



W4005NV46AI /B APPLICATION NOTE PROFINET CONNECTION



APPLICATION NOTE

MODEL: W4005NV46AI /B
Hardware Version: R2 or higher
Software Versions - Main Processor: 1.3.x
ProfiNet Processor: 2.0.x

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1. Abbreviations and Notations Used

Abbreviation	Meaning
PLC	Programmable Logic Controller
IDE	Integrated Development Environment
TIA	Totally Integrated Automation (Siemens)
GSDML	General Station Description XML File (Siemens)
LAN	Local Area Network
BYTE	8-bit wide variable
WORD	16-bit wide variable

Table 1 – Document Abbreviations

2. Introduction

This application note has been created to assist the user in connecting the W4005NV46AI controller to the Siemens PLC via Profibus. The application note has been written for the following combination of tools:

PLC: S7-1200 series (Siemens order code: 6ES7 212-1BE31-0XB0)

Siemens IDE: TIA Portal Version 12

Due to the big number of different tools and packages available 4B are not able to provide application notes for each and every combination. This application note should be thorough enough to be used as guidance for connecting the W4005NV46AI controller via ProfiNet to the end users system of choice.

The application note should be used along side with an example project provided within the Zip file. The application project contains all the necessary information to successfully connect and use the W4005NV46AI controller with a Siemens PLC.

3. Application Note Folder Contents

The application note folder consists of the following sub-folders:

S7_1200_TIA_Example_Project -> The TIA Portal Project Folder

GSDML -> Folder Containing the GSDML file and all the needed supporting files to be used

