VEICHI

VM-RTU-ECT Module

Manual

Stock Code: 688698

VM-RTU-PN Communication Interface Module

Manual

Version V1.1

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Veichi Electric Co., Ltd. provides customers with a full range of technical support, so users can reach the nearest Veichi Electric Co., Ltd. office or customer service center, or the company headquarters directly.

Veichi Electric Co.

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Preface

■ Profile

VM-RTU-PN is a PROFINET communication interface module of VM series. It supports PROFINET communication and fits for PROFINET master devices such as Siemens S7-1500 and S7-1200. One PROFINET communication module unit can connect up to 16 VM series common IO modules. When there are more than 16 modules, it is necessary to add a VM-RTU-PN communication interface module for power supply (every expansion of 16 IO modules requires an additional VM-RTU-PN communication interface module for power supply).

■ Version Change Log

Revision date	Version	Content
2023-3	A1.0	
2022-11	A1.0	First release of the manual

■ Manual Access

This manual is not shipped with the product, so users can get its PDF version in the following way:

- Log on to the official website of Veichi Electric (www.veichi.com), "Service and Support-Download", type in keywords and download.
- Scan the QR code on the product body to get the manual with mobile phone.

■ Warranty Statement

If malfunctions or damage occur on the product under normal use, Veichi Electric offers 18-month warranty (from the date of shipment from the factory, subject to the bar code on the body, and in accordance with the agreements between parties if there are some). Customers will be charged if it exceeds 18 months while damages caused by the following conditions will be charged if it is within 18 months.

- Product damage caused by wrong methods against this manual.
- Product damage caused by fire, flood, or abnormal voltage.
- Product damage caused for abnormal functions against this manual.
- Product damage caused for unspecified purposes against this manual.
- Secondary damage to the product caused by force majeure (natural disasters, earthquakes, lightning strikes) factors.

The relevant service costs are calculated according to the manufacturer's standards, and if there is a contract, the contract will be handled on a priority basis. Please refer to the Product Warranty Card for detailed warranty description.

Safety Precaution

■ Safety Statement

- Read and follow these safety precautions before installing, operating, and maintaining the product.
- Follow all safety precautions stated on the product's labeling and in the manual when installing, operating, and maintaining the product for personal and equipment safety.
- The "CAUTION", "WARNING" and "DANGER" items in this manual do not mean all safety precautions to be observed, but are only supplementary to safety precautions.
- This product shall be used in an environment that complies with the design specifications, otherwise it may cause malfunction, and malfunction or damage to parts caused by failure to comply with the relevant regulations are not covered by the product warranty terms.
- Veichi will not take on any legal responsibility for personal safety accidents, property damage, etc., caused by unauthorized operation of the product.

■ Safety Level Definition

: "DANGER" means death or serious bodily injuries if not operated in accordance with the regulations.

: "WARNING" means death or serious bodily injuries if not operated in accordance with the regulations.

: "CAUTION" means minor bodily injuries or damage to the equipment if not operated in accordance with the regulations.

Keep this guide in a safe place in case it is needed, and be sure to give this manual to the end user.

During Control System Design
 : ➢ Be sure to design safety circuits so that the control system will still work safely when the external power supply drops out or the programmable controller malfunctions; ➢ If the rated load current is exceeded or the load is short-circuited, etc., resulting in prolonged overcurrent, the module may smoke or is on fire, so safety devices such as fuses or circuit breakers shall be installed externally.
 : ➢ Be sure to provide emergency brake circuits, protection circuits, interlock circuits for forward and reverse operation, and upper and lower position interlock switches to prevent damage to the machine in the external circuits of the programmable controller;

- Design external protection circuits and safety mechanisms for output signals related to major accidents for safe operation of the equipment;
- The programmable controller CPU may stop all output when it detects an abnormality in its own system; when some of the controller's circuits fail, output may turn uncontrolled. Please design suitable external control circuits in order to ensure normal operation;
- Damage to output units such as relays and transistors of programmable controllers will cause their output uncontrolled to the ON or OFF state;
- The programmable controller is designed to be used in indoor, overvoltage class II electrical environments, and its power supply system should be equipped with lightning protection to ensure that lightning overvoltage is not added to the programmable controller's power input or signal input, control output and others, so as to avoid damage to the equipment.

Installation

:

- Only maintenance professionals with adequate electrical knowledge and training related to electrical equipment should carry on installation work;
- When removing or installing a module, the external power supply to the system must be completely disconnected beforehand. Failure to fully disconnect the power supply may result in electric shock or module malfunction and misoperation;
- Do not use the programmable controller in the following places: places with dust, grease, conductive dust, corrosive gases, flammable gases; places exposed to high temperature, condensation, wind and rain; and places subject to vibration and shock. Electric shock, fire, and misuse can also cause damage and deterioration to the product;
- Programmable controllers are open type devices, please install them in control cabinets with door locks (protection of the control cabinet housing > IP20), and only operators who have been trained with sufficient electrical knowledge about equipment shall open the control cabinets.

:

- Avoid metal shavings and wire ends falling into the ventilation holes of the controller during installation, which may cause fire, malfunction, and misoperation;
- Ensure that there is no foreign matter on its ventilation surface after installation, otherwise it may lead to poor heat dissipation, which may cause fire, malfunction, and misoperation;
- Connect the modules tightly to their respective connectors and lock the module connection hooks securely. Improper installation of the module may result in malfunction, malfunction and disconnection.

Wiring

:

- Wiring of this product should only be carried out by specialized maintenance personnel with adequate

electrical knowledge and training related to electrical equipment;

- During wiring, the external supply power to the system must be fully disconnected in advance. Failure to do so may result in electric shock or equipment failure or malfunction;
- The terminal cover supplied with the product must be installed before power-up and operation. Failure to install the terminal cover may result in electric shock;
- The cable terminals should be well insulated to ensure that the insulation distance between the cables is not reduced after the cables are installed in the terminal block. Failure to do so may result in electric shock or equipment damage.

:

- To avoid electric shock, disconnect the power supply before connecting the power supply to this product;
- The input power supply of this product is DC24V, if the supplied power is not within ±20% of DC24V, this product will be seriously damaged. Therefore, please check whether the DC power supply provided by the switching power supply is stable or not regularly.

Maintenance

:

- Only specialized maintenance personnel with adequate electrical knowledge and training related to electrical equipment shall carry out the operational maintenance of the product;
- When cleaning the module or re-tightening the bolts on the terminal strip or connectors, the external power supply to the system must be completely disconnected. Failure to do so may result in electric shock;
- When disassembling a module or making connections to or removing communication cables, the external supply power to the system must first be completely disconnected. Failure to fully disconnect may result in electric shock or malfunction.

Safety Recommendations

- Please consider the manual installation or other spare methods that are separate from PLC to stop or start the system when there are mechanical parts that will be touched directly by operators like position of loading/unloading tools or parts with auto running function.
- If it is necessary to modify the programs while the system is in operation, please consider to add locks or other safeguards to ensure that only authorized personnel can make the necessary modifications.

