

ADIO-PN (TIA Portal V16 Guide)

User Manual MTO-ADIOPNU1-V1.0-2202US

Thank you for purchasing an Autonics product.

This user manual contains information about the product and its proper use,
and should be kept in a place where it will be easy to access.

Autonics

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Preface

Thank you for purchasing Autonics products.

Be sure to read and follow the **Safety Precautions** thoroughly before use.

This manual contains information about the product and how to use it properly, so keep it in a place where users can easily find it.

Manual Guide

- Use the product after fully reading the contents of the manual.
- The manual explains the product functions in detail and does not guarantee the contents other than the manual.
- Any or all of the manual may not be edited or copied without permission.
- The manual is not provided with the product.
- Download and use from our website (www.autonics.com).
- The contents of the manual are subject to change without prior notice according to the improvement of the product's performance, and upgrade notices are provided through our website.
- We put a lot of effort to make the contents of the manual a little easier and more accurate. Nevertheless, if you have any corrections or questions, please feel free to comment through our website.

Common Symbols in the Manual



Failure to follow instructions may result in serious injury or death.



Failure to follow instructions may result in injury or product damage.



Supplementary explanation of the function



Example of that function



Important information about the feature

1. ADIO-PN (TIA Portal V16 Guide)



- Be sure to see the product manual of the ADIO-PN (PROFINET) model and follow the precautions.
- This guide document describes the configuration and diagnostic information of the ADIO-PN (PROFINET) model based on TIA Portal V16 which is Siemens' project planning software.

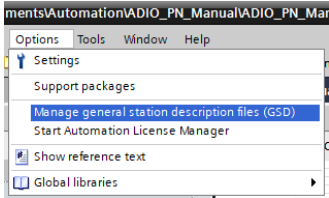
1.1. Install GSDML File

The GSDML file describes specific data of the PROFINET Slave required for the PROFINET project planning software, and defines slots and modules, process data, and valid values for the configuration of IO-Link communication.

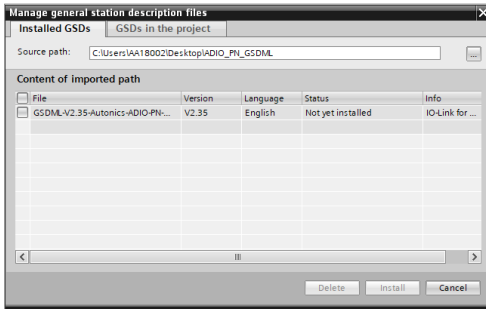
1. Download the ADIO-PN's GSDML file on the Autonics website.
2. Launch TIA Portal V16.
3. Install the GSDML file.

Installation of the GSDML file

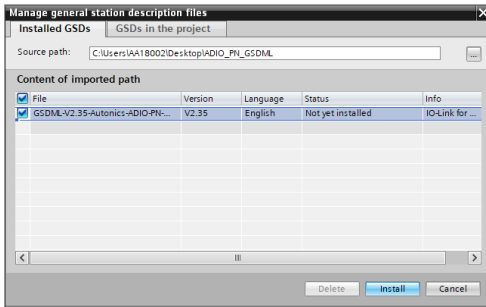
1. Select **Options » Manage general station description files (GSD)**.



2. Select a folder or source that contains the GSDML file.

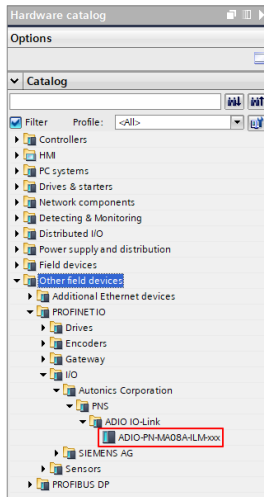


3. Select the GSDML file and click **Install**.

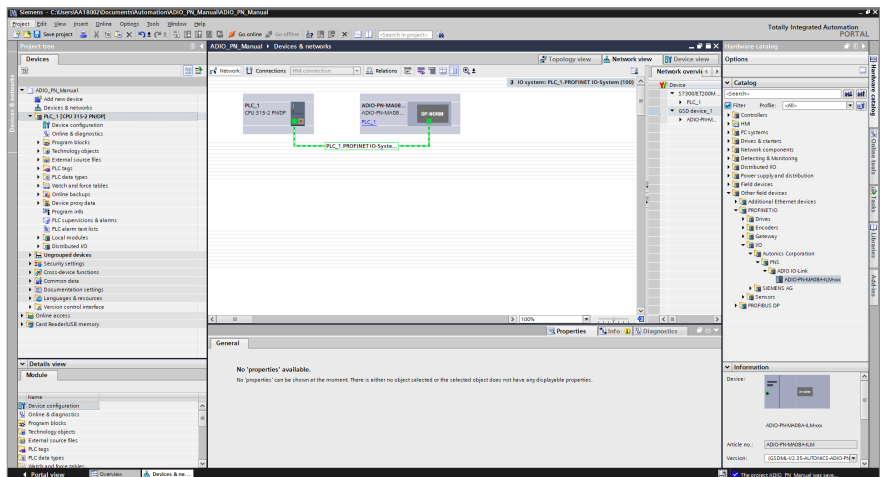


1.2. Integrate to the PROFINET Project

1. The ADIO-PN is created in the **Hardware catalog** after the installation of the GSDML file is complete.

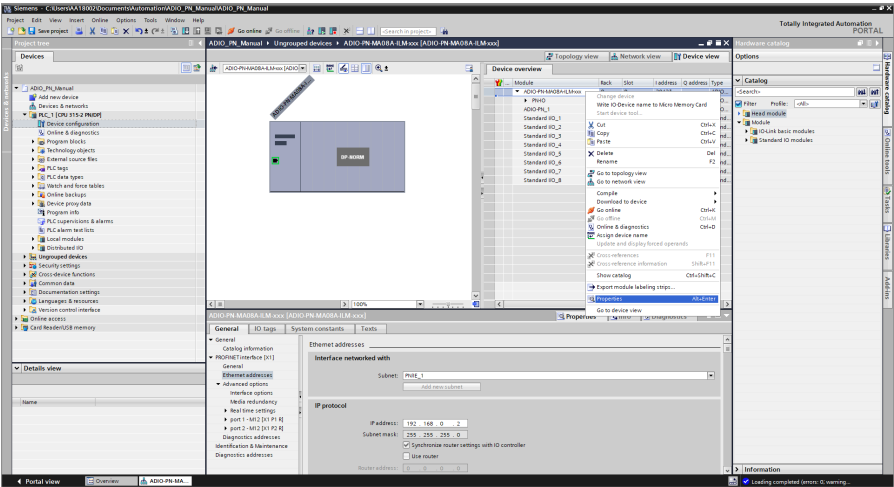


2. Drag and drop the ADIO-PN into the **Network view** and connect with PLC.

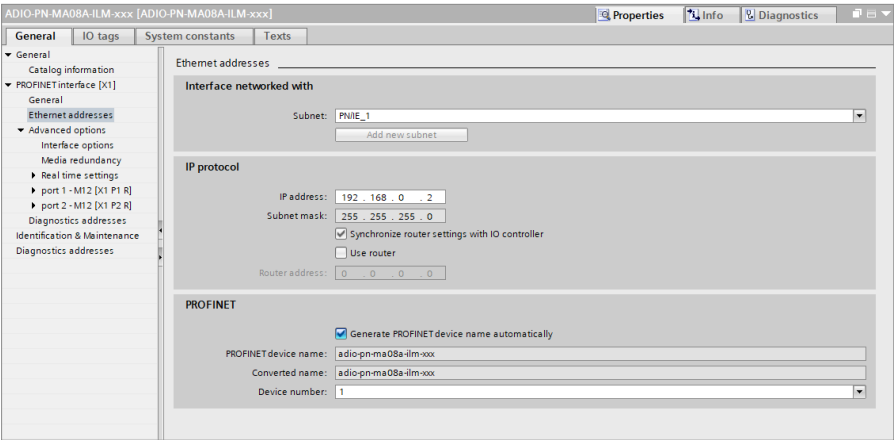


1.3. Device Name and PROFINET Address

Click the module on the left side of **Device view** or double-click the module of slot 0 in the **Device overview**, then the configuration parameters of the IO-Link Master are displayed.



You can configure the PROFINET device name and IP address in the **Ethernet addresses** below.



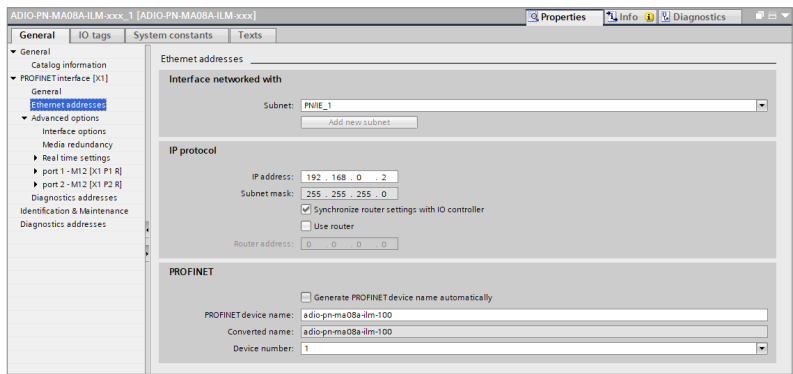
1.3.1. Set Device Name

Be sure to consider the number of rotary switches on the ADIO-PN to set a device name.
Refer to the table below.

Rotary switches	Description	Value
000	The device name stored in the ADIO-PN's EEPROM	PROFINET device name
001 to 999	Set the device name the same as the number of rotary switches.	ADIO-PN-MA08A-ILM-□□□

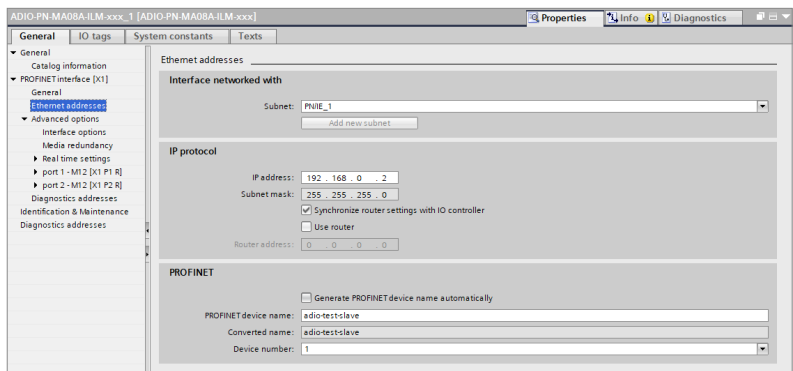
- **The rotary switches are set to the value of 001 to 999.**

Enter the number of rotary switches at the last position of the model name and download to the PLC.