4. Integration Procedure

4.1 Open the TIA Portal Software

4.2 Import the GSDML file

4.2.1. Click on Options -> Install General station description file (GSD)

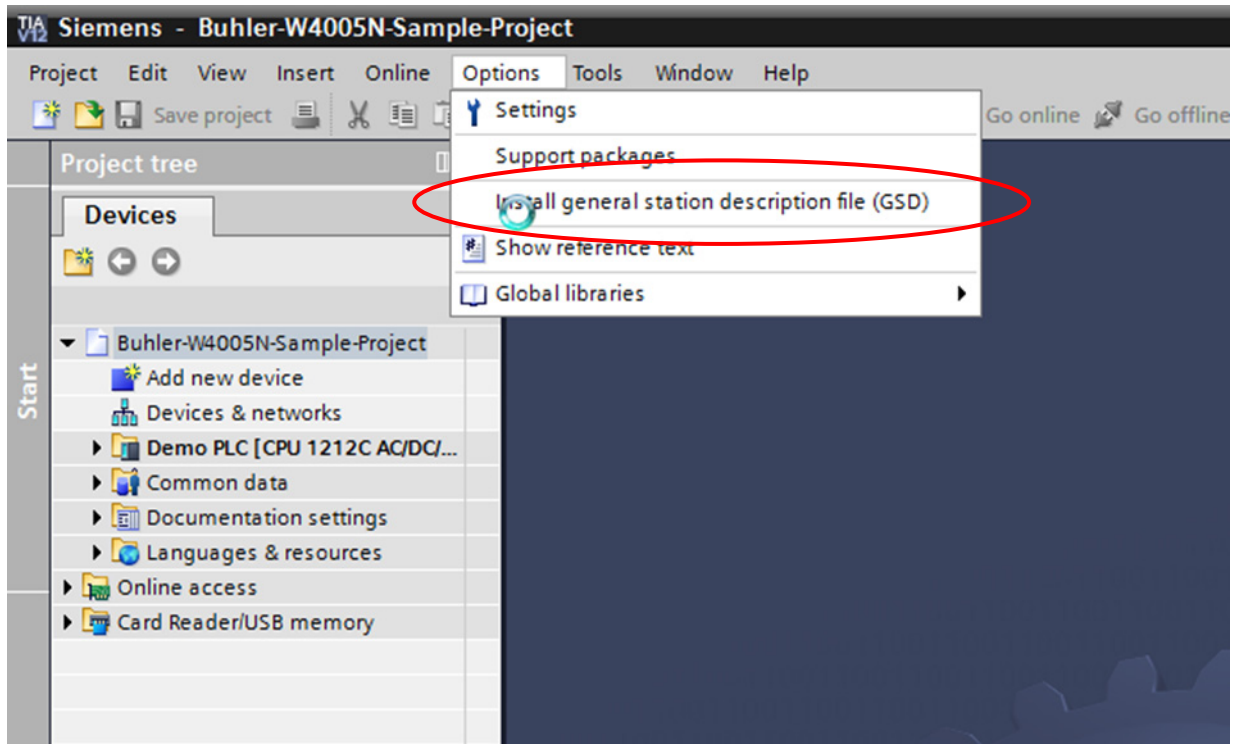


Figure 1 - Install GSD File

4.2.2. Browse to the GSDML file within the GSDML sub-folder of this application note and follow the procedure to install it to the TIA Portal's hardware catalogue

4.3 Add the W4005NV46AI device to the project

Note: The steps below are only necessary if the example project not used and the user is starting a clean project.

Open Network view of the project by right clicking on the PLC device in the project tree as shown in Figure 2 – Open Network View.

Find the W4005NV46AI device in the hardware catalogue and drag-and-drop the W4005NV46AI Controller Runtime Data Module as shown in Figure 4.

It is also possible to use the search feature by typing in “W400” into the Hardware Catalogue’s search box.

Make the logical connection to the PLC and select the IO controller to be used as shown in Figure 3.

Double-click on the W4005V46AI controller module to open the device overview page. Drag and Drop the W400 Runtime Data Module into the Device Overview Slot 1 as shown in Figure 5.

