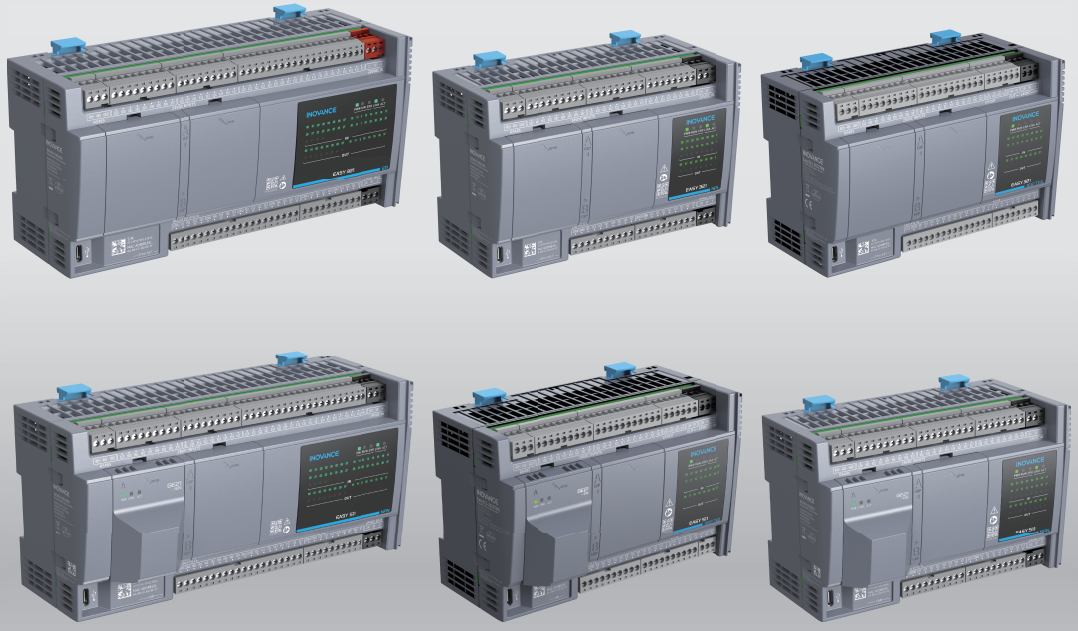
INOVANCE

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Easy321 and Easy511 Series Programmable Logic Controller

User Guide

Industrial Automation | New Energy Vehicle | Intelligent Elevator | Intelligent Robot | Digital Energy | Rail Transit

Data code PS00017976A05

Legal Information

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The contents are subject to change without notice due to product upgrade.

Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

This user guide presents installation, wiring, configuration commissioning, functions, fault diagnosis, and maintenance of Easy321 and Easy511 series products.

More documents

Name	Code	Description
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of H5U and Easy series PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Describes the basic instructions and complex instructions used for programming applications, as well as examples of these instructions.
GE21-RTU Coupler Configuration Card User Guide	PS00017987	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-RTU expansion card.
GE21-CAN-485 Communication Expansion Card User Guide	PS00017986	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-CAN-485 expansion card.
GE21-TF-RTC Memory Expansion Card (with Integrated RTC) User Guide	PS00017990	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-TF-RTC expansion card.
GE21-4AD1DA-I Analog Input and Output Current-Type Expansion Card User Guide	PS00021286	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-4AD1DA-I expansion card.
GE21-8DI Digital Input Expansion Card User Guide	PS00021287	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-8DI expansion card.
GE21-8DO-TN Sink-Type Transistor Output Expansion Card User Guide	PS00021288	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-8DO-TN expansion card.
GE21-232/485-RTC Communication Expansion Card User Guide	PS00021289	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-232/485-RTC expansion card.
GE21-232/485 Communication Expansion Card User Guide	PS00021820	Presents the product information, installation, wiring, and configuration and commissioning of the product.
GE21-8DO-TP Source-Type Transistor Output Expansion Card User Guide	PS00021290	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-8DO-TP expansion card.
GE21-4AD1DA-V Analog Input and Output Voltage-Type Expansion Card User Guide	PS00021307	Presents the product information, installation, wiring, and configuration and commissioning of the GE21-4AD1DA-V expansion card.
Easy321 and Easy511 Series Programmable Logic Controller User Guide (This guide)	PS00017976	Presents comprehensive task information for using Easy321 and Easy511 series products, including product introduction, installation, wiring, configuration and commissioning, features, fault diagnosis, maintenance, and appendix.

Standards compliance

The following table lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification	Directive		Standard
CE certification	EMC directive	2014/30/EU	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	LVD directive	2014/35/EU	EN 61010-1 EN 61010-2-201
	RoHS directive	2011/65/EU amended by (EU) 2015/863	EN IEC 63000
UL/cUL certification	-		UL 61010-1 UL 61010-2-201 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 NO. 61010-2-201
KCC certification	-		-
EAC certification	-		-
UKCA certification	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC regulations	Electromagnetic Compatibility Regulations 2016	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

Revision history

Date	Version	Description
May 2026	A05	Updated the instruction execution time in *"2.5.1 General Specifications" on page 24*.
December 2025	A04	Added content for the 30XP model and the Easy511 series PNP models.
August 2025	A03	Made minor corrections.
July 2025	A02	Updated OPC UA network port specifications in *"2.5.5 Communication Specifications" on page 35*.
June 2025	A01	Made minor corrections.
May 2025	A00	First release.

Access to the guide

This guide is not delivered with the product. You can download the PDF version in the following ways:

- Visit *https://www.inovance.com/global*, and choose Service&Support > **Support >** Documentation Download.
- **Scan** the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download the guide.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance will be charged after the warranty expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee will be charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see the Warranty Card.

1 Fundamental Safety Instructions

1.1 General Safety Instructions

Safety Disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of the product.
2. To ensure personal and equipment safety, observe all safety precautions marked on the product and described in this guide during installation, operation, and maintenance.
3. The "CAUTION", "WARNING", and "DANGER" are only supplements to the safety instructions.
4. Use this product according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
5. Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

Safety Levels and Definitions



The "DANGER" sign indicates that failure to comply with the notice will result in death or serious injury.



The "WARNING" sign indicates that failure to comply with the notice could result in death or serious injury.



The "CAUTION" sign indicates that failure to comply with the notice could result in minor or moderate injury, or equipment damage.

Unpacking
 • Do not install the product in the case of any damage, rust, or signs of use on the product or accessories upon unpacking. • Do not install the product in the case of water seepage into the product or missing or damaged components upon unpacking. • Do not install the product in the case of any discrepancy between the product you received and the product name on the packing list.
 • Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. • Unpack the package by following the unpacking sequence. Do not strike the package violently. • Check for damage, rust, or dents on the surfaces of the product and accessories upon unpacking. • After unpacking, check the contents against the packing list to ensure that the equipment and accessories are in the correct quantities, and that all documentation is complete.

Storage and transportation

WARNING

- Large or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply could result in personal injury or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely connected components may fall off and result in personal injury or equipment damage.
- Do not stand or stay below the product which is being hoisted.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply could result in personal injury or equipment damage.

CAUTION

- Handle the equipment with care and mind your steps during transportation to prevent personal injury or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply could result in personal injury.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply could result in equipment damage.
- Do not store or transport the equipment in locations where the equipment may be exposed to splashing water or rain, direct sunlight, strong electric field, strong magnetic field, or strong vibration.
- Store the equipment for up to three months. Take stricter protective measures and carry out the necessary inspections for a longer storage time.
- Pack the equipment securely and properly before transportation. Use a fully enclosed container for long-distance transportation.
- Never transport the equipment with other devices or items that could impact or cause harm to the equipment.

Design

DANGER

- Provide a safety circuit and include an error handling program in the software to ensure that the product remains in a safe state in case of an external power failure or an internal fault.
- If a sustained overcurrent occurs due to overload or load short circuit, the product may smoke or catch fire. An external safety device (such as a fuse or circuit breaker) must be installed.

WARNING

- If an output component (such as a relay or transistor) in this product is damaged, the corresponding output may become uncontrolled and remain permanently ON or OFF.
- The product design must comply with the overvoltage category requirements specified in the environmental specifications. A system-level lightning protection device must be installed on the power supply to ensure that lightning-induced overvoltages do not reach the product's power input, signal input, or control output terminals, thereby preventing damage to the product.
- Ensure that appropriate actions have been taken to prevent product malfunction caused by a communication fault between the product and related devices. Failure to comply could cause personal injury or equipment damage.

CAUTION

Switches that could cause personal injury or equipment damage must not be configured on the touch screen. Use independent switches for performing critical operations. Failure to comply could result in accidents caused by wrong outputs or faults.

Installation

DANGER

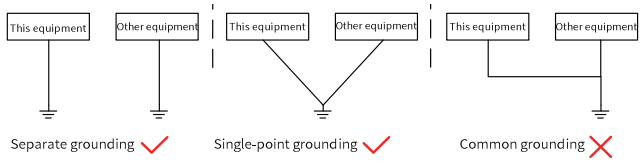
This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.

Installation
WARNING • Read through the guide and safety instructions before installation. • Do not install this equipment in places with strong electric or magnetic field. • Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply may result in mechanical hazards. • Before installation, ensure that the installation site meets the required environmental conditions. Failure to comply could result in equipment damage. • Do not wear loose clothes or accessories during installation. Failure to comply could result in electric shock. • When installing the equipment in an enclosed environment (such as a cabinet or case), use cooling devices (such as fans or air conditioners) to cool the space and meet the installation environment requirements. Failure to do so could result in equipment overheating or fire. • Do not retrofit the equipment. • Never loosen or turn the fixing bolts on product components, or any bolts marked in red. • This equipment must be installed inside an indoor cabinet or terminal equipment. The cabinet or terminal equipment itself must be provided with the necessary protective enclosures, such as a fireproof enclosure, an electrical protective enclosure, and a mechanical protective enclosure. The IP rating of these enclosures must comply with the relevant IEC standards, and applicable local laws and regulations. • Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction. • Install the equipment onto a non-combustible object such as metal. Keep the equipment away from combustible objects. Failure to comply could result in fire. • For products not supporting hot swapping, disconnect all external power supplies of the system before installing/removing the product. Failure to comply could result in electric shock, product failure, or malfunction.
CAUTION • Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation holes from being blocked, which could cause overheating due to poor heat dissipation. • During installation, ensure the equipment is connected to the respective connector securely and hook the equipment firmly. Improper installation may result in malfunction, failure, or detachment.

Wiring

DANGER

- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before wiring, disconnect all the power supplies of the equipment. Wait for at least the time designated on the warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply could result in electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply could result in electric shock.
- Ensure that the equipment is grounded properly. Failure to comply could result in electric shock. Separate grounding or single-point grounding, other than common grounding, is recommended.



- Insulate the cable terminals properly to ensure the insulation distance between cables will not be shortened after cables are connected to the terminal block. Failure to comply could result in electric shock or equipment damage.
- Install the terminal cover attached to the equipment before power-on or operation after wiring is completed. Failure to comply could result in electric shock.

WARNING

- Never connect the power cable to output terminals of the equipment. Failure to comply could cause equipment damage or even fire.
- Cables used for wiring must comply with the requirements for the cross-sectional area and shielding. The shielding layer of the shielded cable must be reliably grounded at one end.
- Tighten the terminal screws with the torque specified in the user guide. Insufficient or excessive torque may cause overheating and damage to the joint, which could result in fire.
- After wiring is done, ensure that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply could result in electric shock or equipment damage.

CAUTION

- Follow the proper electrostatic discharge(ESD) procedure, and wear an anti-static wrist strap to perform wiring. Failure to comply could damage the equipment or its internal circuits.
- Use shielded twisted pair cables for the control circuit. Connect the shield to the grounding terminal of the equipment. Failure to comply may result in equipment malfunction.

Power-on

DANGER

- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before power-on, ensure that the equipment is installed and wired properly.
- Ensure that the power supply meets equipment requirements before power-on to prevent equipment damage or fire accident.
- Do not open the cabinet door or protective cover of the product, touch any wiring terminal of the product, or remove any components or parts while the product is powered on. Failure to comply could result in personal injury or even death.

WARNING

Perform a trial run after wiring to ensure the equipment operates safely. Failure to comply could result in personal injury or equipment damage.

Operation
DANGER • The equipment must be operated only by professionals. Failure to comply can result in injury or death. • Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply could result in electric shock.
WARNING • Do not touch the enclosure, fan, or resistor with bare hands. Failure to comply could result in burns. • Prevent metal or other objects from falling into the equipment during operation. Failure to comply could result in fire or equipment damage. • During operation, do not bring live parts into contact with the metal enclosure of the product. Failure to comply could result in fire or product damage.
CAUTION • Operate the equipment within the specified environmental conditions. Failure to comply could result in equipment failure or damage. • Touch the HMI panel with hands only. Failure to comply could cause panel damage, which is out of the warranty range.
Safety recommendations • In positions where the operator directly touches the mechanical parts, for example, where a mechanical device is loaded/unloaded, or where a machine runs automatically, manually-operated devices or other alternative means must be carefully designed so that they are independent of the equipment to start or stop the automatic operation of the system. • If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Battery usage
WARNING • Do not use batteries that do not meet the product requirements. Failure to comply could result in death, personal injury, explosion, or fire. • Do not throw batteries into fire or hot ovens. Do not crush or cut the battery. Failure to comply could result in death, personal injury, explosion, or fire. • Do not expose the battery to extremely high temperatures. Failure to comply could result in death, personal injury, explosion, or fire. • Do not swallow batteries. Failure to comply could result in chemical burns. • Seek for medical treatment immediately if a button battery is swallowed by accident, because this may cause severe internal burns within two hours and even death.
CAUTION • Keep batteries out of reach of children. • If the battery compartment is not shut tight, stop using the product and keep it away from children.

Maintenance
DANGER • Maintenance must be performed only by trained and qualified electrical personnel. • Do not maintain the equipment with power ON. Failure to comply could result in electric shock. • Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label. • Disconnect all external power supplies of the system before cleaning the equipment or re-tightening screws on the terminal block or screws for connector installation. Failure to comply could result in electric shock. • Disconnect all external power supplies of the system before removing or installing the product, or connecting or disconnecting cables. Failure to comply could result in electric shock or malfunction.

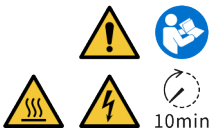
Maintenance
WARNING Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair
DANGER • Repair must be performed only by trained and qualified electrical personnel. • Do not repair the equipment with power ON. Failure to comply could result in electric shock. • Before inspection or repair, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.
WARNING • Submit a request for repair based on the warranty agreement. • When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply could result in equipment damage, personal injury, or death. • Troubleshooting and repair of a faulty or damaged equipment must be performed by professionals based on the repair instructions, with the repair records kept properly. • Replace quick-wear parts of the equipment according to the replacement instructions. • Do not use damaged equipment. Failure to comply could result in death, personal injury, or severe equipment damage. • Recheck the wiring and reset the parameters after equipment replacement.

Disposal
WARNING • Dispose of the retired equipment in accordance with applicable national regulations and standards. Failure to comply could result in property damage, personal injury, or death. • Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution. • Treat the scrapped equipment as industrial waste. Dispose of the batteries according to local laws and regulations.

Safety Label

To ensure safe operation, comply with safety labels on the equipment and do not damage or remove the labels. The following table describes the meanings of the safety labels.

Safety Label	Description
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply could result in personal injury, death, or equipment damage. • Do not touch the terminals or remove the cover with power-on or within 10 min after power-off. Failure to comply could result in electric shock. • The surface of the equipment may become very hot during operation. Do not touch these hot areas, as this may cause burns.

1.2 Industrial Information Security

The product provides interfaces for network connection and data transmission. To protect factories, systems, machines, and networks from cyberattacks, it is essential to implement proper protection mechanism for industrial security.

Customers are responsible for providing and maintaining a secure connection between the product and their network or any other network to protect their factories, systems, machines, and networks from unauthorized access. Such systems or machines can be connected to an enterprise network or the Internet only when a secure connection is established and appropriate security measures (such as using antivirus software or installing firewalls) are in place.

Inovance continuously develops and improves its products and solutions to enhance safety. It is strongly recommended that you update the product promptly and always use the latest version.



Tampering with software (such as viruses, Trojans, and Worms) can lead to unsafe drive state, which can put the device in an unsafe operation state. This may result in death, serious injury, and property damage. Observe the following strictly.

- Always use the latest software version. If the product version is no longer supported or the latest version of the program is not applied, customers are at increased risk of cyber-attacks.
- Take proper protection measures (including but not limited to deploying antivirus software, firewall, WAF, IPS/IDS, situational awareness system, ID verification, and data encryption) to prevent files in the mobile storage device from being damaged by malware and protect products, networks, systems, and interfaces from unauthorized access, disturbance, intrusion, data disclosure, or information theft.
- Check all safety-related interfaces and settings after commissioning.

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2 Product Introduction

2.1 Product Overview

Easy321 and Easy511 are small-sized PLCs developed based on the AutoShop programming platform of Inovance. The motion control instructions comply with PLCopen specifications and support multiple programming languages including ST, LD, and SFC. A massive number of I/O points are available on the CPU. The GE21 expansion cards includes the GE21-RTU configuration expansion card, GE21-CAN-485 communication expansion card, and GE21-TF-RTC storage expansion card. A wide range of models and expansion cards are available to meet various complex applications.

- The Easy321 series includes 60-point, 40-point, and 30-point analog models (30XP models). All three models are available in relay, NPN, and PNP configurations, and each unit features a built-in Ethernet port.
- The Easy511 product line includes 60-point NPN/PNP models, 40-point NPN/PNP models, and 30-point NPN analog models. Each unit is equipped with a built-in EtherCAT port that supports switching to Ethernet, and is equipped with a GE21-EN Ethernet card as standard, which supports standard Ethernet communication protocols.
- The 30-point analog models of both the Easy321 and Easy511 series integrate analog functionality, supporting 4 AD channels, 2 DA channels, as well as voltage and current input/output.

For detailed models for Easy321 and Easy511, see *"2.3 Model and Nameplate" on page 17*.

The advantages of each product are shown in the table below:

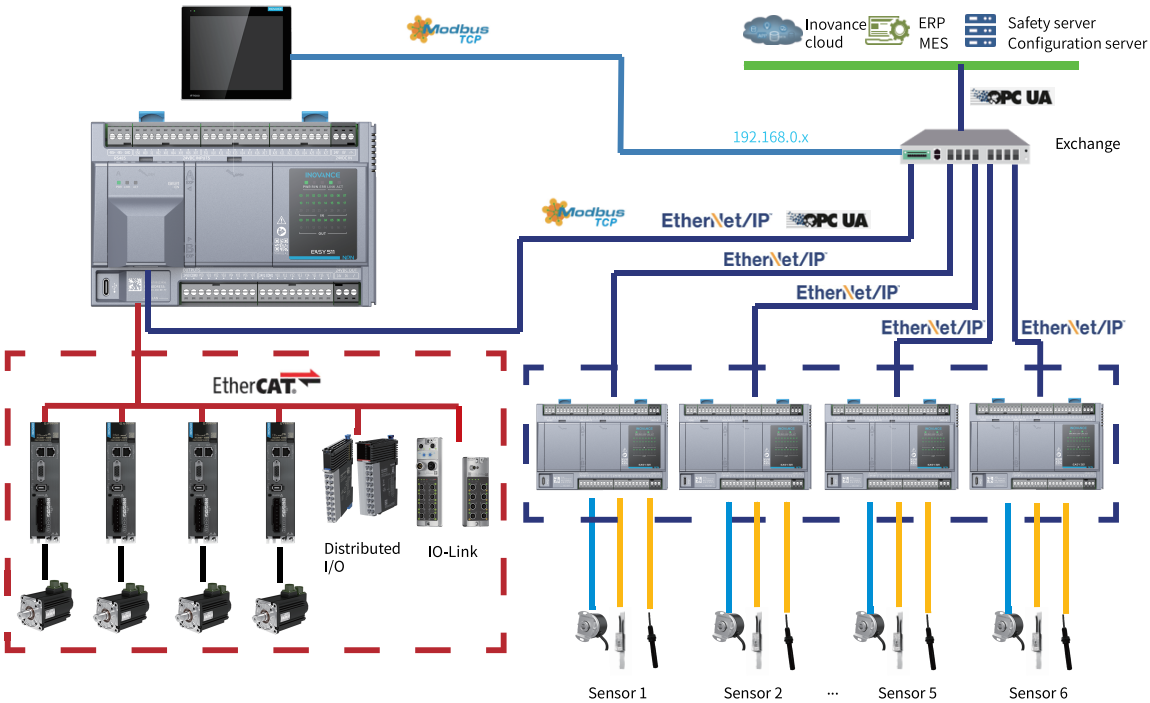
Item	Highlights of Easy321	Highlights of Easy511
Scope of application:	This product series is mainly used in logic control and process control applications, and can also serve as a smart remote I/O.	This product series is mainly applied to bus motion control applications.
Processing performance	Dual-core processor, nanoseconds instruction processing speed	
Program data capacity	• 128000 steps of user program • 1 MByte user-defined variables, of which 128KByte are retentive at power failure • Approximately 150000 soft components; those numbered 1000 and above are retentive at power failure	
Supported protocols	Ethernet x 1. Modbus TCP, OPC UA (server), Socket, EtherNet/IP, PN (slave), MC (slave), FINS (slave) supported.	
	-	EtherCAT x 1; 8 axes (including pulse axes) in the cycle synchronization mode; 4 axes in the profile mode; up to 12 physical axes; up to 72 slaves supported. Supports switching to Ethernet.
Local expansion module	Up to eight GL20 local expansion modules supported without the GL20-PS2 power supply module; up to fifteen GL20 local expansion modules supported with the GL20-PS2 power supply module	

Item	Highlights of Easy321	Highlights of Easy511
Expansion Card	This product has two built-in expansion card slots. Slot A supports expansion cards such as the GE21-CAN-485, and Slot B supports expansion cards such as the GE21-RTU. For the supported expansion card models, see *"9.3 Appendix 3: Applicable Products" on page 128*.	This product has two built-in expansion card slots. Slot A is equipped with a GE21-EN expansion card as standard, while slot B supports a GE21-TF-RTC expansion card. For the supported expansion card models, see *"9.3 Appendix 3: Applicable Products" on page 128*.
	Software-free configuration supported by configuring Easy321 as an intelligent I/O through GE21-RTU expansion card	-
Programming language	Multiple programming languages including ST, LD, and SFC supported; built-in ST execution block in the ladder diagram, FB, FC, structures, unions, and arrays supported; virtual simulation supported by the programming software	

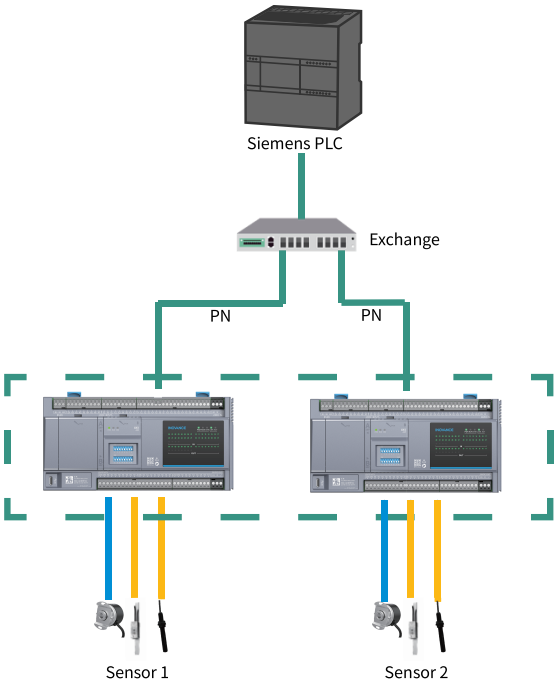
2.2 System Networking

The Easy321 and Easy511 series PLCs support Modbus TCP, EtherNet/IP, OPC UA (Server), PN (Slave), and Socket communication protocols. You can connect the PLC to other stations, ERP, MES, and other systems through a switch. The Easy511 series PLC is equipped with the EtherCAT communication function by default to control operations of the servo drive, AC drive and remote I/Os. The Easy321 series PLC can support CAN communication through an expansion card to connect to the servo drive and AC drive.

The following figure shows a typical system networking diagram.



The Easy321 series PLC can quickly configure the PLC as a PN remote I/O through the GE21-RTU coupler configuration card to back up the configuration information of the PLC that used as a I/O.



2.3 Model and Nameplate

Model

Take the Easy321-1812ERX model as an example. The model description is shown as follows.

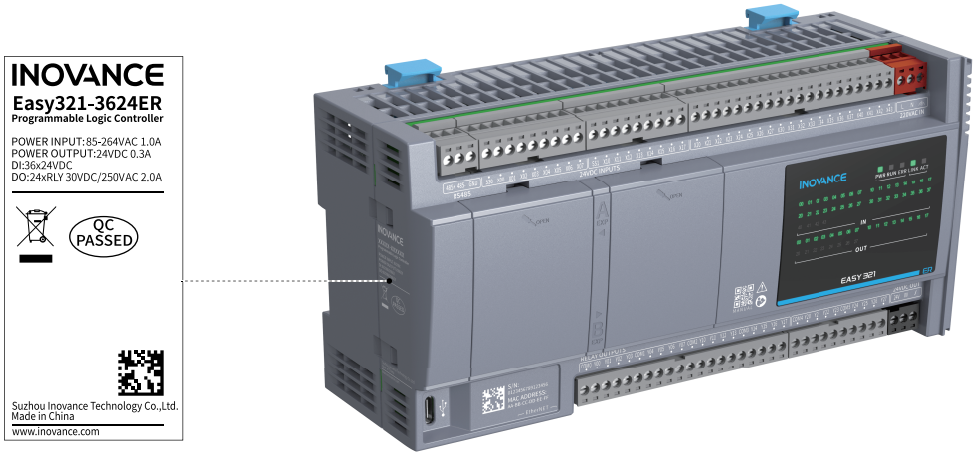
Easy 321 - 18 12 ER X

① ② ③ ④ ⑤ ⑥ ⑦

① **Product series** Easy: Easy series programmable logic controller	⑤ **Number of outputs** 24: 24 outputs 16: 16 outputs 12: 12 outputs
② **Product model** 321: Easy300 series 511: Easy500 series	⑥ **Output type** ER: Relay output TN: Sinking type transistor output TP: Sourcing type transistor output
③ **Model category** Blank: Standard model S: Economical model	⑦ **Analog output** Blank: Analog signals are not integrated on the PLC. X: Analog signals are integrated on the PLC.
④ **Number of inputs** 36: 36 inputs 24: 24 inputs 18: 18 inputs	-

Nameplate

Take the Easy321-3624ER model as an example. The nameplate description is shown in the following figure. For information about the nameplates of other models, see *"2.5.2 Power Supply Specifications" on page 27*, *"2.5.3 Input Specifications" on page 29*, *"2.5.4 Output Specifications" on page 32*.



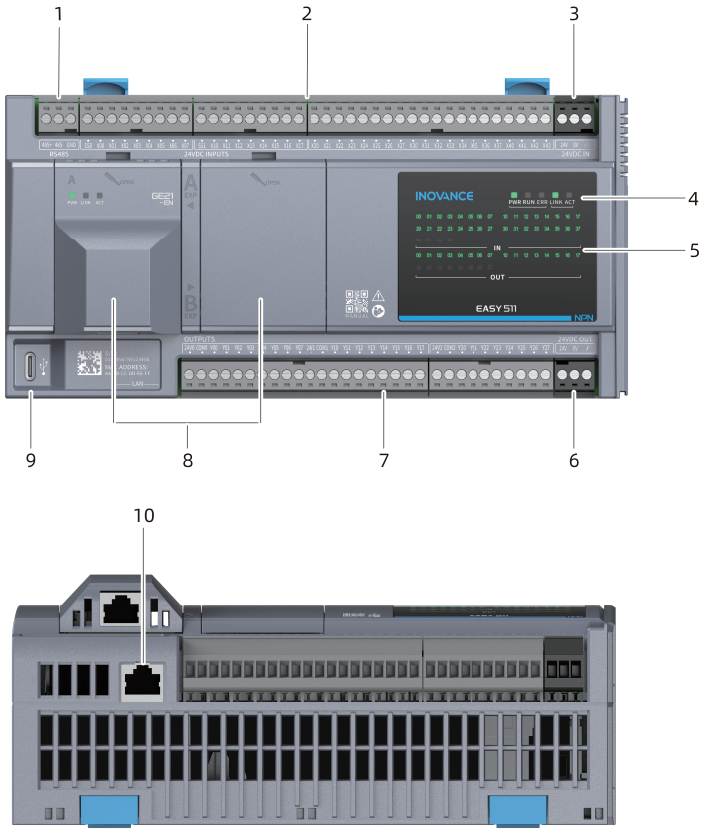
Model	Description	Product code
Easy321-3624ER	Easy300 series programmable controller with 36 inputs and 24 relay outputs	01440709
Easy321-3624TP	Easy300 series programmable controller with 36 inputs and 24 transistor sourcing outputs	01440710
Easy321-3624TN	Easy300 series programmable controller with 36 inputs and 24 transistor sinking outputs	01440711
Easy321-2416ER	Easy300 series programmable controller with 24 inputs and 16 relay outputs	01440715
Easy321-2416TP	Easy300 series programmable controller with 24 inputs and 16 transistor sourcing outputs	01440716
Easy321-2416TN	Easy300 series programmable controller with 24 inputs and 16 transistor sinking outputs	01440717
Easy321-1812TPX	Easy300 series programmable controller with 18 inputs and 12 transistor sourcing outputs 4AD2DA	01440722
Easy321-1812TNX	Easy300 series programmable controller with 18 inputs and 12 transistor sinking outputs 4AD2DA	01440723
Easy321-1812ERX	Easy300 series programmable controller with 18 inputs and 12 relay sinking outputs 4AD2DA	01440721
Easy511-3624TP	Easy500 series programmable controller with 36 inputs and 24 transistor sourcing outputs (Slot A is equipped as standard with an EN card).	01441621
Easy511-3624TN	Easy500 series programmable controller with 36 inputs and 24 transistor sinking outputs (Slot A is equipped as standard with an EN card).	01440944
Easy511-2416TP	Easy500 series programmable controller with 24 inputs and 16 transistor sourcing outputs (Slot A is equipped as standard with an EN card).	01441620

Model	Description	Product code
Easy511-2416TN	Easy500 series programmable controller with 24 inputs and 16 transistor sinking outputs (Slot A is equipped as standard with an EN card).	01440945
Easy511-1812TNX	Easy500 series programmable controller with 18 inputs and 12 transistor sinking outputs 4AD2DA (Slot A is equipped as standard with an EN card).	01440946

2.4 Component Description

2.4.1 Components of the 40-Point and 60-Point Models

The component descriptions are the same for the 40-point and 60-point models. The figure and table below show the descriptions using the Easy511-3624TN model as an example.



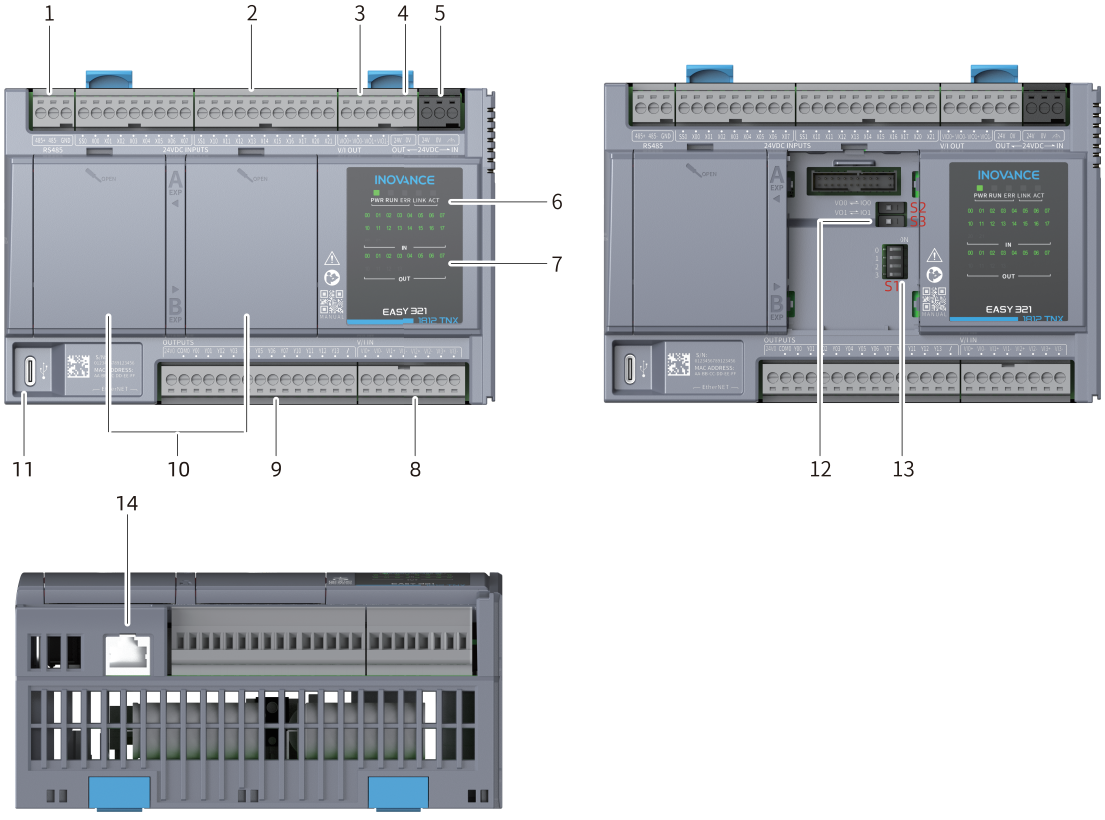
No.	Terminal type	Mark	Definition
1	RS485 terminal	-	For details, see *"4.4.2 Terminal Assignment" on page 86*
2	DI terminal	-	For details, see *"4.3.4.1 60-Point Model Terminal Assignment" on page 67*and *"4.3.4.2 40-Point Model Terminal Assignment" on page 71*
3	Input power port	-	For details, see *"4.3.3 Power Terminal Assignment" on page 66*
4	Signal indicator	-	For details, see *"7.2.2 Offline Diagnosis with Signal Indicators" on page 107*

No.	Terminal type	Mark	Definition
5	I/O indicator	-	For details, see *"7.2.2 Offline Diagnosis with Signal Indicators" on page 107*
6	Output power port	-	For details, see *"4.3.3 Power Terminal Assignment" on page 66*
7	DO terminal	-	For details, see *"4.3.4.1 60-Point Model Terminal Assignment" on page 67*and *"4.3.4.2 40-Point Model Terminal Assignment" on page 71*
8	Expansion card slot	A/B	Receives expansion card for extended functions. The Easy511 product is equipped with a GE21-EN card as standard in slot A. For the component description of the GE21-EN card, see *"2.4.3 Components of the GE21-EN Ethernet Card" on page 22* For details on expansion card options, see *"2.4.1 Components of the 40-Point and 60-Point Models" on page 19*
9	Type-C port		Enables communication with PC.
10	Network port	-	• Easy511 model: EtherCAT interface, switchable to Ethernet protocol. • Easy321 model: RJ45 interface for Ethernet communication.

2.4.2 Components of the 30XP Model

- **Component description**

  The component descriptions are the same for all models. The figure and table below show the descriptions using the Easy321-1812TNX model as an example.



No.	Terminal type	Mark	Definition
1	RS485 terminal	-	For details, see *"4.4.2 Terminal Assignment" on page 86*
2	DI terminal	-	For details, see *"4.3.4.3 30XP Model Terminal Assignment" on page 74*
3	Analog output terminal	-	For details, see *"4.3.4.3 30XP Model Terminal Assignment" on page 74*
4	Output power port	-	For details, see *"4.3.3 Power Terminal Assignment" on page 66*
5	Input power port	-	For details, see *"4.3.3 Power Terminal Assignment" on page 66*
6	Signal indicator	-	For details, see *"7.2.2 Offline Diagnosis with Signal Indicators" on page 107*
7	I/O indicator	-	For details, see *"7.2.2 Offline Diagnosis with Signal Indicators" on page 107*
8	Analog input terminal	-	For details, see *"4.3.4.3 30XP Model Terminal Assignment" on page 74*
9	DO terminal	-	For details, see *"4.3.4.3 30XP Model Terminal Assignment" on page 74*
10	Expansion card slot	A/B	Receives expansion card for extended functions. The Easy511 product is equipped with a GE21-EN card as standard in slot A. For the component description of the GE21-EN card, see *"2.4.3 Components of the GE21-EN Ethernet Card" on page 22* For details on expansion card options, see *"2.4.1 Components of the 40-Point and 60-Point Models" on page 19*
11	Type-C port		Enables communication with PC.
12	Voltage/ Current output switch	S2: VO0 IO0 S3: VO1 IO1	Voltage/Current output switch, which selects the output type of the analog terminals and controls the output voltage or current. For details, see "DIP switch description" below.
13	Current input switch	0, 1, 2, 3 ON	Current input switch, which selects the input type of the analog terminals and controls the input current. For details, see "DIP switch description" below.
14	Network port	-	• Easy511 model: EtherCAT interface, switchable to Ethernet protocol. • Easy321 model: RJ45 interface for Ethernet communication.