- **The rotary switches are set to the value of 000.**

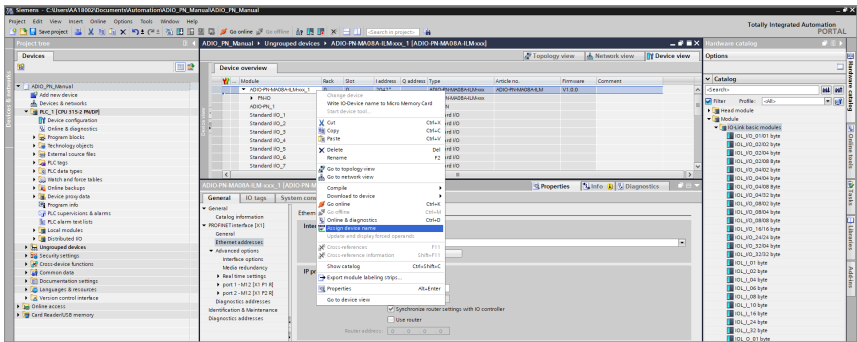
Enter a device name according to the PROFINET Device Name Rules.



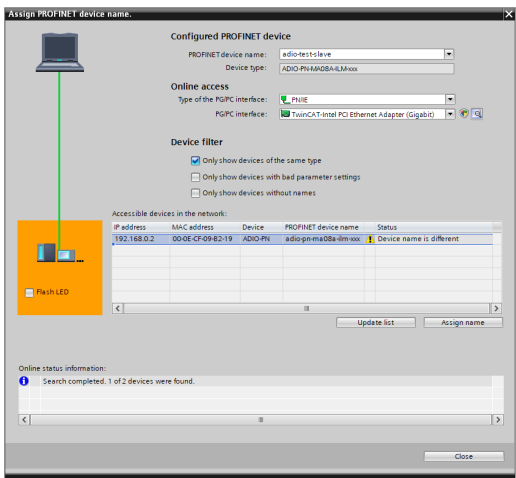
1.3.2. Assign Device Name

- The rotary switches are set to the value of 000.

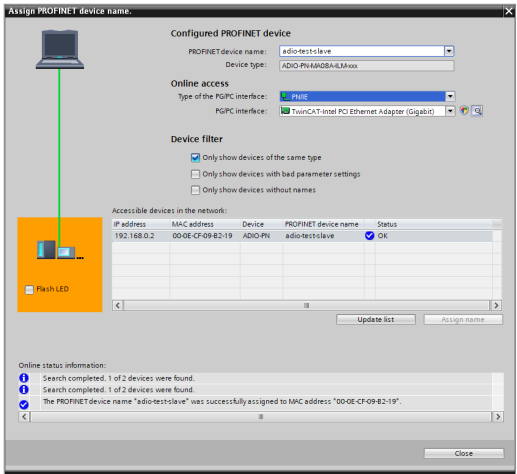
1. Right-click on the module of slot 0 in the **Device overview** and select **Assign device name**.



2. Select **Update list**.



3. When an available device is displayed, select **Assign name** to assign the device.
The device identification is processed via MAC address or Flash test.

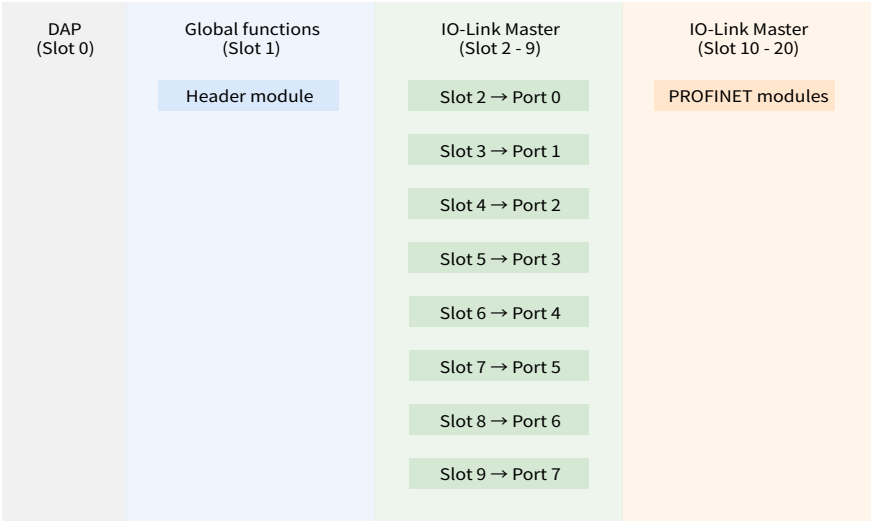


1.4. Configure I/O Port

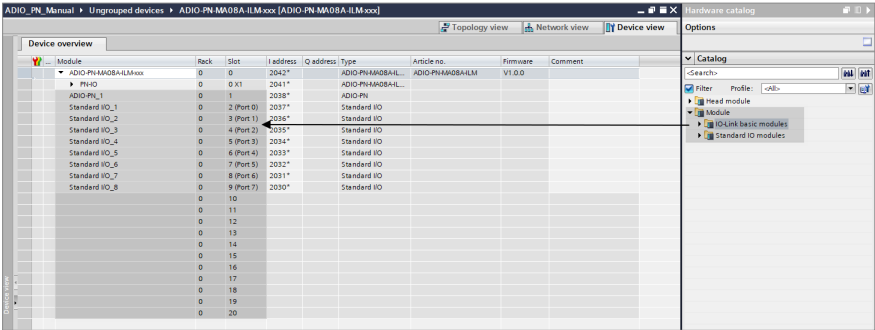
The ADIO-PN as a modular device, consists of the header module and data modules.
To configure the ADIO-PN in the PROFINET system, you need to assign the data modules to the suitable slot.

Refer to the figure below for the structure of slots in the ADIO-PN and its screen in the TIA Portal.

Structure of the slots

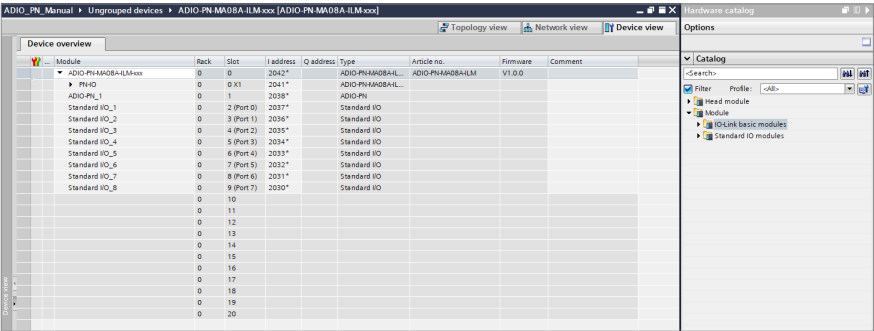


TIA Portal screen



Factory settings

Be sure to configure the slot 2 to 9 as the IO-Link or Standard IO modules corresponding to port 0 to 7 on the ADIO-PN. The factory settings of slots 2 to 9 are defined to the standard IO modules.



The screenshot shows the 'Device overview' window with a table of modules. The table has columns for Module, Rack, Slot, I address, Q address, Type, Article no., Firmware, and Comment. The modules listed are ADIO-PHAPQBA-ILMxxx, ADIO-PH1, Standard IO_1 through Standard IO_8, and slots 10 through 20. The 'Hardware catalog' on the right shows a tree view with 'IO-Link basic modules' and 'Standard IO modules'.

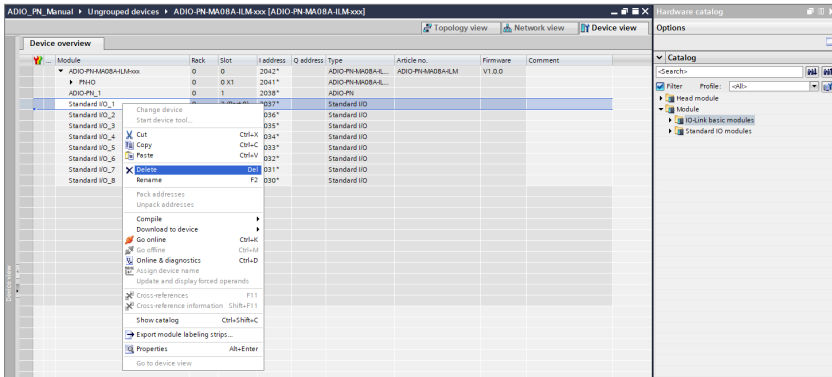
Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware	Comment
ADIO-PHAPQBA-ILMxxx	0	0	2042*		ADIO-PHAPQBA-ILMxxx	ADIO-PHAPQBA-ILMxxx	V1.0.0	
ADIO-PH1	0	0 X1	2041*		ADIO-PH1	ADIO-PH1		
Standard IO_1	0	1	2038*		Standard IO			
Standard IO_2	0	2 (Port 0)	2037*		Standard IO			
Standard IO_3	0	3 (Port 1)	2036*		Standard IO			
Standard IO_4	0	4 (Port 2)	2035*		Standard IO			
Standard IO_5	0	5 (Port 3)	2034*		Standard IO			
Standard IO_6	0	6 (Port 4)	2033*		Standard IO			
Standard IO_7	0	7 (Port 5)	2032*		Standard IO			
Standard IO_8	0	8 (Port 6)	2031*		Standard IO			
	0	9 (Port 7)	2030*		Standard IO			
	0	10						
	0	11						
	0	12						
	0	13						
	0	14						
	0	15						
	0	16						
	0	17						
	0	18						
	0	19						
	0	20						



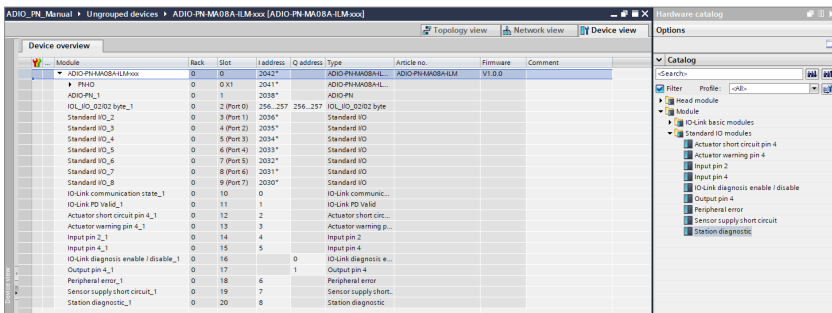
- For detailed information on the configuration of the IO-Link module, refer to 1.4.1, “IO-Link Mode”.
- For detailed information on the configuration of the standard IO modules, refer to 1.4.2, “Standard Input and Output Mode”.

