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PS00006444A11

Easy Series
Programmable Logic Controller

User Guide

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Legal Information

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■ Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

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.

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

WARNING

- 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.

Caution

- 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.

Storage and transportation

Caution

- Handle the equipment with care and mind your step 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

- Design a safety circuit and add an error handling program in the software to ensure the product remains in a safe state upon external power failure or product faults.
- 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

Design

- When an output unit such as a relay or transistor in the equipment is damaged, the output may become uncontrollable and remain ON or OFF for a long period.
- The equipment design must comply with the overvoltage category requirements specified in the environmental specifications. The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the power supply input terminals, signal input terminals, or output terminals, to prevent equipment damage.
- 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.



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



The equipment must be installed by professionals who have received the electrical trainings and have sufficient electrical knowledge. Non-professionals must not operate this equipment.



Installation

- 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 will 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 can result in equipment overtemperature or fire accidents.
- 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.

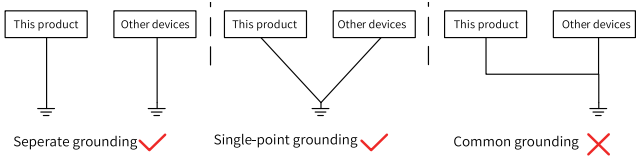


- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation 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

- The equipment must be installed by professionals who have received the electrical trainings and have sufficient electrical knowledge. 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 can 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

Wiring

- 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.



- 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



- The equipment must be installed by professionals who have received the electrical trainings and have sufficient electrical knowledge. 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.



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 protection measures to 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.
- If a button battery is swallowed by accident, seek medical treatment immediately. Failure to comply may result in severe internal burns within two hours, which may cause death.

Caution

- Keep the batteries away from 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.

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 labels

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 labels	Description
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply may 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 product 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 products and solutions to enhance safety. It is strongly recommended that you update the product promptly and always use the latest version.



Malware (such as viruses, Trojans, and worms) can bring the device into an unsafe operating state, resulting in death, serious injury, and property damage. Observe the following precautions:

- Always use the latest software version. If the product version is no longer supported or the latest version is not used, you will be exposed to increased risk of cyber attacks.
- Develop and maintain appropriate protective measures (including but not limited to antivirus software, firewalls, WAF, IPS/IDS, situational awareness system, identity authentication, and data encryption) to prevent the files in mobile storage devices from being damaged by malware, and to protect the products, networks, systems, and interfaces from unauthorized access, tampering, hacking, data leakage, or information theft.
- Check all safety-related interfaces and settings after commissioning.

2 Easy301 Programmable Logic Controller

User Guide

2.1 Preface

■ Introduction

This product is a new generation of small, ultra-thin PLC product independently developed by Inovance. It supports RS485 and RS232 communication, enabling multi-level network communication through the RS485 and RS232 interfaces. It also supports process encapsulation and reuse via FB (Function Block) and FC (Function) functions. Up to 8 expansion modules can be added. For supported module types, see the "Local Expansion Modules" section in the H5U and Easy Series Programmable Logic Controller Programming Guide.

This guide describes installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ 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

■ More documents

Document	Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Provides product information, installation and wiring, programming examples and for GE20 series expansion card.
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
Easy301 Programmable Logic Controller User Guide (this guide)	PS00006239	Introduces the installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ Revision history

Date	Version	Description
August 2026	A11	Added information on compatible I/O modules and updated the unit of program capacity in the technical specifications.
May 2026	A10	Updated the instruction execution time in *"2.2.3.1 General Specifications" on page 23*.
January 2026	A09	Updated effect diagrams and product codes.
September 2025	A08	Made minor corrections.
March 2025	A07	Updated the input and output terminal wiring diagram in *"2.4.2 Terminal Wiring" on page 37*.
January 2025	A06	Made minor corrections.

Date	Version	Description
July 2024	A05	**Addition** • Added input and output terminal wiring diagram in *"2.4.2 Terminal Wiring" on page 37*.
		Revision • Updated the caution note for restart in *"2.2.2 Components" on page 20*. • Updated the program data capacity in *"2.2.3.1 General Specifications" on page 23*. • Updated the number of axes supported in *"2.2.3.1 General Specifications" on page 23*. • Updated the rated bus input current of the GL20-3232ETN-M expansion module in *"2.2.3.2 Power Supply Specifications" on page 24*.
March 2024	A04	**Addition** • Added the Easy301 series programmable controller model and the GL20 series expansion module models in *" Appendix" on page 45*.
		Revision • Updated the descriptions of operation state indicators in *"2.2.2 Components" on page 20*. • Updated the power supply specifications in *"2.2.3.2 Power Supply Specifications" on page 24*. • Updated overcurrent protection device specifications in *"2.3.1 Installation Environment" on page 27*.
February 2024	A03	Made minor corrections.
March 2023	A02	Updated DIN rail mounting hook diagram and product specifications.
October 2022	A01	Made minor corrections.
August 2022	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*, 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 disclaimer

The warranty period of the product is 18 months as of the date of manufacture (refer to the barcode on the equipment). If otherwise agreed upon, the agreed terms and conditions shall prevail. Maintenance will be charged out of the 18-month warranty period.

Even within the 18-month warranty period, maintenance will be charged for the following damage:

- Damage caused by operations not following the instructions in the user 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.

2.2 Product Information

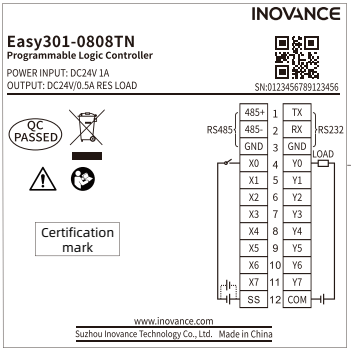
2.2.1 Model and Nameplate

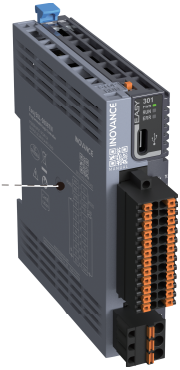
■ Model description

Easy ① 301 ② – 0808 ③ TN ④

① **Product series** Easy: Easy series programmable logic controller	③ **Number of inputs/outputs** • 08: 8 inputs • 08: 8 outputs
② **Series** • 3: 300 series platform • 0: No Ethernet • 1: Model serial number	④ **Output type** TN: Sink-type transistor

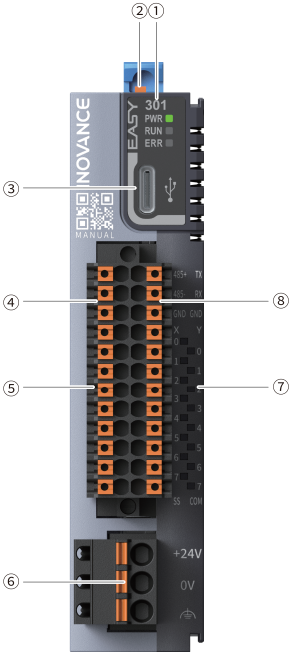
■ Nameplate description





Model	Description	Code
Easy301-0808TN-INT	Easy300 series 8-input 8-output programmable controller	01441153

2.2.2 Components



No.	Type	Mark	Definition	Indicator Color	Description
①	Operation status indicator	PWR	Power supply	Yellow-green	• Steady ON: Power supply normal • OFF: Power supply off or abnormal
		RUN	Normal running	Yellow-green	• Steady ON: User program running • OFF: User program stopped
		ERR	Running error	Red	• OFF: No major error • Blinking[1]: Major error occurred
②	DIP switch	RUN/ STOP	Run/Stop control	-	-
③	Type-C port		Communication with PC	-	-
④	RS485	485+	Positive of RS485 communication signal	-	-
		485–	Negative of RS485 communication signal	-	-
		GND[2]	RS485 communication ground	-	-
⑤	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"2.4.1 Terminal Layout" on page 36*

No.	Type	Mark	Definition	Indicator Color	Description
⑥	Power supply port	+24V	24 VDC power supply positive	-	-
		0V	24 VDC power supply negative	-	-
			Function grounding[2]	-	-
⑦	I/O indicator	X/Y	I/O status	Yellow-green	• Steady ON: Input or output active • OFF: Input or output inactive
⑧	RS232	TX	RS232 signal transmission	-	-
		RX	RS232 signal reception	-	-
		GND[2]	RS232 communica-tion ground	-	-



- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: Do not connect the PE cable to the GND terminal.
- The EtherCAT communication cable model is the same as the servo communication cable model, such as S6-L-T04-3.0.

2.2.3 Product Specifications

2.2.3.1 General Specifications

Item		Specification
Program data capacity		• 128K steps of user program • User-defined variables: 1 MB, 128 KB of which is retentive at power failure • Soft elements: approx. 150 KB. Soft elements with addresses 1000 and above are retentive during power loss. However, they are not retentive when the PLC is powered only by USB.
Instruction execution time	Bit operation	0.09 μs
	Integer operation	0.338 μs
	Floating-point operation (double precision)	0.779 μs
Ethernet		-
Communication via EtherCAT		-
Number of axes		Support up to four axes (local pulse axes: up to 4; virtual axes: up to 16).
Serial communication		Support up to two channels (one channel of RS485 communication and one channel of RS232 communication in the main unit).
CAN communication		-
High-speed input		Single-phase: 8-channel at 200 kHz
High-speed output		Four axes at 200 kHz; PWM pulse width modulation supported
Expansion module		Supports up to 8 local expansion modules
Expansion card		-
Programming language		LD, ST, SFC, and FB/FC function (LD)

Item	Specification
Type-C	• Supports upload and download of user programs and firmware upgrade • USB cable communication distance: 3 m
IP rating	IP20
Dimensions (W x H x D)	24 mm x 100 mm x 83 mm
Weight	Approx. 135 g

2.2.3.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 V)
Rated bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power supply [1]	1 A (typical@5 V)
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

Note

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (⩽ 1 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most four such modules can be connected to the Easy series programmable logic controller (1 A/250 mA = 4).

2.2.3.3 Input Specifications

Item		Specification
Input type		Digital input
Number of input channels		8
Input mode		Sink/Source
Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed input (X0 to X7)	Input current when input is ON	Input current > 4 mA
	Input current when input is OFF	Input current < 2.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	200 kHz
	Input impedance	2.7 kΩ
ON voltage		⩾ 15 VDC
OFF voltage		⩽ 5 VDC
Software filter time		• Low-speed: 2 ms to 1000 ms • High-speed: 2 μs to 1000 μs
Isolation mode		Capacitive isolation for integrated chip
Common terminal mode		8-point/common terminal (positive/ negative polarity of input power being changeable)
Input action display		The input indicator lights up (controlled by software) when the input is in drive state.

2.2.3.4 Output Specifications

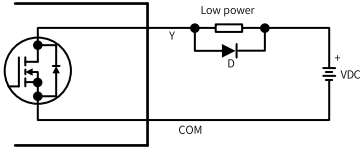
Item	Specification
Output type	NPN transistor output
Number of output channels	8
Output voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specification
High-speed output (Y0 to Y3)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point; 18 W/8 points
	Hardware response time ON/OFF	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	Resistive load: 200 kHz; inductive load: 0.5 Hz; lamp load: 10 Hz
Common output (Y4 to Y7)	Output load (resistive load)	0.5 A/point, 1 A/common terminal
	Output load (inductive load)	6 W/24 VDC (in total)
	Output load (lamp load)	1 W/24 VDC (in total)
	Hardware response time ON/OFF	< 100 μs (OFF→ON, ON→OFF)
	Load current requirements	⩾ 5 mA
	Maximum output frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
PWM output (Y0 to Y3)		Maximum frequency: 200 kHz; minimum pulse width: 2.5 μs; minimum resolution: 2.5 μs; adjustable duty cycle [1]: 0.01% to 99.99%
Leakage current upon OFF		< 30 μA at 24 V
Maximum residual voltage upon ON		< 0.5 VDC
Isolation method		Optocoupler and digital isolator
Common terminal mode		Eight input ports share a common terminal (polarity of output power supply being negative)
Short circuit protection		Protection against short circuit of each channel, recovered after power-off

Item	Specification
External inductive load protection	A flywheel diode [2] is required when an external inductive load is connected.
Output indicator	The output indicator turns on (controlled by software) when the output is in drive state.

[1]: The duty cycle setting is frequency dependent and the pulse width corresponding to the duty cycle must not be less than the minimum pulse width.

[2]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.



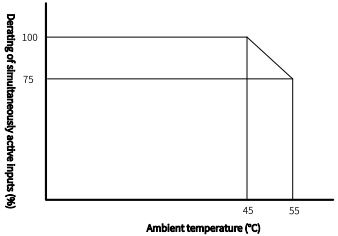
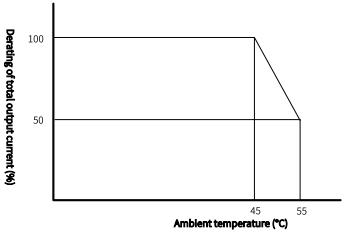
2.3 Mechanical Installation

2.3.1 Installation Environment

When installing the PLC on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specification
Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m (80 kPa)
Pollution degree	PD2
Noise immunity	2 kV on power cable (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV

Item	Specification
Vibration resistance	• Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axes. • Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g^2/Hz; 200 Hz, 0.001 g^2/Hz, G_{rms} of 1.14 g, 30 min each in X, Y and Z directions.
Shock resistance	Application scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions.
Overcurrent protection device	• Easy301: 1.1 A fuse • Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.**

Item	Specification
Installation position and limit	Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet. Installation limit: • Horizontal installation: ■ Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of active inputs shall be reduced to 75% (that is, no more than six channels), with a derating rate of 2.5% for temperature rise of every 1°C.  ■ Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, total current of eight channels not higher than 2 A). When the ambient temperature is 55°C, the total current of active outputs shall be reduced to 50% (that is, total current of eight channels not higher than 1 A), with a derating rate of 5% for temperature rise of every 1°C. 

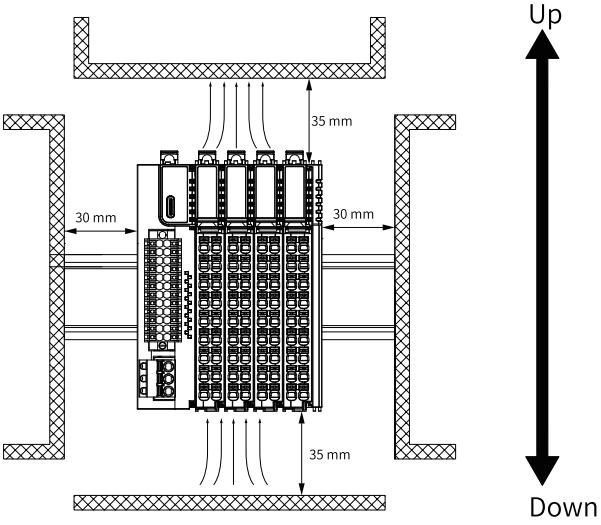
Item	Specification
Installation position and limit	• When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A.

2.3.2 Installation Position

The product can be installed horizontally (recommended), vertically, on top or at the bottom of the electric cabinet. Different installation positions require different operating temperatures, see *"2.3.1 Installation Environment" on page 27*.

■ Optimal installation position

It is optimal to install the PLC horizontally, dissipating heat through natural convection. To ensure normal ventilation, heat dissipation, and sufficient wiring space, reserve clearance around the PLC as shown below.

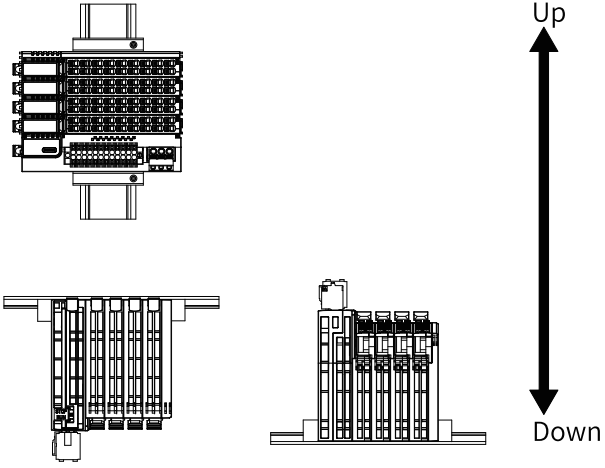


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other installation positions

Other installation positions are shown below. The same clearance as the optimal installation position is also required.



Caution

In case of vertical installation:

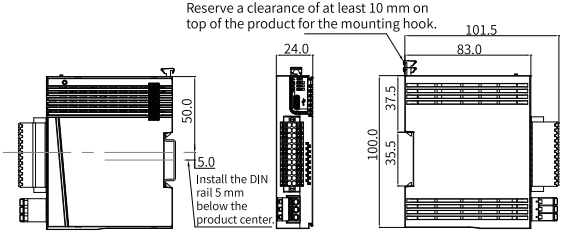
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

2.3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.
- Do not hot swap the modules. This may lead to restart or damage of the PLC or user data loss.
- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

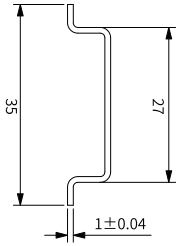
2.3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



2.3.5 Installation Method

The PLC is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (in mm) are shown below.

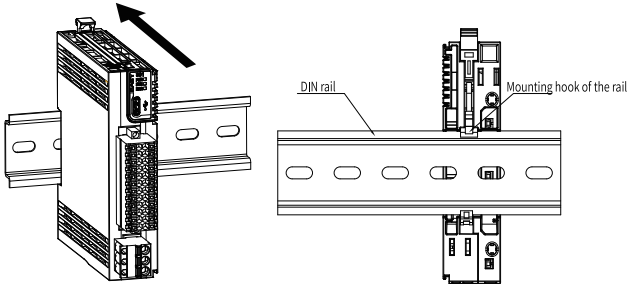


Caution

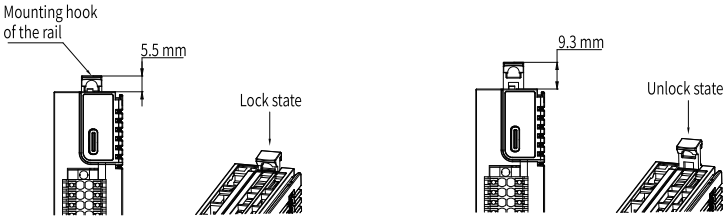
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

■ Installing the PLC

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



2. 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.

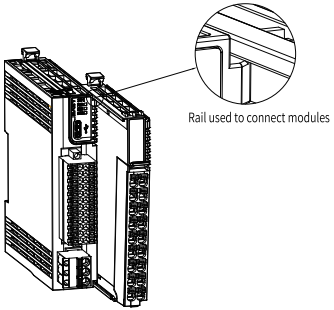
To lock the PLC to the DIN rail, press down the mounting hook.

Caution

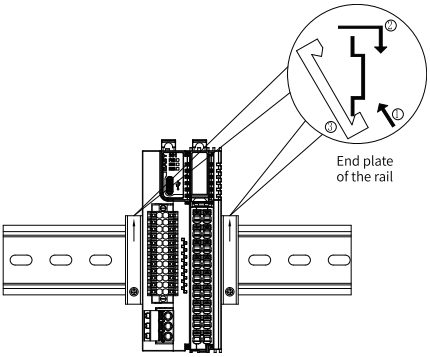
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

■ Installing the module to the PLC

Install the expansion module to the PLC through top and bottom rails, as shown below.

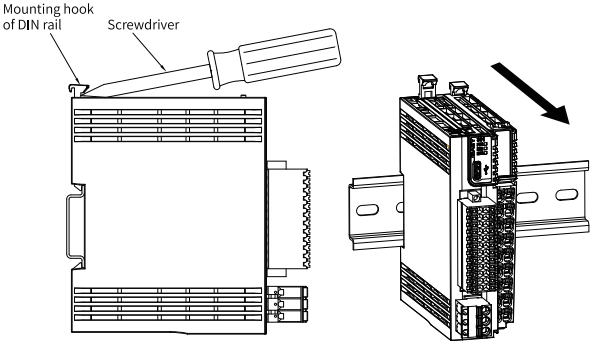


Mount a DIN rail end plate on both sides of the PLC or expansion module. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



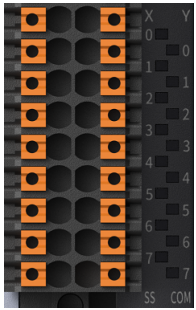
■ Removing the module

Pry the DIN rail mounting hook upwards with a tool such as a slotted screwdriver, hold the protrusions and pull the PLC out straight forward. Then, press down the top of the mounting hook.



2.4 Electrical Installation

2.4.1 Terminal Layout



Left Signal	Left Terminal	Right Terminal	Right Signal
X0 input	X0	Y0	Y0 output
X1 input	X1	Y1	Y1 output
X2 input	X2	Y2	Y2 output
X3 input	X3	Y3	Y3 output
X4 input	X4	Y4	Y4 output
X5 input	X5	Y5	Y5 output
X6 input	X6	Y6	Y6 output
X7 input	X7	Y7	Y7 output
Input common terminal SS	SS	COM	Output common terminal COM

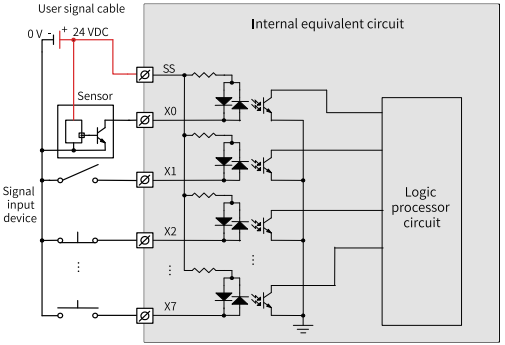
Caution

- Check the silk print on both sides of the terminals to prevent wrong connection. Failure to comply may result in short circuit and damage to the device.
- The length of a high-speed I/O interface extension cable must be within 3.0 m.
- To prevent interference, route the I/O interface extension cable and the power cable (high-voltage/high-current cables) through different and non-parallel routes.

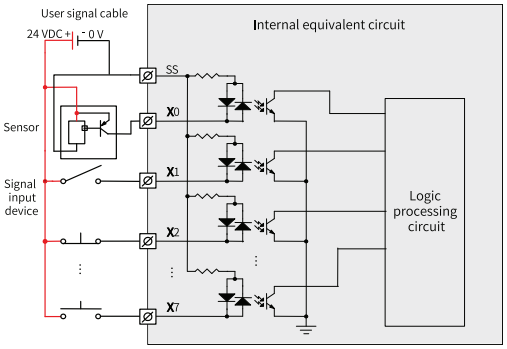
2.4.2 Terminal Wiring

■ Input terminal circuit diagram

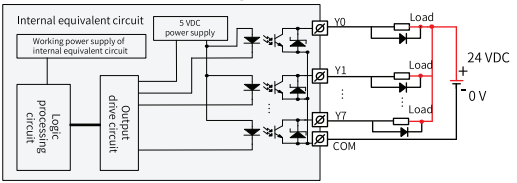
- **Sink wiring**



- **Source wiring**



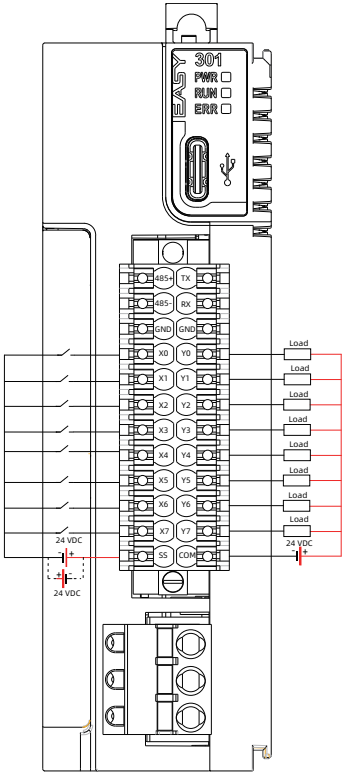
■ Output terminal circuit diagram



Note

An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

■ **Input and output terminal wiring**



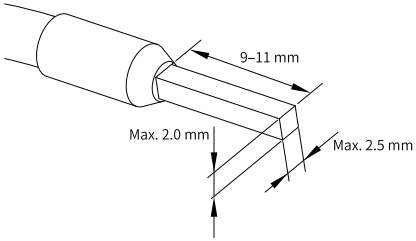
2.5 Communication Connection

2.5.1 Cable Selection

- Power cable
  The cable lugs and diameters in the following table are only for reference.

Material Name	Applicable Cable Diameter	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

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

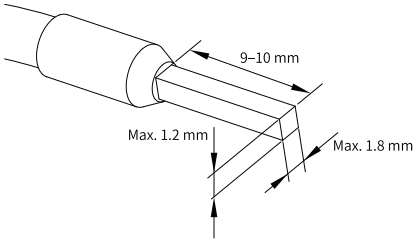


- Communication cable

  The cable lugs and diameters in the following table are only for reference.

Material Name	Applicable Cable Diameter	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20

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



2.5.2 Cable Connection

■ RS485 and RS232 communication

The RS485 communication port and the RS232 communication port share the same terminal block, with RS485 communication port on the left and RS232 communication port on the right. The signal on the left side of the terminal is RS485 communication, and the signal on the right side is RS232 communication.



■ RS485 and RS232 terminal definition

Signal	Left Terminal	Right Terminal	Signal
RS485 differential pair positive signal	485+	TX	RS232 signal transmission
RS485 differential pair negative signal	485–	RX	RS232 signal reception
RS485 communication ground	GND	GND	RS232 communication ground

Caution

- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Do not connect the GND cable to the I/O terminals on the lower side. Failure to comply can lead to short circuit and damage the components.
- Do not connect the PE cable to the GND terminal.

■ RS485 communication specifications

Item	Specification
Number of channels	1
Hardware port	2 x 12-pin terminal (shared with the DIDO)
Isolation mode	No isolation
Termination resistor	No (The PLC can be used as the master or slave.)
Number of slaves	31 (The cable length for each slave branch must be less than 3 m.)
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps
Short circuit protection	Protection against incorrect connection to the 24 V terminal

■ RS232 communication specifications

Item	Specification
Number of channels	1
Hardware port	2 x 12-pin terminal (shared with the DIDO)
Isolation mode	No isolation
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps

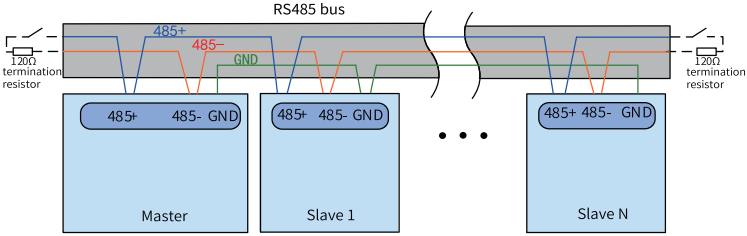
■ Wiring

See *"2.5.1 Cable Selection" on page 39* to select the communication cable and plug it into the communication port.