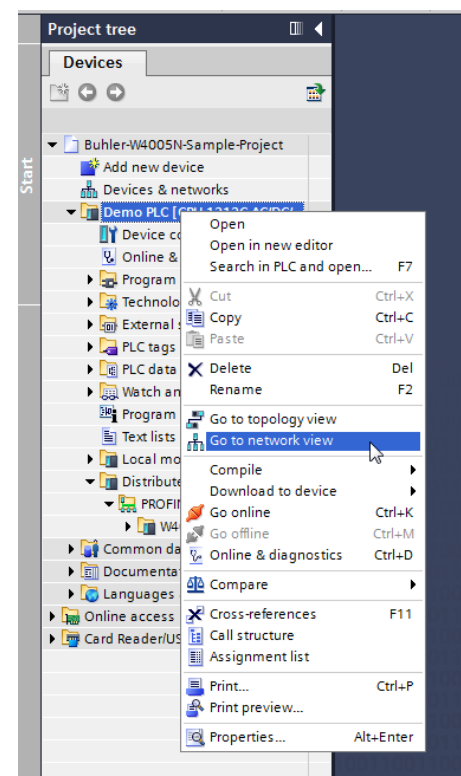


Figure 2 – Open Network View

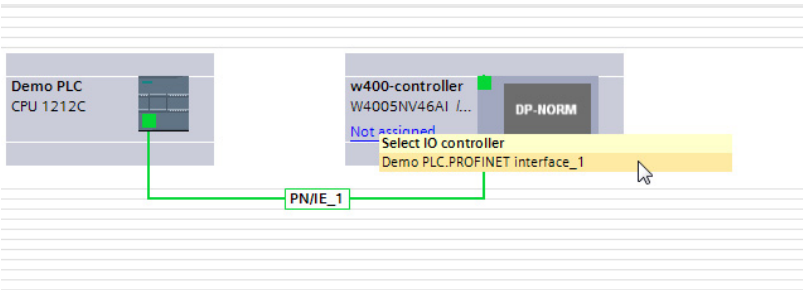


Figure 3 - PLC Network Connection

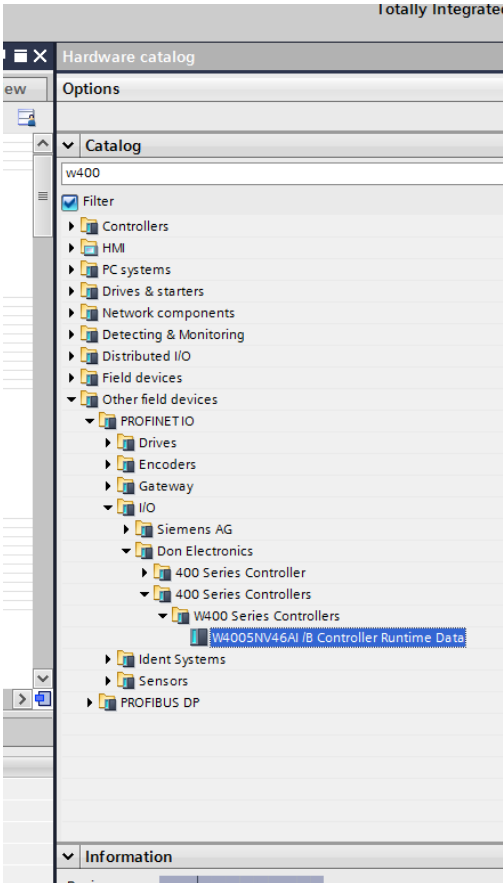


Figure 4 - Hardware Catalogue

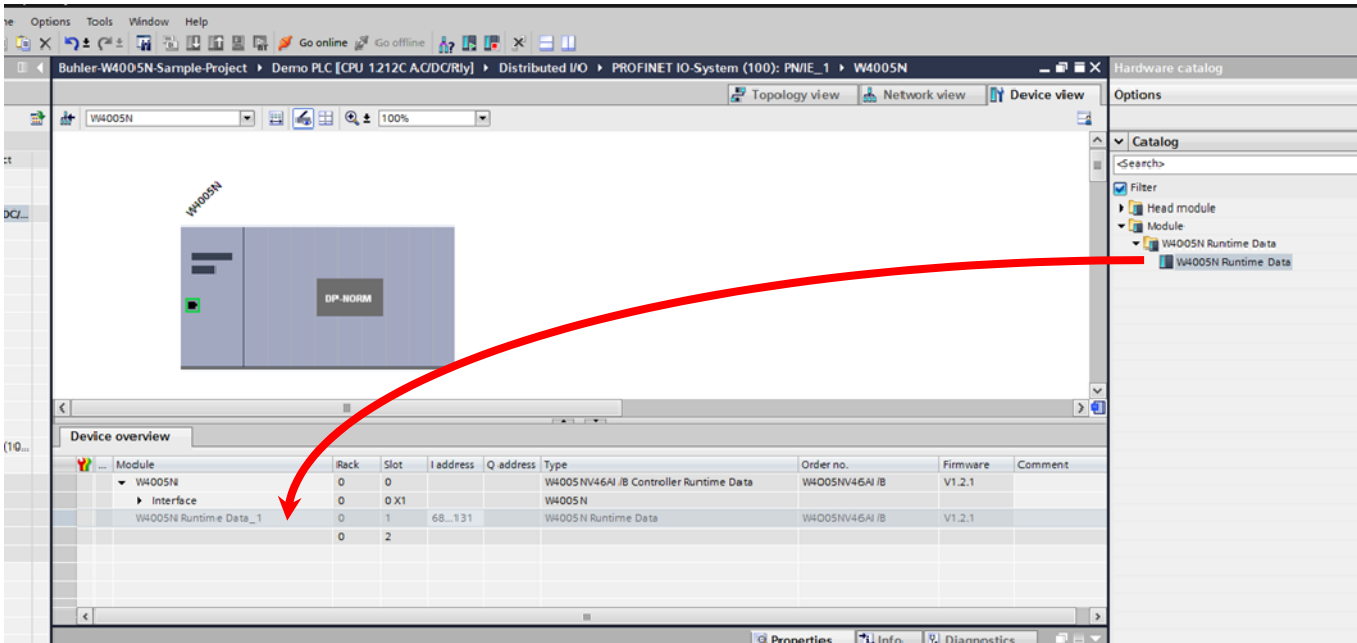


Figure 5 - Slot Assignment

4.4 Open the Example Project

Browse to the location of the Example project file within the example project sub-folder of this application note. Click on “Open the project view” button to display the project within the IDE.