Scrapping

:

- Dispose of this product as industrial waste, and the batteries should be handled separately in accordance with local laws and regulations;
- Dispose of equipment and products in accordance with industrial waste disposal standards to avoid environmental pollution.

1 Product Information

1.1 Naming Rules and Nameplate Description

VM – RTU – PN

⓪ ① ②

⓪ Product information VM: Veichi Flexible Series IO Module
① Module type RTU: Remote terminal unit
② Protocol type PN: PROFINET

1.2 Component Description

No.	Interface	Function definition			
①	Signal indicator	PWR	Power indicator	Green	On when the power is turned on
		RUN	Run indicator	Off	PN module is initializing
				Flashing (green)	PN module is in parameter configuration or waiting for master connection.
				On (green)	PN module communication is normal
		ERR	Communication fault indicator	Off	PN communication is normal
				On (red)	PN has no right extension module or the total extension communication is in error.
				Flashing (red)	Inconsistent configuration of expansion modules
		SF	Module fault indicator	Off	Device is normal
				On (red)	No connection
				Flashing (red)	Connection successful, but no communication data interaction
②	Type-C interface	For single signal software upgrade			
	PROFINET	IN: PROFINET input port			

③	interface	OUT: PROFINET output port for connecting a next PROFINET slave.
④	24V power supply	Module power input terminal

1.3 Specification

1.3.1 Power Specification

Item	Specification
Rated voltage of terminal input voltage	24V DC (20.4V DC~ 28.8V DC)
Rated current of terminal input power supply	0.6A (typical at 24V)
Rated voltage of bus output power supply	5V DC (4.75V DC~5.25V DC)
Rated current of bus output power supply	2A (typical at 5V)
Power output derating	85% derating at 55°C operation (output current up to 1.7A) or 10°C derating at 2A output
Isolation	None
Power supply protection	Overcurrent protection, anti-reverse connection protection, surge absorption

1.3.2 Software Specification

Item	Specification
Physical layer	100 BASE-TX
Communication rate	100 Mbit/s(PROFINET)
Communication method	Full duplex
Topology	Line, star, tree, etc.
Transmission medium	Super Category 5 and above
Transmission distance	<100 meters between two nodes
Number of expansions	Total 16 units, including IO and special modules
Backplane speed	100M
Communication mode	RT mode
Communication cycle	Min. 1ms
Backplane bus compatibility	Compatible protocols between remote module and local module
PROFINET interface	2
Stop output mode	Output according to fault stop mode and preset value, no more

	refreshing
Firmware upgrade	USB firmware upgrade

1.3.3 Environmental Specification

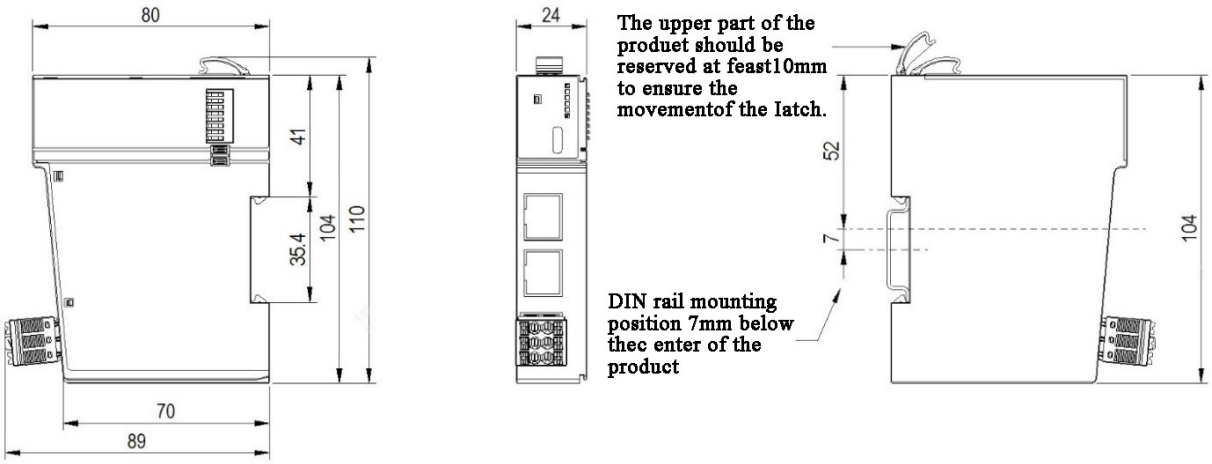
Item	Specification
Environmental working temperature	–20°C~55°C
Environment working humidity	Relative humidity < 95% RH (no condensation)
Air	No corrosive gas
Environment storage temperature	–20°C~60°C, relative humidity < 95% RH (no condensation)
Power output derating	85% derating at 55°C operation (output current not above 1.7A), or 10°C at 2A output
Altitude	Below 2000 meters (80kPa)
Pollution level	Level 2
Anti-interference	Power cord 2Kv (IEC 61000-4-4)
Overvoltage level	II
EMC immunity class	Zone B，IEC61131-2
Vibration	IEC 60068-2-6 5Hz~8.4Hz, amplitude 3.5 mm, 8.4Hz~150 Hz, acceleration 9.8 m/s2, 100 minutes in each direction of X, Y, Z (10 times, 10 minutes each time, total 100 minutes)
Impact	IEC 60068-2-27, 9.8m/s2 , 11ms, X/Y/Z, 3 times in each of the 3 axes and 6 directions

2 Mechanical Installation

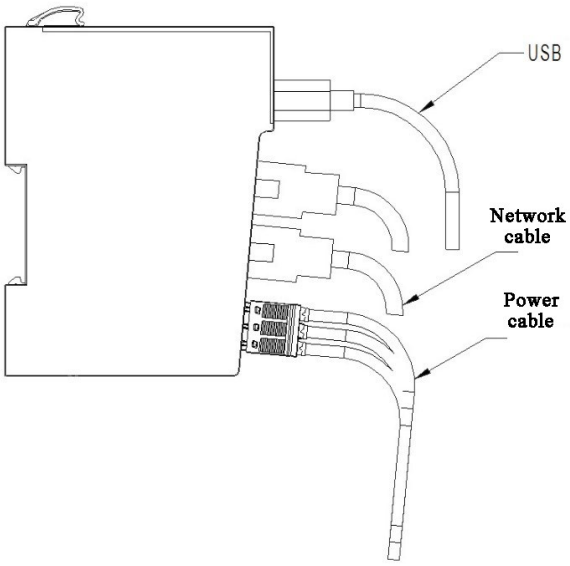
2.1 Mounting Dimensions

2.1.1 Module

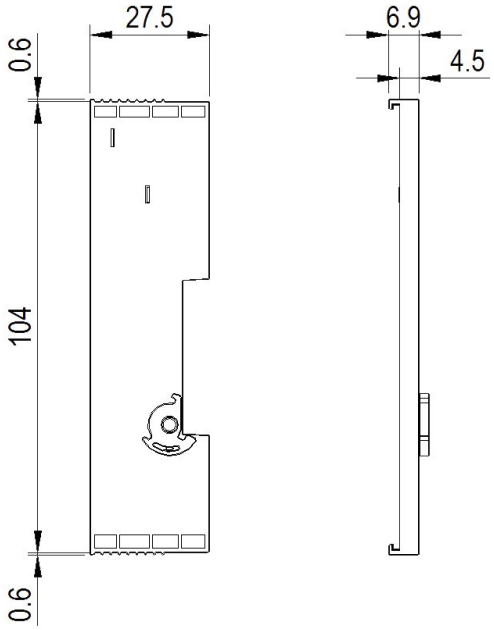
Mounting dimension information is shown below in (mm).



