



Motorized Drum Driver Controller

with Magnetic Encoder (N4 Type,1:4, PROFINET Communication)

Quick Start Guide

Ver1.0

Version Change Record

Version	Time	Description
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1. Professional Terminology

1. Brushless DC Motor: A brushless DC motor consists of a permanent magnet rotor and a stator with windings. This type of motor offers advantages such as simple structure, high reliability, good stability, high efficiency, and strong adaptability, leading to its widespread application.
2. Magnetic encoder: A device installed inside the motor to provide rotor position feedback.
3. PNP: Active high, general power supply range: 15~30V
4. NPN: Active low, general power supply range: 0~0.8V
5. Braking Resistor: A component used to dissipate regenerative energy during motor braking, converting the back electromotive force (regenerative energy) generated when the motor stops into heat energy to prevent potential damage.
6. LED: Light Emitting Diode, used to indicate the status of the drive system.
7. PROFINET: An Industrial Ethernet standard for automation and control technology. With RT/IRT technology, it meets the stringent real-time requirements of industrial control and enables vertical data integration from field sensors to the cloud.
8. ZPA: Zero-pressure accumulation.
9. Zone: A basic conveying zone composed of one photoelectric sensor and at least one motorized roller.

2. Basic Functions

- Plug-and-play replacement without addressing or configuration
- All functions and I/O terminals have LED status indicators
- Integrated logic for zero-pressure accumulation conveying (including initialization)
- Configurable via PLC or PC tools (for currently developed motorized rollers)
- Built-in 100M Ethernet switch
- Limit voltage via braking chopper
- Functional grounding connection for the communication cable shield
- Reverse polarity protection for input and output voltage supply
- Speed closed-loop operation
- Dual LED status display
- Fault output function
- Built-in braking resistor
- PNP/NPN input control is switchable
- Supports 24V/48V motorized roller power supply

3. Matching Motorized Roller Specifications

Rated voltage of the drum	Voltage Range (V)	Rated Power (W)	Rated Current (A)	Starting Current (A)
DC 24V	20~26	35	2.5±0.5	6.25±0.5
		50	3.2±0.5	8±0.5
		80	4.5±0.5	11.25±0.5
DC 48V	40~52	35	1.3±0.5	3.25±0.5
		50	1.6±0.5	4±0.5
		80	2.3±0.5	5.75±0.5

4. Power Supply Requirements

drum power	Switching power supply power	Suggested wire diameter	Suggested wire length
35W	≥80W	0.75mm ² (4A)	≤12 meters
50W	≥120W	0.75mm ² (4A)	≤9 meters
80W	≥200W	1mm ² (6A)	≤9 meters
*Note: When using multiple rollers in practice, it is recommended to use a high-power power supply and avoid single power supply, for example: For example, when using 35 W motorized rollers, a 450 W power supply can support 9 to 11 rollers (with staggered startup). As a general guideline, the power supply can be selected at 1.2 to 1.5 times the total rated power of the motorized rollers.			

5. Drive Control Card Layout

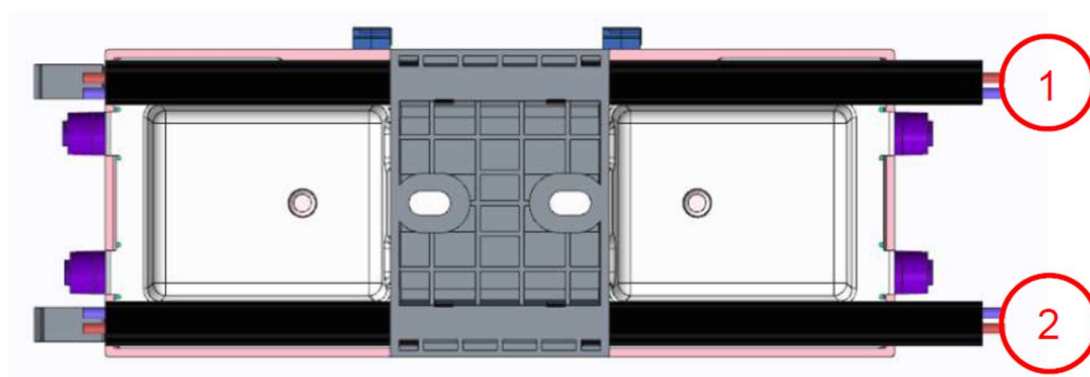


Sequence Position	Function	Description
1	Sensor1	Sensor 1 and IO1 interface
2	Roller 1 terminal	5-pin drum terminal
3	RJ45-A	Slave Interface - LINK A
4	Roller 2 terminal	5-pin drum terminal
5	Sensor2	Sensor 2 and IO2 interface
6	Sensor3	Sensor 3 and IO3 interface
7	Roller 3 terminal	5-pin drum terminal
8	RJ45-A	Slave Interface - LINK A
9	Roller 4 terminals	5-pin drum terminal
10	Sensor4	Sensor 4 and IO4 interface
11	Logic circuit 1	Logic circuit power supply: The control logic power can use cables with a wire diameter of 1.5mm ² , and the logic power is 24V.
12	Logic circuit 2	Logic circuit power supply: The control logic power can use cables with a wire diameter of 1.5mm ² , and the logic power is 24V.
13	Power circuit 1	The motor circuit is powered; for the power supply, it is recommended to use cables with a wire diameter of 2.5mm ² . The power supply voltage is 48V or 24V.
14	Power circuit 2	The motor circuit is powered on. For the power supply, it is recommended to use cables with a wire diameter of 2.5mm ² . The power supply voltage should be 48V or 24V.

5.1 Power Interface (Flat Cable Power Supply)

The bus card has two power interfaces: the upper one is for control logic power, which supplies power to the control logic, and the lower one is for controller drive power, which drives the motor. Both power interfaces use ASI flat cables, connected via pin piercing connectors in a piercing manner, and secured with power cable covers.

