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AM300 Series
Programmable Logic Controller

User Guide

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

Data code PS00008836A08

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■ Waste Disposal

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

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

■ Proper Use of the Product

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

Preface

■ Introduction

This product is a new generation of medium-sized programmable logic controller (PLC) independently developed by Inovance. It provides dual network ports with independent IP addresses. It allows process encapsulation and reuse through the Function Block (FB) and Function (FC) features, and supports multi-layer network communication through the RS485 and Ethernet ports. This product can accommodate a maximum of 16 expansion modules. This product can also provide the RS485, RS232, CAN, digital input (DI), digital output (DO), analog input (AI), analog output (AO), real-time clock (RTC), and trans-flash (TF) card features through expansion cards.

This guide describes the product information, mechanical installation, electrical installation, communication connection, and operation and maintenance.

■ Compliance

The following table lists the certifications, directives, and standards applicable to this product. For certifications actually acquired for the product you purchased, see the certification marks on the product nameplate.

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

Data Name	Data Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Describes the product information, mechanical installation, input connection, output connection, I/O connection, communication connection, and programming examples of the GE20 series expansion card.
Medium-Sized PLC Programming Software User Guide	PS00003145	Describes the basic functions, quick start, network settings, and programming basics of the medium-sized PLC programming software.
Medium-Sized PLC Programming Guide (Motion Control)	19012378	Describes the composition of the PLC motion control system, mechanism of the motion control program, motion control (MC) instructions, and simulation and commissioning related operations.
Medium-Sized PLC Instruction Guide	19012377	Describes basic instructions of the medium-sized PLC.
AM300 Series Programmable Logic Controller User Guide (this guide)	PS00008836	Describes the product information, mechanical installation, electrical installation, communication connection, and operation and maintenance.

■ Revision History

Date	Version	Description
January 2026	A08	Updated effect diagrams and the product code.
September 2025	A07	Updated effect diagrams.
May 2025	A06	Corrected minor errors.

Date	Version	Description
April 2025	A05	• Updated the Ethernet description in *"2.3.1 General Specifications" on page 24* • Updated the software filter time description in *"2.3.3 Input Specifications" on page 28* • Updated the uninstallation instruction in *"3.5 Installation Method" on page 37* • Updated notes for input and output terminal wiring in *"4.2 Terminal Wiring" on page 42*
February 2024	A04	• Updated the descriptions of status indicators in *"2.2 Components" on page 21* • Added the PNP specifications in the pulse input item in *"2.3.1 General Specifications" on page 24* • Updated the power supply specifications in *"2.3.2 Power Supply Specifications" on page 28* • Added the PNP specifications in the high-speed input (X0 to X7) item in *"2.3.3 Input Specifications" on page 28* • Added the PNP specifications in the output type item in *"2.3.4 Output Specifications" on page 29* • Added the PNP output terminal wiring in *"4.2 Terminal Wiring" on page 42* • Added the AM320 programmable controller models and the GL20 expansion module models in *" Appendix" on page 54*
November 2023	A03	• Added the GE20-TF-RTC memory expansion card (with integrated RTC) in *" Appendix" on page 54* • Added the support for the CAN free protocol in CAN specifications in *"2.3.1 General Specifications" on page 24*
September 2023	A02	• Added CAN specifications in *"2.3.1 General Specifications" on page 24* • Added CAN communication descriptions in *"5.1 Communication Networking" on page 48* • Added the GE20-CAN-485 expansion card in *" Appendix" on page 54*
July 2023	A01	Corrected minor errors.
June 2023	A00	Initial release.

■ Access to the Guide

This guide is not in the scope of delivery. If necessary, you can download the PDF file 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 to obtain the corresponding guide.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.

■ Warranty Disclaimer

If your product becomes defective under normal use conditions, we will offer guaranteed repair services within the warranty period. Maintenance will be charged after the warranty period expires.

Even in the warranty period, a maintenance fee will be charged for repair of 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 unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (such as natural disaster, earthquake, and lightning strike)

The maintenance fee will be charged according to our latest Price List if not otherwise agreed upon.

For details, see the Product Warranty Card.

1 General Safety Rules

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.