2.1.2 Connection Cables



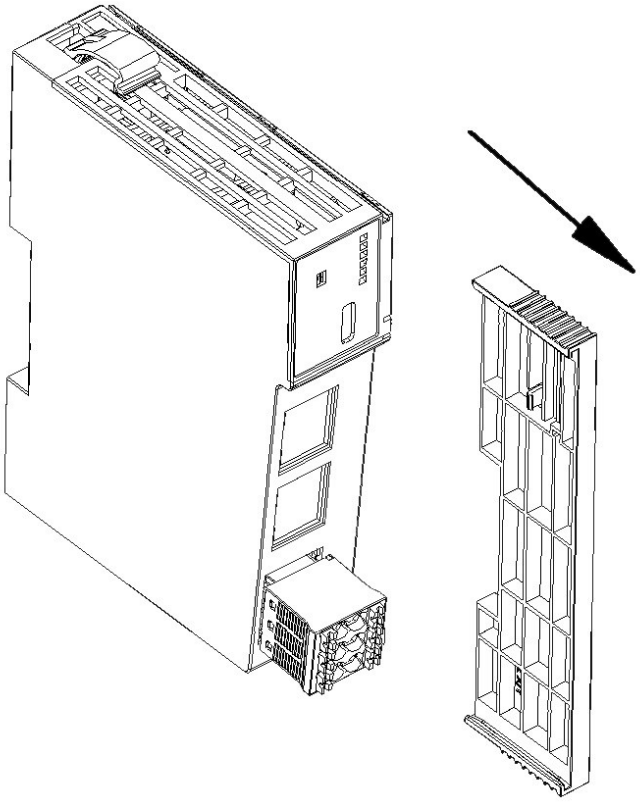
2.1.3 Rear Cover



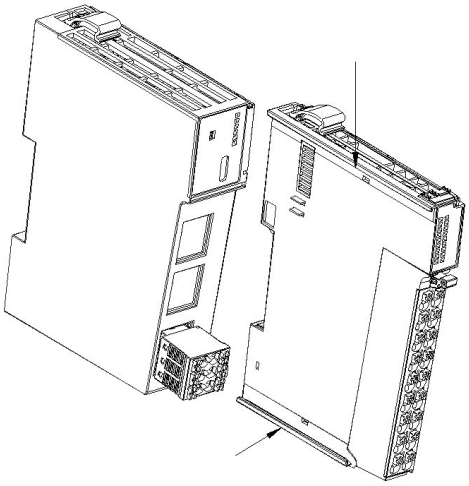
2.2 Installation

2.2.1 Inter-module Installation

Before installing the module, remove the rear cover in the direction indicated before proceeding to the next step as shown in the figure below.

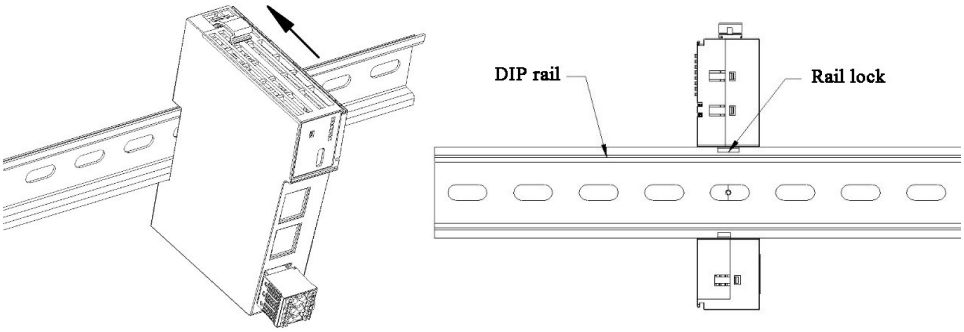


Inter-module assemblies are slide-mounted via the top and bottom rails.

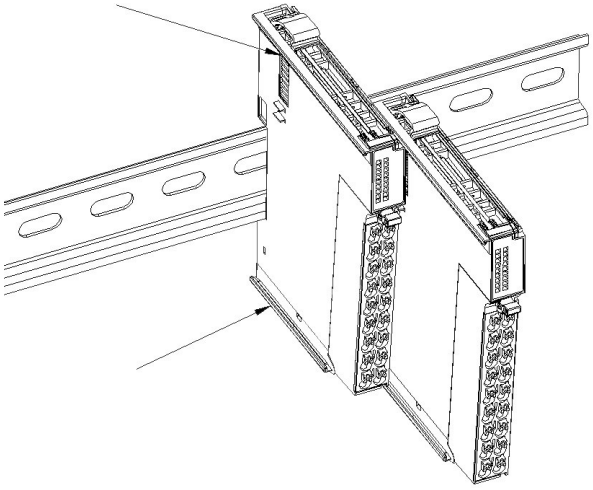


2.2.2 Rail Installation

DIN rail mounting is adopted here. When installing, align the module with the DIN rail and press the snap until there is a clear click sound. As shown in the figure below.