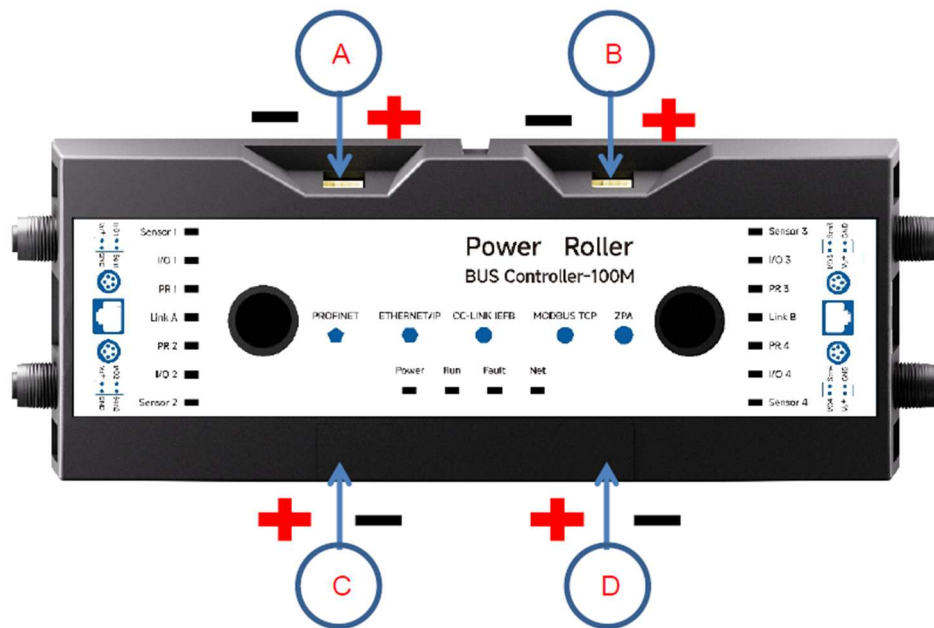
Control logic power supply ① and power supply ② are recommended to use the same 2.5mm² flat cable.



Note:

- 1) For both power supplies, the positive terminal (brown) faces outward and the negative terminal (blue) faces inward. Do not reverse the motor power supply and logic power supply. Since the voltages are different, make sure they are not connected incorrectly (mechanically keyed design).
- 2) When using a 48V motor, the power supply must be 48V, while the logic circuit should be powered by 24V. Note that the logic circuit must not be powered by 48V to avoid damaging the control card;
- 3) When a 24V motor is used, both the power supply and logic supply are 24V. Since the controller can drive four motors simultaneously, significant power fluctuations may occur during operation. It is recommended to use independent power supplies to connect the power and logic circuits separately.

5.2 Power Interface (Quick-Connect Terminals)



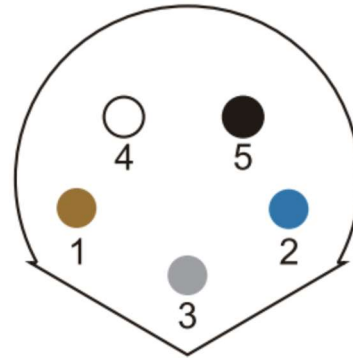
i A and B supply power to the logic circuit, supporting only 24V power supply. A and B are in parallel for internal circuits. Power can be supplied from A to B or from B to A to power the logic circuits of other cards, supporting a series connection of up to 40pcs for bus card logic circuit power supply. Current view: left negative and right positive for logic power supply;

i C and D provide power to the roller motors. The motor configuration is 48V, matching the 48V power supply. C and D are connected in parallel within the internal circuit. Power can be supplied via C-in/D-out or D-in/C-out to power other cards' roller motors. A 35W roller configuration supports daisy-chaining up to 4 cards; a 50W roller configuration supports daisy-chaining up to 2 cards; an 80W roller configuration supports daisy-chaining only 1 card. Current view: positive terminal on the left, negative terminal on the right.

5.3 Motor Interface

There are 4 motor interfaces that can simultaneously drive 4 electric rollers. Perpendicular to the control card terminal direction, the 5-pin definition is as follows:

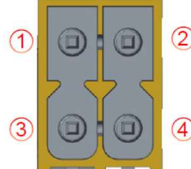
线脚	颜色	功能
1	棕色	电源输入正极
2	蓝色	电源输入负极
3	灰色	调速信号输入
4	白色	转向信号输入
5	黑色	错误反馈输出



5.4 Sensor Interface

The bus card has four sensor interfaces, each with four pins for connecting to the positive power supply, negative power supply, sensor signal, and auxiliary digital input/output signal.

The sensor interface uses KF2EDGKS-3.5-2-2P. The table below defines the sensor interface:

pin	signal	"Description"	Example Figure
1	I/O	Auxiliary Digital Input/Output	
2	SENSOR	Sensor signal input	
3	+24V	The controller outputs a positive 24V power supply externally.	
4	GND	Negative terminal of 24V power supply	

 Precautions for use: Shorting pins 3 and 4 as the positive and negative power terminals may damage the sensor interface and peripherals; shorting pin 1 (when used as an output) with pin 4 may also damage the sensor interface and peripherals.

 When using the ZPA function, the sensor signal must be connected to pin 2. If it is connected to pin 1, the program will fail to correctly identify the presence of goods and control the conveyor operation.

5.5 Ethernet Port

There is one RJ45 Ethernet port on each of the left and right sides of the controller, used for communication between the controller and PLCs as well as among controllers.

 In environments with electromagnetic noise, it is recommended to use shielded Ethernet cables to prevent data loss or other unexpected results during communication.

5.6 Indicator Lights

LED Name	Color	Status	"Meaning"
MotorPower	Green/Red	Green/Red	Green: Power voltage is normal; Red: Voltage abnormal
LogicPower	Green/Red	Green/Red/Off	Green: Logic voltage is normal; Red: Voltage abnormal Extinguished: Logic power supply is not connected
NetRun	Green/Red	Green/Red/Off	Green: PLC connection successful; Red: PLC not connected within 30 seconds after power-on or Ethernet connection disconnected in ZPA mode; Off: PLC not connected within the first 30 seconds after power-on or ZPA mode not started
Fault	red	On/Off/Blink	Solid: Control card fault; Off: Control card normal; Blink: Blinks once
Sensor1/I/O1	green	On/Off	Solid: Signal input present; Off: No signal input
PR1	Green/Red Light	On/Off/Blink	Red: The drum is not connected or the electric motorized drum is abnormal; Green light on steadily: Product ready, drum connected normally; Green light flashing rapidly: Drum operating normally
Sensor2/I/O2	green	On/Off	Solid: Signal input present; Off: No signal input
PR2	Yellow/Red Light	On/Off/Blink	Red: The drum is not connected or the electric motor drum is abnormal; Green LED on steadily: Product ready, drum connected normally; Green light flashing rapidly: Drum

			operating normally
Sensor3/I/O3	green	On/Off	Solid: Signal input present; Off: No signal input
PR3	Yellow/Red Light	On/Off/Blink	Red: The drum is not connected or the electric motorized drum is abnormal; Green light on steadily: Product ready, drum connected normally; Green light flashing rapidly: Drum operating normally
Sensor4/I/O4	green	On/Off	Solid: Signal input present; Off: No signal input
PR4	Yellow/Red Light	On/Off/Blink	Red: The drum is not connected or the electric motorized drum is abnormal; Green LED on steadily: Product ready, drum connected normally; Green light flashing rapidly: Drum operating normally
LinkA	green	On/Off	Solid: Normal communication connection; Off: Abnormal or no connection
LinkB	green	On/Off	Solid: Normal communication connection; Off: Abnormal or no connection

6. Process Data

Process data transmitted between the PLC and the controller are divided into Full Mode, Normal Mode, and Tiny Mode. Each mode consists of two main parts: input image and output image.