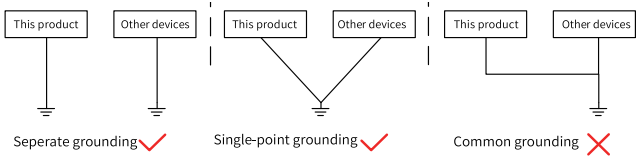


- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation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

2.1 Model and Nameplate

■ Model description

AM 320 – 0808 TX
① ② ③ ④

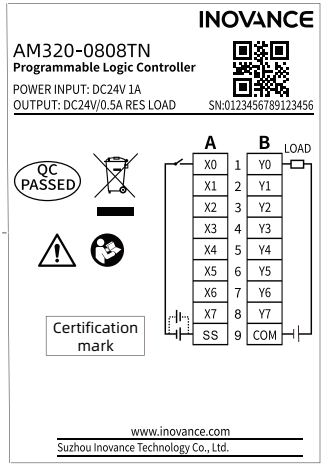
① **Product series** AM: AM series programmable logic controller	③ **Number of inputs/outputs** 08: 8 inputs 08: 8 outputs
② **Model code** 3: 300 series platform 2: Two Ethernet ports 0: Model serial number	④ **Output type** X: N or P TN: Sink-type transistor TP: Source-type transistor

■ Nameplate description

The nameplate is identical for the entire AM300 series, except for the model and SN. This section uses the AM320 model as an example for illustration.

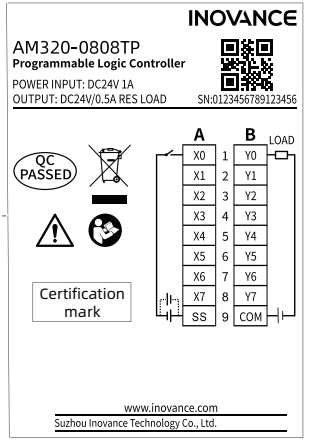
AM320-0808TN





AM320-0808TP

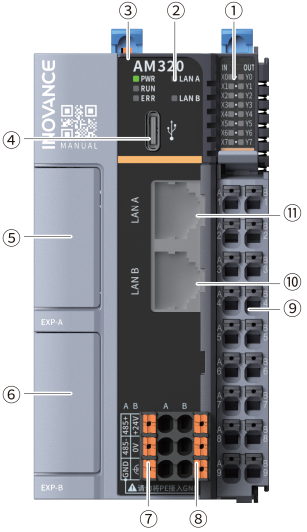




Model	Description	Code
AM320-0808TN-INT	AM300 series 8-input 8-output programmable controller	01441203
AM320-0808TP-INT	AM300 series 8-input 8-output programmable controller	01441171

2.2 Components

Components are identical for the entire AM300 series. This section uses the AM320-0808TN model as an example for illustration.



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
		LAN A	LAN A state	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
		LAN B	LAN B state	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 54

No.	Type	Mark	Definition	Indicator Color	Description
⑦	RS485	485+	Positive of RS485 communication signal	-	-
		485–	Negative of RS485 communication signal	-	-
		GND	RS485 communication ground	-	-
⑧	Power supply port	+24V	24 VDC power supply positive	-	-
		0V	24 VDC power supply negative	-	-
		⏚	Function grounding (FE)	-	-
⑨	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"4.1 Terminal Layout" on page 41*
⑩/-⑪	Ethernet port	LAN B/LAN A	RJ45 ports used for Ethernet communication	-	-

Caution

[1]: If the product malfunctions and needs to be powered off and restarted, be sure to turn off the power and wait for at least 10 seconds after the power indicator is off before proceeding with the power-on and startup operation.

2.3 Product Specifications

2.3.1 General Specifications

■ Specifications

Item		Specification
Program capacity		10 MB
Data capacity		20 MB, of which 512 KB is retentive at power failure
Bit operation		4 ns
Integer operation		5 ns
Floating-point operation (double precision)		8 ns
EtherCAT		Not supported
Axis control performance		4-axis synchronization within a 1 ms cycle (execution time for motion control calculation)
Electronic cam, interpolation		Supported
Local expansion		Expansion module: Supports up to 16 GL20 series local expansion modules.
		Expansion card: Supports 10 types of expansion cards. Up to 2 expansion cards can be installed simultaneously. For the supported type of expansion card, see *" Appendix" on page 54*
Programming platform		InoProShop (CODESYS)
Programming language		IEC 61131-3 programming language (LD, ST, SFC, CFC)
User program upload/ download	EtherNet	Supports PLC monitoring and user program upload/ download over EtherNet.
	TF card	Supports user program download via GE20 series memory expansion card.
	Type-C	Supports PLC monitoring and user program upload/ download via Type-C port.