Change the module

1. Select a module in the **Device overview**, right-click and then select **Delete**.



2. Select a desired module in the **Catalog** and double-click, or drag and drop into the suitable slot.



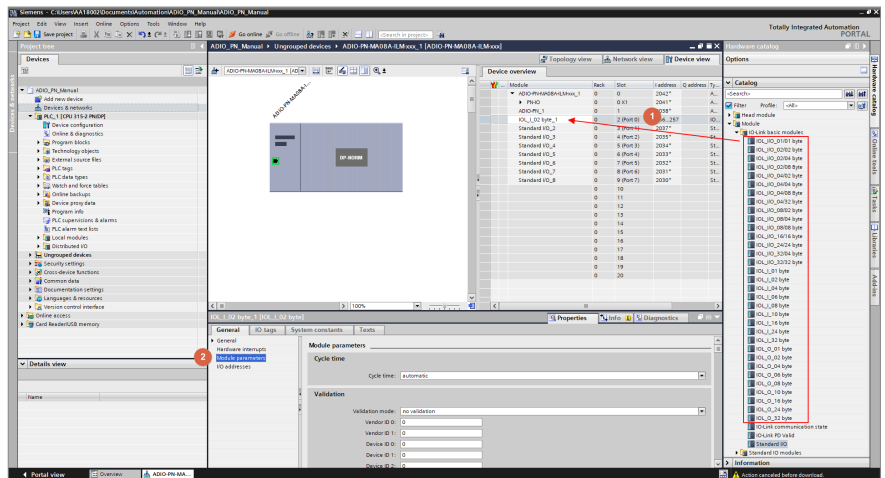
1.4.1. IO-Link Mode



Firstly check the process data length of the IO-Link device.

In general, you can find the related information on the instructions manual of the IO-Link device.

1. Select an IO-Link module suitable for the process data length of the IO-Link device in the **Catalog** and drag and drop into the desired slot.



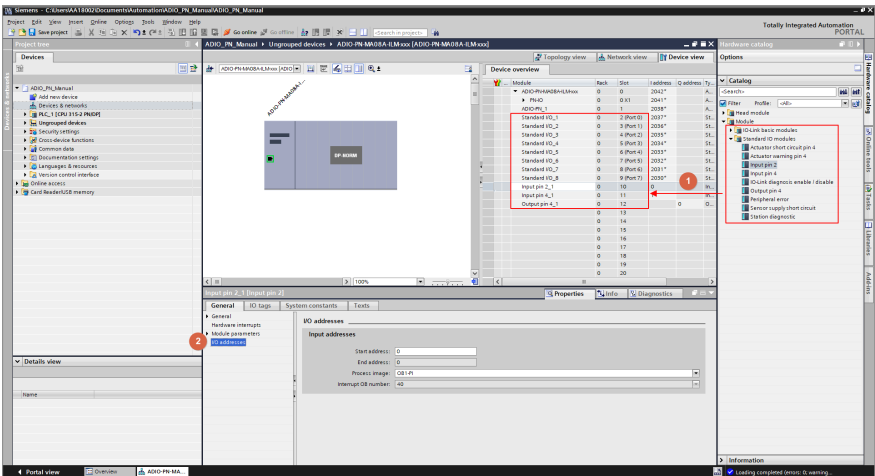
2. Double-click the IO-Link module to configure the IO-Link functions in the **Module parameters**.



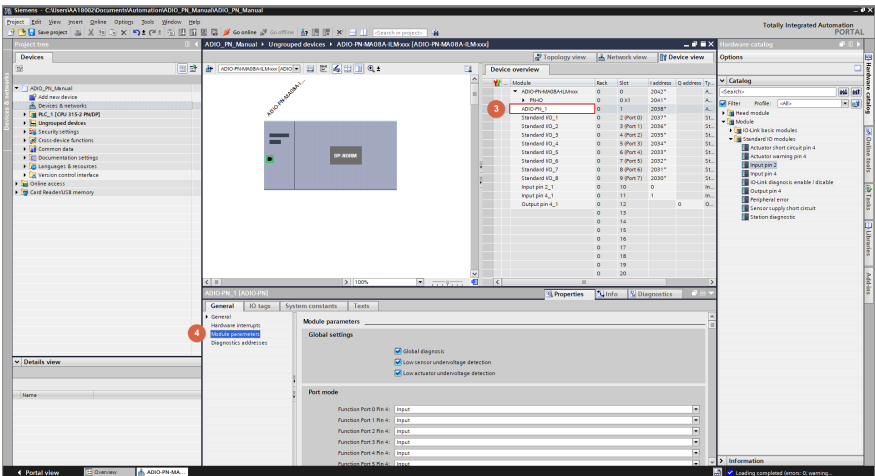
- For more information on the configuration method in TIA Portal, refer to 1.5, "Module Parameters".
- For detailed information on the IO-Link functions, refer to 2.2.2, "Module Parameters: IO-Link".

1.4.2. Standard Input and Output Mode

1. Select a Standard IO module in the **Catalog**, drag and drop into the desired slot.
- Configure Input Pin 2 or 4 and Output Pin 4 modules additionally to set addresses for the process of input and output.



2. Double-click the header module of slot 1 to configure standard I/O functions in the **Module parameters**.





- For more information on the configuration method in TIA Portal, refer to 1.5, “Module Parameters”.
- For detailed information on the standard I/O functions, refer to 2.2.1, “Module Parameters: ADIO-PN”.

1.4.3. Addressing Modules

Double-click the module to change I/O addresses in the **I/O addresses**.
Enter I address (input address) or Q address (output address).

The screenshot displays the TIA Portal V16 interface. The top pane shows the 'Device overview' table, which lists modules and their I/O addresses. The bottom pane shows the 'I/O addresses' configuration window for the selected module 'IOL_I/O_02/02 byte_1'.

Module	Rack	Slot	I address	Q address	Type
ADIO-PN-MA08A-ILM-xxx	0	0	2042*		ADIO-PN-MA08A-...
PI-40	0	0 X1	2041*		ADIO-PN-MA08A-...
ADIO-PN-1	0	1	2038*		ADIO-PN
IOL_I/O_02/02 byte_1	0	2 (Port 0)	256_257	256_257	IOL_I/O_02/02 byte
Standard I/O_2	0	3 (Port 1)	2036*		Standard I/O
Standard I/O_3	0	4 (Port 2)	2035*		Standard I/O
Standard I/O_4	0	5 (Port 3)	2034*		Standard I/O
Standard I/O_5	0	6 (Port 4)	2033*		Standard I/O
Standard I/O_6	0	7 (Port 5)	2032*		Standard I/O
Standard I/O_7	0	8 (Port 6)	2031*		Standard I/O
Standard I/O_8	0	9 (Port 7)	2030*		Standard I/O
	0	10			
	0	11			
	0	12			
	0	13			
	0	14			
	0	15			
	0	16			
	0	17			
	0	18			
	0	19			
	0	20			

The 'I/O addresses' configuration window shows the following settings:

Input addresses

Start address: 256
End address: 257
Process image: None
Interrupt OB number: 40

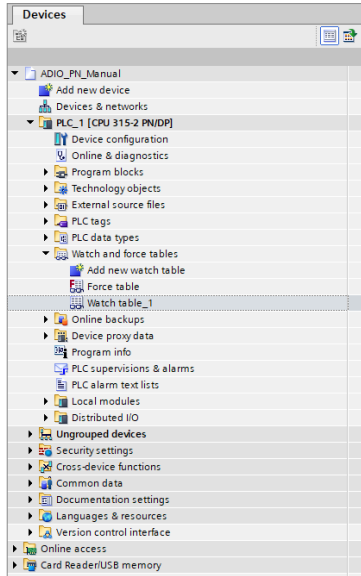
Output addresses

Start address: 256
End address: 257
Process image: None

1.4.4. Monitoring Modules

You can monitor the status of the module via the module address in the **Watch table**.

Double-click **Devices » Watch and force tables » Watch table**.





- The example of watch table: Actuator warning pin 4 module
- For detailed information on the modules, refer to 3, PROFINET Modules.

1. Assign the actuator warning pin 4 to the slot and enter the I address.

The screenshot shows the TIA Portal software interface. The 'Device overview' table lists modules, and the 'Properties' window shows the 'Input addresses' configuration.

Module	Back	Slot	I address	Q address	...
ADDO-PN-MB-MS-EM-Mod	0	0	2042*	A...	
PH-AD	0	0	0x1	2041*	A...
ADDO-PM-1	0	1	2038*	A...	
Standard IO_1	0	2	0x0	2037*	S...
Standard IO_2	0	3	0x0	2036*	S...
Standard IO_3	0	4	0x0	2035*	S...
Standard IO_4	0	5	0x0	2034*	S...
Standard IO_5	0	6	0x0	2033*	S...
Standard IO_6	0	7	0x0	2032*	S...
Standard IO_7	0	8	0x0	2031*	S...
Standard IO_8	0	9	0x0	2030*	S...
Actuator warning pin 4_1	0	10	1	A...	
Input pin 4	0	11			
Output pin 4	0	12			
Input pin 4	0	13			
Output pin 4	0	14			
Input pin 4	0	15			
Output pin 4	0	16			
Input pin 4	0	17			
Output pin 4	0	18			
Input pin 4	0	19			
Output pin 4	0	20			

The 'Properties' window shows the 'Input addresses' configuration:

- Start address: 1
- End address: 1
- Process image: CO-1P
- Interrupt ID number: 40

2. Select the header module and configure the pin 4 as the Output in the Module parameters.

The screenshot shows the TIA Portal software interface. The 'Device overview' table lists modules, and the 'Properties' window shows the 'Module parameters' configuration.

