PROFINET Communication Card

Version 1.0, Edit date 8/24

Safety precautions

The extension card can be installed and operated only by people who have taken part in professional training on electrical operation and safety knowledge, obtained the certification, and been familiar with all steps and requirements for installing, performing commissioning on, operating, and maintaining the device, and are capable of preventing all kinds of emergencies.

Before installing, removing, or operating the communication card, read the safety precautions described in this manual and the variable-frequency drive (VFD) operation manual carefully to ensure safe operation.

For any physical injuries or damage to the device caused due to your neglect of the safety precautions described in this manual and the VFD operation manual, our company shall not be held liable.

- You need to open the housing of the VFD when installing or removing the communication card. Therefore, you must disconnect all power supplies of the VFD and ensure that the voltage inside the VFD is safe. For details, see the description in the VFD operation manual. Severe physical injuries or even death may be caused if you do not follow the instructions.
- Store the communication card in a place that is dustproof and dampproof without electric shocks or mechanical pressure.
- The communication card is electrostatic sensitive. Take measurements to prevent electrostatic discharge when performing operations involving it.
- Tighten the screws up when installing the communication card. Ensure that it is firmly fixed and properly grounded.

Contents

Product confirmation

Check the following after receiving a communication extension card product:

- Whether the communication card is damaged.
- Whether the received communication card is the one you purchase according to the bar code label on the PCB.
- Whether all the following items are contained in the product package:
- One communication card, one tie wrap, one tie, one M3 screw, and one manual
- If the communication card is damaged, a wrong model is delivered, or some items are missing, contact the supplier in a timely manner.
- Confirm the environmental requirements for application.

Table 0-1 Environmental requirements

Item	Requirement
Operation temperature	-10–+50°C
Storage temperature	-20–+60°C
Relative humidity	5%–95%
Other weather conditions	No condensation, ice, rain, snow, or hail; solar radiation < 700 W/m^2
Air pressure	70–106 kPa
Vibration and impact	5.9m/s^2 (0.6g) at the sine vibration of 9 Hz to 200 Hz

PROFINET communication card

2.1 Overview

1. Thanks for choosing UNITRONICS PROFINET communication cards. This manual describes the function specifications, installation, basic operation and settings, and information about the network protocol. To ensure that you install and operate the product properly, read this manual and the communication protocol section in the VFD operation manual carefully before you use the product.
2. This manual only describes how to operate the PROFINET communication card and the related commands but does not provide details about the PROFINET protocol. For more information about the PROFINET protocol, read the related specialized articles or books.
3. This communication card is defined as a PROFINET slave station communication card and is used on a VFD that supports PROFINET communication (B7 Series).
4. The communication card supports the linear network topology and star-shaped network topology.
5. The communication card supports 32 inputs/outputs to read and write process data, read state data, and read and write function parameters of a VFD.

2.2 Features

1. Supported functions

- Supports the PROFINET protocol, and supports PROFINET I/O devices
- Provides two PROFINET I/O ports and supports the 100 M full-duplex operation
- Supports the linear network topology and star-shaped network topology.

2. Supported communication types

- Standard Ethernet channels:

Standard Ethernet channels are non real-time communication channels that use the TCP/IP protocol, and are mainly used for device parameterization and configuration and to read diagnosis data.

- Real-time (RT) communication channels:

RT channels are optimized channels for real-time communication. They take precedence over TCP (UDP)/IP, which ensures that various stations on a network perform data transmission with high time requirements at a certain interval. The bus period may reach the precision of millisecond. These channels are used to transmit data such as process data and alarm data.

- Isochronous real-time (IRT) communication channels

IRT channels are implemented through the built-in Switch-ASIC IRT chip. IRT communication can further shorten the processing time of the communication stack software, synchronizing data transmission of the program and device. The transmission delay is less than 1 ms, and the jitter is less than 1 μs. The typical application is motion control.

3. Communication ports

Standard RJ45 ports are used in PROFINET communication. The communication card provides two RJ45 ports with no transmission direction defined, and therefore you can insert a cable into the port without regard to its direction. Figure 0-1 shows the ports, and Table 0-1 describes the functions of the ports.

Figure 0-1 Two standard RJ45 ports

Table 0-1 Standard RJ45 port pins

Pin	Name	Description
1	TX+	Transmit Data+
2	TX-	Transmit Data-
3	RX+	Receive Data+
4	n/c	Not connected
5	n/c	Not connected
6	RX-	Receive Data-
7	n/c	Not connected
8	n/c	Not connected

4. State indicators

PROFINET communication card provides nine LED indicators to indicate its states. Table 0-2 describes the state indicators.

Table 0-2 State indicators

LED	Color	State	Description
LED1	Green		3.3 V power indicator
LED2 (Bus state indicator)	Red	On	Not connected through a network cable
		Blinking	Connected to the PROFINET controller through a network cable, but no communication established
		Off	Communication established with the PROFINET controller
LED3 (System fault indicator)	Red	On	PROFINET diagnosis enabled
		Off	PROFINET diagnosis disabled
LED4 (Slave ready indicator)	Green	On	TPS-1 communication stack started
		Blinking	TPS-1 waits for the initialization of MCU
		Off	TPS-1 communication stack not started
LED5 (Maintenance state indicator)	Green		Defined by the manufacturer, depending on the characteristics of the device
LED6/7 (Network port state indicator)	Green	On	PROFINET communication card connected to the PC/PLC through a network cable
		Off	PROFINET communication card not connected to the PC/PLC
LED8/9 (Network port communication indicator)	Green	On	PROFINET communication card communicating with the PC/PLC
		Off	PROFINET communication card not communicating with the PC/PLC

2.3 Electrical wiring

PROFINET communication card provides standard RJ45 ports and supports the linear and star topologies. Figure 0-2 and Figure 0-3 show the electrical wiring diagrams for different topologies.

Use CAT5, CAT5e, and CAT6 network cables for electrical wiring. When the communication distance is greater than 50 meters, use high-quality network cables that meet the national standards.

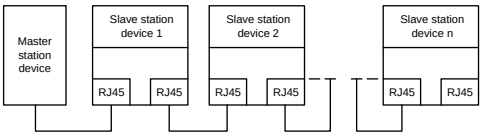


Figure 0-2 Electrical wiring diagram for a linear topology

Note: For the star-shaped network topology, you need to use a PROFINET switch.

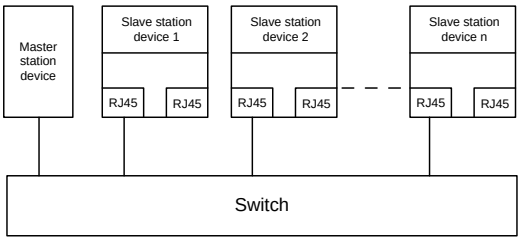


Figure 0-3 Electrical wiring diagram for a star topology

2.4 Communication

2.4.1 Packet format

Table 0-3 describes the structure of an RT frame (non-synchronous).

Table 0-3 Structure of an RT frame

Data header	**Ethernet type**	**VLAN**	**Ethernet type**	**Frame identifier**	**RT user data**	**Period counter**	**Data state**	**Transmission state**	**FCS**
	2 bytes	2 bytes	2 bytes	2 bytes	36–1440 bytes	2 bytes	1 byte	1 byte	4 bytes
	0x8100		0x8892						
	VLAN flag					APDU state			
Data header									
7-byte preamble	1-byte synchronization information		6-byte source MAC address			6-byte destination MAC address			

Table 0-4 describes the structure of the IRT frame (synchronous).

Table 0-4 Structure of an IRT frame

Data header				**Ethernet type**	**VLAN**	**Ethernet type**	**Frame identifier**	**IRT user data**	**FCS**
7-byte preamble	1-byte synchronization	6-byte source MAC address	6-byte destination MAC address	2 bytes	2 bytes	2 bytes	2 bytes	36–1440 bytes	4 bytes

2.4.2 PROFINET I/O communication

The PROFINET communication card supports 16-word input/output. Figure 0-4 shows the packet format for transmitting data with a VFD.

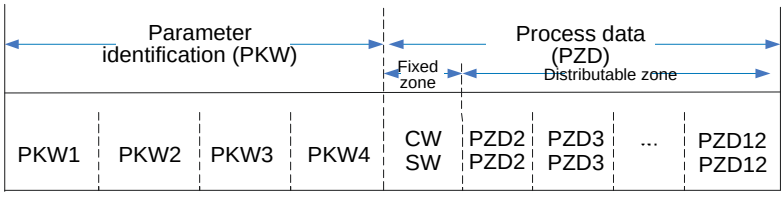


Figure 0-4 Packet structure

By using the 32 inputs/outputs, you can set the reference parameters of the VFD, monitor the status values, transmit control commands, monitor the running state, and read/write the function parameters of the VFD. For specific operations, see the following description.