Item		Specification
Firmware programming	SD card	Supports firmware programming via the GE20 series memory expansion card.
	Type-C	Supports firmware programming by connecting to a PC via Type-C.
Firmware upgrade	EtherNet	Supports firmware upgrade via Ethernet
Dimensions and weight	Dimensions (W x H x D)	53 mm x 100 mm x 80 mm
	Weight	Approx. 184 g
IP rating		IP20

■ Communication specifications

Item		Specification
EtherNet	Ethernet port specifications	• Two Ethernet ports for two NICs, each with a unique IP. • 100M auto-negotiation RJ45 Ethernet port
	Supports EtherNet/IP master and slave.	• As a master station: supports up to 32 slave stations. • As a slave station: supports up to 32 master stations.
	Supports Modbus TCP master and slave.	• As a master station: supports 63 slave stations • As a slave station: supports 31 master stations
	OPC UA server	Supports up to 16 clients
	TCP/UDP free protocol	Supports up to 16 connections
FINS TCP/UDP communication		2 channels (that supports up to 32 connections per channel)
MELSEC communication		2 channels (that supports up to 32 connections per channel)

Item		Specification
OPC UA	User authentication	Anonymous
	Server port	4840
	Session timeout	5 s to 600000 s
	Sampling interval	100 ms, 300 ms, 500 ms, 1000 ms, 2500 ms, 5000 ms
	Publish interval	200 ms to 20000000 ms
	Maximum number of sessions	50
	Maximum number of subscriptions per server	200
	Maximum number of monitored nodes per server	20000
	Maximum number of subscriptions per session	50
	Maximum number of monitored nodes per subscription	10000
	Maximum number of nodes per read/ write request	1000

Item		Specification
RS485	Number of channels supported	11 • Supports 3 channels on the main units: 1 channel on the main unit + 2 channels via expansion cards. • Supports 8 channels via expansion modules: 4 GL20-2S485 modules x 2 channels
	Hardware interface	2×3Pin terminal (shared with the power supply)
	Isolation mode	Non-isolation
	Termination resistor	Without termination resistor, can be master or slave
	Number of slaves connected	Supports up to 31 Modbus RTU slaves.
	Communication baud rate	9600 bit/s, 19200 bit/s, 38400 bit/s, 57600 bit/s, 115200 bit/s
	Short-circuit protection	Providing protection against 24 V improper insertion
	Serial port free protocol	Supported
CAN		• Supports CANopen master: Supports one-channel CANopen master via an expansion card, supporting with up to 63 slaves. • Supports CAN free protocol.
USB	Number of ports supported	1
	USB cable distance	1.5 m
	USB communication version	USB 2.0 at full speed
	USB port	Type-C
	Master/Slave	Can only be used as a slave, not as a master.
	Power supply support	Powers the PLC and download user programs via USB (not available with local modules connected).

2.3.2 Power Supply Specifications

Item	Specification
Rated voltage of terminal input power	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated current of terminal input power	1 A (maximum value at 24 VDC)
Rated voltage of bus output power	5.2 VDC (4.9 VDC to 5.5 VDC)
Rated current of bus output power[1]	2 A (maximum value at 5 V)
24 V input power protection	Protection against short circuit and reverse connection
Hot swapping	Not supported

Note

[1]: Expansion modules are powered by the AM300 series 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 AM300 series programmable logic controller (2 A/250 mA = 8).