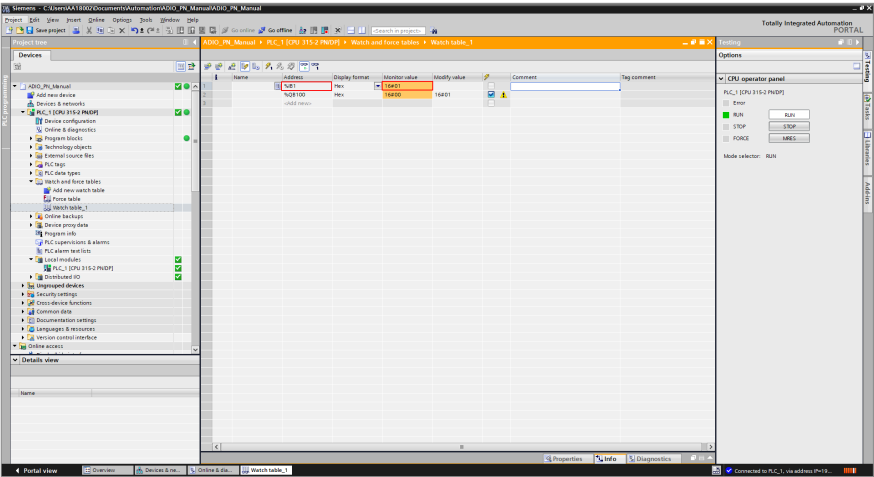
Module	Back	Slot	I address	Q address	...
ADDO-PN-MB-MS-EM-Mod	0	0	2042*	A...	
PH-AD	0	0	0x1	2041*	A...
ADDO-PM-1	0	1	2038*	A...	
Standard IO_1	0	2	0x0	2037*	S...
Standard IO_2	0	3	0x0	2036*	S...
Standard IO_3	0	4	0x0	2035*	S...
Standard IO_4	0	5	0x0	2034*	S...
Standard IO_5	0	6	0x0	2033*	S...
Standard IO_6	0	7	0x0	2032*	S...
Standard IO_7	0	8	0x0	2031*	S...
Standard IO_8	0	9	0x0	2030*	S...
Actuator warning pin 4_1	0	10	1	A...	
Input pin 4	0	11			
Output pin 4	0	12			
Input pin 4	0	13			
Output pin 4	0	14			
Input pin 4	0	15			
Output pin 4	0	16			
Input pin 4	0	17			
Output pin 4	0	18			
Input pin 4	0	19			
Output pin 4	0	20			

The 'Properties' window shows the 'Module parameters' configuration:

- Function Pin 0 Pin 4: Output
- Function Pin 1 Pin 4: Input
- Function Pin 2 Pin 4: Input
- Function Pin 3 Pin 4: Input
- Function Pin 4 Pin 4: Input
- Function Pin 5 Pin 4: Input
- Function Pin 6 Pin 4: Input
- Function Pin 7 Pin 4: Input
- Function Pin 8 Pin 4: Input
- Function Pin 9 Pin 4: Input
- Function Pin 10 Pin 4: Input
- Function Pin 11 Pin 4: Input
- Function Pin 12 Pin 4: Input
- Function Pin 13 Pin 4: Input
- Function Pin 14 Pin 4: Input
- Function Pin 15 Pin 4: Input
- Function Pin 16 Pin 4: Input
- Function Pin 17 Pin 4: Input
- Function Pin 18 Pin 4: Input
- Function Pin 19 Pin 4: Input
- Function Pin 20 Pin 4: Input

- Download to the PLC and go Online.
- Enter the previous I address in the **Watch table** and select .

You can check the port number where the voltage is detected in the Monitor value.



1.5. Module Parameters

1.5.1. IO-Link

Double-click the IO-Link module and select **Module parameters**.

You can configure the IO-Link functions to the corresponding port.

- For detailed information on the IO-Link functions, refer to 2.2.2, “Module Parameters: IO-Link”.

IO_L_02 byte_1 [IO_L_02 byte]

PropertiesInfoDiagnostics

GeneralIO tagsSystem constantsTexts

General

Hardware interrupt:
Module parameters
IO addresses

Module parameters

Cycle time

Cycle time: 4.8 ms

Validation

Validation mode: compatible

Vendor ID 0: 1

Vendor ID 1: 222

Device ID 0: 0

Device ID 1: 0

Device ID 2: 3

Data storage

Data storage settings: Backup / Restore

ISDU Parameter 0

ISDU index (DEC): 24

ISDU subindex (DEC): 0

ISDU length (DEC): 3

ISDU data (HEX): 11.22.33.00

ISDU Parameter 1

ISDU index (DEC): 0

ISDU subindex (DEC): 0

ISDU length (DEC): 0

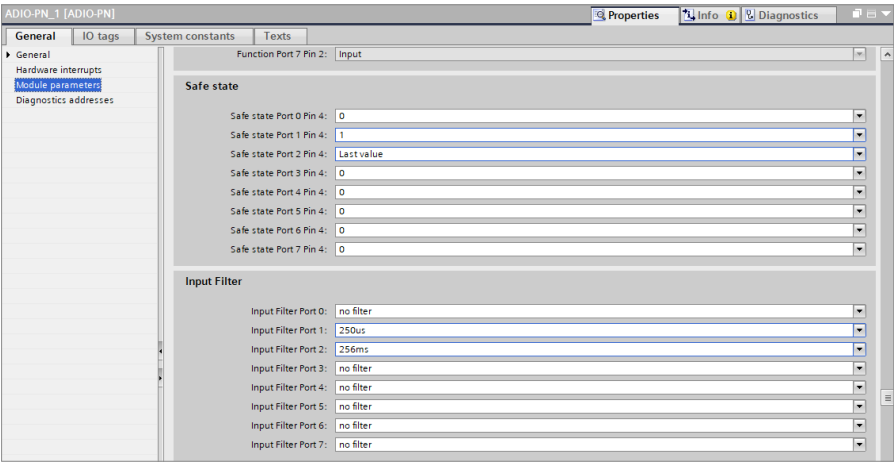
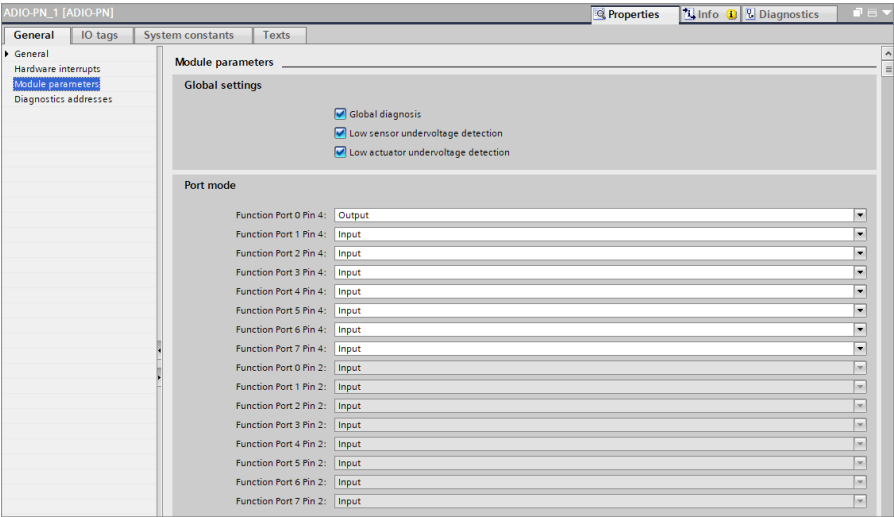
ISDU data (HEX): 00.00

Cycle time	Select a value in the drop-down list.
Validation	1. Select compatible in the drop-down list of the Validation mode. 2. Enter the Vendor ID and Device ID of the IO-Link device.
Data storage	1. Set the Validation function. 2. Select DS mode in the drop-down list of the Data storage settings.
ISDU Parameter 0,1	1. Enter the index, sub-index, data length, and data values of the IO-Link device. 2. Select  to write.

1.5.2. Header (Slot:1) / SIO

Double-click the header module and select the **Module parameters**.
You can configure the global settings and standard I/O functions of the ADIO-PN.

- For detailed information on the functions of the header module, refer to 2.2.1, “Module Parameters: ADIO-PN”.



Global settings	Select all checkboxes.
Port mode	Select the input/output mode of pin 2/4 in the drop-down list.
Safe state	1. Select pin 4 to Output mode in the Port mode. 2. Select the output behaviour of the corresponding port in the drop-down list of the Safe state.
Input Filter	1. Select pin2/4 to Input mode in the Port mode. 2. Select an input filtering time in the drop-down list of the corresponding port.

1.6. Access ISDU Parameters

You can select the following two options to access the ISDU parameters of the connected IO-Link device. Be sure to consider the environmental conditions and use the suitable configuration method.

- **atIOLink**

atIOLink, Autonics' PDCT software, supports the read and write the ISDU parameters of IO-Link devices, data storage, and more. Refer to the atIOLink User Manual.

- **ISDU Parameter 0, 1**

Refer to 1.5, "Module Parameters".

- **Function Block**

Refer to 1.6.1, "Function Block".

1.6.1. Function Block



- The list of main parameters described in this chapter is shown in the table below and for reference only.
- For detailed information on using Function Block, refer to Siemens' IO-Link library in the link below.

[https://support.industry.siemens.com/cs/document/82981502/library-for-io-link-\(liolink\)?dti=0&lc=en-US](https://support.industry.siemens.com/cs/document/82981502/library-for-io-link-(liolink)?dti=0&lc=en-US)

- **The parameter list**

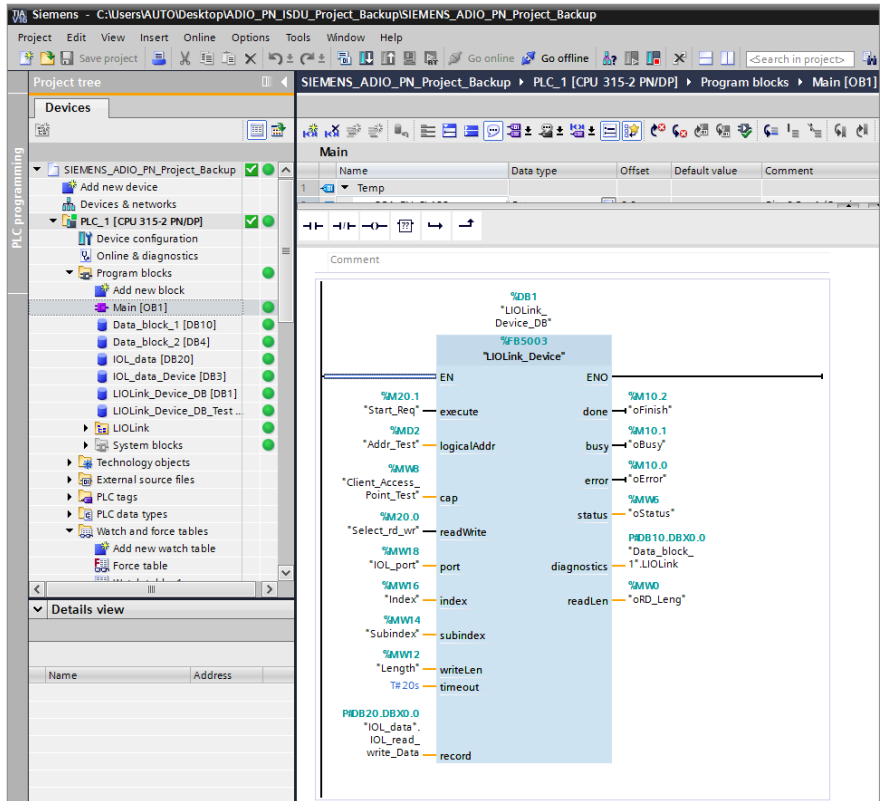
Name	Data type	Description and Values
LIOLink_Device	(Base block)	Supports reading and writing the acyclic data of the IO-Link device
Execute	Bool	FALSE → TRUE: trigger occurs
ReadWrite	Bool	FALSE: read, TRUE: write
Port	Int	Port number where the IO-Link device is running
Index	Int	Index of the IO-Link device parameter
Subindex	Int	Sub-index of the IO-Link device parameter
WriteLen	Int	Length of the data to be written
Done	Bool	TRUE: Command executed successfully
Error	Bool	TRUE: An error occurred.
Status	Word	16#0000 – 16#7FFF: FB status
Record	Array	Parameter data value of the IO-Link device