6.1 Full Function Mode (Full Mode)

The full-function mode can transmit all data.

6.1.1 Input: The input process image consists of four parts: sensors, digital I/O, motor status, and others. The data allocation addresses are shown in the table below:

Byte	Bit	Category	Designation	Type	Comments
0	0.0	Sensors	Sensor 1	BOOL	True=sensor active
0	0.1	Sensors	Sensor 2	BOOL	
0	0.2	Sensors	Sensor 3	BOOL	
0	0.3	Sensors	Sensor 4	BOOL	
0	0.4	Digital I/O	Aux 1	BOOL	True=auxiliary input/output active
0	0.5	Digital I/O	Aux 2	BOOL	
0	0.6	Digital I/O	Aux 3	BOOL	
0	0.7	Digital I/O	Aux 4	BOOL	
1	1	Motors	Roller 1 Error	BOOL	True=motor error, False=motor OK
1	1.1	Motors	Roller 2 Error	BOOL	
1	1.2	Motors	Roller 3 Error	BOOL	
1	1.3	Motors	Roller 4 Error	BOOL	
1	1.4	Controller	Controller Err	BOOL	True=Controller error
1	1.5	Spare	Spare	BOOL	
1	1.6	Spare	Spare	BOOL	
1	1.7	Spare	Spare	BOOL	
2		Motor states PR 1	Speed Pos 1	INT8	
3		Motor states PR 2	Speed Pos 2	INT8	
4		Motor states PR 3	Speed Pos 3	INT8	
5		Motor states PR 4	Speed Pos 4	INT8	
6		Motor states RD 1	Motor Current 1	UINT16	
8		Motor states RD 2	Motor Current 2	UINT16	
10		Motor states RD 3	Motor Current 3	UINT16	

12		Motor states RD 4	Motor Current 4	UINT16	
14		Motor states RD 1	Motor Temperature1	UINT16	
16		Motor states RD 2	Motor Temperature2	UINT16	
18		Motor states RD 3	Motor Temperature3	UINT16	
20		Motor states RD 4	Motor Temperature4	UINT16	
22		System state	Voltage_Motor	UINT16	"Motor power" voltage in mV
24		System state	Voltage_Logic	UINT16	"Power logic + sensors" voltage in mV
26		Control inputs	Spare	BYTE	
27		Control outputs	Spare	BYTE	
28		Handshake signals	Spare	BYTE	
29		Zone States	Spare	BYTE	
30		Zone States	Spare	BYTE	
31		Spare	Spare	BYTE	

6.1.2 Output: The output process image consists of three parts: digital I/O, motors, and others. The data allocation addresses are shown in the table below:

Byte	Bit	Category	Designation	Type	Comments
0	0.0	Digital I/O	Aux 1	BOOL	True = auxiliary output active
0	0.1	Digital I/O	Aux 2	BOOL	
0	0.2	Digital I/O	Aux 3	BOOL	
0	0.3	Digital I/O	Aux 4	BOOL	
1		Motor RD 1	Speed Pos 1	INT8	Target speed/position (-100...0...100 per cent 1) / -90...0...90, 123... 127 degrees
2		Motor RD 2	Speed Pos 2	INT8	
3		Motor RD 3	Speed Pos 3	INT8	
4		Motor RD 4	Speed Pos 4	INT8	
5		Control inputs overwrite	Spare	UINT8	
6		Control outputs overwrite	Spare	UINT8	
7		Handshake signal overwrite	Spare	UINT8	

6.2 Normal Mode

Compared to the full-function mode, the normal mode cannot transmit data such as motor current, motor temperature, and power supply voltage.

6.2.1 Input: The input process image consists of four parts: sensors, digital I/O, motor status, and others. The data allocation addresses are shown in the table below:

Byte	Bit	Category	Designation	Type	Comments
0	0	Sensors	Sensor 1	BOOL	True = sensor active
0	0.1	Sensors	Sensor 2	BOOL	
0	0.2	Sensors	Sensor 3	BOOL	
0	0.3	Sensors	Sensor 4	BOOL	
0	0.4	Digital I/O	Aux 1	BOOL	True = auxiliary input/output active
0	0.5	Digital I/O	Aux 2	BOOL	
0	0.6	Digital I/O	Aux 3	BOOL	
0	0.7	Digital I/O	Aux 4	BOOL	
1	1	Motors	Roller 1 Error	BOOL	True = motor error, False = motor OK
1	1.1	Motors	Roller 2 Error	BOOL	
1	1.2	Motors	Roller 3 Error	BOOL	
1	1.3	Motors	Roller 4 Error	BOOL	
1	1.4	Controller	Controller Err	BOOL	True = Controller error
1	1.5	Spare	Spare	BOOL	
1	1.6	Spare	Spare	BOOL	
1	1.7	Spare	Spare	BOOL	
2		Motor states RD 1	Speed Pos 1	INT8	Actual target speed/position (-100...0...100 per cent/ -90...0...90, 123...127 degrees)
3		Motor states RD 2	Speed Pos 2	INT8	
4		Motor states RD 3	Speed Pos 3	INT8	
5		Motor states RD 4	Speed Pos 4	INT8	

6.2.2 Output: The output process image consists of three parts: digital I/O, motors, and others. The data allocation addresses are shown in the table below:

Byte	Bit	Category	Designation	Type	Comments
0	0.0	Digital I/O	Aux 1	BOOL	True = auxiliary output active
0	0.1	Digital I/O	Aux 2	BOOL	
0	0.2	Digital I/O	Aux 3	BOOL	
0	0.3	Digital I/O	Aux 4	BOOL	

1		Motor RD 1	Speed Pos 1	INT8	Target speed/position (-100...0...100 per cent 1) / -90...0...90, 123...127 degrees
2		Motor RD 2	Speed Pos 2	INT8	
3		Motor RD 3	Speed Pos 3	INT8	
4		Motor RD 4	Speed Pos 4	INT8	

6.3 Tiny Mode

Compared with Normal Mode, Tiny Mode does not transmit real-time motor speed data. In this mode, the PLC controls motor speed using 2-bit data.