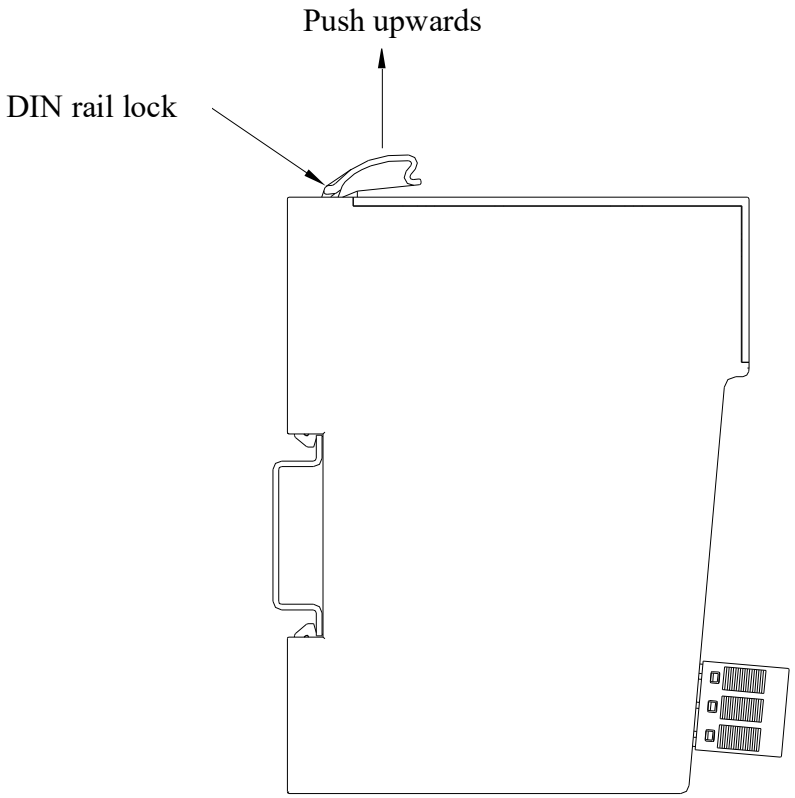


Note: After the module installation is completed, the snap will automatically rebound to lock the DIN rail, if the snap does not rebound, please press it down on the top of the snap by hand to ensure that the installation is in place.



2.2.3 Rail Disassembly

Push the rail snap with your finger and pull the module out in the direction away from the DIN rail.



3 Electrical Installation

3.1 Cable Selection

3.1.1 Communication Cables

Use shielded layer network cables for network data transmission among PROFINET bus communication without short circuit, misalignment and poor contact; the length of the cables between the devices should not exceed 100m, longer cables may cause signal attenuation so to reduce the normal communication. The following specifications of network cable are recommended:

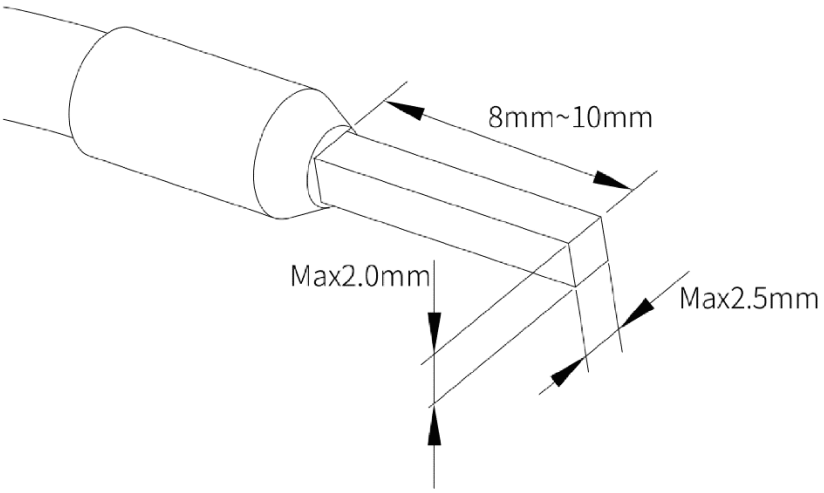
Item	Specification
Cable type	Flexible crossover cables, S-FTP, CAT 5
Standards	EIA/TIA568A，EN50173，ISO/IEC11801 EIA/TI Abulletin TSB，EIA/TIA SB40-A&TSB36
Cross section	AWG26
Conductor type	AWG26
Wire pair	4

3.1.2 Power Cables

The wire lug diameters in the following table are for reference only, and it can be rationally calculated according to the actual use.

Material name	Wire diameter	
	PRC standard /mm2	American standard (US) /AWG
Tube lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

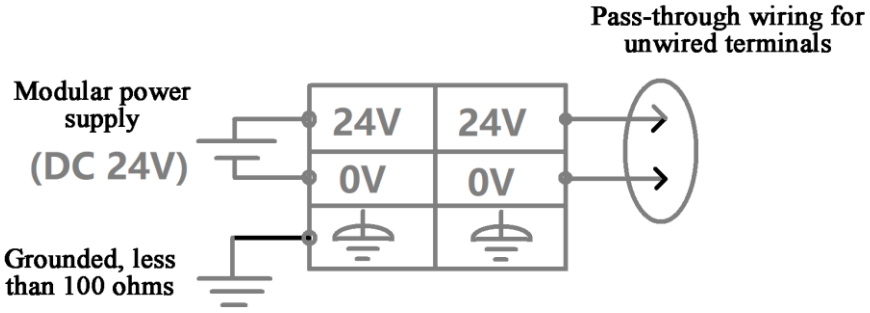
If other tube lugs are used, crimp them to the stranded wire, shape and size are required as shown below.



3.1.3 External Interface Specification

Interface type	Interface Name	Cable/Max. length	Function definition	User terminal	Performance
PROFINET interface	PROFINET	Shielded cable/100 m	PROFINET communication interface	RJ45 network port*2	100Mbps (100BaseTX)
Power supply	24V input	3-core unshielded cable/20 m	24V input	6PIN pluggable terminal	24V/1A

3.2 Terminal Wiring



4 Troubleshooting

4.1 Indicator Diagnosis

LED indicator		Description	Cause	Solution
ERR	On	No modules scanned for this protocol	1. Expansion module does not exist 2. Local bus communication is not scanned to the expansion module	1. Check whether the expansion module is normally installed and powered up 2. Check the communication interface contact of the expansion module or restart the whole system 3. Check whether the specification and length of the network cables are consistent with the regulations.
	Flashing	1. The number of configuration IO modules are more than the actually scanned. 2. The number of configuration IO modules are fewer than the actually scanned. 3. Configuration IO module type and the actual scanned type is not consistent.	1. The actual slot of the expansion module is inconsistent with configuration. 2. Local bus communication failure leads to inconsistency between the scanned module and the configuration.	1. Check the number of expansion modules and the installation order 2. Check the communication interface contact of the expansion module or restart the whole system
SF	On	1. IO module configuration failure 2. IO module state switching failure 3. IO module dropout	1. Local bus communication failure results in errors when the master module interacts with the	1. Check the communication interface contact of the expansion module or restart the whole system 2. Check whether the module in the corresponding slot is powered

			expansion module 2. lO module power-down or unplugged local bus communication loss of frame rate is too high, report the fault	down or unplugged. 3. Check the contact condition of the communication interface of the expansion module or restart the whole system.

4.2 Share_in and Share_out Instruction

4.2.1 Share_in

The first 2 bytes of Share in will be refreshed in real time, corresponding to the local bus status, PROFINET communication status, and the values in normal state: 0x01 (local bus), 0x02 (PROFINET communication), and 0X05 (version information) can be used for program judgment.