1. Create a list of tags related to the IO-Link device in the **Devices » PLC tags**.

The screenshot shows the Siemens TIA Portal interface with the 'Default tag table' for a PLC. The table lists various tags related to the IO-Link device. The tags are organized into a list on the left and a detailed table on the right.

Name	Data type	Address	Begin	Access	Visible	Comment
Start_Res	Bool	M00.1	☒	☒	☒	
Select_Res	Bool	M00.0	☒	☒	☒	
IOL_port	Int	M00.8	☒	☒	☒	
Index	Int	M00.16	☒	☒	☒	
Subindex	Int	M00.14	☒	☒	☒	
Length	Int	M00.12	☒	☒	☒	
ofinish	Bool	M00.2	☒	☒	☒	
ofbus	Bool	M00.1	☒	☒	☒	
oferror	Bool	M00.0	☒	☒	☒	
ofdiagnos	Bool	M00.6	☒	☒	☒	
ofmode_select	Int	M00.0	☒	☒	☒	
oferror_device	Bool	M00.8	☒	☒	☒	
ofsubindex_device	Int	M00.0	☒	☒	☒	
oflength_device	Bool	M00.2	☒	☒	☒	
ofselect_res_de	Bool	M00.3	☒	☒	☒	
oflength_de	Int	M00.4	☒	☒	☒	
ofstart_res_de1	Bool	M00.5	☒	☒	☒	
ofselect_res_de1	Bool	M00.6	☒	☒	☒	
oflength_de1	Int	M00.6	☒	☒	☒	
oferror_device	Bool	M00.0	☒	☒	☒	

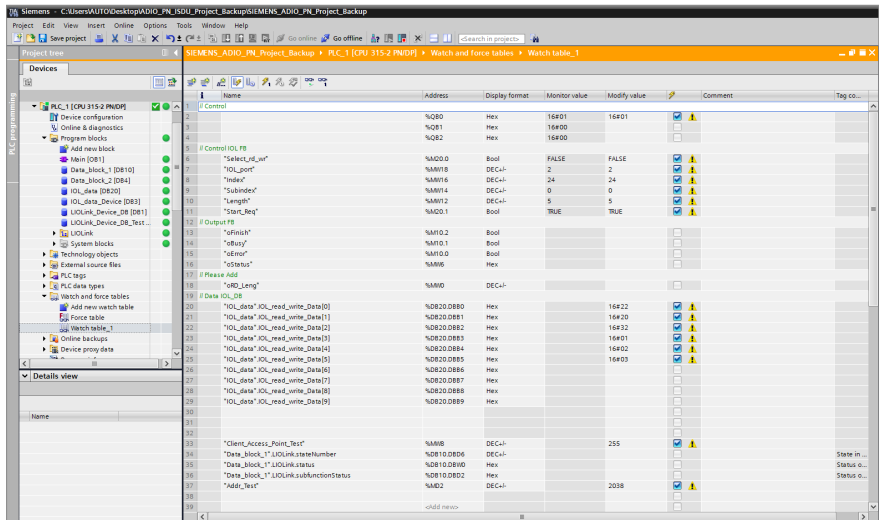
2. Mapping the Function Block in the **Devices** » **Program blocks**.



- When using the ADIO-PN as an IO-Link Master, enter the parameter values listed in the table below.

Name	Value
logicalAddr	I address value of the header module (slot 1)
cap (client access point)	255

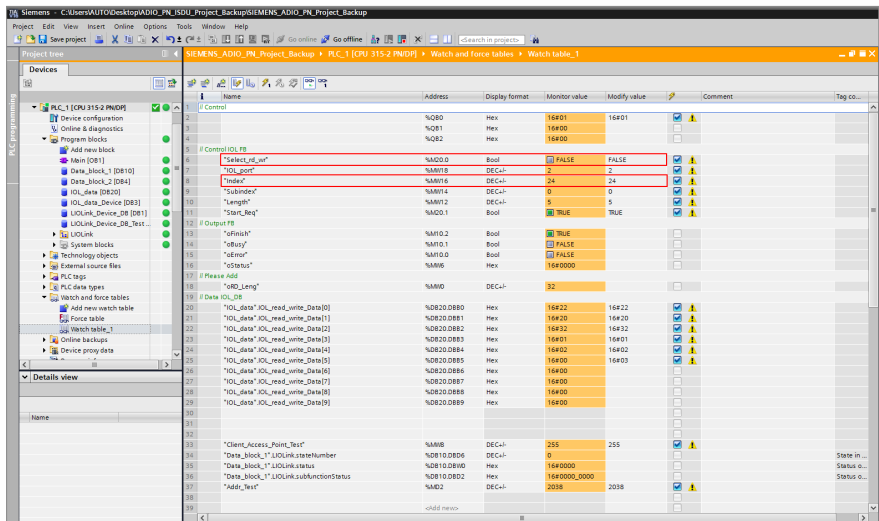
3. Add the required parameters to the Watch table.



Name	Address	Display format	Monitor value	Modify value	Comment	Tag co.
1 Control	%Q0	Hex	16401	16401		
2	%Q1	Hex	16400			
3	%Q2	Hex	16400			
4 Control IOL FB						
5 "select_read"	%M0.0	Bool	FALSE	FALSE		
6 "IO_goto"	%M18	DEC+	2	2		
7 "Index"	%M16	DEC+	24	24		
8 "Subindex"	%M14	DEC+	0	0		
9 "Length"	%M12	DEC+	5	5		
10 "Start_Req"	%M0.1	Bool	TRUE	TRUE		
11						
12 I Output FB						
13 "sFinsh"	%M10.2	Bool				
14 "sFinsh"	%M10.1	Bool				
15 "sError"	%M10.0	Bool				
16 "sStatus"	%M6	Hex				
17 I Please Add						
18 "sIO_Leng"	%M0	DEC+				
19 I Data IOL_DB						
20 "IOL_data" IOL_read_write_Data[0]	%D20.D880	Hex	16422	16422		
21 "IOL_data" IOL_read_write_Data[1]	%D20.D881	Hex	16420	16420		
22 "IOL_data" IOL_read_write_Data[2]	%D20.D882	Hex	16432	16432		
23 "IOL_data" IOL_read_write_Data[3]	%D20.D883	Hex	16401	16401		
24 "IOL_data" IOL_read_write_Data[4]	%D20.D884	Hex	16402	16402		
25 "IOL_data" IOL_read_write_Data[5]	%D20.D885	Hex	16400	16400		
26 "IOL_data" IOL_read_write_Data[6]	%D20.D886	Hex				
27 "IOL_data" IOL_read_write_Data[7]	%D20.D887	Hex				
28 "IOL_data" IOL_read_write_Data[8]	%D20.D888	Hex				
29 "IOL_data" IOL_read_write_Data[9]	%D20.D889	Hex				
30						
31						
32						
33 "Client_Access_Point_Test"	%M8	DEC+	255	255		
34 "Data_Block_1" IOLink startNumber	%D10.D806	DEC+				State In...
35 "Data_Block_1" IOLink status	%D10.D800	Hex				Status o...
36 "Data_Block_1" IOLink subfunctionStatus	%D10.D802	Hex				
37 "Add_Text"	%M2	DEC+	2038	2038		
38						
39						
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4. Enter the parameter INDEX of the IO-Link device and excute the watch read.

In the figure below, the index of the application specific tag, 24 (0x18), was used.



Name	Address	Display format	Monitor value	Modify value	Comment	Tag co.
1 Control	%Q0	Hex	16401	16401		
2	%Q1	Hex	16400			
3	%Q2	Hex	16400			
4 Control IOL FB						
5 "select_read"	%M0.0	Bool	FALSE	FALSE		
6 "IO_goto"	%M18	DEC+	2	2		
7 "Index"	%M16	DEC+	24	24		
8 "Subindex"	%M14	DEC+	0	0		
9 "Length"	%M12	DEC+	5	5		
10 "Start_Req"	%M0.1	Bool	TRUE	TRUE		
11						
12 I Output FB						
13 "sFinsh"	%M10.2	Bool	TRUE			
14 "sFinsh"	%M10.1	Bool	FALSE			
15 "sError"	%M10.0	Bool	FALSE			
16 "sStatus"	%M6	Hex	164000			
17 I Please Add						
18 "sIO_Leng"	%M0	DEC+	32			
19 I Data IOL_DB						
20 "IOL_data" IOL_read_write_Data[0]	%D20.D880	Hex	16422	16422		
21 "IOL_data" IOL_read_write_Data[1]	%D20.D881	Hex	16420	16420		
22 "IOL_data" IOL_read_write_Data[2]	%D20.D882	Hex	16432	16432		
23 "IOL_data" IOL_read_write_Data[3]	%D20.D883	Hex	16401	16401		
24 "IOL_data" IOL_read_write_Data[4]	%D20.D884	Hex	16402	16402		
25 "IOL_data" IOL_read_write_Data[5]	%D20.D885	Hex	16400	16400		
26 "IOL_data" IOL_read_write_Data[6]	%D20.D886	Hex	16400	16400		
27 "IOL_data" IOL_read_write_Data[7]	%D20.D887	Hex	16400	16400		
28 "IOL_data" IOL_read_write_Data[8]	%D20.D888	Hex	16400	16400		
29 "IOL_data" IOL_read_write_Data[9]	%D20.D889	Hex	16400	16400		
30						
31						
32						
33 "Client_Access_Point_Test"	%M8	DEC+	255	255		
34 "Data_Block_1" IOLink startNumber	%D10.D806	DEC+	9			State In...
35 "Data_Block_1" IOLink status	%D10.D800	Hex	1640000			Status o...
36 "Data_Block_1" IOLink subfunctionStatus	%D10.D802	Hex	1640000_2000			
37 "Add_Text"	%M2	DEC+	2038	2038		
38						
39						
40						
41						
42						
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5. Enter the length and input value of the data to be written.