6.3.1 Input: The input process image consists of four parts: sensors, digital I/O, motor status, and others. The data allocation addresses are shown in the table below:

Byte	Bit	Category	Designation	Type	Comments
0	0	Sensors	Sensor 1	BOOL	True=sensor active
0	0.1	Sensors	Sensor 2	BOOL	
0	0.2	Sensors	Sensor 3	BOOL	
0	0.3	Sensors	Sensor 4	BOOL	
0	0.4	Digital I/O	Aux 1	BOOL	True=auxiliary input/output active
0	0.5	Digital I/O	Aux 2	BOOL	
0	0.6	Digital I/O	Aux 3	BOOL	
0	0.7	Digital I/O	Aux 4	BOOL	
1	1	Motors	Roller 1 Error	BOOL	True=motor error, False=motor OK
1	1.1	Motors	Roller 2 Error	BOOL	
1	1.2	Motors	Roller 3 Error	BOOL	
1	1.3	Motors	Roller 4 Error	BOOL	
1	1.4	Controller	Controller Err	BOOL	True=Controller error
1	1.5	Spare	Spare	BOOL	
1	1.6	Spare	Spare	BOOL	
1	1.7	Spare	Spare	BOOL	

6.3.2 Output: The output process image consists of three parts: digital I/O, motors, and others. The data allocation addresses are shown in the table below:

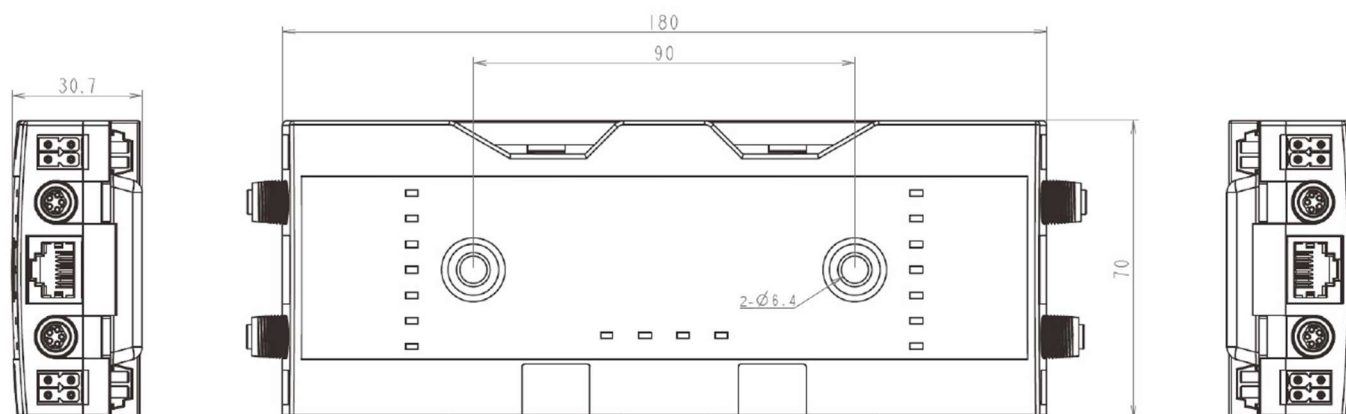
Byte	Bit	Category	Designation	Type	Comments
0	0	Digital I/O	Aux 1	BOOL	True = auxiliary output active
0	0.1	Digital I/O	Aux 2	BOOL	
0	0.2	Digital I/O	Aux 3	BOOL	
0	0.3	Digital I/O	Aux 4	BOOL	

0	0.4	Motors	Motor DIR 1	BOOL	True = reverse main direction
0	0.5	Motors	Motor DIR 2	BOOL	
0	0.6	Motors	Motor DIR 3	BOOL	
0	0.7	Motors	Motor DIR 4	BOOL	
1	1	Motors	Motor Speed A 1	BOOL	Note1 Motor speed: Motor Speed A=0, Motor Speed B=0, Motor stop Motor Speed A=1, Motor Speed B=0, Speed=100% Motor Speed A=0, Motor Speed B=1, Speed=50% Motor Speed A=1, Motor Speed B=1, Speed=75%
1	1.1	Motors	Motor Speed B 1	BOOL	
1	1.2	Motors	Motor Speed A 2	BOOL	
1	1.3	Motors	Motor Speed B 2	BOOL	
1	1.4	Motors	Motor Speed A 3	BOOL	
1	1.5	Motors	Motor Speed B 3	BOOL	
1	1.6	Motors	Motor Speed A 4	BOOL	
1	1.7	Motors	Motor Speed B 4	BOOL	

 In minimal mode, only three motor speed levels can be set, and the values for each speed level can be configured via Conveyor Tool.

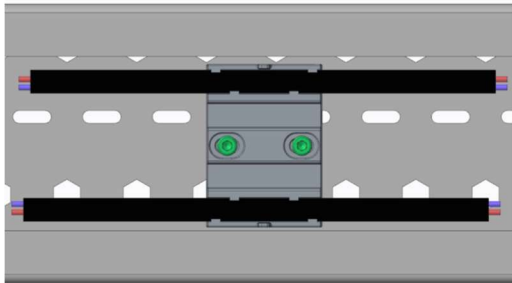
7. Dimensions and Installation

7.1 Installation Dimensions

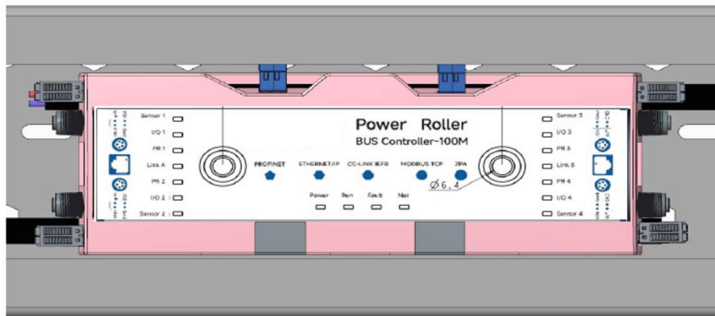


7.2 Installation Steps

Step 1: Install the flat cable on the plastic bracket, and use two M5 bolts to fix the plastic bracket to the profile frame.



Step 2: Fix the control card to the plastic bracket, and fix the control card to the profile frame through the two M6 bolts in the middle



8. Application Environment

Category	DC 48V motor configuration	DC 24V motor configuration
Rated voltage of power supply	48V DC	24V DC
Power supply voltage range	42 to 52V DC	20 to 26V DC
Rated voltage of logical power supply	24V DC	
Logic power supply voltage range	18 to 26V DC	
Logic control current	The controller's maximum current is 0.2A, plus the connected sensors/actuators totaling 1.6A	
Motor temperature protection	105°C	
Controller temperature protection	85°C	
Current protection	fuse	
Protection Level	IP20	
Operating environment temperature	0 to 40°C	
Storage ambient temperature	-40 to 85°C	
Operating environment humidity	5% to 95% RH (non-condensing)	
Ambient air	Non-corrosive gas	
Working vibration intensity	0.5G	
Installation Location	indoor	

 Ensure the controller is assembled correctly to avoid damage or malfunction.