Address	Description	Values and Meaning
Share in 1st byte	Local bus	1: normal 2: communication error 3: no expansion module 4: inconsistent configuration
Share in 2nd byte	PN bus	1: no connection 2: successful connection
Share in 3rd byte	PN coupler software version	Current version number
Share in 4th byte	Displayed according to share out 1st byte value	Slot n module diagnostic information: 4th byte: slot n module hardware fault information 0: no fault 5th byte: slot n module channel 1 fault information Bit0 is 1 for disconnection, Bit1 is 1 for over limit 6th byte: Slot n module 2nd channel fault information 7th byte: Slot n module 3rd channel fault information 8th byte: Slot n module 4th channel fault information

4.2.2 Share_out

Share_in will be displayed according to the value of Share_out from the 4th byte onwards. Share_in and Share_out modules need to be present at the same time and please enter the corresponding value in Share out.

Address	Description	Values and Meaning
Share_out 1st byte	Input value	0x10: Slot 1 module fault message 0x11: Slot 2 module fault message

		..... 0x1E: Slot 15 module fault message 0x1F: Slot 16 module fault message

5 Use S7-1500 with VM-RTU-PN

Use S7-1500 and Veichi PN coupler distributed IO device to create the project. The case is illustrated using the PN communication between S7-1500 CPU and VM-RTU-PN as an example. (The same as S7-1200 CPU)

Hardware:

1. S7-1500 -CPU 1511-1PN;

2. VM-RTU-PN coupler, VM-0808ETN module;

Software: TIA Portal V16

5.1 Create A S7-1500 Project

1. Open TIA-PortalV16, "Project" - "Create new project" as shown in Figure 1.

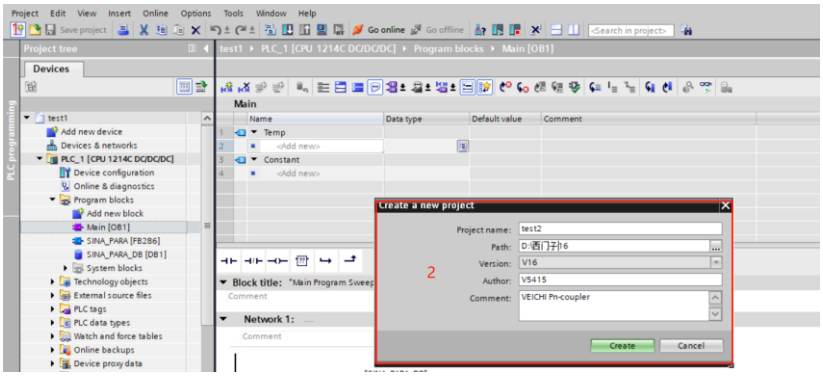


Figure 1 New project

2. Double click "Add new device" to select controller model (S7-1500) and CPU version type. (Users can choose according to the actual CPU model) As shown in Figure 2.

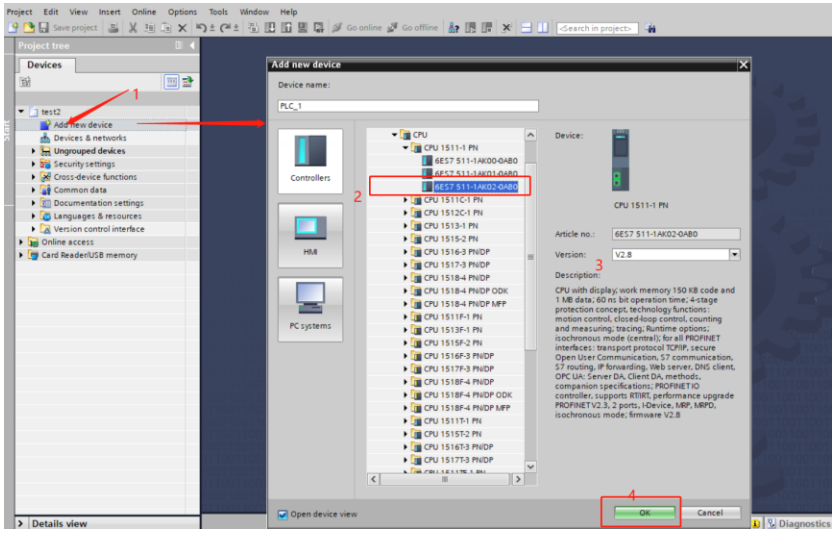


Figure 2 CPU model selection

5.2 GSD File Installation

1. After finishing the above steps, install the GSD device description file. In the menu bar, select "Options" - "Manage general station description files (GSD)", select the GSD path in the pop-up window, check the installation. As shown in Figure 3 (GSD file can be downloaded from the Veichi official website)