In the figure below, 0x99 was entered for 5-byte data (Data[0] ~ Data[4]) since the value of 5 is for the data length.

Name	Address	Display format	Monitor value	Modify value	Comment	Tag co...
Control	%Q0	Hex	16401	16401		
%Q1	Hex	16400				
%Q2	Hex	16400				
Control_IOL_Flt						
"Select_vt_w"	MAD0.0	Bool	TRUE	TRUE		
"IOL_goto"	MAM18	DEC+	2	2		
"Test"	MAM16	DEC+	24	24		
"Subindex"	MAM14	DEC+	0	0		
"Length"	MAM12	DEC+	5	5		
"Data_Leng"	MAD0.1	Bool	TRUE	TRUE		
Output_Flt						
"rflnsh"	MAM0.2	Bool	TRUE			
"rflnsh"	MAM0.1	Bool	FALSE			
"rflnsh"	MAM0.0	Bool	FALSE			
"rflnsh"	MAM0.0	Hex	1640000			
"rflnsh"	MAM0.0	DEC+	32			
Data_IOL_Flt						
"IOL_data_IOL_read_write_Data[0]"	N2020.D800	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[1]"	N2020.D801	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[2]"	N2020.D802	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[3]"	N2020.D803	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[4]"	N2020.D804	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[5]"	N2020.D805	Hex	16400	16403		
"IOL_data_IOL_read_write_Data[6]"	N2020.D806	Hex	16400			
"IOL_data_IOL_read_write_Data[7]"	N2020.D807	Hex	16400			
"IOL_data_IOL_read_write_Data[8]"	N2020.D808	Hex	16400			
"IOL_data_IOL_read_write_Data[9]"	N2020.D809	Hex	16400			
"Client_Access_Point_Test"	MAM0	DEC+	255	255		
"Data_Block_1" LIOLink stateNumber	N2010.D806	DEC+	0			State in ...
"Data_Block_1" LIOLink status	N2010.D800	Hex	1640000			Status 0...
"Data_Block_1" LIOLink subfunction status	N2010.D802	Hex	1640000_0000			Status 0...
"Addr_Test"	MAM2	DEC+	2038	2038		

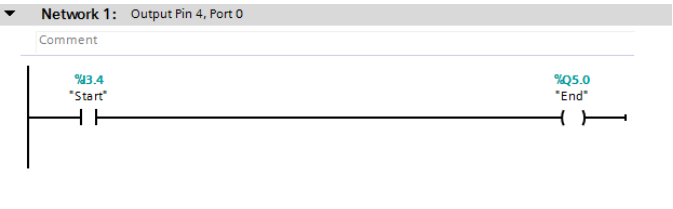
6. Execute the read again to check the value of the data.

Writing the parameter value has been normally applied.

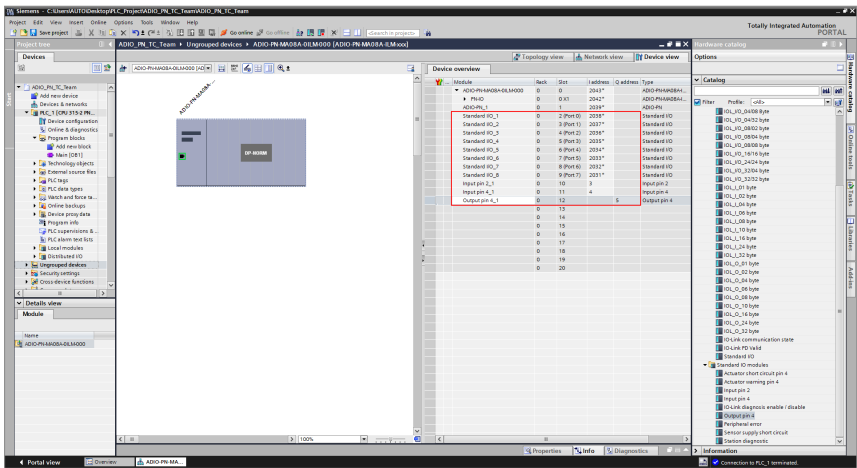
Name	Address	Display format	Monitor value	Modify value	Comment	Tag co...
Control	%Q0	Hex	16401	16401		
%Q1	Hex	16400				
%Q2	Hex	16400				
Control_IOL_Flt						
"Select_vt_w"	MAD0.0	Bool	FALSE	FALSE		
"IOL_goto"	MAM18	DEC+	2	2		
"Test"	MAM16	DEC+	24	24		
"Subindex"	MAM14	DEC+	0	0		
"Length"	MAM12	DEC+	5	5		
"Data_Leng"	MAD0.1	Bool	TRUE	TRUE		
Output_Flt						
"rflnsh"	MAM0.2	Bool	TRUE			
"rflnsh"	MAM0.1	Bool	FALSE			
"rflnsh"	MAM0.0	Bool	FALSE			
"rflnsh"	MAM0.0	Hex	1640000			
"rflnsh"	MAM0.0	DEC+	32			
Data_IOL_Flt						
"IOL_data_IOL_read_write_Data[0]"	N2020.D800	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[1]"	N2020.D801	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[2]"	N2020.D802	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[3]"	N2020.D803	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[4]"	N2020.D804	Hex	16499	16499		
"IOL_data_IOL_read_write_Data[5]"	N2020.D805	Hex	16400	16403		
"IOL_data_IOL_read_write_Data[6]"	N2020.D806	Hex	16400			
"IOL_data_IOL_read_write_Data[7]"	N2020.D807	Hex	16400			
"IOL_data_IOL_read_write_Data[8]"	N2020.D808	Hex	16400			
"IOL_data_IOL_read_write_Data[9]"	N2020.D809	Hex	16400			
"Client_Access_Point_Test"	MAM0	DEC+	255	255		
"Data_Block_1" LIOLink stateNumber	N2010.D806	DEC+	0			State in ...
"Data_Block_1" LIOLink status	N2010.D800	Hex	1640000			Status 0...
"Data_Block_1" LIOLink subfunction status	N2010.D802	Hex	1640000_0000			Status 0...
"Addr_Test"	MAM2	DEC+	2038	2038		

1.7. Standard I/O: Use Ladder Logic

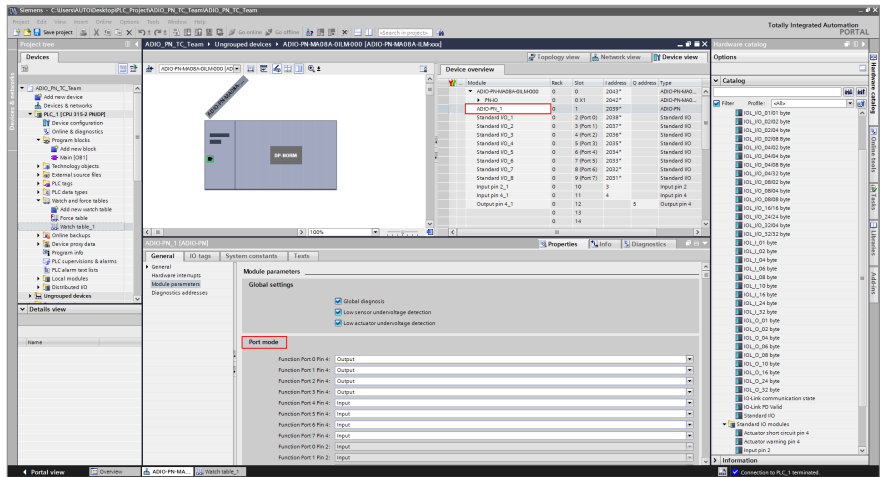
This chapter explains how to create a Ladder logic, applying the input signal to the port 4 and transferring the output signal to the port 0 as shown in the figure below.



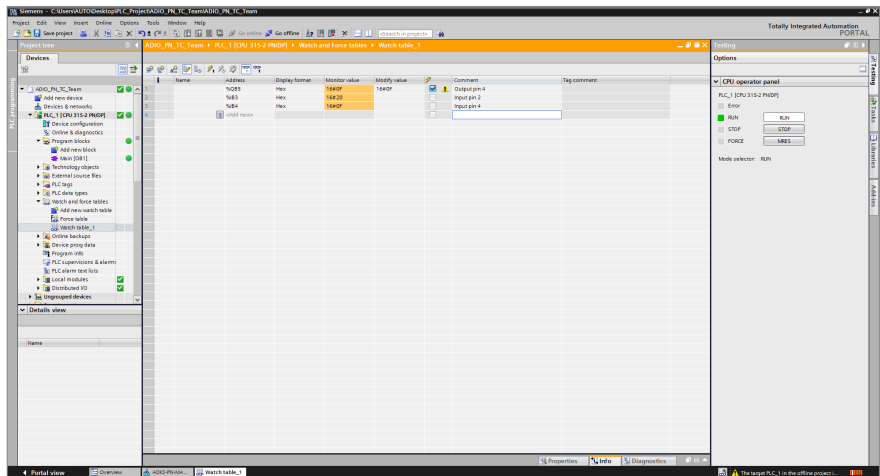
- 1. Assign the standard I/O, Input pin 2/4, and Output pin 4 modules to the desired slot and set the I/O address.
 - I address: input address, Q address: output address



- Double-click the header module and configure the input/output mode of the each port in the **Module parameters**. In the figure below, the Pin 4 from the port 0 to 3 was configured to the output mode.



- Monitor the operating state of ports in the **Watch table**. The yellow LED lights up on the I/O port indicator 0 of the port 0 to 3 under the output.