Parameter zone:

PKW1—Parameter identification

PKW2—Array index number

PKW3—Parameter value 1

PKW4—Parameter value 2

Process data:

CW—Control word (transmitted from the master to a slave. For description, see

Table 0-5)

SW—Status word (transmitted from a slave to the master. For description, see Table 0-7.)

PZD—Process data (defined by users)

(When the process data is output by the master to a slave, it is a reference value; and when the process data is input by a slave to the master, it is an actual value.)

PZD zone (process data zone): The PZD zone in a communication packet is designed for controlling and monitoring a VFD. The master and slave stations always process the received PZD with the highest priority. The processing of PZD takes priority over that of PKW, and the master and slave stations always transmit the latest valid data on the interfaces.

CWs and SWs

Using CWs is the basic method of the fieldbus system to control VFDs. A CW is transmitted by the fieldbus master station to a VFD device. In this case, the adapter module functions as a gateway. The VFD device responds to the bit code information of the CW and feeds state information back to the master through an SW.

Reference value: A VFD device may receive control information in multiple channels, including analog and digital input terminals, VFD control panel, and communication modules such as RS485 To enable the control over VFD devices through PROFINET, you need to set the communication module as the controller of the VFD device.

Actual value: An actual value is a 16-bit word that includes information about VFD device operation. The monitoring function is defined through VFD parameters. The conversion scale of an integer transmitted as an actual value from the VFD device to the master depends on the set function. For more description, see the related VFD operation manual.

Note: A VFD device always checks the bytes of a CW and reference value.

Task packet (master station -> VFD)

CW: The first word in a PZD task packet is a VFD CW. You can select the expression method according to P15.43. Table 0-5 and Table 0-6 describe the control words (CWs) of the B7 series VFD.

Table 0-5 B7 series VFD CWs expressed in decimal format

Bit	Name	Value	Description
0–7	Communication-based control command	1	Forward running
		2	Reverse running
		3	Forward jogging
		4	Reverse jogging
		5	Stop
		6	Coast to stop (emergency stop)
		7	Fault reset
		8	Jogging to stop
		9	Decelerate to stop
8	Enable writing	1	Enable reading and writing (PKW1-PKW4)
9–10	Motor group setting	00	Motor 1
		01	Motor 2
11	Control mode switching	1	Enable torque/speed control switching
		0	Disable switching

Bit	Name	Value	Description
12	Reset power consumption to zero	1	Enable
		0	Disable
13	Pre-excitation	1	Enable
		0	Disable
14	DC braking	1	Enable
		0	Disable
15	Heartbeat reference	1	Enable
		0	Disable

Table 0-6 B7 series VFD CWs expressed in binary format

Bit	Name	Description	Priority
0	Forward running	0: Decelerate to stop 1: Forward running	1
1	Reverse running	0: Decelerate to stop 1: Reverse running	2
2	Fault reset	0: Disable 1: Enable	3
3	Coast to stop	0: Disable 1: Enable	4
4	Forward jogging	0: Disable 1: Enable	5
5	Reverse jogging	0: Disable 1: Enable	6
6	Jogging to stop	0: Disable 1: Enable	7
7	/	Reserved	
8	Enable reading and writing (PKW1-PKW4)	0: Disable 1: Enable	
9	/	Reserved	
10	Decelerate to stop	0: Disable 1: Enable	0: Top priority
11–15	/	Reserved	

Reference value (REF): The second to twelfth words in a PZD task packet are the main settings. The main frequency settings are provided by the main setting signal source. Table 0-7 describes the settings of B7 series VFD.

Table 0-7 Settings of B7 series VFD

Function code	Word	Value range	Default value
P16.32	Received PZD2	0: Invalid 1: Set frequency (0–Fmax, unit: 0.01 Hz) 2: PID reference (-1000–1000, in which 1000 corresponds to 100.0%) 3: PID feedback (-1000–1000, in which 1000 corresponds to 100.0%) 4: Torque setting (-3000–+3000, in which 1000 corresponds to 100.0% of the rated current of the motor) 5: Setting of the upper limit of forward running frequency (0–Fmax, unit: 0.01 Hz) 6: Setting of the upper limit of reverse running frequency (0–Fmax, unit: 0.01 Hz) 7: Upper limit of the electromotive torque (0–3000, in which 1000 corresponds to 100.0% of the rated current of the motor) 8: Upper limit of the brake torque (0–3000, in which 1000 corresponds to 100.0% of the rated current of the motor) 9: Virtual input terminal command, 0x000–0x3FF (bit9–bit0 correspond to S8/S7/S6/S5/HDIB/HDIA/S4/S3/S2/S1 in sequence) 10: Virtual output terminal command, 0x00–0x0F (bit3–bit0 correspond to RO2/RO1/HDO/Y1 in sequence) 11: Voltage setting (for V/F separation) (0–1000, in which 1000 corresponds to 100.0% of the rated voltage of the motor) 12: AO1 output setting 1 (-1000–+1000, in which 1000 corresponds to 100.0%) 13: AO2 output setting 2 (-1000–+1000, in which 1000 corresponds to 100.0%)	0
P16.33	Received PZD3		0
P16.34	Received PZD4		0
P16.35	Received PZD5		0
P16.36	Received PZD6		0
P16.37	Received PZD7		0
P16.38	Received PZD8		0
P16.39	Received PZD9		0
P16.40	Received PZD10		0
P16.41	Received PZD11		0
P16.42	Received PZD12		0

Function code	Word	Value range	Default value
		14: MSB of position reference (signed number) 15: LSB of position reference (unsigned number) 16: MSB of position feedback (signed number) 17: LSB of position feedback (unsigned number) 18: Position feedback setting flag (position feedback can be set only after this flag is set to 1 and then to 0) 19: Function code mapping (PZD2–PZD12 correspond to P14.49–P14.59 respectively.) 20–31: Reserved	

Response packet (VFD -> master station)

SW: The first word in a PZD response packet is a VFD SW. You can select the expression method according to P15.43.

Table 0-8 and Table 0-9 describe the control words (CWs) of the B7 series VFD.

Table 0-8 B7 series VFD SWs expressed in decimal format

Bit	Name	Value	Description
0–7	Running state	1	Forward running
		2	Reverse running
		3	Stopped
		4	Faulty
		5	POFF
8	Bus voltage established	1	Ready to run
		0	Not ready to run
9–10	Motor group feedback	0	Motor 1
		1	Motor 2
11	Motor type feedback	1	Synchronous motor
		0	Asynchronous motor
12	Overload pre-alarm feedback	1	Overload pre-alarm generated
		0	No overload pre-alarm generated
13–14	Run/Stop mode	0	Keypad-based control
		1	Terminal-based control
		2	Communication-based control
		3	Reserved
15	Heartbeat feedback	1	Heartbeat feedback
		0	No heartbeat feedback

Table 0-9 B7 series VFD SWs expressed in binary format

Bit	Name	Description	Priority
0	Forward running	0: Disable 1: Enable	1
1	Reverse running	0: Disable 1: Enable	2
2	Stopped	0: Disable 1: Enable	3
3	Fault	0: Disable 1: Enable	4
4	POFF	0: Disable 1: Enable	5
5	Pre-excited	0: Disable 1: Enable	6
6–15	/	Reserved	

Actual value (ACT): The second to twelfth words in a PZD task packet are the main actual values. The main actual frequency values are provided by the main actual value signal source. Table 0-10 lists the actual status values of the B7 series VFD.

Table 0-10 Actual status values of Goodrive350 series VFD

Function code	Word	Value range	Default value
P16.43	Transmitted PZD2	0: Invalid 1: Running frequency (×100, Hz) 2: Set frequency (×100, Hz) 3: Bus voltage (×10, V) 4: Output voltage (×1, V) 5: Output current (×10, A) 6: Actual output torque (×10, %) 7: Actual output power (×10, %) 8: Rotating speed of the running (×1, RPM) 9: Linear speed of the running (×1, m/s) 10: Ramp frequency reference 11: Fault code 12: AI1 value (×100, V) 13: AI2 value (×100, V) 14: AI3 value (×100, V) 15: HDIA frequency (×100, kHz) 16: Terminal input state 17: Terminal output state 18: PID reference (×100, %) 19: PID feedback (×100, %) 20: Rated torque of the motor 21: MSB of position reference (signed number) 22: LSB of position reference (unsigned number) 23: MSB of position feedback (signed number) 24: LSB of position feedback (unsigned number) 25: Status word 26: HDIB frequency value (×100, kHz)	0
P16.44	Transmitted PZD3		0
P16.45	Transmitted PZD4		0
P16.46	Transmitted PZD5		0
P16.47	Transmitted PZD6		0
P16.48	Transmitted PZD7		0
P16.49	Transmitted PZD8		0
P16.50	Transmitted PZD9		0
P16.51	Transmitted PZD10		0
P16.52	Transmitted PZD11		0
P16.53	Transmitted PZD12		0

PKW zone

PKW zone (parameter identification flag PKW1—numerical zone): The PKW zone describes the processing mode of the parameter identification interface. A PKW interface is not a physical interface but a mechanism that defines the transmission mode (such reading and writing a parameter value) of parameter between two communication ends.