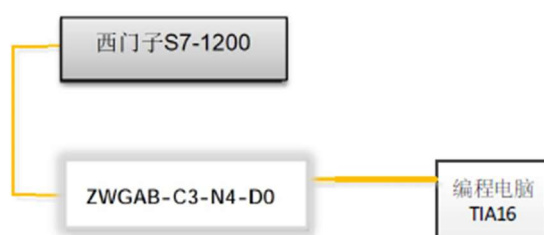
 The controller should be installed on a flat bracket to ensure that it does not twist or deform due to external forces during and after installation.

 The nuts on the fixing screws should not be left too high, as this may interfere with the connection of the network cables.

 The controller must not be installed in an environment completely sealed by metal, as this will block wireless signals and cause Bluetooth functionality to malfunction. After installing the controller, avoid drilling holes in metal brackets near the controller to prevent metal shavings from falling into the controller, which could cause a short circuit and damage the device.

9. Usage Demonstration

9.1 Communication Connection Diagram



Note: ZWGAB-C3-N4-D0 refers to the bus card

9.2 Hardware Configuration

List the modules and related materials required for the example, as shown in the table below:

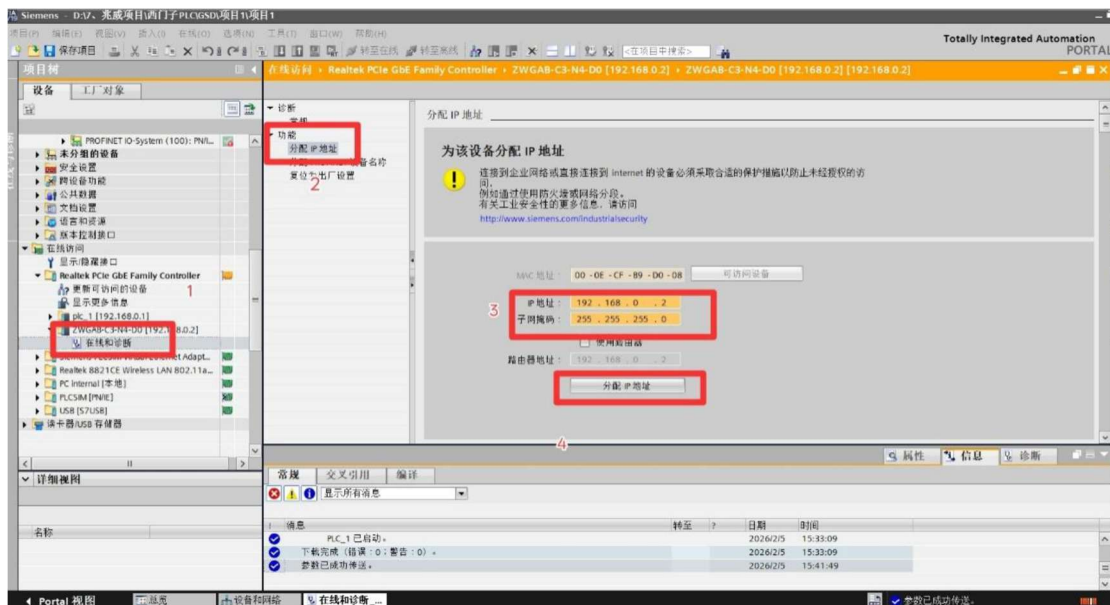
Hardware	Quantity	Remarks
Programming Computer	1 unit	Install TIA Portal V16
Siemens S7-1200 CPU	1	This example uses CPU 1211-1
ZWGAB-C3-N4-D0	1	Bus card
Ethernet cable	2 pcs	
24V Switching Power Supply	1	
Wires	As required	

9.3 Configuring Coupler Parameters in TIA Portal

Connect the ZWGAB-C3-N4-D0 coupler to the computer using an Ethernet cable. Open TIA Portal, create a new empty project, and then locate the local network interface of the computer under Project tree > Online access. Double-click "Update accessible devices"; TIA Portal will automatically search for and detect the connected ZWGAB-C3-N4-D0 coupler (Note: It is recommended to connect a single ZWGAB-C3-N4-D0 coupler directly to the computer when configuring its IP address and device name to avoid configuration errors caused by having multiple modules). As shown in the figure below:

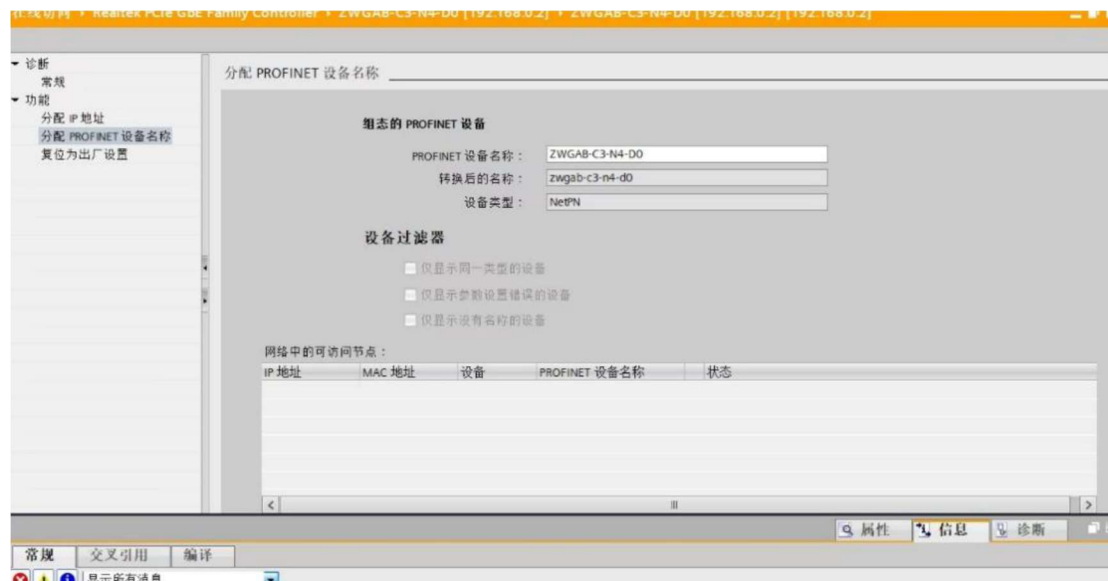


After locating the ZWGAB-C3-N4-D0 coupler, click the arrow in front of the module, double-click "Online and Diagnostics," and configure the module parameters in the pop-up window as shown below:



Assign IP: When the IP address is successfully assigned, TIA Portal displays "Parameters have been transferred successfully" in the lower-right corner of the software window or in the "Messages" section under the "General" tab, as shown in the figure below:

Configure the device name of the ZWGAB-C3-N4-D0 coupler in the same manner, as shown in the figure below:

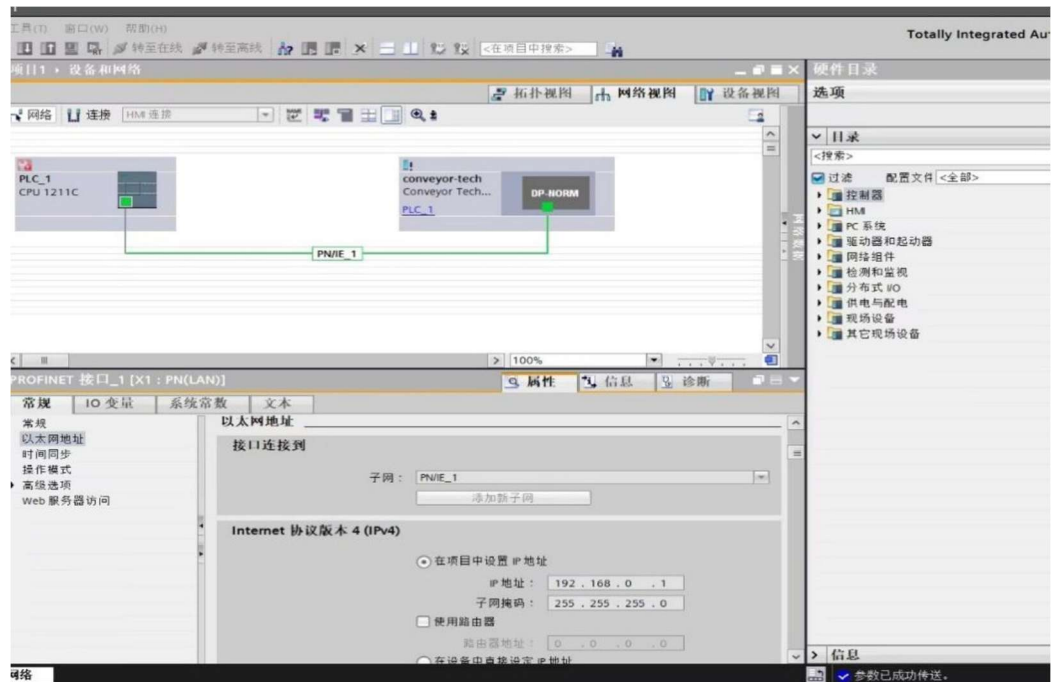


***Note:**

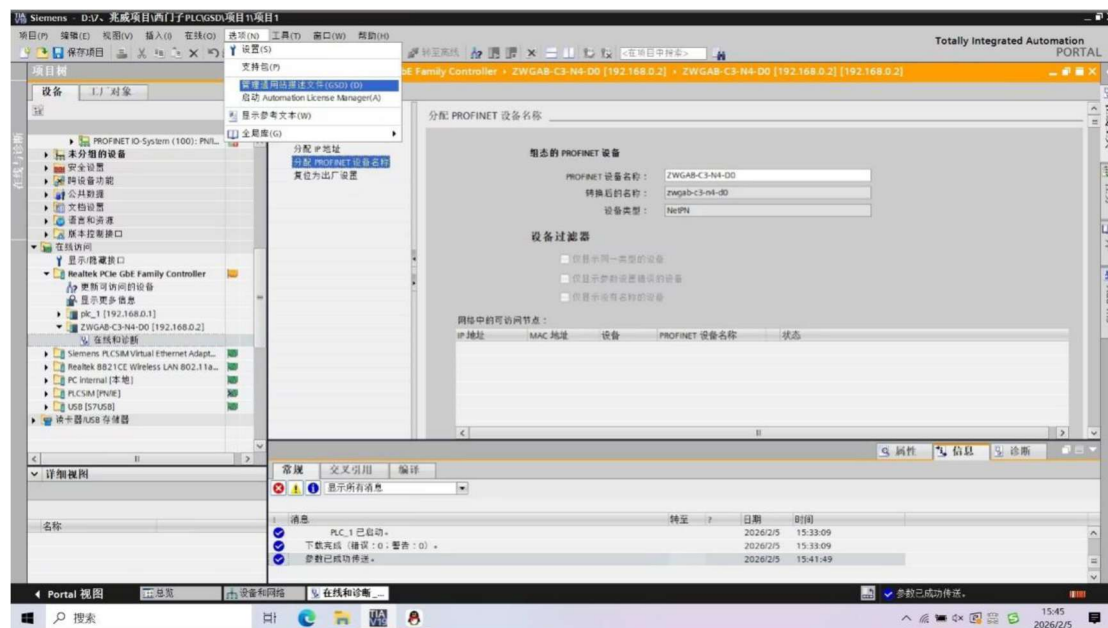
- 1) The device name of ZWGAB-C3-N4-D0 must be set correctly, and device names within the same LAN must be unique. Duplicate device names will prevent normal communication.
- 2) When configuring hardware in TIA Portal, the device name in the hardware configuration must match the device name in ZWGAB-C3-N4-D0; otherwise, normal communication cannot be achieved.