4. Create the tags with the module addresses from the previous step in the **Devices » Program blocks**.

- %I3.4 = %Input address. Port number
- %Q5.0 = %Output address. Port number

Define tag

Name	Section	Address	Data type	PLC tag table	Comment
End	Global Output	%Q5.0	Bool	Default tag table	Output Pin 4, Port 0

DefineCancel

Autodesk TIA Portal V16

Project: ... ADIO-PLC-Team

Menu: ... ADIO-PLC-Team > PLC-1 (CPU 312-2 DP) > Program blocks > Main [001]

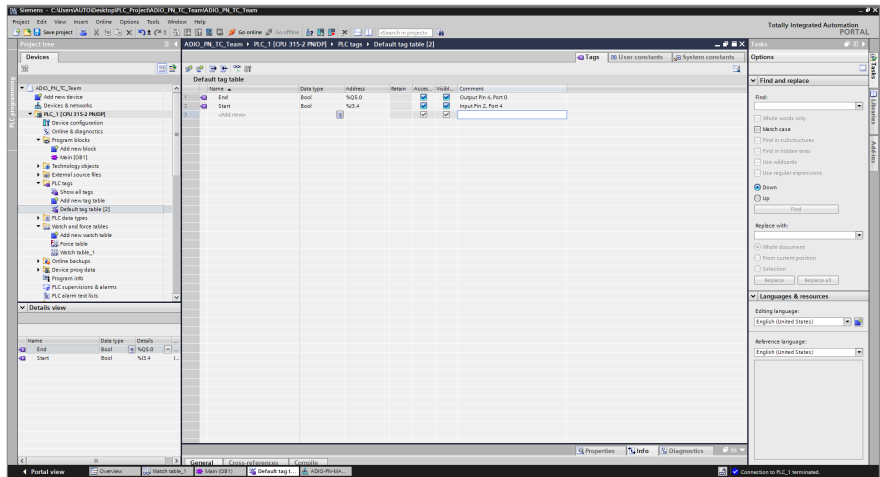
Left Panel: Devices

Center Panel: Main [001]

Right Panel: Properties

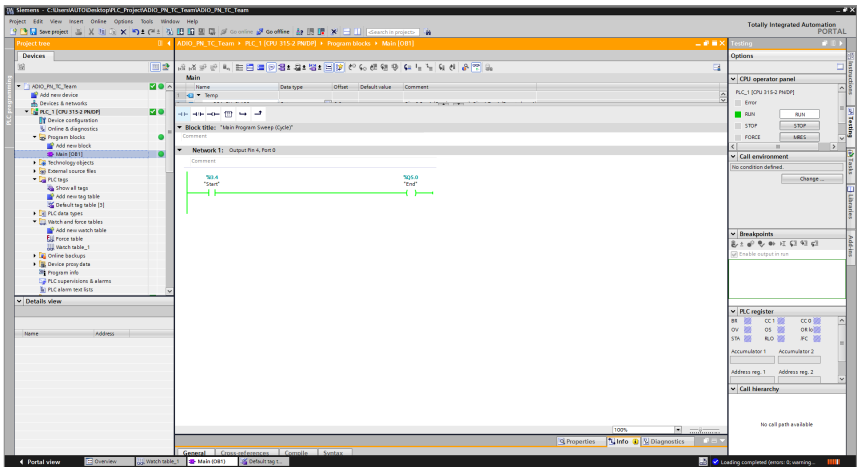
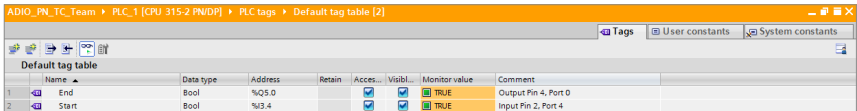
Bottom Panel: Properties

5. Checking and monitoring the added tags is available in the **Devices » PLC tags**.



6. Check the Ladder logic depending on the input and output state.

- Input, output = True



- Input, output = False

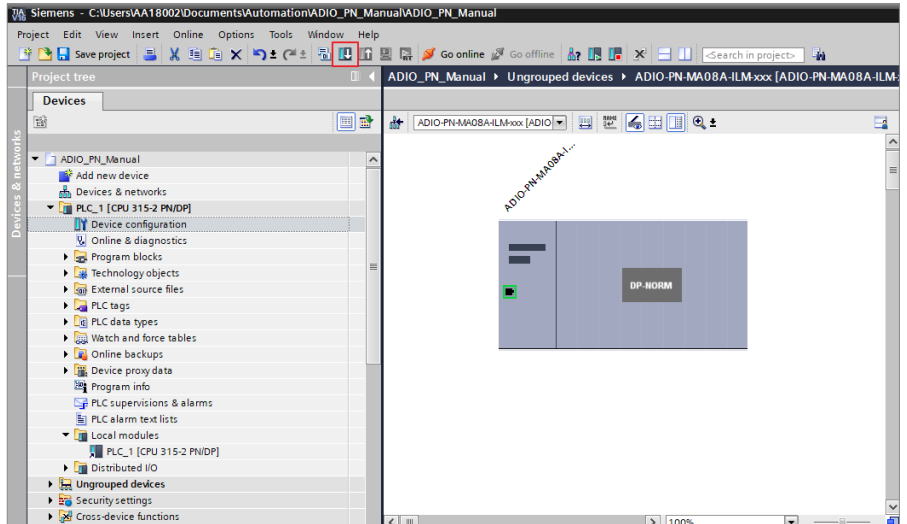
The screenshot displays the Siemens SIMATIC Manager environment. At the top, the title bar indicates the project is 'ADDO_PLN_TC_Team'. The main window is divided into several panes:

- Top Panel:** Shows the project hierarchy: 'ADDO_PLN_TC_Team' > 'PLC_1 (CPU 315-2 DP)' > 'Program blocks' > 'Main [001]'. Below this is a 'Default tag table' with columns for Name, Data type, Address, Retain, Access, Visibility, Monitor value, and Comment. It lists 'End' (Bool, %Q5.0) and 'Start' (Bool, %I3.4).
- Left Pane:** The 'Objects' tree shows the project structure, including 'Main' and 'Network 1'. The 'Main' object is selected, showing its properties and a list of objects (e.g., 'ADDO_PLN_TC_Team', 'CPU 315-2 DP', 'Network 1').
- Center Pane:** Displays a ladder logic diagram for 'Network 1'. It shows a normally open contact labeled 'Start' connected to a coil labeled 'End'.
- Right Pane:** The 'Options' panel is visible, showing settings for the 'CPU operator panel' and 'PLC_1 (CPU 315-2 DP)'. It includes checkboxes for 'RUN', 'STOP', 'FORCE', and 'MEND'. Below this is the 'Breakpoints' section, which is currently empty.

The bottom status bar shows the current view is 'Ladder Logic' and the project is 'ADDO_PLN_TC_Team'.

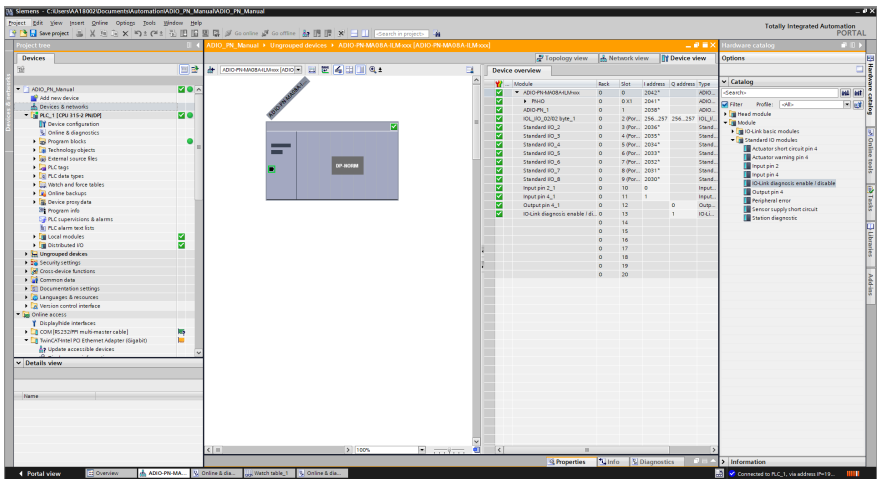
1.8. Download the Program to a PLC

In the TIA Portal, click  (Download to device) at the top of the screen to write the configuration information to connected PLC.

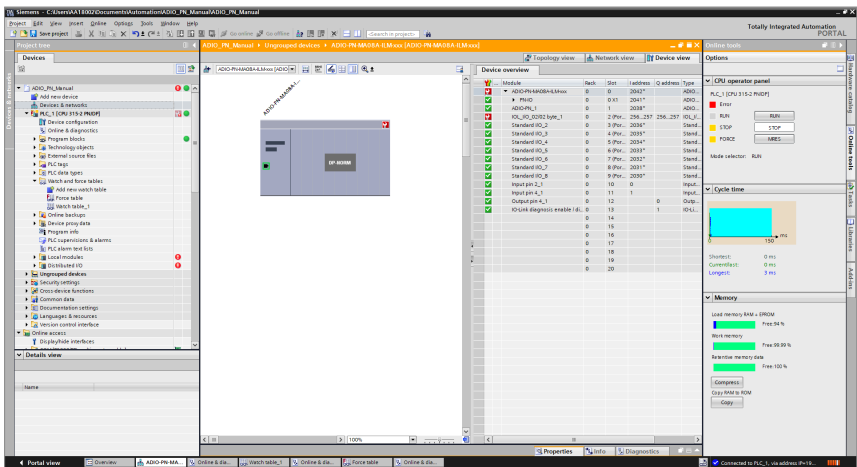


1.9. Check the Operation Status

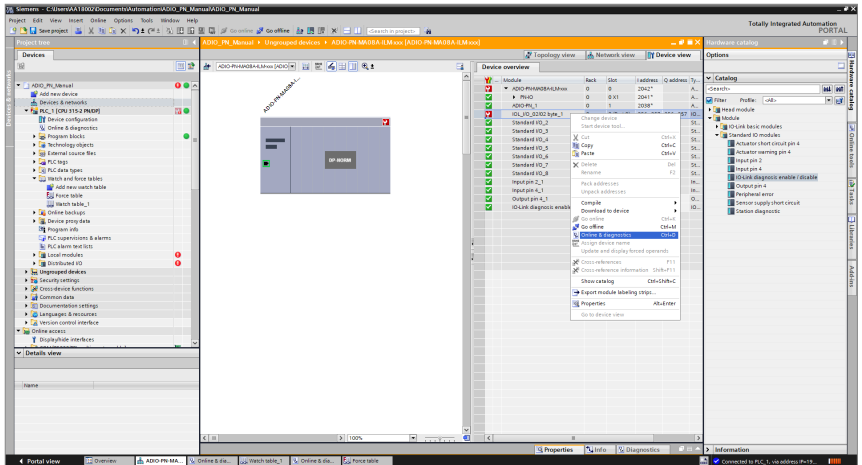
- The state of connection: normal
Green checkboxes are shown like the figure below.