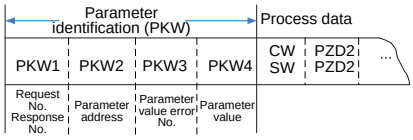


Figure 0-5 Parameter identification zone

In the periodic communication, the PKW zone consists of four 16-bit words. The following table describes the definition of each word.

First word PKW1 (16 bits)		
Bits 15–00	Task or response identification flag	0–7
Second word PKW2 (16 bits)		
Bits 15–00	Basic parameter address	0–247
Third word PKW3 (16 bits)		
Bits 15–00	Value (most significant word) of a parameter or error code of the returned value	00
Fourth word PKW4 (16 bits)		
Bits 15–00	Value (least significant word) of a parameter	0–65535

Note: If the master station requests the value of a parameter, the values in PKW3 and PKW4 of the packet that the master station transmits to the VFD are no longer valid.

Task request and response: When transmitting data to a slave, the master uses a request number, and the slave uses a response number to accept or reject the request.

Table 0-11 Task identification flag PKW1

Request No. (from the master to a slave)		Response signal	
Request No.	**Function**	**Acceptance**	**Rejection**
0	No task	0	—
1	Requesting the value of a parameter	1, 2	3
2	Modifying a parameter value (one word) [modifying the value only on RAM]	1	3 or 4
3	Modifying a parameter value (two words) [modifying the value only on RAM]	2	3 or 4
4	Modifying a parameter value (one word) [modifying the value on both RAM and EEPROM]	1	3 or 4
5	Modifying a parameter value (two words) [modifying the value on both RAM and EEPROM]	2	3 or 4

Note: The requests #2, #3, and #5 are not supported currently.

Table 0-12 Response identification flag PKW1

Response No. (from a slave to the master)	
Response No.	**Function**
0	No response
1	Transmitting the value of a parameter (one word)
2	Transmitting the value of a parameter (two words)
3	The task cannot be executed and one of the following error number is returned: 1: Invalid command 2: Invalid data address 3: Invalid data value 4: Operation failure 5: Password error 6: Data frame error 7: Parameter read only 8: Parameter cannot be modified during VFD running 9: Password protection

PKW examples

Example 1: Reading the value of a parameter

You can set PKW1 to 1 and PKW2 to 0A to read a frequency set through keypad (the address of the frequency set through keypad is 10), and the value is returned in PKW4. The following data is in hexadecimal format.

Request (master station -> VFD)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		...	PZD12	
Request	00	01	00	0A	00	00	00	00	xx	xx	xx	xx	xx	xx	...	xx	xx

0010: Parameter address

0001: Request for reading parameter values

Response (VFD -> master station)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		...	PZD12	
Response	00	01	00	0A	00	00	13	88	xx	xx	xx	xx	xx	xx	...	xx	xx

1388: Parameter value in address 10

0001: Response (parameter value updated)

Example 2: Modifying the value of a parameter (on both RAM and EEPROM)

You can set PKW1 to 4 and PKW2 to 0A to modify a frequency set through keypad (the address of the frequency set through keypad is 10), and the value to be modified (50.00) is in PKW4.

Request (master station -> VFD)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		...	PZD12	
Request	00	04	00	0A	00	00	13	88	xx	xx	xx	xx	xx	xx	...	xx	xx

1388: Parameter value in address 10

0004: Parameter value to be modified

Response (VFD-> master station)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		...	PZD12	
Response	00	01	00	0A	00	00	13	88	xx	xx	xx	xx	xx	xx	...	xx	xx

0001: Response (parameter value updated)

PZD examples: The transmission of the PZD zone is implemented through VFD function code settings. For the function codes, see the related UNITRONICS VFD operation manual.

Example 1: Reading the process data of a VFD

In this example, PZD3 is set to "8: Rotating speed of the running" through the VFD parameter P15.14. This operation sets the parameter forcibly. The setting remains until the parameter is set to another option.

Response (VFD -> master station)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		…	PZD12	
Response	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	00	0A	…	xx	xx

Example 2: Writing process data to a VFD device

In this example, PZD3 is set to "2: PID reference" through the VFD parameter P15.03. The parameter specified in each request frame is updated with the information contained in PZD3 until another parameter is specified.

Request (master station -> VFD)

	PKW1		PKW2		PKW3		PKW4		CW		PZD2		PZD3		…	PZD12	
Response	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	00	00	…	xx	xx

Subsequently, the information contained in PZD3 is used as tractive force reference in each request frame until another parameter is specified.

2.5 Example of PLC communication

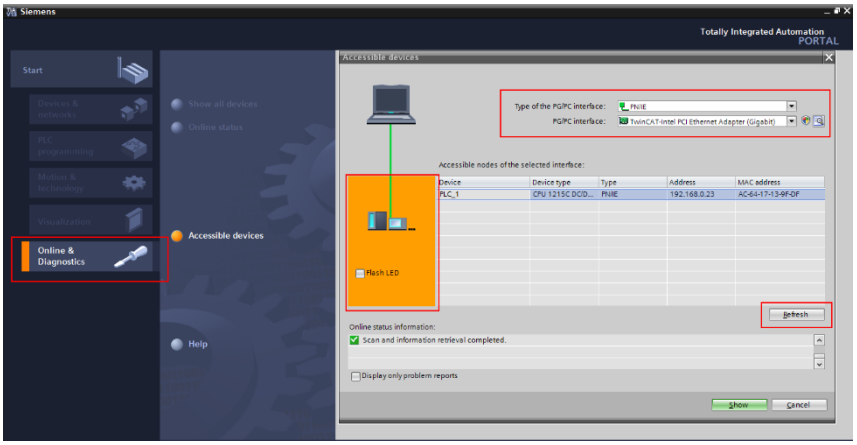
This example shows how to use a Siemens S7-1200 series PLC to communicate with the PROFINET adapter module (through using the TIA Portal V13 PC software as the configuration tool).

2.5.1 Parameter configuration

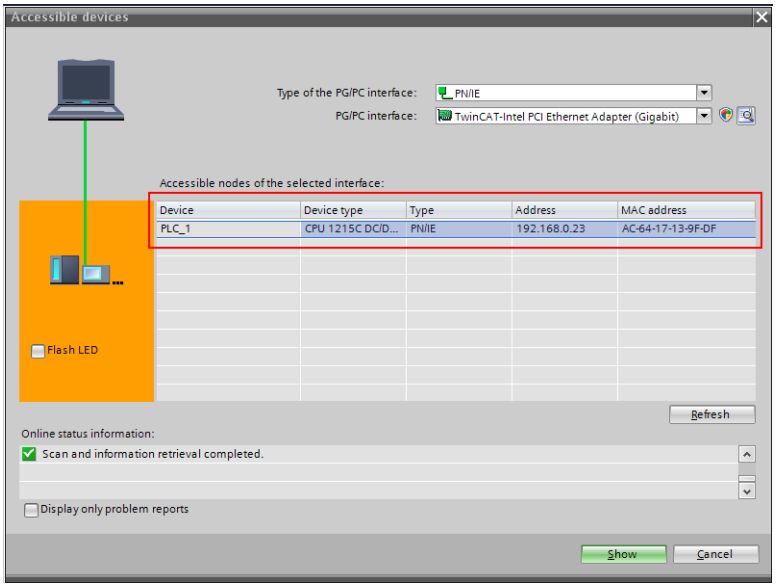
Connect the PLC to the PC with a standard network cable, and set the computer IP (e.g. 192.168.0.100) in the PC network settings. Set the IP and name of the PLC.