- **DIP switch description**



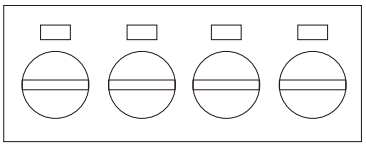
Remove the B-slot expansion card cover before toggling the DIP switch.

- **Voltage/Current output switch**



By default, the switches S2 and S3 are set to the left position for voltage output (VO0/VO1). For current output, set them to the right position (IO0/IO1). It is recommended to use a small screwdriver or similar tools to toggle the switch.

The corresponding voltage/current output terminal assignment is shown in the figure below.



- **Current input switch**

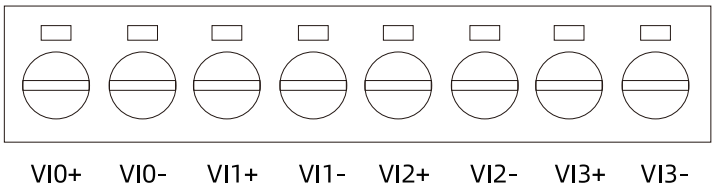


By default, the switch S1 is set to the left position for voltage input. For current input, set it to the right position (ON). It is recommended to use a small screwdriver or similar tools to toggle the switch.

Caution

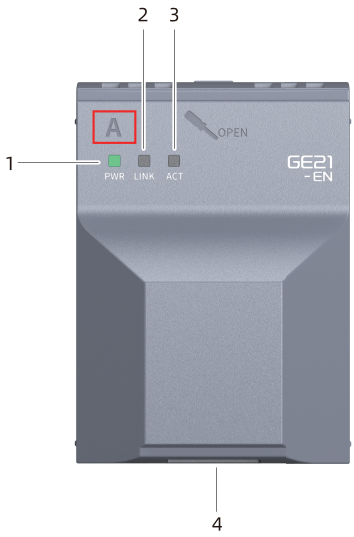
0 to 3 correspond to current input channels 0 to 3.

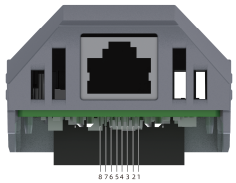
The corresponding voltage/current input terminal assignment is shown in the figure below.



2.4.3 Components of the GE21-EN Ethernet Card

The Easy511 series PLC is equipped with GE21-EN Ethernet card as standard by default. The following table describes the components of the GE21-EN Ethernet card.



No.	Port type	Identification	Definition	Indicator color	Description
1	Power supply indicator	PWR	Power supply normal	Yellow-green	• Steady ON: Power supply normal. • OFF: Power supply abnormal.
2	Ethernet LINK indicator	LINK	Connection normal	Yellow-green	• Steady ON: Connected • OFF: Not connected
3	Ethernet ACT LED	ACT	Communication status	Yellow-green	• Flashing: Communication in progress • OFF: No communication
4	User terminal	-	-	-	 **RJ45 pin** / **Signal description** 1 – TX+ 2 – TX- 3 – RX+ 4 – - 5 – - 6 – RX- 7 – - 8 – -

Note

The letter "A" in the figure indicates that only the card slot A of the PLC is supported.

2.5 Technical Specifications

2.5.1 General Specifications

Item		Specification								
		Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Dimensions (W x H x D) (mm)		205 mm x 100 mm x 75 mm	155 mm x 100 mm x 75 mm	155 mm x 100 mm x 75 mm	205 mm x 100 mm x 75 mm	155 mm x 100 mm x 75 mm	155 mm x 100 mm x 75 mm	205 mm x 100 mm x 85 mm	155 mm x 100 mm x 85 mm	155 mm x 100 mm x 85 mm
Weight		750 g	630 g	625 g	615 g	525 g	530 g	635 g	545 g	550 g
Program data capacity		• 128000 steps of user program • 1 MByte user-defined variables, of which 128KByte are retentive at power failure • Approximately 150000 soft components; those numbered 1000 and above are retentive at power failure								
Instruction execution time	Bit operation	0.09 μs								
	Integer operation	0.338 μs								
	Floating-point operation (double precision)	0.779 μs								
High-speed I/O	High-speed input	Supports pulse input, maximum 4-axis (encoder axis)/8-channel 200 kHz input, A/B phase supported, pulse+direction, CW/CCW, and single-phase counting								
	High-speed output	Not supported			Pulse input supported, max. 4 axes (pulse axis, unified instruction with bus axis)/8-channel 200 K, AB phase supported, pulse+direction, CW/CCW, PWM pulse width modulation (4-channel) supported					

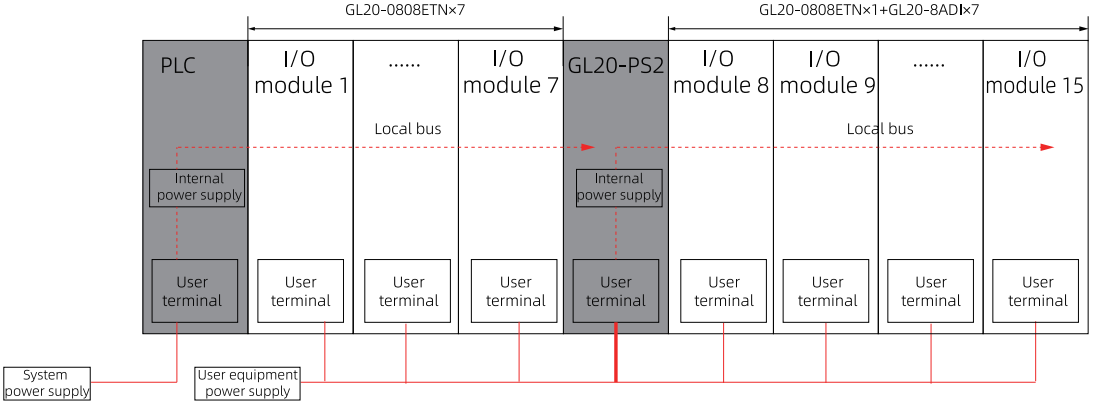
<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="9">Specification</th></tr>
<tr><th>Easy321-3624ER</th><th>Easy321-2416ER</th><th>Easy321-1812ERX</th><th>Easy321-3624TP/TN</th><th>Easy321-2416TP/TN</th><th>Easy321-1812TPX/TNX</th><th>Easy511-3624TP/TN</th><th>Easy511-2416TP/TN</th><th>Easy511-1812TNX</th></tr>
<tr><td rowspan="4">Expansion module and expansion card</td><td>Local expansion module</td><td colspan="9">• Up to eight GL20 local expansion modules supported without GL20-PS2 power supply
• Supports up to 15 GL20 local expansion modules when equipped with a GL20-PS2 power supply. The actual number of supported modules must be calculated based on the total bus current consumption.[1]</td></tr>
<tr><td rowspan="2">Expansion Card</td><td colspan="9">• GE21-RTU expansion card that allows the PLC to be quickly configured as a PN coupler
• GE21-RTU expansion card that backs up the configuration information of the PLC when it is used as smart I/O; original parameters downloaded automatically after PLC replacement without software maintenance</td></tr>
<tr><td colspan="6">The PLC has two built-in expansion card slots. For supported expansion card models, see "9.3 Appendix 3: Applicable Products" on page 128</td><td colspan="3">Two expansion card slots available
• Slot A is equipped as standard with a GE21-EN Ethernet card, which supports 100 Mbps Ethernet.
• For B-slot expansion card models supported, see "9.3 Appendix 3: Applicable Products" on page 128</td></tr>
<tr><td>PLC program/firmware update</td><td colspan="9">Updated through GE21-TF-RTC expansion card</td></tr>
</table>

Note

[1]:

- The following requirements must be met when connecting the expansion module. Otherwise, the GL20-PS2 module power supply must be added on the right side of the corresponding module before the limit is exceeded.
  - The total power consumption of the expansion module does not exceed the PLC bus power supply current of 1A.
  - The number of expansion modules does not exceed eight.
- Calculation example: Expansion of eight GL20-0808ETN (power consumption: 130 mA) + seven GL20-8ADI (power consumption: 65 mA) expansion modules. For detailed power consumption of each module, see *"9.3 Appendix 3: Applicable Products" on page 128*.
  - Total power consumption of the expansion I/O module = 130 mA x 8 + 65 mA x 7 = 1495 mA (Total power consumption of the expansion modules = Power consumption of expansion module 1 + Power consumption of expansion module 2 +.... + Power consumption of expansion module n.)
  - Determine whether the power consumption and the number of expansion modules exceed the limit.
    - The current bus power consumption is 1495 mA, which exceeds the PLC power supply capacity of 1A.
    - The current number of expansion modules is 15, which exceeds the maximum permissible number of 8.
  - Confirm the configuration.

    In conclusion, the PLC cannot support the above configuration. The GL20-PS2 module must be added to the right side of the 7th module. The total power consumption of the module with the PLC is 965 mA (130 mA x 7 + 55 mA x 1 = 965 mA). The power consumption of GL20-PS2 is 55 mA. The total number of expansion modules is 16. The system configuration is shown in the following figure.



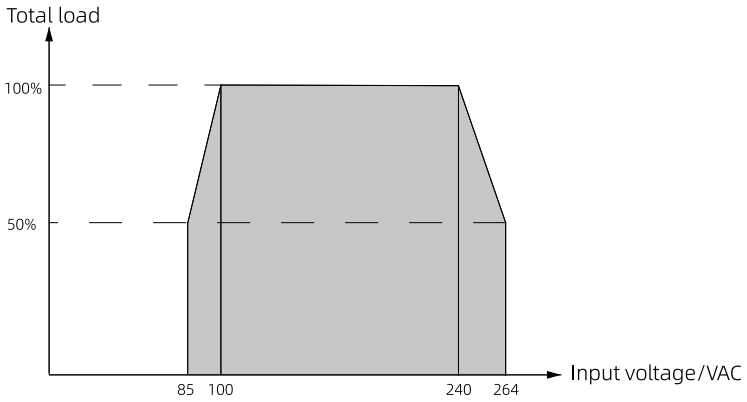
2.5.2 Power Supply Specifications

<table>
<tr><th colspan="3" rowspan="2">Item</th><th colspan="9">Specification</th></tr>
<tr><th>Easy321-3624ER</th><th>Easy321-2416ER</th><th>Easy321-1812ERX</th><th>Easy321-3624TP/TN</th><th>Easy321-2416TPN/TN</th><th>Easy321-1812TPX/TNX</th><th>Easy511-3624TPN/TN</th><th>Easy511-2416TP/TN</th><th>Easy511-1812TNX</th></tr>
<tr><td rowspan="4">Power input</td><td colspan="2">Rated voltage</td><td colspan="3">220 VAC input[1], voltage range from 85 VAC to 264 VAC
Under operating conditions of 85 VAC to 100 VAC and 240 VAC to 264 VAC, derate the load by 50%, as shown in the derating curve below.</td><td colspan="6">24 VDC input[2], voltage range from 21.6 VDC to 26.4 VDC</td></tr>
<tr><td colspan="2">Rated current</td><td colspan="3">1 A</td><td colspan="6">1 A (max@24 V)</td></tr>
<tr><td>Power supply protection</td><td>Short circuit supported</td><td colspan="9">Supported</td></tr>
<tr><td>Reversed polarity protection</td><td colspan="9">Supported</td></tr>
<tr><td rowspan="2">Power output</td><td colspan="2">Rated voltage</td><td colspan="9">20.4 VDC to 26.4 VDC</td></tr>
<tr><td colspan="2">Max. current</td><td colspan="9">0.3 A</td></tr>
<tr><td rowspan="2">Local bus</td><td colspan="2">Rated current</td><td colspan="9">1A, up to 8 local expansion modules supported</td></tr>
<tr><td colspan="2">Hot swap</td><td colspan="9">Not supported</td></tr>
</table>

Caution

- [1]: The power input terminal on the relay model is orange and supports 220 VAC input.
- [2]: The power input terminal on the transistor model is black and supports 24 VDC input; 220 VAC input is prohibited.

For safety reasons, derate the relay model under undervoltage and overvoltage conditions, as shown in the derating curve below.


Total load
100%
50%
85
100
240
264
Input voltage/VAC

2.5.3 Input Specifications

Digital input specifications

Item			Specification								
			Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
High-speed DI interface	Input type		Digital input								
	Input mode		Source/Sink								
	Number of input channels		8-channel (high-speed)								
	Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)								
	High-speed input (X0-X7)	Input current at input ON	Input current > 4 mA (typical value at 24 V input)								
		Input current at input OFF	Input current < 2.5 mA								
		Hard ware response time	< 2 μs								
		Maximum input frequency	200 kHz								
		Input impedance	3.1 KΩ to 3.4 KΩ								
	ON-state voltage		> 15 VDC								
	OFF-state voltage		< 5 VDC								
	Software filter time		High speed: 200 ns to 1000 μs								
	Common terminal		The common terminal is shared by all the DIs (polarity (+/-) of the input power supply can be changed).								
	Input derating		For details, see the "Digital/Relay derating" in *"2.7 Derating Specifications" on page 41*.								

Item			Specification								
			Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Regular DI interface	Input type		Digital input								
	Input mode		Source/Sink								
	Number of input channels		28 channels (regular)	16 channels (regular)	10 channels (regular)	28 channels (regular)	16 channels (regular)	10 channels (regular)	28 channels (regular)	16 channels (regular)	10 channels (regular)
	Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)								
	Normal input	Input current at input ON	4 mA (typical@24 V)								
		Hard ware response time	< 100 μs								
		Maximum input frequency	250 Hz								
		Input impedance	5.3 KΩ to 6.3 KΩ								
	ON-state voltage		> 15 VDC								
	OFF-state voltage		< 5 VDC								
	Software filter time		Low speed: 2 ms to 1000 ms								
	Common terminal		The common terminal is shared by all the DIs (polarity (+/-) of the input power supply can be changed).								
	Input derating		For details, see the "Digital/Relay derating" in *"2.7 Derating Specifications" on page 41*.								

Analog input specifications

Item	Specification			
	Easy321-1812ERX	Easy321- 1812TNX	Easy321- 1812TPX	Easy511-1812TNX
Input type	Analog differential input			
Input mode	Voltage/Current			
Number of input channels	4 channels			
Resolution	16-bit			
Conversion time	60 μs/channel			

Item		Specification			
		Easy321-1812ERX	Easy321- 1812TNX	Easy321- 1812TPX	Easy511-1812TNX
Voltage input	Voltage input range	± 10 V, 0 V to 10 V, ± 5 V, 0 V to 5 V, 1 V to 5 V			
	Voltage input load	> 1MΩ			
	Voltage input accuracy (25℃)	±0.1% (full range)			
	Voltage input accuracy (full temperature range)	± 0.2% (full range)			
	Voltage input limit	± 15 V			
	Voltage input diagnosis	Wire breakage detection not supported			
Current input	Current input range	± 20 mA, 0 mA to 20 mA, 4 mA to 20 mA			
	Current sampling impedance	250 Ω			
	Current input accuracy (25℃)	±0.1% (full range)			
	Current input accuracy (full temperature range)	± 0.2% (full range)			
	Current input limit	±30 mA (transient), ±24 mA (average)			
	Current input diagnosis	Wire break detection supported only when set to 4 mA to 20 mA			
Isolation		No isolation between the channels; isolation between the interfaces and the power supply; isolation between the interfaces and the bus			
Input status display		None			

For specifications of the analog range, see *"6.4 Analog Input and Output" on page 103*

2.5.4 Output Specifications

Digital output specifications

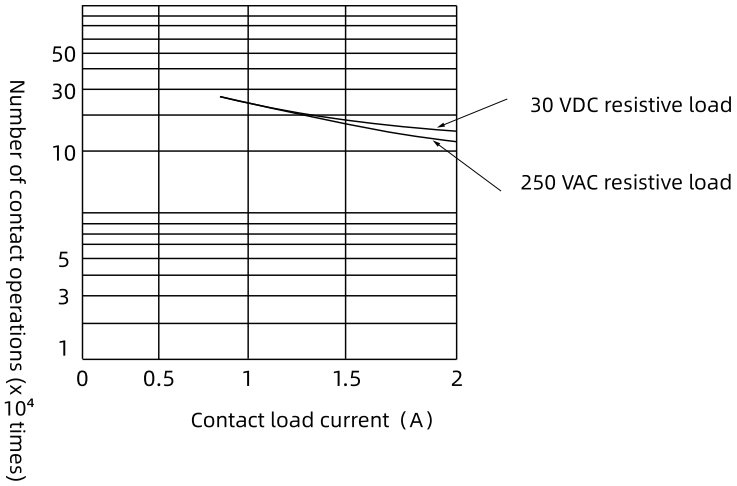
<table>
<tr><th colspan="3" rowspan="2">Item</th><th colspan="6">Specification</th></tr>
<tr><th>Easy321-3624TP/TN</th><th>Easy321-2416TP/TN</th><th>Easy321-1812TPX/TNX</th><th>Easy511-3624TP/TN</th><th>Easy511-2416TP/TN</th><th>Easy511-1812TNX</th></tr>
<tr><td rowspan="10">High-speed output interface</td><td colspan="2">Output type</td><td colspan="6">Digital output (transistor)</td></tr>
<tr><td colspan="2">Output mode</td><td colspan="5">Sink-type (NPN)/Source-type (PNP)</td><td>Sink (NPN)</td></tr>
<tr><td colspan="2">Number of output channels</td><td colspan="6">8-channel (high-speed)</td></tr>
<tr><td colspan="2">Output voltage class</td><td colspan="6">24 VDC±10% (21.6 VDC to 26.4 VDC)</td></tr>
<tr><td rowspan="2">Output load</td><td>Resistive load</td><td colspan="6">0.5 A/point; 2 A/8 points</td></tr>
<tr><td>Inductive load</td><td colspan="6">7.2 W/point; 24 W/8 points</td></tr>
<tr><td colspan="2">Hardware response time (ON/OFF)</td><td colspan="6">< 1 μs (OFF→ON); < 2 μs (ON→OFF)</td></tr>
<tr><td colspan="2">Load current requirements</td><td colspan="6">Load current ≥ 12 mA when used with outputs greater than 10 kHz</td></tr>
<tr><td colspan="2">Maximum output frequency</td><td colspan="6">200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load</td></tr>
<tr><td colspan="2">PWM output</td><td colspan="6">Maximum frequency: 200 kHz; minimum pulse width: 2.5 μs; minimum resolution: 2.5 μs, adjustable duty cycle: 0.01% to 99.99% (The duty cycle is related to the frequency. The pulse width corresponding to the duty cycle cannot be lower than the minimum pulse width.)</td></tr>
<tr><td rowspan="9">Regular output interface</td><td colspan="2">Output type</td><td colspan="6">Digital output (transistor)</td></tr>
<tr><td colspan="2">Output mode</td><td colspan="5">Sink-type (NPN)/Source-type (PNP)</td><td>Sink (NPN)</td></tr>
<tr><td colspan="2">Number of output channels</td><td>16 channels (regular)</td><td>8 channels (regular)</td><td>4 channels (regular)</td><td>16 channels (regular)</td><td>8 channels (regular)</td><td>4 channels (regular)</td></tr>
<tr><td colspan="2">Output voltage class</td><td colspan="6">24 VDC±10% (21.6 VDC to 26.4 VDC)</td></tr>
<tr><td rowspan="3">Output load</td><td>Resistive load</td><td colspan="6">0.5 A/point; 2 A/8 points</td></tr>
<tr><td>Inductive load</td><td colspan="6">7.2 W/point; 24 W/8 points</td></tr>
<tr><td>Lamp load</td><td colspan="6">5 W/point, 18 W/8-point</td></tr>
<tr><td colspan="2">Hardware response time (ON/OFF)</td><td colspan="6">100 μs/100 μs</td></tr>
<tr><td colspan="2">Switching frequency</td><td colspan="6">Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz</td></tr>
<tr><td colspan="3">OFF-state leakage current</td><td colspan="6">< 10 μA at rated 24 V</td></tr>
<tr><td colspan="3">Max. residual voltage during ON</td><td colspan="6">Less than 0.5 VDC</td></tr>
</table>

Item	Specification					
	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Common terminal	8 points/common terminal					
Short-circuit protection	Available per channel					
External inductive load protection	A flywheel diode is required when an external inductive load is connected.					
Output derating	For details, see "2.7 Derating Specifications" on page 41"Digital/Relay derating" section					

Relay output specifications

Item		Specification		
		Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX
DO terminals	Output type	Relay output		
	Output mode	Dry contact		
	Number of output channels	24 channels (regular)	16 channels (regular)	12 channels (regular)
	Output voltage class	250 VAC/30 VDC		
	Output resistive load	2 A/point; 8 A/4 points		
	Hardware response time (ON/OFF)	Approx.15ms		
	Min, load	5 VDC, 100 mA		
	Switching frequency	No more than 20 operations per minute		
	Mechanical Life	5000000 operations		
	Electrical life	As shown in the relay life curve below.		
	Output derating	For details, see "2.7 Derating Specifications" on page 41"Digital/Relay derating" section		

The relay life curve is shown as below.



Caution

- For resistive loads at 30 VDC or 250 VAC, the maximum load current is 2 A with a mechanical life of approximately 100,000 operations.
- If the maximum load current exceeds 2 A, the relay life will be significantly reduced. Operation beyond the rated specifications is strictly prohibited.

Analog output specifications

Item		Specification			
		Easy321-1812ERX	Easy321-1812TNX	Easy321-1812TPX	Easy511-1812TNX
Output type		Analog output			
Output mode		Voltage/Current			
Number of output channels		2			
Resolution		16-bit			
Conversion time		60 μs/channel			
Voltage output	Voltage output range	± 10 V, 0 V to 10 V, ± 5 V, 0 V to 5 V, 1 V to 5 V			
	Voltage output load	> 1 kΩ			
	Voltage output accuracy (25°C)	±0.1% (full range)			
	Voltage output accuracy (full temperature range)	± 0.5% (full range)			
	Voltage output diagnosis	Short-circuit detection and overtemperature protection are not supported.			
Current output	Current output range	0 mA to 20 mA, 4 mA to 20 mA			
	Current output load	0 Ω to 600 Ω			
	Current output accuracy (25°C)	±0.1% (full range)			
	Current output accuracy (full temperature range)	± 0.5% (full range)			
	Current output diagnosis	Open-circuit detection and overtemperature protection are not supported.			
	Output derating	For details, see *"2.7 Derating Specifications" on page 41*"Analog derating"			
Isolation		No isolation between the channels; isolation between the interfaces and the power supply; isolation between the interfaces and the bus			

For specifications of the analog range, see *"6.4 Analog Input and Output" on page 103*.

2.5.5 Communication Specifications

Ethernet specifications

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Number of ports supported	One Ethernet port						One Ethernet port and one EtherCAT port		
Network media	Flexible crossover cable, double-layer shielded (SFTP or SFTPP), Cat5e or above. For details, see *"4.2.2 Preparation Before Wiring" on page 63*								
Duplex mode	Full duplex								
Hardware interface	Single network port RJ45								
Baud rate	10 Mbps/100 Mbps								
Communication distance	≤ 100m								
Protocol	• Supports EtherNet/IP protocol, master/slave, up to 32 slaves. • Supports maximum data volume of 1,400 bytes per connection.								
	Supports Modbus TCP protocol, can operate as a master or a slave, up to 31 slaves.								
	Supports FINS slave								
	Supports MC slave								
	Socket								
	Supports OPC UA protocol, server only								
	Serves as a PN slave only, with up to 16 modules supported								

EtherCAT specifications

Item	Specification		
	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Number of network ports	1		
Communication protocol	EtherCAT protocol		
Services available	FoE, CoE (PDO, SDO)		
Synchronization start condition	• DC synchronization • SM synchronization • User-defined DC synchronization For detailed information on terms, see *" Term" on page 130*		

Item	Specification		
	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Physical layer	100Base-TX		
Baud rate	100 Mbps		
Duplex mode	Full duplex		
Topology	• Line type • Star type		
Transmission media	Flexible crossover cable, double-layer shielded (SFTP or SFTPP), Cat5e or above. For details, see "4.2.2 Preparation Before Wiring" on page 63		
Transmission distance	Less than 100 m between two nodes		
EtherCAT frame length	44–1498 bytes		
Process Data	Up to 1486 bytes per Ethernet frame		
Automatic scanning function	Supported		
Number of axes	Up to 12 axes, in which 8 axes for period synchronization mode (including pulse axis) and 4 axes for profile mode		
Number of slaves	Up to 72 slaves supported		
Cam	Synchronous operation of 8 groups of cams supported		
Disable and scan	Supports disabling and scanning of slaves		

RS485 specifications

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Number of channels supported	RS485 x 11 (1 built-in channel, 2 channels via the expansion card, 8 channels via local expansion modules)						RS485 x 10 (1 built-in channel, 1 channel via the B-slot expansion card, 8 channels via local expansion modules)		
Hardware interface	3-pin terminal on the user side								
Isolation	Not supported								
Termination resistor	None (external termination resistor needed). The port can serve as a master or slave.								
Number of slaves connected	Up to 31 (The branch line length per slave must be shorter than 3 m. For details, see "4.4.3 Terminal Wiring" on page 87)								
Communication baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps								

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Short-circuit protection	Providing protection against 24 V improper insertion								
Protocol	Serial free protocol, Modbus ASCII protocol (master-slave), and Modbus-RTU protocol supported								

Note

When all four PLCs are configured as slaves on the same bus, it is not recommended to other devices to that bus.

RS232 specifications

All models support the GE21-232/485 expansion card. For details, see "GE21-232/485-RTC Communication Expansion Card User Guide".

Item	Specification
Number of ports supported	One port via expansion card.
Baud rates supported	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps

CAN specification

The GE21-CAN-485 expansion card supports the CAN protocol. For details, see*GE21-CAN-485 Communication Expansion Card User Guide*

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Number of ports supported	One port via expansion card.						-		
Protocol	CANlink and CANopen protocols supported								
Slave	• CANlink: Supports up to 63 slaves. • CANopen: Supports up to 30 slaves.								

USB specifications

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-1812ERX	Easy321-3624TP/TN	Easy321-2416TP/TN	Easy321-1812TPX/TNX	Easy511-3624TP/TN	Easy511-2416TP/TN	Easy511-1812TNX
Number of ports supported	1								
USB cable distance	1.5 m								
USB communication version	USB 2.0 at full speed								
USB hardware interface	Type-C interface								
Function	Monitoring, online modification, program upload/download, and firmware upgrade.								

Ethernet port specifications

Note

- The Easy511 series PLC is equipped with a GE21-EN Ethernet card as standard and supports dual network ports.
- The Easy321 series PLC supports a single network port.

Item	Built-in network port (Ethernet 0)	Expansion network port (Ethernet 1)	Description
Default IP	• Easy511: 192.168.2.88 • Easy321: 192.168.1.88	Easy511: 192.168.1.88	-
IP conflict detection	Supported	Supported	-
Cross-segment IP adjustment	Supported	Supported	-
System variable-based adjustment	Supported	Supported	-
Modbus TCP	Supported	Supported	-
OPC UA	Supported	Supported	Use either built-in or expansion network port, but not both.
EtherNet/IP	Supported	Supported	Use either built-in or expansion network port, but not both.
FINS	Supported	Supported	-
PN	Supported	Supported	Use either built-in or expansion network port, but not both.

Item	Built-in network port (Ethernet 0)	Expansion network port (Ethernet 1)	Description
EtherCAT switchover	• Easy511: EtherCAT for built-in network port by default, which can be switched to Ethernet. • Easy321: EtherCAT not supported	Not supported	-
TCP/UDP instruction	Supported	Supported	-
Monitoring Protocol	Supported	Supported	-
MC protocol	Supported	Supported	For details on MC protocol configuration and applicable specifications, see the "MC Communication" section in H5U and Easy Series Programmable Logic Controller Programming Guide.
Program upload/ download	Supported	Supported	-
Firmware upgrade	Supported	Supported	-

2.5.6 Function Specifications

Item	Specification								
	Easy321-3624ER	Easy321-2416ER	Easy321-3624TN/TP	Easy321-2416TN/TP	Easy321-1812ERX	Easy321-1812TNX/TPX	Easy511-1812TNX	Easy511-3624TN/TP	Easy511-2416TN/TP
Programming language	LD, ST, SFC, and FB/FC function (LD)								
Program conversion tool	Converts programs from H1U–H3U to the Easy series quickly.								
Subroutine	Subprogram encryption is supported. Separate network encryption is not supported.								
Program encryption (function block encryption)	Supports FB/FC program encryption.								
Program modification during operation without stop	Online modification is supported, in which all instructions can be modified online. However, configurations cannot be modified online. Subprograms cannot be deleted online.								
Cam, gear, and interpolation	Not supported		Supported		Not supported	Supported			
Project configuration software	Autoshop								

Item		Specification								
		Easy321-3624ER	Easy321-2416ER	Easy321-3624TN/TP	Easy321-2416TN/TP	Easy321-1812ERX	Easy321-1812TNX/TPX	Easy511-1812TNX	Easy511-3624TN/TP	Easy511-2416TN/TP
User program upgrade	USB	Supports Type-C interface for PLC program upload/download and monitoring without external power supply.								
	Micro SD	Supports Micro SD card user program download. For details, see "8.3.2 Micro SD Card User Program Download" on page 123								
	HMI (Inovance)	Supports downloading user programs to the HMI.								
Firmware upgrade/programming	USB	Supports Type-C interface for PLC firmware upgrade/programming without external power supply.								
	Micro SD	Supports Micro SD card user program upgrade.								
Special feature		The GE21-RTU card can be used to quickly configure Easy321 as smart I/Os to serve as a PN slave without the need for software configuration. For details, see "6.1 PN Coupler Mode" on page 100					Dual network ports. For details, see "6.2 Dual Network Ports" on page 102			
		Increases the number of built-in I/O points on the PLC. For details, see "6.3 Local I/O Point Expansion" on page 103								
		-				Supports 4 AD and 2 DA channels, with voltage and current input/output. For configuration details, see "6.4 Analog Input and Output" on page 103		-		

2.6 Environmental Specifications

Item	Specification
Installation/Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dust/gases, strong vibration, and repetitive shock
Altitude	≤ 2000 m
IP rating	IP20
Pollution degree	2
Interference immunity	AC power line: 4 kV; DC power line: 2 kV (IEC61000-4-4)
Overvoltage category	Relay model: II; Non-relay model: I
EMC immunity level	Zone B, IEC61131-2
ESD protection level	Contact discharge: +/-6 kV; air discharge: +/-8 kV

Item		Specification
Vibration resistance		• Application scenario: Tested according to IEC60068-2-6. 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; 10 cycles per axis. • Transportation scenario: Tested according to IEC 60068-2-64; at 5 Hz to 100 Hz, the power spectral density is 0.01 g^2/Hz; at 200Hz, the power spectral density is 0.001g^2/Hz, with Grms 1.14g
Shock resistance		Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 shocks in total in X, Y and Z axes.
Ambient temperature/humidity		• Temperature: ▪ Standalone: -20℃ to +60 ℃ ▪ Parallel: -20℃ to +55 ℃ • Humidity: < 95% RH (30℃), non-condensing
Storage temperature/humidity		• Temperature: -20°C to +60°C • Humidity: < 95% RH (30℃), non-condensing
Transportation temperature/ humidity		• Temperature: -40°C to +70°C • Humidity: < 95% RH (40°C), non-condensing
Installation method and restrictions	Installation method	For details, see *"3.1.2 Installation Method" on page 45*
	Installation restrictions	For details, see *"2.7 Derating Specifications" on page 41*

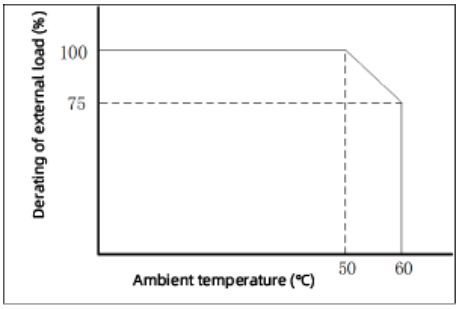
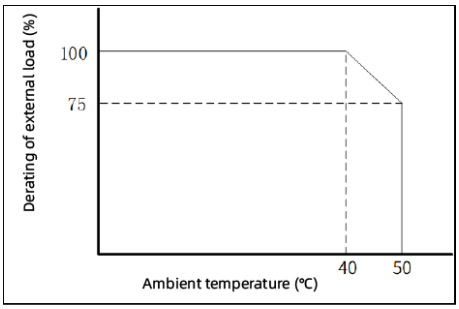
Note

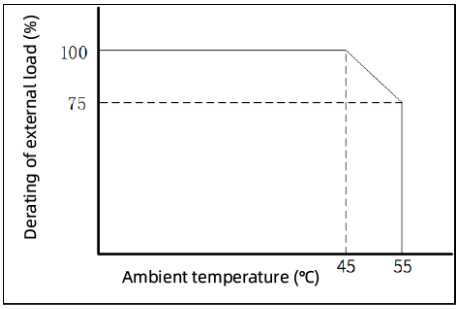
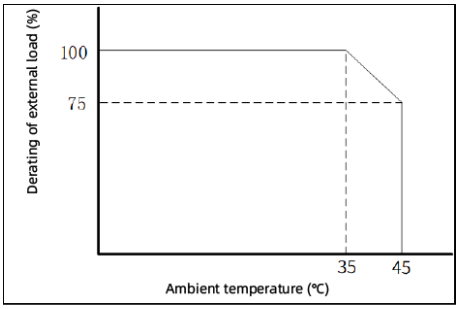
The temperature required for vertical installation is 10℃ lower than that for horizontal installation.

2.7 Derating Specifications

For specific requirements on the installation/operating environment, see *"2.6 Environmental Specifications" on page 40*.

Digital/Relay derating

<table>
<tr><th>Category</th><th>Item</th><th colspan="2">Input/output load derating curve</th></tr>
<tr><td rowspan="2">Single PLC (with expansion card)</td><td rowspan="2">• Single PLC: Without expansion module and with two expansion cards (not derated)
• Operating conditions: CPU load rate of 80% or below
• The temperature for vertical installation is 10℃ lower than that for horizontal installation.</td><td>Horizontal installation</td><td>Derate according to the actual ambient temperature on site, as shown in the following figure.
• Input derating:Full load at 50°C. At 60°C, the number of usable input points is derated to 75% (≤ 27 points for 36-input models, or ≤ 18 points for 24-input models).
• Output derating:Full load at 50°C. At 60°C, the number of usable output points is derated to 75% (≤ 18 points for 24-output models, or ≤ 12 points for 16-output models).

</td></tr>
<tr><td>Vertical installation</td><td>Derate according to the actual ambient temperature on site, as shown in the following figure.
• Input derating:Full load at 40°C. At 50°C, the number of usable input points is derated to 75% (≤ 27 points for 36-input models, or ≤ 18 points for 24-input models).
• Output derating:Full load at 40°C. At 50°C, the number of usable output points is derated to 75% (≤ 18 points for 24-output models, or ≤ 12 points for 16-output models).

</td></tr>
</table>

<table>
<tr><th>Category</th><th>Item</th><th colspan="2">Input/output load derating curve</th></tr>
<tr><td rowspan="2">Parallel PLCs (with expansion card)</td><td rowspan="2">• Parallel PLCs: With expansion module and two expansion cards (not derated)
• Operating conditions: CPU load rate of 80% or below
• The temperature for vertical installation is 10℃ lower than that for horizontal installation.</td><td>Horizontal installation</td><td>Derate according to the actual ambient temperature on site, as shown in the following figure.
• Input derating:Full load at 45℃. At 55℃, the number of usable input points is derated to 75% (≤ 27 points for 36-input models, or ≤ 18 points for 24-input models).
• Output derating:Full load at 45℃. At 55℃, the number of usable output points is derated to 75% (≤ 18 points for 24-output models, or ≤ 12 points for 16-output models).

</td></tr>
<tr><td>Vertical installation</td><td>Derate according to the actual ambient temperature on site, as shown in the following figure.
• Input derating:Full load at 35℃. At 45℃, the number of usable input points is derated to 75% (≤ 27 points for 36-input models, or ≤ 18 points for 24-input models).•
• Output derating:Full load at 35℃. At 45℃, the number of usable output points is derated to 75% (≤ 18 points for 24-output models, or ≤ 12 points for 16-output models).

</td></tr>
</table>

Note

Up to eight GL20 modules are supported without a GL20-PS2 power supply and up to 15 GL20 modules can be expanded with a GL20-PS2 power supply.

Analog derating

Category	Item	Derating status
Current output	Standalone • Without expansion modules, with two expansion cards (no derating for the cards) • Operating conditions: CPU load rate of 80% or below • The temperature for vertical installation is 10℃ lower than that for horizontal installation.	Derate based on actual field conditions. • **Horizontal installation:**When both channels output 20 mA, keep the operating temperature at or below 60°C. Otherwise, the module may overheat. • **Vertical installation:**When both channels output 20 mA, keep the operating temperature at or below 50°C. Otherwise, the module may overheat.
	Parallel • With expansion modules, with two expansion cards (no derating for the cards) • Operating conditions: CPU load rate of 80% or below • The temperature for vertical installation is 10℃ lower than that for horizontal installation.	Derate based on actual field conditions. • **Horizontal installation:**When both channels output 20 mA, keep the operating temperature at or below 55°C. Otherwise, the module may overheat. • **Vertical installation:**When both channels output 20 mA, keep the operating temperature at or below 45°C. Otherwise, the module may overheat.