2.5.3 RS485 Communication

It is recommended to use a shielded twisted pair cable for the RS485 bus and use a twisted pair cable to connect the RS485+ and RS485– terminals. Connect a 120 Ω termination resistor to both ends of the bus to prevent signal reflection. Connect the signal reference grounds of all nodes together. Up to 31 nodes can be connected and the distance between branches must be less than 3 m.

The RS485 bus topology is shown below.



2.6 Operation and Maintenance

2.6.1 RUN and STOP States

After writing a program to the STOP-state PLC, execute the following operations to run or stop the system:

State	Operation
To run the system	1. Set the system to RUN state. 2. Ensure the RUN indicator is solid on in yellow green.
To stop the system	Set the system to STOP state or stop the PLC through the host controller.

2.6.2 User Program Download with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.

- Power off the PLC.

Steps

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

2.6.3 Firmware Programming with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Note

Perform filmware programming carefully because the original application will be deleted and user data will be lost after firmware programming (in .img format).

Steps

1. Load the TF card into the TF expansion card and mount the TF expansion card to the PLC.
2. Power on the PLC again.

The state of firmware programming is indicated by the RUN and ERR indicators: Flashing quickly for three seconds indicates the start of firmware programming. Remaining solid on indicates firmware programming is in progress. Flashing slowly indicates firmware programming is completed.

3. After firmware programming is completed, power off the PLC and remove the TF card.
4. Power on the PLC again.

2.7 Appendix

■ Easy301 programmable logic controller

Model	Description	Code
Easy301-0808TN-INT	Easy300 series 8-input 8-output programmable logic controller	01441153

■ GL20 expansion module

Module	Model	Description	Code
Digital	GL20-0016ETP-INT	16-channel digital transistor PNP output module	01441069
	GL20-1600END-INT	16-channel digital input module	01441085
	GL20-0016ETN-INT	16-channel digital transistor NPN output module	01441063
	GL20-0800END-INT	8-channel digital input module	01441054
	GL20-0008ETP-INT	8-channel digital transistor PNP output module	01441062
	GL20-0008ETN-INT	8-channel digital transistor NPN output module	01441058
	GL20-0808ETN-INT	8-channel digital input and 8-channel transistor NPN output module	01441072
	GL20-0008ER-INT	8-channel general-purpose relay output module	01441064
	GL20-3200END-INT	32-channel digital input module (PUSH IN terminal)	01441067
	GL20-0032ETN-INT	32-channel transistor NPN output module (PUSH IN terminal)	01441079
	GL20-0404ETP-5V-INT	4-channel digital input and 4-channel digital output module (5 V)	01441070
	GL20-3232ETN-M-INT	32-channel digital input and 32-channel NPN transistor output module (ejector header)	01441080
	GL20-0004ER-INT	4-channel relay output general-purpose module	01441088
	GL20-0004ETP-2A-INT	4-channel high-current digital PNP transistor output module	01441059
	GL20-0032ETP-INT	32-channel digital transistor PNP output module	01441533

Module	Model	Description	Code
Analog	GL20-4AD-INT	4-channel analog input module	01441075
	GL20-4DA-INT	4-channel analog output module	01441089
	GL20-8ADV-INT	8-channel analog input module - voltage type	01441086
	GL20-8ADI-INT	8-channel analog input module - current type	01441092
	GL20-8DAV-INT	8-channel analog output module - voltage type	01441083
	GL20-8DAI-INT	8-channel analog output module - current type	01441087
Temperature measurement	GL20-4PT-INT	4-channel input thermal resistor temperature detection module	01441074
	GL20-4TC-INT	4-channel input thermocouple temperature detection module	01441066
	GL20-4PT-ISO-INT	4-channel thermal resistor temperature detection input module, channel-separated	01441528
	GL20-8TC-INT	8-channel thermocouple input module	01441531
	GL20-4TC-ISO-INT	4-channel thermocouple temperature detection input module, channel-separated	01441532
	GL20-4LC-PID-INT	4-channel PID integrated RTD/ thermocouple temperature control module	01441530
Communication	GL20-2SCOM-INT	2-channel serial port module (third-party not supported)	01441084
	GL20-2S485-INT	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01441071
Process module	GL20-2SSI-INT	2-channel SSI communication module	01441056
	GL20-2HC-INT	2-channel high-speed count module	01441073

Module	Model	Description	Code
Other module	GL20-PS2-INT	Power supply module	01441060

3 Easy302 Programmable Logic Controller

User Guide

3.1 Preface

■ Introduction

This product is a new generation of small PLC product independently developed by Inovance. It supports the RS485 and RS232 communication functions, enabling multi-level network communication through the RS485 and RS232 interfaces. It also supports process encapsulation and reuse via FB (Function Block) and FC (Function) functions. Up to 16 expansion modules can be added. For supported module types, see the "Local Expansion Modules" section in the H5U and Easy Series Programmable Logic Controller Programming Guide. In addition, it can also provide the RS485, RS232, CAN, digital input (DI), digital output (DO), analog input (AI), analog output (AO), real-time clock (RTC), and TF card functions through expansion cards.

This guide describes installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ 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

■ More documents

Document	Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Provides product information, installation and wiring, and programming examples for GE20 series expansion card.
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
Easy302 Series Programmable Logic Controller User Guide (This guide)	PS00006240	Introduces the installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ Revision history

Date	Version	Description of changes
August 2026	A11	Added information on compatible I/O modules and updated the unit of program capacity in the technical specifications.
May 2026	A10	Updated the instruction execution time in *"3.2.3.1 General Specifications" on page 58*.
January 2026	A09	Updated effect diagrams and product codes.
September 2025	A08	Made minor corrections.
April 2025	A07	Made minor corrections.
January 2025	A06	Made minor corrections.

Date	Version	Description of changes
July 2024	A05	**Addition** • Added input and output terminal wiring diagram in *"3.4.2 Terminal Wiring" on page 72*.
		Revision • Updated the caution note for restart in *"3.2.2 Components" on page 55*. • Updated the program data capacity in *"3.2.3.1 General Specifications" on page 58*. • Updated the number of axes supported in *"3.2.3.1 General Specifications" on page 58*. • Updated the rated bus input current of the GL20-3232ETN-M expansion module in *"3.2.3.2 Power Supply Specifications" on page 59*.
March 2024	A04	**Addition** • Added the Easy302 programmable controller models and the GL20 expansion module models in *" Appendix" on page 80*
		Revision • Updated the descriptions of operation state indicators in *"3.2.2 Components" on page 55*. • Updated the power supply specifications in *"3.2.3.2 Power Supply Specifications" on page 59*.
February 2024	A03	Made minor corrections.
March 2023	A02	Updated DIN rail mounting hook diagram and product specifications.
October 2022	A01	• Added CAN communication function. • Made minor corrections.
August 2022	A00	Initial 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

The warranty period of the product is 18 months as of the date of manufacture (refer to the barcode on the equipment). If otherwise agreed upon, the agreed terms and conditions shall prevail. Maintenance will be charged out of the 18-month warranty period.

Even within the 18-month warranty period, maintenance 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
- Secondary damage caused by force majeure (natural disaster, earthquake, lightning strike)

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

For details, see the Warranty Card.

3.2 Product Information

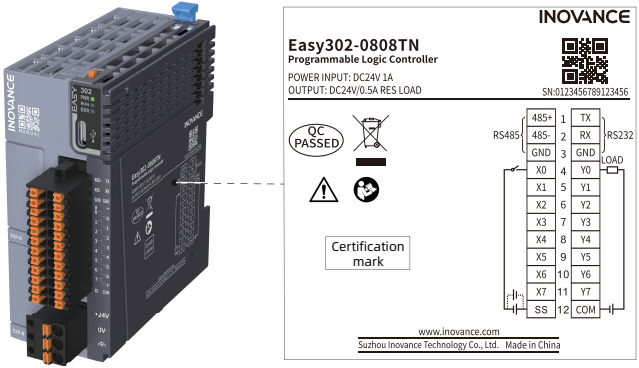
3.2.1 Model and Nameplate

■ Model description

Easy ① 302 ② – 0808 ③ TN ④

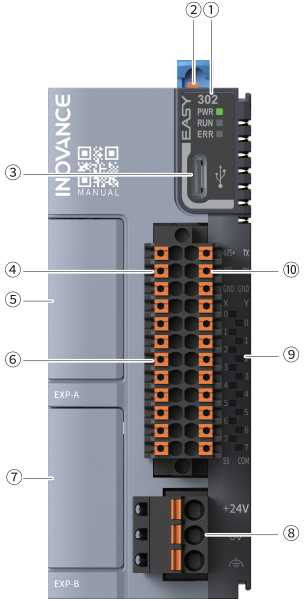
① **Product series** • Easy: Easy series programmable logic controller	③ **Number of inputs/outputs** • 08: 8 inputs • 08: 8 outputs
② **Series** • 3: 300 series platform • 0: No Ethernet • 2: Model serial number	④ **Output type** • TN: Sink-type transistor

■ Nameplate description



Model	Description	Code
Easy302-0808TN-INT	Easy300 series 8-input 8-output programmable controller	01441143

3.2.2 Components



No.	Type	Mark	Definition	Indicator Color	Description
①	Operation status indicator	PWR	Power supply	Yellow-green	• Steady ON: Power supply normal • OFF: Power supply off or abnormal
		RUN	Normal running	Yellow-green	• Steady ON: User program running • OFF: User program stopped
		ERR	Running error	Red	• OFF: No major error • Blinking[1]: Major error occurred
②	DIP switch	RUN/STOP	Run/Stop control	-	-
③	Type-C port		Communication with PC	-	-
④	RS485	485+	Positive of RS485 communication signal	-	-
		485–	Negative of RS485 communication signal	-	-
		GND [2]	RS485 communication ground	-	-
⑤/-⑦	Expansion card slot	EXP-A/ EXP-B	Expansion card slots, used to expand features	-	Expansion card options are available in *"Appendix" on page 80*
⑥	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"3.4.1 Terminal Layout" on page 71*

No.	Type	Mark	Definition	Indicator Color	Description
⑧	Power supply port	+24V	24 VDC power supply positive	-	-
		0V	24 VDC power supply negative	-	-
		⏚	Function grounding[2]	-	-
⑨	I/O indicator	X/Y	I/O status	Yellow-green	• Steady ON: Input or output active • OFF: Input or output inactive
⑩	RS232	TX	RS232 signal transmis-sion	-	-
		RX	RS232 signal reception	-	-
		GND [2]	RS232 communica-tion ground	-	-

Caution

- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: Do not connect the PE cable to the GND terminal.
- The EtherCAT communication cable model is the same as the servo communication cable model, such as S6-L-T04-3.0.

3.2.3 Product Specifications

3.2.3.1 General Specifications

Item		Specification
Program data capacity		• 128K steps of user program • User-defined variables: 1 MB, 128 KB of which is retentive at power failure • Soft elements: approx. 150 KB. Soft elements with addresses 1000 and above are retentive during power loss. However, they are not retentive when the PLC is powered only by USB.
Instruction execution time	Bit operation	0.09 μs
	Integer operation	0.338 μs
	Floating-point operation (double precision)	0.779 μs
Ethernet		-
EtherCAT communication		-
Number of axes		Up to 5 local pulse axes and up to 16 virtual axes.
Serial communication		Supports up to 3 channels (two channels in the main unit and one channels extended in the expansion card).
CAN communication		Supports one master via the expansion card (requires firmware version 5.65.2.0 or later and AutoShop 4.6.5.0 or later). • CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes
High-speed input		Single-phase: 8-channel at 200 kHz
High-speed output		Five axes at 200 kHz; PWM pulse width modulation supported
Expansion module		Support up to 16 local expansion modules
Expansion card		Supports up to two expansion cards.

Item	Specification
Programming language	LD, ST, SFC, and FB/FC function (LD)
Type-C	• Supports user program download/upload and firmware upgrade through type-C or GE20–TF expansion card. • USB cable communication distance: 3 m
IP rating	IP20
Dimensions (W x H x D)	40 mm x 100 mm x 83 mm
Weight	Approx. 157 g

3.2.3.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 V)
Rated bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power supply [1]	2 A (typical@5 V)
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

Note

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (⩽ 2 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most eight such modules can be connected to the Easy series programmable logic controller (2 A/250 mA = 8).

3.2.3.3 Input Specifications

Item		Specification
Input type		Digital input
Number of input channels		8
Input mode		Sink/Source
Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed input (X0 to X7)	Input current when input is ON	Input current > 4 mA
	Input current when input is OFF	Input current < 2.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	200 kHz
	Input impedance	2.7 kΩ
ON voltage		⩾ 15 VDC
OFF voltage		⩽ 5 VDC
Software filter time		• Low-speed: 2 ms to 1000 ms • High-speed: 2 μs to 1000 μs
Isolation mode		Capacitive isolation for integrated chip
Common terminal mode		8-point/common terminal (positive/ negative polarity of input power being changeable)
Input action display		The input indicator lights up (controlled by software) when the input is in drive state.

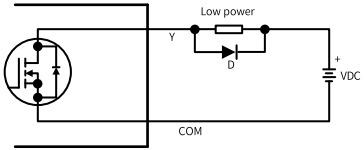
3.2.3.4 Output Specifications

Item	Specification
Output type	NPN transistor output
Number of output channels	8
Output voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specification
High-speed output (Y0-Y7)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point; 18 W/8 points
	Hardware response time ON/OFF	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	Resistive load: 200 kHz; inductive load: 0.5 Hz; lamp load: 10 Hz
PWM output		Maximum frequency: 200 kHz; minimum pulse width: 5 μs; minimum resolution: 5 μs; adjustable duty cycle [1]: 0.01% to 99.99%
Leakage current upon OFF		< 30 μA at 24 V
Maximum residual voltage upon ON		< 0.5 VDC
Isolation method		Digital isolator
Common terminal mode		Eight input ports share a common terminal (polarity of output power supply being negative)
Short circuit protection		Protection against short circuit of each channel, recovered after power-off
External inductive load protection		A flywheel diode [2] is required when an external inductive load is connected.
Output indicator		The output indicator turns on (controlled by software) when the output is in drive state.

[1]: The duty cycle setting is frequency dependent and the pulse width corresponding to the duty cycle must not be less than the minimum pulse width.

[2]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.



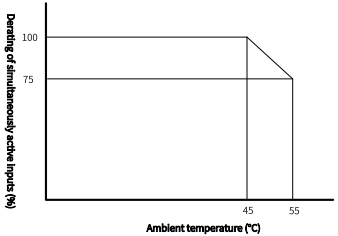
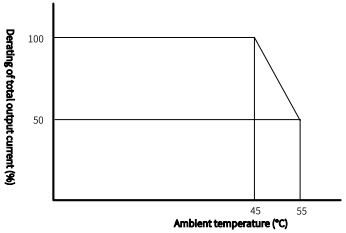
3.3 Mechanical Installation

3.3.1 Installation Environment

When installing the PLC on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specification
Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m (80 kPa)
Pollution degree	PD2
Noise immunity	2 kV on power cable (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV
Vibration resistance	• Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axes. • Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g^2/Hz; 200 Hz, 0.001 g^2/Hz, G_{rms} of 1.14 g, 30 min each in X, Y and Z directions.
Shock resistance	Application scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions.
Overcurrent protection device	• Easy301: 1.1 A fuse • Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing

Item	Specification
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.**

Item	Specification
Installation position and limit	Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet. Installation limit: • Horizontal installation: ■ Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of active inputs shall be reduced to 75% (that is, no more than six channels), with a derating rate of 2.5% for temperature rise of every 1°C.  ■ Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, total current of eight channels not higher than 2 A). When the ambient temperature is 55°C, the total current of active outputs shall be reduced to 50% (that is, total current of eight channels not higher than 1 A), with a derating rate of 5% for temperature rise of every 1°C. 

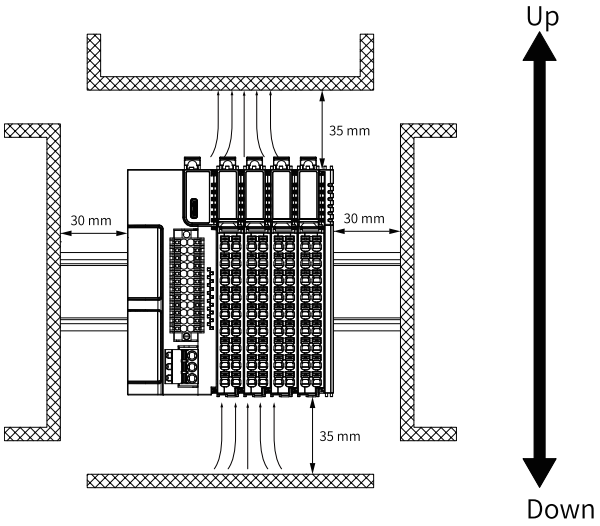
Item	Specification
Installation position and limit	• When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A.

3.3.2 Installation Position

The product can be installed horizontally (recommended), vertically, on top or at the bottom of the electric cabinet. Different installation positions require different operating temperatures, see *"3.3.1 Installation Environment" on page 62*.

■ Optimal installation position

It is optimal to install the PLC horizontally, dissipating heat through natural convection. To ensure normal ventilation, heat dissipation, and sufficient wiring space, reserve clearance around the PLC as shown below.

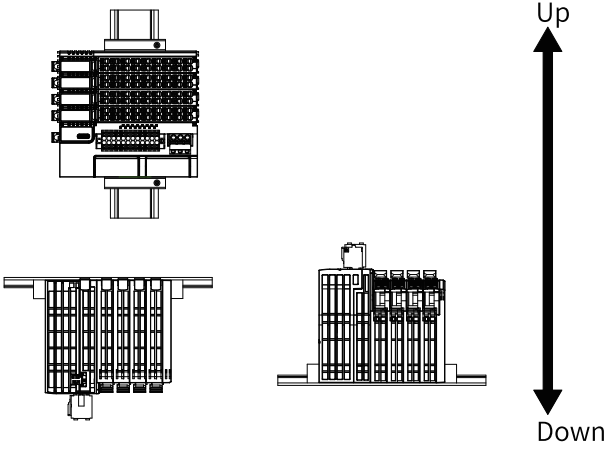


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other installation positions

Other installation positions are shown below. The same clearance as the optimal installation position is also required.



Caution

In case of vertical installation:

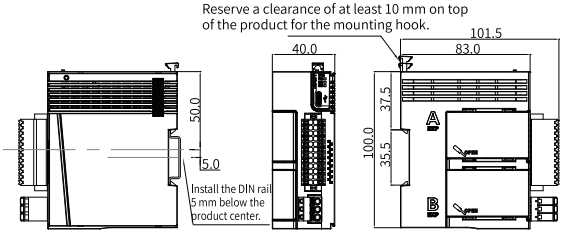
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

3.3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.
- Do not hot swap the modules. This may lead to restart or damage of the PLC or user data loss.
- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

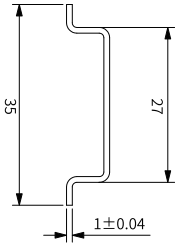
3.3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



3.3.5 Installation Method

The PLC is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (in mm) are shown below.

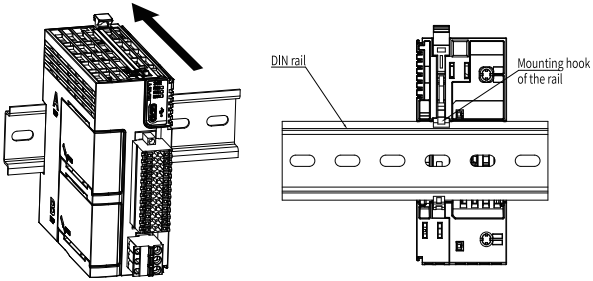


Caution

When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

■ Installing the PLC

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



2. 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.

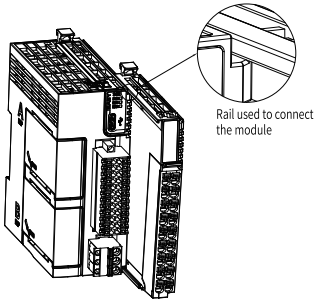
To lock the PLC to the DIN rail, press down the mounting hook.

Caution

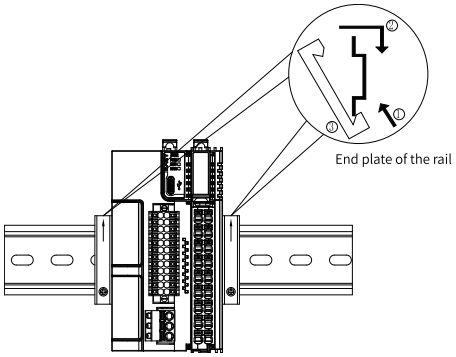
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

■ Installing the module to the PLC

Install the expansion module to the PLC through top and bottom rails, as shown below.

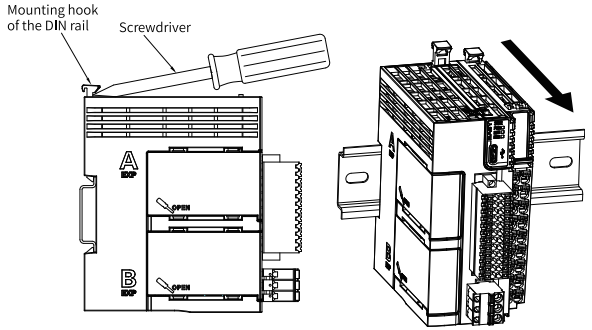


Mount a DIN rail end plate on both sides of the PLC or expansion module. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of the end plate to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



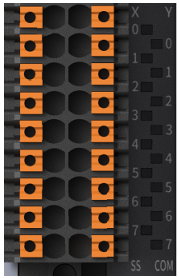
■ Removing the module

Pry the DIN rail mounting hook upwards with a tool such as a slotted screwdriver, hold the protrusions and pull the PLC out straight forward. Then, press down the top of the mounting hook.



3.4 Electrical Installation

3.4.1 Terminal Layout



Left Signal	Left Terminal	Right Terminal	Right Signal
X0 input	X0	Y0	Y0 output
X1 input	X1	Y1	Y1 output
X2 input	X2	Y2	Y2 output
X3 input	X3	Y3	Y3 output
X4 input	X4	Y4	Y4 output
X5 input	X5	Y5	Y5 output
X6 input	X6	Y6	Y6 output
X7 input	X7	Y7	Y7 output
Input common terminal	SS	COM	Output common terminal

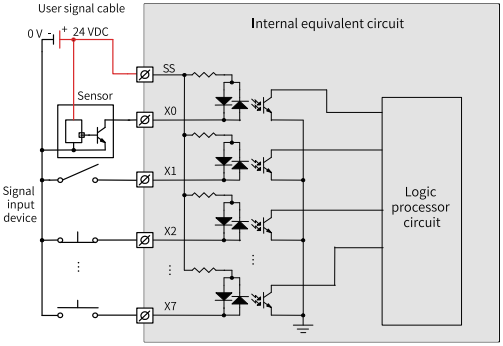
Caution

- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Failure to comply may lead to short circuit and damage the components.
- The length of a high-speed I/O interface extension cable must be within 3 m.
- Route extension cables separately from high-voltage and high-current power cables that produce strong interference signals, and avoid parallel routing.

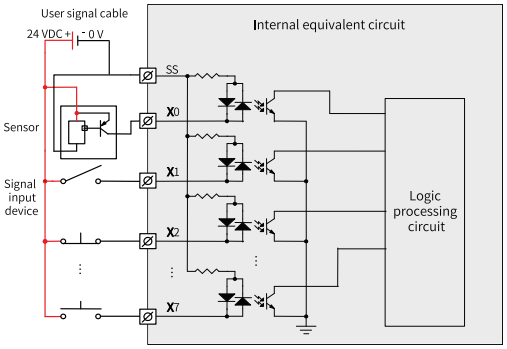
3.4.2 Terminal Wiring

■ Input terminal circuit diagram

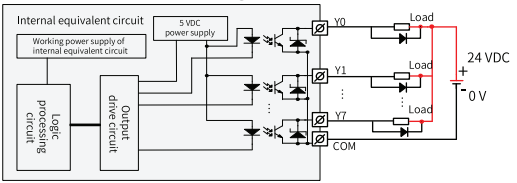
- **Sink wiring**



- **Source wiring**



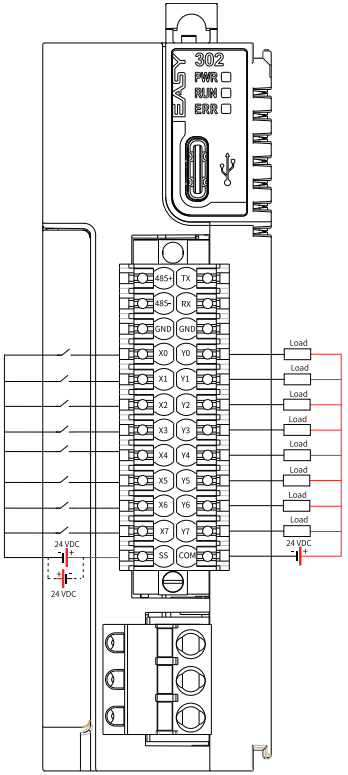
■ Output terminal circuit diagram



Note

An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

■ **Input and output terminal wiring diagram**



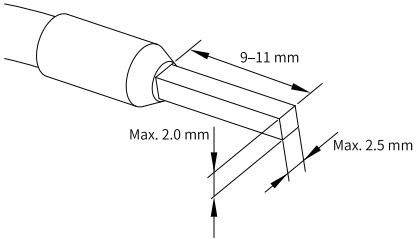
3.5 Communication Connection

3.5.1 Cable Selection

- Power cable
  The cable lugs and diameters in the following table are only for reference.

Material Name	Applicable Cable Diameter	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

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

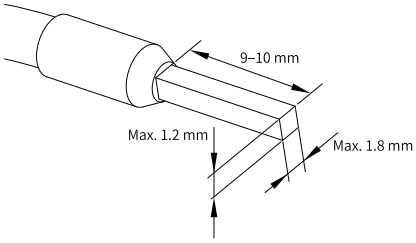


- Communication cable

  The cable lugs and diameters in the following table are only for reference.