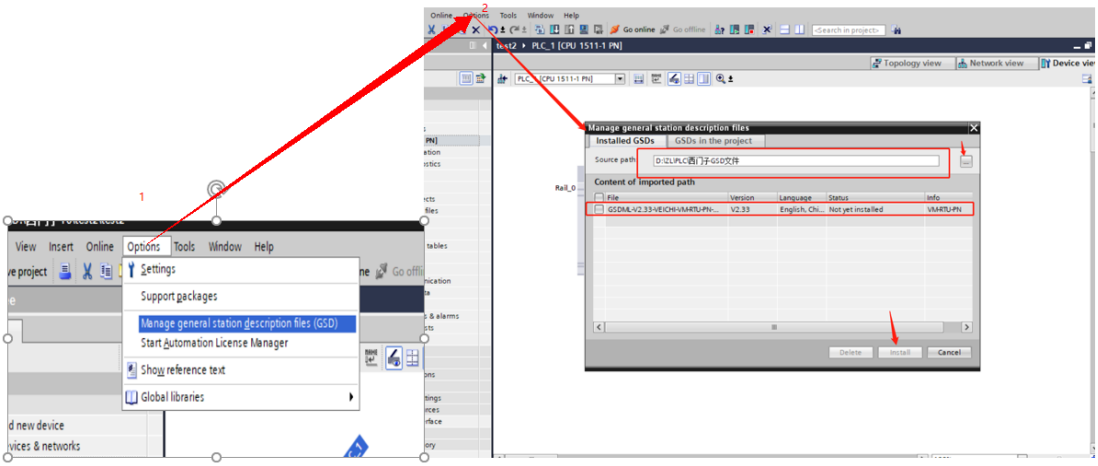


Figure 3 GSD file installation

5.3 Device Configuration

1. Add VM-RTU-PN device configuration and connect the configuration as shown in Figure 4:

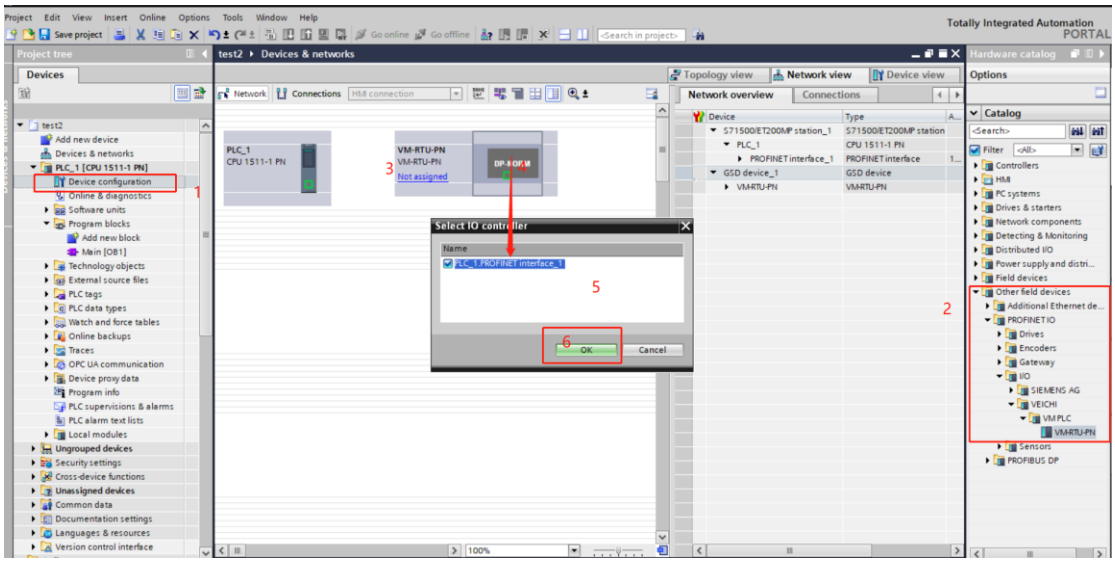


Figure 4 PN device configuration

2. Double-click the "VM-RTU-PN" device in the configuration, and then enter the "Device view" window to configure the modules. Add VM-0808ETN, Share_in and Share_out modules in turn, then the software will automatically assign I address, Q address and Share_in and Share_out parameters as shown in Figure 5.

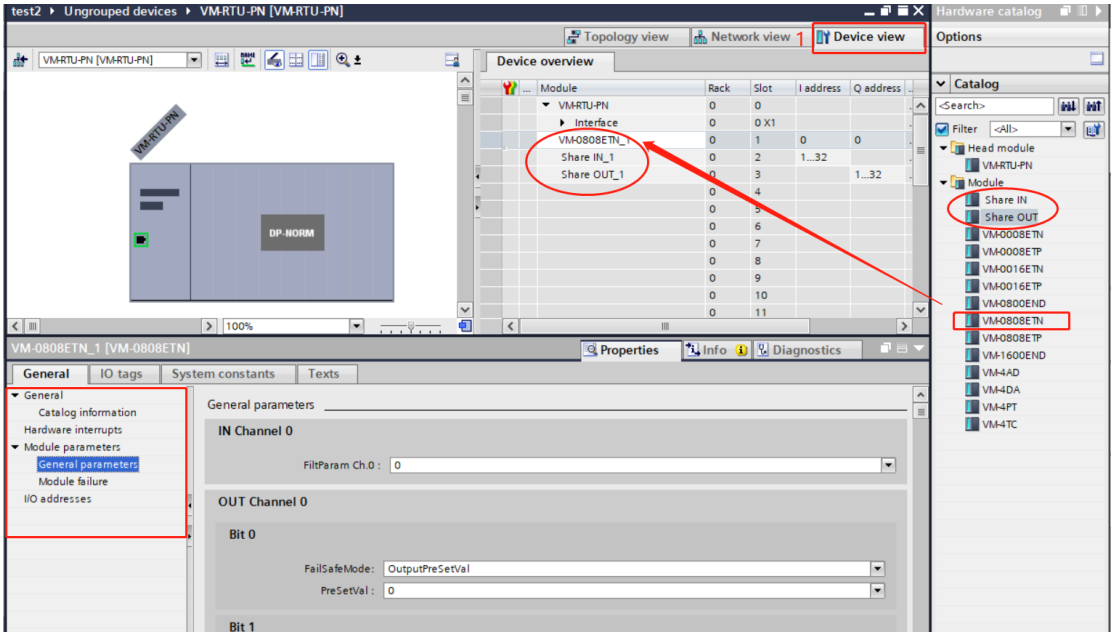


Figure 5 Module configuration

Note: As can be seen from the figure, the input address A1-A8 of VM-0808ETN is mapped to IB0 (I0.0-I0.7); the output address B1-B8 is mapped to QB0 (Q0.0-Q0.7); the Share_in monitoring information is assigned to IB1~IB32, and the Share_out monitoring information is assigned to QB1~QB32.

5.4 IP Address and Device Name Assignment

1. After completing the device configuration, start to set the IP address and device name. Note that the IP address and device name must be set or communication will not be successful. (Keep the IP address in the same network segment)