4.5 Establish connection to the PLC

Right-click on the PLC Controller in the Project tree and click Properties

Type in the IP address that the PLC should have. Make sure to match the sub-net to the sub-net of you PC. Click OK.

Right-click on the PLC Controller in the Project tree and click “Download to Device” -> “Hardware and Software”.

“Extended Download to Device” window will appear. Select the following settings:

Type of PG/PC interface: **PN/IE**

PG/PC interface: **Select the network adapter that should be used to communicate with the PLC. Please try not to use Wi-Fi connection for this.**

Connection to Subnet: **PN/IE_1**

The device list will be updated with all the devices found on your LAN. Select the device with the type “CPU 1212C ...” and press Load. Project will be compiled and downloaded to the PLC controller. If asked keep pressing Load and Finish in order to complete the download process.

Verify that the project was downloaded successfully by going online. Use the “Go Online” button at the top controls toolbar of the IDE. A Green RUN LED should appear on the PLC and a green circle/dot should appear next to the “Program Blocks” field in the project tree.

Note: The W4005NV46AI controller has not yet been configured and there should be a with the “Distributed IO” section in the project tree.

4.6 Configuring the W4005NV46AI controller in the PLC project

Make sure the connection to PLC is offline by pressing the “Go Offline” button

Open the Network View as shown in Figure 2.

Double-click on the W4005NV46AI / B controller to open the Device Overview as shown in Figure 5.

Right-click on the W4005NV46AI /B controller and click on Properties. Within the Properties window select the “ProfiNet interface” section. Fill in the details as necessary, but pay the most attention to the module IP address and ProfiNet device name fields. These fields are how the PLC will establish the connection to the device later on. Make sure that the IP address set here is in the same sub-net as the PLC controller and the PC in order to avoid communication problems.

Cycle time can be left as **Automatic** and the Watchdog time can be left as **3 x cycle times** as per TIA Portal defaults.

Save project and then Download Hardware and Software to the PLC controller. The PLC is now configured to exchange data with the Device Name and IP address set above.

4.7 Configuring the W4005NV46AI /B controller's internal settings

The W4005NV46AI /B devices are delivered with the Device Name set to an **empty string** and IP address set to **192.168.1.100**. In most cases these setting will be different from the settings in the PLC and the W4005NV46AI /B module internal setting will need to be updated. The process is given below.

Right-click on the W4005N module within the project tree and select “Online & diagnostics” as shown in Figure 6.

Click in the “Functions” section in the newly opened window on the left hand side.

First assign the Device name. Refresh the “Accessible devices in the network” list and find the device type “400 Series Control”. Select it and click assign name. Wait for the process to finish. Refresh to verify that the name has been assigned successfully.

Assign the device IP address by first finding the device by its MAC address. The MAC address is printed on the W4005NV46AI controller's RJ45 Ethernet port label, inside the unit.

Click on the “Accessible Devices” button next to the MAC address, which will load another window, where the correct device should be selected either by using the MAC address or the Device Type / Device Name. Click OK.

Click “Set IP Address” once the pop up window is closed (this may take more than 10 seconds, please be patient).