Material Name	Applicable Cable Diameter	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20

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



3.5.2 Cable Connection

■ RS485 and RS232 communication

The RS485 communication port and the RS232 communication port share the same terminal block, with RS485 communication port on the left and RS232 communication port on the right. The signal on the left side of the terminal is RS485 communication, and the signal on the right side is RS232 communication.



■ RS485 and RS232 terminal definition

Signal	Left Terminal	Right Terminal	Signal
RS485 differential pair positive signal	485+	TX	RS232 signal transmission
RS485 differential pair negative signal	485–	RX	RS232 signal reception
RS485 communication ground	GND	GND	RS232 communication ground



- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Do not connect the GND cable to the I/O terminals on the lower side. Failure to comply can lead to short circuit and damage the components.
- Do not connect the PE cable to the GND terminal.

■ RS485 communication specifications

Item	Specification
Number of channels	2 (The PLC itself supports one channel and can support one more channel through the expansion card. If RS232 is used, the PLC supports a maximum of 3 channels.)
Hardware port	2 x 12-pin terminal (shared with the DIDO)
Isolation mode	No isolation
Termination resistor	No (The PLC can be used as the master or slave.)
Number of slaves	31 (The cable length for each slave branch must be less than 3 m.)
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps
Short circuit protection	Protection against incorrect connection to the 24 V terminal

■ RS232 communication specifications

Item	Specification
Number of channels	2 (The PLC itself supports one channel and can support one more channel through the expansion card. If RS485 is used, the PLC supports a maximum of 3 channels.)
Hardware port	2 x 12-pin terminal (shared with the DIDO)
Isolation mode	No isolation
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps

■ Wiring

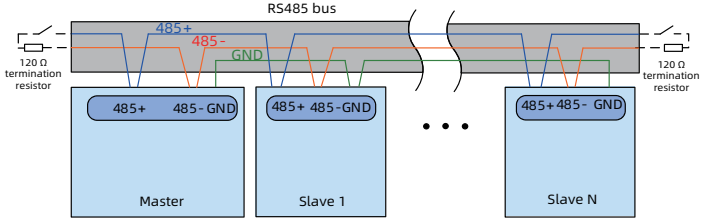
See *"3.5.1 Cable Selection" on page 74* to select the communication cable and plug it into the communication port.

3.5.3 RS485 Communication

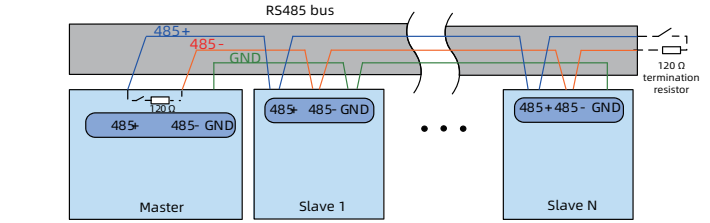
- It is recommended to use a shielded twisted pair cable to connect the 485+ and 485– ports of the RS485 bus.
- Connect a 120 Ω termination resistor at each end of the bus to prevent signal reflection.
- Connect the reference grounds of RS485 signals of all the nodes together.
- Up to 31 nodes can be connected to the RS485 bus and the cable length of any node branch must be less than 3 m.

The following figures show the RS485 bus topology.

Local RS485 communication of Easy series hosts



RS485 communication of GE20 series extension cards



3.6 Operation and Maintenance

3.6.1 RUN and STOP States

After writing a program to the STOP-state PLC, execute the following operations to run or stop the system:

State	Operation
To run the system	1. Set the system to RUN state. 2. Ensure the RUN indicator is solid on in yellow green.
To stop the system	Set the system to STOP state or stop the PLC through the host controller.

3.6.2 User Program Download with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Steps

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

3.6.3 Firmware Programming with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Note

Perform filmware programming carefully because the original application will be deleted and user data will be lost after firmware programming (in .img format).

Steps

1. Load the TF card into the TF expansion card and mount the TF expansion card to the PLC.
2. Power on the PLC again.

   The state of firmware programming is indicated by the RUN and ERR indicators: Flashing quickly for three seconds indicates the start of firmware programming. Remaining solid on indicates firmware programming is in progress. Flashing slowly indicates firmware programming is completed.

3. After firmware programming is completed, power off the PLC and remove the TF card.
4. Power on the PLC again.

3.7 Appendix

■ Easy302 programmable logic controller

Model	Description	Code
Easy302-0808TN-INT	Easy300 series 8-input 8-output programmable logic controller	01441143

■ GE20 expansion card

Type	Model	Description	Code	Slot supported	ID
Digital input/output	GE20-4DI-INT	GE20 series 4-channel digital input card	01480130	A/B	13
	GE20-4DO-TN-INT	GE20 series 4-channel digital sinking transistor output card	01480115	A/B	5
Analog input/output	GE20-2AD1DA-I-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (current type)	01480138	A/B	11
	GE20-2AD1DA-V-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (voltage type)	01480107	A/B	3
Communication	GE20-232/485-INT	GE20 series RS232 or RS485 communication card	01480119	A/B	7
	GE20-232/485-RTC-INT	GE20 series RS232 or RS485 communication card (integrated RTC)	01480122	B	14
	GE20-CAN-485-INT	GE20 series CAN and RS485 communication card	01480114	A	15
Storage	GE20-TF-INT	GE20 series TF card	01480109	B	1
	GE20-TF-RTC-INT	GE20 series TF card (intergrated RTC)	01480132	B	6
Clock	GE20-RTC-INT	GE20 series RTC card	01480099	B	9

Note

The ID is "0" when there is no expansion card. For expansion card IDs, see the relevant expansion card user guides.

■ GL20 expansion module

Module	Model	Description	Code
Digital	GL20-0016ETP-INT	16-channel digital transistor PNP output module	01441069
	GL20-1600END-INT	16-channel digital input module	01441085
	GL20-0016ETN-INT	16-channel digital transistor NPN output module	01441063
	GL20-0800END-INT	8-channel digital input module	01441054
	GL20-0008ETP-INT	8-channel digital transistor PNP output module	01441062
	GL20-0008ETN-INT	8-channel digital transistor NPN output module	01441058
	GL20-0808ETN-INT	8-channel digital input and 8-channel transistor NPN output module	01441072
	GL20-0008ER-INT	8-channel general-purpose relay output module	01441064
	GL20-3200END-INT	32-channel digital input module (PUSH IN terminal)	01441067
	GL20-0032ETN-INT	32-channel transistor NPN output module (PUSH IN terminal)	01441079
	GL20-0404ETP-5V-INT	4-channel digital input and 4-channel digital output module (5 V)	01441070
	GL20-3232ETN-M-INT	32-channel digital input and 32-channel NPN transistor output module (ejector header)	01441080
	GL20-0004ER-INT	4-channel relay output general-purpose module	01441088
	GL20-0004ETP-2A-INT	4-channel high-current digital PNP transistor output module	01441059
	GL20-0032ETP-INT	32-channel digital transistor PNP output module	01441533

Module	Model	Description	Code
Analog	GL20-4AD-INT	4-channel analog input module	01441075
	GL20-4DA-INT	4-channel analog output module	01441089
	GL20-8ADV-INT	8-channel analog input module - voltage type	01441086
	GL20-8ADI-INT	8-channel analog input module - current type	01441092
	GL20-8DAV-INT	8-channel analog output module - voltage type	01441083
	GL20-8DAI-INT	8-channel analog output module - current type	01441087
Temperature measurement	GL20-4PT-INT	4-channel input thermal resistor temperature detection module	01441074
	GL20-4TC-INT	4-channel input thermocouple temperature detection module	01441066
	GL20-4PT-ISO-INT	4-channel thermal resistor temperature detection input module, channel-separated	01441528
	GL20-8TC-INT	8-channel thermocouple input module	01441531
	GL20-4TC-ISO-INT	4-channel thermocouple temperature detection input module, channel-separated	01441532
	GL20-4LC-PID-INT	4-channel PID integrated RTD/ thermocouple temperature control module	01441530
Communication	GL20-2SCOM-INT	2-channel serial port module (third-party not supported)	01441084
	GL20-2S485-INT	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01441071
Process module	GL20-2SSI-INT	2-channel SSI communication module	01441056
	GL20-2HC-INT	2-channel high-speed count module	01441073

Module	Model	Description	Code
Other module	GL20-PS2-INT	Power supply module	01441060

4 Easy320 Series Programmable Logic Controller User Guide

4.1 Preface

■ Introduction

This product is a new-generation small programmable logic controller (PLC) independently developed by Inovance. It features dual Ethernet ports with built-in switch functionality, supports process encapsulation and reuse through FB/FC programming, and enables multi-level network communication over RS485 and Ethernet. It supports up to 16 expansion modules. For supported module types, refer to "Local Expansion Modules" in the H5U & Easy Series Programmable Logic Controllers Programming Guide. The expansion cards can be used for RS485/RS232/CAN/DI/DO/AI/AO/RTC/TF card features.

This guide describes installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ 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

■ More documents

Document	Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Provides product information, installation and wiring, and programming examples for GE20 series expansion card.
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
Easy320 Series Programmable Logic Controller User Guide (This guide)	PS00005850	Introduces the installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ Revision history

Date	Version	Description of changes
August 2026	A12	Added matching I/O modules.
May 2026	A11	• Updated the instruction execution time. • Added communication specifications in *"4.2.3.5 Communication Specifications" on page 99*.
January 2026	A10	• Modified *"4.5.3 Cable Connection" on page 122* and added the network cable transmission speed. • Updated effect diagrams and product codes.
September 2025	A09	Made minor corrections.
June 2025	A08	Made minor corrections.
March 2025	A07	Updated the input and output terminal wiring diagram in *"4.4.2 Terminal Wiring" on page 114*.
January 2025	A06	Made minor corrections.

Date	Version	Description of changes
July 2024	A05	**Addition** • Added input and output terminal wiring diagram in *"4.4.2 Terminal Wiring" on page 114*.
		Revision • Updated the precautions for powering off and restarting in *"4.2.2 Components" on page 91*. • Updated the program data capacity in *"4.2.3.1 General Specifications" on page 95*. • Updated the number of axes supported in *"4.2.3.1 General Specifications" on page 95*.
March 2024	A04	Made minor corrections.
February 2024	A03	• Added the PNP model in *"4.2.1 Model and Nameplate" on page 90*. • Updated the descriptions of running status indicators in *"4.2.2 Components" on page 91*. • Added the PNP specifications to the high-speed input item in *"4.2.3.1 General Specifications" on page 95*. • Updated the power supply specifications in *"4.2.3.2 Power Supply Specifications" on page 96*. • Added the PNP specifications to the high-speed input (X0 to X7) item in *"4.2.3.3 Input Specifications" on page 97*. • Added the PNP specifications to the output type item in *"4.2.3.4 Output Specifications" on page 98*. • Added the output terminal circuit wiring diagram for the PNP model in *"4.4.2 Terminal Wiring" on page 114*. • Added the Easy320 series programmable logic controller model and the GL20 series expansion module models in *" Appendix" on page 127*.
March 2023	A02	Updated DIN rail mounting hook diagram and product specifications.
October 2022	A01	• Added CAN communication function. • Made minor corrections.
August 2022	A00	Initial 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 caused by proper operation of the user. Maintenance fees will be charged after the warranty period expires.

Even within the warranty period, maintenance will be charged for the following product 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
- Secondary damage caused by force majeure (natural disaster, earthquake, lightning strike)

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

For details, see the Warranty Card.

4.2 Product Information

4.2.1 Model and Nameplate

■ Model description

Easy ① 320 ② – 0808 ③ TX ④

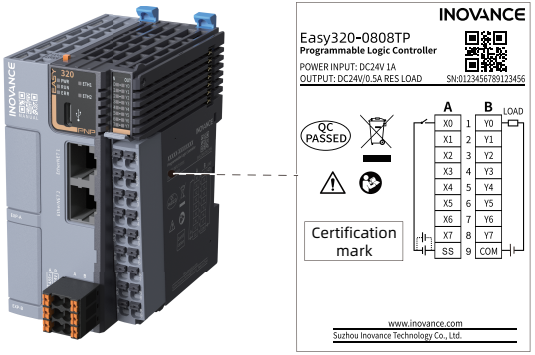
① **Product series** • Easy: Easy series programmable logic controller	③ **Number of inputs/outputs** • 08: 8 inputs • 08: 8 outputs
② **Series** • 3: 300 series platform • 2: Two Ethernet ports • 0: Model serial number	④ **Output type** • TN: Sink-type transistor • TP: Source-type transistor

■ Nameplate description

Easy320-0808TN-INT



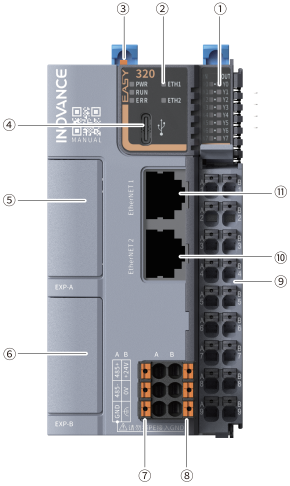
Easy320-0808TP-INT



Model	Description	Code
Easy320-0808TN-INT	Easy300 series 8-input 8-output programmable controller	01441216
Easy320-0808TP-INT	Easy300 series 8-input 8-output programmable controller	01441186

4.2.2 Components

The Easy320-0808TN-INT and Easy320-0808TP-INT models share the same components. The following section takes the Easy320-0808TN-INT model as an example to describe the components.


③
②
①
④
⑤
⑥
⑪
⑩
⑨
⑦
⑧
INOVANCE
EASY 320
PWR
RUN
ERR
ETH1
ETH2
MANUAL
EtherNET 1
EtherNET 2
EXP-A
EXP-B
A B
A B
EXP0
485
EXP1
CAN
EXP2

No.	Type	Mark	Definition	Indicator color	Description
①	I/O indicator	IN/OUT	I/O status	Yellow-green	• Steady ON: Input or output active • OFF: Input or output inactive
②	Operation status indicator	PWR	Power supply	Yellow-green	• Steady ON: Power supply normal • OFF: Power supply off or abnormal
		RUN	Normal running	Yellow-green	• Steady ON: User program running • OFF: User program stopped
		ERR	Running error	Red	• OFF: No major error • Blinking[1]: Major error occurred
		ETH1	Ethernet link 1	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
		ETH2	Ethernet link 2	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
③	DIP switch	RUN/STOP	Run/Stop control	-	-
④	Type-C port		Communica-tion with PC	-	-
⑤/-⑥	Expansion card slot	EXP-A/EXP-B	Expansion card slots, used to expand features	-	Expansion card options are available in *"Appendix" on page 127*

No.	Type	Mark	Definition	Indicator color	Description
⑦	RS485	485+	Positive of RS485 communication signal	-	-
		485–	Negative of RS485 communication signal	-	-
		GND[2]	RS485 communication ground	-	-
⑧	Power supply port	+24V	24 VDC power supply positive	-	-
		0V	24 VDC power supply negative	-	-
			Function grounding[1]	-	-
⑨	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"4.4.1 Terminal Layout" on page 113*
⑩/-⑪	Ethernet port	EtherNET1/ EtherNET2	RJ45 ports used for Ethernet communication	-	PoE power supply not supported



- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: Do not connect the PE cable to the GND terminal.

4.2.3 Product Specifications

4.2.3.1 General Specifications

Item		Specification
Program data capacity		• 128K steps of user program • 1 MB user-defined variables, of which 128KB are retentive during power loss • Soft elements: approx. 150 KB. Soft elements with addresses 1000 and above are retentive during power loss. However, they are not retentive when the PLC is powered only by USB.
Instruction execution time	Bit operation	0.09 μs
	Integer operation	0.338 μs
	Floating-point operation (double precision)	0.779 μs
Ethernet		• Supports EtherNet/IP, OPC UA server, Modbus TCP (up to 31 slaves), Socket, PROFINET slave, FINS TCP & UDP slave, MC communication, Web Server, SFTP, and network firewall. • Supports program upload/download and firmware upgrade.
EtherCAT communication		-
Number of axes		Up to 5 local pulse axes and up to 16 virtual axes.

Item	Specification
Serial communication	Supports up to 3 channels (one channel on the main unit and two channels extended in the expansion card). **Note**: GL20-2S485 and GL20-2SCOM serial port modules are supported.
CAN communication	Supports one master via the expansion card (requires firmware version 5.65.2.0 or later and AutoShop 4.6.5.0 or later). • CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes
High-speed input	• Easy320-0808TN-INT: 8-channel at 200 kHz (single-phase) • Easy320-0808TP-INT: 8-channel at 100 kHz (single-phase)
High-speed output	5-axis 200 K, PWM pulse width modulation supported
Expansion module	Support up to 16 local expansion modules
Expansion card	Supports up to two expansion cards.
Programming language	LD, ST, SFC, and FB/FC function (LD)
Type-C	• Supports user program download/upload and firmware upgrade through type-C or GE20–TF expansion card. • USB cable communication distance: 3 m
IP rating	IP20
Dimensions (W x H x D)	53 mm x 100 mm x 80 mm
Weight	Approx. 184 g

4.2.3.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 V)
Rated bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power supply [1]	2 A (typical@5 V)

Item	Specification
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

Note

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (⩽ 2 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most eight such modules can be connected to the Easy series programmable logic controller (2 A/250 mA = 8).

4.2.3.3 Input Specifications

Item		Specification
Input type		Digital input
Number of input channels		8
Input mode		Sourcing/Sinking
Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed input (X0-X7)	Input current at input ON	• Easy320-0808TN-INT: > 4 mA • Easy320-0808TP-INT: < 2.5 mA
	Input current at input OFF	• Easy320-0808TN-INT: < 2.5 mA • Easy320-0808TP-INT: ＜1.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	200 kHz
	Input impedance	3.4 kΩ
ON-state voltage		⩾ 15 VDC
OFF-state voltage		⩽ 5 VDC
Software filter time		• Low speed: 2 ms to 1000 ms • High speed: 2 μs to 1000 μs

Item	Specification
Isolation	Capacitive isolation with integrated chips
Common terminal	8-point/common terminal (The polarity +/- of input power supply is changeable.)
Input status display	The input indicator turns on (controlled by software) when the input is in drive state.

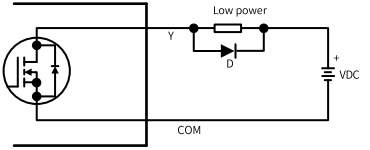
4.2.3.4 Output Specifications

Item		Specification
Output type		• TN: NPN transistor output • TP: PNP transistor output
Number of output channels		8
Output voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed output (Y0-Y7)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point, 18 W/8-point
	Hardware response time (ON/OFF)	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
OFF-state leakage current		Less than 30 μA at 24 V
Maximum residual voltage during ON		Less than 0.5 VDC
Isolation		Digital isolator
Common terminal		8 points per common terminal (negative terminal of the output power supply).
Short-circuit protection		Short circuit protection per channel, recovered after power failure

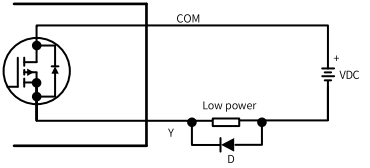
Item	Specification
External inductive load protection	Connect a flywheel diode [1] when connecting the external inductive load.
Output action display	The output indicator turns on (controlled by software) when the output is in drive state.

[1]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.

- **Easy320-0808TN-INT**



- **Easy320-0808TP-INT**



4.2.3.5 Communication Specifications

■ EtherNet/IP specifications

Item	Specification
Supported Ethernet ports	1 port, EtherNET1/ EtherNET2
Maximum number of connections	64 (including both master and slave connections)

Item			Specification
Implicit message	Number of originator I/O connections		32
	Number of target I/O connections		32
	RPI		5 ms to 50000 ms
	Class1 communication bandwidth	4Bytes	12800pps
		250Bytes	12800pps
		500Bytes	12800pps
		1444Bytes	8000pps
	Maximum data size per connection		• Input: 1444 bytes • Output: 1444 bytes
Explicit message	Maximum number of Class3 connections (as a server)		64 (server-side connection count)
	Number of target Class3 tags	Number of originator Class3	32
		Number of target Class3	32
	Number of originator UCMM tags	Number of target UCMM tags	32
		Number of target UCMM tags	32

■ OPC UA server specifications

Item	Specification
Safety policy	Supported
User authentication	Supports both anonymous login and username/password login.
Port range	1024 to 49151. The default value is 4840.
Maximum session timeout (s)	Default value: 10; optional range: 5 to 600,000

Item	Specification
Minimum sampling interval (ms)	100, 250, 500, 1000 (Default), 5000, 10000
Minimum publish interval (ms)	Default value: 1000; range: 500 to 20,000,000
Maximum number of sessions	10
Maximum number of subscriptions per server	100
Maximum number of subscriptions per session	20
Maximum number of monitored nodes per subscription	1000
Maximum number of monitored nodes per server	1000
Maximum number of nodes per read/write request	1000

■ Modbus TCP specifications

Item		Specification
As master	Port range	1 to 65535 (Default: 502)
	Timeout value	100 to 10000
	Number of connected slaves	Supports connection of up to 31 slaves.
	Number of channels	Supports 255 communication channels
As slave	Number of supported masters	Supports connection of up to 31 masters.
Supported instructions		MB_Client

■ PROFINET slave specifications

Item	Specification
Maximum input/ output bytes	960 bytes
Maximum number of PN modules (coupler mode)	16
Minimum I/O cycle time for communication	2 ms
Minimum watchdog time for communication	24 ms
Network topology	Star, tree, and linear

■ Socket specifications

Item	Specification
Services available	Server, client, and data transmission/reception
Supported instructions	TCP_Listen TCP_Accept TCP_Connect TCP_Receive TCP_Send TCP_Close UDP_Bind UDP_JoinGroup UDP_Receive UDP_Send

■ FINS specifications

Item	Specification
Supported protocols	TCP/UDP protocols
Server support	Enabled (default)
Port	Default: 9600
Maximum number of TCP/UDP client connections	32
Maximum number of network nodes	254
Maximum number of elements that can be read consecutively	2000 words

■ CAN specifications

Item	Specification
Number of ports supported	One port via expansion card.
Supported protocols	CANlink and CANopen protocols supported
Slave	• CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes

■ RS485 Specifications

For details, see "RS485 communication" in *"4.5.3 Cable Connection" on page 122*.

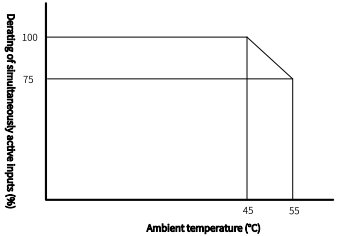
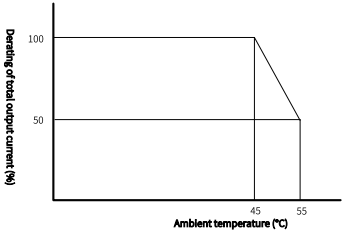
4.3 Mechanical Installation

4.3.1 Installation Environment

When installing the PLC on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specification
Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m (80 kPa)
Pollution degree	PD2
Noise immunity	2 kV on power cable (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV

Item	Specification
Vibration resistance	• Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axes. • Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g^2/Hz; 200 Hz, 0.001 g^2/Hz, G_{rms} of 1.14 g, 30 min each in X, Y and Z directions.
Shock resistance	Application scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions.
Overcurrent protection device	• Easy301: 1.1 A fuse • Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.**

Item	Specification
Installation position and limit	Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet. Installation limit: • Horizontal installation: ■ Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of active inputs shall be reduced to 75% (that is, no more than six channels), with a derating rate of 2.5% for temperature rise of every 1°C.  ■ Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, total current of eight channels not higher than 2 A). When the ambient temperature is 55°C, the total current of active outputs shall be reduced to 50% (that is, total current of eight channels not higher than 1 A), with a derating rate of 5% for temperature rise of every 1°C. 

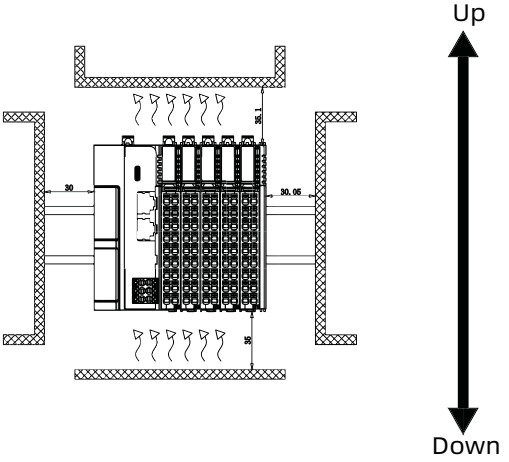
Item	Specification
Installation position and limit	• When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A.

4.3.2 Installation Position

This product can be installed in four positions (modes): horizontal (recommended), vertical, cabinet top, and cabinet bottom. Different modes have different ambient temperature requirements. For details, see *"4.3.1 Installation Environment" on page 104*.

■ Optimal installation position

The optimal installation mode is horizontal, adopting natural convection for heat dissipation. To ensure normal ventilation and heat dissipation and sufficient wiring space, sufficient clearance must be reserved around the module, as shown in the following figure.

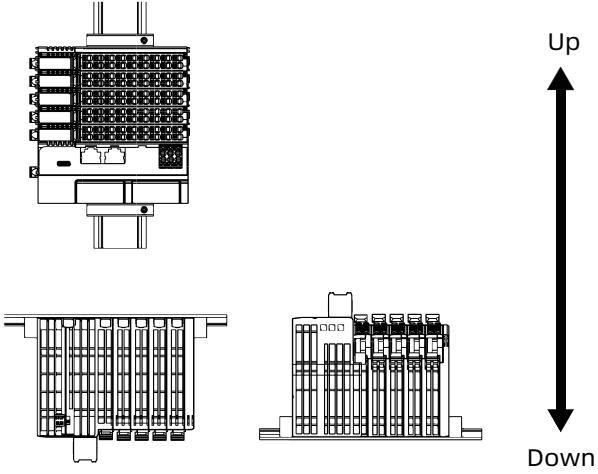


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other installation positions

For other installation positions, the same clearance requirements as the optimal installation position apply. Other installation positions are shown in the following figure.