3 Installation

3.1 Knowledge Before Installation

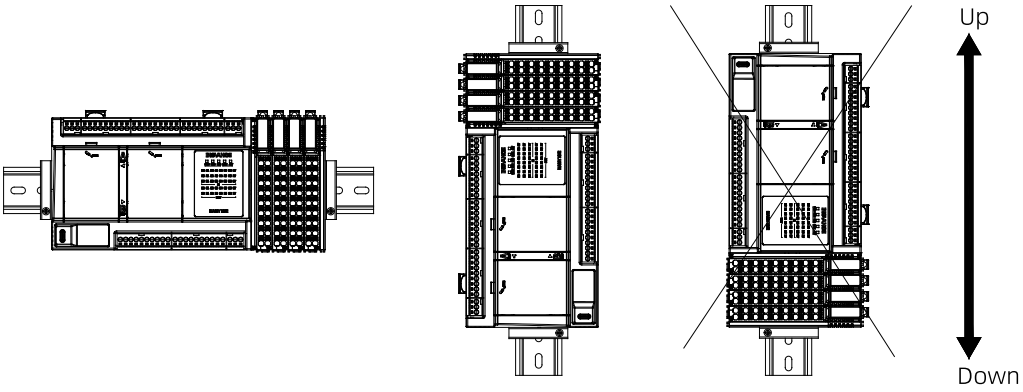
3.1.1 Introduction

Although this product has been designed to strict standards, the following installation requirements, such as installation method, installation space, and installation precautions, must still be met to ensure stable operation of the product.

3.1.2 Installation Method

Method

The PLC can be installed horizontally or vertically. It is recommended to install the PLC horizontally. Different installation directions require different operating temperatures and limits. For details, see *"2.6 Environmental Specifications" on page 40*.



Horizontal installation

Vertial installation with PLC at the bottom

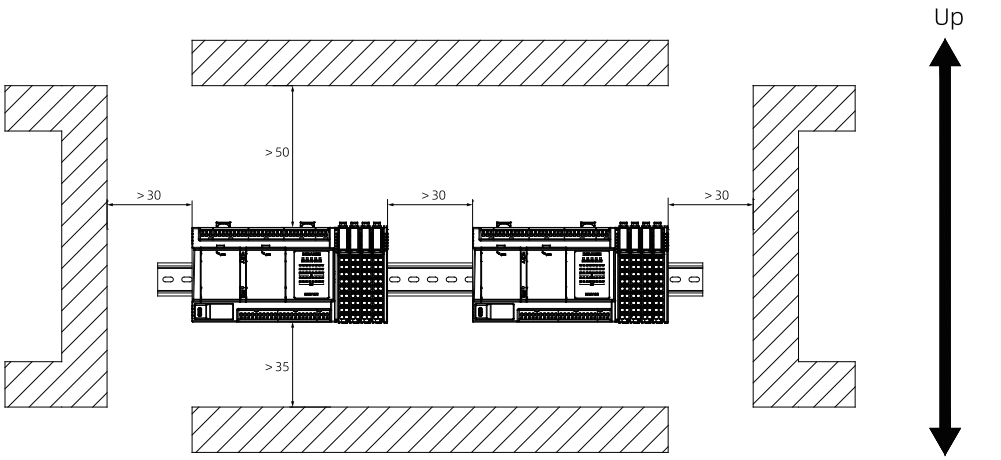
Vertial installation with PLC on the top

Caution

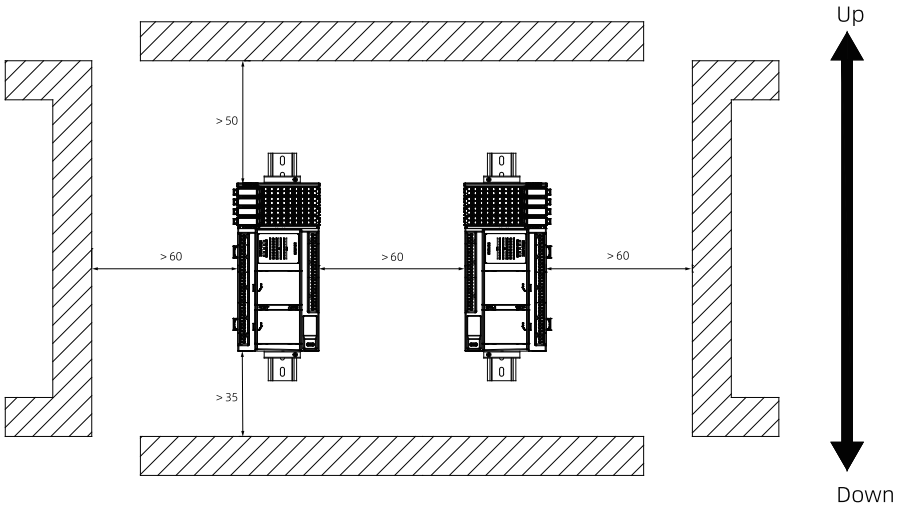
- Face-up or face-down installation is not supported during horizontal installation.
- Observe the following requirements during vertical installation.
  - The PLC must be installed below all I/O modules.
  - Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate, which may result in loose of the PLC from the DIN rail, resulting in malfunction.

Heat dissipation requirements

This PLC dissipates heat by natural convection. To ensure proper ventilation and reserve sufficient wiring space, keep a minimum clearance around the product. The following figure shows the clearance ((in mm) required for horizontal and vertical installation.



Horizontal installation



Vertical installation

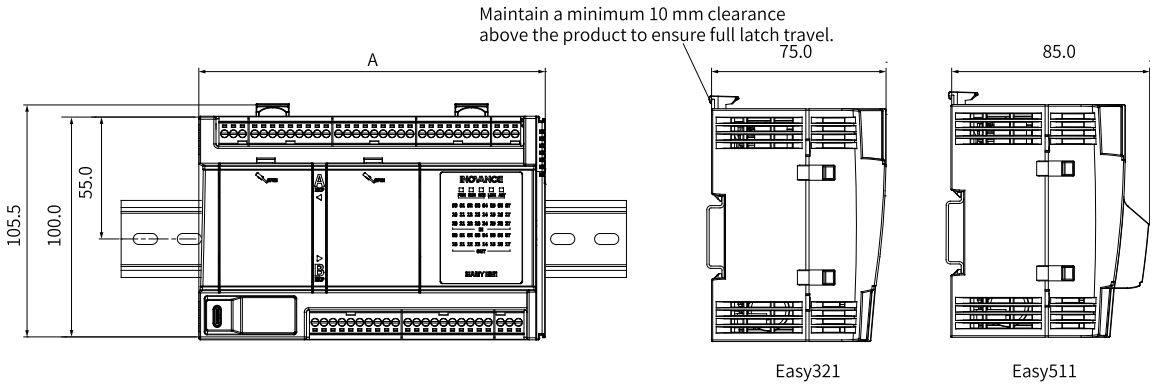
Caution

Do not install the product directly above a heat-generating device (such as a heater, transformer, or large resistor). Keep the product away from the heating source by at least 100 mm.

3.1.3 Installation Clearance

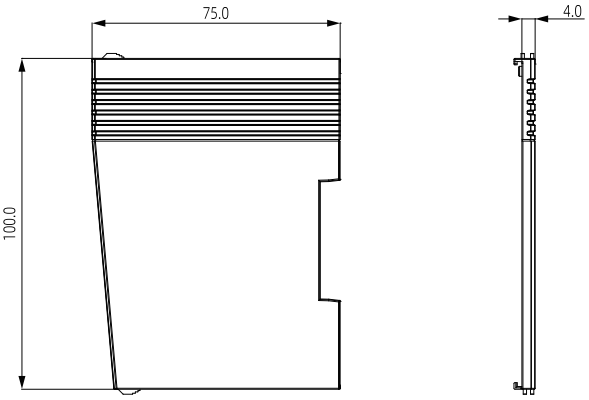
Installation dimensions

The width varies by model, while all other dimensions are consistent. Detailed dimensions are shown below (in mm).



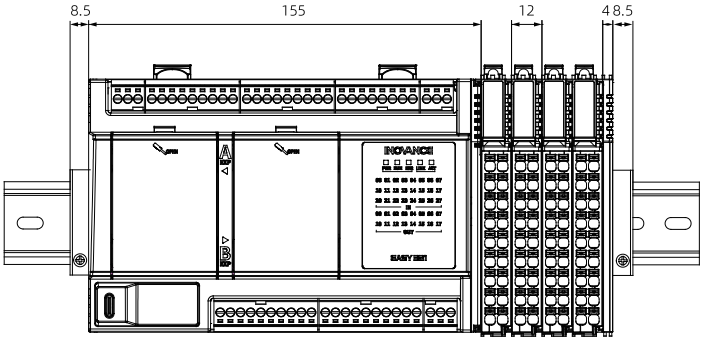
Model	Width A/mm
Easy321-3624ER	205
Easy321-3624TP	205
Easy321-3624TN	205
Easy511-3624TP	205
Easy511-3624TN	205
Easy321-2416ER	155
Easy321-2416TP	155
Easy321-2416TN	155
Easy511-2416TP	155
Easy511-2416TN	155
Easy321-1812ERX	155
Easy321-1812TNX	155
Easy321-1812TPX	155
Easy511-1812TNX	155

Dimensions of the rear cover are shown below (in mm).



Installation width calculation example

The following takes one Easy321-2416ER + four GL20-0008ETN expansion modules + one end cover + two end plates as an example (in mm). Total installation width = 155 mm + (12 x 4) mm + 4 mm + (8.5 x 2) mm = 224 mm

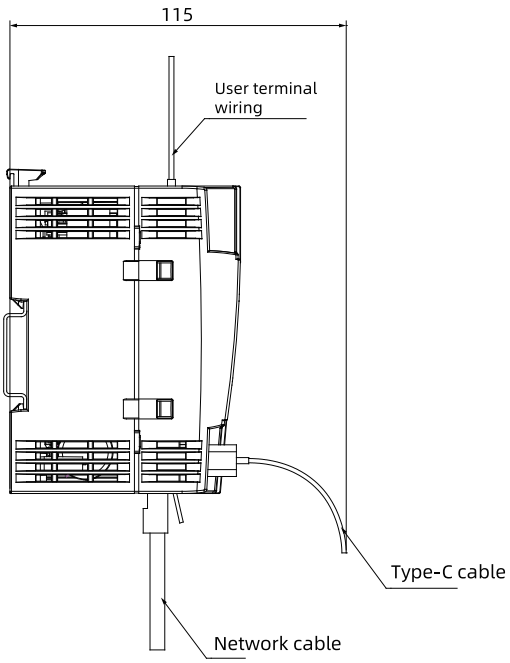


The following shows the width of each expansion module (one model as an example) in mm.

Model	Width/mm
GL20-0008ETN	12
GL20-0008ER	24
GL20-3232ETN	36
End plate	8.5

Reserved space for cables

When installing the product, reserve enough space for connecting cables, as shown in the following figure (in mm).



3.1.4 Installation Precautions

To ensure the reliability and functional integrity of this product, comply with the following installation requirements:

The installation environment of this product must meet the following requirements.

- Keep the product away from sunlight.
- Do not expose the product to conductive filaments or dust, including but not limited to carbon fiber, gold bonding wire, and graphite powders, metal powder, and toner.

- Do not expose the product to contaminated liquids, including but not limited to water/oil mist, cutting fluid, electroplating fluid, acid mist, hydrogen peroxide, detergent, and salt mist.
- Do not expose the product to corrosive gases, including but not limited to hydrogen sulfide, sulfur dioxide flow, ammonia, chlorine, hydrogen chloride, and hydrogen fluoride.
- Do not expose the product to explosive gas and dust.
- Do not install the product on a device or machine with vibration source or shock source.
- Keep the product away from heating sources.
- Do not install the product in an environment with condensation or where the temperature changes dramatically.

Appropriate isolation measures shall be taken when installing this product in environments with the following conditions:

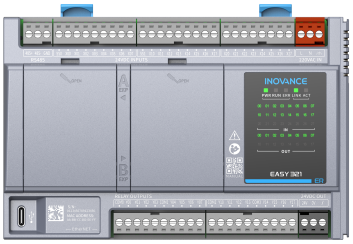
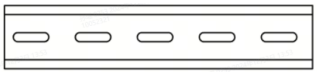
- Environments that affected by static electricity or other forms of noise
- Environment affected by strong electromagnetic fields
- Environments that exposed to radiation
- Environments that close to the power supply cables or large AC drives, high-power high-frequency generators, large contactors, and welding machines

Precautions for installing this product:

- Before installing or removing the master and module, ensure that the master and module are powered off.
- Do not hot swap the modules. This may lead to PLC restart, and user data loss or damage.
- Prevent the master, module enclosure, or terminals from dropping or suffering from impact or shock.

3.2 Pre-installation Preparation

Take an Easy321-2416ER PLC as an example. The following table shows the products, accessories, and tools that need to be prepared before installation.

Products, accessories, and tools	Specification	Quantity	Diagram
This Product	-	1	
Expansion module	-	Several	-
Expansion Card	-	1/2	-
DIN rail	Compliant with IEC60715 standard (35 mm in width and 1.0 mm in thickness). For details, see *"9.1 Appendix 1: Dimension Diagram" on page 125*	1	

Products, accessories, and tools	Specification	Quantity	Diagram
End plate	At least two end plates (a pair) to be used together with the DIN rail	2	
Screws (mounting rail)	M4	Several	-
Phillips screwdriver	5 mm in radius	1	
Straight screwdriver	2.5 mm to 3.0 mm in head width	1	

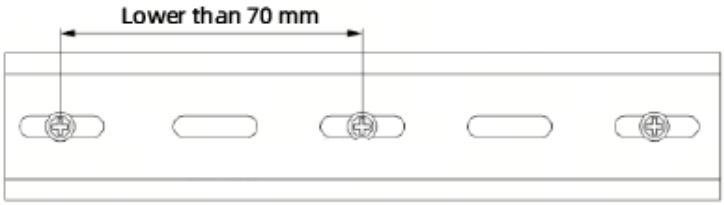
3.3 Installation Procedure

3.3.1 Installing the DIN Rail

Caution

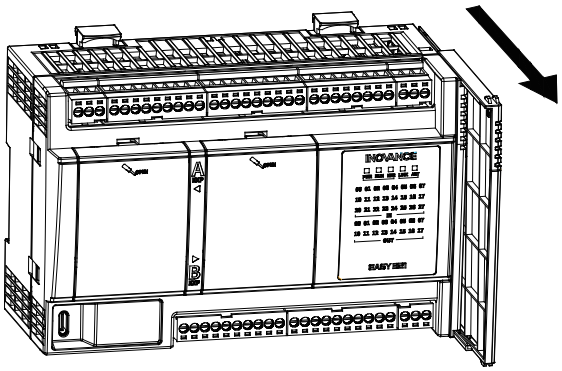
If the thickness of the DIN rail is not as required, the product cannot fit in or function properly as the DIN rail mounting hook does not work.

Tighten the screws on the DIN rail with a Phillips screwdriver. Use M4 screws spaced at intervals of 70 mm or less, and tighten them to a torque of 12 kgf·cm.

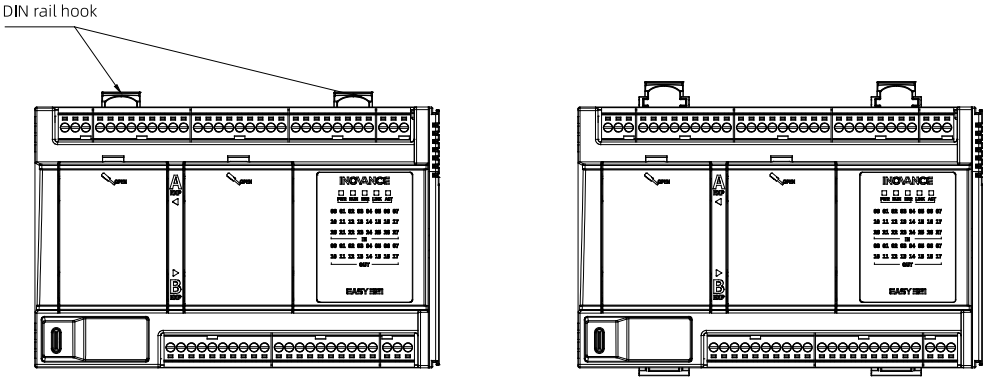


3.3.2 Product Installation

1. Remove the rear cover in the direction indicated by the arrow, as shown below.

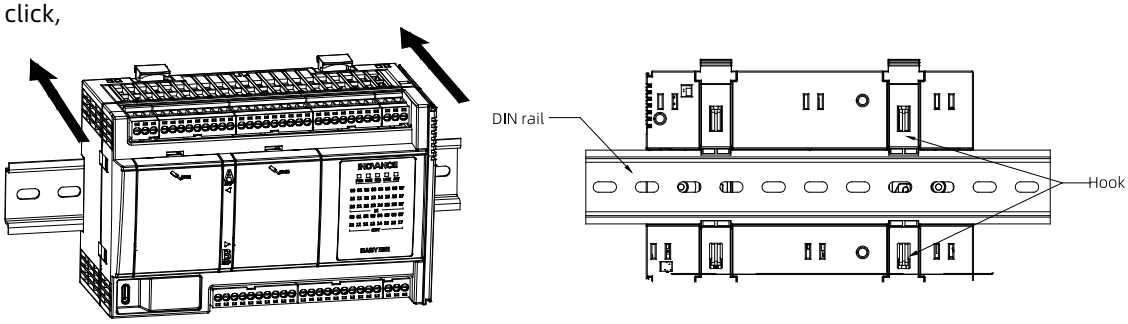


2. Check that the DIN rail mounting hook is unlocked, as shown below.

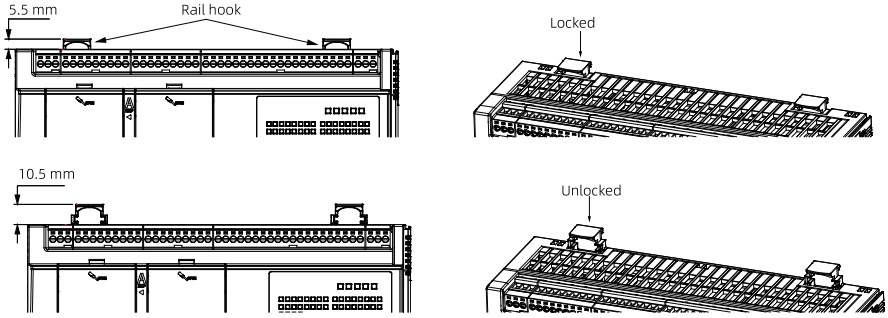


Locked Unlocked

3. Align the PLC with the DIN rail and push it in the direction indicated by the arrow until you hear a click,



4. Make sure the DIN rail mounting hook of the PLC is locked. The locked and unlocked states of the mounting hook are shown below.



- If the mounting hook is pressed down, it is locked.
- If the mounting hook is lifted up, it is unlocked. Press down the mounting hook to lock the module to the DIN rail.

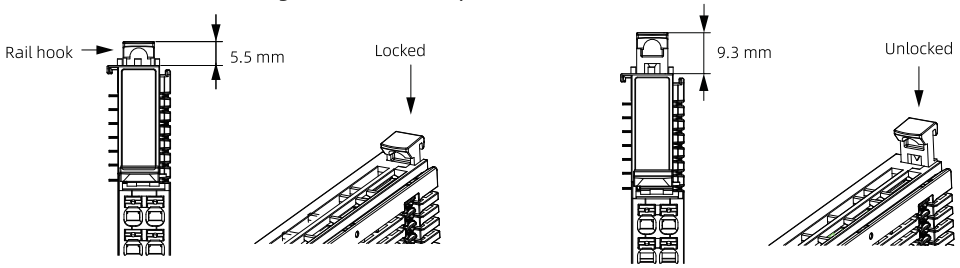
3.3.3 Installing the Expansion Card

For details on installation of each expansion card, see section 2.3 Installation Instructions in the following user guides.

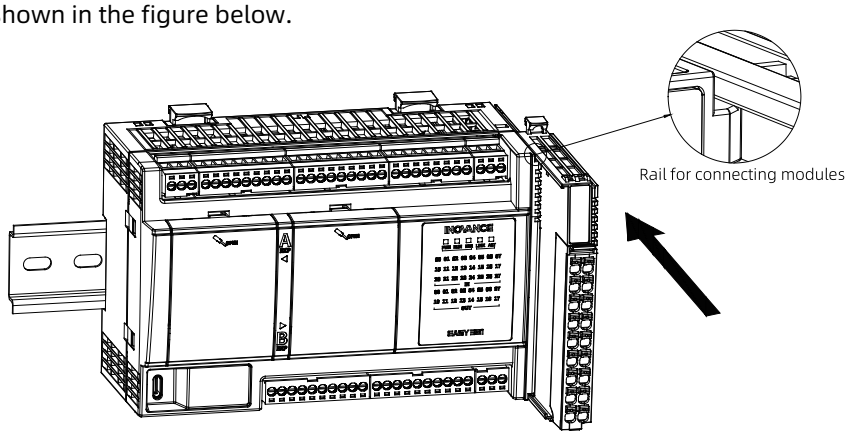
- GE21-CAN-485 Communication Expansion Card User Guide
- GE21-RTU Coupler Configuration Card User Guide
- GE21-TF-RTC Memory Expansion Card (Integrated with RTC) User Guide
- GE21-4AD1DA-I Analog Input and Output Current-Type Expansion Card User Guide
- GE21-8DI Digital Input Expansion Card User Guide
- GE21-8DO-TN Sink-Type Transistor Output Expansion Card User Guide
- GE21-232/485-RTC Communication Expansion Card User Guide
- GE21-8DO-TP Source-Type Transistor Output Expansion Card User Guide
- GE21-4AD1DA-V Analog Input and Output Voltage-Type Expansion Card User Guide
- GE21-232/485 Communication Expansion Card User Guide

3.3.4 Installing the Expansion Module

1. Check that the DIN rail mounting hook of the expansion module is unlocked, as shown below.

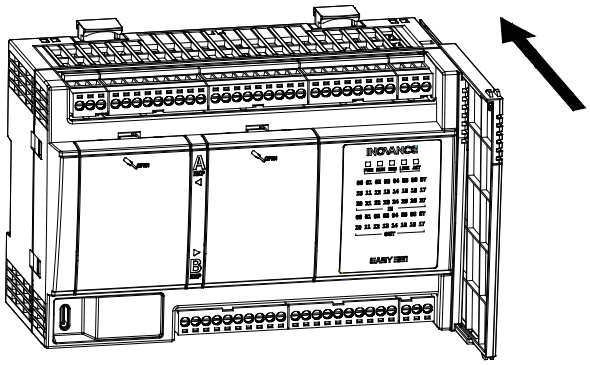


2. Align the expansion module with the guide rails on the top and bottom of the main unit. Press the module in the direction of the arrow until a click is heard, indicating that the module is fully seated, as shown in the figure below.

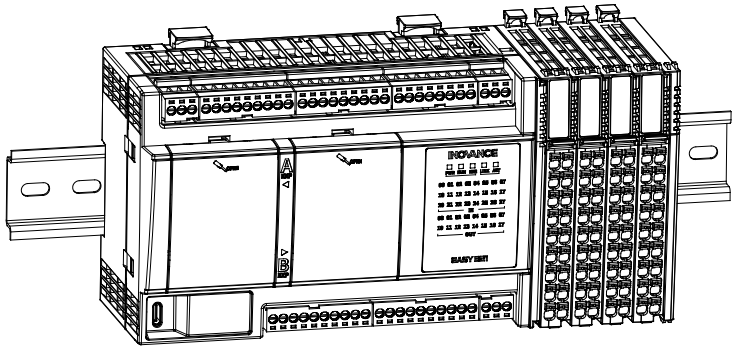


3.3.5 Installing the End Cover

1. Align the end cover with the guide rail of the last expansion module. Slide the end cover in the direction indicated by the arrow.

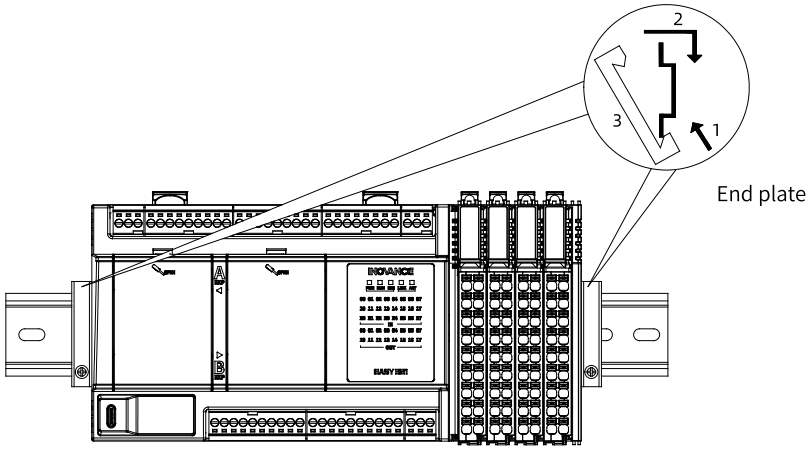


2. Ensure the end cover is flush with the end of the expansion module to prevent the metal pins from being exposed, as shown below.



3.3.6 Installing the End Plate

To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of the end plate to the top of the DIN rail, and then tighten the screws with a Phillips screwdriver to lock the end plate in place, as shown below.



3.4 Post-Installation Inspection

No.	Check Item	Confirmation
1	The rail mounting hook of the PLC and expansion module are in the locked state.	
2	Ensure that the end plates on both sides are securely locked.	

No.	Check Item	Confirmation
3	After installation, ensure that there are no foreign objects on the ventilation surfaces.	
4	Ensure that the installation environment meets the environmental requirements mentioned in the precautions.	

4 Wiring

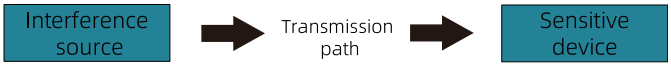
4.1 Knowledge Before Wiring

4.1.1 Introduction

The purpose of standard wiring practices in industrial environments is to reduce electromagnetic interference (EMI) effects on equipment and systems, ensuring stable operation of industrial control systems and the accuracy of data. Although Inovance has designed industrial products to meet harsh environments, proper external wiring and cable routing should still be considered during use.

4.1.2 Basic EMC Information

Interference occurs when electromagnetic sources affect sensitive devices. The three elements that constitute interference are: interference source, transmission path, and sensitive devices.

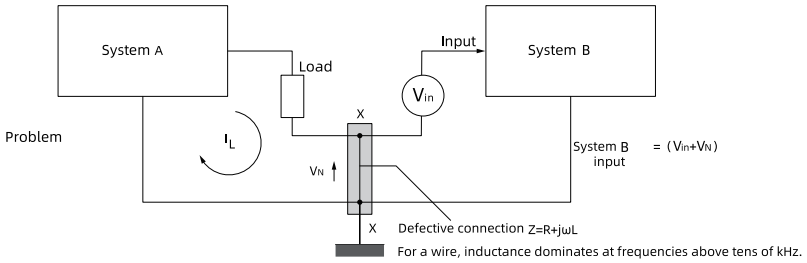


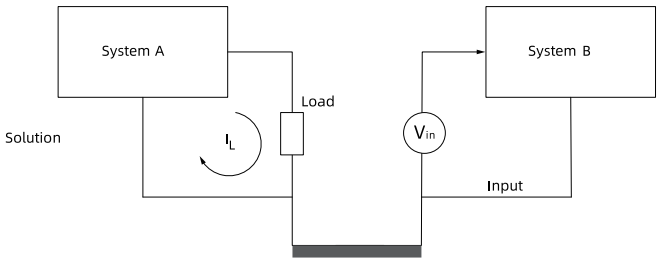
EMC (Electro Magnetic Compatibility) issues are system-related. This section primarily addresses how to reduce interference by adjusting the transmission path. Common solutions include shielding, isolation, and proper wiring.

Different coupling modes can be handled in different ways. The following describes the causes and solutions of interference in several common coupling modes.

Common impedance coupling

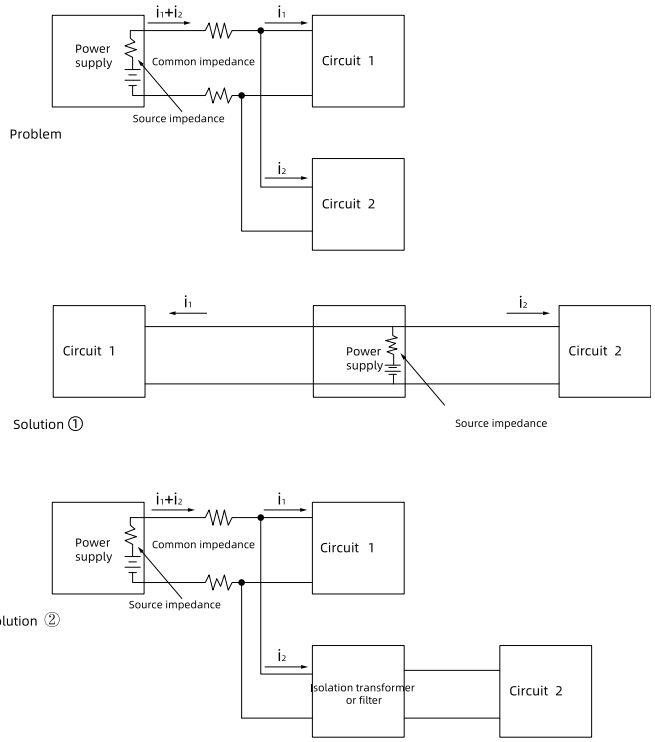
- Cause: Grounding cables serve as one of the signal circuit paths. Due to its impedance (approximately several hundred nH/m), the interference in System A can result in a voltage difference in grounding wires, affecting System B.
- Solution: Separate single-point grounding





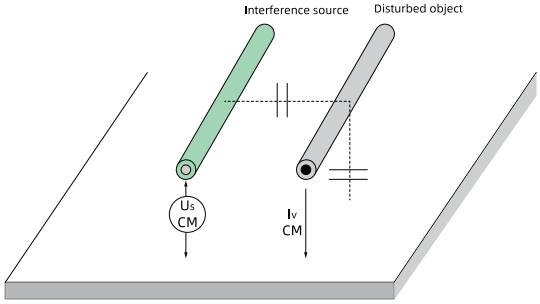
Common power coupling

- Cause: Any change in the power current required by Circuit 2 will affect Circuit 1, making it easy for interference from Circuit 2 to affect Circuit 1.
- Solution:
  - Connect Circuit 2 directly to the power supply output terminal.
  - Use an isolation transformer or a filter.



Receptive coupling

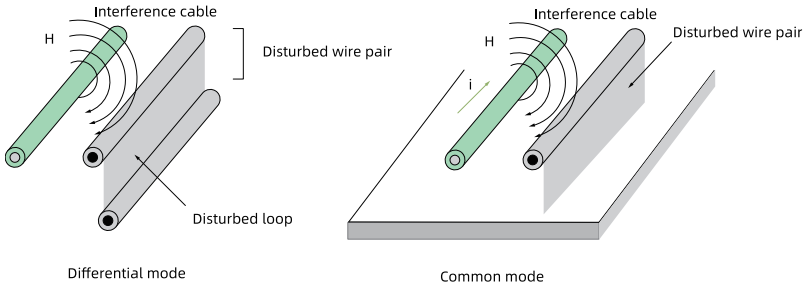
- Cause: A capacitor consists of two conductors separated by a dielectric material. When different signal cables are in parallel with air as the dielectric, interference can occur between signals, causing capacitive coupling.
- Solution: Shield the signals and increase the distance between signal cables.



Inductive coupling

1. Cause: Cables act as inductors. When varying current flows through the cable, a magnetic field and electric field are generated around it. These fields can induce voltages and currents in sensitive circuits, affecting their operation.

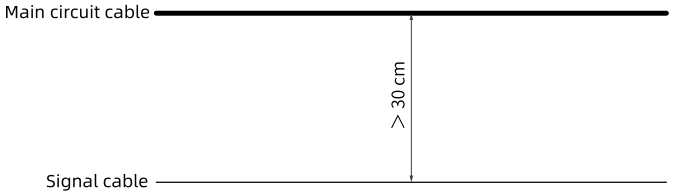
2. Solution: Increase the spacing to reduce mutual inductance and ground both ends of the shielded cables.



4.1.3 Cable Routing Requirements

Routing requirements

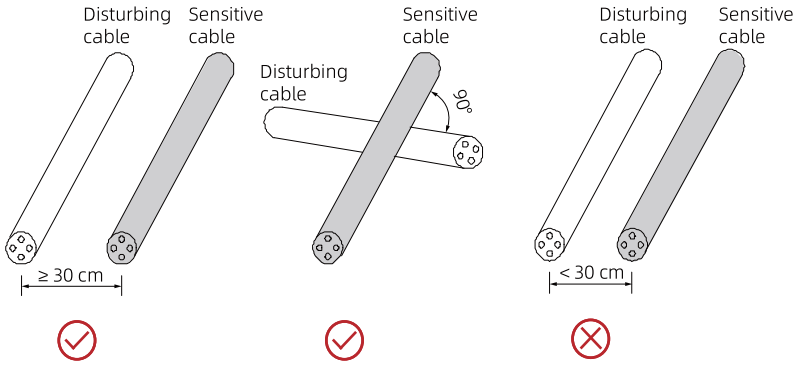
- Main circuit routing requirements
  Main circuit power input cables and motor cables may generate strong electromagnetic interference. To prevent the electromagnetic interference incurred by long-distance parallel routing and coupling between disturbing cables and control cables, keep a clearance of at least 30 cm between main circuit cables and signal cables. Main circuit cables include the input R/S/T cable, output U/V/W cable, DC bus, and braking cable. Signal cables include the I/O signal cable and communication cable. Cable slots must be properly connected and grounded. Aluminum slots can ensure equipotential between devices. Properly connect the PLC and I/O module to the system (machines or devices). Protect all connections with spray coating and ensure full contact with the conductive metal.



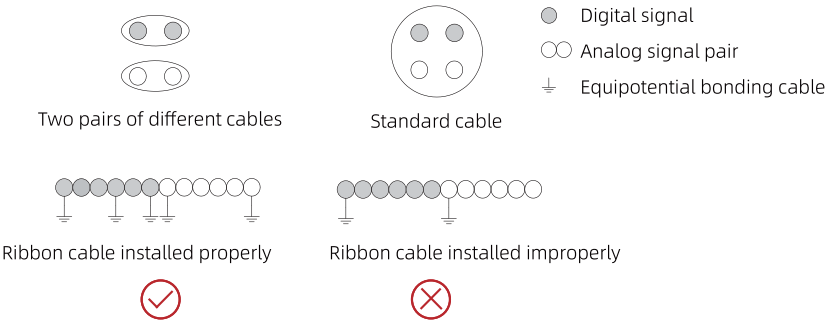
- I/O signals include analog input (AI) signals, analog output (AO) signals, digital input (DI) signals, digital output (DO) signals, and relay output signals. To avoid interference to I/O signals, separate the I/O signal cables at least 30 cm from the main circuit cables (R/S/T cables and U/V/W cables) and other power cables or power supply cables.

Routing recommendations

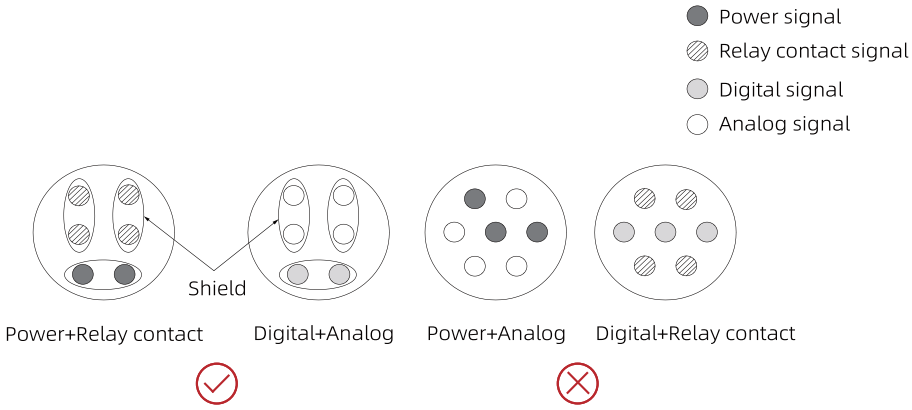
- Routing disturbing cables and sensitive cables
  Route cables that transmit different types of signals through different routes. Separate the disturbing cables from sensitive cables by a clearance of at least 30 cm. When these two types of cables must be cross-connected, make sure that the cross-connection angle is 90 degrees to prevent interference, as shown below.



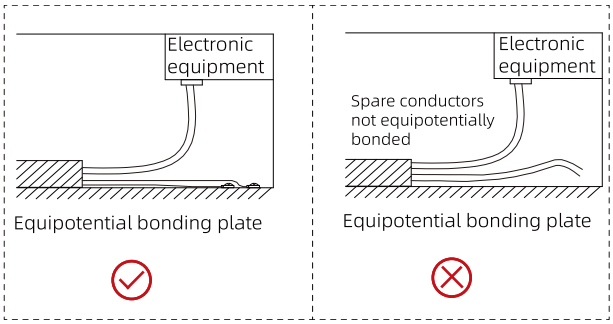
- Routing of cables transmitting different types of signals
  Route cables that transmit different types of signals through different routes and separate them with equipotential signal cables. When routing cables that transmit the same type of signals, lay equipotential signal cables at the outer layer and lay equipotential signal cables as many as possible in the middle, as shown in the following figure.