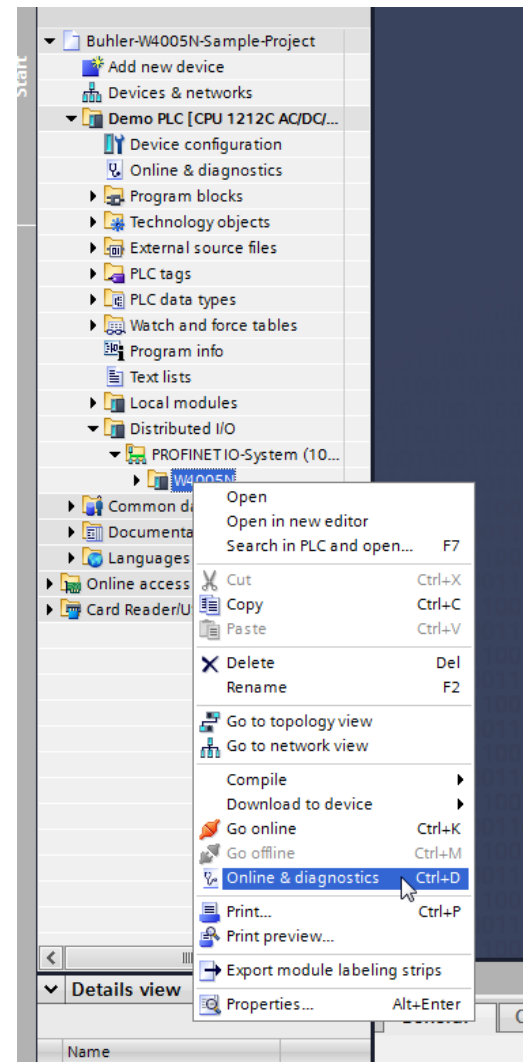


Figure 6 - Online and Diagnostics Launch

Important: The W4005NV46AI module will set the new IP address and reset automatically. The module will take 10-15 seconds to re-initialise. The TIA portal will indicate that it failed to set the IP Address. Please ignore this warning.

After the W4005NV46AI module has restarted it should start communicating with the PLC. The PLC Error LED should stop blinking and only the Run LED should now be solid green.

Please verify that the W4005NV46AI /B controller is communicating by going online to the PLC and verifying that all the status circles in the project tree are solid green.