Caution

In case of vertical installation:

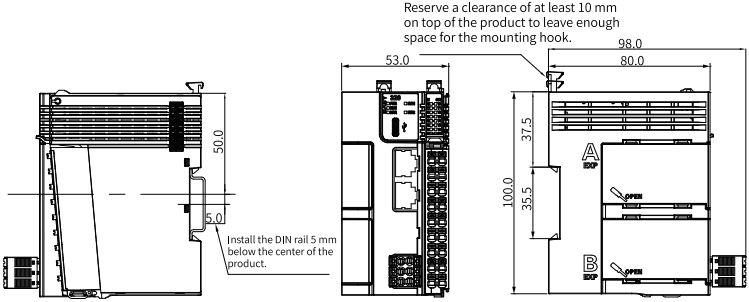
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

4.3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.
- Do not hot swap the modules. This may lead to restart or damage of the PLC or user data loss.
- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

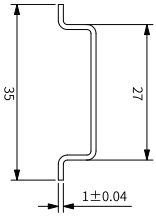
4.3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



4.3.5 Installation Method

The PLC is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (in mm) are shown below.

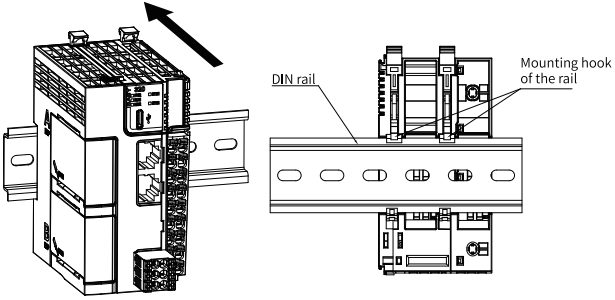


Caution

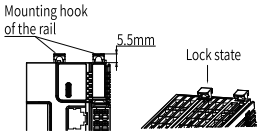
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

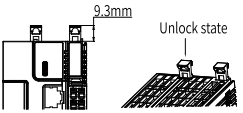
■ Installing the PLC

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



2. 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.

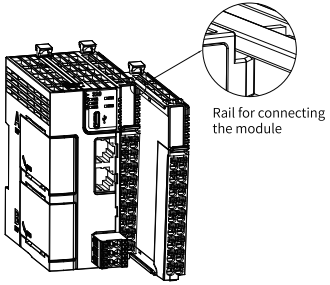
To lock the PLC to the DIN rail, press down the mounting hook.

Caution

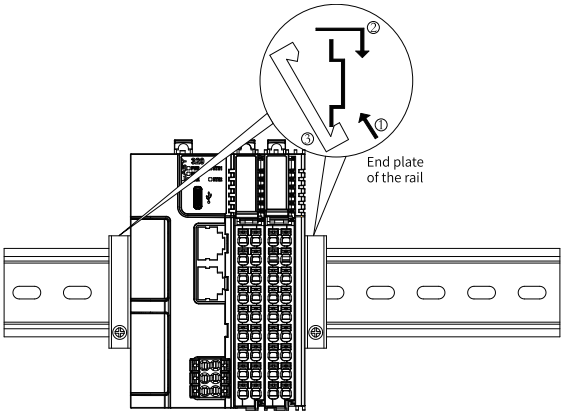
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

■ Installing the module to the PLC

Install the expansion module to the PLC through top and bottom rails, as shown below.

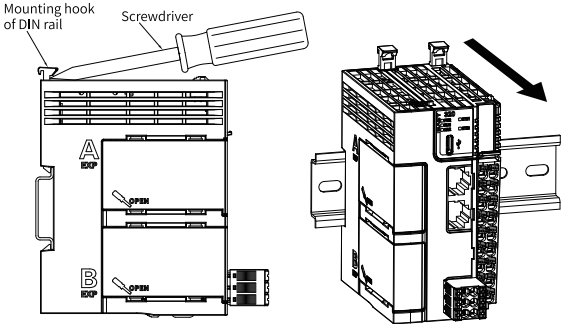


Mount a DIN rail end plate on both sides of the PLC or expansion module. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



■ Removing the module

Pry the DIN rail mounting hook upwards with a tool such as a slotted screwdriver, hold the protrusions and pull the PLC out straight forward. Then, press down the top of the mounting hook.



4.4 Electrical Installation

4.4.1 Terminal Layout



Left Signal	Left Terminal	Right Terminal	Right Signal
X0 input	A1	B1	Y0 output
X1 input	A2	B2	Y1 output
X2 input	A3	B3	Y2 output
X3 input	A4	B4	Y3 output
X4 input	A5	B5	Y4 output
X5 input	A6	B6	Y5 output
X6 input	A7	B7	Y6 output
X7 input	A8	B8	Y7 output
Input common terminal SS	A9	B9	Output common terminal COM

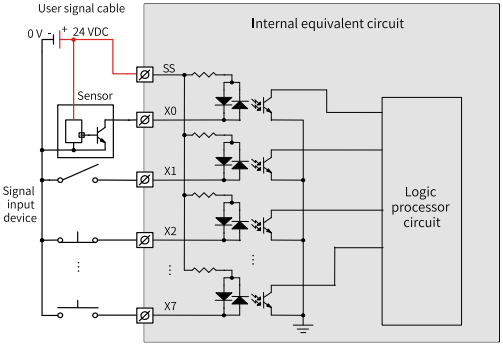
Caution

- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Failure to comply may lead to short circuit and damage the components.
- The length of a high-speed I/O interface extension cable must be within 3 m.
- Route extension cables separately from high-voltage and high-current power cables that produce strong interference signals, and avoid parallel routing.

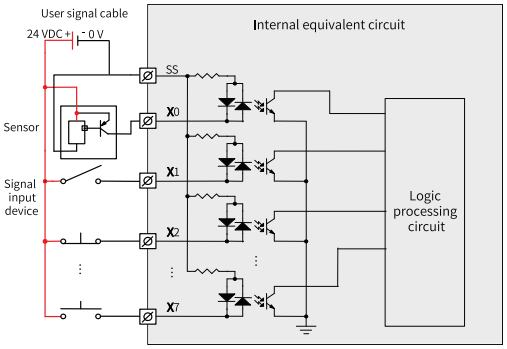
4.4.2 Terminal Wiring

■ Input terminal circuit diagram

- **Sink wiring**

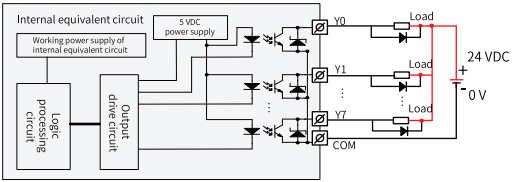


- **Source wiring**



■ Output terminal circuit diagram

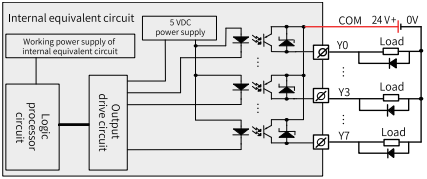
- **Easy320-0808TN-INT**



Note

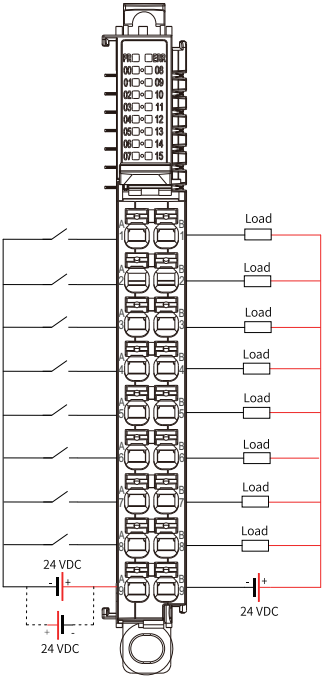
An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

- **Easy320-0808TP-INT**

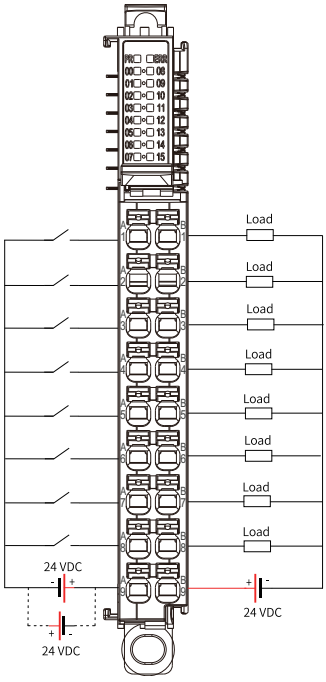


■ Input and output terminal wiring

- **Easy320-0808TN-INT**

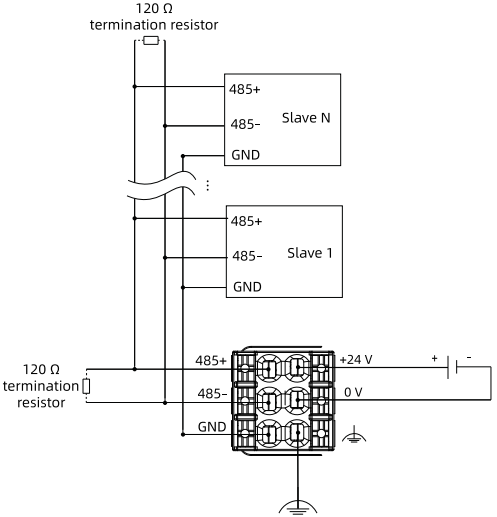


- **Easy320-0808TP-INT**



■ Power terminal wiring

The power terminal wiring diagram is the same for Easy320-0808TN-INT and Easy320-0808TP-INT.



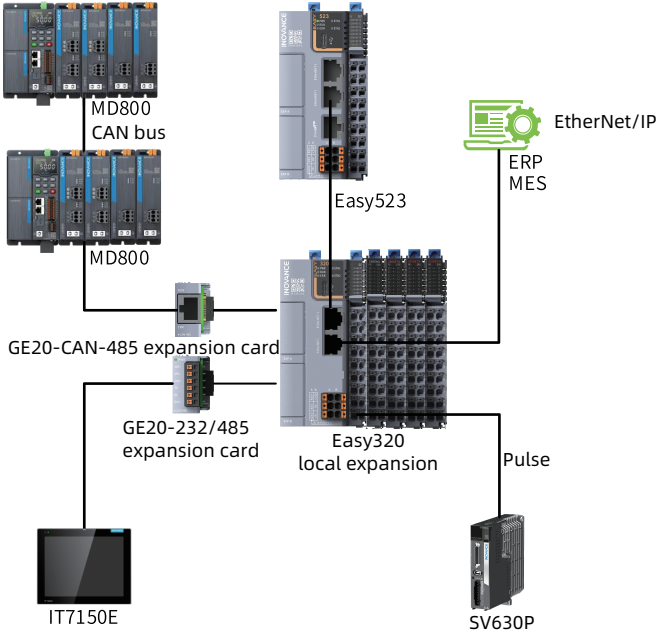
■ RS485 terminal wiring

For details about RS485 terminal wiring, see *"4.5.4 RS485 Communication" on page 124*.

4.5 Communication Connection

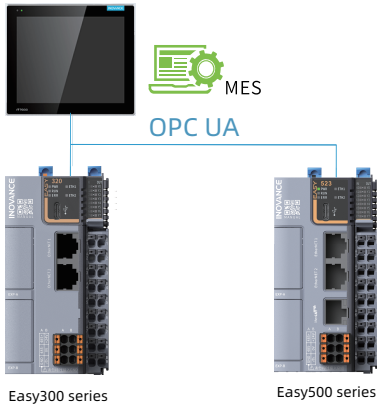
4.5.1 Communication Networking

This product uses the Ethernet port to connect to other stations or ERP or MES systems. It uses the GE20-232/485 expansion card for communication with a computer or HMI. It uses the GE20-CAN-485 expansion card and CAN bus communication to connect to the MD800 AC drives, as shown in the following figure.



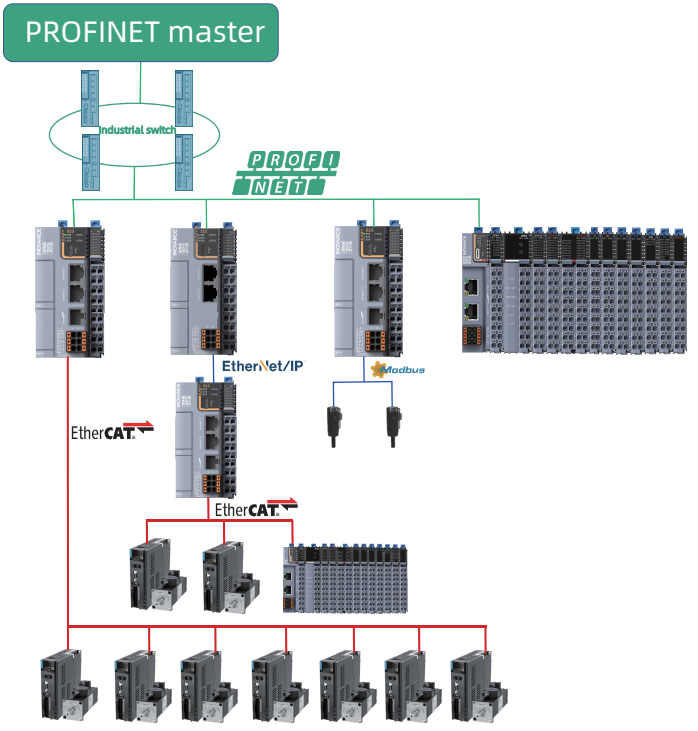
■ OPC UA topology

The MES system connects to the Easy320 and Easy52X PLCs through the OPC UA server, as shown in the following figure.



■ PROFINET topology

The PROFINET master connects to the Easy523 and Easy320 PLCs and the GL20 modules through PROFINER. It connects to other slaves, such as SV630N, SV660N, and other servos, as well as other EtherCAT-enabled modules through the EtherCAT port, as shown in the following figure.

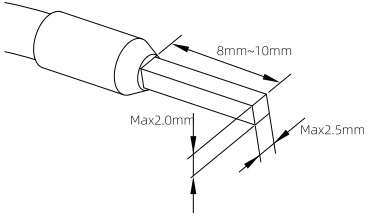


4.5.2 Cable Selection

The cable lugs and cable sizes in the following table are for reference only. Select proper cables based on actual situations.

Material Name	Applicable Cable Size	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

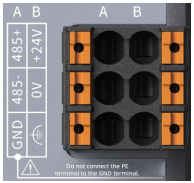
If other tubular lugs are used, crimp them to twisted cables. The following figure shows requirements on the shape and size.



4.5.3 Cable Connection

■ RS485 communication

The RS485 communication port and the 24 V power supply port are located on the left and right of the same terminal block, respectively.



- Terminal definition

Signal	Left Terminal	Right Terminal	Signal
RS485 differential pair positive signal	485+	+24V	24 VDC power supply positive
RS485 differential pair negative signal	485–	0V	24 VDC power supply negative
RS485 communication ground	GND		PE



- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Do not connect the GND cable to the I/O terminals on the lower side. Failure to comply can lead to short circuit and damage the components.
- Do not connect the PE cable to the GND terminal.

- Communication specifications

Item	Specification
Number of channels	3 (The PLC itself supports one channel and can support two more channels including RS232 through expansion cards.)
Hardware port	2 x 3-pin terminal (shared with the power supply)
Isolation mode	No isolation
Termination resistor	No (The PLC can be used as the master or slave.)
Number of slaves	31 (The cable length for each slave branch must be less than 3 m.)
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps
Transmission speed	• 10 Mbps: 10BASE-T • 100 Mbps: 100BASE-TX • 10 Mbps/100 Mbps self-adaptive
Short circuit protection	Protection against incorrect connection to the 24 V terminal

- Wiring

  Select proper communication cables according to *"4.5.2 Cable Selection" on page 121* and insert the cables to the corresponding communication ports.

■ Ethernet communication

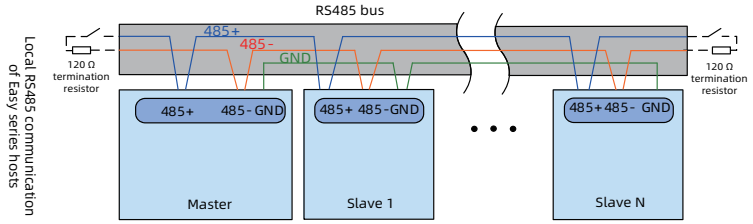
For reliable communication, use Cat 5 shielded twisted pair cables with injection molded, iron-shelled connectors as Ethernet cables.

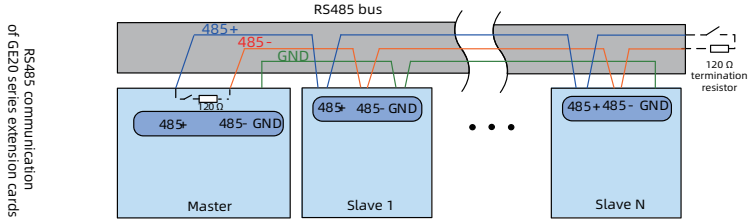
- Insert the registered jack on the cable into the Ethernet port (RJ45 port) until a click is heard.
- To remove the RJ45 network cable, press and hold the tail of the registered jack, and then pull it out along the direction parallel with the PLC.

4.5.4 RS485 Communication

- It is recommended to use a shielded twisted pair cable to connect the 485+ and 485– ports of the RS485 bus.
- Connect a 120 Ω termination resistor at each end of the bus to prevent signal reflection.
- Connect the reference grounds of RS485 signals of all the nodes together.
- Up to 31 nodes can be connected to the RS485 bus and the cable length of any node branch must be less than 3 m.

The following figures show the RS485 bus topology.





4.6 Operation and Maintenance

4.6.1 RUN and STOP States

After writing a program to the STOP-state PLC, execute the following operations to run or stop the system:

State	Operation
To run the system	1. Set the system to RUN state. 2. Ensure the RUN indicator is solid on in yellow green.
To stop the system	Set the system to STOP state or stop the PLC through the host controller.

4.6.2 User Program Download with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Steps

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

4.6.3 Firmware Programming with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Note

Perform filmware programming carefully because the original application will be deleted and user data will be lost after firmware programming (in .img format).

Steps

1. Load the TF card into the TF expansion card and mount the TF expansion card to the PLC.

2. Power on the PLC again.

   The state of firmware programming is indicated by the RUN and ERR indicators: Flashing quickly for three seconds indicates the start of firmware programming. Remaining solid on indicates firmware programming is in progress. Flashing slowly indicates firmware programming is completed.

3. After firmware programming is completed, power off the PLC and remove the TF card.

4. Power on the PLC again.

■ Easy320 programmable controllers

Model	Description	Code
Easy320-0808TN-INT	Easy300 series 8-input 8-output programmable controller	01441216
Easy320-0808TP-INT	Easy300 series 8-input 8-output programmable controller	01441186

■ GE20 expansion card

Type	Model	Description	Code	Slot supported	ID
Digital input/output	GE20-4DI-INT	GE20 series 4-channel digital input card	01480130	A/B	13
	GE20-4DO-TN-INT	GE20 series 4-channel digital sinking transistor output card	01480115	A/B	5
Analog input/output	GE20-2AD1DA-I-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (current type)	01480138	A/B	11
	GE20-2AD1DA-V-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (voltage type)	01480107	A/B	3

Type	Model	Description	Code	Slot supported	ID
Communication	GE20-232/485-INT	GE20 series RS232 or RS485 communication card	01480119	A/B	7
	GE20-232/485-RTC-INT	GE20 series RS232 or RS485 communication card (integrated RTC)	01480122	B	14
	GE20-CAN-485-INT	GE20 series CAN and RS485 communication card	01480114	A	15
Storage	GE20-TF-INT	GE20 series TF card	01480109	B	1
	GE20-TF-RTC-INT	GE20 series TF card (intergrated RTC)	01480132	B	6
Clock	GE20-RTC-INT	GE20 series RTC card	01480099	B	9

Note

The ID is "0" when there is no expansion card. For expansion card IDs, see the relevant expansion card user guides.

■ GL20 expansion module

Module	Model	Description	Code
Digital	GL20-0016ETP-INT	16-channel digital transistor PNP output module	01441069
	GL20-1600END-INT	16-channel digital input module	01441085
	GL20-0016ETN-INT	16-channel digital transistor NPN output module	01441063
	GL20-0800END-INT	8-channel digital input module	01441054
	GL20-0008ETP-INT	8-channel digital transistor PNP output module	01441062
	GL20-0008ETN-INT	8-channel digital transistor NPN output module	01441058
	GL20-0808ETN-INT	8-channel digital input and 8-channel transistor NPN output module	01441072
	GL20-0008ER-INT	8-channel general-purpose relay output module	01441064
	GL20-3200END-INT	32-channel digital input module (PUSH IN terminal)	01441067
	GL20-0032ETN-INT	32-channel transistor NPN output module (PUSH IN terminal)	01441079
	GL20-0404ETP-5V-INT	4-channel digital input and 4-channel digital output module (5 V)	01441070
	GL20-3232ETN-M-INT	32-channel digital input and 32-channel NPN transistor output module (ejector header)	01441080
	GL20-0004ER-INT	4-channel relay output general-purpose module	01441088
	GL20-0004ETP-2A-INT	4-channel high-current digital PNP transistor output module	01441059
	GL20-0032ETP-INT	32-channel digital transistor PNP output module	01441533

Module	Model	Description	Code
Analog	GL20-4AD-INT	4-channel analog input module	01441075
	GL20-4DA-INT	4-channel analog output module	01441089
	GL20-8ADV-INT	8-channel analog input module - voltage type	01441086
	GL20-8ADI-INT	8-channel analog input module - current type	01441092
	GL20-8DAV-INT	8-channel analog output module - voltage type	01441083
	GL20-8DAI-INT	8-channel analog output module - current type	01441087
Temperature measurement	GL20-4PT-INT	4-channel input thermal resistor temperature detection module	01441074
	GL20-4TC-INT	4-channel input thermocouple temperature detection module	01441066
	GL20-4PT-ISO-INT	4-channel thermal resistor temperature detection input module, channel-separated	01441528
	GL20-8TC-INT	8-channel thermocouple input module	01441531
	GL20-4TC-ISO-INT	4-channel thermocouple temperature detection input module, channel-separated	01441532
	GL20-4LC-PID-INT	4-channel PID integrated RTD/ thermocouple temperature control module	01441530
Communication	GL20-2SCOM-INT	2-channel serial port module (third-party not supported)	01441084
	GL20-2S485-INT	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01441071
Process module	GL20-2SSI-INT	2-channel SSI communication module	01441056
	GL20-2HC-INT	2-channel high-speed count module	01441073

Module	Model	Description	Code
Other module	GL20-PS2-INT	Power supply module	01441060

5 Easy501/Easy502 Programmable Logic Controller User Guide

5.1 Preface

■ Introduction

This product is a new generation of small PLC product independently developed by Inovance. It supports the EtherCAT bus control and RS485 function, enabling multi-level network communication through the RS485 and EtherCAT interfaces. It also supports process encapsulation and reuse via FB (Function Block) and FC (Function) functions. Up to 16 expansion modules can be added. For supported module types, see the "Local Expansion Modules" section in the H5U and Easy Series Programmable Logic Controller Programming Guide. In addition, it can also provide the RS485, RS232, CAN, digital input (DI), digital output (DO), analog input (AI), analog output (AO), real-time clock (RTC), and TF card functions through expansion cards.

This guide describes installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ 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

■ More documents

Document	Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Provides product information, installation and wiring, and programming examples for GE20 series expansion card.
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
Easy501/Easy502 Programmable Logic Controller User Guide (this guide)	PS00006241	Introduces the installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ Revision history

Date	Version	Description of changes
August 2026	A11	Added information on compatible I/O modules and updated the unit of program capacity in the technical specifications.
June 2026	A10	Updated safety precautions and modified output specifications.
January 2026	A09	Updated effect diagrams and product codes.
September 2025	A08	Made minor corrections.
March 2025	A07	Updated the input and output terminal wiring diagram in *"5.4.2 Terminal Wiring" on page 156*.
January 2025	A06	Made minor corrections.

Date	Version	Description of changes
July 2024	A05	**Addition** • Added input and output terminal wiring diagram in *"5.4.2 Terminal Wiring" on page 156*.
July 2024	A05	**Revision** • Updated the program data capacity in *"5.2.2 Components" on page 139*. • Updated the program data capacity in *"5.2.3.1 General Specifications" on page 142*. • Updated the number of axes supported in *"5.2.3.1 General Specifications" on page 142* • Updated the rated bus input current of the GL20-3232ETN-M expansion module in *"5.2.3.2 Power Supply Specifications" on page 143*.
March 2024	A04	**Addition** • Added the Easy50X programmable controller models and the GL20 expansion module models in *" Appendix" on page 167*.
		Revision • Updated the descriptions of operation state indicators in *"5.2.2 Components" on page 139*. • Updated the power supply specifications in *"5.2.3.2 Power Supply Specifications" on page 143*.
February 2024	A03	Made minor corrections.

Date	Version	Description of changes
December 2023	A02	• Updated the "input common terminal" and "output common terminal" in *"5.4.1 Terminal Arrangement" on page 155* • Updated *" Appendix" on page 167*.
March 2023	A01	Updated DIN rail mounting hook diagram and product specifications.
October 2022	A00	Initial 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

The warranty period of the product is 18 months as of the date of manufacture (refer to the barcode on the equipment). If otherwise agreed upon, the agreed terms and conditions shall prevail. Maintenance will be charged out of the 18-month warranty period.

Even within the 18-month warranty period, maintenance 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
- Secondary damage caused by force majeure (natural disaster, earthquake, lightning strike)

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

For details, see the Warranty Card.