1) Open the "TIA PORTAL V13" software, and click "Online & Diagnostics" --> "Accessible Devices" on the left. Select "PN/IE" in the drop-down list of "Type of the PG/PC interface", select the Ethernet port in

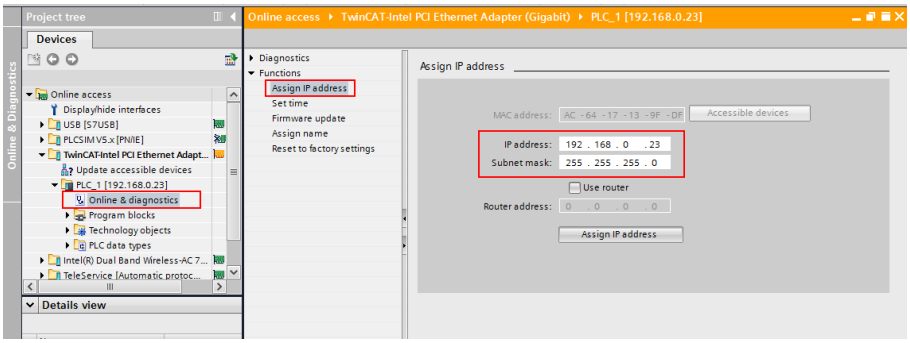
the "PG/PC Interface", and finally click "Refresh" to scan the connected PLC devices, as shown in the following figure.



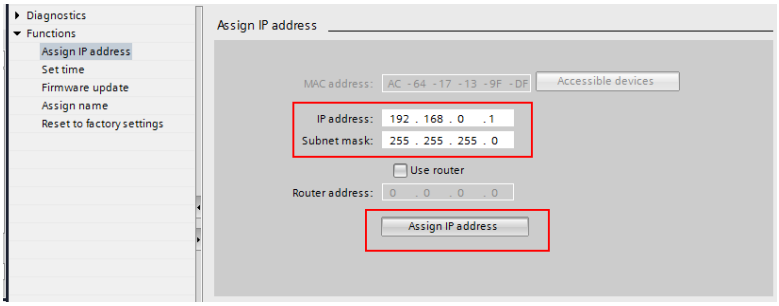
2) If the connection between the PLC and PC is normal, after scanning is completed, the PLC device will appear in the device bar, as shown in the red box of the following figure. The device bar displays the device, device type and device MAC address. Then click the "Show" button in the lower right corner to enter the device settings.



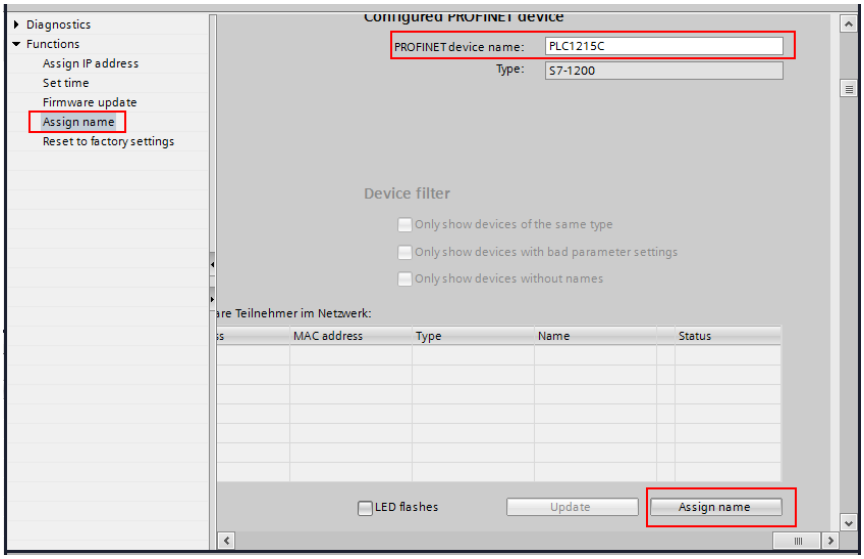
3) Click "Online & Diagnostics" in the device tree, click "Assign IP Address" under the "Functions" on the right of the menu bar, and set the IP address and subnet mask of the PLC shown in the red box marked ③, to ensure that the IP address of the PC and the IP address of the PLC are in the same network segment, as shown in the following figure.



4) Set the IP address of the PLC to "192.168.0.1" and subnet mask to "255.255.255.0" (you can check "Use router", that is, the router assigns IP). Click the "Assign IP address" button after the setting is completed, as shown in the following figure.

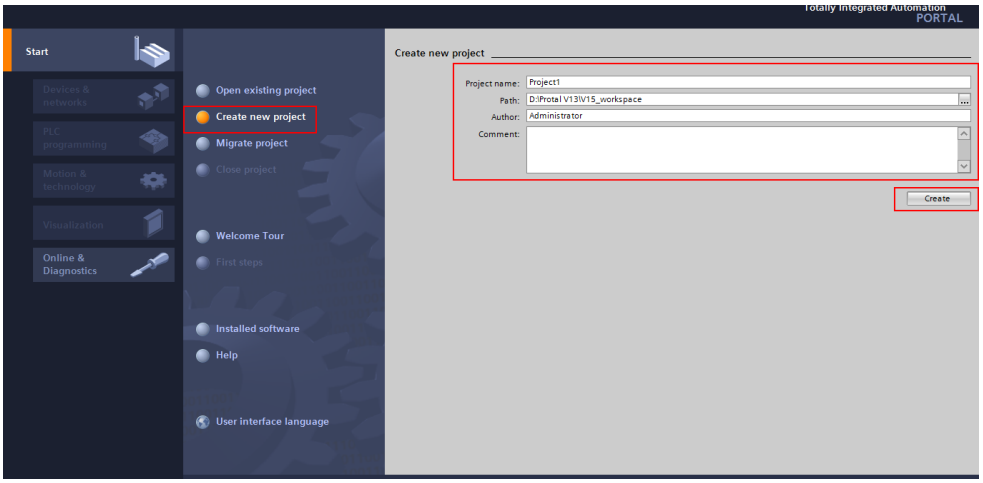


5) Click "Assign Name", and mark the PLC name in the position shown in the red box marked ②, such as "PLC1215C". Click the "Assign Device Name" button, as shown in the following figure.

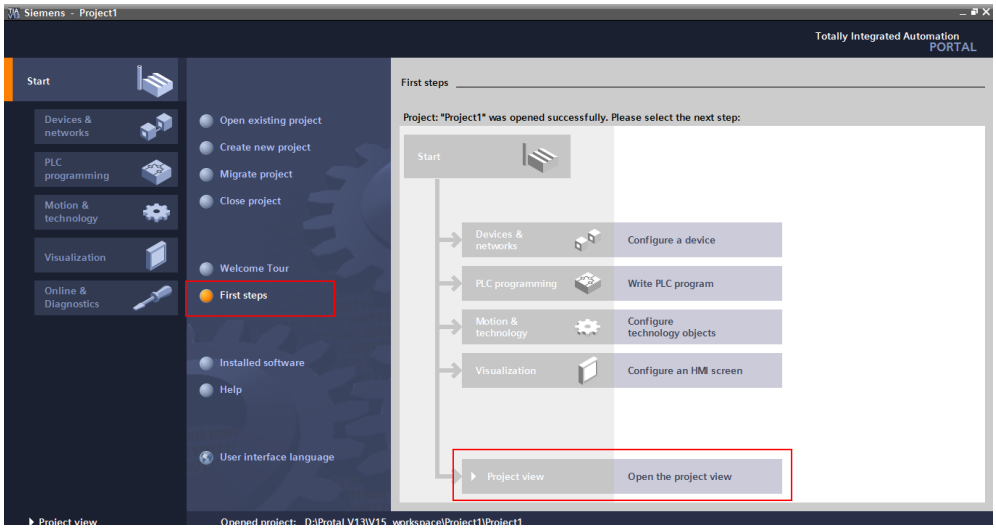


2.5.2 Create a new project

Double click the TIA PORTAL V13 icon to open the TIA PORTAL V13 project tool. Click the "Create new project" button to create a new project, add project name, project storage path, author, comment and other related information, and click the "Create" button to create a new project, as shown in the following figure.

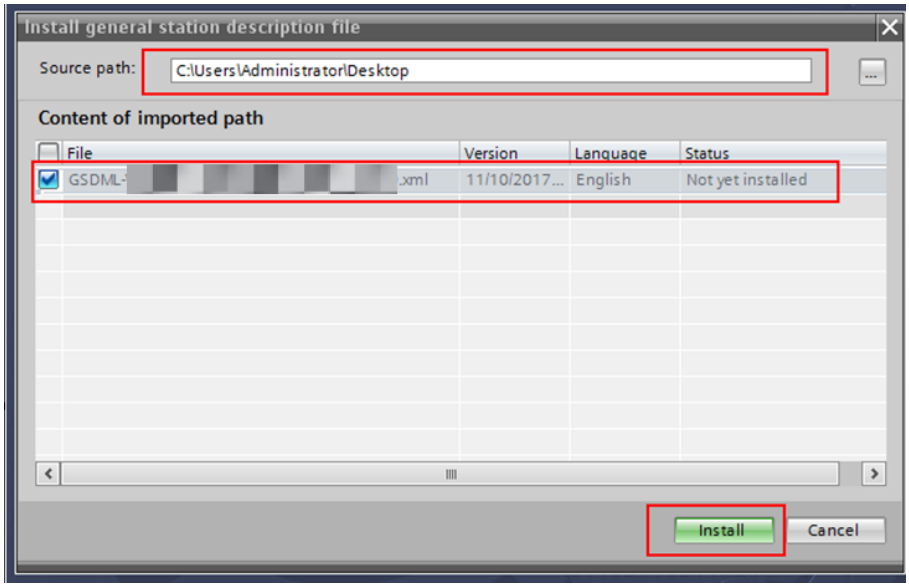


After creating a new project, double click "Open the project view", as shown in the following figure.