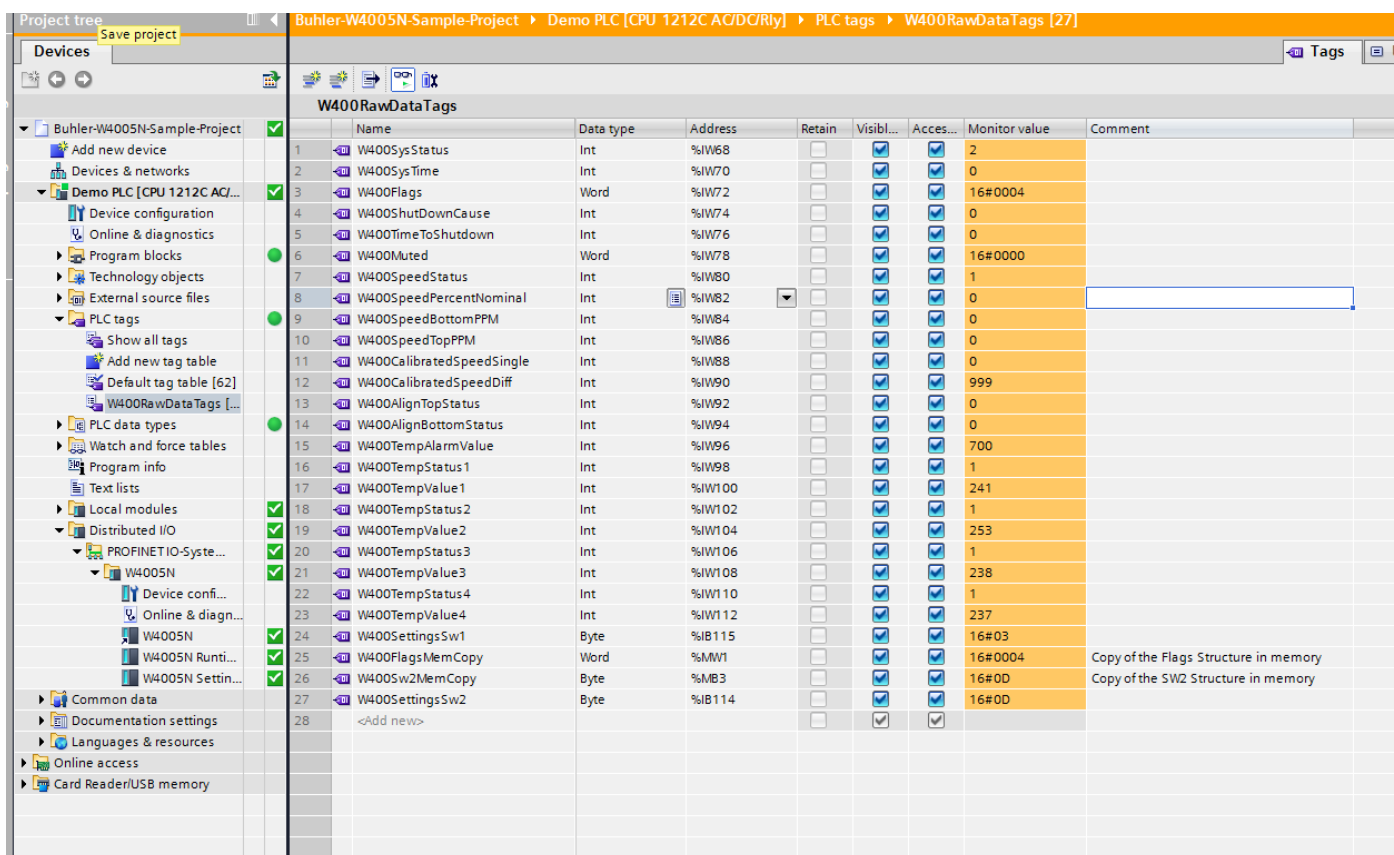
5. W4005NV46AI /B Data Decoding

This application note gives a very simplistic example of the decoding of the W4005NV46AI /B controller's data. This is intended to act as a starting point for the full implementation by the end user. Please refer to the W4005V46AI-SYSx /B user manual for the full decoding information as this is out of scope of this document.

64 WORDS are allocated within the PLC memory for each W4005NV46AI /B controller. Only 52 WORDS are used, the rest are allocated for future implementations.

5.8 W4005NV46AI Raw Data Tags

Please go to PLC Tags -> W400RawDataTags and click on the "Monitor All" icon to see the raw data returned from the W400NV46AI /B controller to the PLC as shown in Figure 7.



Name	Data type	Address	Retain	Visibl...	Acces...	Monitor value	Comment
W400SysStatus	Int	%IW68		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	
W400SysTime	Int	%IW70		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400Flags	Word	%IW72		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#0004	
W400ShutDownCause	Int	%IW74		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400TimeToShutdown	Int	%IW76		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400Muted	Word	%IW78		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#0000	
W400SpeedStatus	Int	%IW80		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	
W400SpeedPercentNominal	Int	%IW82		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400SpeedBottomPPM	Int	%IW84		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400SpeedTopPPM	Int	%IW86		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400CalibratedSpeedSingle	Int	%IW88		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400CalibratedSpeedDiff	Int	%IW90		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	999	
W400AlignTopStatus	Int	%IW92		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400AlignBottomStatus	Int	%IW94		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	
W400TempAlarmValue	Int	%IW96		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	700	
W400TempStatus1	Int	%IW98		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	
W400TempValue1	Int	%IW100		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	241	
W400TempStatus2	Int	%IW102		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	
W400TempValue2	Int	%IW104		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	253	
W400TempStatus3	Int	%IW106		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	
W400TempValue3	Int	%IW108		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	238	
W400TempStatus4	Int	%IW110		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	
W400TempValue4	Int	%IW112		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	237	
W400SettingsSw1	Byte	%IB115		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#03	
W400FlagsMemCopy	Word	%MW1		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#0004	Copy of the Flags Structure in memory
W400Sw2MemCopy	Byte	%MB3		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#0D	Copy of the SW2 Structure in memory
W400SettingsSw2	Byte	%IB114		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16#0D	
<Add new>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Figure 7 - Raw W4005NV46AI /B Data