5.2 Product Information

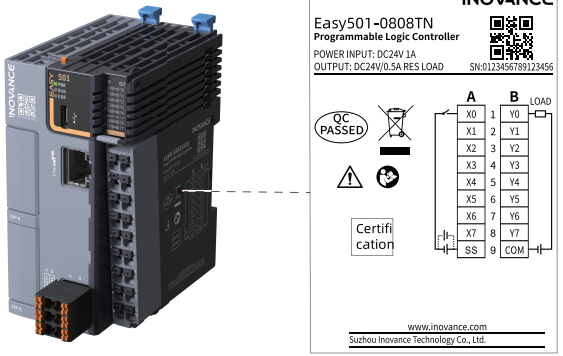
5.2.1 Model and Nameplate

■ **Model**

Easy ① 50*X* ② – 0808 ③ TN ④

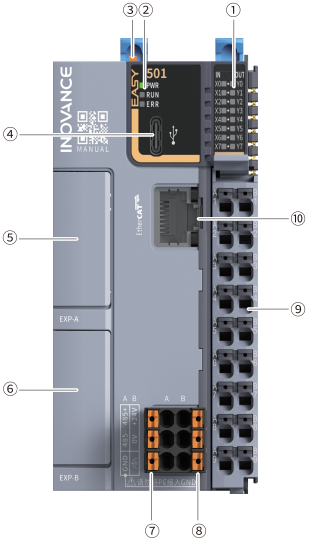
① **Product series** Easy: Easy series programmable logic controller	③ **Number of input/output channels** • 08: 8 inputs • 08: 8 outputs
② **Series** • 5: 500 series platform • 0: No Ethernet • X: Number of EtherCAT axes, where "1" is for 8 axes, and "2" is for 16 axes.	④ **Output type** TN: Sinking type transistor

■ Nameplate



Model	Description	Code
Easy501-0808TN	Easy500 series 8-input 8-output 8-axis programmable logic controller	01441159
Easy502-0808TN	Easy500 series 8-input 8-output 16-axis programmable logic controller	01441178

5.2.2 Components



No.	Port type	Identification	Definition	Indicator color	Description
①	I/O indicator	IN/OUT	I/O status display	Yellow-green	• Steady on: Input/Output active • Off: Input/Output inactive
②	Running status indicator	PWR	Power supply normal	Yellow-green	• Steady on: Power supply normal. • Off: No power or power supply abnormal.
		RUN	Running	Yellow-green	• Steady on: User program in progress • Off: User program stopped
		ERR	Operation error	Red	• Off: No critical error occurred • Flashing[1]: Critical error occurred
③	DIP switch	RUN/STOP	Controls start/ stop of the PLC.	-	-
④	Type-C port		Enables communication with PC.	-	-
⑤/-⑥	Expansion card slot	EXP-A/ EXP-B	Receives expansion card for extended functions.	-	For details on expansion card options, see "*Appendix*" *on page 167*
⑦	RS485	485+	RS485 communication signal (+)	-	-
		485-	RS485 communication signal (-)	-	-
		GND[2]	RS485 communication signal ground	-	-

No.	Port type	Identification	Definition	Indicator color	Description
⑧	Power supply interface	+24 V	24 VDC power supply (+)	-	-
		0 V	24 VDC power supply (-)	-	-
			Function grounding[2]	-	-
⑨	I/O terminal	–	8 inputs and 8 outputs	-	For details, see *"5.4.1 Terminal Arrangement" on page 155*
⑩	EtherCAT interface	EtherCAT	For EtherCAT communication	-	POE power supply is not supported.



- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: Do not connect the PE cable to the GND terminal.
- The EtherCAT communication cable model is the same as the servo communication cable model, such as S6-L-T04-3.0.

5.2.3 Product Specifications

5.2.3.1 General Specifications

Item		Easy501-0808TN	Easy502-0808TN
Program data capacity		• 200 K steps • User-defined variables: 2 MB, 128 KB of which is retentive at power failure • Soft elements: Approx. 150 KB (retentive at power failure after No. 1000; non-retentive at power failure when the PLC is only powered by USB).	
Instruction execution time	Bit operation	0.08 μs	
	Integer operation	0.232 μs	
	Floating-point operation (double precision)	0.578 μs	
Ethernet		-	
EtherCAT communication		Supports 1 EtherCAT master with up to 72 EtherCAT slaves.	
Number of axes		Up to 8 (Up to 8 axes for bus axis; up to 8 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis)	Up to 16 (Up to 16 axes for bus axis; up to 16 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis)
Serial communication		Supports up to 3 channels (one channel on the main unit and two channels extended in the expansion card).	
CAN communication		Supports one master via the expansion card (requires firmware version 5.65.2.0 or later and AutoShop 4.6.5.0 or later). • CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes	
High-speed input		Single-phase: 8-channel at 200 kHz	
High-speed output		Five axes at 200 kHz; PWM pulse width modulation supported	
Expansion module		Support up to 16 local expansion modules	

Item	Easy501-0808TN	Easy502-0808TN
Expansion card	Supports up to two expansion cards.	
Programming language	LD, ST, SFC, and FB/FC function (LD)	
Type-C	• Supports user program download/upload and firmware upgrade through type-C or GE20–TF expansion card. • USB cable communication distance: 3 m	
IP rating	IP20	
Dimensions (W x H x D)	53 mm x 100 mm x 80 mm	
Weight	Approx. 177 g	

5.2.3.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 V)
Rated bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power supply [1]	2 A (typical@5 V)
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (≤ 2 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most eight such modules can be connected to the Easy series programmable logic controller (2 A/250 mA = 8).

5.2.3.3 Input Specifications

Item		Specifications
Input type		Digital input
Number of input channels		8
Input mode		Sourcing/Sinking
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
	Input current at input OFF	Input current < 2.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	200 kHz
	Input impedance	3.4 kΩ
ON-state voltage		⩾ 15 VDC
OFF-state voltage		⩽ 5 VDC
Software filter time		• Low speed: 2 ms to 1000 ms • High speed: 2 μs to 1000 μs
Isolation method		Capacitive isolation with integrated chips
Common terminal		8-point/common terminal (The polarity +/- of input power supply is changeable.)
Input status display		The input indicator turns on (controlled by software) when the input is in drive state.

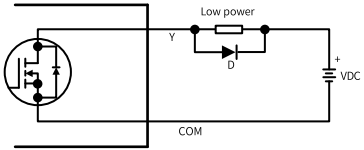
5.2.3.4 Output Specifications

Item	Specifications
Output type	Transistor NPN
Number of output channels	8
Output voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specifications
High-speed output (Y0-Y7)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point, 18 W/8-point
	Hardware response time (ON/OFF)	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
PWM output		Maximum frequency: 200 kHz; minimum pulse width: 2.5 μs; minimum resolution: 2.5 μs; adjustable duty cycle [1]: 0.01% to 99.99%
OFF-state leakage current		Less than 30 μA at 24 V
Max. residual voltage during ON		Less than 0.5 VDC
Common terminal		8-point/common terminal ("-" of power supply)
Short-circuit protection		Short circuit protection per channel, recovered after power failure
External inductive load protection		A flywheel diode [2] is required when an external inductive load is connected.
Output action display		The output indicator turns on (controlled by software) when the output is in drive state.

[1]: The duty cycle setting is frequency dependent and the pulse width corresponding to the duty cycle must not be less than the minimum pulse width.

[2]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.



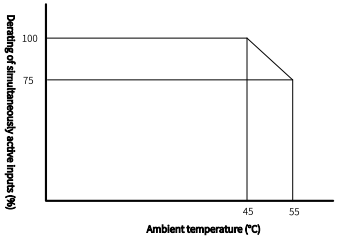
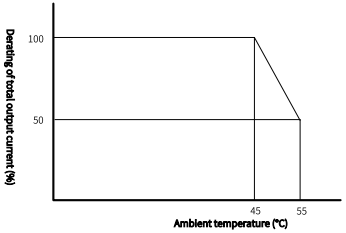
5.3 Mechanical Installation

5.3.1 Installation Environment

When installing the PLC on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specification
Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m (80 kPa)
Pollution degree	PD2
Noise immunity	2 kV on power cable (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV
Vibration resistance	• Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axes. • Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g^2/Hz; 200 Hz, 0.001 g^2/Hz, G_{rms} of 1.14 g, 30 min each in X, Y and Z directions.
Shock resistance	Application scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions.
Overcurrent protection device	• Easy301: 1.1 A fuse • Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing

Item	Specification
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.**

Item	Specification
Installation position and limit	Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet. Installation limit: • Horizontal installation: ■ Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of active inputs shall be reduced to 75% (that is, no more than six channels), with a derating rate of 2.5% for temperature rise of every 1°C.  ■ Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, total current of eight channels not higher than 2 A). When the ambient temperature is 55°C, the total current of active outputs shall be reduced to 50% (that is, total current of eight channels not higher than 1 A), with a derating rate of 5% for temperature rise of every 1°C. 

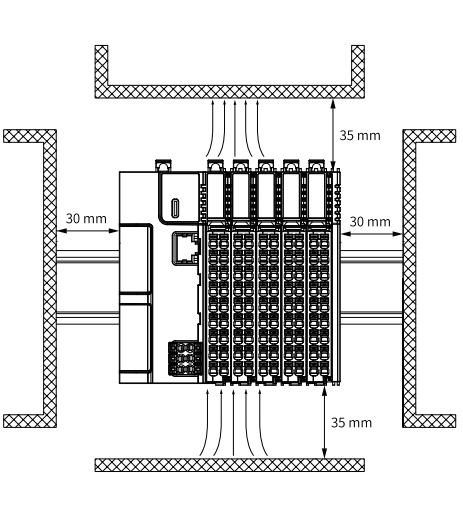
Item	Specification
Installation position and limit	• When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A.

5.3.2 Installation Position Requirements

The PLC can be mounted horizontally or vertically, on top or at the bottom of the electric cabinet. Different mounting options require different operating temperatures, see *"5.3.1 Installation Environment" on page 146*.

■ Optimal mounting option

The PLC is most preferably installed horizontally. The heat dissipation is realized by natural convection mode. To ensure normal ventilation and heat dissipation and to allow sufficient wiring space, reserve minimum clearance around the PLC, as shown in the following figure.

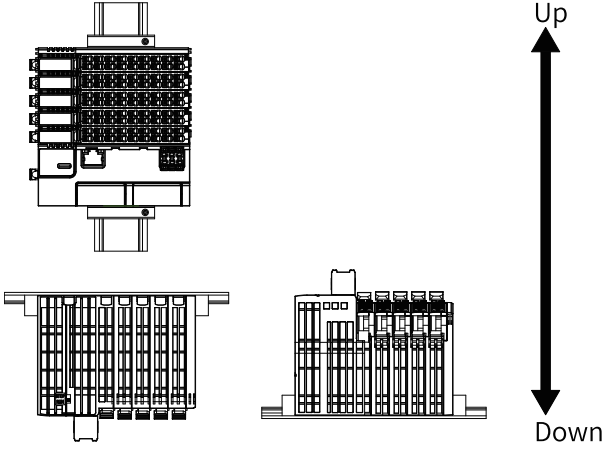


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other mounting options

Other mounting options require the same clearance as the optimal mounting option and are shown in the following figure.



Caution

In case of vertical installation:

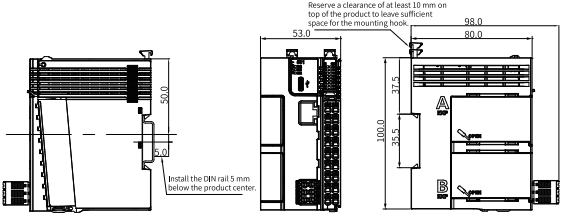
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

5.3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.
- Do not hot swap the modules. This may lead to restart or damage of the PLC or user data loss.
- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

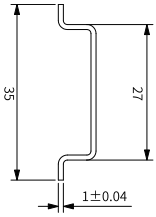
5.3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



5.3.5 Installation Procedure

The PLC is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.

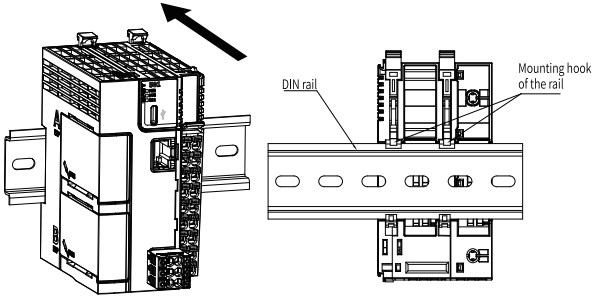


Caution

When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

■ Installing the PLC

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



2. Confirm that the DIN rail mounting latch on the main unit is locked. The locked and unlocked states of the DIN rail mounting latch are shown in the figure below.



- If the DIN rail mounting latch is in the lower position, it is locked.
- If the DIN rail mounting latch is in the upper position, it is unlocked.

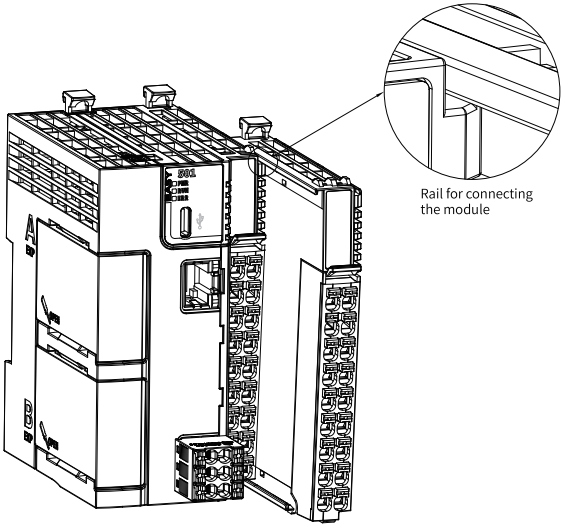
If the DIN rail mounting latch is unlocked, press down the latch to lock it.

Caution

Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

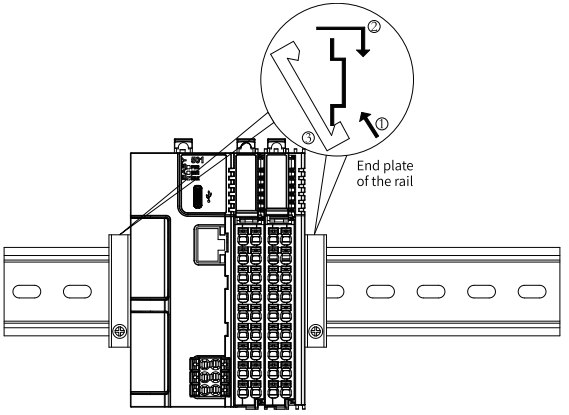
■ Installing modules to the PLC

You can install an expansion module to the PLC with the help of top and bottom guides on them, as shown below.



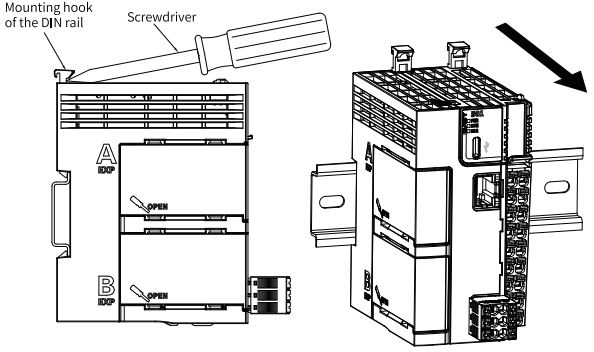
Mount an end plate on a side of the PLC or expansion module. To mount the guide rail end plate, hook its lower lip under the bottom of the guide rail. Then, rotate the

end plate so that the top of the end plate hooks onto the top of the rail. Finally, tighten the screws to lock the end plate in place, as shown below.



■ Removing the module

Use a slotted screwdriver or similar tool to pry the rail mounting latch upward. Then, pull the module forward to remove it. After removal, press down the top of the latch.



5.4 Electrical Installation

5.4.1 Terminal Arrangement



Signal (left)	Terminal (left)	Terminal (right)	Signal (right)
X0 input	A1	B1	Y0 output
X1 input	A2	B2	Y1 output
X2 input	A3	B3	Y2 output
X3 input	A4	B4	Y3 output
X4 input	A5	B5	Y4 output
X5 input	A6	B6	Y5 output
X6 input	A7	B7	Y6 output
X7 input	A8	B8	Y7 output
Input common terminal (SS)	A9	B9	Output common terminal (COM)

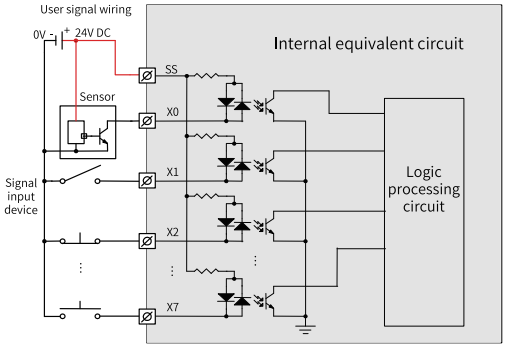
Caution

- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Failure to comply may lead to short circuit and damage the components.
- The length of a high-speed I/O interface extension cable must be within 3 m.
- Route extension cables separately from high-voltage and high-current power cables that produce strong interference signals, and avoid parallel routing.

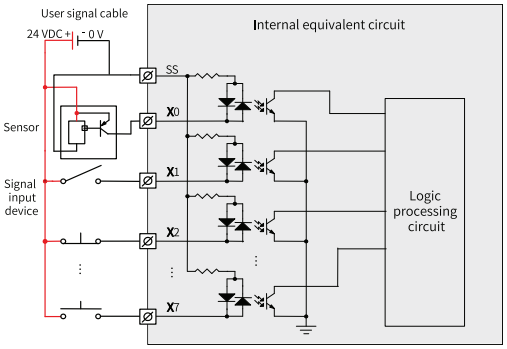
5.4.2 Terminal Wiring

■ Input terminal circuit diagram

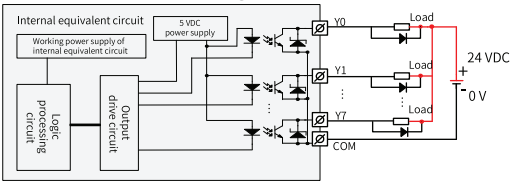
- **Sinking wiring**



- **Source wiring**



■ Output terminal circuit diagram

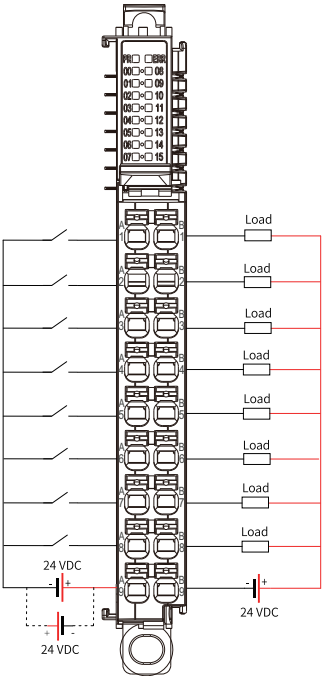


Note

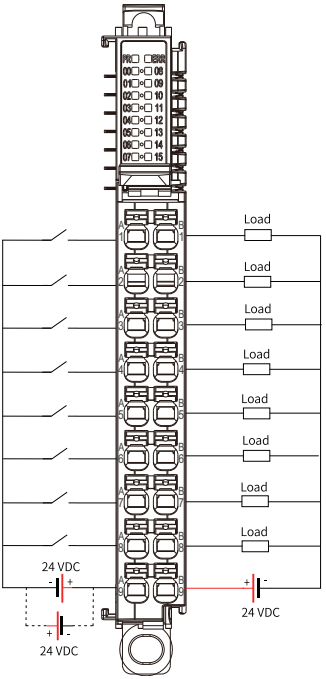
An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

■ Input and output terminal wiring diagram

- **Easy501-0808TN**



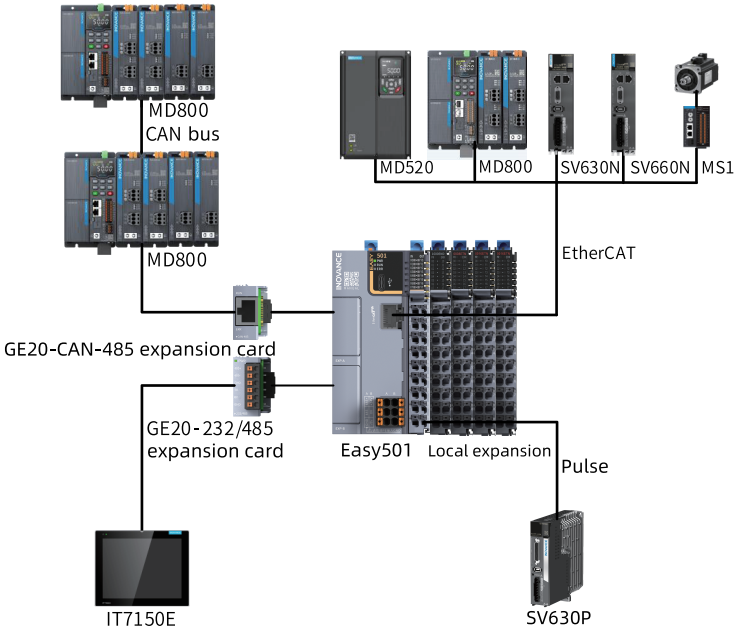
- **Easy502-0808TN**



5.5 Communication Connection

5.5.1 Communication networking

This PLC can be connected to other slave devices via the EtherCAT interface, such as MD520 and MD800 AC drives, SV630N and SV660N servo drives, and other EtherCAT-enabled modules. Through the GE20-CAN-485 expansion card, CAN bus communication enables one network to the field for the MD800 drives. In addition, point-to-point communication with computers, HMIs, and other devices can be achieved via the GE20-232/485 expansion card. A schematic diagram of the network configuration is shown below.

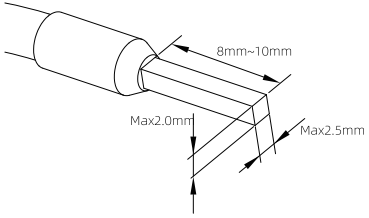


5.5.2 Cable Selection

The cable lugs and cable sizes in the following table are for reference only. Select proper cables based on actual situations.

Material Name	Applicable Cable Size	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

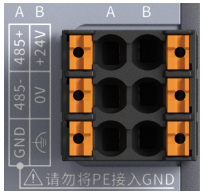
If other tubular lugs are used, crimp them to twisted cables. The following figure shows requirements on the shape and size.



5.5.3 Cable Connection

■ RS485 communication

The RS485 communication port and power supply port share the same terminal block, with RS485 communication port on the left and 24 V power supply port on the right.



- Terminal assignment

Signal description	Terminal (left)	Terminal (right)	Signal description
RS485 differential pair signal (+)	485+	+24 V	24 VDC power supply (+)
RS485 differential pair signal (-)	485-	0 V	24 VDC power supply (-)
RS485 communication ground terminal	GND	⏚	PE

Caution

- Check the silk print on both sides of the terminal to prevent wrong cable connection. Do not connect the GND cable to the I/O terminal on the lower side. Failure to comply can lead to short circuit and damage the components.
- Do not connect the PE cable to the GND terminal.

- Communication specifications

Item	Description
Number of ports supported	Supports up to 3 serial ports (1 onboard port, and 2 additional ports via an expansion card). Even when RS232 ports are included, the total number of serial ports is limited to 3.
Hardware interface	2 x 3PIN terminal (shared with the power supply)
Isolation mode	Non-isolation
Termination resistor	Without termination resistor, can be master or slave
Number of slaves connected	Up to 31 slaves (The length of each slave branch must be shorter than 3 m.)
Communication baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, and 115200 bps supported
Short-circuit protection	Providing protection against 24 V improper insertion

- Wiring
  See *"5.5.2 Cable Selection" on page 160* when selecting the communication cable.
  Insert the communication cable into the communication port.

■ EtherCAT communication

- Connection: Hold the RJ45 connector by the cable, and insert it into the EtherCAT port until you hear a click.
- Disconnection: Press and hold the latch on the RJ45 connector, and pull the connector straight out horizontally from the product.

5.5.4 EtherCAT Communication

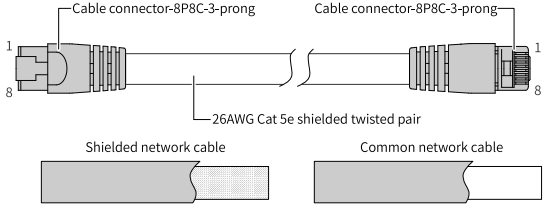
■ EtherCAT specifications

Item	Description
Communication protocol	EtherCAT protocol
Services available	CoE (PDO, SDO)
Synchronization mode	Servo drives use DC (Distributed Clock); I/O modules use input/output synchronization.
Physical layer	100BASE-TX
Baud rate	100 Mbps (100Base-TX)
Duplex mode	Full duplex
Topology	Linear
Transmission medium	Network cables, see the Wring section
Transmission distance	Less than 100 m between two nodes
Number of slaves	Up to 72 (Easy501 supports 8 axes; Easy502 supports 16 axes)
EtherCAT frame length	44 to 1498 bytes
Process data	Maximum 1486 bytes per Ethernet frame

■ Wiring

The PLC provides a CN3 port for EtherCAT bus communication. The communication cable must meet the following requirements:

Communication cable requirements



Signal pin assignment

Pin	Signal	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 applicable

Length requirements

The cable between devices cannot exceed 100 m when the EtherCAT bus is used, exceeding of which may attenuate the signal and affect normal communication.

Technical requirements

100% continuity test, without occurrence of short circuit, open circuit, misalignment, or poor contact. Cables meeting the following requirements are recommended.

Item	Specification
Cable type	Flexible crossover cable, S-FTP, Cat5e
Standard	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI Abulletin TSB EIA/TIA SB40-A&TSB36
Cross-sectional area	26 AWG
Conductor type	Twisted pair
Number of pairs	4

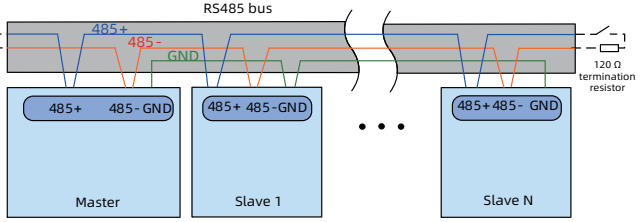
5.5.5 RS485 Communication

- It is recommended to use a shielded twisted pair cable to connect the 485+ and 485– ports of the RS485 bus.
- Connect a 120 Ω termination resistor at each end of the bus to prevent signal reflection.
- Connect the reference grounds of RS485 signals of all the nodes together.

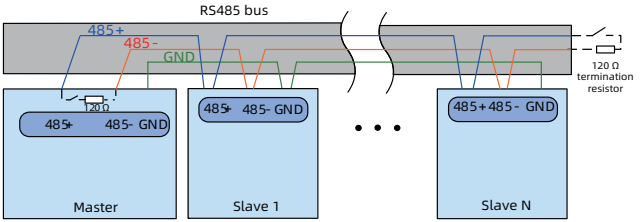
- Up to 31 nodes can be connected to the RS485 bus and the cable length of any node branch must be less than 3 m.

The following figures show the RS485 bus topology.

Local RS485 communication of Easy series hosts



RS485 communication of GE20 series extension cards



5.6 Operation and Maintenance

5.6.1 RUN and STOP States

After writing a program to the STOP-state PLC, execute the following operations to run or stop the system:

State	Operation
To run the system	1. Set the system to RUN state. 2. Ensure the RUN indicator is solid on in yellow green.
To stop the system	Set the system to STOP state or stop the PLC through the host controller.