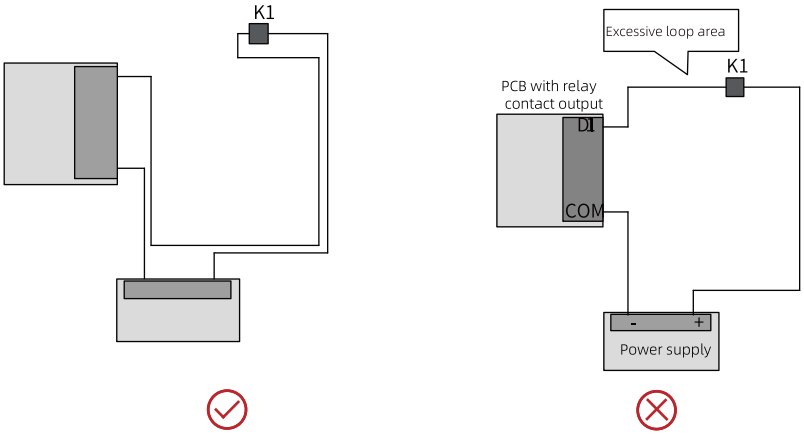
- Routing multi-conductor cables
  For multi-conductor cables, it is recommended that one cable transmits one type of signals. If one cable is used to transmit different types of signals, use the cable with conductors shielded, as shown in the following figure.



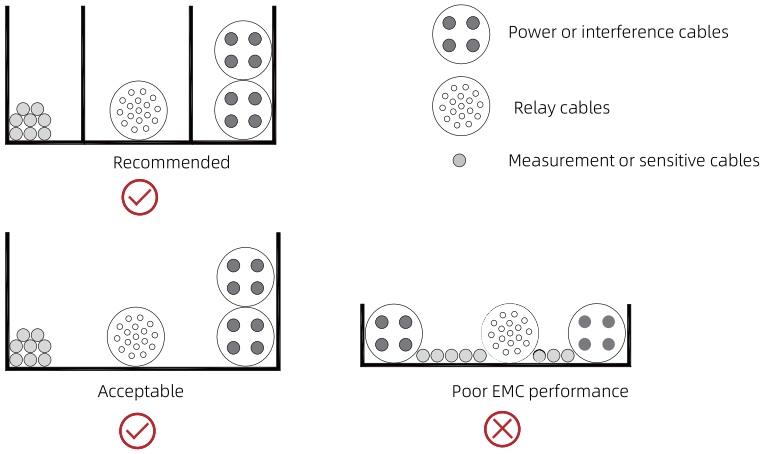
  Connect the spare or unused conductors in a multi-conductor cable to the equipotential bondings, as shown below. Do not leave these conductors unconnected.



- Requirements on the wiring loop area
  For cables that transmit low-level sensor signals and shared cables that transmit relay signals, lay them close to each other to avoid forming a loop area. Use twisted pair cables for analog signals. Lay digital signal cables close to each other, as shown below.



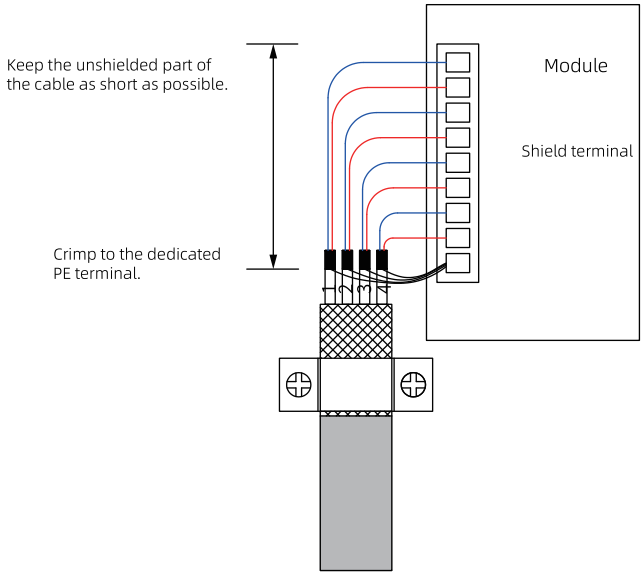
- Laying multiple types of cables
  For cables of different types, route the cables along the equipotential metal plate. To enhance the internal EMC performance, separate different types of cables or separate cables with metal separators (recommended) in the same metal (zinc-iron or stainless steel) duct, as shown below.



4.1.4 Grounding Requirements for Shielded Cables

Shielded cables can reduce interference from magnetic fields, electric fields, or electromagnetic fields by diverting interference currents from the shielding layer to ground.

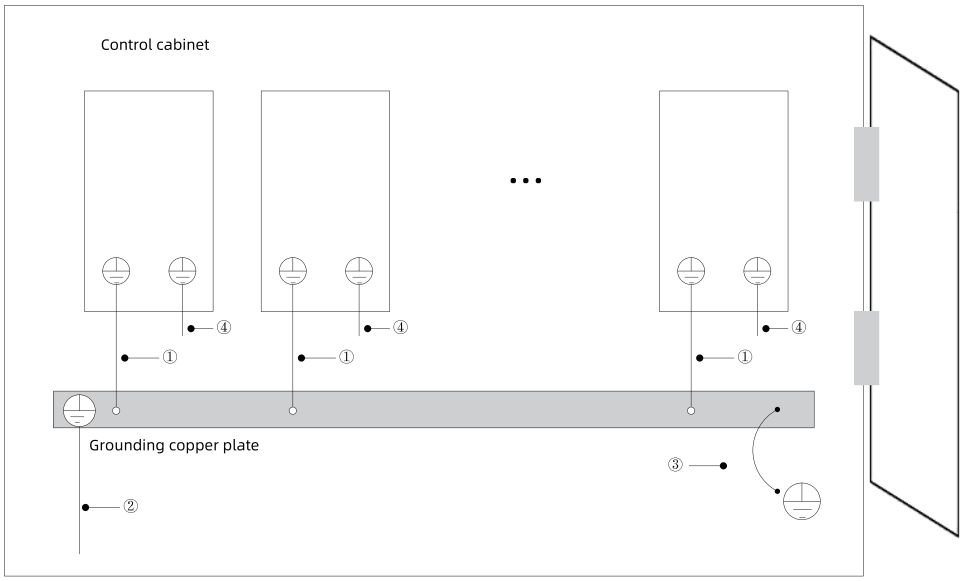
Minimize the length of the unshielded part of a shielded cable, and connect the shield to the nearest PE terminal. If the unshielded part is too long, the cable conductor is prone to signal interference. For modules without a dedicated PE terminal, connect the shield to an external PE terminal, as shown below.



4.1.5 Equipotential Grounding Requirements

Equipotential grounding connects the electrical equipment body and external conductive parts to the same or nearly the same potential. This not only prevents electric shock but also meets EMC requirements.

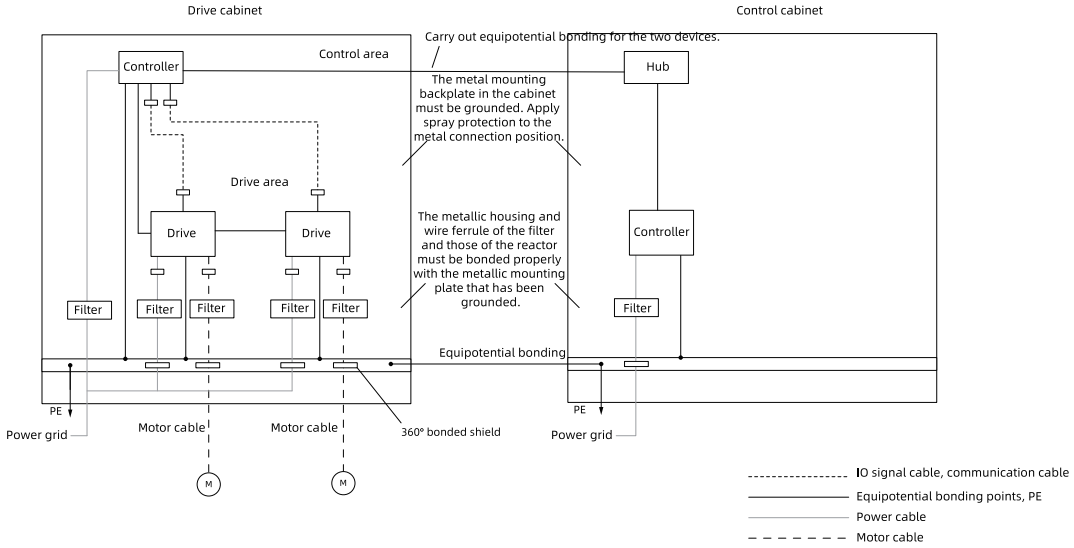
- General grounding requirements
  To ensure proper grounding of the product, observe the following requirements.
  - Ensure that the grounding terminal is properly grounded in accordance with the relevant electrical regulations of the country or region, preventing improper operation or damage to the equipment. The grounding terminal cannot be used as the neutral (N) terminal of the power supply.
  - Ensure that the protective earth conductor meets the technical specifications and local safety standards. Keep the grounding cable as short as possible. The protective earth conductor must be made of yellow-green copper conductor and cannot be connected in series with circuit breakers or other switching devices.
  - Observe the grounding requirements of all the devices as improper grounding can lead to malfunction.
  - Install the device on a conductive metal mounting surface. Ensure that the whole conductive bottom of the device is attached properly to the mounting surface.
  - Fasten the grounding screws using the recommended torque to prevent the screws from being loose or overtightened.
- Grounding requirements for multiple devices
  The following shows parallel grounding of multiple devices.



No.	Description
①	Connect the main circuit input PE terminal to the grounding copper busbar of the control cabinet through the protective grounding conductor.
②	Connect the PE cable on the input power supply end to the grounding copper busbar of the control cabinet.
③	Connect the grounding copper busbar of the control cabinet to the metal enclosure of the control cabinet through the protective grounding conductor.
④	Connect the motor output cable shield to the output PE terminal of the drive.

- Grounding of the cabinet

  A cost-effective method of suppressing interference in a cabinet is to isolate the interference source from the equipment that may be interfered with. Divide the cabinet into multiple EMC compartments or use multiple cabinets based on the intensity of interference sources, and install each device in accordance with the following wiring principles.



No.	Grounding Rules
①	Install the control devices and the drive devices in two different cabinets.
②	If multiple cabinets are used, use grounding cables with a cross-sectional area of at least 16 mm² to connect different cabinets, therefore realizing equipotential bonding between the cabinets.

No.	Grounding Rules
③	Place the devices in different areas in the cabinet according to the device signal strength.
④	Carry out equipotential bonding for the devices in different areas of the cabinet.
⑤	Shield all communication (for example, RS485) and signal cables that routed out from the cabinet.
⑥	Install the power supply input filter close to the cabinet input interface.
⑦	Spray each grounding point in the cabinet.

4.1.6 Lightning and Overvoltage Protection

The surge protection device (SPD) is installed on the input side of the PLC to ensure that electrical systems and important electrical and electronic equipment are protected from damage caused by lightning overvoltage. The SPD is mainly used to limit transient overvoltage and operating overvoltage caused by lightning in power supply and signal systems. Lightning surges can be transmitted to the PLC through the power supply or signal cable. When a lightning stroke occurs, the ground potential increases, which may damage the device. The induced voltage can be produced in the cable and loop when a pulse electromagnetic field is generated by a lightning strike on the building or in the vicinity. External lightning protection measures, such as lightning rods, grounding wires, and grounding devices, cannot prevent the conduction of lightning induction surge along the cable and secondary lightning strike. Therefore, it is also necessary to install an SPD.

4.2 Ethernet or EtherCAT Cable Connection

4.2.1 Wiring Precautions

When connecting Ethernet/EtherCAT network cables, note the following:

- Use the recommended cables and adapter boards for connection. It is recommended that shielded cables be used as extension cables to enhance anti-interference capacity.
- When connecting the cable to the Ethernet/EtherCAT port of this product, insert it firmly into the port until it locks into place.
- Do not bundle communication cables with power cables (high voltage, high current) or other cables that produce strong interference signals. They should be routed separately, avoiding parallel routing.
- Do not place communication cables near noise-generating equipment. If unavoidable, take measures to mitigate noise, such as placing the equipment in a metal enclosure.
- Do not place communication cables in environments with high temperatures or high humidity.
- Do not place communication cables in environments with excessive dust, oil mist, or other harmful contaminants.
- There are restrictions on the bending radius of communication cables. Check the bending radius according to the communication cable specifications.

4.2.2 Preparation Before Wiring

Cable requirements

The Ethernet/EtherCAT bus uses standard RJ45 connectors. Use shielded twisted-pair cable of Category 5e or higher, with metal-shell plugs and injection-molded boots. The shielded network cable used for Ethernet/EtherCAT data transmission must be free of short circuits, misalignment, and poor contact. The specifications for the shielded cable are shown in the table below.

Item	Specification
Cable type	Flexible crossover cable, S-FTP, Cat 5e or higher
Double-shielded	Braided shield (coverage: 85%), aluminum foil shield (coverage: 100%)
Standards compliance	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TIA Bulletin TSB, EIA/TIA SB40-A&TSB36
Cross-sectional area	AWG26 and above
Conductor type	Twisted pair
Number of pairs	4
Certification	UL
Environment	• Resistant to industrial oil, corrosive acid and alkali • Operating temperature: -30°C to +60°C

Note

The cable length between devices cannot exceed 100 m. Failure to comply can lead to signal attenuation, affecting the communication performance.

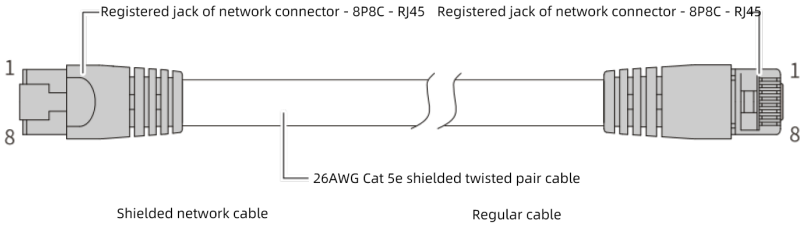
Recommended cable

Recommended network cables are as follows.

No.	Code	Name	Specification
1	15040261	Complete cable set - S6-L-T04-0.3-100M network communication cable - 0.3m (RoHS)	CAT.5e SFTP 26AWG
2	15040262	Complete cable set - S6-L-T04-3.0-100M network communication cable - 3m (RoHS)	CAT.5e SFTP 26AWG
3	15041960	Complete cable set - S6-L-T04-0.2-100M network communication cable - 0.2 m (RoHS)	CAT.5e SFTP 26AWG
4	15041961	Complete cable set - S6-L-T04-0.5-100M network communication cable - 0.5 m (RoHS)	CAT.5e SFTP 26AWG
5	15041962	Complete cable set - S6-L-T04-1.0-100M network communication cable - 1.0 m (RoHS)	CAT.5e SFTP 26AWG
6	15041963	Complete cable set - S6-L-T04 - 2.0m - 100M network communication cable - 2.0 m (RoHS)	CAT.5e SFTP 26AWG
7	15041964	Complete cable set - S6-L-T04-5.0-100M network communication cable - 5.0 m (RoHS)	CAT.5e SFTP 26AWG
8	15041965	Complete cable set - S6-L-T04-10.0-100M network communication cable - 10.0 m (RoHS)	CAT.5e SFTP 26AWG
9	1504A819	Complete cable set - S6-L-T04-1.5-100M network communication cable - 1.5 m (RoHS)	CAT.5e SFTP 26AWG

4.2.3 Pin Assignment

This product supports Ethernet/EtherCAT communication via the CN3 port. The requirements for the communication cable are as follows.



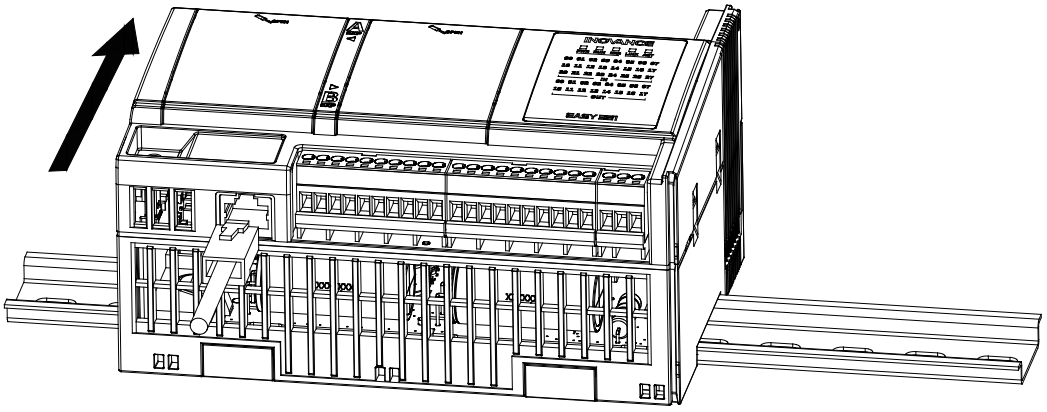
The signal lead assignments are shown in the table below.

Pin No.	Signal	Direction	Description
1	TD+	Output	Data transmission +
2	TD-	Output	Data transmission -
3	RD+	Input	Data reception +
4	-	-	Not used
5	-	-	Not used
6	RD-	Input	Data reception -
7	-	-	Not used
8	-	-	Not used

4.2.4 Cable Connection/Disconnection

Cable connection

Hold the registered jack with your finger and insert the network cable in the network port direction until you hear a clicking sound, as shown below.



Cable disconnection

Press and hold the clip of the cable and pull it out along the direction parallel with the module.

4.3 Power Supply Cable and I/O Terminal Cable Connection

4.3.1 Wiring Precautions

Note the following when connecting the power supply cables.

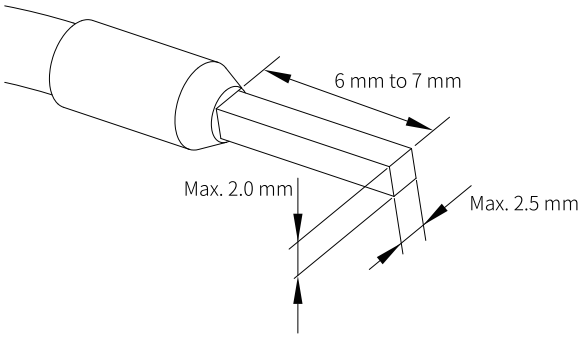
- Disconnect the external power supply before wiring.
- Route I/O terminal cables and high-voltage/high-current cables that can generate strong interference through different and non-parallel routes.

4.3.2 Wiring Preparation

The following table shows the recommended cables, which can be calculated properly and adjusted as needed. It is recommended to use a three-core non-shielded cable with a maximum length of 20 m. The total extension distance of the high-speed I/O interface extension cable must be lower than 3 m.

Name	Applicable cross sectional area		KST		Suzhou Yuanli	
	GB standard/ mm^2	US standard/ AWG	Model	Crimping tool	Model	Crimping tool
Tubular lug	0.3	22	E0308	KST2000L	E0308	YAC-5
	0.5	20	E0508		E0508	
	0.75	18	E7508		E7508	
	1	18	E1008		E1008	
	1.5	16	E1508		E1508	

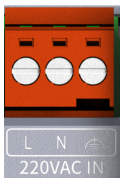
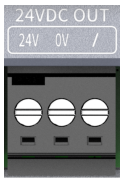
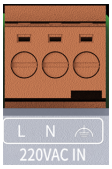
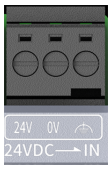
To use other types of tubular lugs, crimp the lug to the twisted pair according to the shape and dimension requirements shown below.



Note

- Add crimping terminals to prevent short circuit of adjacent pins during terminal wiring.
- The maximum tightening torque for tightening wiring screws is 0.45 N·m.

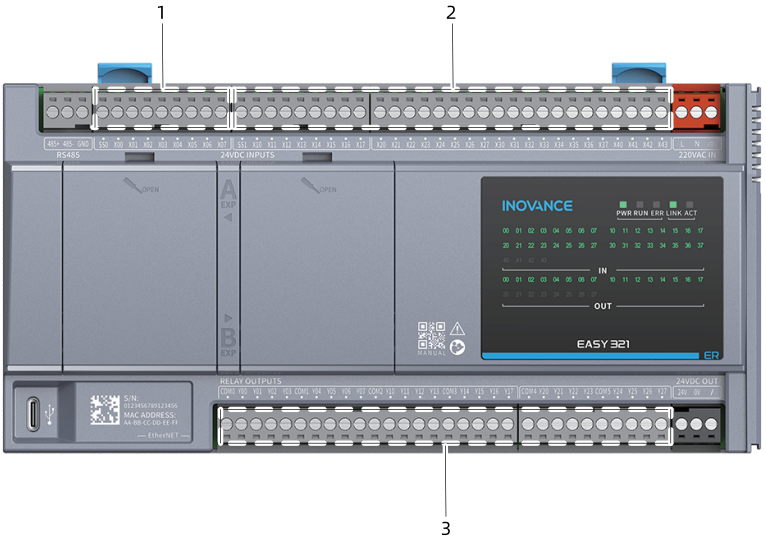
4.3.3 Power Terminal Assignment

Model	Terminal type	Model	Mark	Terminal marking	Terminal wiring description
40-point/ 60-point models	Input power port	ER		L	Line
				N	Neutral
				⏚	Functional earth terminal
		TN, TP		+24 V	Input power +24 VDC
				0 V	Input power 0 V
				⏚	Functional earth terminal
	Output power port	ER, TN, TP		+24 V	Output power +24 VDC, for use with external equipment. For specifications, see *"2.5.2 Power Supply Specifications" on page 27*)
				0 V	Output power 0 V
				/	-
30XP model	Input power port	ERX		L	Line
				N	Neutral
				⏚	Functional earth terminal
		TNX, TPX		24 V	Input power +24 VDC
				0 V	Input power 0 V
				⏚	Functional earth terminal
	Output power port	ERX		24 V	Output power +24 VDC, for use with external equipment. For specifications, see *"2.5.2 Power Supply Specifications" on page 27*)
				0 V	Output power 0 V
		TNX, TPX		24 V	Output power +24 VDC, for use with external equipment. For specifications, see *"2.5.2 Power Supply Specifications" on page 27*)
				0 V	Output power 0 V

4.3.4 I/O Terminal Assignment

4.3.4.1 60-Point Model Terminal Assignment

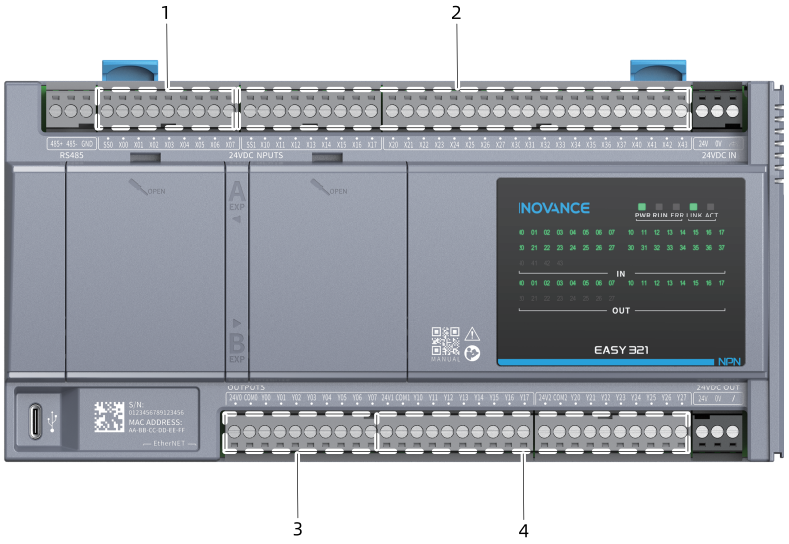
60-point ER model



No.	1		2		3	
Terminal type	High-speed DI port		Regular DI port		Regular DO port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal
Easy321-3624ER	High-speed common terminal	SS0	Regular input common terminal	SS1	COM0	Common terminal 0
	X00 input	X00	X10 input	X10	Y00	Y00 output
	X01 input	X01	X11 input	X11	Y01	Y01 output
	X02 input	X02	X12 input	X12	Y02	Y02 output
	X03 input	X03	X13 input	X13	Y03	Y03 output
	X04 input	X04	X14 input	X14	COM1	Common terminal 1
	X05 input	X05	X15 input	X15	Y04	Y04 output
	X06 input	X06	X16 input	X16	Y05	Y05 output
	X07 input	X07	X17 input	X17	Y06	Y06 output
	-	-	X20 input	X20	Y07	Y07 output
	-	-	X21 input	X21	COM2	Common terminal 2
	-	-	X22 input	X22	Y10	Y10 output
	-	-	X23 input	X23	Y11	Y11 output
	-	-	X24 input	X24	Y12	Y12 output
	-	-	X25 input	X25	Y13	Y13 output
	-	-	X26 input	X26	COM3	Common terminal 3
	-	-	X27 input	X27	Y14	Y14 output
	-	-	X30 input	X30	Y15	Y15 output
	-	-	X31 input	X31	Y16	Y16 output
	-	-	X32 input	X32	Y17	Y17 output
	-	-	X33 input	X33	COM4	Common terminal 4
	-	-	X34 input	X34	Y20	Y20 output
	-	-	X35 input	X35	Y21	Y21 output
	-	-	X36 input	X36	Y22	Y22 output
	-	-	X37 input	X37	Y23	Y23 output
	-	-	X40 input	X40	COM5	Common terminal 5
	-	-	X41 input	X41	Y24	Y24 output
	-	-	X42 input	X42	Y25	Y25 output
	-	-	X43 input	X43	Y26	Y26 output
	-	-	-	-	Y27	Y27 output

60-point TN and TP models

Take the Easy321-3624TN model as an example.

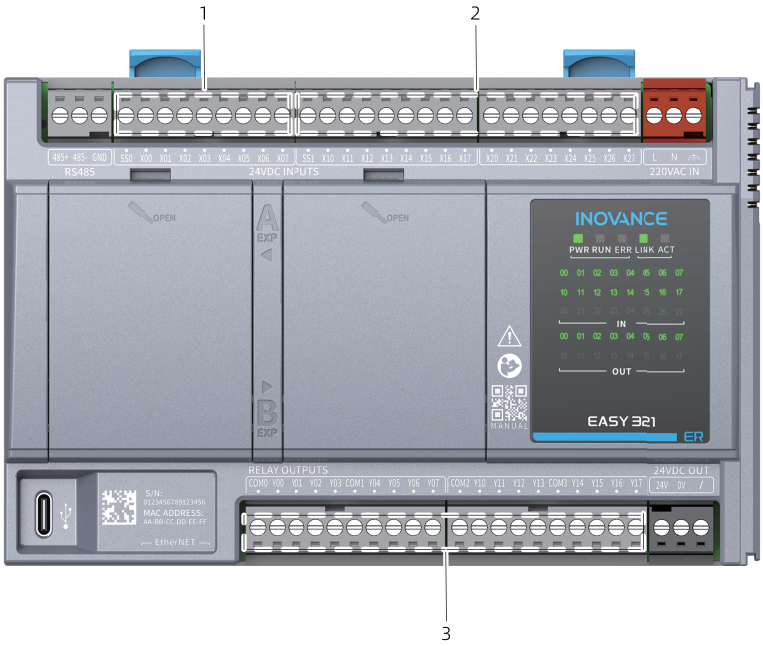

1
2
3
4
RS485
24VDC NPUTS
24VDC IN
INOVANCE
EASY 321
NPN
IN
OUT

No.	1		2		3		4	
Terminal type	High-speed DI port		Regular DI port		High-speed DO port		Regular DO port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal	Terminal marking	Terminal signal
Easy321-3624TN Easy321-3624TP Easy511-3624TN Easy511-3624TP	High-speed common terminal	SS0	Regular input common terminal	SS1	24V0	24 V input positive	24V1	24 V input positive
	X00 input	X00	X10 input	X10	COM0	24 V input negative	COM1	24 V input negative
	X01 input	X01	X11 input	X11	Y00	Y00 output	Y10	Y10 output
	X02 input	X02	X12 input	X12	Y01	Y01 output	Y11	Y11 output
	X03 input	X03	X13 input	X13	Y02	Y02 output	Y12	Y12 output
	X04 input	X04	X14 input	X14	Y03	Y03 output	Y13	Y13 output
	X05 input	X05	X15 input	X15	Y04	Y04 output	Y14	Y14 output
	X06 input	X06	X16 input	X16	Y05	Y05 output	Y15	Y15 output
	X07 input	X07	X17 input	X17	Y06	Y06 output	Y16	Y16 output
	-	-	X20 input	X20	Y07	Y07 output	Y17	Y17 output
	-	-	X21 input	X21	-	-	24V2	24 V input positive
	-	-	X22 input	X22	-	-	COM2	24 V input negative
	-	-	X23 input	X23	-	-	Y20	Y20 output
	-	-	X24 input	X24	-	-	Y21	Y21 output
	-	-	X25 input	X25	-	-	Y22	Y22 output
	-	-	X26 input	X26	-	-	Y23	Y23 output
	-	-	X27 input	X27	-	-	Y24	Y24 output
	-	-	X30 input	X30	-	-	Y25	Y25 output
	-	-	X31 input	X31	-	-	Y26	Y26 output
	-	-	X32 input	X32	-	-	Y27	Y27 output
	-	-	X33 input	X33	-	-	-	-
	-	-	X34 input	X34	-	-	-	-
	-	-	X35 input	X35	-	-	-	-

No.	1		2		3		4	
Terminal type	High-speed DI port		Regular DI port		High-speed DO port		Regular DO port	
Product model	Terminal signal	Termi-nal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal	Terminal marking	Terminal signal
Easy321-3624TN Easy321-3624TP Easy511-3624TN Easy511-3624TP	-	-	X36 input	X36	-	-	-	-
	-	-	X37 input	X37	-	-	-	-
	-	-	X40 input	X40	-	-	-	-
	-	-	X41 input	X41	-	-	-	-
	-	-	X42 input	X42	-	-	-	-
	-	-	X43 input	X43	-	-	-	-

4.3.4.2 40-Point Model Terminal Assignment

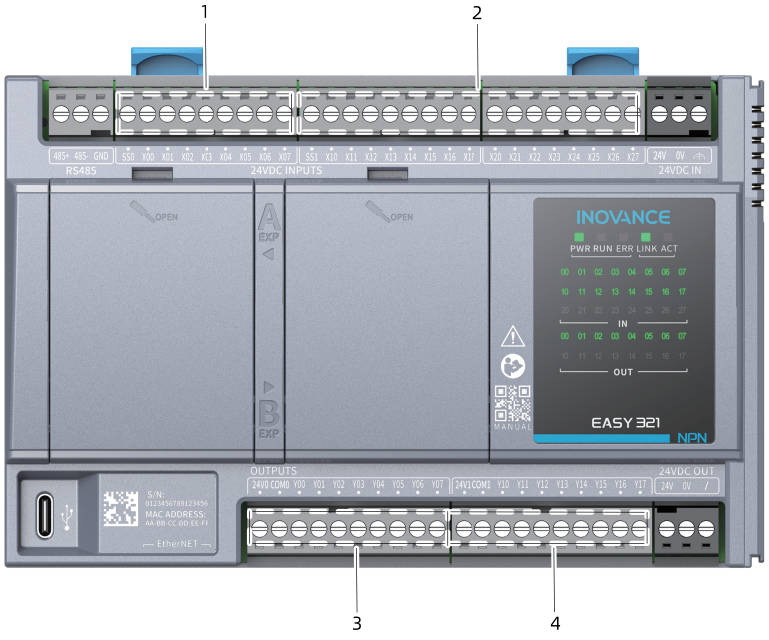
40-point ER model



No.	1		2		3	
Terminal type	High-speed DI port		Regular DI port		Regular DO port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal
Easy321-2416ER	High-speed common terminal	SS0	Regular input common terminal	SS1	COM0	Common terminal
	X00 input	X00	X10 input	X10	Y00	Y00 output
	X01 input	X01	X11 input	X11	Y01	Y01 output
	X02 input	X02	X12 input	X12	Y02	Y02 output
	X03 input	X03	X13 input	X13	Y03	Y03 output
	X04 input	X04	X14 input	X14	COM1	Common terminal
	X05 input	X05	X15 input	X15	Y04	Y04 output
	X06 input	X06	X16 input	X16	Y05	Y05 output
	X07 input	X07	X17 input	X17	Y06	Y06 output
	-	-	X20 input	X20	Y07	Y07 output
	-	-	X21 input	X21	COM2	Common terminal
	-	-	X22 input	X22	Y10	Y10 output
	-	-	X23 input	X23	Y11	Y11 output
	-	-	X24 input	X24	Y12	Y12 output
	-	-	X25 input	X25	Y13	Y13 output
	-	-	X26 input	X26	COM3	Common terminal
	-	-	X27 input	X27	Y14	Y14 output
	-	-	-	-	Y15	Y15 output
	-	-	-	-	Y16	Y16 output
	-	-	-	-	Y17	Y17 output

40-point TN and TP models

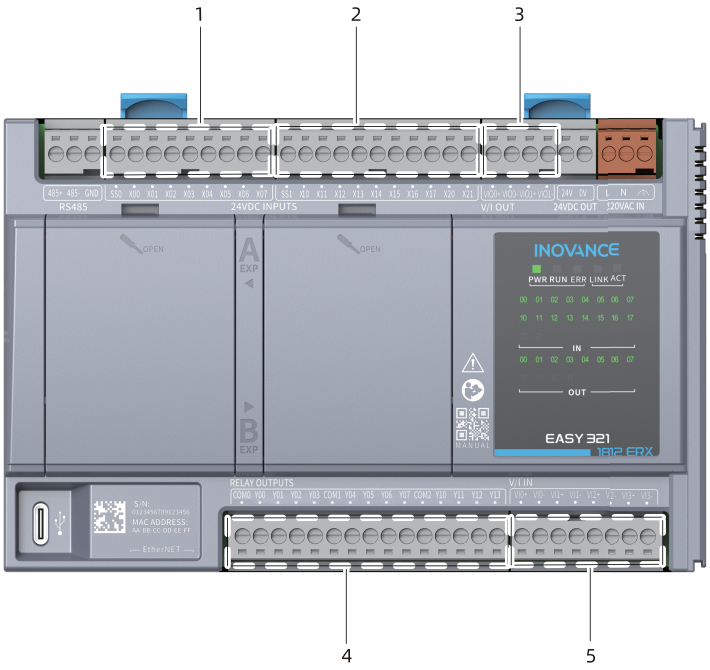
Take the Easy321-2416TN model as an example.



