		
6	"SVX_RPM"	%IW82	DEC		
7	"SVX_Amps"	%IW84	DEC		
8	"SVX_Percent_Torque"	%IW86	DEC		
9	"SVX_Percent_Power"	%IW88	DEC		
10	"SVX_Volts"	%IW90	DEC		
11	"SVX_DC_Link_V"	%IW92	DEC		
12	"SVX_Active_Fault Code"	%IW94	DEC		
13	"SVX_ID_Output"	%QW64	DEC		
14	"SVX_IND_Output"	%QW66	DEC		
15	"SVX_Value1_Output"	%QW68	DEC		
16	"SVX_Value2_Output"	%QW70	DEC		
17	"SVX_ID_Input"	%IW68	DEC		
18	"SVX_IND_Input"	%IW70	DEC		
19	"SVX_Value1_Input"	%IW72	DEC		
20	"SVX_Value2_Input"	%IW74	DEC		

Below is the Tool Bar located above the Watch List.

If the second icon from the right is selected, the Watch List will begin monitoring and displaying the I/O data as follows:

	Name	Address	Display format	Monitor value	Modify value
1	"SVX_Control"	%QW72	Bin	2#0000_0000_0000_0000	
2	"SVX_Speed_Ref"	%QW74	DEC	0	
3	"SVX_Status"	%IW76	Bin	2#0010_0000_0111_0000	
4	"SVX_Speed_Actual"	%IW78	DEC	0	
5	"SVX_Hertz"	%IW80	DEC	0	
6	"SVX_RPM"	%IW82	DEC	0	
7	"SVX_Amps"	%IW84	DEC	0	
8	"SVX_Percent_Torque"	%IW86	DEC	0	
9	"SVX_Percent_Power"	%IW88	DEC	0	
10	"SVX_Volts"	%IW90	DEC	0	
11	"SVX_DC_Link_V"	%IW92	DEC	279	
12	"SVX_Active_Fault Code"	%IW94	DEC	0	
13	"SVX_ID_Output"	%QW64	Hex	16#0000	
14	"SVX_IND_Output"	%QW66	Hex	16#0000	
15	"SVX_Value1_Output"	%QW68	Hex	16#0000	
16	"SVX_Value2_Output"	%QW70	Hex	16#0000	
17	"SVX_ID_Input"	%IW68	Hex	16#0000	
18	"SVX_IND_Input"	%IW70	Hex	16#0000	
19	"SVX_Value1_Input"	%IW72	Hex	16#0000	
20	"SVX_Value2_Input"	%IW74	Hex	16#0000	

In the “Modify value” column, the data for output tags can be modified to energize the SVX drive and send a Speed Reference value.

Start: 0x047F
Stop: 0x047E

Speed Reference:

0-10000 represents 0-100.00% Speed (0-60.00 Hz if the Maximum Speed is set to 60.00 Hz and the minimum is set to 0Hz)

The data can be entered/viewed in different formats by changing the Display Format for any value.

Each time values are entered or modified in the “Modify Value” column for the Output tags, the lightning bolt with a 1 under it shown below must be selected to instruct the PLC to write the value to the SVX drive via the OPTC3 option card.

References

SVX Drive User Manual, Publication MN04001004E
SVX Drive Application Manual, Publication MN04004001E

SVX Drive PROFIBUS Option card (OPTC3) User Manual, Publication MN04003006E

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/swd

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