5.6.2 User Program Download with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Steps

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

5.6.3 Firmware Programming with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Note

Perform filmware programming carefully because the original application will be deleted and user data will be lost after firmware programming (in .img format).

Steps

1. Load the TF card into the TF expansion card and mount the TF expansion card to the PLC.
2. Power on the PLC again.
   The state of firmware programming is indicated by the RUN and ERR indicators: Flashing quickly for three seconds indicates the start of firmware programming. Remaining solid on indicates firmware programming is in progress. Flashing slowly indicates firmware programming is completed.
3. After firmware programming is completed, power off the PLC and remove the TF card.
4. Power on the PLC again.

5.7 Appendix

■ Easy50X programmable logic controllers

Model	Description	Code
Easy501-0808TN	Easy500 series 8-input 8-output 8-axis programmable logic controller	01441159
Easy502-0808TN	Easy500 series 8-input 8-output 16-axis programmable logic controller	01441178

■ GE20 expansion card

Type	Model	Description	Code	Slot supported	ID
Digital input/output	GE20-4DI	4-channel input 24 VDC input Sink/Source	01480116	A/B	13
	GE20-4DO-TN	4-channel sinking transistor output 24 VDC output	01480126	A/B	5
Analog input/output	GE20-2AD1DA-I	2-channel analog input and 1-channel analog output (current type)	01480121	A/B	11
	GE20-2AD1DA-V	2-channel analog input and 1-channel analog output (voltage type)	01480129	A/B	3
Communication	GE20-CAN-485	CAN and RS485 communication (RJ45)	01480134	A	15
	GE20-232/485	RS232 or RS485 communication	01480137	A/B	7
	GE20-232/485-RTC	RS232 or RS485 communication (with RTC)	01480101	B	14
Storage	GE20-TF	TF expansion card	01480106	B	1
	GE20-TF-RTC	Storage expansion card (with integrated RTC)	01480136	B	6
Clock	GE20-RTC	Clock expansion card	01480112	B	9

Note

The ID is "0" when there is no expansion card. For expansion card IDs, see the relevant expansion card user guides.

■ GL20 expansion module

Module	Model	Description	Code
Digital	GL20-0016ETP	16-channel digital output (PNP)	01441374
	GL20-1600END	16-channel digital input	01441375
	GL20-0016ETN	16-channel digital output (NPN)	01441373
	GL20-0800END	8-channel digital input	01441362
	GL20-0008ETP	8-channel digital output (PNP)	01441363
	GL20-0008ETN	8-channel digital output (NPN)	01441364
	GL20-0808ETN	8-channel digital input and 8-channel digital output (NPN)	01441369
	GL20-0008ER	8-channel relay output module	01441372
	GL20-3200END	32-channel digital input	01441349
	GL20-0032ETN	32-channel digital output (NPN)	01441348
	GL20-0404ETP-5V	5 VDC; 4-channel digital input and 4-channel digital output (coming soon)	01441342
	GL20-3232ETN-M	32-channel digital input and 32-channel digital output (NPN), with external terminal block wiring	01441376
	GL20-0004ER	4-channel relay output module	01441344
	GL20-0004ETP-2A	4-channel digital output (PNP)	01441340
	GL20-1600END-5V	16-channel digital input	01441269
	GL20-0032ETP	32-channel digital output (PNP)	01441501

Module	Model	Description	Code
Analog	GL20-4AD	4-channel analog input	01441378
	GL20-4DA	4-channel analog output	01441379
	GL20-8ADV	8-channel analog input	01441346
	GL20-8ADI	8-channel analog input	01441343
	GL20-8DAV	8-channel analog output module - voltage type	01441282
	GL20-8DAI	8-channel analog output module - current type	01441283
	GL20-4AD-H	4-channel analog input	01441500
Temperature measurement	GL20-4PT	4-channel thermal resistor input	01441371
	GL20-4TC	4-channel thermocouple input	01441370
	GL20-4PT-ISO	4-channel isolated RTD input	01441499
	GL20-8TC	8-channel thermocouple input	01441245
	GL20-4TC-ISO	4-channel isolated thermocouple input	01441498
	GL20-4LC-PID	4-channel PID integrated RTD/ thermocouple temperature control module	01441271
Communication	GL20-2SCOM	2-channel serial port module (third-party not supported)	01441350
	GL20-2S485	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01441353
	GL20-2CAN	CAN communication module (one master and one slave) - onshore version	01441252
Process module	GL20-2SSI	2-channel SSI communication	01441354
	GL20-2HC	2-channel high-speed count module	01441334
Other module	GL20-PS2	Power supply module	01441367

6 Easy52X Series Programmable Logic Controller User Guide

6.1 Preface

■ Introduction

This product is a new-generation small programmable logic controller (PLC) independently developed by Inovance. It features EtherCAT bus control and dual Ethernet ports with built-in switch functionality, supports process encapsulation and reuse through FB/FC programming, and enables multi-level network communication over RS485, Ethernet and EtherCAT ports. It supports up to 16 expansion modules. For supported module types, refer to "Local Expansion Modules" in the H5U and Easy Series Programmable Logic Controller Programming Guide. RS485/RS232/CAN/DI/DO/AI/AO/RTC clock/TF card functions can also be provided with the expansion cards.

This guide describes installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ 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

■ More documents

Document	Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Provides product information, installation and wiring, and programming examples for GE20 series expansion card.
H5U and Easy Series Programmable Logic Controller Programming Guide	19012249	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.
H5U and Easy Series Programmable Logic Controller Instruction Guide	19012250	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
Easy52X Series Programmable Logic Controller User Guide (This guide)	PS00005506	Introduces the installation and wiring of the PLC, including product information, mechanical installation, and electrical installation.

■ Revision history

Date	Version	Description of changes
August 2026	A11	Added matching I/O modules.
May 2026	A10	• Updated the instruction execution time. • Added communication specifications in *"6.2.3.5 Communication Specifications" on page 186*.
March 2026	A09	Made minor corrections.
January 2026	A08	Updated effect diagrams and product codes.
September 2025	A07	Updated the module restrictions for non-horizontal installation in *"6.3.1 Installation Environment" on page 192*.
March 2025	A06	Updated the input and output terminal wiring diagram in *"6.4.2 Terminal Wiring" on page 202*.
January 2025	A05	Made minor corrections.

Date	Version	Description of changes
July 2024	A04	**Addition** Added input and output terminal wiring diagram in *"6.4.2 Terminal Wiring" on page 202*. **Revision** • Updated the caution note for restart in *"6.2.2 Components" on page 177*. • Updated the program data capacity in *"6.2.3.1 General Specifications" on page 181*. • Updated the number of axes supported in *"6.2.3.1 General Specifications" on page 181*. • Updated the rated bus input current of the GL20-3232ETN-M expansion module in *"6.2.3.2 Power Supply Specifications" on page 183*.
February 2024	A03	**Addition** • Added the PNP model in *"6.2.1 Model and Nameplate" on page 176*. • Added the PNP specifications to the high-speed input item in *"6.2.3.1 General Specifications" on page 181*. • Added the PNP specifications to the high-speed input (X0 to X7) item in *"6.2.3.3 Input Specifications" on page 183*. • Added the PNP specifications to the output type item in *"6.2.3.4 Output Specifications" on page 184*. • Added the output terminal circuit wiring diagram for the PNP model in *"6.4.2 Terminal Wiring" on page 202*. • Added the Easy52X series programmable logic controller models and the GL20 series expansion module models in *" Appendix" on page 227*. **Revision** • Updated the descriptions of running status indicators in *"6.2.2 Components" on page 177*. • Updated the power supply specifications in *"6.2.3.2 Power Supply Specifications" on page 183*.
March 2023	A02	Updated DIN rail mounting hook diagram and product specifications.

Date	Version	Description of changes
October 2022	A01	• Added CAN communication function. • Made minor corrections.
August 2022	A00	Initial 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 caused by proper operation of the user. Maintenance fees will be charged after the warranty period expires.

Even within the warranty period, maintenance will be charged for the following product 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
- Secondary damage caused by force majeure (natural disaster, earthquake, lightning strike)

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

For details, see the Warranty Card.

6.2 Product Information

6.2.1 Model and Nameplate

■ Model description

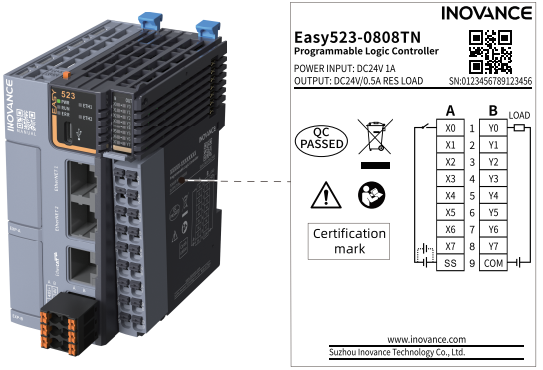
Easy 52*X* – 0808 T*X*

① ② ③ ④

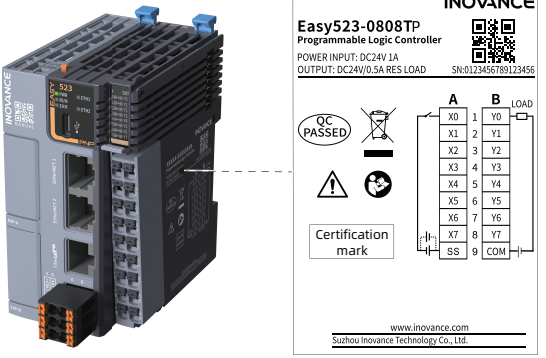
① **Product series** Easy: Easy series programmable logic controller	③ **Number of inputs/outputs** 08: 8 inputs 08: 8 outputs
② **Model code** 5: 500 series platform 2: 2 Ethernet ports X: Number of EtherCAT axes, 1 indicating 8 axes, 2 indicating 16 axes, and 3 indicating 32 axes	④ **Output type** X: N or P TN: Sink-type transistor TP: Source-type transistor

■ Nameplate description

Easy523-0808TN-INT



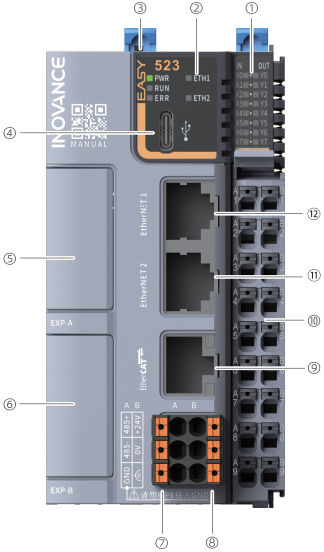
Easy523-0808TP-INT



Model	Description	Code
Easy521-0808TN-INT	Easy500 series 8-input 8-output 8-axis programmable controller	01441173
Easy522-0808TN-INT	Easy500 series 8-input 8-output 16-axis programmable controller	01441188
Easy523-0808TN-INT	Easy500 series 8-input 8-output 32-axis programmable controller	01441208
Easy521-0808TP-INT	Easy500 series 8-input 8-output 8-axis programmable controller	01441160
Easy522-0808TP-INT	Easy500 series 8-input 8-output 16-axis programmable controller	01441210
Easy523-0808TP-INT	Easy500 series 8-input 8-output 32-axis programmable controller	01441206

6.2.2 Components

The Easy52X-0808TN-INT and Easy52X-0808TP-INT models share the same components. The following section takes the Easy523-0808TN-INT model as an example to describe the components.


③
②
①
④
⑤
⑥
⑫
⑪
⑩
⑨
⑦
⑧
INOVANCE
MANUAL
EASY 523
PWR
RUN
ERR
ETH1
ETH2
EtherNET 1
EtherNET 2
EXP-A
EXP-B
EtherCAT
A B
485+
485-
0V
+24V
SHIELD
PE
AGND

No.	Type	Mark	Definition	Indicator color	Description
①	I/O indicator	IN/OUT	I/O status	Yellow-green	• Steady ON: Input or output active • OFF: Input or output inactive
②	Operation status indicator	PWR	Power supply	Yellow-green	• Steady ON: Power supply normal • OFF: Power supply off or abnormal
		RUN	Normal running	Yellow-green	• Steady ON: User program running • OFF: User program stopped
		ERR	Running error	Red	• OFF: No major error • Blinking[1]: Major error occurred
		ETH1	Ethernet link 1	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
		ETH2	Ethernet link 2	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
③	DIP switch	RUN/STOP	Run/Stop control	-	-
④	Type-C port		Communication with PC	-	-
⑤/⑥	Expansion card slot	01/02	Expansion card slots, used to expand features	-	Expansion card options are available in "*Appendix*" *on page 227*

No.	Type	Mark	Definition	Indicator color	Description
⑦	RS485	485+	Positive of RS485 communication signal	-	-
		485–	Negative of RS485 communication signal	-	-
		GND[2]	RS485 communication ground	-	-
⑧	Power supply port	+24V	24 VDC power supply positive	-	-
		0V	24 VDC power supply negative	-	-
			Function grounding[2]	-	-
⑨	EtherCAT port	EtherCAT	EtherCAT communication[2]	-	PoE power supply not supported
⑩	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"6.4.1 Terminal Layout" on page 201*
⑪/⑫	Ethernet port	EtherNET1/ EtherNET2	RJ45 ports used for Ethernet communication	-	PoE power supply not supported

Caution

- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: Do not connect the PE cable to the GND terminal.
- The EtherCAT communication cable model is the same as the servo communication cable model, such as S6-L-T04-3.0.

6.2.3 Product Specifications

6.2.3.1 General Specifications

Item		Easy521-0808TX-INT	Easy522-0808TX-INT	Easy523-0808TX-INT
Program data capacity		• 200 K steps • User-defined variables: 2 MB, 128 KB of which is retentive at power failure • Soft elements: approx. 150 KB. Soft elements with addresses 1000 and above are retentive during power loss. However, they are not retentive when the PLC is powered only by USB.		
Instruction execution time	Bit operation	0.08 μs		
	Integer operation	0.232 μs		
	Floating-point operation (double precision)	0.578 μs		
Ethernet		• Supports EtherNet/IP, Modbus TCP (up to 31 slaves), Socket, OPC UA sever, PROFINET slave, FINS TCP & UDP slave, MC communication, Web Server, SFTP, and network firewall. • Program upload/download and firmware upgrade.		
EtherCAT communication		Supports 1 EtherCAT master with up to 72 EtherCAT slaves.		

Item	Easy521-0808TX-INT	Easy522-0808TX-INT	Easy523-0808TX-INT
Number of axes available (pulse + EtherCAT bus)	Max. 8 axes Up to 8 axes for bus axis; up to 8 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis.	Max. 16 axes Up to 16 axes for bus axis; up to 16 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis.	Max. 32 axes Up to 32 axes for bus axis; up to 32 axes for profile axis; up to 5 axes for local pulse axis; up to 32 axes for virtual axis.
Serial communication	Supports up to 3 channels (one onboard channel in the PLC and two channels extended in the expansion card). **Note**: GL20-2S485 and GL20-2SCOM serial port modules are supported.		
CAN communication	Supports one master via the expansion card (requires firmware version 5.66.0.0 or later, software version AutoShop4.8.0.0 or later). • CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes		
High-speed input	• Easy52X-0808TN-INT: 8-channel at 200 kHz (single-phase) • Easy52X-0808TP-INT: 8-channel at 100 kHz (single-phase)		
High-speed output	5-axis 200 K, PWM pulse width modulation supported		
Expansion module	Support up to 16 local expansion modules		
Expansion card	Supports up to two expansion cards.		
Programming language	LD, ST, SFC, and FB/FC function (LD)		
Type-C	• Supports user program download/upload and firmware upgrade through type-C or GE20–TF expansion card. • USB cable communication distance: 3 m		
IP rating	IP20		
Dimensions (W x H x D)	53 mm x 100 mm x 80 mm		
Weight	Approx. 197 g		

6.2.3.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 VDC)
Rated bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power supply [1]	2 A (typical@5 V)
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

Note

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (⩽ 2 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most eight such modules can be connected to the Easy series programmable logic controller (2 A/250 mA = 8).

6.2.3.3 Input Specifications

Item	Specification
Input type	Digital input
Number of input channels	8
Input mode	Sourcing/Sinking
Input voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specification
High-speed input (X0-X7)	Input current at input ON	• Easy52X-0808TN-INT: ＞4 mA • Easy52X-0808TP-INT: ＞2.5 mA
	Input current at input OFF	• Easy52X-0808TN-INT: < 2.5 mA • Easy52X-0808TP-INT: ＜1.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	• Easy52X-0808TN-INT: 200 kHz • Easy52X-0808TP-INT: 100kHz
	Input impedance	• Easy52X-0808TN-INT: 3.4 kΩ • Easy52X-0808TP-INT: 5.7 kΩ
ON-state voltage		⩾ 15 VDC
OFF-state voltage		⩽ 5 VDC
Software filter time		• Low speed: 2 ms to 1000 ms • High speed: 2 μs to 1000 μs
Isolation		Capacitive isolation with integrated chips
Common terminal		8-point/common terminal (The polarity +/- of input power supply is changeable.)
Input status display		The input indicator turns on (controlled by software) when the input is in drive state.

6.2.3.4 Output Specifications

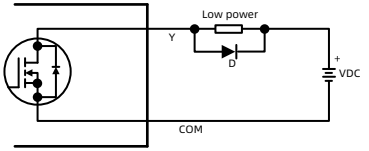
Item	Specification
Output type	• TN: NPN transistor output • TP: PNP transistor output
Number of output channels	8
Output voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specification
High-speed output (Y0-Y7)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point, 18 W/8-point
	Hardware response time (ON/OFF)	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
PWM output		Maximum frequency: 200 kHz; minimum pulse width: 2.5 μs; minimum resolution: 2.5 μs; adjustable duty cycle [1]: 0.01% to 99.99%
OFF-state leakage current		Less than 30 μA at 24 V
Maximum residual voltage during ON		Less than 0.5 VDC
Isolation		Digital isolator
Common terminal		8 points/common terminal (+/- polarity of output power supply reversible)
Short-circuit protection		Short circuit protection per channel, recovered after power failure
External inductive load protection		Flywheel diode [1] required when connecting external inductive load.
Output action display		The output indicator turns on (controlled by software) when the output is in drive state.

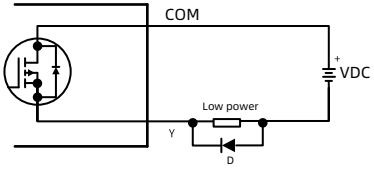
[1]: The duty cycle setting is frequency dependent and the pulse width corresponding to the duty cycle must not be less than the minimum pulse width.

[2]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.

- **Easy52X-0808TN-INT**



- **Easy52X-0808TP-INT**



6.2.3.5 Communication Specifications

■ EtherCAT specifications

Item	Specification		
	Easy521-0808TX-INT	Easy522-0808TX-INT	Easy523-0808TX-INT
Number of channels	1 channel		
Communication protocol	EtherCAT protocol		
Services available	CoE (PDO, SDO)		
Synchronization mode	Servo drives use DC (Distributed Clock); I/O modules use input/output synchronization.		
Physical layer	100Base-TX		
Baud rate	100 Mbps (100Base-TX)		
Duplex mode	Full duplex		
Topology	Linear, star, tree		
Transmission medium	Network cable. For details, see *"6.5.4 EtherCAT Communication" on page 210*		
Transmission distance	Less than 100 m between two nodes		

Item	Specification		
	Easy521-0808TX-INT	Easy522-0808TX-INT	Easy523-0808TX-INT
EtherCAT frame length	44 bytes to 1498 bytes		
Process data	Up to 1486 bytes per Ethernet frame		
Maximum synchroniza-tion jitter	±75 μs		
Number of axes	Max. 8 axes Up to 8 axes for bus axis; up to 8 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis.	Max. 16 axes Up to 16 axes for bus axis; up to 16 axes for profile axis; up to 5 axes for local pulse axis; up to 16 axes for virtual axis.	Max. 32 axes Up to 32 axes for bus axis; up to 32 axes for profile axis; up to 5 axes for local pulse axis; up to 32 axes for virtual axis.
Number of slaves	Up to 72		
EtherCAT frame length	44 bytes to 1498 bytes		
Process data	Maximum 1486 bytes per Ethernet frame		
Ring function	Cable redundancy supported		
Automatic scanning	Supported		
Cam, gear, and interpolation	Cam, gear, and interpolation supported		

■ EtherNet/IP specifications

<table>
<tr><th colspan="3">Item</th><th>Specification</th></tr>
<tr><td colspan="3">Number of ports</td><td>1 port, EtherNET1/ EtherNET2</td></tr>
<tr><td rowspan="7">Implicit message</td><td colspan="2">Maximum number of connections</td><td>64 (including both master and slave connections)</td></tr>
<tr><td colspan="2">Number of originator I/O connections</td><td>32</td></tr>
<tr><td colspan="2">Number of target I/O connections</td><td>32</td></tr>
<tr><td colspan="2">RPI</td><td>5 ms to 50000 ms</td></tr>
<tr><td rowspan="4">Class1 communication bandwidth</td><td>4Bytes</td><td rowspan="4">12800pps</td></tr>
<tr><td>250Bytes</td></tr>
<tr><td>500Bytes</td></tr>
<tr><td>1444 bytes</td></tr>
<tr><td colspan="2">Maximum data size per connection</td><td>• Input: 1444 bytes
• Output: 1444 bytes</td></tr>
<tr><td rowspan="5">Explicit message</td><td colspan="2">Maximum number of Class3 connections (as a server)</td><td>64 (server-side connection count)</td></tr>
<tr><td rowspan="2">Number of target Class3 tags</td><td>Number of originator Class3</td><td>32</td></tr>
<tr><td>Number of target Class3</td><td>32</td></tr>
<tr><td rowspan="2">Number of originator UCMM tags</td><td>Number of target UCMM tags</td><td>32</td></tr>
<tr><td>Number of target UCMM tags</td><td>32</td></tr>
</table>

■ OPC UA server specifications

Item	Specification
Safety policy	Supported
User authentication	Supports both anonymous login and username/password login.
Port range	1024 to 49151. The default value is 4840.
Maximum session timeout (s)	Default value: 10; optional range: 5 to 600,000
Minimum sampling interval (ms)	100, 250, 500, 1000 (Default), 5000, 10000
Minimum publish interval (ms)	Default value: 1000; range: 500 to 20,000,000
Maximum number of sessions	20
Maximum number of subscriptions per server	100
Maximum number of subscriptions per session	20
Maximum number of monitored nodes per subscription	1000
Maximum number of monitored nodes per server	1000
Maximum number of nodes per read/write request	1000

■ Modbus TCP specifications

Item		Specification
As master	Port range	1 to 65535 (Default: 502)
	Timeout value	100 to 10000
	Number of connected slaves	Supports connection of up to 31 slaves.
	Number of channels	Supports 255 communication channels
As slave	Number of supported masters	Supports connection of up to 31 masters.

■ PROFINET slave specifications

Item	Specification
Maximum input/ output bytes	960 bytes
Maximum number of PN modules (coupler mode)	16
Minimum I/O cycle time for communication	2 ms
Minimum watchdog time for communication	24 ms
Network topology	Star, tree, and linear

■ Socket specifications

Item	Specification
Services available	Server, client, and data transmission/reception
Supported instructions	TCP_Listen TCP_Accept TCP_Connect TCP_Receive TCP_Send TCP_Close UDP_Bind UDP_JoinGroup UDP_Receive UDP_Send

■ FINS specifications

Item	Specification
Supported protocols	TCP/UDP protocols
Server support	Enabled (default)
Port	Default: 9600
Maximum number of TCP/UDP client connections	32
Maximum number of network nodes	254
Maximum number of elements that can be read consecutively	2000 words

■ CAN specifications

Item	Specification
Number of ports supported	One port via expansion card.
Supported protocols	CANlink and CANopen protocols supported
Slave	• CANlink: Support up to 62 slaves • CANopen: Support up to 30 slaves and 16 axes

■ RS485 Specifications

For details, see "RS485 communication" in *"6.5.3 Cable Connection" on page 208*.

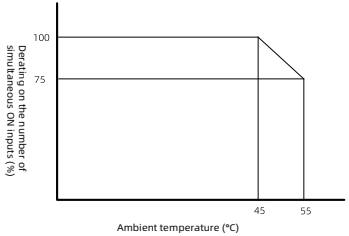
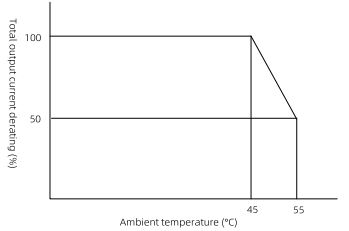
6.3 Mechanical Installation

6.3.1 Installation Environment

When installing the PLC on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specification
Operating environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m (80 kPa)
Pollution degree	PD2
Noise immunity	2 kV on power cable (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV

Item	Specification
Vibration resistance	• Application scenario: Tested according to IEC 60068-2-6; 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axes. • Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g^2/Hz; 200 Hz, 0.001 g^2/Hz, G_{rms} of 1.14 g, 30 min each in X, Y and Z directions.
Shock resistance	Application scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions.
Overcurrent protection device	• Easy301: 1.1 A fuse • Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.**

Item	Specification
Installation position and limit	Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet. Installation limit: • Horizontal installation: ■ Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of active inputs shall be reduced to 75% (that is, no more than six channels), with a derating rate of 2.5% for temperature rise of every 1°C.  ■ Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, total current of eight channels not higher than 2 A). When the ambient temperature is 55°C, the total current of active outputs shall be reduced to 50% (that is, total current of eight channels not higher than 1 A), with a derating rate of 5% for temperature rise of every 1°C. 

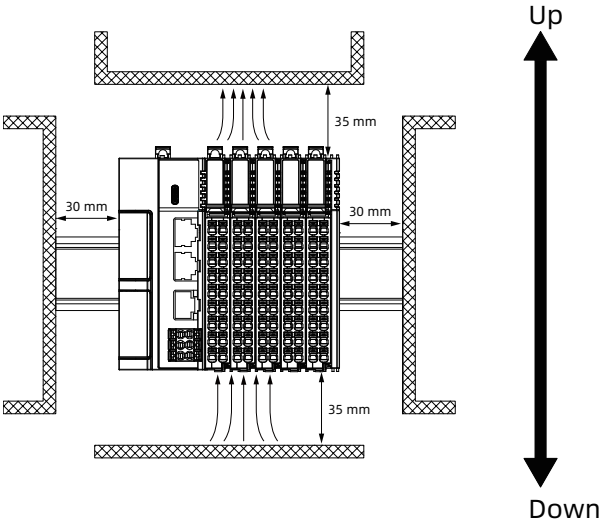
Item	Specification
Installation position and limit	When installed non-horizontally: The maximum number of inputs should not exceed 6, the maximum output current should not exceed 1 A, and the number of modules should not exceed 6.