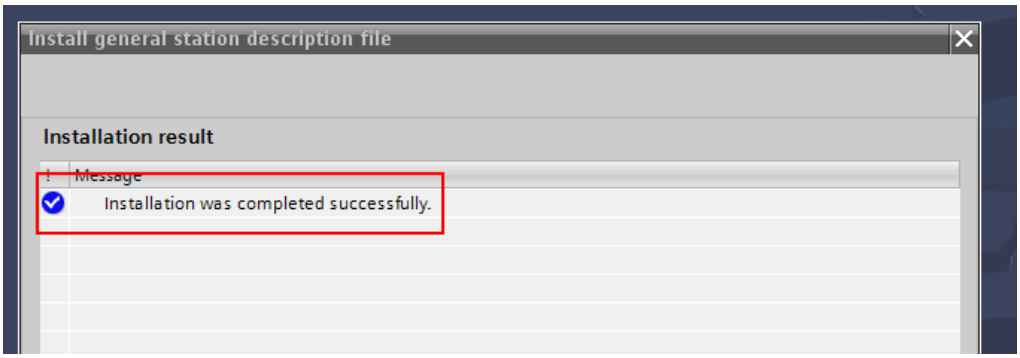


2.5.3 Add GSD files

In the project view, click "Options" on the toolbar, select the "Manage general station description files (GSD)" option from the drop-down list, and a box pops up, as shown in the following figure. Enter the file directory where the UNITRONICS GSD file is located in the source path, select the GSD file, and click the "Install" button to start the installation.



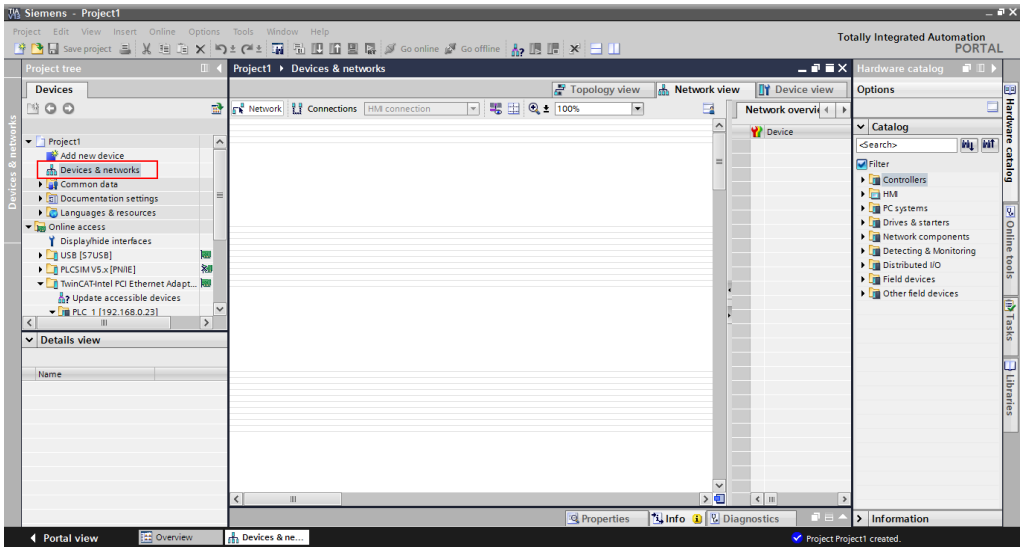
After the installation was completely successful, a prompt pops up, indicating that the GSDML file has been installed successfully, as shown in the following figure.



2.5.4 Configure the basic information of the project

1) Enter the "Devices & networks" view interface.

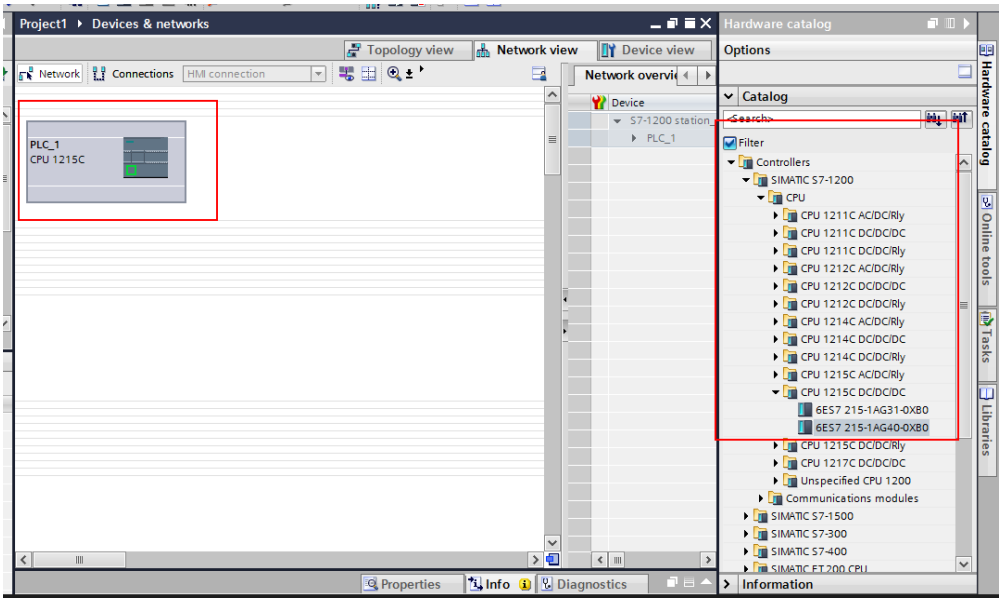
In the project view, select and double click "Devices & networks" in the project tree on the left to enter the "Network overview" view interface, as shown in the following figure.



2) Add Project device and PROFINET network.

(1) Add PLC S7-1215C to the "Devices & networks" view.

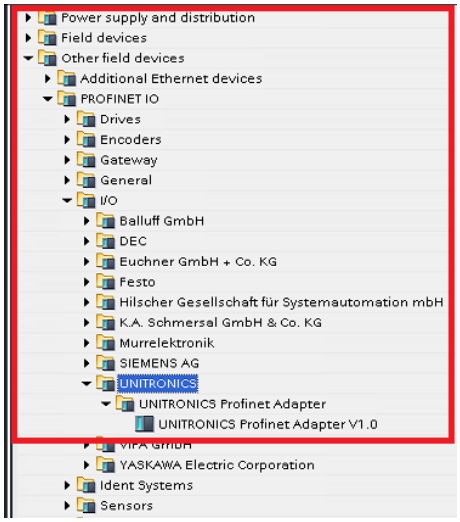
In the "Hardware catalog" on the right sidebar, select "Controller" → "SIMATIC S7-1200" → "CPU" → "CPU 1215C AC/DC/Rly" → "6ES7 215-1BG40-0XB0", and double click the "6ES7 215-1BG40-0XB0" icon or drag it to the project, as shown in the following figure.



(2) Add the UNITRONICS communication card to the "Devices & networks" view.