Master setup: as shown in Figure 6

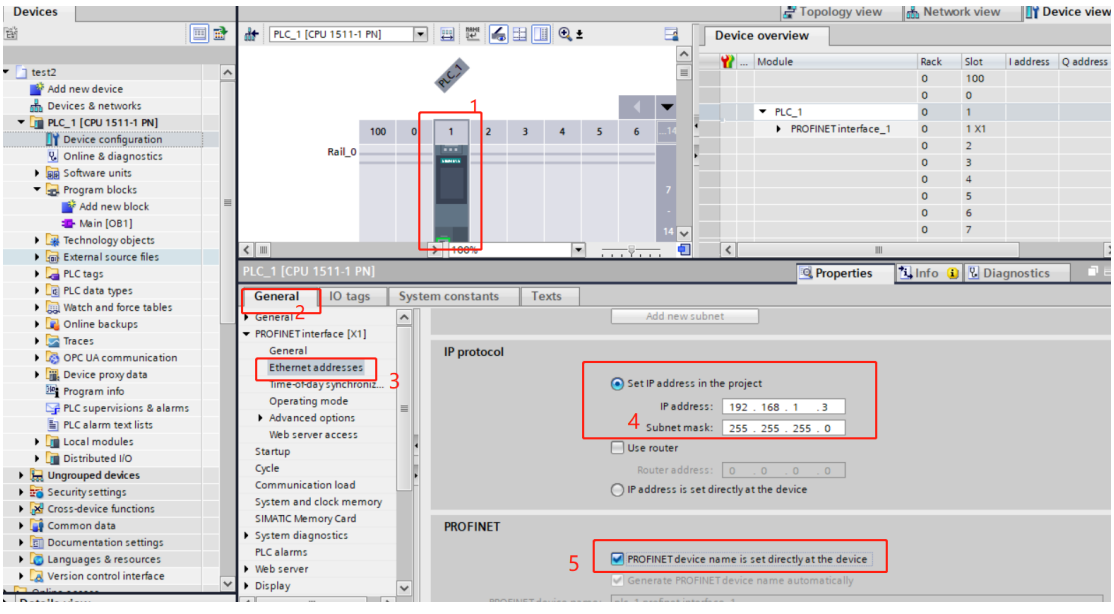


Figure 6 Master IP address setting

Slave setup: as shown in Figure 7

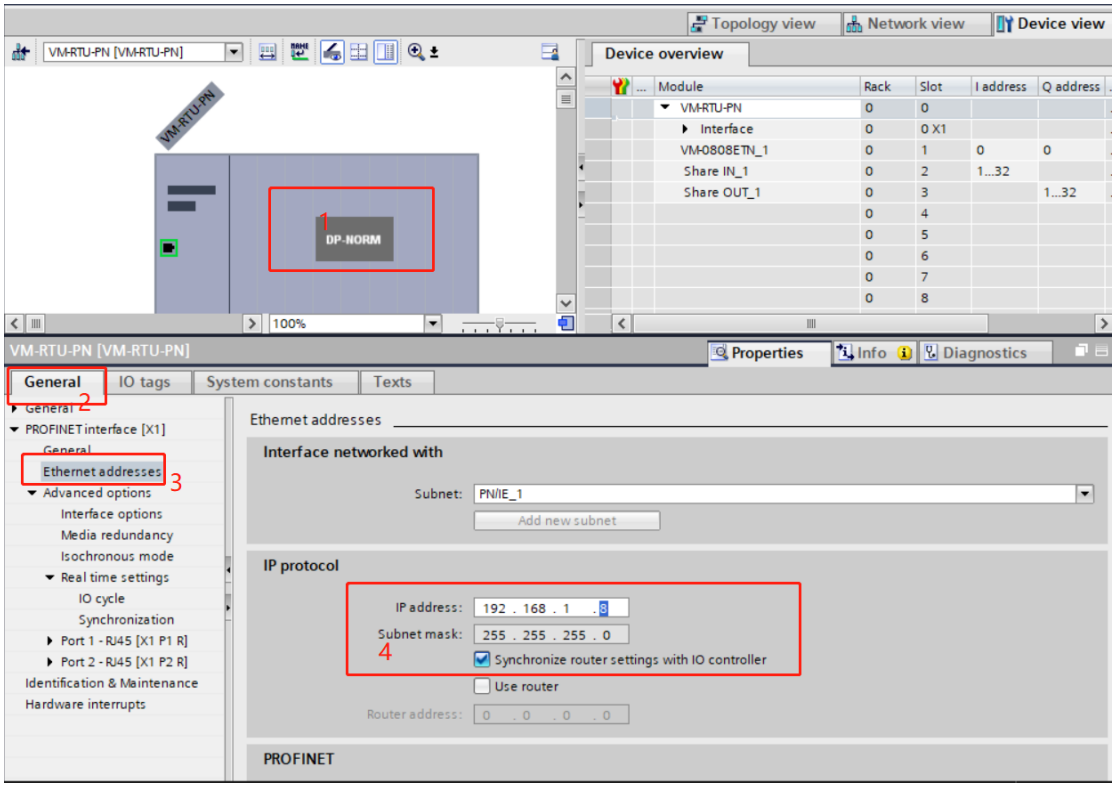


Figure 7 Slave IP address setting

2. Right-click coupler and select "Assign PROFINET device name" and "Update List", when it is used for the first time, the IP address and device name of coupler are blank, select the device that needs to be assigned a name and click "Assign name". As shown in Figure 8

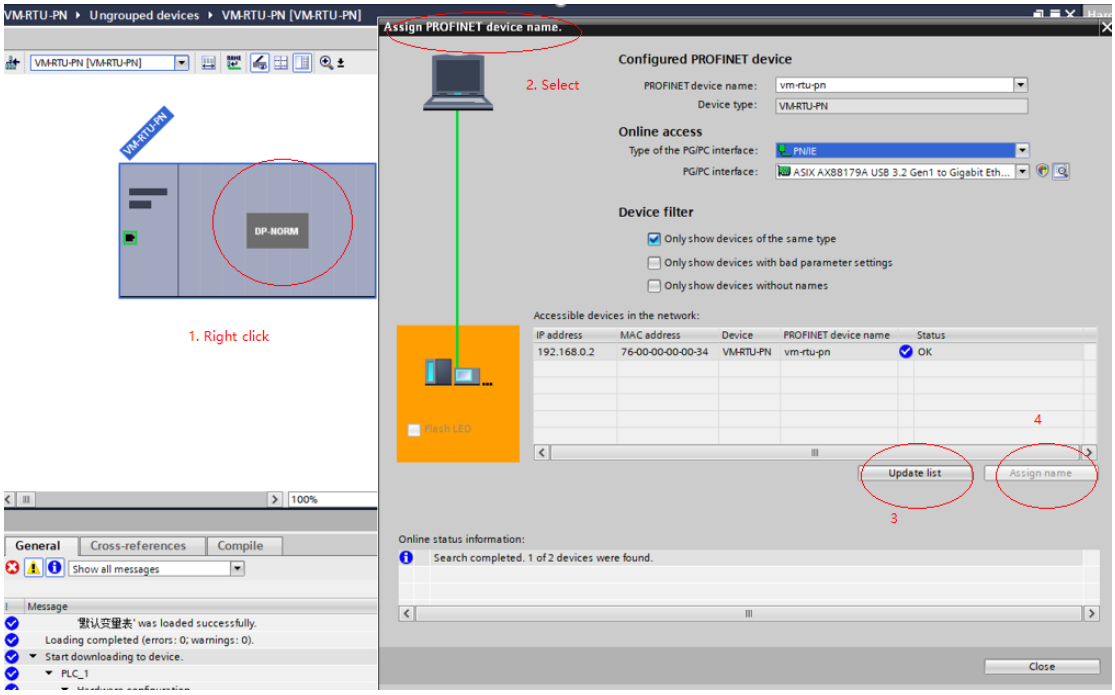


Figure 8 Assign names

3. The software automatically configures the IP addresses and PROFINET device names successfully (IP and PROFINET device names set by the slave in 5.4). As shown in Figure 9