6.3.2 Installation Position

This product can be installed in four positions (modes): horizontal (recommended), vertical, cabinet top, and cabinet bottom. Different modes have different ambient temperature requirements. For details, see *"6.3.1 Installation Environment" on page 192*.

■ Optimal installation position

The optimal installation mode is horizontal, adopting natural convection for heat dissipation. To ensure normal ventilation and heat dissipation and sufficient wiring space, sufficient clearance must be reserved around the module, as shown in the following figure.

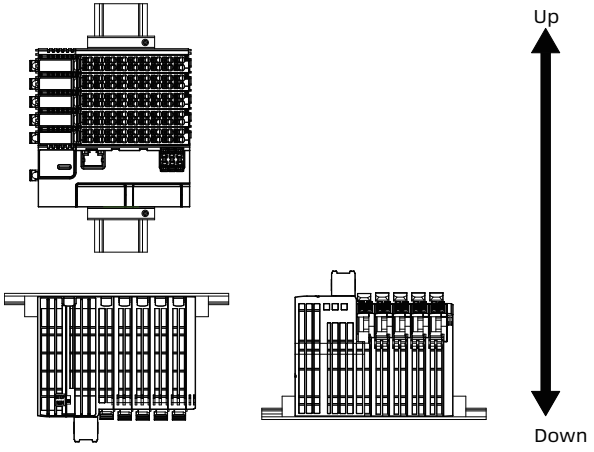


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other installation positions

For other installation positions, the same clearance requirements as the optimal installation position apply. Other installation positions are shown in the following figure.



Caution

In case of vertical installation:

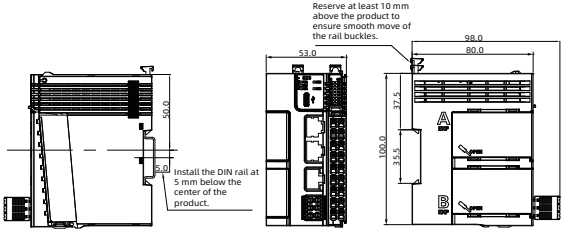
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

6.3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.
- Do not hot swap the modules. This may lead to restart or damage of the PLC or user data loss.
- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

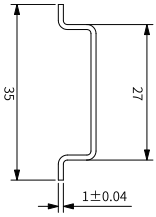
6.3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



6.3.5 Installation Method

The DIN rail in compliance with IEC 60715 is used to install the PLC. The following figure shows the dimensions (width of 35 mm and thickness of 1 mm) of the rail.

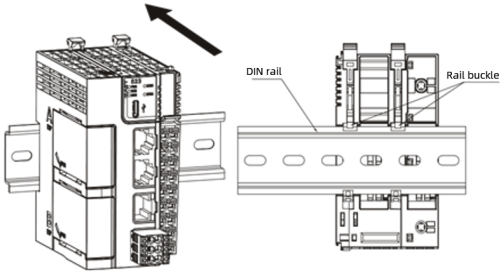


Caution

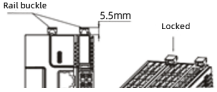
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

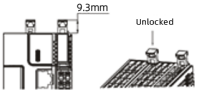
■ Installing the PLC

1. Align the PLC with the DIN rail and push the PLC towards the direction marked by the arrow until you hear a click sound, as shown in the following figure.



2. Confirm that the DIN rail buckles of the PLC are locked. The following figures show the locked and unlocked states of the buckles.





- The buckles are locked when pressed down.

- The buckles are unlocked when lifted up.

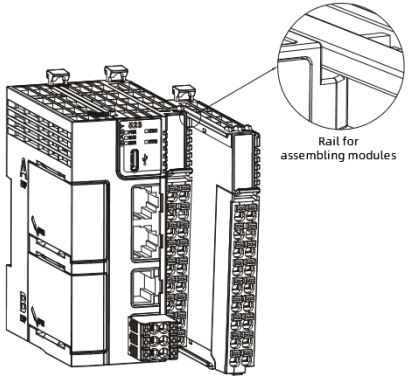
Pressing the buckles locks them.

Caution

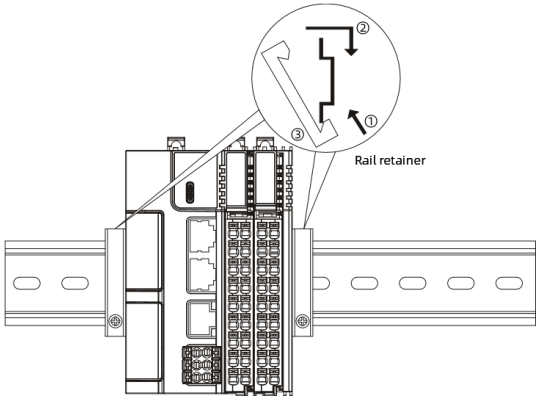
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

■ Inserting modules to the PLC

Modules are slided onto the PLC through the rails on the top and bottom of the modules, as shown in the following figure.

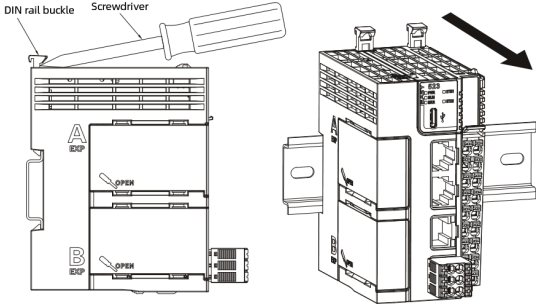


Mount an end plate on a side of the PLC or expansion module. When you install a rail retainer, hook the bottom of the retainer to the bottom of the rail, rotate the retainer to make its top hook the top of the rail, and then tighten the screw to fasten the rail retainer, as shown in the figure below.



■ Removal

Use a straight screwdriver or similar tool to pry up the rail buckles, pull the module forward, and press the buckles down after the module is pulled out.



6.4 Electrical Installation

6.4.1 Terminal Layout



Left Signal	Left Terminal	Right Terminal	Right Signal
X0 input	A1	B1	Y0 output
X1 input	A2	B2	Y1 output
X2 input	A3	B3	Y2 output
X3 input	A4	B4	Y3 output
X4 input	A5	B5	Y4 output
X5 input	A6	B6	Y5 output
X6 input	A7	B7	Y6 output
X7 input	A8	B8	Y7 output
Input common terminal SS	A9	B9	Output common terminal COM

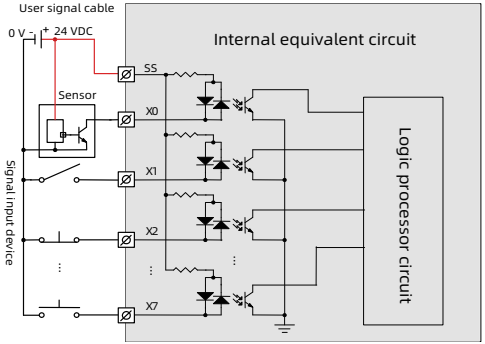
Caution

- The total extension length of high-speed I/O extension cables must not exceed 3 m.
- Do not bundle the extension cables with power cables (high voltage, high current) or other cables that carry strong interference. Route the extension cables separately from these cables and avoid running them in parallel.

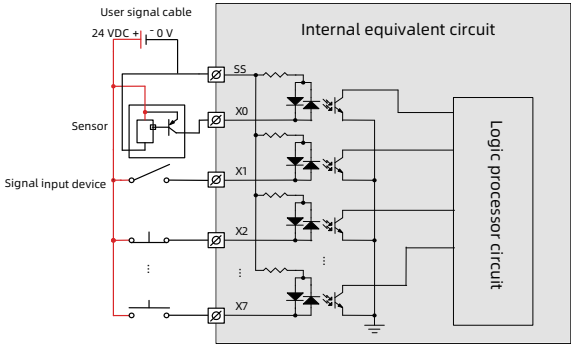
6.4.2 Terminal Wiring

■ Input terminal circuit diagram

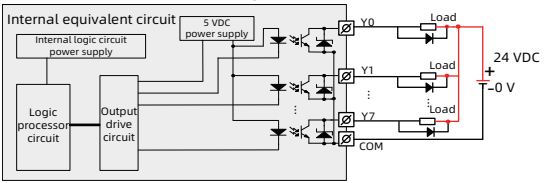
- **Sink wiring**



- **Source wiring**



■ Output terminal circuit diagram

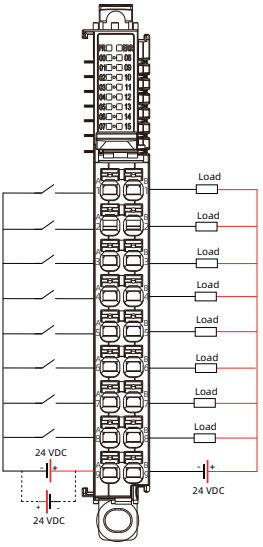


Note

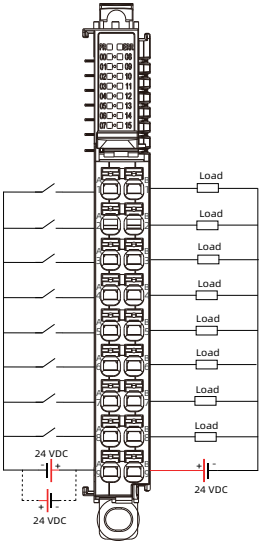
An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

■ Input and output terminal wiring

- **Easy52X-0808TN-INT**



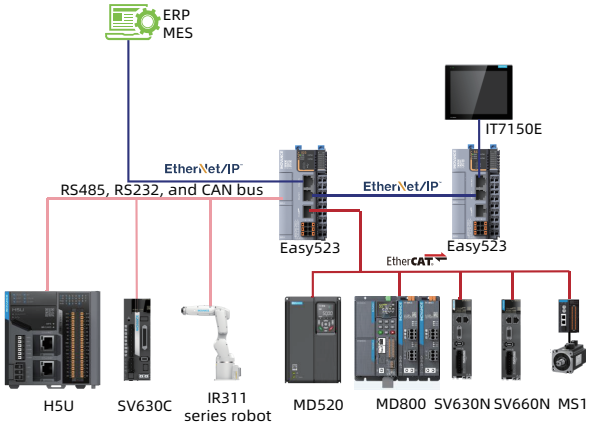
- **Easy52X-0808TP-INT**



6.5 Communication Connection

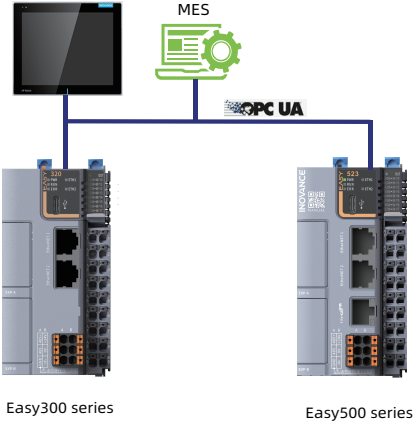
6.5.1 Communication Networking

This PLC can be connected to other sites, ERP, MES and other systems through Ethernet interface, or connected to other slaves (such as MD520, MD800, SV630N and SV660N drives) or other modules with EtherCAT function through EtherCAT interface. With GE20 series extension cards, this PLC can also be connected to H5U, SV630C, and IR311 series industrial robots through RS485, RS232, or CAN communication, as shown below.



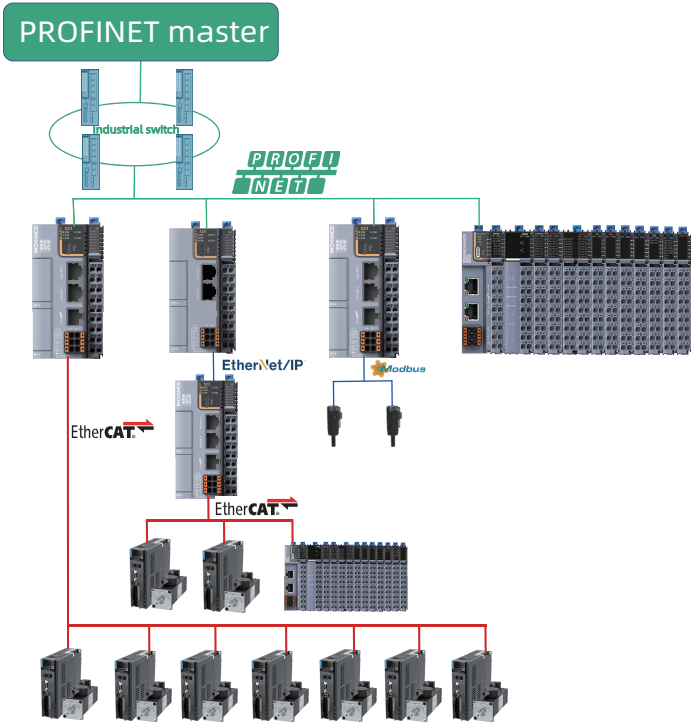
■ OPC UA topology

The MES system connects to the Easy320 and Easy52X PLCs through the OPC UA server, as shown in the following figure.



■ PROFINET topology

The PROFINET master connects to the Easy523 and Easy320 PLCs and the GL20 modules through PROFINET. It connects to other slaves, such as SV630N, SV660N, and other servos, as well as other EtherCAT-enabled modules through the EtherCAT port, as shown in the following figure.

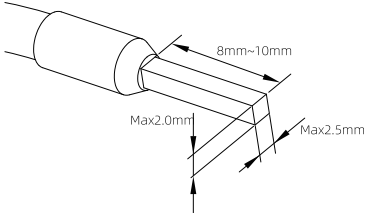


6.5.2 Cable Selection

The cable lugs and cable sizes in the following table are for reference only. Select proper cables based on actual situations.

Material Name	Applicable Cable Size	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

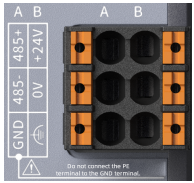
If other tubular lugs are used, crimp them to twisted cables. The following figure shows requirements on the shape and size.



6.5.3 Cable Connection

■ RS485 communication

The RS485 communication port and the 24 V power supply port are located on the left and right of the same terminal block, respectively.



- Terminal definition

Signal	Left Terminal	Right Terminal	Signal
RS485 differential pair positive signal	485+	+24V	24 VDC power supply positive
RS485 differential pair negative signal	485–	0V	24 VDC power supply negative
RS485 communication ground	GND		PE



- Check the silk prints on both sides of the terminal to prevent wrong cable connection. Do not connect the GND cable to the I/O terminals on the lower side. Failure to comply can lead to short circuit and damage the components.
- Do not connect the PE cable to the GND terminal.

- Communication specifications

Item	Specification
Number of channels	3 (The PLC itself supports one channel and can support two more channels including RS232 through expansion cards.)
Hardware port	2 x 3-pin terminal (shared with the power supply)
Isolation mode	No isolation
Termination resistor	No (The PLC can be used as the master or slave.)
Number of slaves	31 (The cable length for each slave branch must be less than 3 m.)
Baud rate	9600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps
Transmission speed	• 10 Mbps: 10BASE-T • 100 Mbps: 100BASE-TX • 10 Mbps/100 Mbps self-adaptive
Short circuit protection	Protection against incorrect connection to the 24 V terminal

- Wiring

  Select proper communication cables according to *"6.5.2 Cable Selection" on page 207* and insert the cables to the corresponding communication ports.

■ Ethernet communication

For reliable communication, use Cat 5 shielded twisted pair cables with injection molded, iron-shelled connectors as Ethernet cables.

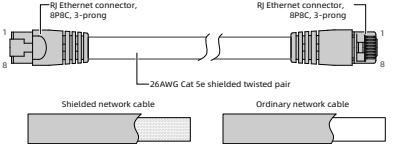
- Insert the registered jack on the cable into the Ethernet port (RJ45 port) until a click is heard.
- To remove the RJ45 network cable, press and hold the tail of the registered jack, and then pull it out along the direction parallel with the PLC.

6.5.4 EtherCAT Communication

■ Wiring

The PLC provides a CN3 port for EtherCAT bus communication. The communication cable must meet the following requirements:

Communication cable requirements



Signal pin assignment

Pin	Signal	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 applicable

Cable

100% continuity test, without occurrence of short circuit, open circuit, misalignment, or poor contact. Cables meeting the following requirements are recommended.

Item	Specification
Cable type	Flexible crossover cable, double-layer shielded (SFTP or SFTPP), Cat5e or above (100BASE-TX)
Double-shielded	Braided shield (coverage: 85%), aluminum foil shield (coverage: 100%)
Standards compliance	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI Abulletin TSB, and 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 environment temperature: -30°C to +60°C



When using EtherCAT bus, 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.

Cable code	Cable model	Cable specification (m)
15040261	S6-T04-0.3	0.3
15040262	S6-T04-3.0	3.0
15041960	S6-T04-0.2	0.2
15041961	S6-T04-0.5	0.5
15041962	S6-T04-1.0	1.0

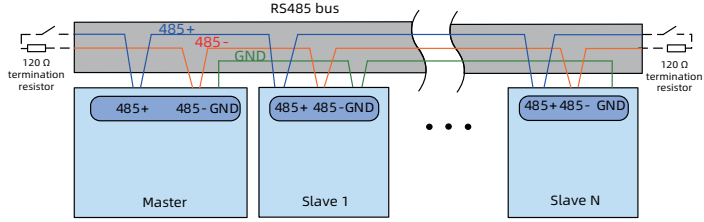
Cable code	Cable model	Cable specification (m)
15041963	S6-T04-2.0	2.0
15041964	S6-T04-5.0	5.0
15041965	S6-T04-10.0	10.0

6.5.5 RS485 Communication

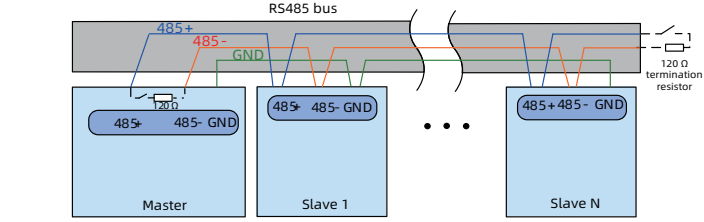
- It is recommended to use a shielded twisted pair cable to connect the 485+ and 485– ports of the RS485 bus.
- Connect a 120 Ω termination resistor at each end of the bus to prevent signal reflection.
- Connect the reference grounds of RS485 signals of all the nodes together.
- Up to 31 nodes can be connected to the RS485 bus and the cable length of any node branch must be less than 3 m.

The following figures show the RS485 bus topology.

Local RS485 communication of Easy series hosts



RS485 communication of GE20 series extension cards



6.6 Operation and Maintenance

6.6.1 Program RUN and STOP

After writing a program to the STOP-status PLC, execute the following operations to run or stop the system:

State	Operation
To run the system	1. Set the system to RUN status. 2. Ensure the RUN indicator is solid on in yellow green.
To stop the system	Set the system to STOP status or stop the PLC through the host controller.

6.6.2 User Program Download with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Steps

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

6.6.3 Firmware Programming with a TF Card

Prerequisite

- Prepare a TF card (Micro SD) with a capacity of 32 GB or less and a FAT32 file system.
- Power off the PLC.

Note

Perform filmware programming carefully because the original application will be deleted and user data will be lost after firmware programming (in .img format).

Steps

1. Load the TF card into the TF expansion card and mount the TF expansion card to the PLC.
2. Power on the PLC again.

   The state of firmware programming is indicated by the RUN and ERR indicators: Flashing quickly for three seconds indicates the start of firmware programming. Remaining solid on indicates firmware programming is in progress. Flashing slowly indicates firmware programming is completed.

3. After firmware programming is completed, power off the PLC and remove the TF card.
4. Power on the PLC again.

6.6.4 Address Conflict Detection

■ Introduction

The address conflict detection function is used to check whether the IP address of the network adapter of a device is occupied by other devices in the current network after this device is connected to the network, its IP address is modified, or the Ethernet port cable is removed. If the IP address has been occupied, check the alarm information through troubleshooting or by referring to the system operation log page.

Caution

Address conflict detection is the default system behavior.

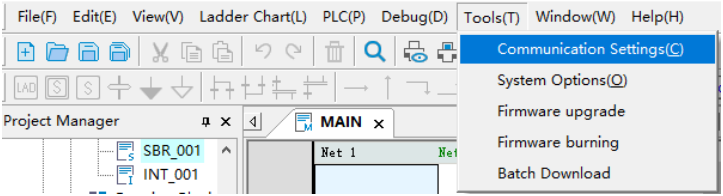
■ Viewing alarms

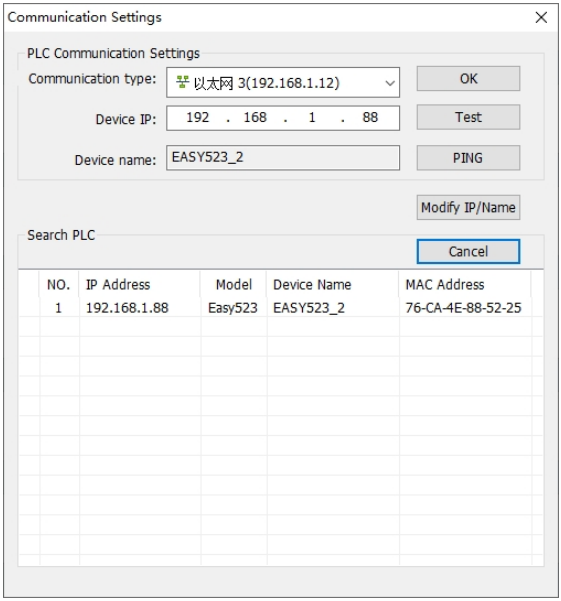
Prerequisites

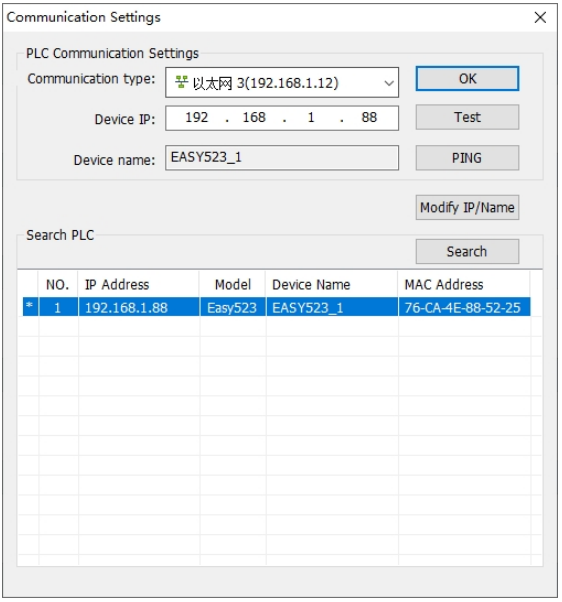
- Firmware version: V6.4.0.0 and later
- Software version: AutoShop V4.10.2.0 and later
- Easy523 is connected.

Procedure

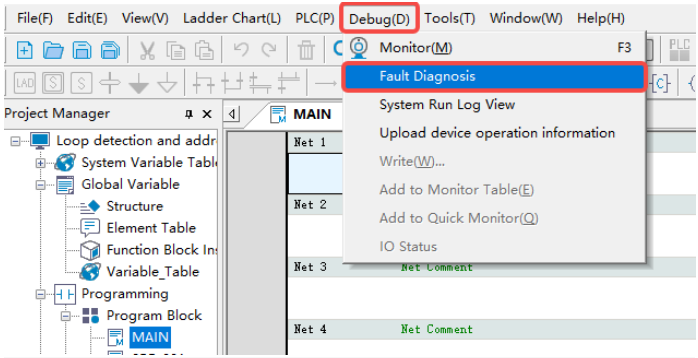
1. In the menu bar, choose "Tools(T)" > "Communication Settings". On the page displayed, modify the IP addresses of two Easy523 PLCs to 192.168.1.88. Then, only one device with the IP address 192.168.1.88 can be detected in the Ethernet, as shown in the following figure.

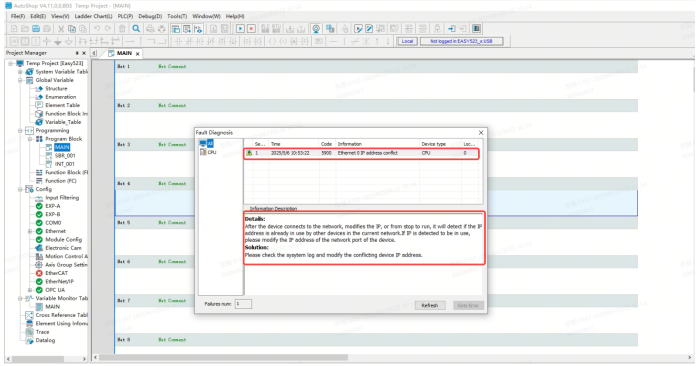



Communication Settings
PLC Communication Settings
Communication type:
以太网 3(192.168.1.12)
OK
Device IP:
192 . 168 . 1 . 88
Test
Device name:
EASY523_2
PING
Modify IP/Name
Search PLC
Cancel
NO.
IP Address
Model
Device Name
MAC Address
1
192.168.1.88
Easy523
EASY523_2
76-CA-4E-88-52-25

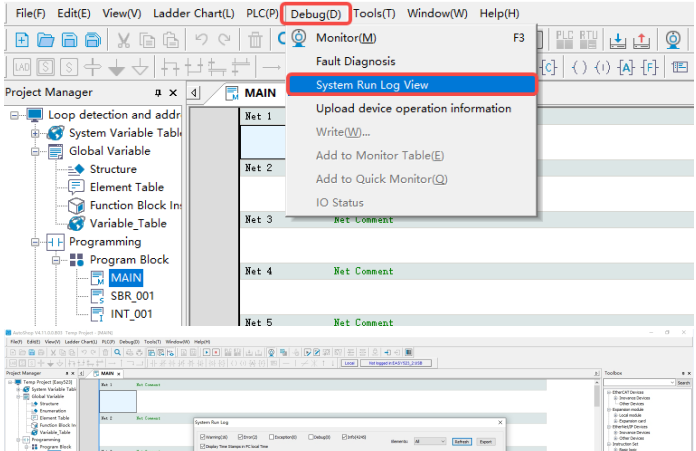


2. You can view the diagnosis information of "Ethernet IP address conflict" in any of the following two ways.
   - In the menu bar, choose "Debug(D)" > "Fault Diagnosis" to view the diagnosis information of "Ethernet IP address conflict", as shown in the following figure.