No.	1		2		3		4	
Terminal type	High-speed DI port		Regular DI port		High-speed DO port		Regular DO port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal	Terminal marking	Terminal signal
Easy321-2416TN Easy321-2416TP Easy511-2416TN Easy511-2416TP	High-speed common terminal	SS0	Regular input common terminal	SS1	24V0	24 V input positive	24V1	24 V input positive
	X00 input	X00	X10 input	X10	COM0	24 V input negative	COM1	24 V input negative
	X01 input	X01	X11 input	X11	Y00	Y00 output	Y10	Y10 output
	X02 input	X02	X12 input	X12	Y01	Y01 output	Y11	Y11 output
	X03 input	X03	X13 input	X13	Y02	Y02 output	Y12	Y12 output
	X04 input	X04	X14 input	X14	Y03	Y03 output	Y13	Y13 output
	X05 input	X05	X15 input	X15	Y04	Y04 output	Y14	Y14 output
	X06 input	X06	X16 input	X16	Y05	Y05 output	Y15	Y15 output
	X07 input	X07	X17 input	X17	Y06	Y06 output	Y16	Y16 output
	-	-	X20 input	X20	Y07	Y07 output	Y17	Y17 output
	-	-	X21 input	X21	-	-	-	-
	-	-	X22 input	X22	-	-	-	-
	-	-	X23 input	X23	-	-	-	-
	-	-	X24 input	X24	-	-	-	-
	-	-	X25 input	X25	-	-	-	-
	-	-	X26 input	X26	-	-	-	-
	-	-	X27 input	X27	-	-	-	-

4.3.4.3 30XP Model Terminal Assignment

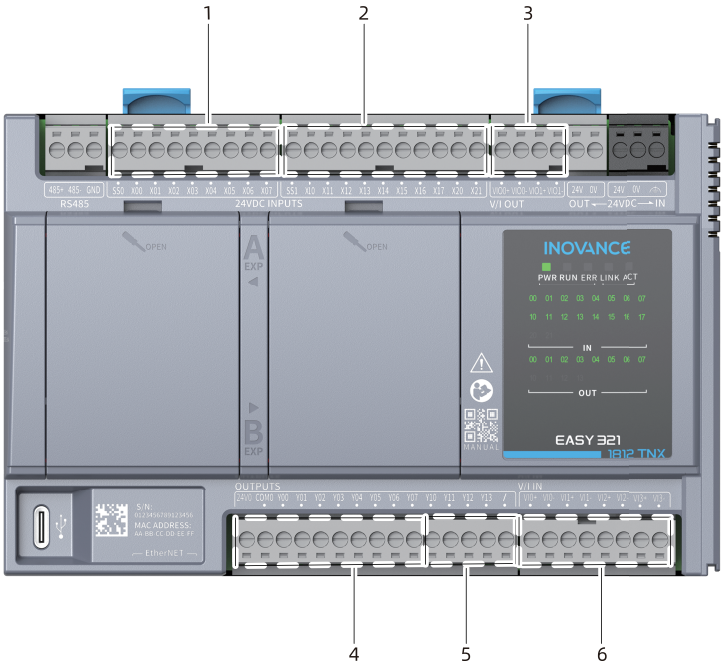
30-point ERX model



No.	1		2		3		4		5	
Terminal type	High-speed DI port		Regular DI port		Analog output port		Regular DO port		Analog input port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal	Terminal marking	Terminal signal
Easy321-1812ERX	High-speed common terminal	SS0	Regular input common terminal	SS1	Analog output 0+	VIO0+	COM0	Common terminal 0	VI0+	Analog input 0+
	X00 input	X00	X10 input	X10	Analog output 0-	VIO0-	Y00	Y00 output	VI0–	Analog input 0-
	X01 input	X01	X11 input	X11	Analog output 1+	VIO1+	Y01	Y01 output	VI1+	Analog input 1+
	X02 input	X02	X12 input	X12	Analog output 1-	VIO1-	Y02	Y02 output	VI1–	Analog input 1-
	X03 input	X03	X13 input	X13	-	-	Y03	Y03 output	VI2+	Analog input 2+
	X04 input	X04	X14 input	X14	-	-	COM1	Common terminal 1	VI2–	Analog input 2-
	X05 input	X05	X15 input	X15	-	-	Y04	Y04 output	VI3+	Analog input 3+
	X06 input	X06	X16 input	X16	-	-	Y05	Y05 output	VI3–	Analog input 3-
	X07 input	X07	X17 input	X17	-	-	Y06	Y06 output	-	-
	-	-	X20 input	X20	-	-	Y07	Y07 output	-	-
	-	-	X21 input	X21	-	-	COM2	Common terminal 2	-	-
	-	-	-	-	-	-	Y10	Y10 output	-	-
	-	-	-	-	-	-	Y11	Y11 output	-	-
	-	-	-	-	-	-	Y12	Y12 output	-	-
	-	-	-	-	-	-	Y13	Y13 output	-	-

30-point TNX and TPX models

Take the Easy321-1812TNX model as an example.


1
2
3
RS485
24VDC INPUTS
V/I OUT
OUT←24VDC→IN
INOVANCE
PWR RUN ERR LINK ACT
IN
OUT
EASY 321
1912 TNX
OUTPUTS
V/I IN
EtherNET
4
5
6

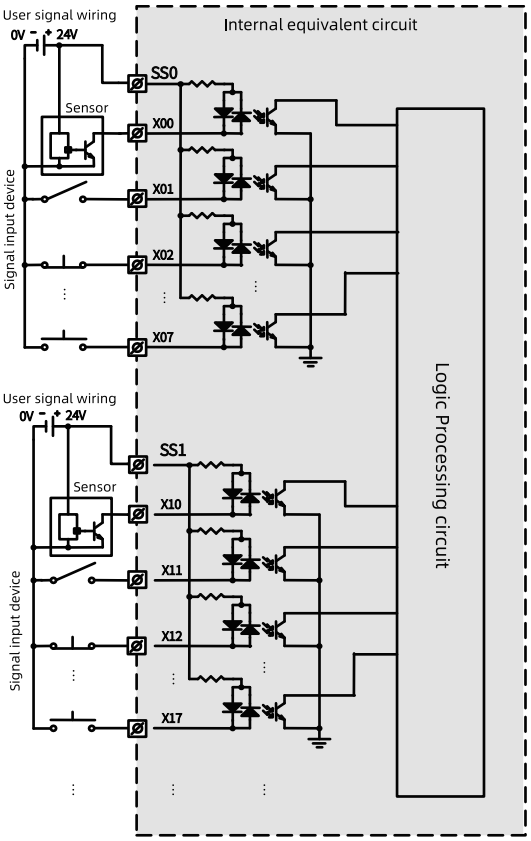
No.	1		2		3		4		5		6	
Terminal type	High-speed DI port		Regular DI port		Analog output port		High-speed DO port		Regular DO port		Analog input port	
Product model	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal marking	Terminal signal	Terminal marking	Terminal signal	Terminal marking	Terminal signal
Easy321-1812TNX Easy321-1812TPX Easy511-1812TNX	High-speed common terminal	SS0	Regular input common terminal	SS1	Analog output 0+	VIO0+	24V0	24 V input positive	Y10	Y10 output	VI0+	Analog input 0+
	X00 input	X00	X10 input	X10	Analog output 0-	VIO0-	COM0	24 V input negative	Y11	Y11 output	VI0–	Analog input 0-
	X01 input	X01	X11 input	X11	Analog output 1+	VIO1+	Y00	Y00 output	Y12	Y12 output	VI1+	Analog input 1+
	X02 input	X02	X12 input	X12	Analog output 1-	VIO1-	Y01	Y01 output	Y13	Y13 output	VI1–	Analog input 1-
	X03 input	X03	X13 input	X13	-	-	Y02	Y02 output	/	-	VI2+	Analog input 2+
	X04 input	X04	X14 input	X14	-	-	Y03	Y03 output	-	-	VI2–	Analog input 2-
	X05 input	X05	X15 input	X15	-	-	Y04	Y04 output	-	-	VI3+	Analog input 3+
	X06 input	X06	X16 input	X16	-	-	Y05	Y05 output	-	-	VI3–	Analog input 3-
	X07 input	X07	X17 input	X17	-	-	Y06	Y06 output	-	-	-	-
	-	-	X20 input	X20	-	-	Y07	Y07 output	-	-	-	-
	-	-	X21 input	X21	-	-	-	-	-	-	-	-

4.3.5 Terminal Wiring

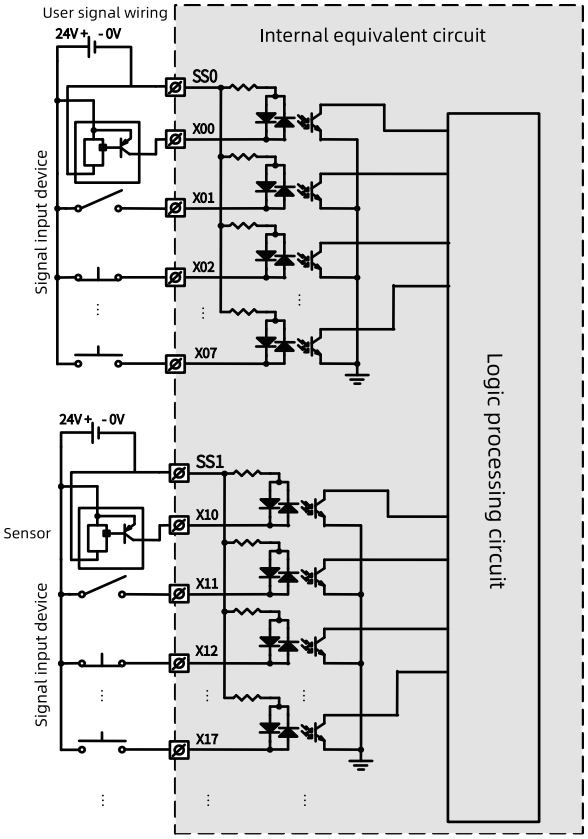
4.3.5.1 Terminal Wiring for 40-Point and 60-Point Models

Wiring block diagram of terminal input

- Sinking transistor input

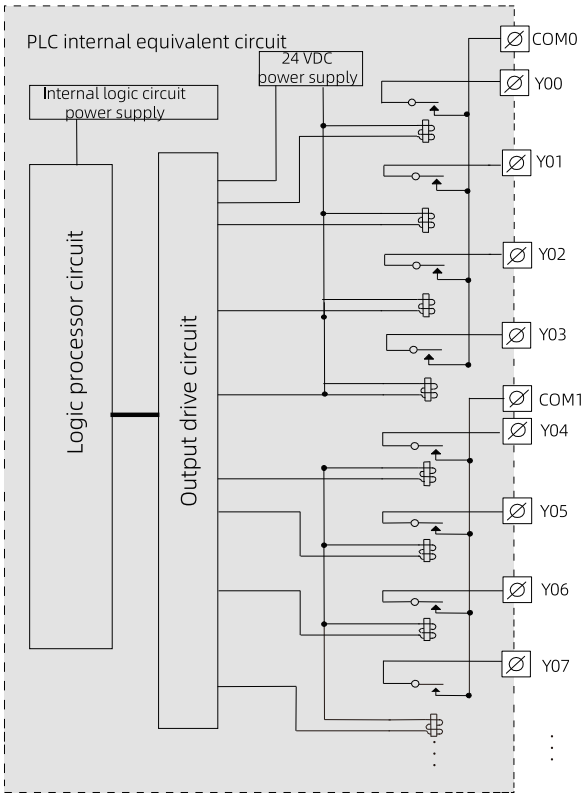


- Sourcing transistor input

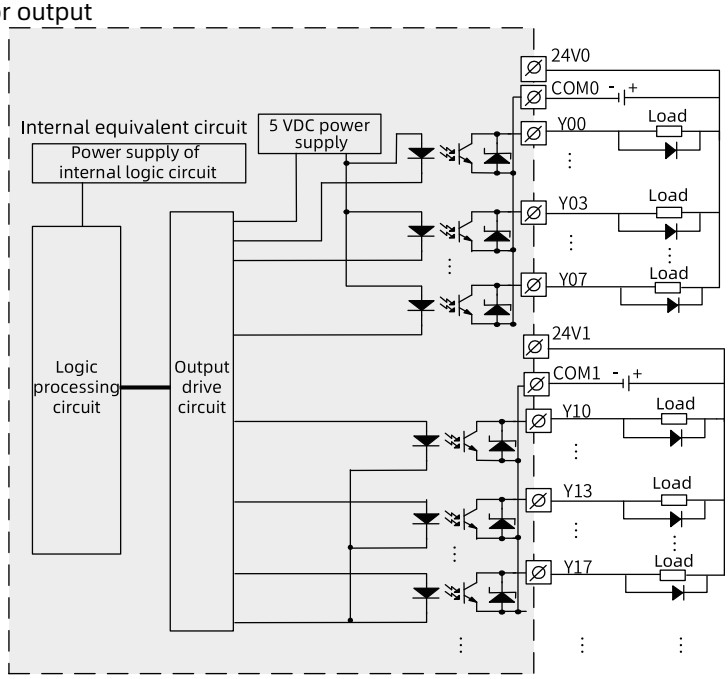


Wiring block diagram for terminal output

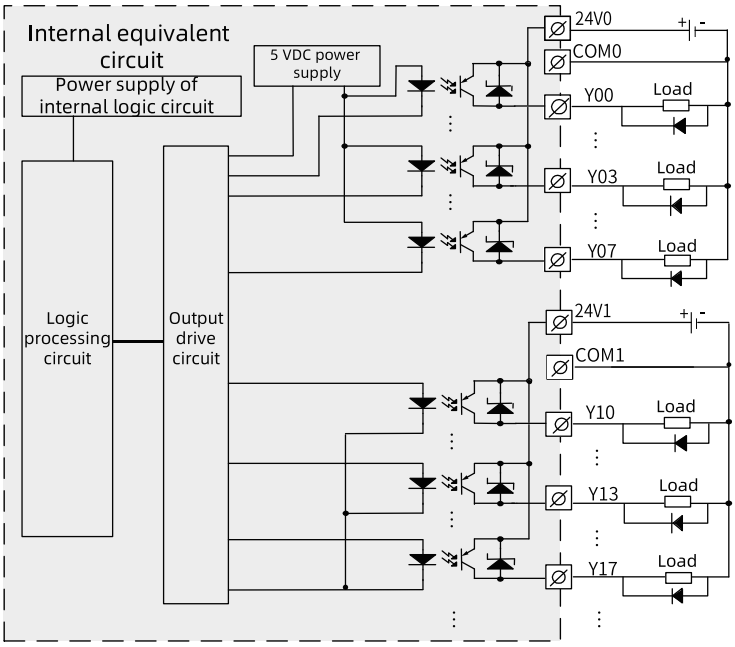
- Relay output



- Sinking transistor output



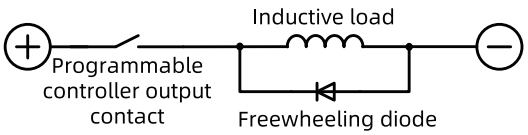
- Sourcing transistor output



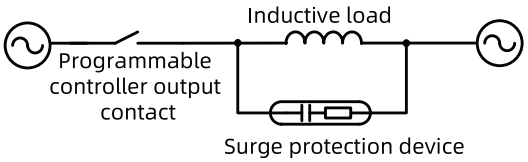
- Contact protection in the case of inductive load
  The PLC is not equipped with an internal protection circuit for relays. Therefore, when an inductive load is used, a large back EMF can be generated between contacts at stop, which can lead to arc discharge that causes contact failure or contact pitting, shortening the service life of the contacts. It is recommended to use loads with built-in protection circuit.

  When using a load that lacks a built-in protection circuit, an external contact protection circuit can be used to reduce noise and extend the product lifetime.

  - Relay DC circuit
    Connect a freewheel diode in parallel with the load upon DC circuit. The freewheel diode must satisfy the following requirements: ① reverse voltage: 5 to 10 x load voltage; ② forward current > load current.



  - Relay AC circuit
    Connect a surge protection device in parallel with the load. The surge protection device must meet the following requirements: ① The rated voltage is applicable to all kinds of outputs; ② The electrostatic capacity is about 0.1 μF; ③ The resistance is about 100 Ω to 200 Ω.



- Contact protection when capacitive load used

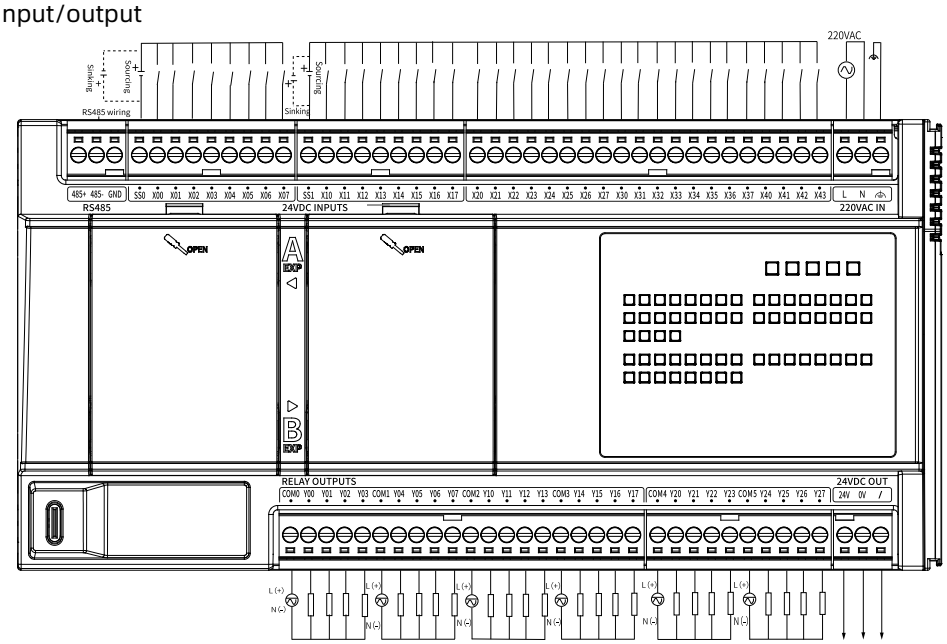
When the capacitive load is applied, the contacts may experience an impulse current 20 to 40 times the normal current. Please note that Impulse current should not exceed the current generated when using maximum resistive load.

When the electronic circuit load such as an AC drive is used, capacitive loads may also exist due to capacitors and others.

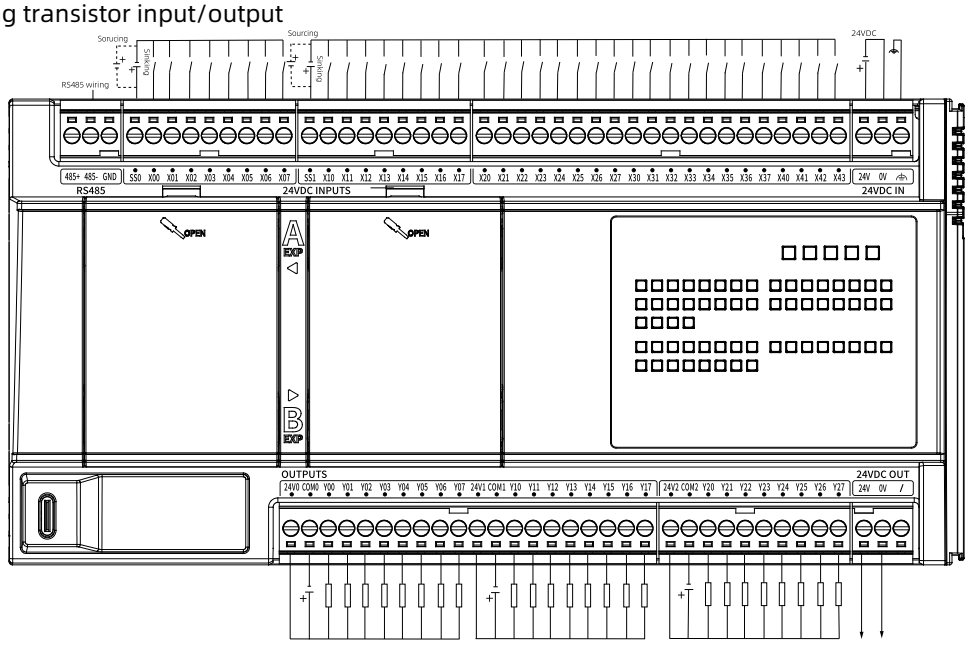
Input/Output grounding diagram

The following takes 60-point ER/TN/TP models as an example, which is similar to the 40-point ER/TN/TP models.

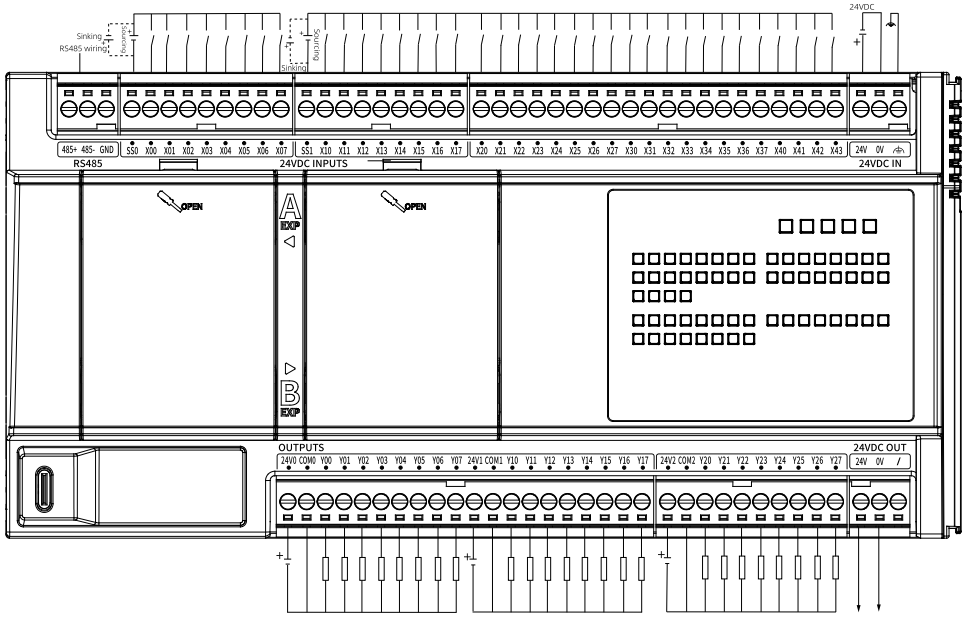
- Relay input/output



- Sinking transistor input/output



- Sourcing transistor input/output



4.3.5.2 Terminal Wiring for 30XP Model

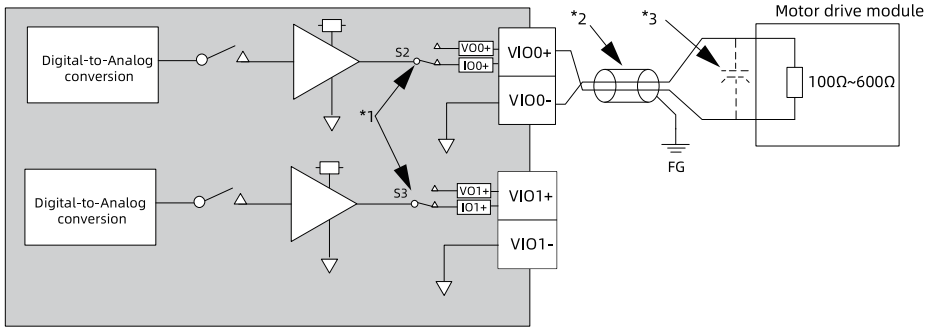
For the digital and relay I/O wiring, see *"4.3.5.1 Terminal Wiring for 40-Point and 60-Point Models" on page 77*. This section describes analog wiring.

Caution

Before connecting analog signals, set the voltage and current DIP switches to the required signal type. For details on the DIP switch settings, see the "DIP switch description" in *"2.4.2 Components of the 30XP Model" on page 20*.

Analog current/voltage output wiring diagram

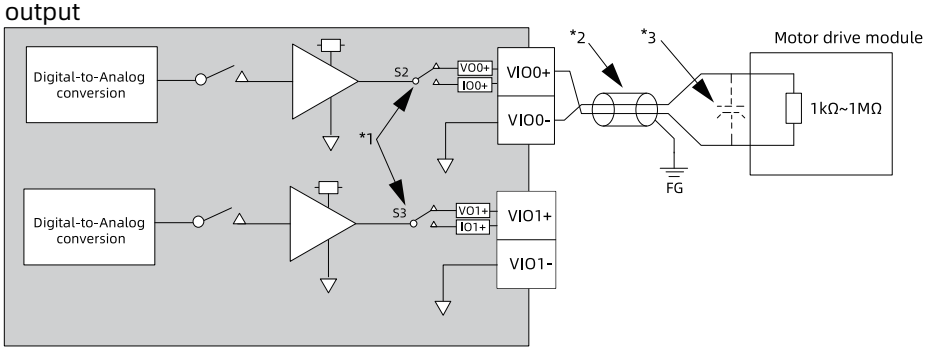
- Current output



Note

- *1: By default, switches S2,S3 are set to the left-side voltage output terminals "VO0"/"VO1". For current output, they must be set to the right-side "IO0"/"IO1" terminals. For details, see the "DIP switch description" in *"2.4.2 Components of the 30XP Model" on page 20*.
- *2: Use 2-conductor shielded twisted-pair cable as the signal cable.
- *3: If noise or ripple is present on the external wiring, connect a 0.1–0.47 μF, 25 V capacitor between the VIO+ and VIO- terminals.

- Voltage output



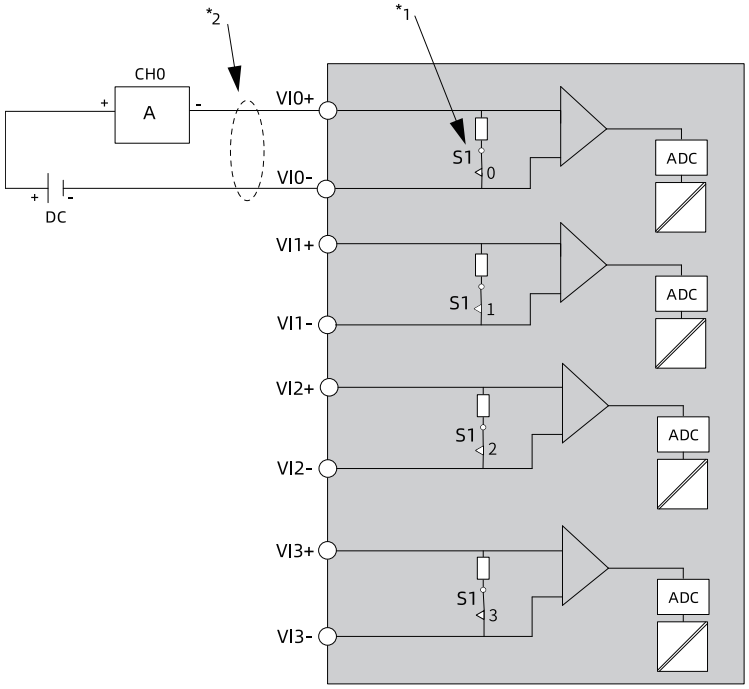
Note

- *1: By default, switches S2 and S3 are set to the left-side voltage output terminals "VO0" and "VO1", respectively. They remain in this state during voltage output. For details, see the "DIP switch description" in *"2.4.2 Components of the 30XP Model" on page 20*.
- *2: Use 2-conductor shielded twisted-pair cable as the signal cable.
- *3: If noise or ripple is present on the external wiring, connect a 0.1–0.47 μF, 25 V capacitor between the VIO+ and VIO- terminals.

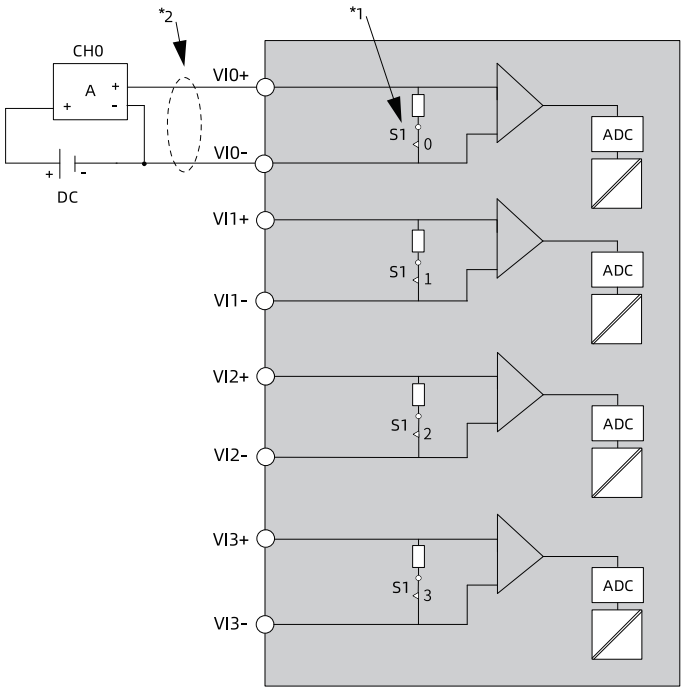
Analog current/voltage input wiring diagram

- **Current input**

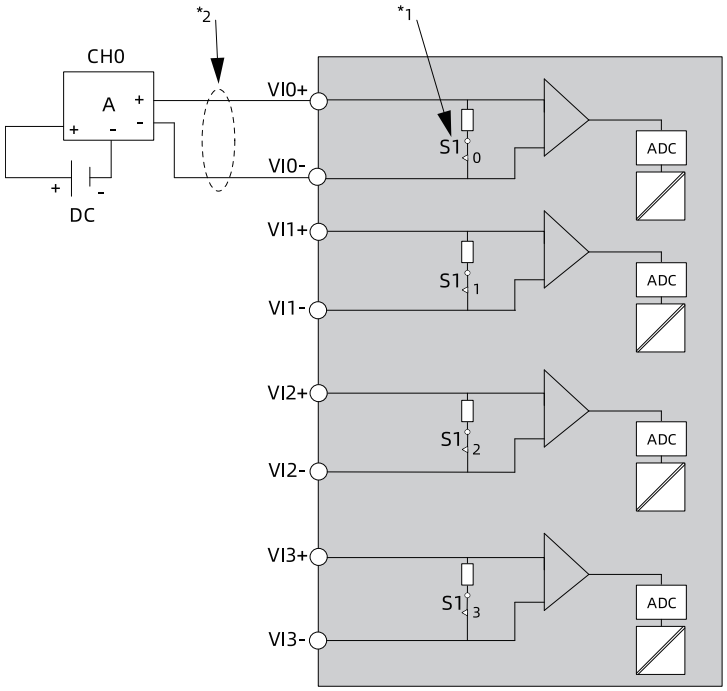
  Two-wire current input



  Three-wire current input



Four-wire current input

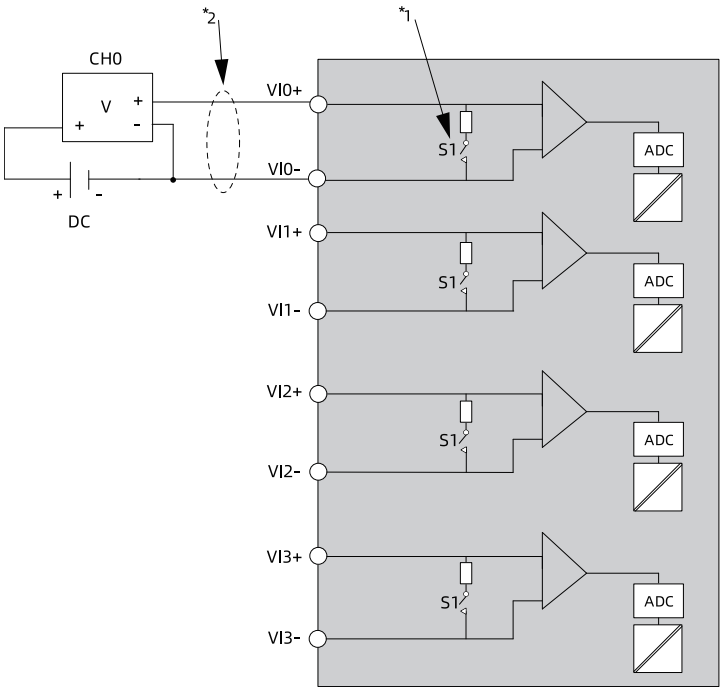


Note

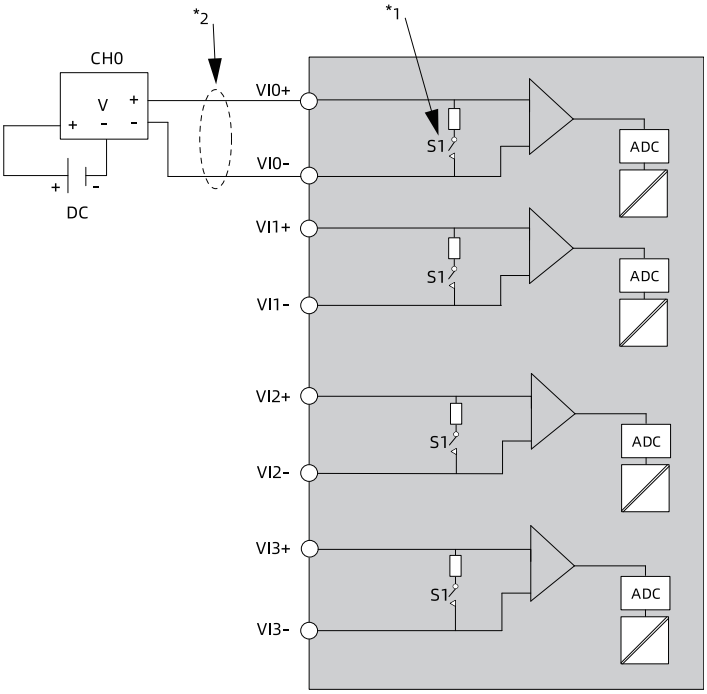
- *1: By default, the switch S1 is set to the left position for voltage input. For current input, set it to the right position (ON). It is recommended to use a small screwdriver or similar tools to toggle the switch. For details, see the "DIP switch description" in *"2.4.2 Components of the 30XP Model" on page 20*.
- *2: Use 2-conductor shielded twisted-pair cable as the signal cable.

- **Voltage input**

  Three-wire voltage input



Four-wire voltage input



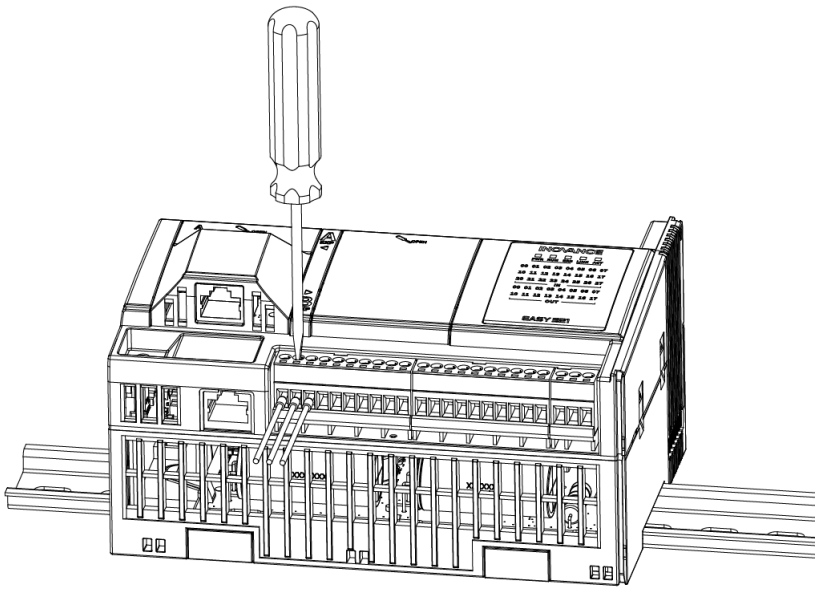
Note

- *1: By default, switch S1 is set to the left (non-ON) position, corresponding to voltage input. Keep this setting when using voltage input. For details, see the "DIP switch description" in *"2.4.2 Components of the 30XP Model" on page 20*.
- *2: Use 2-conductor shielded twisted-pair cable as the signal cable.

4.3.6 Cable Connection/Disconnection

Cable connection

1. Insert the cable into the terminal.
2. Tighten the screws with a straight screwdriver to secure the cables, as shown below.



Cable disconnection

Loosen the terminal screws with a straight screwdriver and pull out the cable.

4.4 RS485 Cable Connection

4.4.1 Wiring Preparation

For details, see *"4.3.1 Wiring Precautions" on page 65*.

4.4.2 Terminal Assignment

Terminal type	Product model	Network silkscreen name	Terminal description
RS485 terminal	Easy511 products Easy321 products	485+	RS485 communication signal (+)
		RS485-	RS485 communication signal -
		GND[1]	RS485 communication signal ground

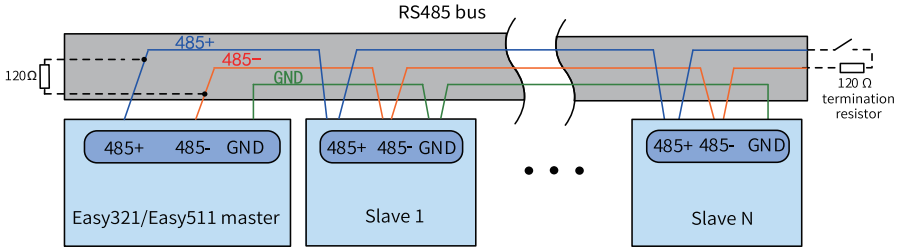
Caution

[1] Do not connect a grounding cable to GND.

4.4.3 Terminal Wiring

The following figure shows the RS485 bus connection topology. Note the following when connecting the RS485 bus.

- For the RS485 bus, a shielded twisted-pair cable is recommended. The 485+ and 485- lines must be wired as a twisted pair within this cable.[1].
- To prevent signal reflection, connect a 120 Ω termination resistor at each end of the bus.[2].
- Connect the reference grounds of 485 signals of all the nodes together.
- A maximum of 31 nodes are supported. The stub length from each node to the main bus must be less than 3 m.



Note

[1]: Use ferrules to prevent short circuits between adjacent pins during terminal wiring.

[2] The Easy series PLC is not equipped with a termination resistor. An external resistor must be connected by the user. The GE21-CAN-485 expansion card is equipped with a termination resistor, which can be controlled through a DIP switch. This DIP switch is set to ON (termination resistor applied) by default.

4.4.4 Connecting/Disconnecting Cables

For details, see *"4.3.6 Cable Connection/Disconnection" on page 86*.

4.5 USB Cable Connection

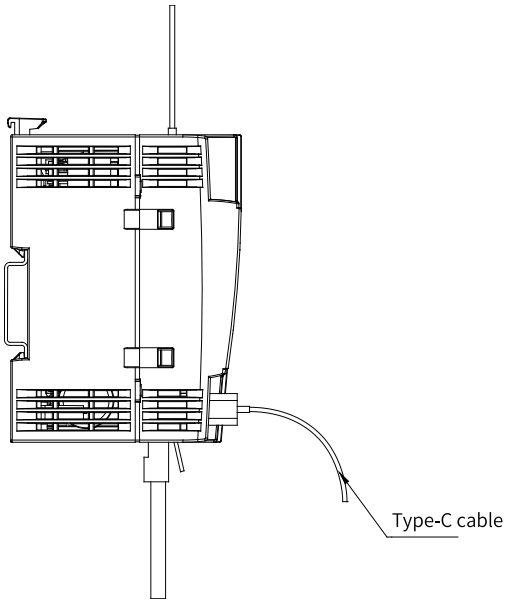
4.5.1 Wiring Preparation

Prepare an USB cable and a PC.