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)

Item		Specification
High-speed pulse input (X0 to X7)	Number of hardware input channels	8
	Input current when input is ON	• AM320-0808TN: > 4 mA • AM320-0808TP: > 2.5 mA
	Input current when input is OFF	• AM320-0808TN: < 2.5 mA • AM320-0808TP: < 1.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	• AM320-0808TN: 200 kHz • AM320-0808TP: 100 kHz
	Input impedance	• AM320-0808TN: 3.4 kΩ • AM320-0808TP: 5.7 kΩ
	Number of encoder axes	Max. 4
	A/B phase, pulse/direction, CW/CCW, single-phase pulse signal	Supported
ON voltage		⩾ 15 VDC
OFF voltage		⩽ 5 VDC
Software filter time		• Low-speed: 2 ms to 1000 ms • High-speed: 200 ns to 100 μs
Isolation mode		Capacitive isolation for integrated chip
Common terminal mode		8-point/common terminal (positive/negative polarity of input power being changeable)

2.3.4 Output Specifications

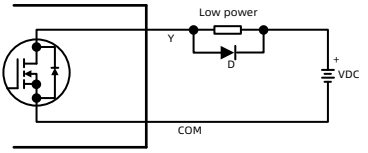
Item	Specification
Output type	• TN: NPN transistor output • TP: PNP transistor output
Number of output channels	8
Output voltage class	24 VDC±10% (21.6 VDC to 26.4 VDC)

Item		Specification
High-speed pulse output (Y0 to Y7)	Number of hardware output channels	8
	Resistive output load	0.5 A/point; 2 A/8-point
	Inductive output load	7.2 W/point; 24 W/8-point
	Lamp output 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
	Number of pulse axes	Supports up to 4 pulse axes, which share motion control instructions with the bus axis
	A/B phase, pulse/direction, CW/CCW, single-phase pulse signal	Supported
	PWM function	Supported (5 Hz to 200 kHz)
PWM output		Maximum frequency 200 kHz, minimum pulse width 2.5 μs, minimum resolution 2.5 μs, adjustable duty cycle 0.01% to 99.99%
Leakage current upon OFF		< 30 μA at rated 24 V
Maximum residual voltage during ON		< 0.5 VDC
Isolation mode		Digital isolator
Common terminal mode		8-point/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		Flywheel diode[1] is required when an external inductive load is connected.
Output action display		The output indicator lights up (controlled by software) when the output is in drive state.

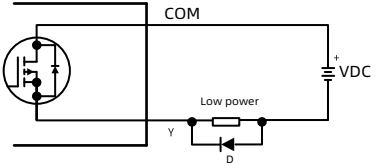
Note

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

- **AM320-0808TN**



- **AM320-0808TP**



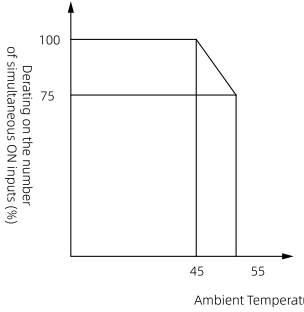
3 Mechanical Installation

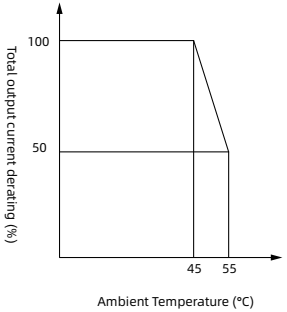
3.1 Installation Environment

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

Item	Specification
Installation/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
IP rating	IP20
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
Grounding mode	Connect to a termination resistor of 100 Ω or lower.
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. • Transportation scenario: Tested according to IEC 60068-2-64; power spectral density of 0.011 g^2/Hz at 5 Hz to 100 Hz and of 0.001 g^2/Hz at 200 Hz; G_{rms} of 1.14 g
Shock resistance	Application/Transportation scenario: Tested according to IEC 60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 times in X/Y/Z-axis directions
Operating temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Humidity: < 95% RH (30°C), 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
Storage temperature and humidity	• Temperature: –20°C to +60°C • Humidity: < 95% RH (30°C), non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Humidity: < 95% RH (40°C), non-condensing

Installation position and limit	Installation position		The module can be installed in four modes. For details, see *"3.2 Installation Position" on page 34*
Installation position and limit	Installation limit	Horizontal installation	• **Input derating** The PLC can operate with full load at ambient temperature of 45°C. Derate the number of ON input points to 75% (lower than or equal to six ON input points) at an ambient temperature of 55°C. Derate the number of ON input points by 2.5% for every additional 1°C above 45°C. 