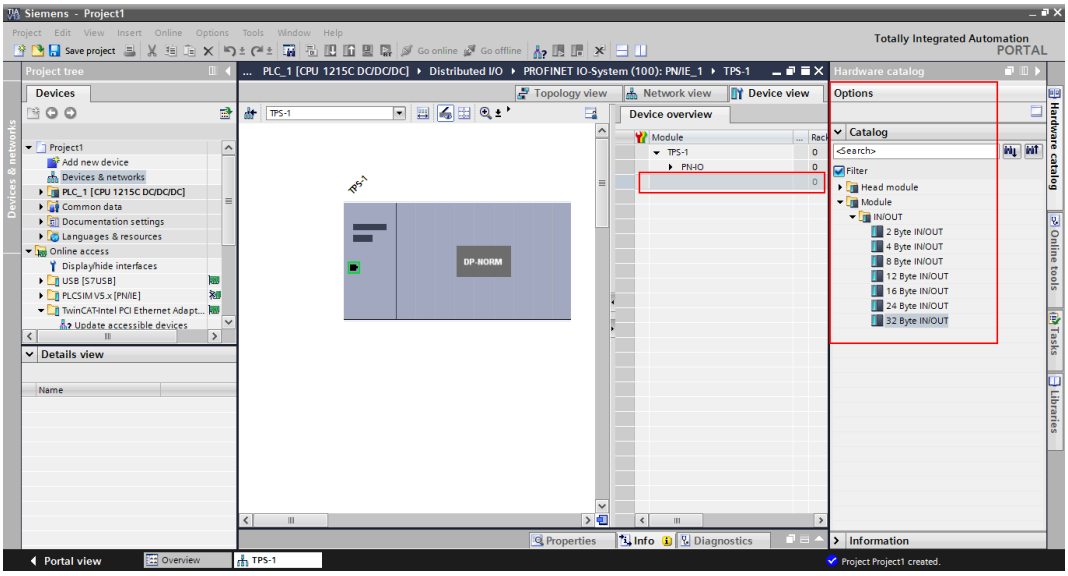
In the "Hardware Catalog", click "Other field devices" → "Profinet IO" → "I/O" → "UNITRONICS" → "UNITRONICS Profinet Adapter" → "UNITRONICS Profinet Adapter V1.0", and double click the "UNITRONICS Profinet Adapter V1.0" icon or drag it to the view of "Devices & networks". The communication card is displayed as "Not assigned", as shown in the following figure.

Click the "Not assigned" option of "UNITRONICS Profinet Adapter V1.0" and select the IO controller "PLC_1. PROFINET IO-System", then CPU and UNITRONICS Profinet in the network view are connected to the same Profinet subnet, as shown in the following figure.

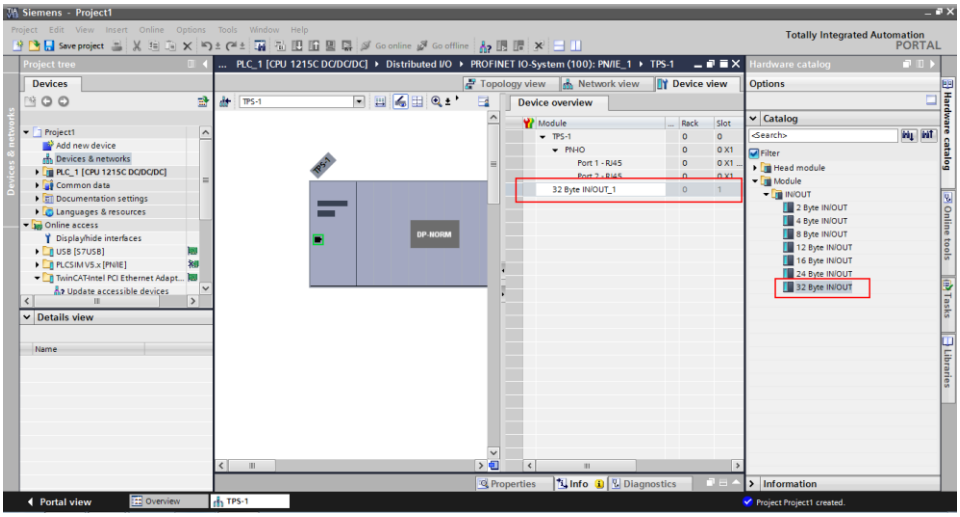


(3) Add the UNITRONICS I/O sub-module to the project.

Double click the "UNITRONICS Profinet Adapter V1.0" icon in the "Devices & Networks" view to enter the "Device view" interface, as shown in the following figure.



Click the "Hardware Catalog" on the right → "Module", double click the "32 Byte IN/OUT" module or drag it to the blank space in the "Device view", and the "32 Byte IN/OUT" module is added to the project, as shown in the following figure.



(4) Simple configuration of S7-1215C and UNITRONICS Profinet parameters.

<1> Configure parameters of PLC S7-1215C.

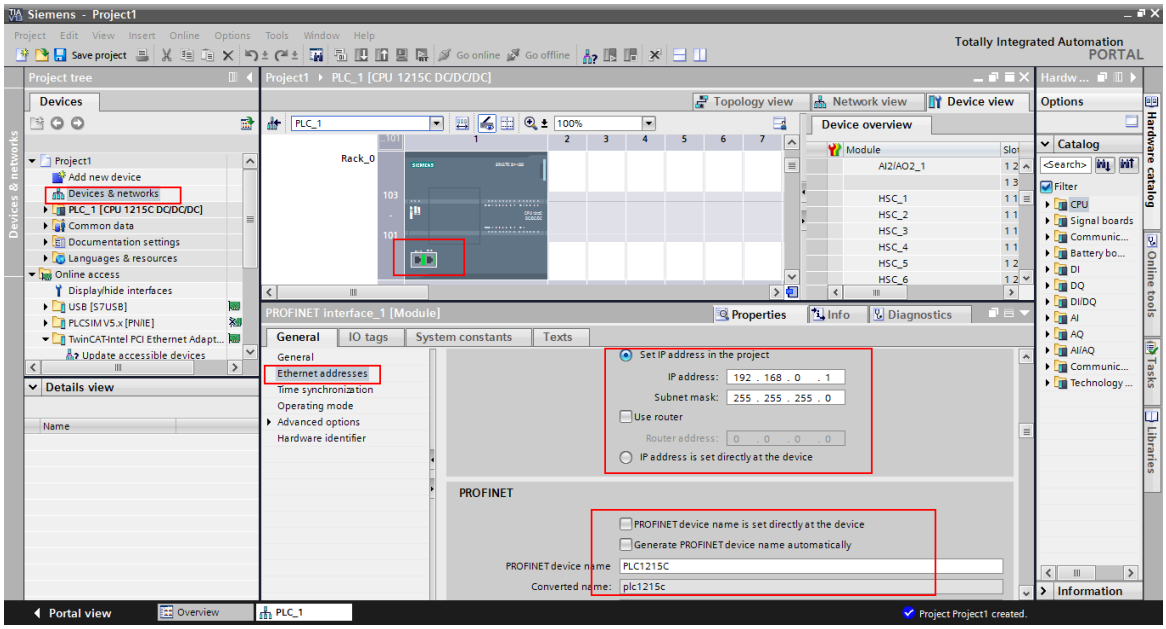
Double click the "Devices & Networks" option to enter the view interface of "Devices & Networks".

Double click the "PLC S7-1215C" icon in the interface to enter the "Device view" interface of the PLC.

Double click the network interface position in the PLC icon to enter the properties editing interface bar of "PROFINET interface_1".

Click the "Ethernet addresses" option in the "General" list to set the PLC address and name (In this example, IP address of the PLC is 192.168.0.1 and PLC name is PLC1215C).

Operations are shown in the following figure.



<2> Configure parameters of the UNITRONICS Profinet communication card.

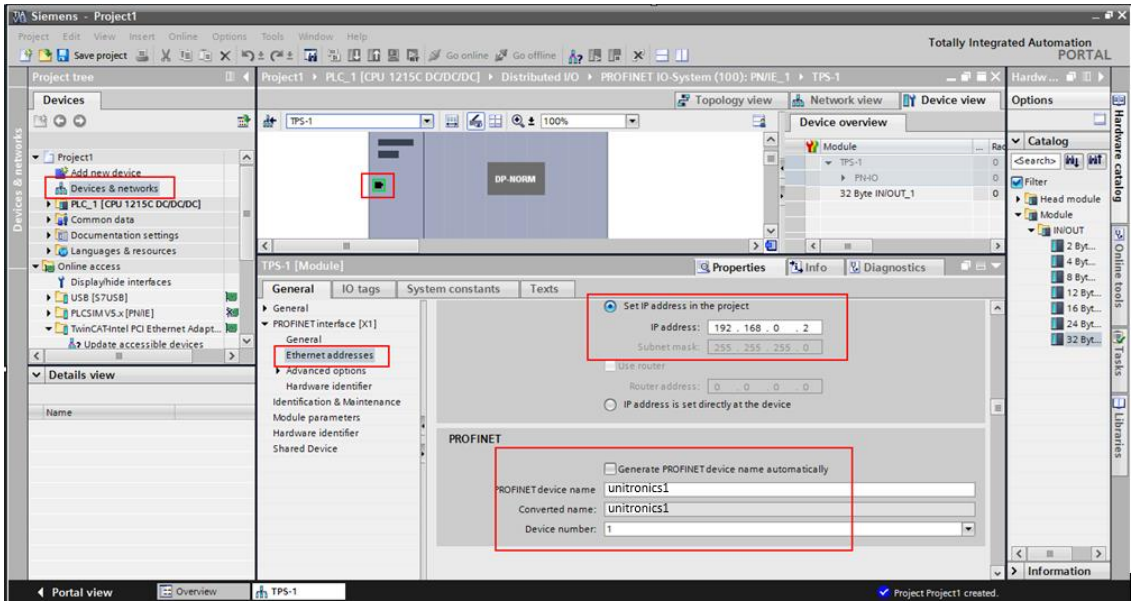
Double click the "Devices & Networks" option to enter the view interface of "Devices & Networks".