4.5.2 Connecting/Disconnecting Cables

Connecting cables

Connect one end of the USB cable to the Type-C terminal of the PLC and the other end to the PC.



Note

To remove the cable, pull out the USB cable directly.

5 Configuration and Commissioning

5.1 Configuration

The following uses the configuration of Easy511-3624TN+GL20-RTU-ECT32+GL20-1600END+GL20-0016ETN as an example to illustrate the configuration and commissioning of this product.

Prerequisites

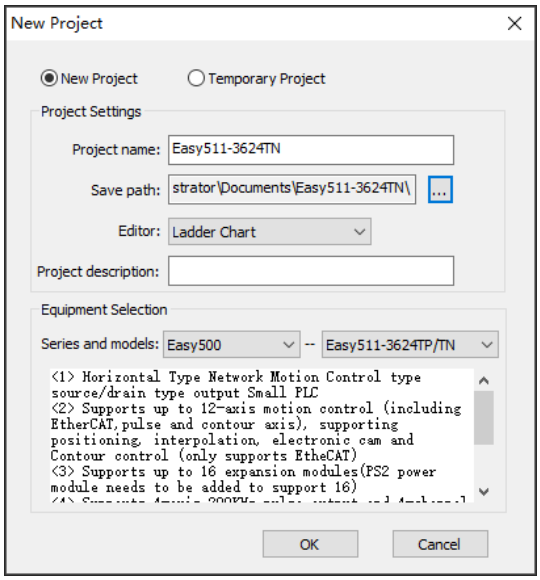
- The installation and wiring of the required hardware are completed.
- All products are powered on.
- The PC with the AutoShop programming software is connected to Easy511 series PLC through a USB cable.

Procedure

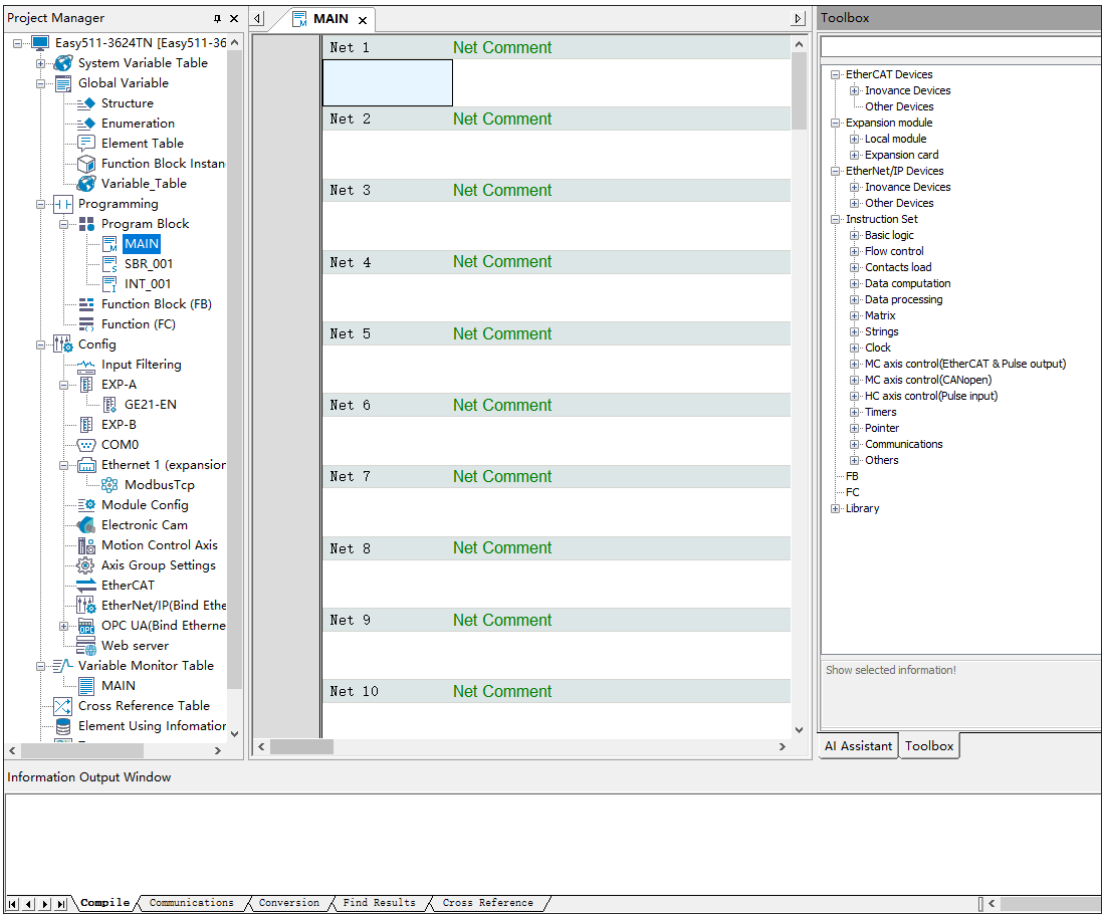
1. Create a project.

   a. Double-click the AutoShop shortcut icon on the PC desktop to open the AutoShop programming software.

   b. In the menu bar, select "File > New Project" to open the "New Project" dialog box, as shown below.

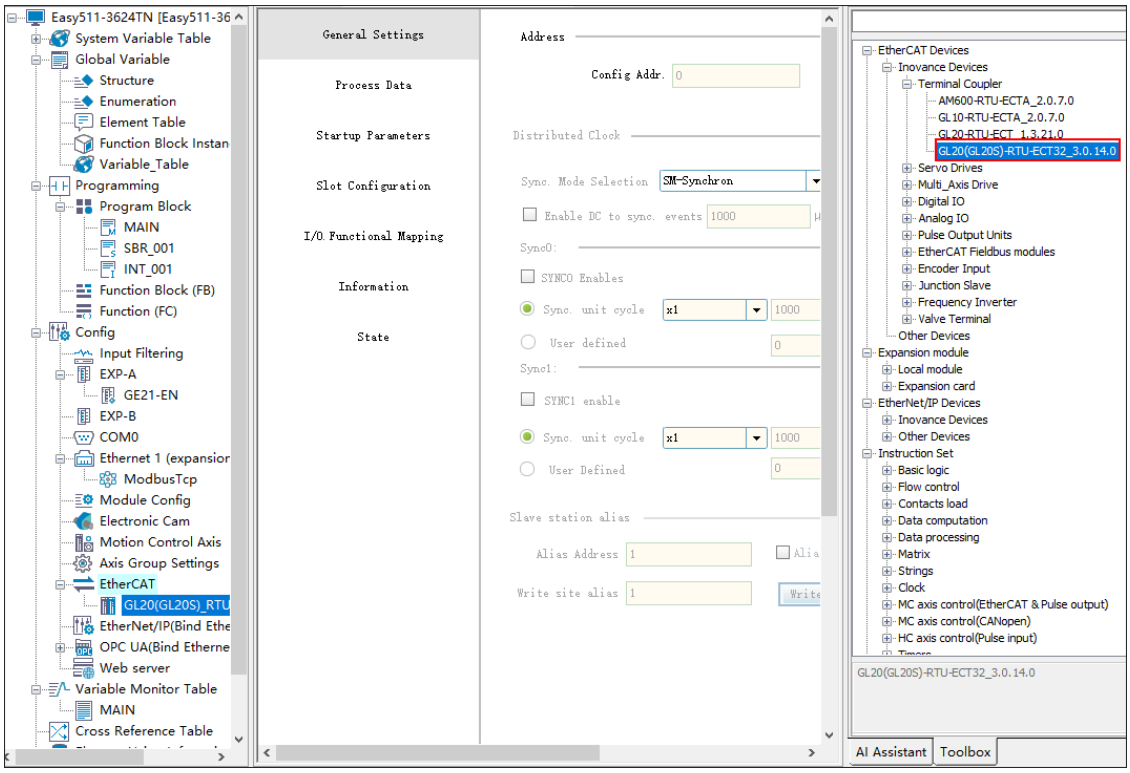


   c. Set the project name, project save path, programming language, and project description. Under Series and Model, select Easy500 - Easy511-3624TP/TN and click OK to enter the Easy511-3624TN project interface.



2. Add a coupler.

   In the "Toolbox" on the right, select "EtherCAT Devices" > "Inovance Devices" > "Terminal Coupler". Double-click "GL20-RTU-ECT32" to add a "GL20-RTU-ECT32" slave node under the "EtherCAT" node. Open the configuration interface as shown in the figure below.

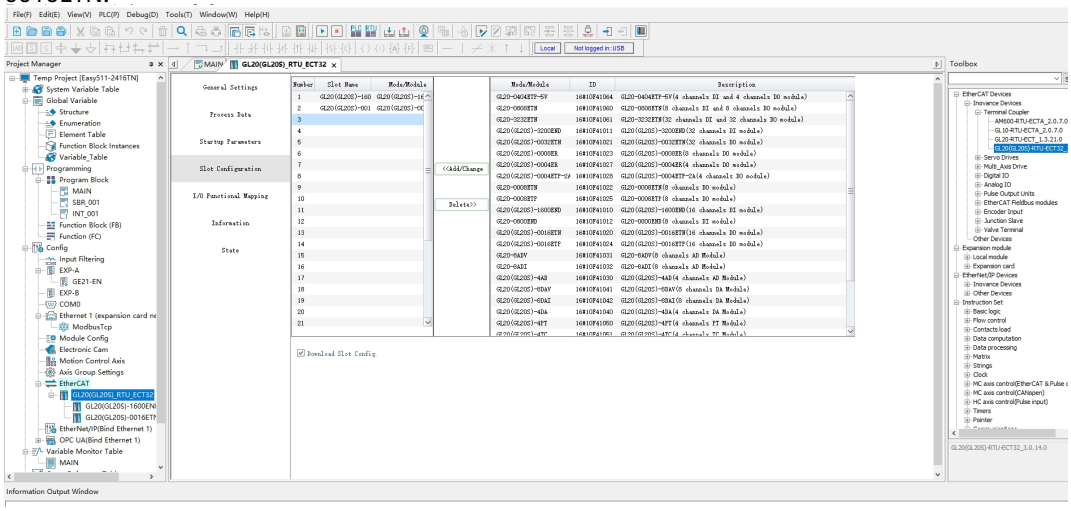


3. Add an expansion module.

- Method 1: Adding manually

  a. Click "Slot Configuration" to access the slot configuration page.

  b. Select the module on the right side of the interface, and click "Add/Change" to add GL20 expansion modules. This example uses two actual modules: GL20-1600END and GL20-0016ETN.

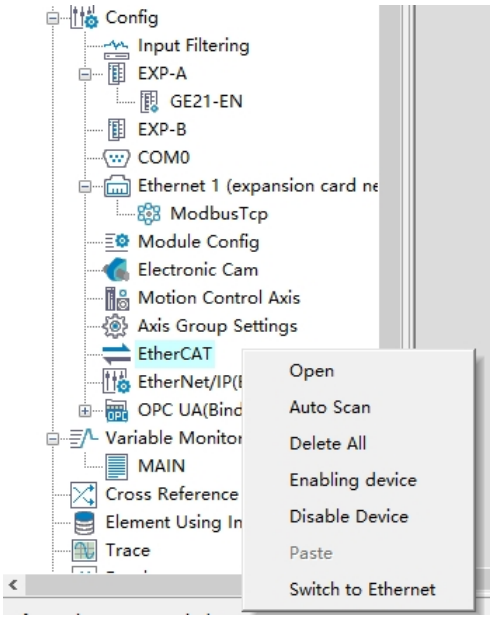


Note

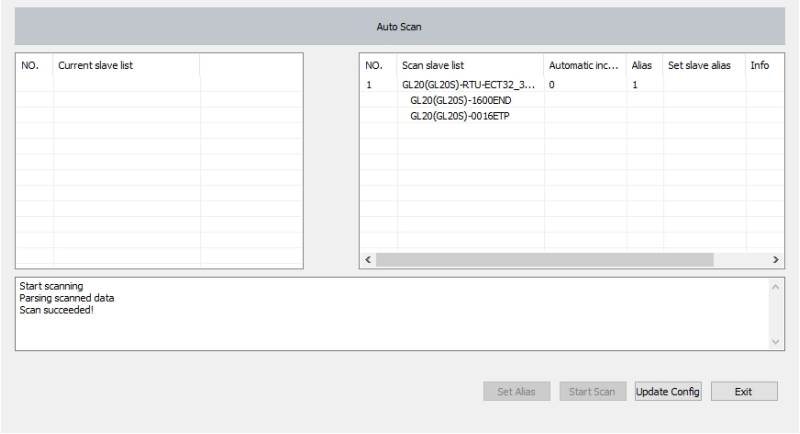
- When the sum of the power consumption of the module added exceeds the maximum power consumption, a pop-up prompt can be displayed.
- To delete a module, select the module on the left side of the interface and click "Delete".

- Method 2: Scanning automatically

a. In the "Project Manager" navigation tree on the left, right-click "EtherCAT" and select "Auto Scan".



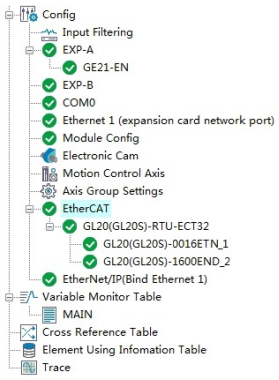
b. In the opened dialog box, click "Start Scan" to display the actually connected GL20 series expansion modules.



Note

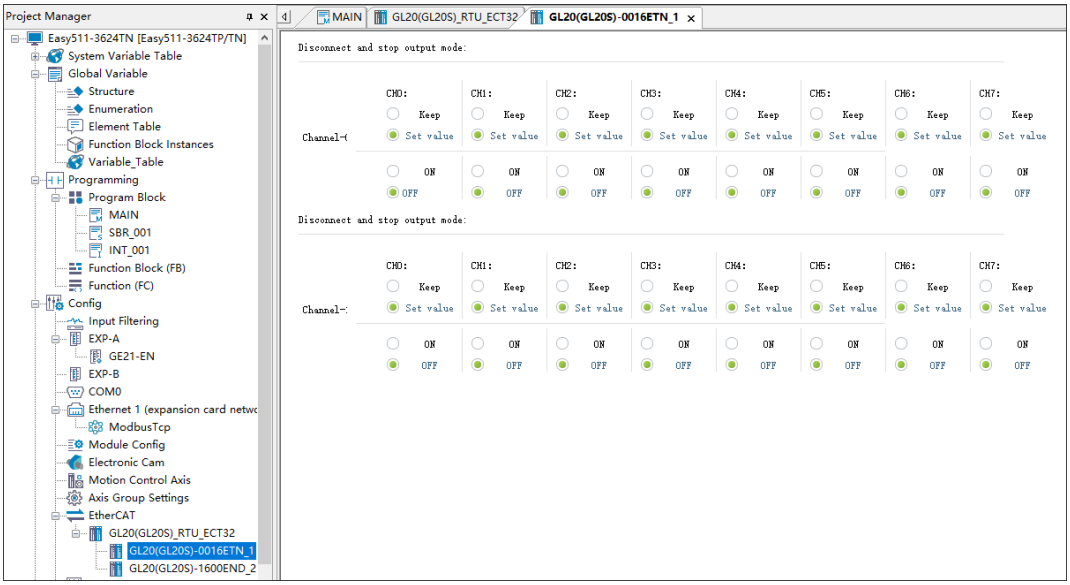
When the total power consumption of the scanned modules exceeds the maximum power consumption, the configuration can be updated normally, but an alarm message can be displayed during compilation.

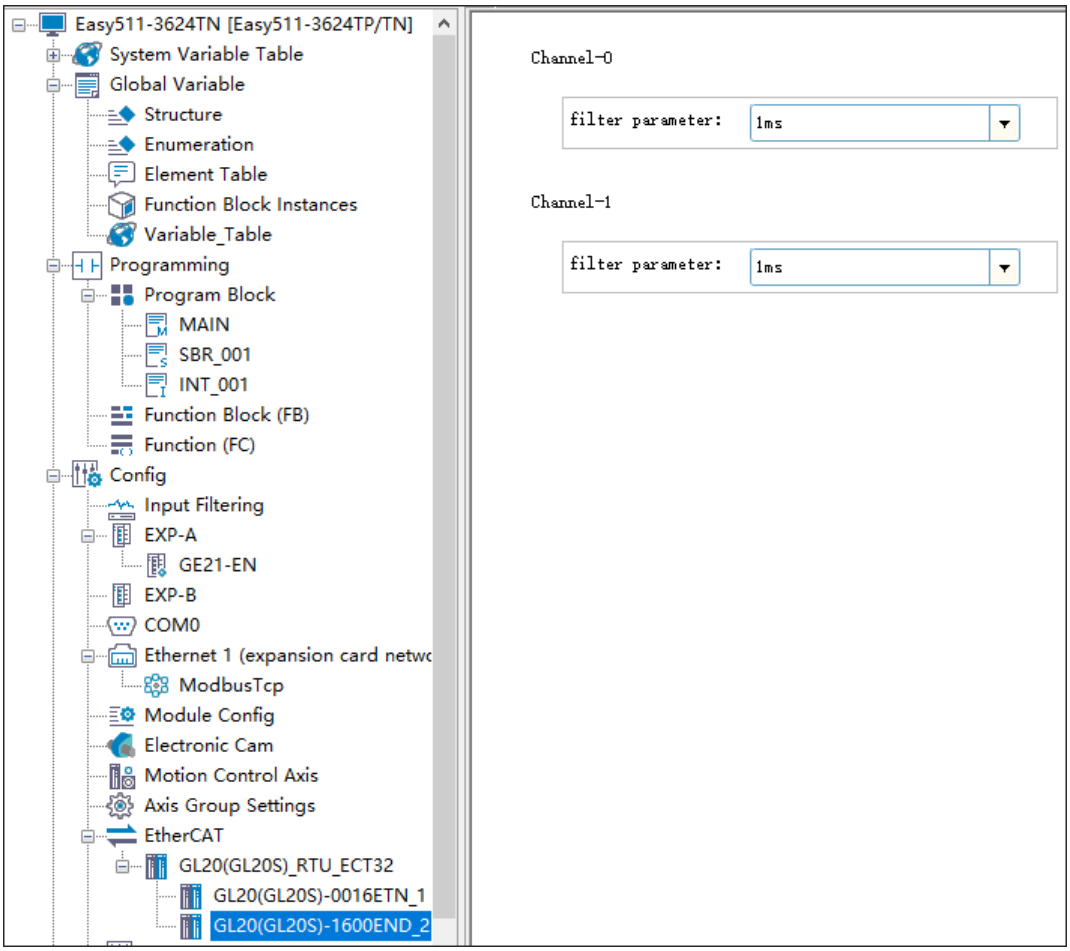
c. Click "Update Config". The EtherCAT configuration in the project management window is shown in the following figure.



4. Configure the module.

   Double-click the module node in the project management tree under "EtherCAT>GL20-RTU-ECT32" in sequence to open the configuration interface of the corresponding module and configure the module parameters. The module parameters are described in the following table.



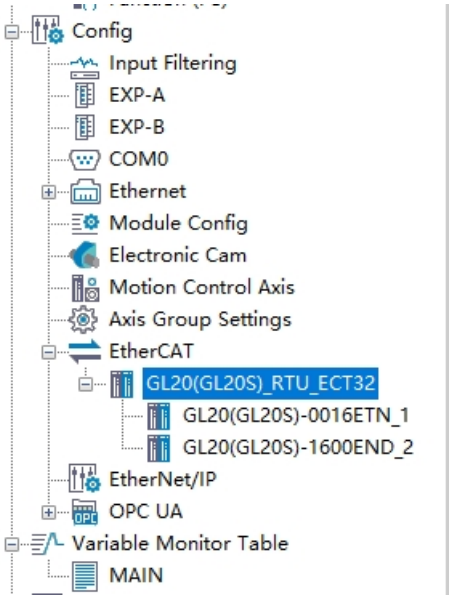


Module	Parameter		Description	Setting
GL20-1600END	Filter parameters		Input filter time	Dropdown options: No filter, 0.25 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms. Default: 1 ms
GL20-0016ETN	Disconnect and stop output mode	Output last value/ Output preset value	Output last value: Keeps the present output status Output preset value: Outputs according to the preset value	Check "Output last value" or "Output preset value".
		ON/OFF	Output preset value: • ON: Outputs 1 • OFF: Outputs 0	Check "ON" or "OFF".

5. Download, run, and stop the program.

   a. Click the download button in the toolbar to download the program to the PLC.
   b. After the download is complete, click the run button in the toolbar to run the program.

6. Click the monitor button in the toolbar. Green icons are displayed in front of the EtherCAT node and GL20-RTU-ECT32 node. The "Current status of PLC" indicator and "Failure status" indicator at the bottom of the AutoShop interface are displayed in green (PLC当前状态 故障状态), indicating that no error is reported by the PLC, which means the GL20-RTU-ECT32 communication interface module is operating properly.



5.2 Commissioning

After the Easy series PLC is configured with the remote I/O, you need to perform simple commissioning on the remote I/O functions to ensure that the PLC, EtherCAT coupler, and GL20 expansion module operate properly. In this section, the delay time for "Output > Input" is tested by taking the two terminals of remote I/O as an example.

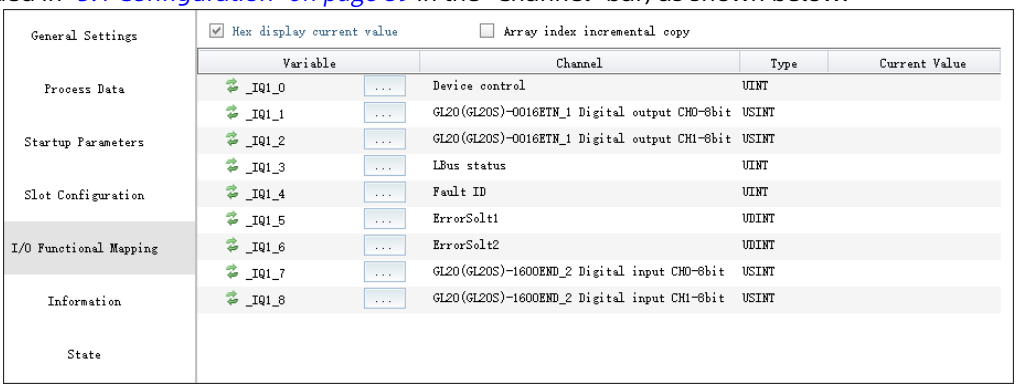
Prerequisites

After I/O wiring is done, connect the 00 terminal output of GL20-0016ETN to the 00 terminal input of GL20-1600END.

Procedure

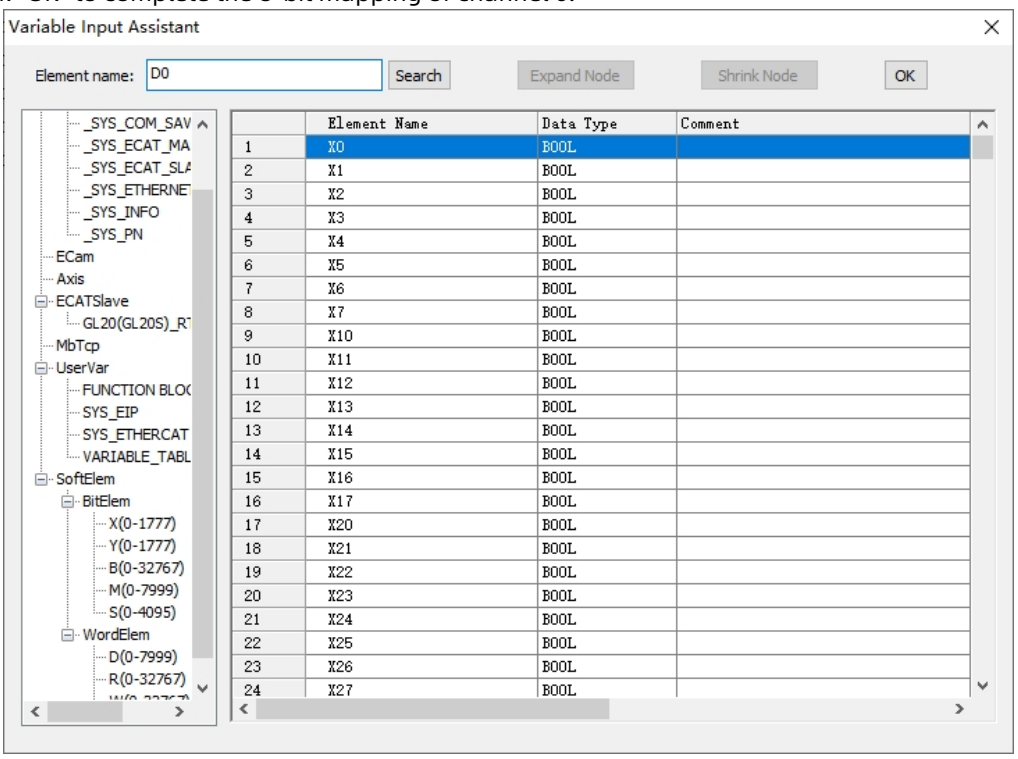
1. Perform I/O mapping.

   a. Double-click the "Config > EtherCAT > GL20-RTU-ECT32" in the project tree to open the configuration interface of the EtherCAT coupler. Click "IO Functional Mapping" in the configuration interface. You can see GL20-0016ETN and GL20-1600END expansion modules that added in *"5.1 Configuration" on page 89* in the "Channel" bar, as shown below.

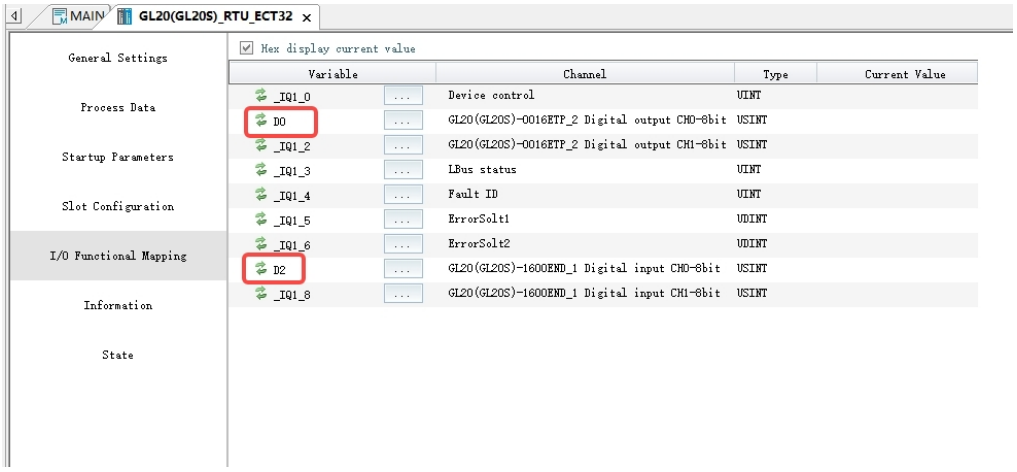


   b. The remote I/O terminal mapping uses groups of 8 bits as a channel. Double-click the icon ... for the "GL20-0016ETN_1 Digital output CH0-8bit" channel. In the "Variable Input Assistant"

window that opens, click "SoftElem > WordElem > D(0-7999)", select the soft component D0, and click "OK" to complete the 8-bit mapping of channel 0.

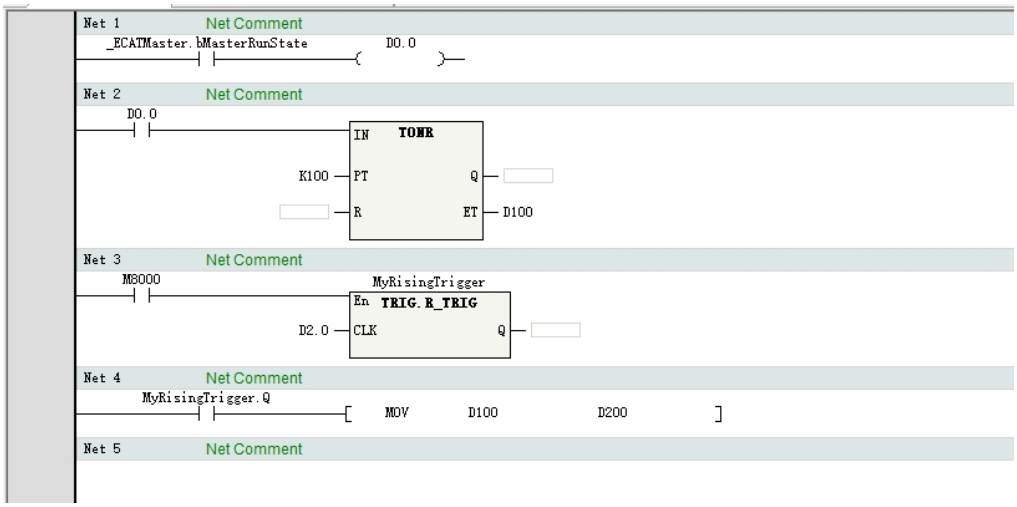


Map input channel 0 to D2 soft component in the same procedure. The following figure shows the interface after mapping is done.



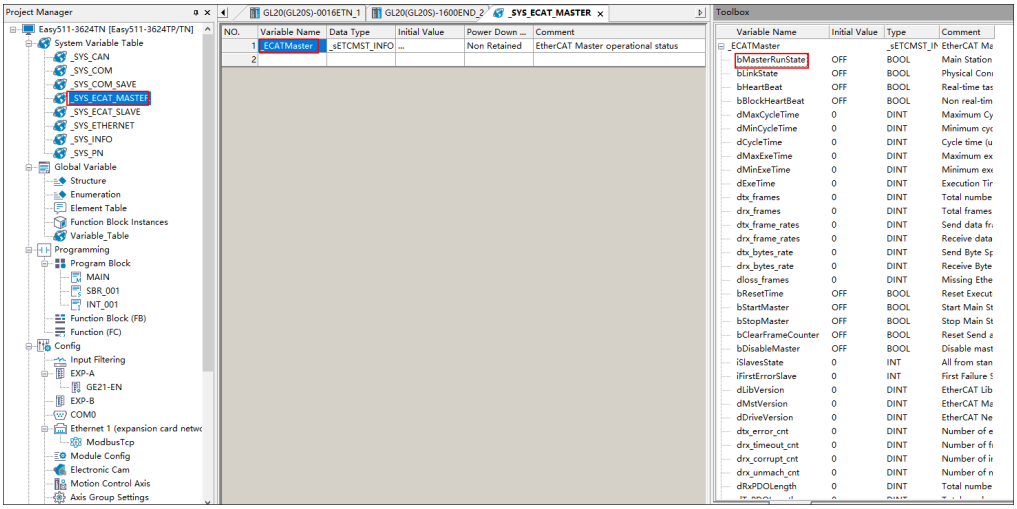
2. Write a test program.

The following figure uses the ladder diagram programming in the MAIN program block as an example.



- Network 1

  "_ECATMaster" is a predefined system structure variable, which can be viewed by double-clicking "System Variable Table > _SYS_ECAT_MASTER" in the project management tree. Click the "_ECATMaster" variable name in the system variable table "_SYS_ECAT_MASTER" to view the details of the structure variable in the "Toolbox" window on the right side of the interface, as shown in the following figure. The member "bMasterRunState" indicates whether EtherCAT has been initialized.



Note

- The remote I/O in this example is based on EtherCAT. Therefore, EtherCAT initialization must be done before output.
- D0.0 indicates the lowest bit of the word soft component of D0. In step 1 "I/O mapping", the low 8 bits of D0 are bound to the first 8 channels of the remote output terminal. Therefore, setting D0.0 is equivalent to generating output from terminal 00 of GL20-0016ETN.

- Network 2

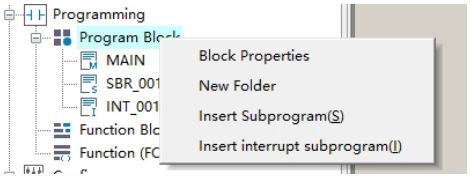
  When D0.0 generates output, start a TONR switch-on delay timer for timing. Note that only the timing function is used here, and the "delayed switch-on" feature is not used. TONR.PT is set to 1000 ms only to prevent the timing from ending before the purpose of this example is achieved. TONR.ET indicates the time elapsed from the moment when TONR.IN is set to the

moment when the time is counted to TONR.PT. For details on using the TONR instruction, see *H5U and Easy Series Programmable Logic Controller Instruction Guide*.

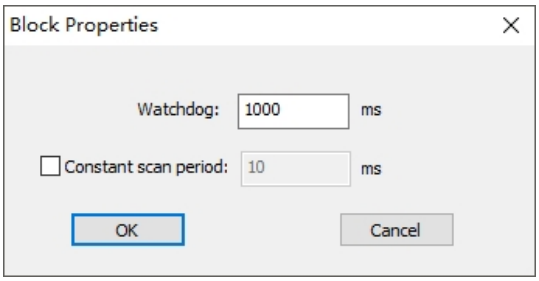
- Network 3
  The GL20-1600END terminal 00 that bound to D2.0 is the input in this example. When D2.0 receives the D0.0 signal, a rising edge is generated to trigger the MyRisingTrigger.CLK pin, which in turn sets the MyRisingTrigger.Q pin to a main task scan cycle.
- Network 4
  Saves the time in network 2 TONR.ET to D200 during the current scan cycle that set by the MyRisingTrigger.Q pin. After power-on, the value saved in D200 is the delay time of the remote I/O "Output > Input" in this example.

3. View the results.
   To get consistent results, set the main task scan cycle to 1 ms and the EtherCAT scan cycle to 1 ms.

   a. Set the main task scan cycle.
   Right-click "Program Block", and click "Block Properties".

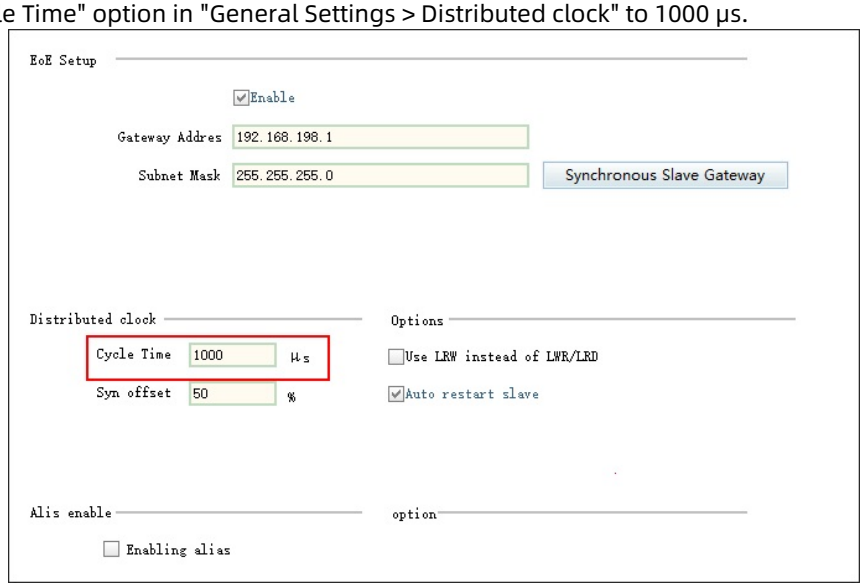


   In the dialog box that opens, check "Constant scan period" and fill in a value of 1 ms.



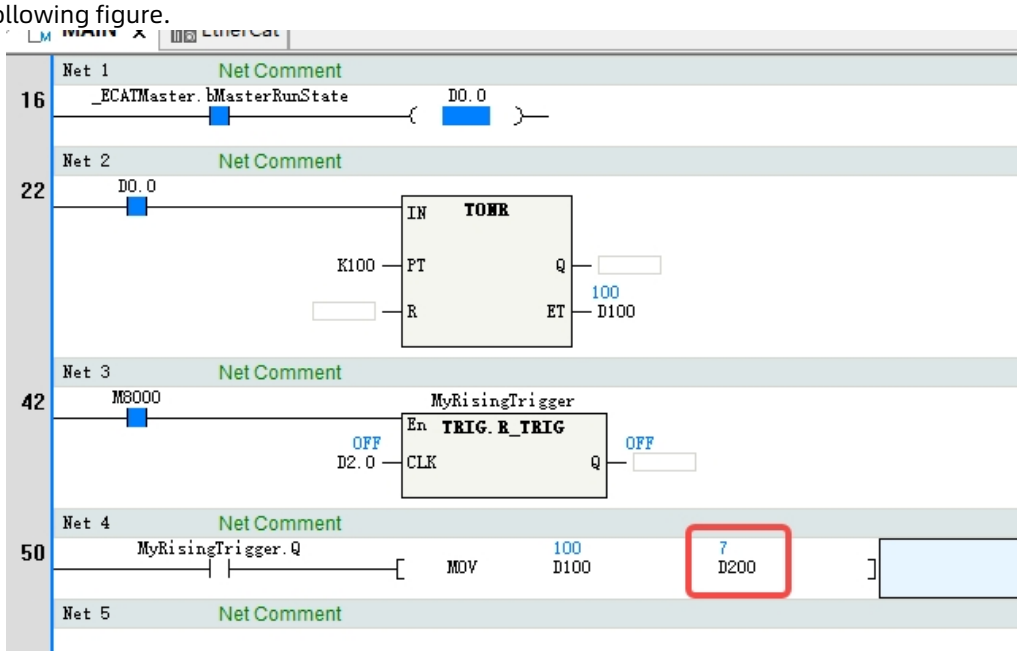
   b. Set the EtherCAT scan cycle.