5.9 W4005NV46AI /B Decoded Data Structure

This example project also gives a simplistic example of a Function Block that can be used to decode the raw data and save it into a structure database. Basic data type needed for this have been created and can be found in the “PLC data types” section of the project tree. All the relevant data types start with the “W400...” text.

“W400DataDecoding” function block (FB1 in this example) is the data decoding block which write the data into the “W400SysDb[DB1]” data structure. An array of this structure can be created by the end user to facilitate the connection and update of multiple W4005NV46AI /B modules within a single project. This is outside the scope of this application note.

The decoded data can be seen in the “W400SysDB” structure as shown in Figure 8.

Name	Data type	Start value	Monitor value	Retain	Accessible f...	Visible in ...	Setpoint	Com
1 Static								
2 W400SysDb	*W400SysRunti...							
3 System	*W400SystemSecti...							
4 State	Word	16#0	16#0002					
5 Time	Real	0.0	0.0					
6 Flags	*W400SystemFlags...							
7 Interlock	Bool	false	FALSE					
8 CalibratedF...	Bool	false	FALSE					
9 CalibratedF...	Bool	false	TRUE					
10 AlarmRelay...	Bool	false	FALSE					
11 StopRelaySt...	Bool	false	FALSE					
12 SystemAlarm	Bool	false	FALSE					
13 AlarmReset...	Bool	false	FALSE					
14 Alarm	*W400AlarmSectio...							
15 ShutdownCause	Word	16#0	16#0000					
16 TimeToShutdo...	Real	0.0	0.0					
17 Muted	Word	16#0	16#0000					
18 Speed	*W400SpeedSectio...							
19 Status	Int	0	1					
20 NominalPercent	Real	0.0	0.0					
21 TopPPM	Real	0.0	0.0					
22 BottomPPM	Real	0.0	0.0					
23 CalibratedSpee...	Real	0.0	0.0					
24 CalibrateSpeed...	Real	0.0	99.0					
25 Alignment	*W400AlignmentSe...							
26 HeadStatus	Int	0	0					
27 TailStatus	Int	0	0					
28 Temperature	*W400Temperature...							
29 TemperatureAl...	Real	0.0	70.0					
30 t	Array [0..3] of *W4...							
31 t[0]	*W400TempSensor...							
32 Status	Int	0	1					
33 Value	Real	0.0	24.0					
34 t[1]	*W400TempSensor...							
35 Status	Int	0	1					
36 Value	Real	0.0	25.0					
37 t[2]	*W400TempSensor...							
38 Status	Int	0	1					
39 Value	Real	0.0	23.0					
40 t[3]	*W400TempSensor...							
41 Status	Int	0	1					
42 Value	Real	0.0	23.0					
43 Settings	*W400SettingsType*							
44 Switch1_Temp...	Int	0	3					
45 Switch2_Other...	*W400sw2Settings...							
46 SpeedMode	Bool	false	TRUE					
47 StartUpDelay	Bool	false	FALSE					
48 BearingSen...	Bool	false	TRUE					

Figure 8 - W4005NV46AI /B Decoded PLC Data

6. Conclusion

This application note has shown how to integrate the W4005NV46AI /B controller into an existing Siemens S7-1200 series project or how to use the example project provided with this application note. The end user will have found all the information necessary to establish a ProfiNet connection and read the data in as well as basic data decoding example has been given.

In an event of any problems arising in connecting the W4005NV46AI /B controller to the PLC or for more information please contact your system provider or your 4B Group local sales support.

7. Revision History

Revision	Date	Modifications
1	01 June 2014	Initial Application Note Release

Table 2- Revision History

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