9.4 Configuration in TIA Portal

1. Open the TIA Portal software, create a project, and set the CPU's IP address as shown in the figure below:

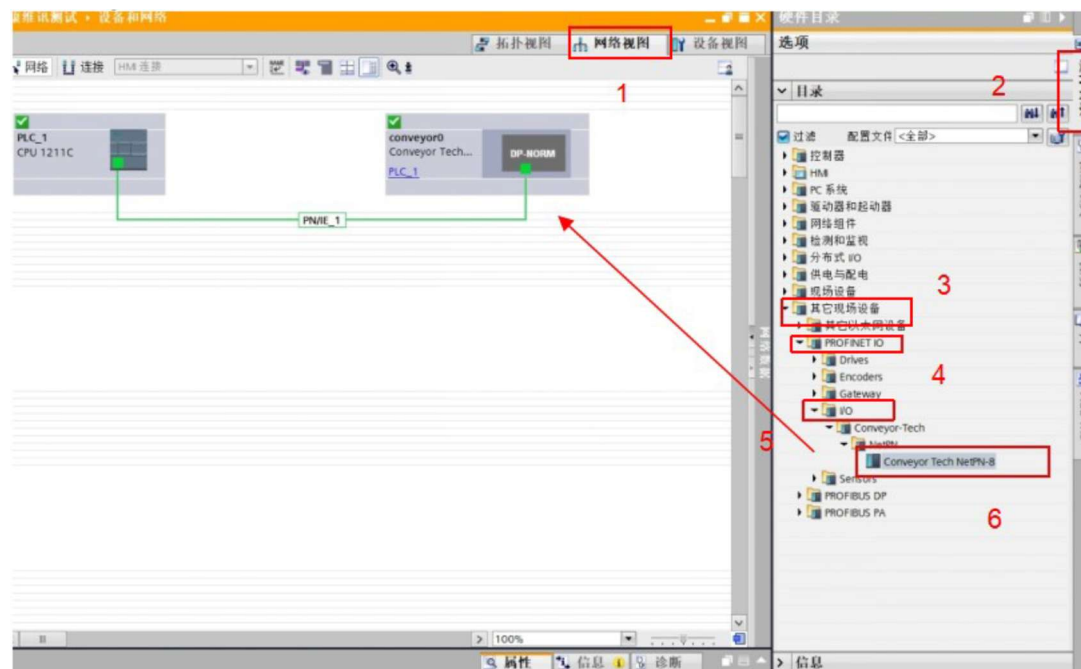


② Install the GSD file for ZWGAB-C3-N4-D0

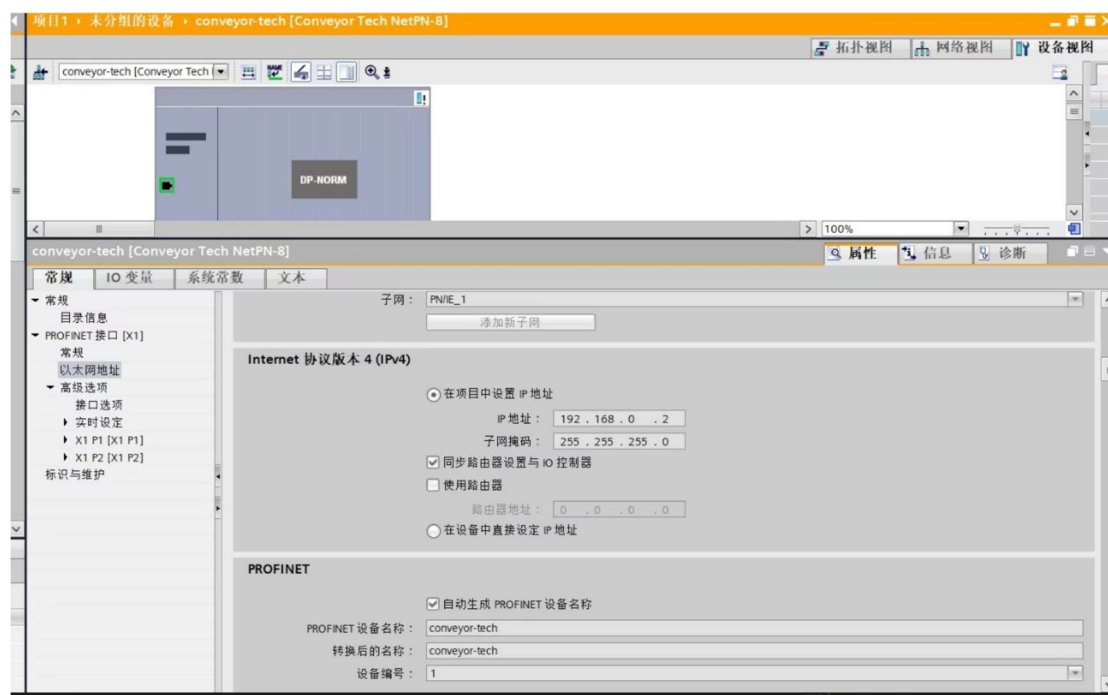


③ Configured Hardware

Configure the conveyor into the project, as shown in the figure below:



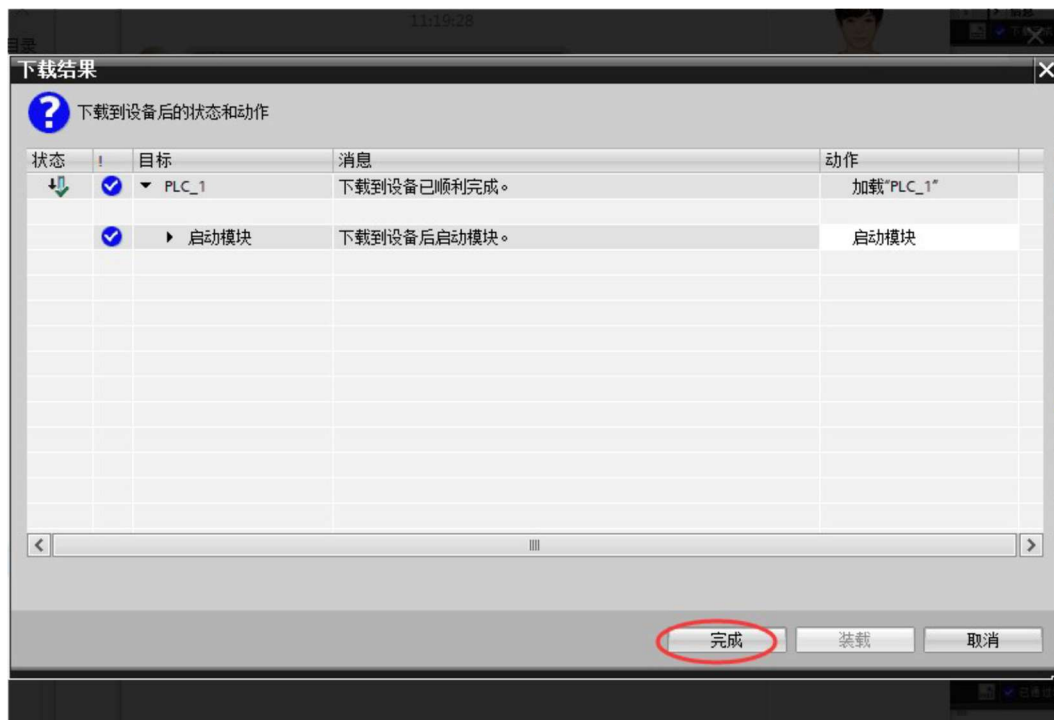
Set the IP address and PROFINET device name for conveyor-tech:



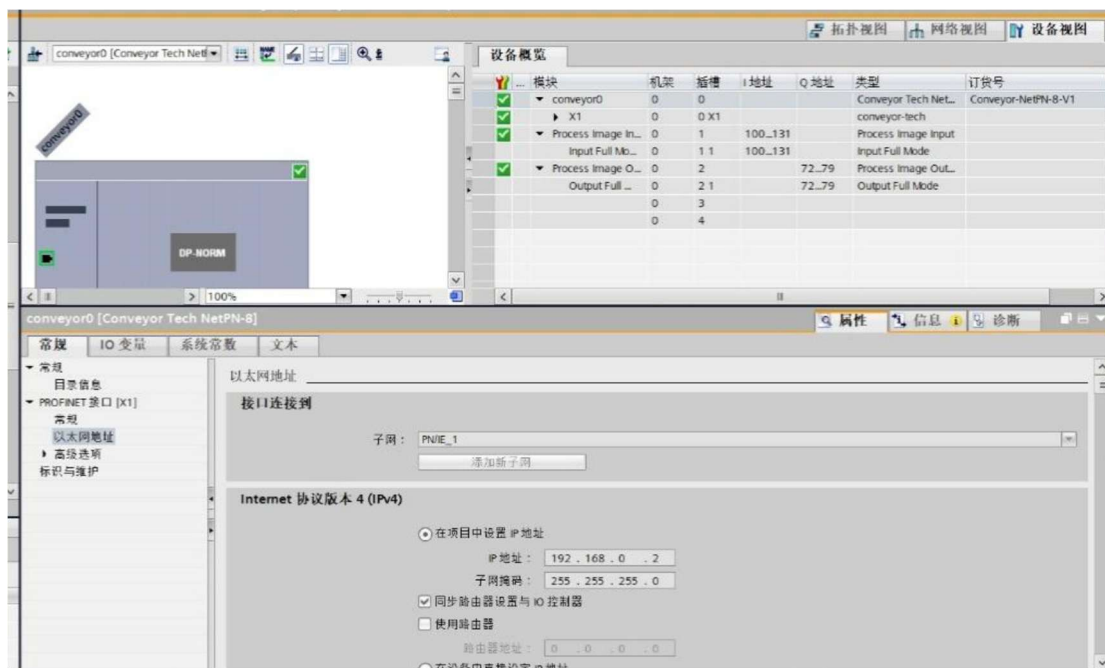
*Note:

1) When configuring conveyor-tech in TIA Portal, the PROFINET device name must match the device name configured in conveyor-tech; otherwise, communication will not function properly.

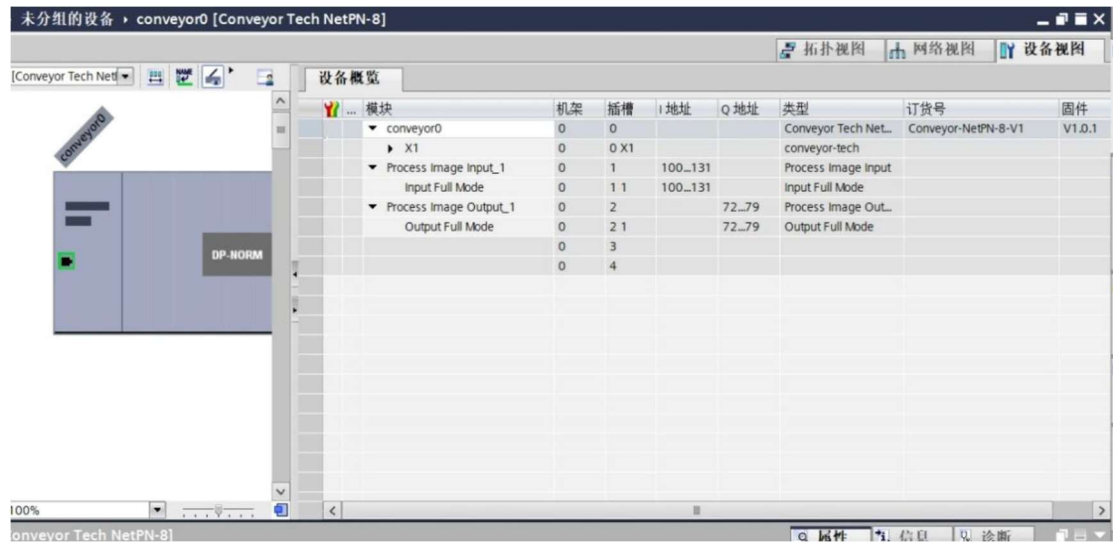
After configuring the hardware, download the project to the S7-1200 CPU, then click "Go Online" to check the block status as shown in the figure below:



After downloading the hardware configuration to the S7-1200 CPU, click "Go Online" and verify that all devices in the "Network View" are marked with ✓. In this state, it indicates that the hardware configuration is correct and the module is operating normally.

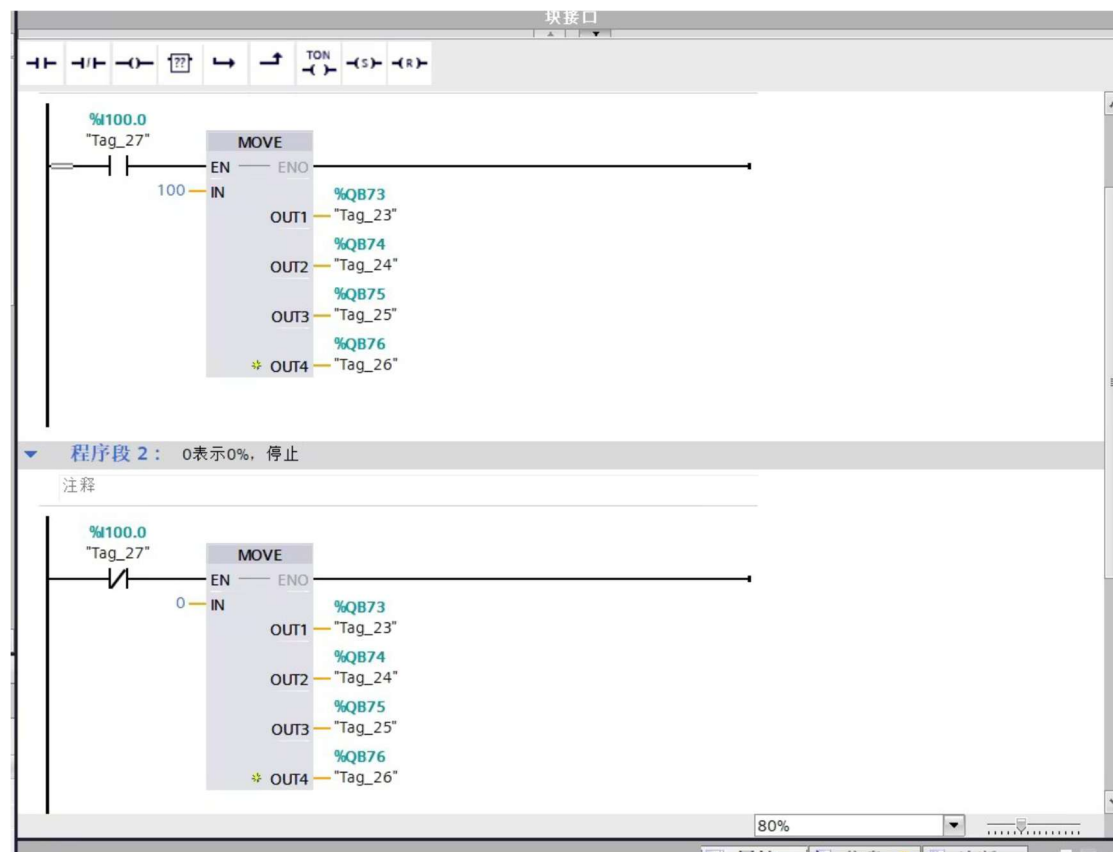


9.5 Data Address Description



Note: See Chapter 6 for specific address allocation.

Example:



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