   1). Double-click "Configuration > EtherCAT" to open the EtherCAT configuration interface, and set the "Cycle Time" option in "General Settings > Distributed clock" to 1000 μs.



2). Click the button on the toolbar to download the program and configuration to the PLC.

3). Click on the toolbar to monitor the PLC and view the results in the MAIN, as shown in the following figure.



Caution

This result is for reference only, which varies with programs and firmware versions. For detailed I/O refresh performance, see *H5U&Easy Series Programmable Logic Controller Programming Guide*.

6 Product Functions

6.1 PN Coupler Mode

Supported models

The GE21-RTU expansion card supports all Easy321 models.

Function description

The GE21-RTU expansion card allows you to quickly configure the PLC as a PN coupler. This expansion card can back up the configuration information of the PLC when it acts as a PN coupler. After replacing the PLC, the card automatically downloads the parameters to restore the original state, enabling truly software-free maintenance.

PN coupler mode switchover

For detailed configuration of PN coupler mode, see section 4 Configuration Commissioning in *GE21-RTU Coupler Configuration Card User Guide*.

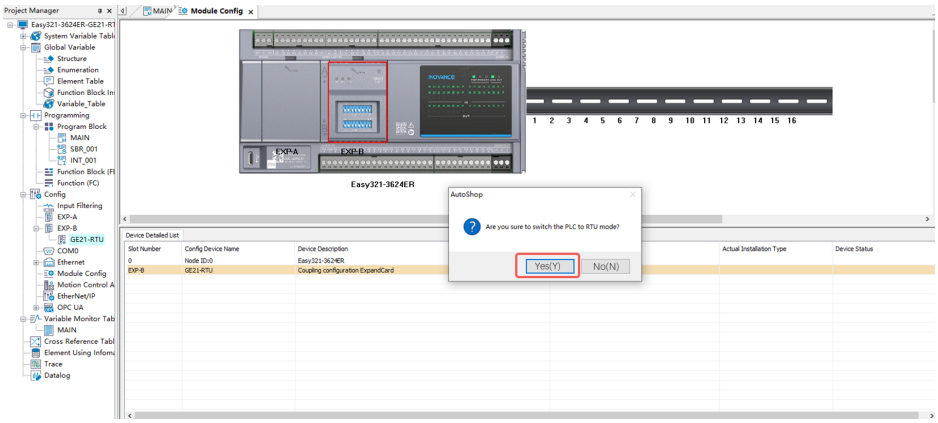
Caution

- The GE21-RTU expansion card only supports EXP-B card slot.
- The type ID of the GE21-RTU expansion card is 18. The configured expansion card type must be consistent with the type of the expansion card installed.

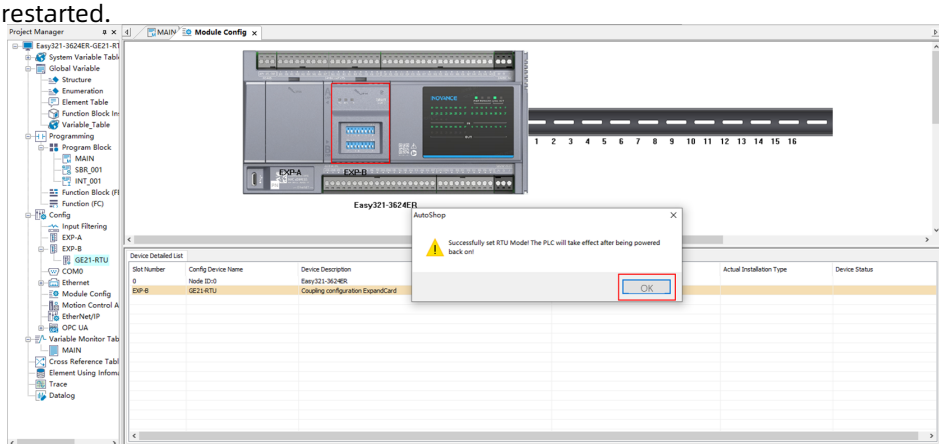
- **GE21-RTU expansion card switching to PN coupler mode**
  - S2: Switch 1
    - DIP switch 0: Allows the expansion card to upload backup data to the PLC.
    - DIP switch 1: Allows backup data to be downloaded from PLC to the expansion card.
  - S2: Switches 2 to 4
    - Set to 010: Indicates the PROFINET coupler mode.
    - Other DIP switches: Indicates the PLC mode.
  - Other DIP switches are not enabled.
- **AutoShop switching to PN coupler mode**

  Procedure

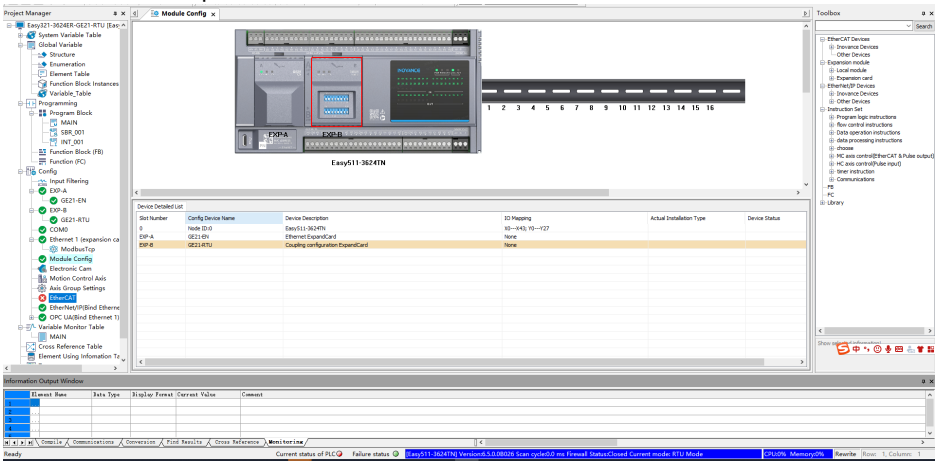
  1. Create a new project in AutoShop, click the RTU button  in the toolbar, and click "Yes" in the pop-up window.



2. A dialog box indicating successful setting pops Up. Click OK. The setting takes effect after the PLC is restarted.



3. The current mode is coupler mode.



- **Retaining PLC functions in the PROFINET coupler mode**

  When switching to the coupler mode, the PLC cannot enter the operational state and only the following PLC functions are supported.

  - Firmware upgrade: Upgrading or downgrading does not change the mode. Upgrading of the SD card and IMG can restore the PLC to the default PLC mode.
  - Project upload and download: After the project is downloaded, the PLC cannot run, and the background software prompts the information indicating that the PLC is in the coupler mode and cannot be switched to the running mode.

- Online monitoring: Only the IO status can be monitored. The PLC program does not run, and online modification is not supported.
- IP address modification: The modified IP address takes effect immediately.

6.2 Dual Network Ports

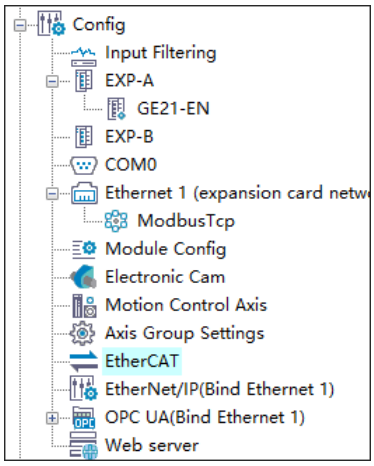
Supported models

All Easy511 models are equipped with a GE21-EN Ethernet card as standard.

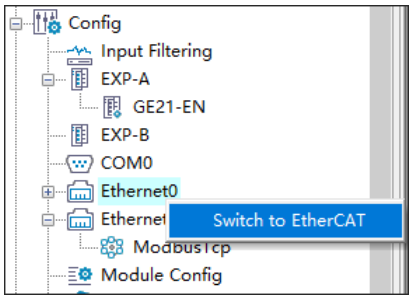
Function description

The PLC features one built-in EtherCAT port. By installing a GE21-EN expansion card, you can add another network port, providing dual network ports.

- The built-in Ethernet port supports one EtherCAT channel, which can be switched to Ethernet protocol.
  - The built-in network port of the Easy511 is set to EtherCAT by default, as shown in the figure below.



  - When the built-in network port is set to Ethernet, right-click "Ethernet 0" in the project tree on the left and select "Switch to EtherCAT" to change the built-in port to EtherCAT mode, as shown in the figure below.



- The built-in GE21-EN expansion card provides one expansion network port to support functions including Ethernet-based monitoring, program upload/download, Socket, Modbus-TCP, and EIP.

6.3 Local I/O Point Expansion

Supported models

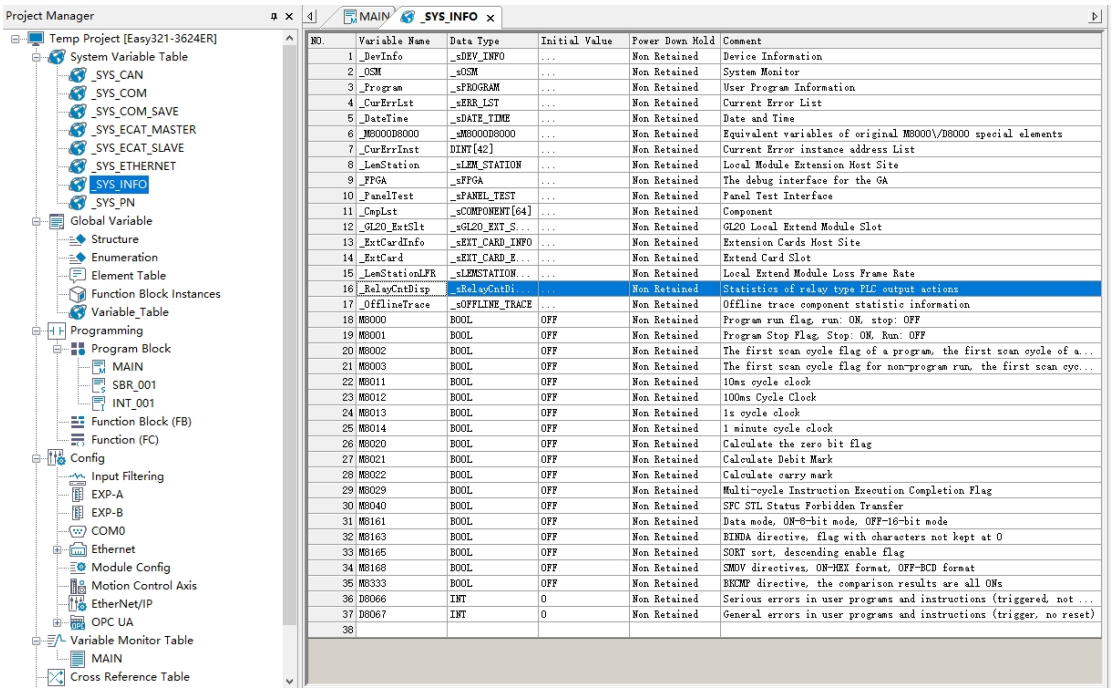
- All Easy321 product models
- All Easy511 product models

Function description

The Easy321 and Easy511 series offer an increased number of onboard I/O points and include new relay output models.

- **Short circuit protection function for transistor model**
  Each of the eight output terminals form a group that shares short circuit protection. Take Y10 to Y17 as an example. If Y12 is short-circuited, The short circuit protection is triggered and Y12 cannot be operated. You can view the short circuit alarm with fault code 5302 through the software tool. After the short circuit fault is cleared, power on the 24 V external power supply next to terminals Y10 to Y17 again to restore the function of Y12.

- **Output action counting function for relay model**
  You can record the number of actions during the lifetime of the relay model. Double-click "System Variable Table > _SYS_INFO" in the project management tree, and click "_RelayCntDisp" to view the member variables in the tool box on the right, as shown in the following figure.



6.4 Analog Input and Output

Supported models

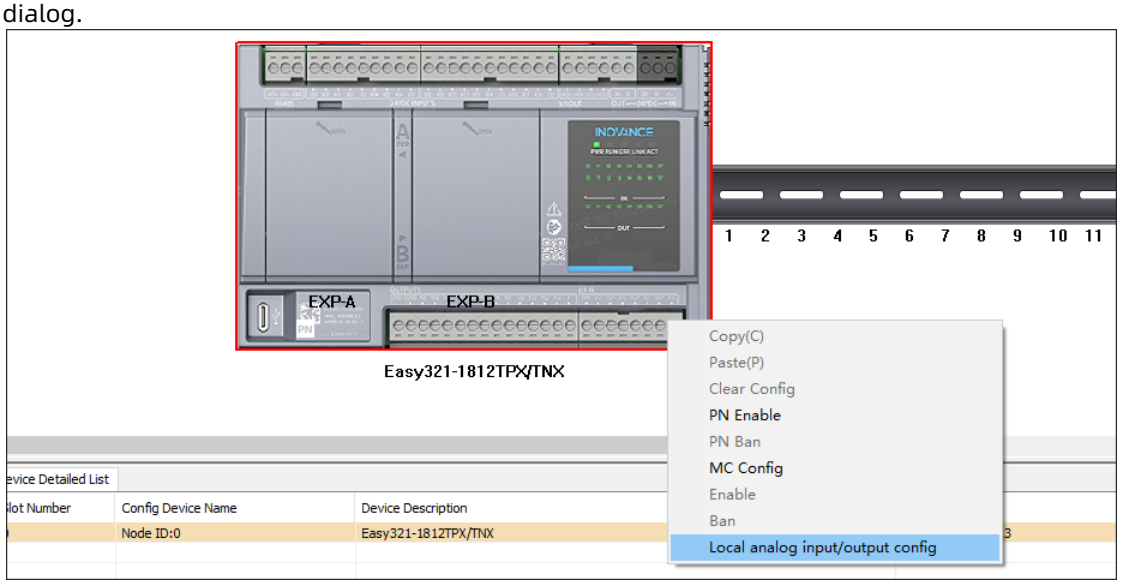
- Easy321-1812ERX
- Easy321-1812TNX

- Easy321-1812TPX
- Easy511-1812TNX

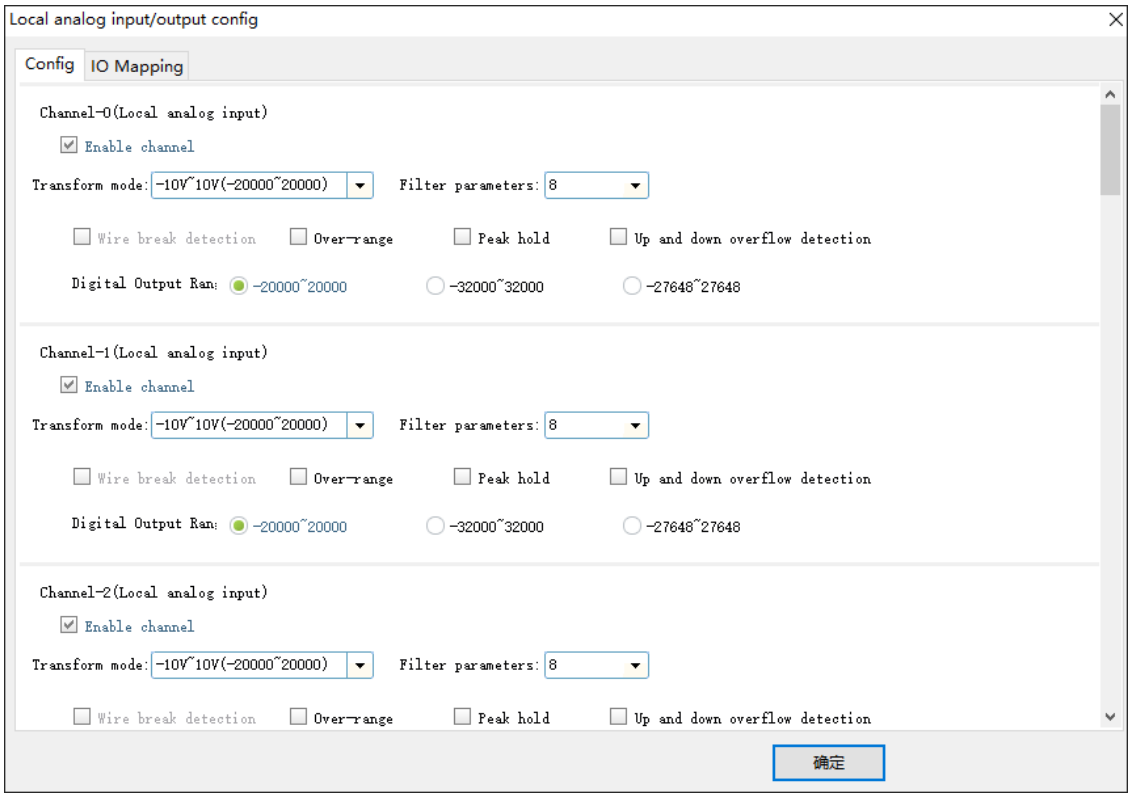
Procedure

The following describes the analog configuration steps using Easy321-1812TNX and Easy321-1812TPX as examples:

1. After creating a new analog model project, double-click "Configuration > Module Configuration" in the project management tree on the left to open the configuration interface.
2. Right-click the device diagram, and select "Local analog input/output config" in the pop-up dialog.



3. In the "Local analog input/output config" dialog box, configure the parameters for each channel in the "Configuration" tab, and click "OK" after completion.



All the parameters are shown in the following table.

Parameter	Description
Enable access	Check the checkbox to enable this channel. If the channel is not needed, clear the checkbox to save the scanning time. The checkbox is selected by default.
Transform mode	Select the corresponding span and resolution.
Filter parameters	Set the filter parameter, which ranges from 1 ms to 255 ms.
Wire break detection	An alarm is reported when no wire connection is detected. This function is supported on 4-20 mA inputs. It is not enabled by default.
Over-range	Select the checkbox to enable the function. An alarm is reported when the rated range is exceeded. The function is not enabled by default. (Except for the ranges 0V-10V, V-5V, 1V-5V, 0mA-20mA, and 4mA-20mA, a value less than -200 is treated as below the lower limit, and a value greater than 20000 is treated as above the upper limit.)
Peak hold	The maximum value currently collected will not be updated if the later value does not exceed the current value. This function is not enabled by default.
Up and down overflow	After this option is selected, an alarm is reported when temperature measurement range is exceeded. This option is not selected by default.
Digital output range	Sets the analog output range, which determines the range of the values output by this channel for conversion. The available options in the "Conversion Mode" drop-down list correspond to the ranges set by the "Digital output range".

The specifications of the analog range are shown in the table below.

Analog	Rated range	Rated digital value	Output limit range	Limited digital value
Analog voltage output	-10 V to +10 V	-20000 to +20000 -32000 to +32000 -27648 to +27648	-10.25 V to 10.25 V	-20500 to +20500 -32768 to +32767 -28340 to +28340
	0 V to +10 V	0 to +20000 0 to +32000 0 to +27648	-0.5 V to 10.25 V	-1000 to +20500 -1600 to +32767 -1382 to +28340
	-5 V to +5 V	-20000 to +20000 -32000 to +32000 -27648 to +27648	-5.5 V to +5.5 V	-22000 to +22000 -32768 to +32767 -30404 to +30404
	0 V to +5 V	0 to +20000 0 to +32000 0 to +27648	-0.25 V to +5.25 V	-1000 to +21000 -1600 to +32767 -1382 to +29030
	1 V to +5 V	0 to +20000 0 to +32000 0 to +27648	+0.8 V to +5.2 V	-1000 to +21000 -1600 to +32767 -1382 to +29030
Analog current output	0 mA to +20 mA	0 to +20000 0 to +32000 0 to +27648	0 mA to +21 mA	0 to +21000 0 to +32767 0 to +29030
	4 mA to +20 mA	0 to +20000 0 to +32000 0 to +27648	+3.2 mA to +20.8 mA	-1000 to +21000 -1600 to +32767 -1382 to +29030
Analogs voltage input	-10 V to +10 V	-20000 to +20000 -32000 to +32000 -27648 to +27648	-10.2 V to +10.2 V	-20400 to +20400 -32640 to +32640 -28200 to +28200
	0 V to +10 V	0 to +20000 0 to +32000 0 to +27648	-0.5 V to +10.2 V	-1000 to +20400 -1600 to +32640 -1382 to +28200
	-5 V to +5 V	-20000 to +20000 -32000 to +32000 -27648 to +27648	-5.1 V to +5.1 V	-20400 to +20400 -32640 to +32640 -28200 to +28200
	0 V to +5 V	0 to +20000 0 to +32000 0 to +27648	-0.25 V to +5.1 V	-1000 to +20400 -1600 to +32640 -1382 to +28200
	1 V to +5 V	0 to +20000 0 to +32000 0 to +27648	+0.8 V to +5.08 V	-1000 to +20400 -1600 to +32640 -1382 to +28200
Analog current input	-20 mA to +20 mA	-20000 to +20000 -32000 to +32000 -27648 to +27648	-20.4 mA to +20.4 mA	-20400 to +20400 -32640 to +32640 -28200 to +28200
	0 mA to +20 mA	0 to +20000 0 to +32000 0 to +27648	-1 mA to +20.4 mA	-1000 to +20400 -1600 to +32640 -1382 to +28200
	4 mA to +20 mA	0 to +20000 0 to +32000 0 to +27648	+3.2 mA to +20.32 mA	-1000 to +20400 -1600 to +32640 -1382 to +28200

7 Troubleshooting

7.1 Troubleshooting Overview

For more information, see the "Troubleshooting" section in H5U and Easy Series Programmable Logic Controller Programming Guide.

Troubleshooting is a method for locating problems. It helps users quickly identify why PLC program execution results deviate from expectations and find appropriate solutions based on the fault messages. The PLC integrates a fault diagnosis function. Detailed diagnostic information is provided through the hardware indicators and the fault diagnosis window of the programming software, allowing users to quickly locate the cause of a problem and resolve system faults efficiently.

This chapter describes the fault diagnosis function of the product in three parts: troubleshooting method, troubleshooting cases, fault classification, and fault codes.

7.2 Troubleshooting Method

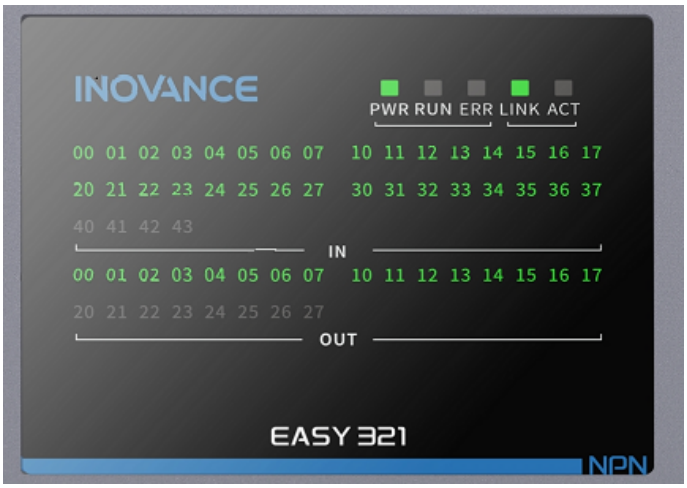
7.2.1 Introduction

The diagnostic information can be obtained through offline diagnosis with PLC signal indicators and online diagnosis with AutoShop software.

7.2.2 Offline Diagnosis with Signal Indicators

When the product is running in an operating environment and is not connected to AutoShop, you can determine the PLC status offline through the signal indicator on the product panel.





The following table describes the signal indicator definitions, status, and solutions.

Terminal type		Mark	Color	Description	Solution
Signal indicator	Power-on status indicator	PWR	Yellow-green	• Steady ON: Power supply OK • OFF: Power supply error	Used to check whether the power supply is normal.
	Operation status indicator	RUN	Yellow-green	• Steady ON: User program is running • OFF: User program stopped	Used to check whether the PLC operates properly.
	PLC system status indicators	ERR	Red	• OFF: No critical error • Flashing: The PLC is faulty and stops running.	If the ERR indicator flashes, use AutoShop online diagnosis to check the cause of the PLC error. For details, see "7.2.3 Online Diagnosis Through AutoShop" on page 109.
	Network port status indicator	LINK	Yellow-green	• Steady ON: Network connected successfully • OFF: Network not connected	Used to check whether the network port is connected properly.
	Network port status indicator	ACT	Yellow-green	• Flashing: Data transmission in progress on the built-in network port • Steady ON: No data transmission on the built-in network port	Used to check whether data transmission of the network port is normal.
I/O indicator		IN	Yellow-green	• Steady ON: Signal input generated by the terminal • OFF: No signal input generated from the terminal	Used to check whether the input terminal is active. If not, check whether the input common terminal is wired properly.
		OUT	Yellow-green	• Steady ON: Signal output generated by the terminal • OFF: No signal output generate from the terminal	Used to check whether the output terminal is active. If not, check whether the common output terminal is wired properly. Transistor models with a large number of points are equipped with the output short circuit protection function. When the indicator turns on but no output is generated, check whether the output terminal is short-circuited. After the short circuit fault is rectified, the terminal function can be restored after the 24 V power supply of the output terminal is powered on again.

Note

To restart the product upon a fault, turn off the power supply and disconnect the USB power supply cable, and wait for at least 10s before power on again.

7.2.3 Online Diagnosis Through AutoShop

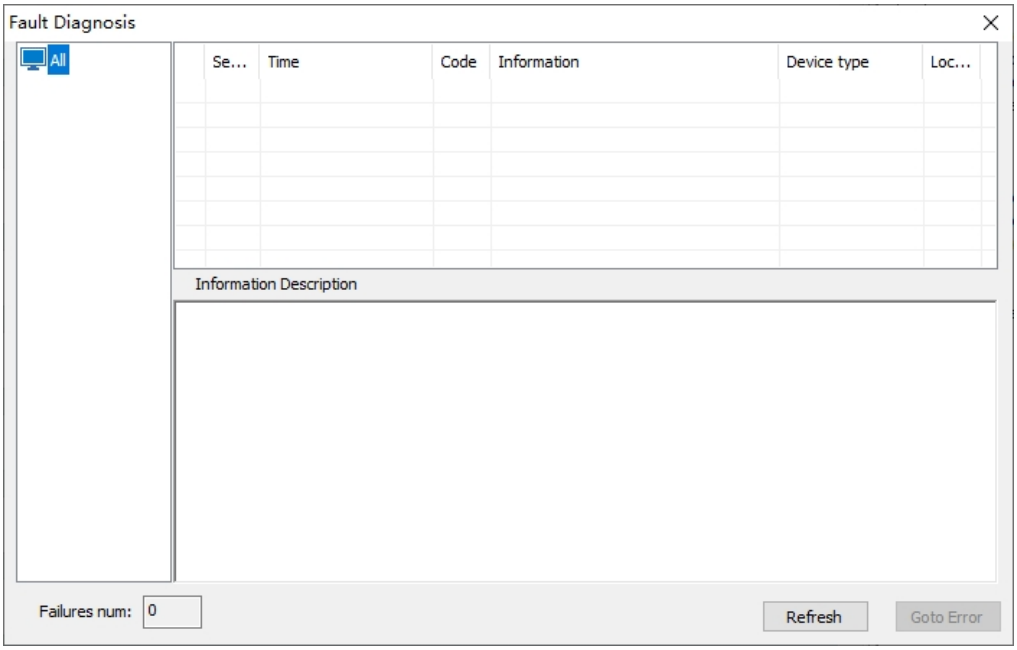
The integrated troubleshooting function of this product provides the fault source, detailed information, and solutions via AutoShop. This section introduces how to troubleshoot via AutoShop.

Prerequisites

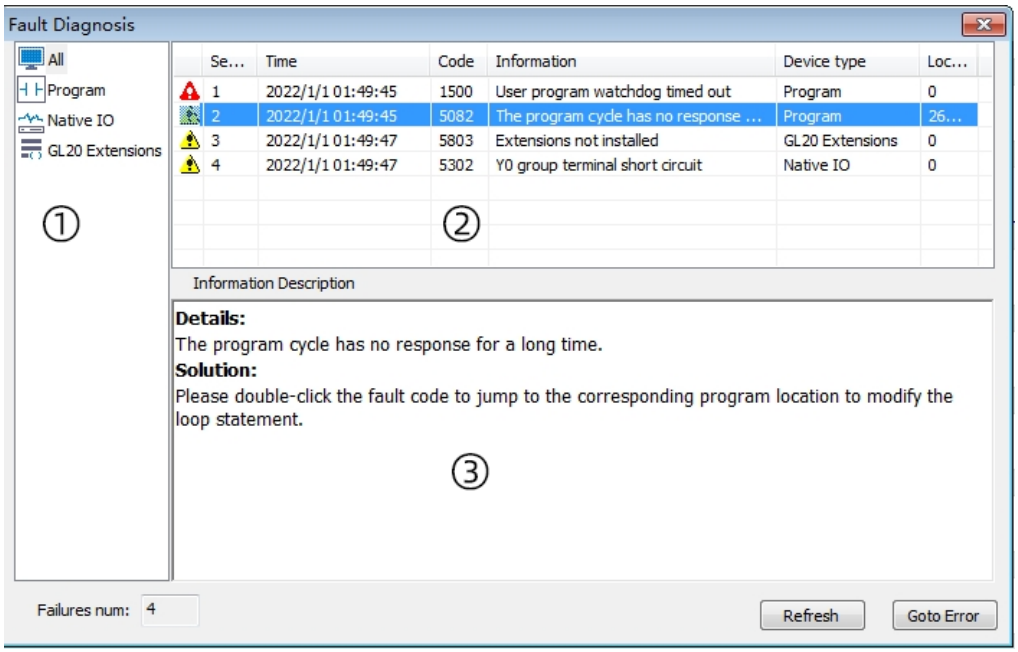
- The PLC has been connected to the PC that installed with AutoShop through a network cable or USB cable.
- This product is powered on and turned on.

Procedure

1. Open the AutoShop "Fault Diagnosis" window. There are two methods:
   - Method 1: Select "Debug > Fault Diagnosis" in the menu bar at the top of the AutoShop interface.
   - Method 2: Click the monitoring icon on the AutoShop toolbar to enter monitoring mode. The "Current status of PLC" indicator and the "Failure status" indicator are displayed at the bottom of the AutoShop interface PLC当前状态 故障状态.
     Double-click the fault indicator to open the "Fault Diagnosis" window. The following figure indicates that there are no faults.



2. Perform troubleshooting.



- You can filter the display of fault entries based on the device type through area ①.
- You can view the fault level, serial number, time, fault code, fault information, fault device type, and fault location through area ②.
  - There are two fault levels: The one is a red triangle fault, which causes the PLC to enter an error state and stop. The other one is a yellow triangle fault, which allows continued operation but must still be noted.
  - A fault code is a unique number that identifies a specific fault. For detailed fault codes, see the "Fault Codes" section in *H5U and Easy Series Programmable Logic Controller Programming Guide*.
  - The fault information indicates the fault cause.
  - The device type indicates the source of the fault.
  - Click "Go to Error" in the bottom right corner of the "Fault Diagnosis" window to jump to the corresponding location of the fault.
- You can click a specific fault entry to display the fault details and recommended solutions through area ③.

7.3 Troubleshooting Cases

The following takes the fault in *"7.2.3 Online Diagnosis Through AutoShop" on page 109* as an example for fault diagnosis.

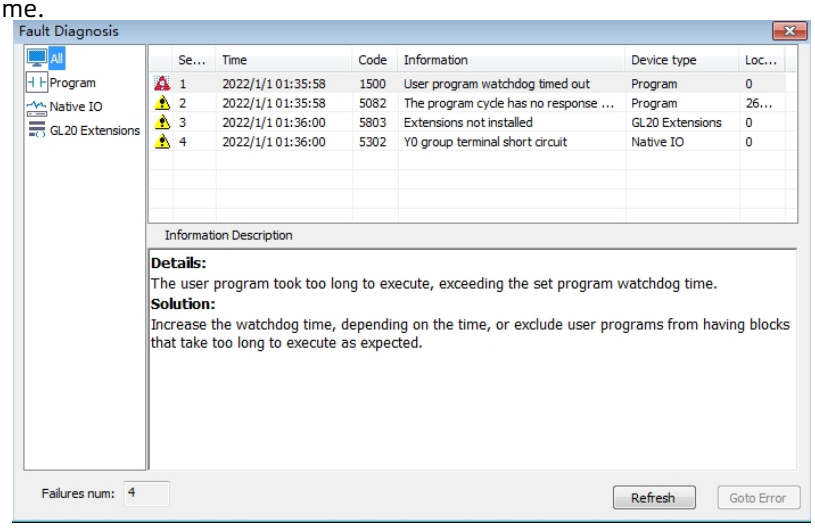
Prerequisites

- Watchdog time: 100 ms; fixed scanning cycle: 1 ms; 8-bit FOR loop written in the subprogram to make a watchdog timeout fault intentionally
- The module is configured with GL20-0808ETN, but the GL20-0808ETN module is not mounted.
- Make the Y0 terminal generate output through the program to short circuit the terminal intentionally.

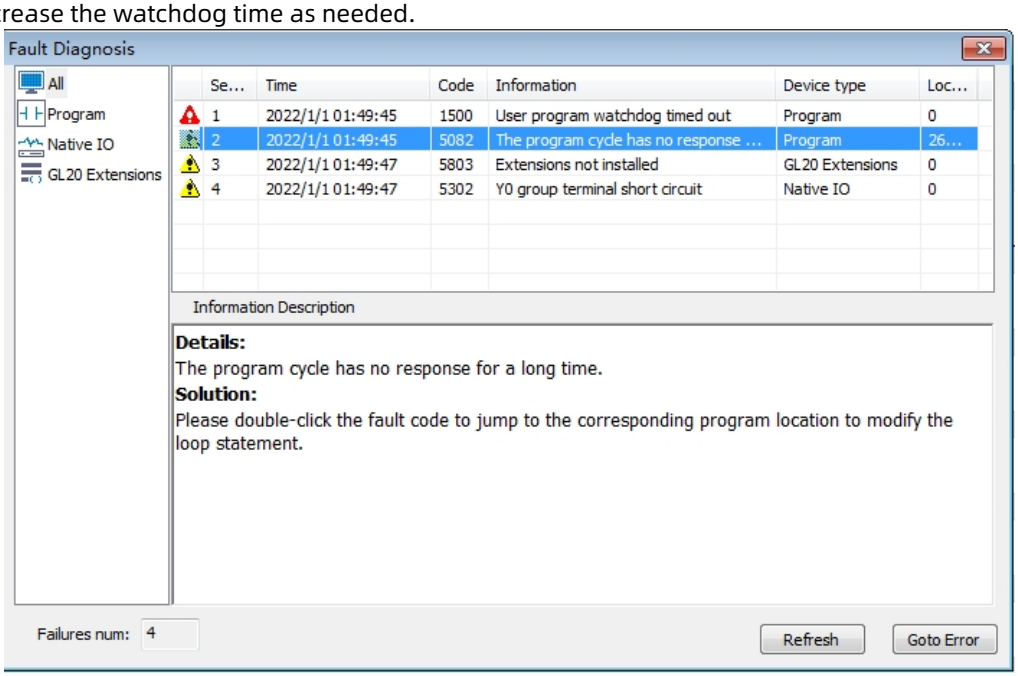
Troubleshooting procedure

1. Perform offline diagnosis through the signal indicator. The RUN indicator on the PLC panel is off and the ERR indicator flashes in red, which indicates the PLC stops due to an error, resulting in a serious fault.
2. Perform online diagnosis through AutoShop to determine the cause of the error. Use AutoShop to monitor the PLC and open the fault diagnosis page.

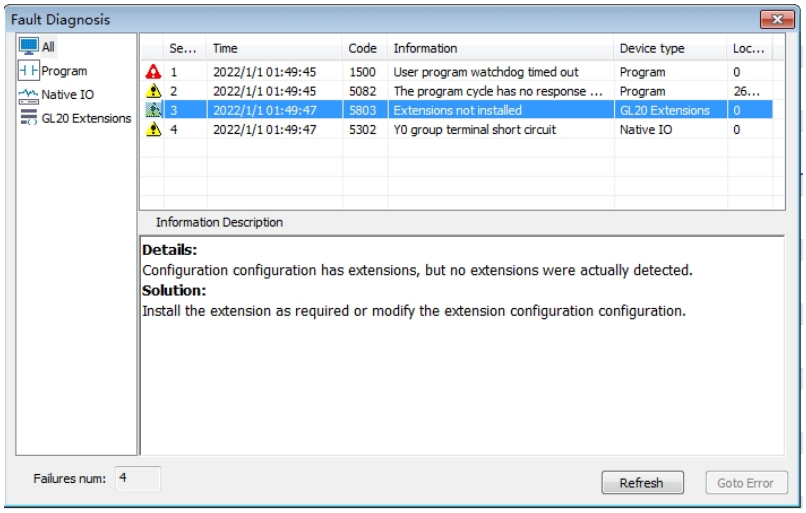
- The entry 1 indicates that the error is caused by a watchdog timeout fault of the user program. Increase the watchdog time or check whether the program has sections with excessive execution time.