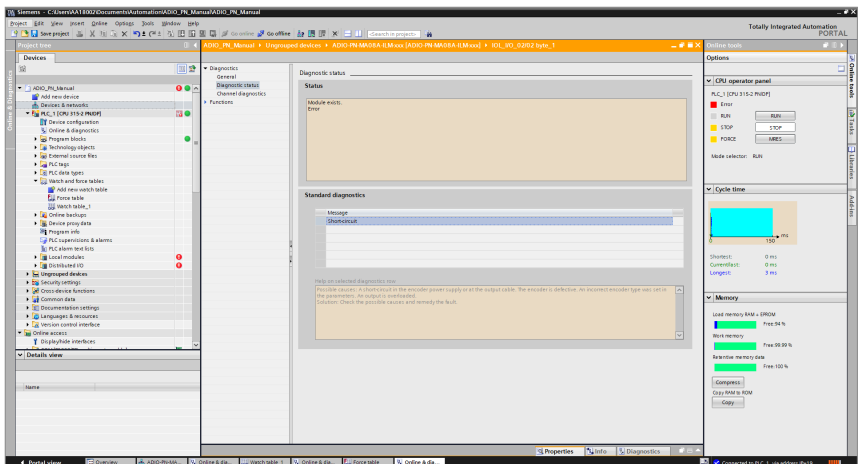
- The state of connection: error
1. Red checkboxes are shown like the figure below.



2. Right-click the corresponding port and select the **Online & diagnostics**.



3. Select the **Diagnostic status** to see error/diagnostic messages in the **Standard diagnostics**.



2. Slot

2.1. Slot 0: DAP

Slot	Subslot	Name	Description
0		ADIO-PN-MA08A-ILM-□□□	Device Access Point (DAP)
	X1	PN-IO	PROFINET functions
	X1 P1	Port 1 - M12	Ethernet port functions
	X1 P2	Port 2 - M12	

2.2. Slot 1 to 20: Parameter Data

Slot	Name	Description
1	ADIO-PN_1	Available to configure the functions including the global settings, port mode, safe state, and input filter in the module parameters. → 2.2.1, “Module Parameters: ADIO-PN”
2	Port 0	Assign the standard I/O or IOL module of the PROFINET modules and select the operation mode of each I/O port to the standard I/O (SIO) or IO-Link. In case of the IO-Link mode, the module parameters support the cycle time, validation, data storage, and ISDU Parameter 0,1. → 2.2.2, “Module Parameters: IO-Link” → 3, PROFINET Modules
3	Port 1	
4	Port 2	
5	Port 3	
6	Port 4	
7	Port 5	
8	Port 6	
9	Port 7	
10 to 20	-	Available to check the process data, port status, and diagnostic information via the PROFINET modules. → 3, PROFINET Modules

2.2.1. Module Parameters: ADIO-PN

Parameter	Function	Description and Values
Global settings	Global diagnosis	When the global diagnosis is selected, the power supply state of the sensor or actuator and diagnostic messages are transferred to the PROFINET Master. • Diagnostic information → 4, Diagnostics
	Low sensor undervoltage detection	
	Low actuator undervoltage detection	
Port mode	Function Port n. Pin 4	Configure the operation mode of pin 4 (SIO). • Input or Output
	Function Port n. Pin 2	Pin 2 supports the digital input mode only. • Input
Safe state	Safe state Port n. pin 4 (Function Port n. Pin 4: Output)	Define the behaviour of output on each I/O port when the communication connection is interrupted between the PROFINET Master and the ADIO-PN. • 0: Switch the output signal to Low • 1: Switch the output signal to High • Last value: Keep the previous state
Input Filter	Input Filter Port n. (Function Port n. Pin 2/4: Input)	The processing time of the digital input signal can be set via this function. The digital input filtering time suppresses unwanted input signal changes or eliminates noise from input signals to prevent a data distortion or chattering. It can also be used as ON Delay/OFF Delay depending on the selected filter time. • no filter • 250 us to 256 ms

2.2.2. Module Parameters: IO-Link

The following parameters can be configured via the IOL module of the IO-Link basic modules.
For detailed information, refer to 3, PROFINET Modules.

Parameter	Function	Description and Values
Cycle time	Cycle time	Select cycle time of the IO-Link device. - Automatic: Automatically set to the fastest cycle time 1.6 to 132.8 ms
Validation	Validation mode	Compare and verify a connected IO-Link device with a IO-Link device information stored in the IO-Link Master. - no validation: No validation is performed. - compatible: Compare Vendor ID and Device ID and then start the IO-Link communication only if they are matched.
	Vendor ID 0	Enter a Vendor ID of the IO-Link device.
	Vendor ID 1	
	Device ID 0	Enter a Device ID of the IO-Link device.
	Device ID 1	
	Device ID 2	
Data storage	Data storage settings	The whole parameters of IO-Link device are stored/uploaded in the IO-Link Master (Backup), or apply/download last updated parameters to the compatible IO-Link device (Restore). Firstly, configure the Validation mode as the compatible to use the data storage. - disable - Restore: Apply the parameter values of DS to the IO-Link device. - Backup / Restore: - Empty DS data: Store the parameter values of the connected IO-Link device in the IO-Link Master. - Contained DS data: Apply the parameter values to the IO-Link device.
ISDU Parameter 0,1	ISDU index (DEC)	The parameter index of the IO-Link device
	ISDU subindex (DEC)	The Parameter sub-index of the IO-Link device
	ISDU length (DEC)	Size of ISDU data to be written
	ISDU data (HEX)	Value or data of ISDU to be written

3. PROFINET Modules

3.1. IO-Link basic modules

Module	Description and Values
IOL_I/O_x/x byte	Configure the operation mode of each I/O port to the IO-Link. Select a suitable size of the IO-Link input or output process data. • IO-Link input and output: IOL_I/O_01/01 byte to IOL_I/O_32/32 byte • IO-Link input: IOL_I_01 byte to IOL_I_32 byte • IO-Link output: IOL_O_01 byte to IOL_O_32 byte
IO-Link communication state	It shows the port in the IO-Link communication. → 3.3, “Mapping: IO-Link basic modules”
IO-Link PD Valid	It shows the port with valid process data of the IO-Link. → 3.3, “Mapping: IO-Link basic modules”
Standard I/O	Configure the operation mode of each I/O port to the standard input and output mode. Be sure to assign the Input Pin 2, Input Pin 4, and Output Pin 4 from the standard IO modules additionally, since the input and output signals are shown on the separate modules. → 3.2, “Standard IO modules”

3.2. Standard IO modules

Module	Description and Values
Actuator short circuit pin 4	When the Function Port n. Pin 4 is Output, it shows short circuit state of each I/O port. • NPN: Short circuit between Pin 4 and Pin 1 (L+) • PNP: Short circuit between Pin 4 and Pin 3 (L-) → 3.4, “Mapping: Standard IO modules”
Actuator warning pin 4	When the Function Port n. Pin 4 is Output, it shows each I/O port that has no output signal but has voltage signal. → 3.4, “Mapping: Standard IO modules”
Input Pin 2	When the Function Port n. Pin 2 is Input, it shows each I/O port that has input signal on Pin 2. → 3.4, “Mapping: Standard IO modules”
Input Pin 4	When the Function Port n. Pin 4 is Input, it shows each I/O port that has input signal on Pin 4. → 3.4, “Mapping: Standard IO modules”
IO-Link diagnosis enable / disable	It shows disconnected IO-Link communication of each I/O port. If the global diagnosis is deactivated, this module will not be activated. → 2.2.1, “Module Parameters: ADIO-PN” → 3.4, “Mapping: Standard IO modules”
Output Pin 4	When the Function Port n. Pin 4 is Output, it shows each I/O port that has output signal on Pin 4. → 3.4, “Mapping: Standard IO modules”
Peripheral error	It shows the error state of each I/O port such as the Actuator short circuit pin 4 or Sensor supply short circuit. → 3.4, “Mapping: Standard IO modules”
Sensor supply short circuit	It shows each I/O port that has the short circuit to the supply voltage of the sensor. → 3.4, “Mapping: Standard IO modules”
Station diagnostic	It shows a fault that has occurred. → 3.5, “Mapping: Station diagnostic module”

3.3. Mapping: IO-Link basic modules

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

IO-Link basic modules IO-Link communication state
IO-Link PD Valid

3.4. Mapping: Standard IO modules

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

Standard IO modules Actuator short circuit pin 4
Actuator warning pin 4
Input Pin 2
Input Pin 4
IO-Link diagnosis enable / disable
Output Pin 4
Peripheral error
Sensor supply short circuit

3.5. Mapping: Station diagnostic module

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
S: IOL	Actuator warning	S: UA	S: US	Reserved	No UA	UA low	US low

S: IOL (IO-Link short circuit)	The short circuit occurred at Pin 4 (C/Q) and Pin 3 (L-) in the IO-Link mode. 0: Normal 1: Short circuit detected
Actuator warning	An error occurred corresponding to the module of Actuator warning pin 4. 0: Normal 1: An error occurred
S: UA (Actuator short circuit)	An error occurred corresponding to the module of Actuator short circuit pin 4. 0: Normal 1: An error occurred
S: US (Sensor supply short circuit)	An error occurred corresponding to the module of the Sensor supply short circuit. 0: Normal 1: An error occurred
No UA	No supply voltage of the actuator (< 10 VDC) 0: Normal 1: No actuator power
UA low	Low supply voltage of the actuator (< 18 VDC) 0: Normal 1: Low-voltage detected
US low	Low supply voltage of the sensor (< 18 VDC) 0: Normal 1: Low-voltage detected

4. Diagnostics

4.1. Channel Error Type and Diagnostic Messages

Error code (hex)	Message	Description
0x0001	Short circuit	In the IO-Link mode, the short circuit occurred at Pin 1 and 3, or Pin 3 and 4 on the I/O port.
0x0002	Undervoltage	Low supply voltage of the actuator (< 18 VDC)
0x0004	Overload	When the Function Port n. Pin 4 is Output, the overload occurs.
0x0006	Line break	The IO-Link communication is disconnected.
0x001B	Sensor has incorrect configuration (IO-Link device)	Invalid data length or Validation failed
0x0101	Actuator warning	When the Function Port n. Pin 4 is Output, an I/O port that has no output signal but has voltage signal is detected.

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Dimensions or specifications on this manual are subject to change and some models may be discontinued without notice.

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