Double click the "UNITRONICS Profinet Adapter V1.0" icon in the interface to enter the "Device view" interface of the communication card.

Double click the network interface position in the UNITRONICS Profinet communication card icon to enter the properties editing interface bar of PROFINET interface.

Click the "PROFINET interface [X1]" option in the "General" list, and click the "Ethernet addresses" option. Configure parameters of the UNITRONICS PROFINET communication card according to the parameters shown in the following figure such as IP address and device name of the communication card (in this example, IP address of the communication card is 192.168.0.2 and the name is unitronics1).

Operations are shown in the following figure.



2.5.5 Assign the device name of the IO device (UNITRONICS communication card)

After the CPU and UNITRONICS Profinet communication card are successfully connected to the PC through the network cable, click "Online access" on the left to find the network card corresponding to the PC that is connected to the PLC and communication card.

In all displayed devices, find the UNITRONICS communication card device and click it, such as emc (192.168.0.2) device, as shown in the following figure (**Note:** When the communication card is used for the first time, there is no device name, and only the default IP can be scanned) .

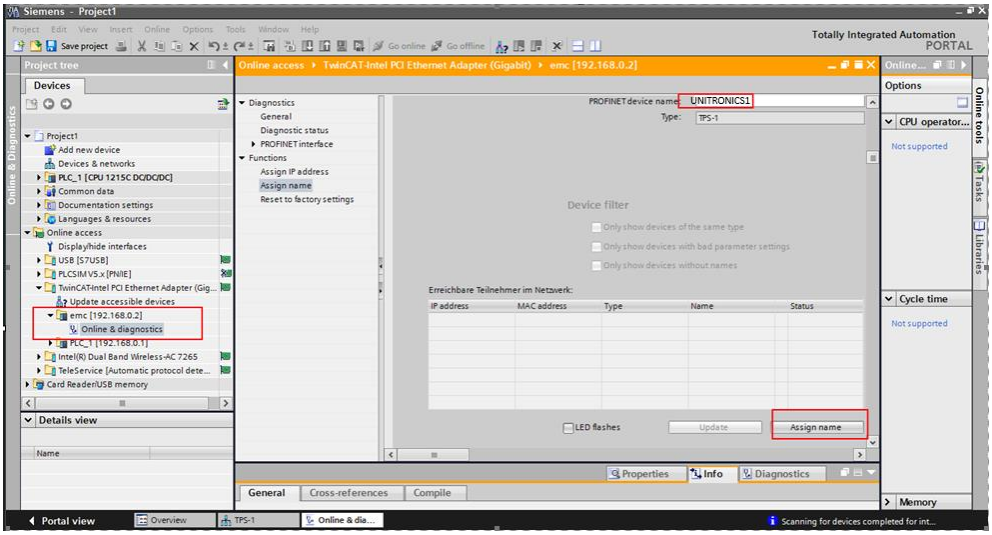
Double click "Online & Diagnostics" to enter the online diagnostics state.

Click "Functions" → "Assign name" to enter the "Assign name" interface.

Enter the communication card name in "PROFINET device name", and click "Assign Name" in the lower right corner to confirm.

Note: The name of the PROFINET communication card set online must be consistent with that set in the configuration project, otherwise PROFINET communication cannot be carried out between the devices.

The operation steps are shown in the following figure.



2.5.6 Save, compile, and download

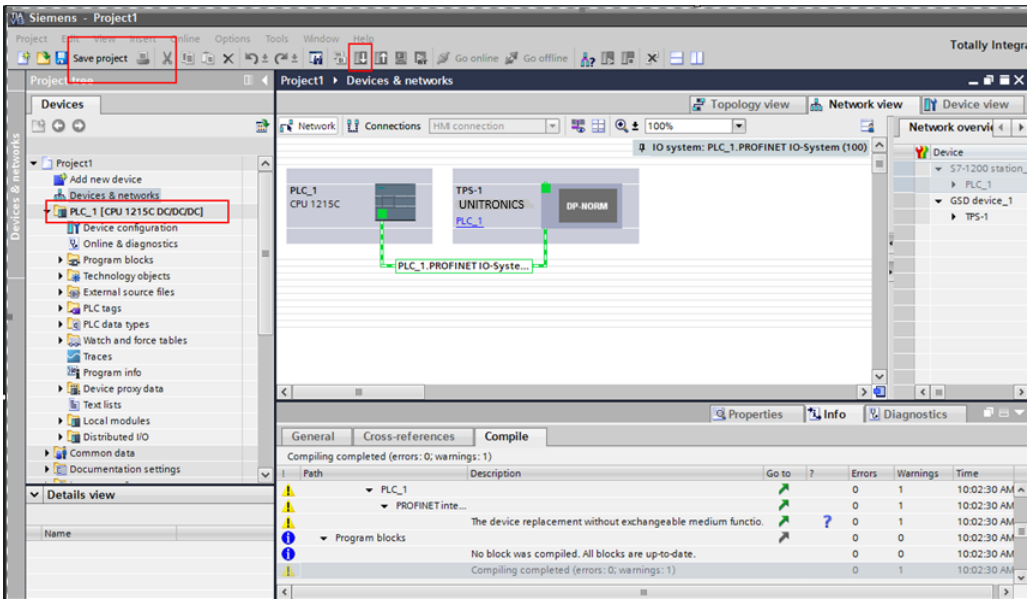
Download the project configuration information to the PLC S7-1215C after the entire project configuration is completed.

Click "Save Project" to save the entire project.

Right click "PLC_1 [CPU 1215C AC/DC/Rly]" → left click "Compile" → "Hardware and software (change only)" to compile the entire project.

Click the "Download to device" icon to download the project configuration to the PLC controller.

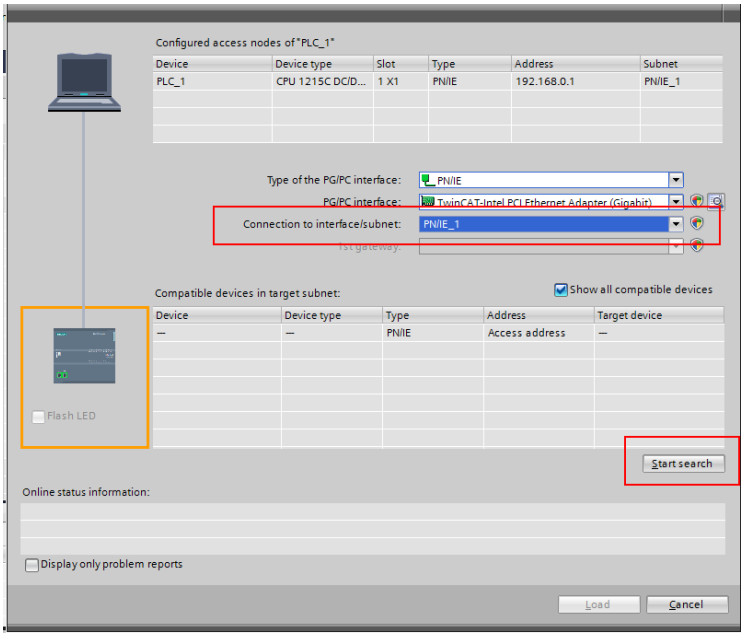
Operations are shown in the following figure.



In the download dialog box, search for the connected PLC device, as shown in the following figure.

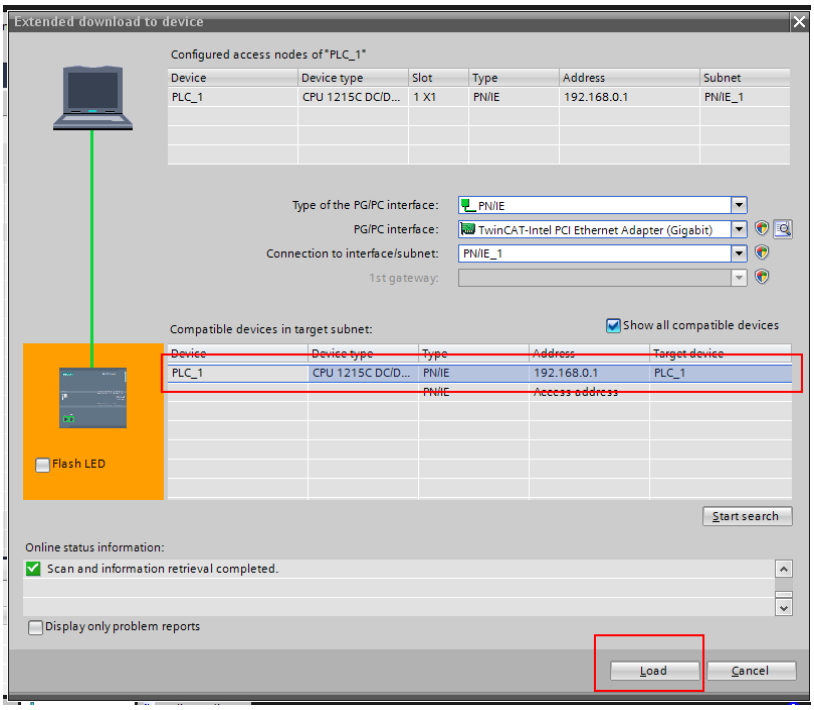
Select the "PN/ IE_1" option in the drop-down list of "Connection to interface/subnet".