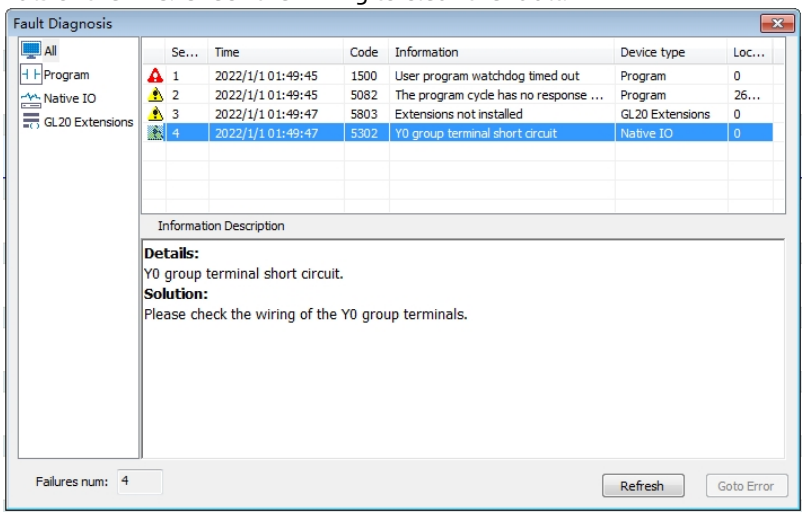
- The entry 2 shows that the program cycle has no response for a long time. Click the entry 2 and follow the recommended Solution to navigate to the error, where you can locate the 8-digit FOR loop that caused the watchdog timeout. In this case, you can optimize the program or increase the watchdog time as needed.



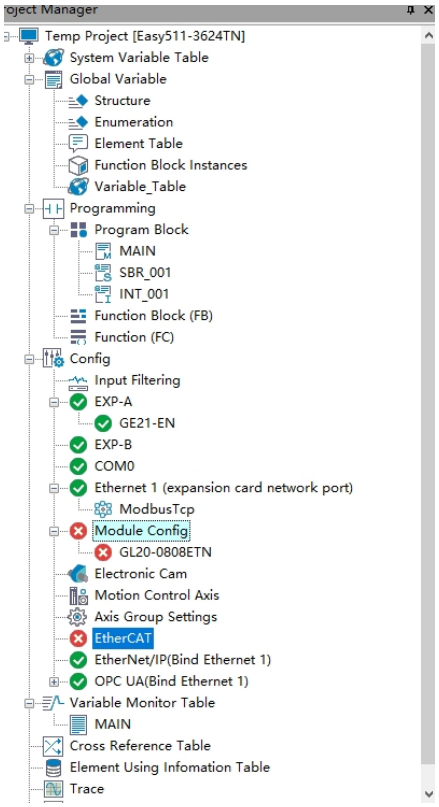
- The entry 3 indicates "Extensions not installed", but the user may have configured the expansion module in the project configuration.



- The entry 4 displays "Y0 group terminal short circuit", indicating a short circuit in the first eight output terminals of the PLC. Check the wiring to clear the fault.



You can find and rectify this fault by viewing the "Project Management" window in the monitoring state.



7.4 Fault Classification and Fault Codes

For a complete list of fault codes, see *H5U and Easy Series Programmable Logic Controller Programming Guide*.

The following table lists the newly added fault codes.

- **CPU fault codes**

Fault code	Error ID	Description	Solution
3010	After switching to ECT or ETH drive through the software, perform a restart to activate the switchover.	The ECT or ETH drive configured through the software does not match the drive actually operated by the board, resulting in PLC operation failure.	After a power cycle, click "Run" to activate the drive and run the PLC.
5902	Check whether network segment conflict exists between the network ports of the device. If a network segment conflict is detected, the local network port will be closed. Modify the network segment of the local network port.	The network segment is in conflict with others.	Modify the network segment of the local network port.

- **Local I/O fault codes**

Fault code	Error ID	Description	Solution
5302	The Yxx to Yzz terminals are short-circuited.	The Yxx to Yzz terminals are short-circuited.	Check the wiring of Yxx to Yzz terminals. (Each group contains 8 terminals that share one short-circuit alarm. For example, if a short-circuit fault occurs on terminals Y10–Y17, the corresponding group alarm will be triggered.)

- **Local analog input/output fault codes**

Fault code	Error ID	Description	Solution
10001	Failed to parse local analog configuration data	The format of the local analog configuration data does not meet the requirements and cannot be parsed correctly.	Use AutoShop to clear the compilation information, and recompile the program for download.
10002	Local analog module not powered	The local analog module requires an external power supply, but the detected voltage is below the required level.	Connect the external power supply correctly according to the product specifications.
10003	Local analog power supply overvoltage	The local analog module requires an external power supply, but the detected voltage is above the required level.	Connect the external power supply correctly according to the product specifications.
10004	Local analog power supply undervoltage	The local analog module requires an external power supply, but the detected voltage is below the required level.	Connect the external power supply correctly according to the product specifications.
10010	Local analog output DAC chip overtemperature	The DAC chip temperature is detected as too high, and may cause abnormal operation.	1 .Do not install the PLC in an environment where the temperature is without the specified range. 2 .The PLC has an internal fault. Replace it with a working PLC and return the faulty one to the factory for repair.
10011	Local analog output DAC chip hardware fault	The internal fault has been detected in the DAC chip, so the PLC cannot work properly.	Replace the PLC, and return the faulty PLC to the factory for repair.
10012	Local analog output not calibrated	The local analog output has not been calibrated. Accuracy may not meet specifications when outputting voltage or current.	If the accuracy does not meet your actual application requirements, replace the PLC with a calibrated one and return the faulty PLC to the factory for calibration.

Fault code	Error ID	Description	Solution
10020	Local analog channel output disconnected	• For the input channel, no input signal is connected to the input port, or the input signal is too weak to be detected or sampled. • For the current output channel, no load is connected to the output port, or the load impedance is too high, preventing normal current output.	• For the input channel, ensure that the signal of the input port is connected properly and reliably, and that the signal is valid. • For the current output channel, ensure that the load is connected properly and reliably, and that the load impedance is within the specified range of the module specification.
10021	Local analog channel output short circuit	For the voltage output channel, the output port may be short-circuited or the connected load impedance s too small, preventing normal voltage output.	For the voltage output channel, ensure that the load is connected properly and reliably, and that the load impedance is within the specified range of the module specification.
10030	Local analog input ADC configuration parameter fault	A fault has occurred in the local analog input ADC configuration parameters.	1 .Check whether the local analog power supply voltage is stable. 2 .Try to restart the PLC.
10031	Local analog input ADC chip overtemperature	The ADC chip temperature is detected as too high, and may cause abnormal operation.	1 .Do not install the PLC in an environment where the temperature is without the specified range. 2 .The PLC has an internal fault. Replace it with a working PLC and return the faulty one to the factory for repair.
10032	Local analog input ADC chip hardware fault	The internal fault has been detected in the ADC chip, so the PLC cannot work properly.	Replace the PLC, and return the faulty PLC to the factory for repair.
10033	Local analog input not calibrated	The local analog input has not been calibrated. Accuracy may not meet specifications during voltage or current sampling.	If the accuracy does not meet your actual application requirements, replace the PLC with a calibrated one and return the faulty PLC to the factory for calibration.
10040	Local analog input channel current input disconnected	• For the input channel, no signal is connected to the input port, or the input signal is too weak to be detected or sampled. • For the current output channel, no load is connected to the output port, or the load impedance is too high, preventing normal current output.	• For the input channel, ensure that the signal of the input port is connected properly and reliably, and that the signal is valid. • For the current output channel, ensure that the load is connected properly and reliably, and that the load impedance is within the specified range of the module specification.

Fault code	Error ID	Description	Solution
10042	Local analog input channel input above the upper limit	For the input channel, the input signal has exceeded the upper sampling threshold. At this time, the signal can be sampled normally but the accuracy cannot be guaranteed.	For the input channel, check the actual input signal value. • If the signal input to this channel has exceeded the set sampling range under normal working conditions, modify the sampling range as appropriate. • If the signal is abnormal, check the output device or instrument of the signal.
10043	Local analog input channel input below the lower limit	For the input channel, the input signal has fallen below the lower sampling threshold. At this time, the signal can be sampled normally but the accuracy cannot be guaranteed.	For the input channel, check the actual input signal value. • If the signal input to this channel has exceeded the set sampling range under normal working conditions, modify the sampling range as appropriate. • If the signal is abnormal, check the output device or instrument of the signal.
10044	Local analog input channel input overflow	For the input channel, the input signal has exceeded the upper sampling threshold. Sampling cannot be performed properly, and there is a possibility that the input port may be burned.	For the input channel, check the actual input signal value. • If the signal input to this channel has exceeded the set sampling range under normal working conditions, modify the sampling range as appropriate. • If the signal is abnormal, check the output device or instrument of the signal.
10045	Local analog input channel input underflow	For the input channel, the input signal has fallen below the lower sampling threshold, and sampling cannot be performed properly.	For the input channel, check the actual input signal value. • If the signal input to this channel has exceeded the set sampling range under normal working conditions, modify the sampling range as appropriate. • If the signal is abnormal, check the output device or instrument of the signal.

8 Maintenance

8.1 Cleaning and Routine Maintenance

8.1.1 Cleaning



Before cleaning, ensure that the power supply has been switched off. Do not use volatile solvents such as paint thinner, benzene, or chemical wipes for cleaning.

Clean the dirt with a piece of soft dry cloth during routine cleaning. For stubborn dirts that cannot be removed with the soft dry cloth, use a piece of cloth moistened with properly diluted cleaning agent (2% concentration), ensuring thorough wringing to achieve damp (not wet) condition prior to wiping.

8.1.2 Routine Maintenance

Preparation of tools

- Multimeter: used to measure voltage.
- Thermometer: used to measure temperature.
- Hygrometer: used to measure humidity.
- ESD cleaning cloth: used to wipe away dust or dirt.
- Phillips screwdriver: used to tighten screws and replace batteries.
- Slotted screwdriver: for terminal assembly/disassembly and wiring.

Routine maintenance items

Item	Inspection content	Criteria	Solution
Relay life	Has the service life been reached?	For details, see *"2.5.4 Output Specifications" on page 32* in the relay life curve in "Relay output specifications".	It is recommended to replace the relay near the end of its service life.
Power supply	Measure the power terminal block and check that the voltage change is within the allowed range.	• Transistor type: 24 VDC input, voltage range 21.6 VDC to 26.4 VDC • Relay type: 220 VAC input, voltage range 85 VAC to 264 VAC • Analog type: ▪ Voltage input range: ±10 V, 0 V to 10 V, ±5 V, 0 V to 5 V, 1 V to 5 V ▪ Current input range: ±20 mA, 0 mA to 20 mA, 4 mA to 20 mA	Use a multimeter to measure voltage across the terminals, and adjust the supply voltage to meet the specified range.
	Shared power supply with other devices	The power supply capacity shall be greater than the total power consumption of all devices	Use a separate power supply as shared power may cause power oscillation due to insufficient capacity.
Environmental inspection	Corrosive gas or flammable gas	Not allowed	If the environment does not meet the specifications, modifications must be made.
	Check whether the ambient temperature is proper (When the PLC is installed in a cabinet, the temperature within the cabinet is the ambient temperature).	• Temperature: ▪ Standalone: -20°C to +60°C ▪ Parallel: -20°C to +55°C • Humidity: <95% RH (at 30°C), without condensation	If the environment does not meet the specifications, modifications must be made.
	Direct sunlight	Not allowed	Provide a shelter.
	Dust, dirt, salt, or iron filings	Not allowed	Remove them and provide a shelter.
	Droplets of water, oil, or chemicals	Not allowed	Remove them and provide a shelter.
	Vibration or shock to the controller	The vibration and shock resistance should meet relevant requirements.	Install cushioning materials for vibration and shock resistance.
	Interference sources	Not allowed	Keep the controller away from any interference sources or take shielding measures.

Item	Inspection content	Criteria	Solution
Installation and wiring inspection	Check that cable connectors are fully inserted and locked.	Looseness is not allowed.	Fully insert the connector and lock it with screws.
	External crimp terminals too close to each other	Ensure a proper distance between terminals.	Check the distance visually and correct any improper distance.
	Check that external wiring screws are securely fastened.	Looseness is not allowed.	Use a Phillips screwdriver to tighten the screws.
	Broken external cables	No visible damage.	Check cables visually and replace broken cables (if any).
	Check whether the PLC rail lock is securely fastened to the DIN rail.	The PLC and guide rail are installed securely.	Connect the PLC to the DIN rail securely.
PE grounding and shielding inspection	Check if the PE grounding is secure.	The screws for PE grounding are secure with no looseness.	Tighten the screws for PE grounding.
	Check the PE grounding cable conductor for any damage.	The PE grounding cable conductor layer is undamaged.	Replace the PE grounding cable.
	Check if there is any rust or oxidation at the PE grounding point.	No rust or oxidation at the PE grounding point.	Remove rust or oxidation from the PE grounding point.
	Check the shielding layer of the shielded cable for any damage, corrosion, or oxidation.	No damage, corrosion, or oxidation for the shielding layer of the shielded cable.	Replace the shielded cable.
	Check if the shielding layer of the shielded cable is reliably connected.	Ensure reliable connection of the shielding layer of the shielded cable.	Securely connect the shielding layer of the shielded cable.

8.2 Part Replacement

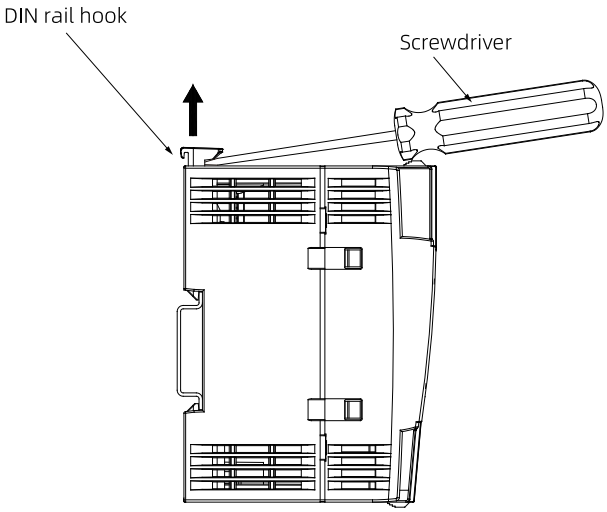
8.2.1 Replacing the PLC

Prerequisites

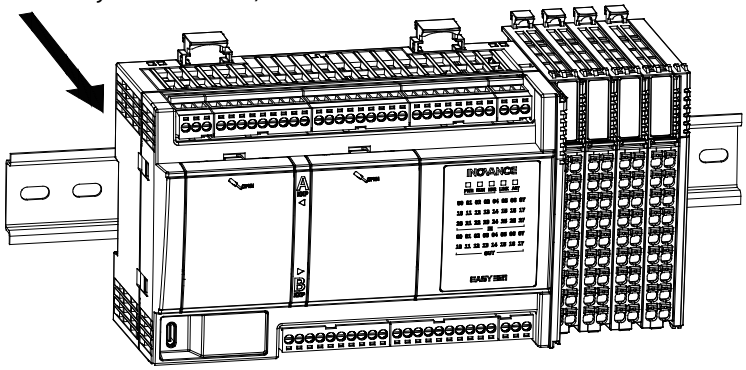
- The PLC has been powered off.
- Prepare a straight screwdriver or similar tool.

Procedure

1. Use a flat screwdriver or similar tool to pry up the snap-fit joint of the DIN rail and remove the old product, as shown below.



2. Pull the old product away from the rail, as shown below.



3. Install a new PLC. For details, see *"3.3.2 Product Installation" on page 50*.

8.2.2 Replace the Expansion Card

For details on replacing the expansion card, see section 2.3 Installation Instructions in the following user guides.

- GE21-CAN-485 Communication Expansion Card User Guide
- GE21-RTU Coupler Configuration Card User Guide
- GE21-TF-RTC Memory Expansion Card (Integrated with RTC) User Guide
- GE21-4AD1DA-I Analog Input and Output Current-Type Expansion Card User Guide
- GE21-8DI Digital Input Expansion Card User Guide
- GE21-8DO-TN Sink-Type Transistor Output Expansion Card User Guide
- GE21-232/485-RTC Communication Expansion Card User Guide
- GE21-8DO-TP Source-Type Transistor Output Expansion Card User Guide
- GE21-4AD1DA-V Analog Input and Output Voltage-Type Expansion Card User Guide
- GE21-232/485 Communication Expansion Card User Guide

8.2.3 Replacing the Expansion Module

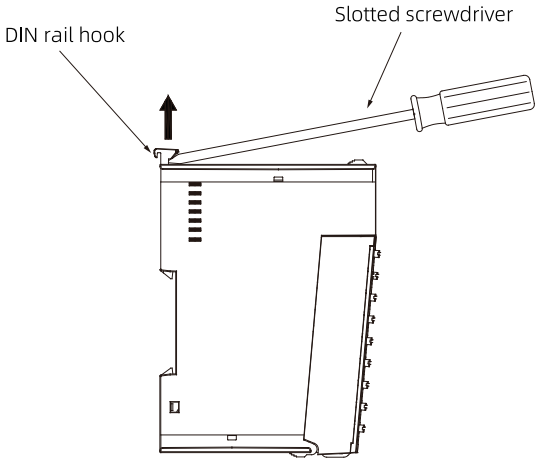
Prerequisites

- The module has been powered off.

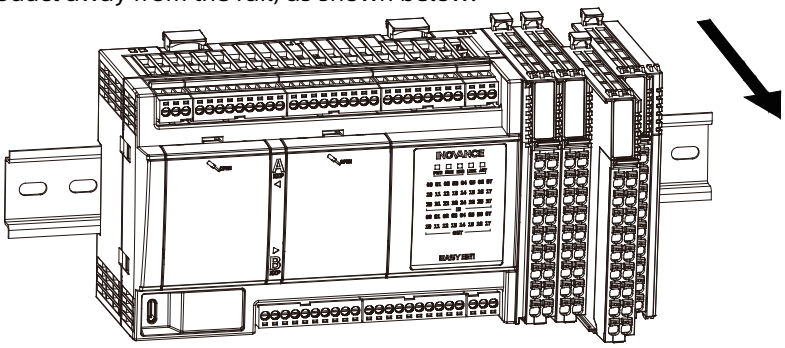
- Prepare a straight screwdriver or similar tool.

Procedure

1. Use a flat screwdriver or similar tool to pry up the snap-fit joint of the DIN rail and remove the old product, as shown below.



2. Pull the old product away from the rail, as shown below.



3. Install a new module. For detailed information, see *"3.3.4 Installing the Expansion Module" on page 52*.

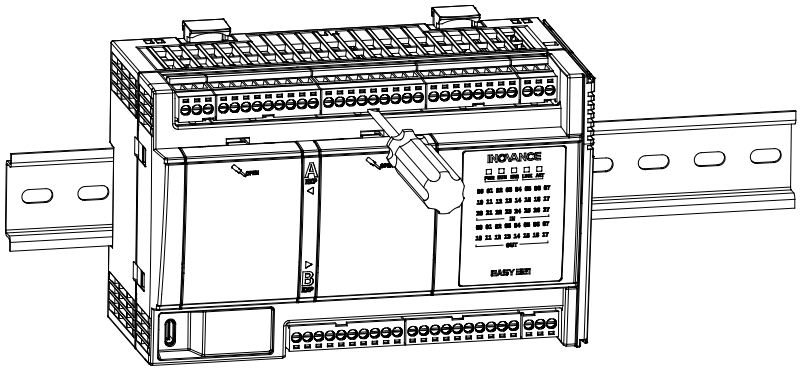
8.2.4 Replacing the Terminal

Prerequisites

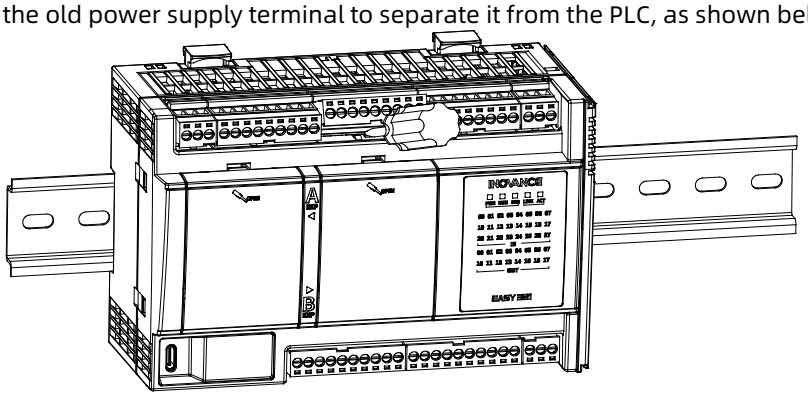
- The PLC has been powered off.
- Prepare a straight screwdriver or similar tool.

Procedure

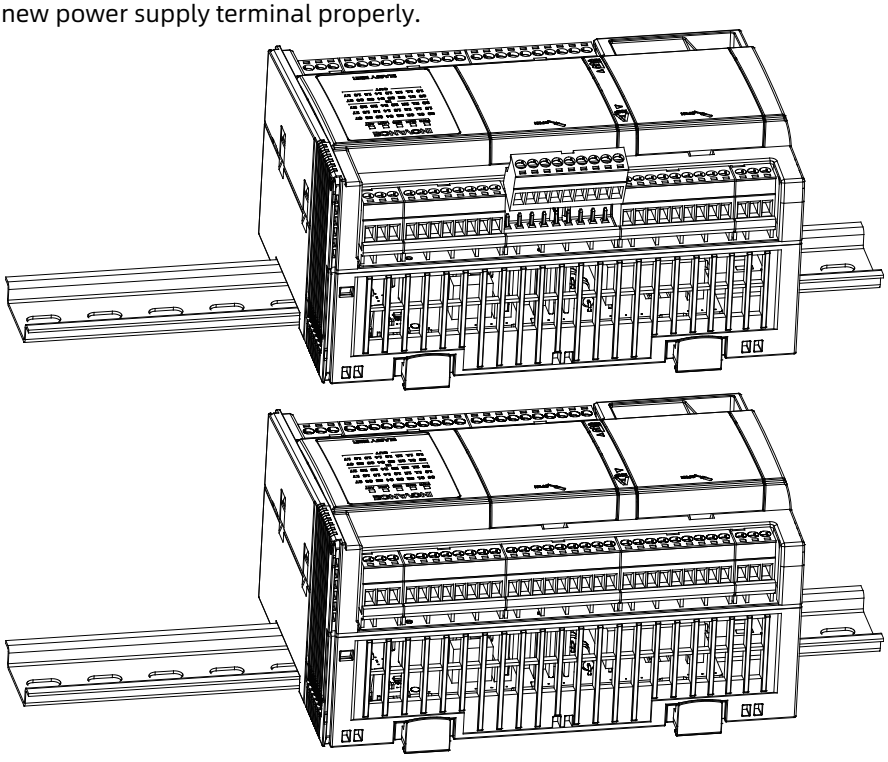
1. Insert a slotted screwdriver down into the slot.



2. Gently pry up the old power supply terminal to separate it from the PLC, as shown below.



3. Insert the new power supply terminal properly.



8.2.5 Replacing the Backup Battery

For details, see the "Appendix: Replacing the Backup Battery" section in the "GE21-TF-RTC Memory Expansion Card (Integrated with RTC) User Guide".

8.3 Software Maintenance

8.3.1 Micro SD Card Firmware Programming

Prerequisites

- Prepare a Micro SD card with file system FAT32 and capacity lower than or equal to 32 G.
- Power off the PLC.



The original applications are deleted after the firmware is done programming.

Procedure

1. Load the Micro SD card to the GE21-TF-RTC expansion card and mount the GE21-TF-RTC expansion card to the PLC.
2. Power on the PLC again.
   a. The RUN indicator and ERR indicator on the PLC flash for three seconds, indicating that firmware programming starts.
   b. When the RUN and ERR indicators are steady ON, the firmware is being programmed.
   c. When the RUN and ERR indicators start flashing slowly, the firmware is done programming.
3. After firmware programming is done, power off the PLC and remove the GE21-TF-RTC expansion card.
4. Power on the PLC again.

8.3.2 Micro SD Card User Program Download

Prerequisites

- Prepare a Micro SD card with file system FAT32 and capacity lower than or equal to 32 G.
- Power off the PLC.

Procedure

1. Generate a "Down/Updown" file using AutoShop. For details, see the "Applying the Function of Download File Generation" section in H5U and Easy Series Programmable Logic Controller Programming Guide.
2. Create a "PLCProgram" directory in the root directory of the Micro SD card and copy the "Down/Updown" file to the "PLCProgram" directory.
3. Load the Micro SD card to the GE21-TF-RTC expansion card and install the expansion card to the PLC.
4. Power on the PLC again and download the user program in the Micro SD card to the PLC. The RUN indicator flashes quickly at a frequency of 4 Hz during downloading.
5. After the user program is downloaded, the RUN indicator flashes slowly at a frequency of 1 Hz and the PLC enters the "STOP" state. You can remove the GE21-TF-RTC expansion card now.

If the ERR indicator flashes slowly, the download fails. Check whether the downloaded file is applicable to the PLC model and whether the login password of the downloaded file is the same as that of the PLC. If the model and password are both correct but the download still fails, contact Inovance for technical support.

6. Power off and on the PLC again.

8.4 Maintenance

Unauthorized maintenance or disassembly of this product is inhibited. All liabilities arising from such unauthorized interventions shall be solely borne by the operator.

For maintenance upon fault, contact Inovance service personnel to deliver the faulty product to the designated address.

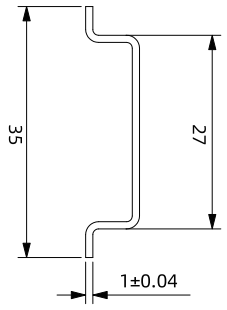
Requirements before product repair:

- The fault symptoms are described clearly.
- Make sure whether the accessories need to be replaced. If yes, contact Inovance service personnel.

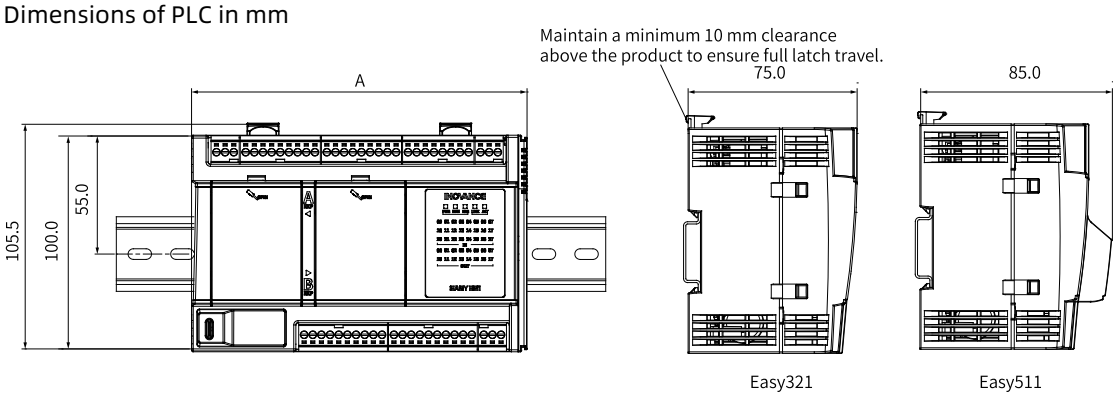
9 Appendix

9.1 Appendix 1: Dimension Diagram

- Dimensions of DIN rail in mm

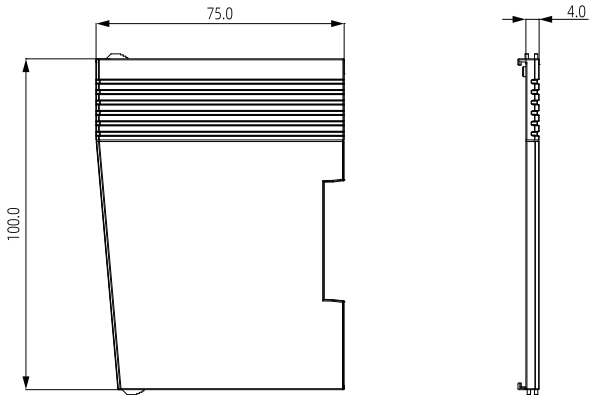


- Dimensions of PLC in mm

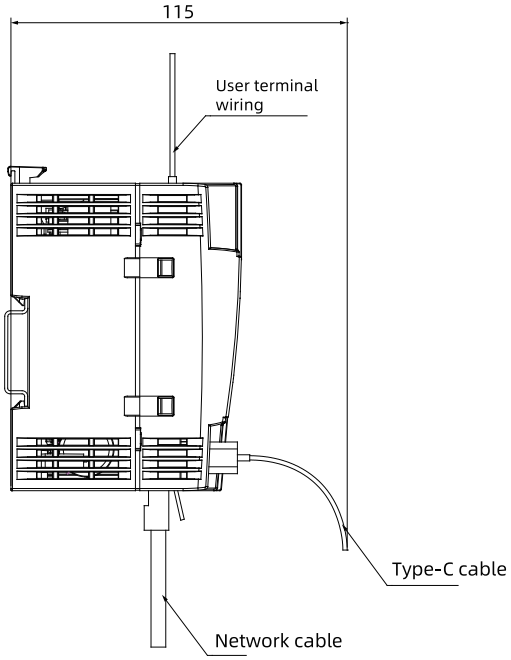


Model	Width A/mm
Easy321-3624ER	205
Easy321-3624TP	205
Easy321-3624TN	205
Easy511-3624TP	205
Easy511-3624TN	205
Easy321-2416ER	155
Easy321-2416TP	155
Easy321-2416TN	155
Easy511-2416TP	155
Easy511-2416TN	155
Easy321-1812ERX	155
Easy321-1812TNX	155
Easy321-1812TPX	155
Easy511-1812TNX	155

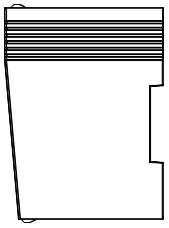
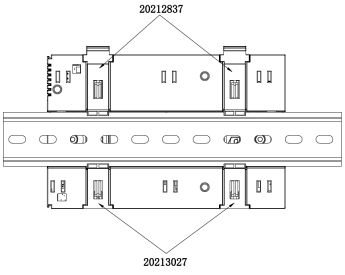
- Dimensions of the rear cover in mm

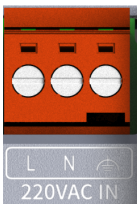
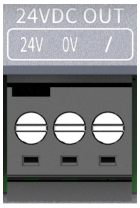
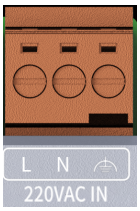
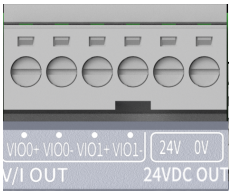
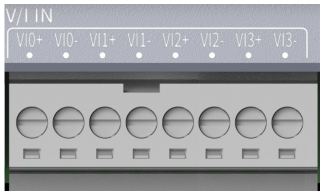


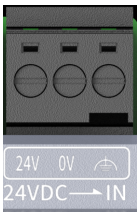
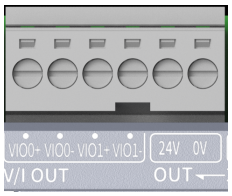
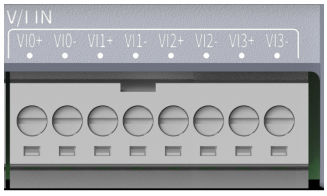
- Dimensions of cables in mm



9.2 Appendix 2: Spare Parts

Name	Diagram	Code
End Cover		20215208
Snap-fit joints of the DIN rail		20213027 20212837

Name		Diagram	Code
60-point and 40-point models	Relay model input power terminals		15212449
	Transistor model input power terminals		15212449
	24 V power output terminal		15212449
30XP relay model	Input power supply terminal		15212772
	Analog output and 24 V power output terminals		15212790
	Analog input terminal		15212770

Name		Diagram	Code
30XP transistor model	Input power supply terminal		15212774
	Analog output and 24 V power output terminals		15212790
	Analog input terminal		15212770
RS485 terminal			15212449

9.3 Appendix 3: Applicable Products

GE21 expansion card

Model	Description	Slot supported	Product code	Applicable model
GE21-CAN-485	GE21 series CAN and RS485 communication card	A	01480073	Easy321 products
GE21-232/485-RTC	GE21 series RS232 or RS485 communication card (integrated RTC)	B	01480072	Easy321, Easy511 products
GE21-232/485	GE21 series 232 or 485 communication card	A/B	01480146	Easy321, Easy511 products
GE21-TF-RTC	GE21 series TF card (Integrated RTC)	B	01480074	Easy321, Easy511 products
GE21-RTU	GE21 series coupler configuration card	B	01480069	Easy321, Easy511 products
GE21-4AD1DA-I	GE21 series expansion card with four analog inputs and one analog output (current type)	A/B	01480070	Easy321, Easy511 products
GE21-4AD1DA-V	GE21 series expansion card with four analog inputs and one analog output (voltage type)	A/B	01480071	Easy321, Easy511 products
GE21-8DI	GE21 series 8-channel digital input card	A/B	01480088	Easy321, Easy511 products

Model	Description	Slot supported	Product code	Applicable model
GE21-8DO-TN	GE21 series 8-channel digital sink-type transistor output card	A/B	01480090	Easy321, Easy511 products
GE21-8DO-TP	GE21 series 8-channel digital source-type transistor output card	A/B	01480089	Easy321, Easy511 products

GL20 expansion module

Module	Model	Description	Product code	Power consumption
Digital	GL20-0016ETP	16-channel digital transistor PNP output module	01440292	100 mA
	GL20-1600END	16-channel digital input module (NPN/PNP)	01440291	120 mA
	GL20-0016ETN	16-channel digital transistor NPN output module	01440293	145 mA
	GL20-0800END	8-channel digital input module	01440381	105 mA
	GL20-0008ETP	8-channel digital transistor PNP output module	01440380	80 mA
	GL20-0008ETN	8-channel digital transistor NPN output module	01440379	115 mA
	GL20-0808ETN	Digital hybrid module with 8 inputs and 8 outputs	01440339	130 mA
	GL20-0008ER	8-channel relay output module	01440334	110 mA
	GL20-3200END	32-channel digital transistor input module	01440466	85 mA
	GL20-0032ETN	32-channel digital transistor NPN output module	01440467	80 mA
	GL20-0404ETP-5V	4-channel digital transistor PNP output module	01440506	90 mA
	GL20-3232ETN-M	32-point digital input and 32-point transistor NPN output module (cables XA3210A-40-L0.5M-01 and T024-K required)	01440290	250 mA
Analog	GL20-4AD	4-channel analog input module (sampling cycle 1 ms/channel)	01440288	95 mA
	GL20-4DA	4-channel analog output module	01440287	70 mA
	GL20-8ADV	8-channel analog input module - voltage type	01440482	65 mA
	GL20-8ADI	8-channel analog input module - current type	01440489	65 mA
Temperature measurement	GL20-4PT	4-channel resistance temperature detector module	01440337	95 mA
	GL20-4TC	4-channel thermocouple module	01440338	95 mA
Process module	GL20-2SSI	2-channel encoder input module (SSI protocol)	01440445	115 mA
Power supply module	GL20-PS2	Relay power supply module	01440351	55 mA
Communication module	GL20-2S485	2-channel RS485 expansion module (Inovance PLC supported only)	01440456	155 mA
	GL20-2SCOM	2-channel RS232/RS485/RS422 communication module (Inovance PLC supported only)	01440463	170 mA

Term

DC

DC (Distributed Clock) is a clock synchronization mode of the EtherCAT bus that is used to ensure clock synchronization of all devices in the network. Each slave device has a local clock, which is calibrated through the synchronization signal sent by the master to ensure that all EtherCAT devices in the entire system are running under a common clock, thus controlling the synchronization execution of each device task.

SM

SM (SyncManager) is a clock synchronization mode on the EtherCAT bus that ensures clock synchronization of all devices in the network. The synchronization mode is triggered by SYNC events to ensure that all devices perform data processing and update at the same time, thus controlling the synchronization execution of tasks of each device.

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel 1: Pay attention to Inovance Technology Services WeChat public number. Click Smart Customer Service to enjoy 7 x 24-hour product support services, including function application consulting. Troubleshooting instructions, obtaining manual materials, etc.



- Channel 2: Call the national unified service hotline: 4000-300124. Service hours: Monday to Saturday, 8:30 to 12:00 and 13:30 to 17:30.
- Channel 3: Visit Inovance website (www.inovance.com) to enjoy downloading materials, pre-sales consulting, and after-sales support. Service such as return repair application and authentication.
- Channel 4: For equipment installation and commissioning, warranty fault handling, factory-based co-production, and spare parts purchase, For maintenance and other services, you can visit the Inovance app-service store on Palm Beach to place orders (download link:*https://zshc.inovance.com/download*or download the experience to the mobile app market/app store).

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

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