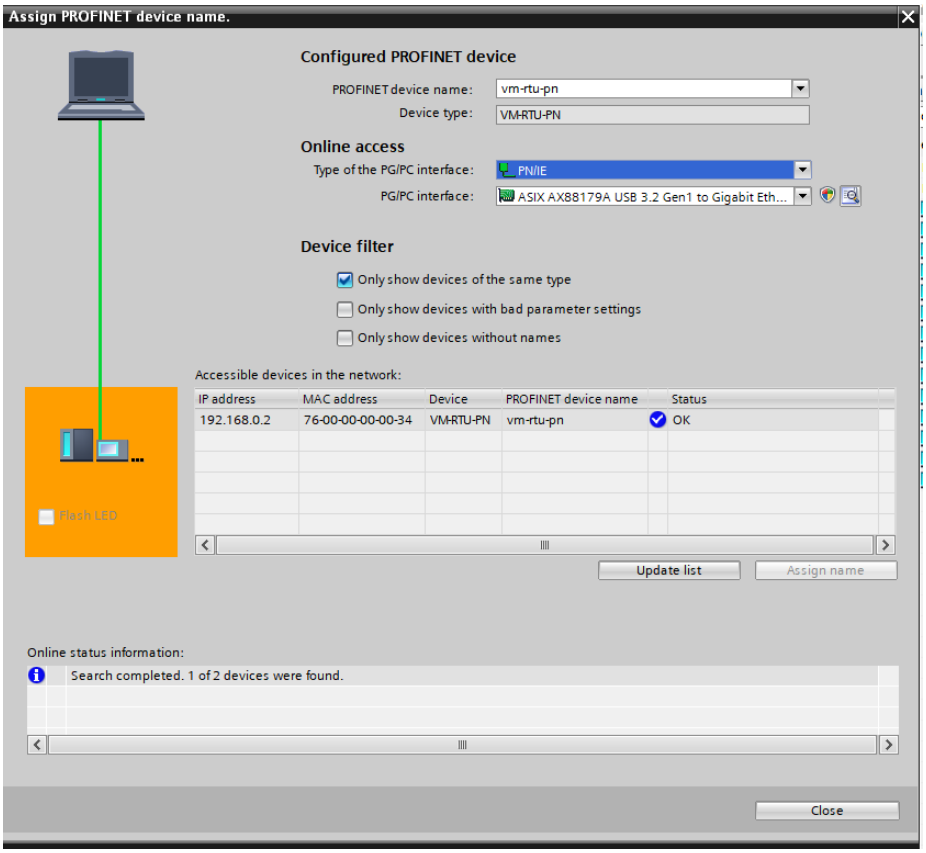


Figure 9 Assign names

5.5 Hardware Configuration Download

1. Click on " Compile" - "Hardware Complete Rebuild", and then "Hardware configuration download", and the hardware configuration download is complete. Click "Compile" - "Software rebuild", download the software (all download), click "Go online" communication will show a successful check as shown in Figure 10

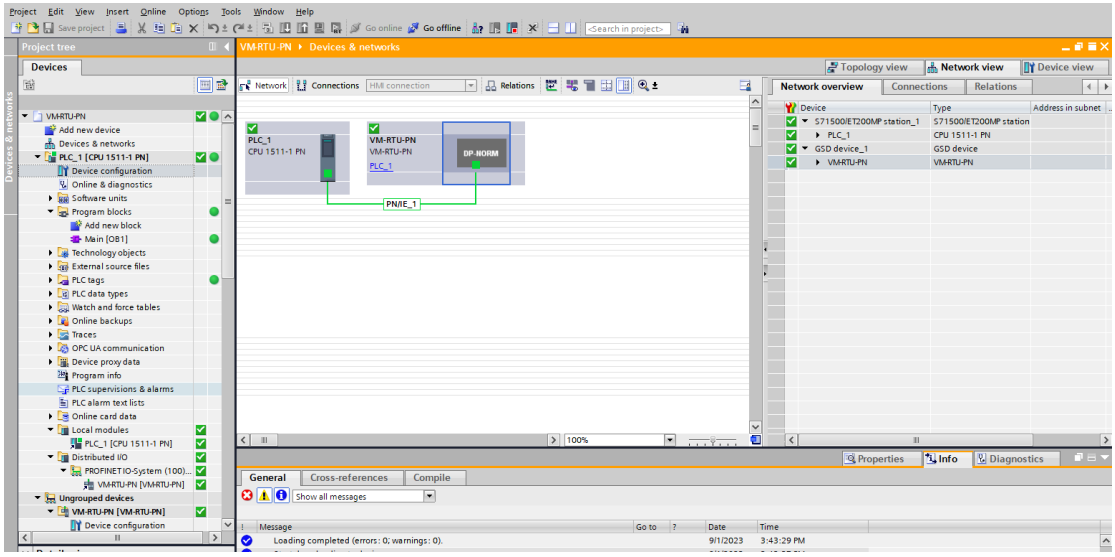


Figure 10 Device configuration completed

5.6 Programming-Downloading-Online Monitoring

1. Add %M0.0 and control output %Q0.0 in Main[OB1] program, and then "Compile" - "Download" - "Go Online" - "Monitor", right-click to change the monitor value to 1, as shown in Figure 11 below.

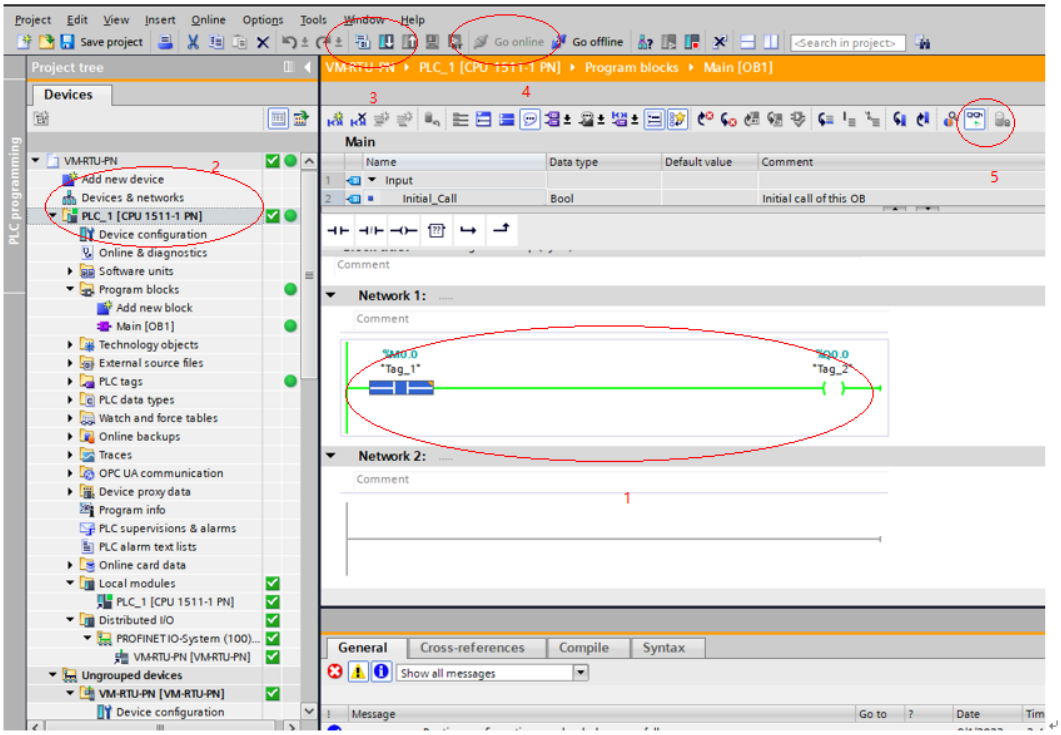


Figure 11 Online monitoring and commissioning

VEICHI

SUZHOU VEICHI ELECTRIC Co.,Ltd.

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