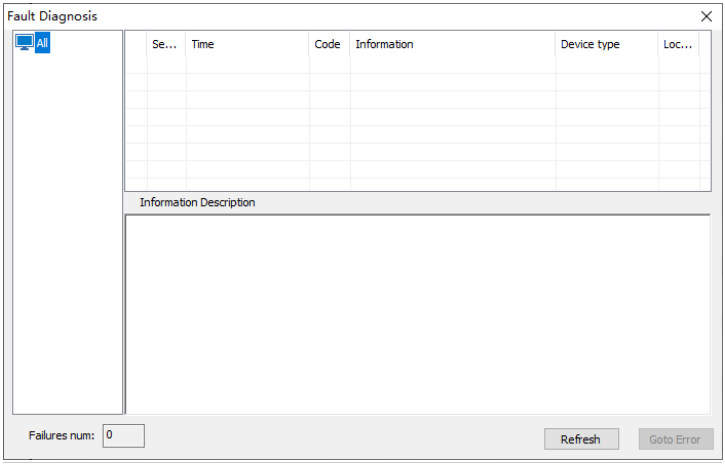


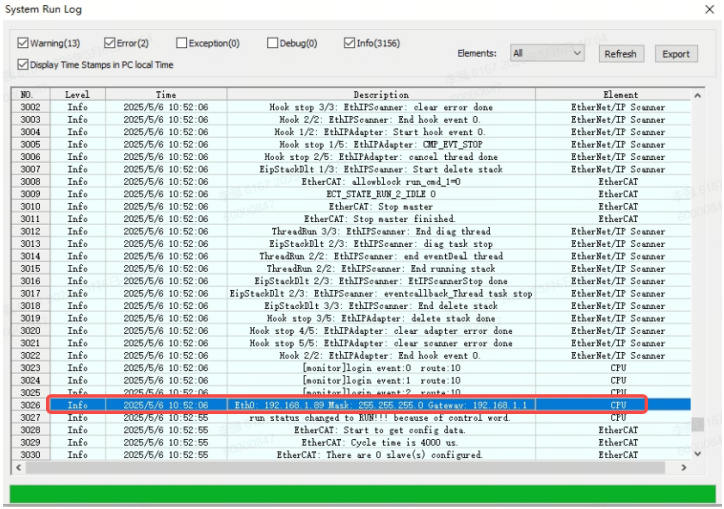


- In the software, choose "Debug(D)" > "System Run Log View" in the menu bar at the top to view the diagnosis information of "Ethernet IP address conflict". Conflicting IP address, network adapter name, and MAC address are displayed in the logs, as shown in the following figure.



3. Correct the conflicting IP address. Then, the diagnosis information of "Ethernet IP address conflict" disappears from the "Fault Diagnosis" window and the "System Run Log" window, a shown in the following figure.


Fault Diagnosis
All
Se...
Time
Code
Information
Device type
Loc...
Information Description
Failures num:
0
Refresh
Goto Error


System Run Log
Warning(13)
Error(2)
Exception(0)
Debug(0)
Info(3156)
Elements:
All
Refresh
Export
Display Time Stamps in PC local Time
NO. Level Time Description Element
3002 Info 2025/5/6 10:52:06 Hook stop 3/3: EthIPScanner: clear error done EtherNet/IP Scanner
3003 Info 2025/5/6 10:52:06 Hook 2/2: EthIPScanner: End hook event 0. EtherNet/IP Scanner
3004 Info 2025/5/6 10:52:06 Hook 1/2: EthIPAdapter: Start hook event 0. EtherNet/IP Scanner
3005 Info 2025/5/6 10:52:06 Hook stop 1/5: EthIPAdapter: CMF_EVT_STOP EtherNet/IP Scanner
3006 Info 2025/5/6 10:52:06 Hook stop 2/5: EthIPAdapter: cancel thread done EtherNet/IP Scanner
3007 Info 2025/5/6 10:52:06 EipStackDlt 1/3: EthIPScanner: Start delete stack EtherNet/IP Scanner
3008 Info 2025/5/6 10:52:06 EtherCAT: allowblock run_cmd_1=0 EtherCAT
3009 Info 2025/5/6 10:52:06 ECT_STATE_RUN_2_IDLE 0 EtherCAT
3010 Info 2025/5/6 10:52:06 EtherCAT: Stop master EtherCAT
3011 Info 2025/5/6 10:52:06 EtherCAT: Stop master finished EtherCAT
3012 Info 2025/5/6 10:52:06 ThreadRun 3/3: EthIPScanner: End diag thread EtherNet/IP Scanner
3013 Info 2025/5/6 10:52:06 EipStackDlt 2/3: EthIPScanner: diag task stop EtherNet/IP Scanner
3014 Info 2025/5/6 10:52:06 ThreadRun 2/2: EthIPScanner: end eventDeal thread EtherNet/IP Scanner
3015 Info 2025/5/6 10:52:06 ThreadRun 2/2: EthIPScanner: End running stack EtherNet/IP Scanner
3016 Info 2025/5/6 10:52:06 EipStackDlt 2/3: EthIPScanner: EtIPScannerStop done EtherNet/IP Scanner
3017 Info 2025/5/6 10:52:06 EipStackDlt 2/3: EthIPScanner: eventcallback_Thread task stop EtherNet/IP Scanner
3018 Info 2025/5/6 10:52:06 EipStackDlt 3/3: EthIPScanner: End delete stack EtherNet/IP Scanner
3019 Info 2025/5/6 10:52:06 Hook stop 3/5: EthIPAdapter: delete stack done EtherNet/IP Scanner
3020 Info 2025/5/6 10:52:06 Hook stop 4/5: EthIPAdapter: clear adapter error done EtherNet/IP Scanner
3021 Info 2025/5/6 10:52:06 Hook stop 5/5: EthIPAdapter: clear scanner error done EtherNet/IP Scanner
3022 Info 2025/5/6 10:52:06 Hook 2/2: EthIPAdapter: End hook event 0. EtherNet/IP Scanner
3023 Info 2025/5/6 10:52:06 [monitor]login event:0 route:10 CPU
3024 Info 2025/5/6 10:52:06 [monitor]login event:1 route:10 CPU
3025 Info 2025/5/6 10:52:06 [monitor]login event:2 route:10 CPU
3026 Info 2025/5/6 10:52:06 Eth0: 192.168.1.89 Mask: 255.255.255.0 Gateway: 192.168.1.1 CPU
3027 Info 2025/5/6 10:52:55 run status changed to RUN!!! because of control word. CPU
3028 Info 2025/5/6 10:52:55 EtherCAT: Start to get config data. EtherCAT
3029 Info 2025/5/6 10:52:55 EtherCAT: Cycle time is 4000 us. EtherCAT
3030 Info 2025/5/6 10:52:55 EtherCAT: There are 0 slave(s) configured. EtherCAT

6.6.5 Loop Detection

■ Introduction

When loop detection is enabled, after a device is connected to the network, the system checks whether the device is in a loop in the current network. When a loop is detected, you can view and print the diagnosis and log information in the "System Diagnosis" and "System Run Log" windows, which shows that a network loop exists and the loop connection must be disconnected.

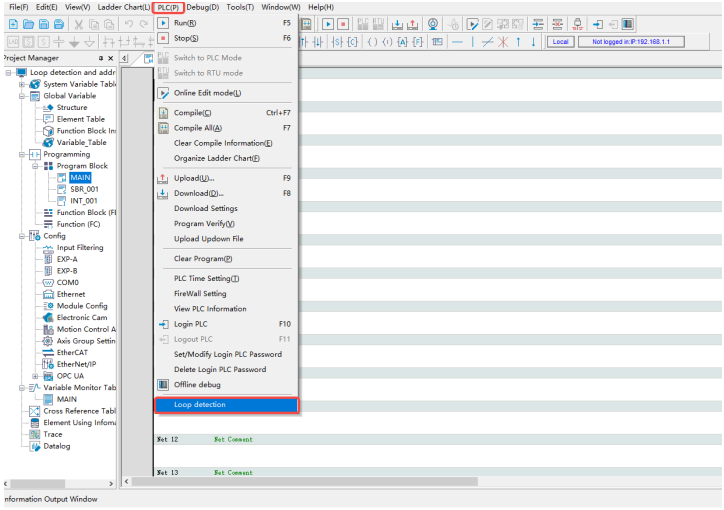
■ Function configuration

Prerequisites

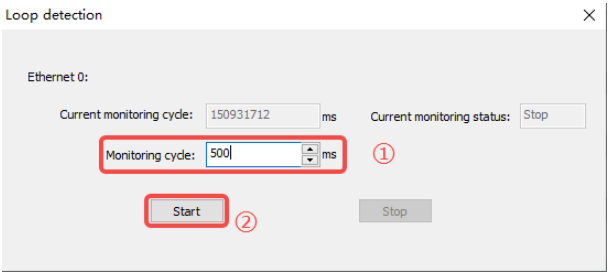
- Firmware version: V6.4.0.0 and later
- Software version: AutoShop V4.10.2.0 and later
- Easy523 is connected.

Procedure

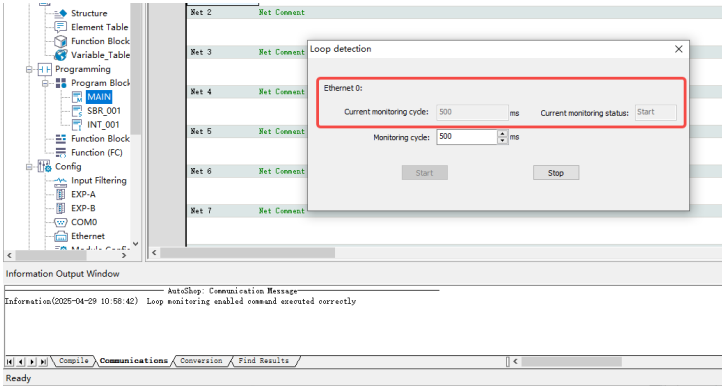
1. In the menu bar, choose "PLC(P)" > "Loop detection". The "Loop detection" configuration page is displayed, as shown in the following figure.



2. On this page, "Current monitoring cycle" and "Current monitoring status" (Start/Stop) are automatically identified and displayed. You can set "Monitoring cycle" to 500 ms at ①, and click "Start" at ② to enable loop detection, as shown in the following figure.

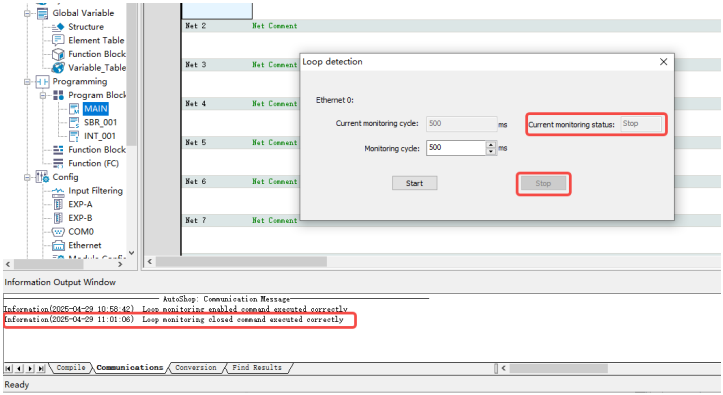


3. The "Loop monitoring enabled command executed correctly" message is displayed in the "Information Output Window" area. In the "Loop detection" window, the current monitoring cycle is updated to the set cycle and the current monitoring status changes to "Start", as shown in the following figure.



To disable the loop detection function, click "Stop" in the "Loop detection" window. Then, the prompt "Loop monitoring closed command executed correctly" is displayed in the "Information Output Window" area and the current monitoring

status in the "Loop detection" window changes to "Stop", as shown in the following figure.



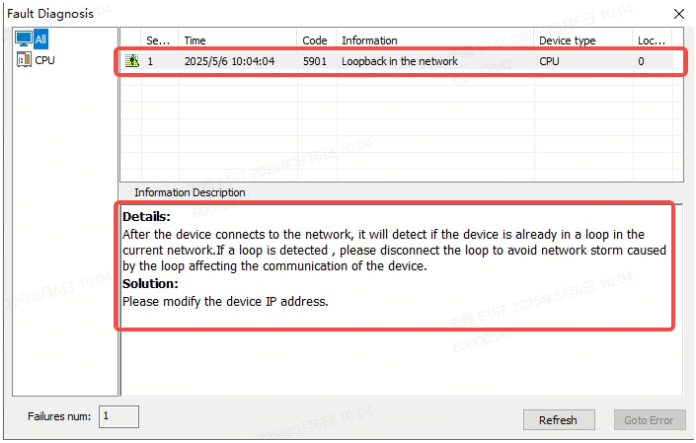
■ Viewing alarms

Prerequisites

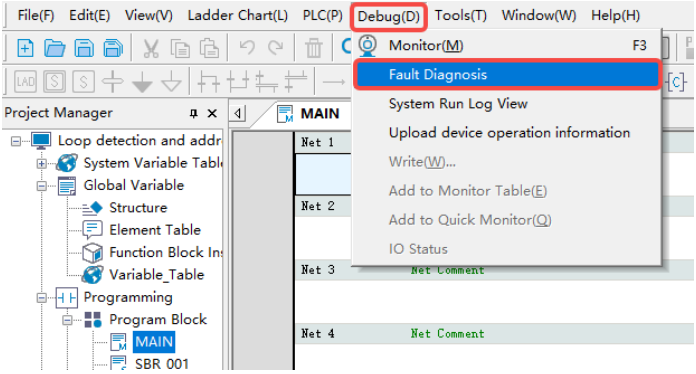
- Autoshop is started.
- Easy523 is connected.

Procedure

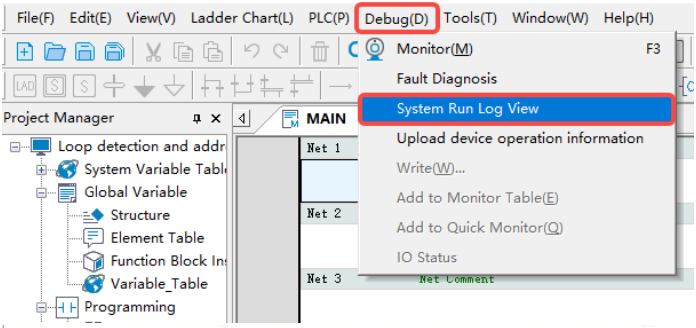
1. You can view the loop alarm in any of the following two ways.
   - In the menu bar, choose "Debug(D)" > "Fault Diagnosis" to view the loop alarm information, as shown in the following figure.

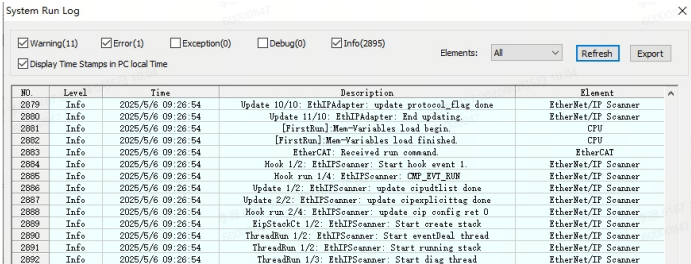


Click a diagnosis information item to view the details and solutions of a loop detection alarm, as shown in the following figure.



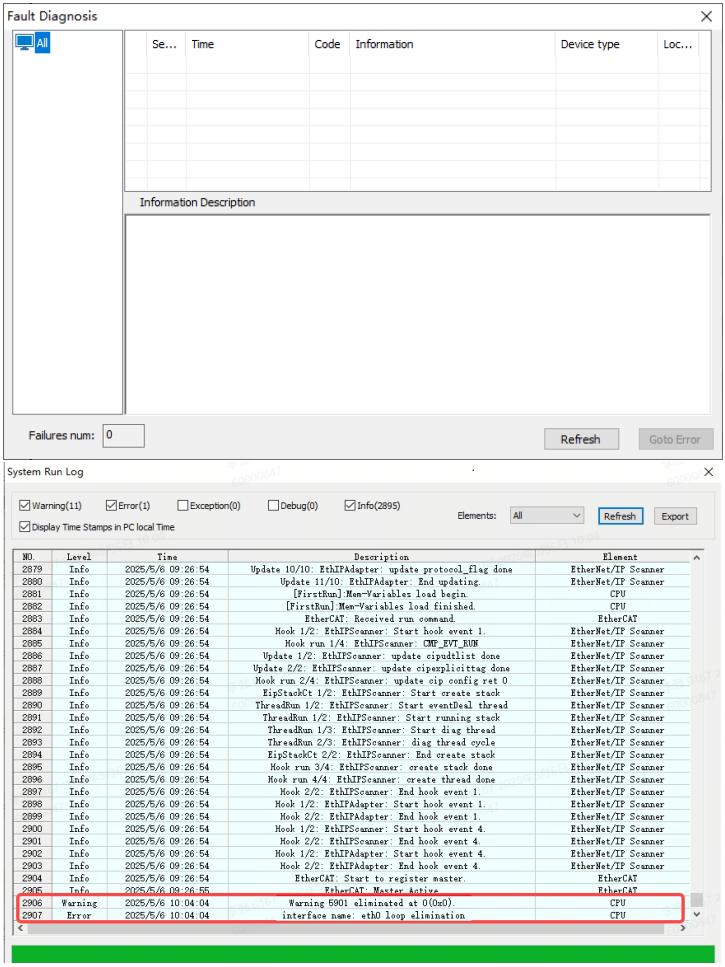
- In the menu bar, choose "Debug(D)" > "System Run Log View" to view the loop alarm information. When the system network has a loop, the alarm log indicating that Ethernet0 has a loop is displayed, as shown in the following figure.





2. Disconnect the network with the loop.

   The network loop diagnosis information disappears and "eth0 loop elimination" is displayed in the system operation log, as shown in the following figure.


Fault Diagnosis
All
Se...
Time
Code
Information
Device type
Loc...
Information Description
Failures num: 0
Refresh
Goto Error
System Run Log
Warning(11)
Error(1)
Exception(0)
Debug(0)
Info(2895)
Elements: All
Refresh
Export
Display Time Stamps in PC local Time
NO. Level Time Description Element
2879 Info 2025/5/6 09:26:54 Update 10/10: EthIPAdapter: update protocol_flag done EtherNet/IP Scanner
2880 Info 2025/5/6 09:26:54 Update 11/10: EthIPAdapter: End updating. EtherNet/IP Scanner
2881 Info 2025/5/6 09:26:54 [FirstRun]:Mem-Variables load begin. CPU
2882 Info 2025/5/6 09:26:54 [FirstRun] Mem-Variables load finished. CPU
2883 Info 2025/5/6 09:26:54 EtherCAT: Received run command. EtherCAT
2884 Info 2025/5/6 09:26:54 Hook 1/2: EthIPScanner: Start hook event 1. EtherNet/IP Scanner
2885 Info 2025/5/6 09:26:54 Hook run 1/4: EthIPScanner: CMP_EVT_RUN EtherNet/IP Scanner
2886 Info 2025/5/6 09:26:54 Update 1/2: EthIPScanner: update cipudtlist done EtherNet/IP Scanner
2887 Info 2025/5/6 09:26:54 Update 2/2: EthIPScanner: update cipexplicittag done EtherNet/IP Scanner
2888 Info 2025/5/6 09:26:54 Hook run 2/4: EthIPScanner: update cip config ret 0 EtherNet/IP Scanner
2889 Info 2025/5/6 09:26:54 EipStackCt 1/2: EthIPScanner: Start create stack EtherNet/IP Scanner
2890 Info 2025/5/6 09:26:54 ThreadRun 1/2: EthIPScanner: Start eventDeal thread EtherNet/IP Scanner
2891 Info 2025/5/6 09:26:54 ThreadRun 1/2: EthIPScanner: Start running stack EtherNet/IP Scanner
2892 Info 2025/5/6 09:26:54 ThreadRun 1/3: EthIPScanner: Start diag thread EtherNet/IP Scanner
2893 Info 2025/5/6 09:26:54 ThreadRun 2/3: EthIPScanner: diag thread cycle EtherNet/IP Scanner
2894 Info 2025/5/6 09:26:54 EipStackCt 2/2: EthIPScanner: End create stack EtherNet/IP Scanner
2895 Info 2025/5/6 09:26:54 Hook run 3/4: EthIPScanner: create stack done EtherNet/IP Scanner
2896 Info 2025/5/6 09:26:54 Hook run 4/4: EthIPScanner: create thread done EtherNet/IP Scanner
2897 Info 2025/5/6 09:26:54 Hook 2/2: EthIPScanner: End hook event 1. EtherNet/IP Scanner
2898 Info 2025/5/6 09:26:54 Hook 1/2: EthIPAdapter: Start hook event 1. EtherNet/IP Scanner
2899 Info 2025/5/6 09:26:54 Hook 2/2: EthIPAdapter: End hook event 1. EtherNet/IP Scanner
2900 Info 2025/5/6 09:26:54 Hook 1/2: EthIPScanner: Start hook event 4. EtherNet/IP Scanner
2901 Info 2025/5/6 09:26:54 Hook 2/2: EthIPScanner: End hook event 4. EtherNet/IP Scanner
2902 Info 2025/5/6 09:26:54 Hook 1/2: EthIPAdapter: Start hook event 4. EtherNet/IP Scanner
2903 Info 2025/5/6 09:26:54 Hook 2/2: EthIPAdapter: End hook event 4. EtherNet/IP Scanner
2904 Info 2025/5/6 09:26:54 EtherCAT: Start to register master. EtherCAT
2905 Info 2025/5/6 09:26:55 EtherCAT: Master Active EtherCAT
2906 Warning 2025/5/6 10:04:04 Warning 5901 eliminated at 0(0x0). CPU
2907 Error 2025/5/6 10:04:04 interface name: eth0 loop elimination CPU

6.7 Appendix

■ Easy52X series programmable logic controllers

Model	Description	Code
Easy521-0808TN-INT	Easy500 series 8-input 8-output 8-axis programmable logic controller	01441173
Easy522-0808TN-INT	Easy500 series 8-input 8-output 16-axis programmable logic controller	01441188
Easy523-0808TN-INT	Easy500 series 8-input 8-output 32-axis programmable logic controller	01441208
Easy521-0808TP-INT	Easy500 series 8-input 8-output 8-axis programmable logic controller	01441160
Easy522-0808TP-INT	Easy500 series 8-input 8-output 16-axis programmable logic controller	01441210
Easy523-0808TP-INT	Easy500 series 8-input 8-output 32-axis programmable logic controller	01441206

■ GE20 expansion card

Type	Model	Description	Code	Slot supported	ID
Digital input/output	GE20-4DI-INT	GE20 series 4-channel digital input card	01480130	A/B	13
	GE20-4DO-TN-INT	GE20 series 4-channel digital sinking transistor output card	01480115	A/B	5
Analog input/output	GE20-2AD1DA-I-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (current type)	01480138	A/B	11
	GE20-2AD1DA-V-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (voltage type)	01480107	A/B	3
Communication	GE20-232/485-INT	GE20 series RS232 or RS485 communication card	01480119	A/B	7
	GE20-232/485-RTC-INT	GE20 series RS232 or RS485 communication card (integrated RTC)	01480122	B	14
	GE20-CAN-485-INT	GE20 series CAN and RS485 communication card	01480114	A	15
Storage	GE20-TF-INT	GE20 series TF card	01480109	B	1
	GE20-TF-RTC-INT	GE20 series TF card (intergrated RTC)	01480132	B	6
Clock	GE20-RTC-INT	GE20 series RTC card	01480099	B	9

Note

The ID is "0" when there is no expansion card. For expansion card IDs, see the relevant expansion card user guides.

■ GL20 expansion module

Module	Model	Description	Code
Digital	GL20-0016ETP-INT	16-channel digital transistor PNP output module	01441069
	GL20-1600END-INT	16-channel digital input module	01441085
	GL20-0016ETN-INT	16-channel digital transistor NPN output module	01441063
	GL20-0800END-INT	8-channel digital input module	01441054
	GL20-0008ETP-INT	8-channel digital transistor PNP output module	01441062
	GL20-0008ETN-INT	8-channel digital transistor NPN output module	01441058
	GL20-0808ETN-INT	8-channel digital input and 8-channel transistor NPN output module	01441072
	GL20-0008ER-INT	8-channel general-purpose relay output module	01441064
	GL20-3200END-INT	32-channel digital input module (PUSH IN terminal)	01441067
	GL20-0032ETN-INT	32-channel transistor NPN output module (PUSH IN terminal)	01441079
	GL20-0404ETP-5V-INT	4-channel digital input and 4-channel digital output module (5 V)	01441070
	GL20-3232ETN-M-INT	32-channel digital input and 32-channel NPN transistor output module (ejector header)	01441080
	GL20-0004ER-INT	4-channel relay output general-purpose module	01441088
	GL20-0004ETP-2A-INT	4-channel high-current digital PNP transistor output module	01441059
	GL20-0032ETP-INT	32-channel digital transistor PNP output module	01441533

Module	Model	Description	Code
Analog	GL20-4AD-INT	4-channel analog input module	01441075
	GL20-4DA-INT	4-channel analog output module	01441089
	GL20-8ADV-INT	8-channel analog input module - voltage type	01441086
	GL20-8ADI-INT	8-channel analog input module - current type	01441092
	GL20-8DAV-INT	8-channel analog output module - voltage type	01441083
	GL20-8DAI-INT	8-channel analog output module - current type	01441087
Temperature measurement	GL20-4PT-INT	4-channel input thermal resistor temperature detection module	01441074
	GL20-4TC-INT	4-channel input thermocouple temperature detection module	01441066
	GL20-4PT-ISO-INT	4-channel thermal resistor temperature detection input module, channel-separated	01441528
	GL20-8TC-INT	8-channel thermocouple input module	01441531
	GL20-4TC-ISO-INT	4-channel thermocouple temperature detection input module, channel-separated	01441532
	GL20-4LC-PID-INT	4-channel PID integrated RTD/ thermocouple temperature control module	01441530
Communication	GL20-2SCOM-INT	2-channel serial port module (third-party not supported)	01441084
	GL20-2S485-INT	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01441071
Process module	GL20-2SSI-INT	2-channel SSI communication module	01441056
	GL20-2HC-INT	2-channel high-speed count module	01441073

Module	Model	Description	Code
Other module	GL20-PS2-INT	Power supply module	01441060

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: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

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