Click the "Start search" button in the lower right corner to start scanning and detecting PLC devices in the subnet.



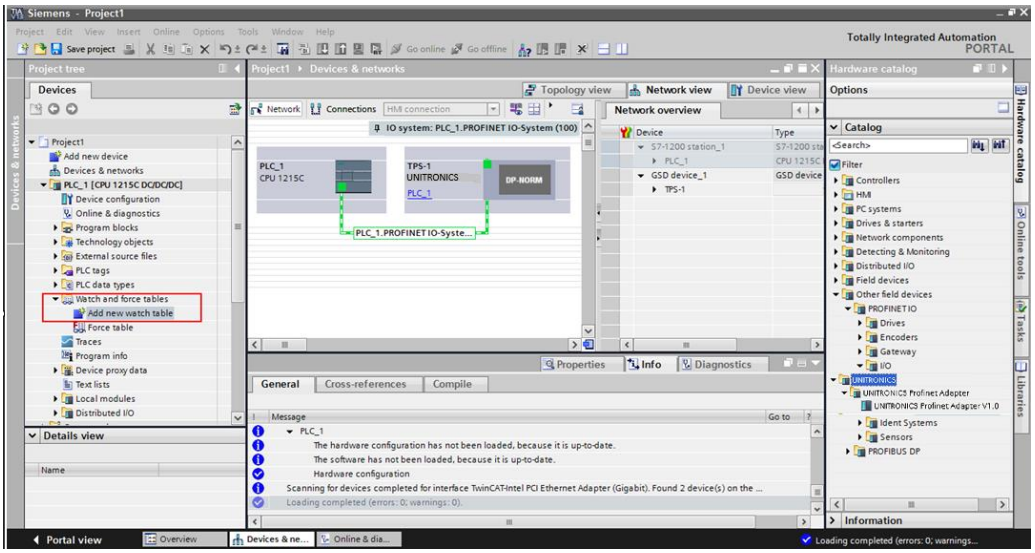
After searching is completed, the PLC S7-1215C that is connected to the PC will be displayed in the list of "Compatible devices in target subnet", as shown in the following figure.

Select the PLC to be downloaded in the following figure, and click the "Download" button to download the configuration information and PLC program to the selected PLC.

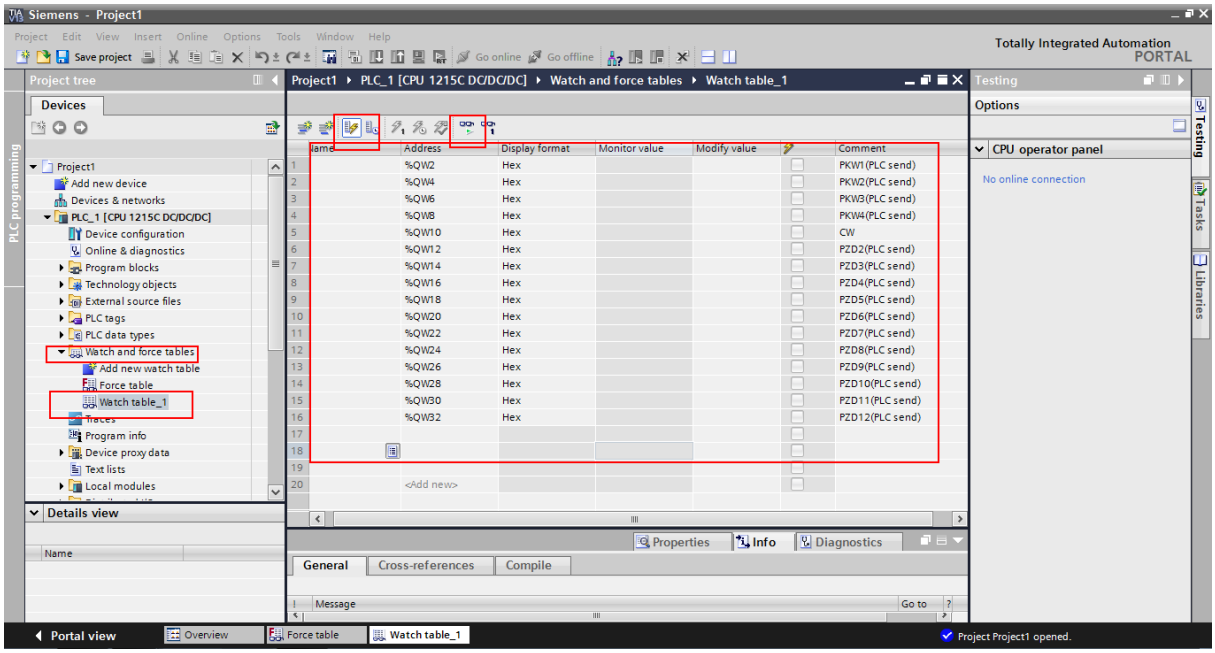


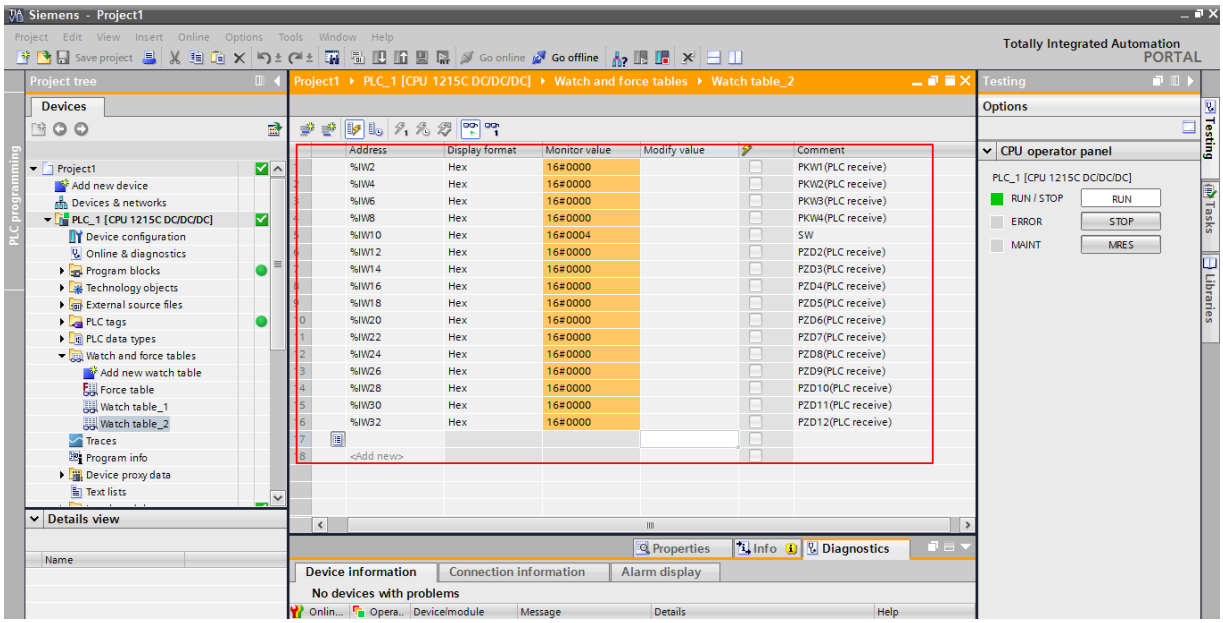
2.5.7 VFD parameter watching

Click "Watch and force tables" in the left menu bar, and double click "Add new watch table" in the drop-down menu, as shown in the following figure.



Create target watch variables—PZD, PKW, control word and status word variables of the VFD in the newly created watch table, as shown in the following figure.





After the watch variables are created, click the "Watch all" button in the watch table to monitor the values of all variables, and click the "Modify parameters" button in the watch table to modify the parameters of the target variable, so as to watch the VFD through the PLC.