Installation position and limit	Installation limit	Horizontal installation	• **Output derating** The PLC can operate with full load (total current of eight output points not exceeding 2 A) at an ambient temperature of 45°C. Derate the total output current of ON output points to 50% (total current of eight output points not exceeding 1 A) at an ambient temperature of 55°C. Derate the total output current of ON output points by 5% for every additional 1°C above 45°C. 
Installation position and limit	Installation limit	Non-horizontal installation	At the same time, the maximum number of input points should not exceed 6, the maximum output current should not exceed 1 A, and the number of modules should not exceed 6.

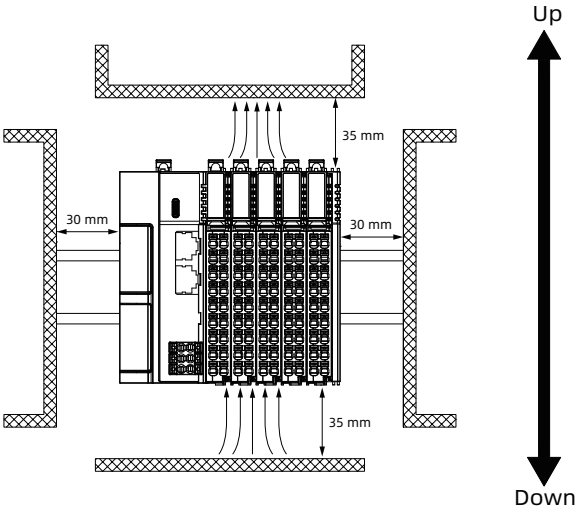
3.2 Installation Position

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 *"3.1 Installation Environment" on page 32*.

■ 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.

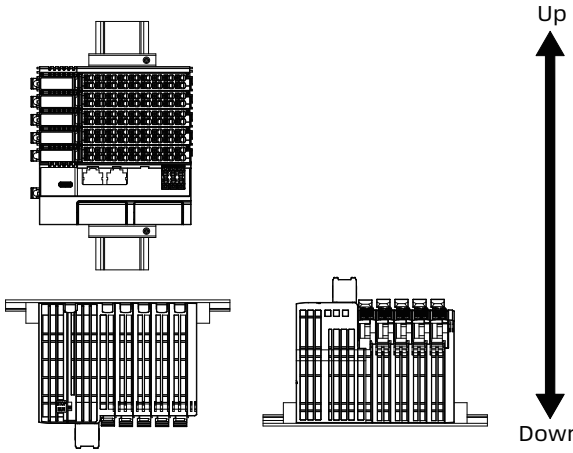


Caution

If there is a high-temperature heat source (heater, transformer, large resistor, etc.) in vicinity of the product, keep the product away from the heat source 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:

- PLC must be installed below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate, which may result loose of the PLC from the DIN rail.

3.3 Installation Precautions

- Before you install and uninstall the PLC and modules, ensure that they are powered off.

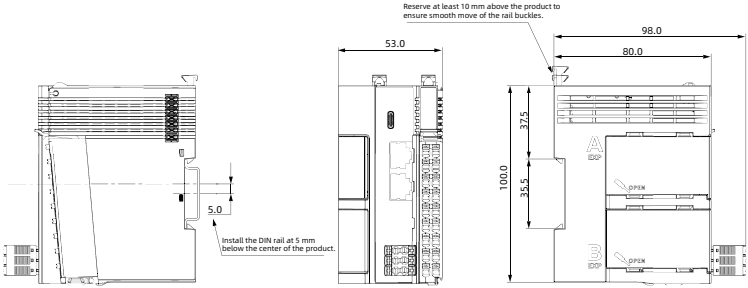
Caution

Do not connect/disconnect the module with power ON. This may lead to master restart or user data loss or damage.

- To avoid damage to the PLC and modules, prevent the enclosure and terminals of them from falling-off or being impacted.

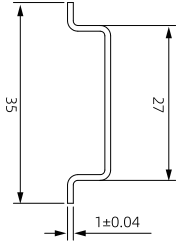
3.4 Installation Dimensions

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



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.

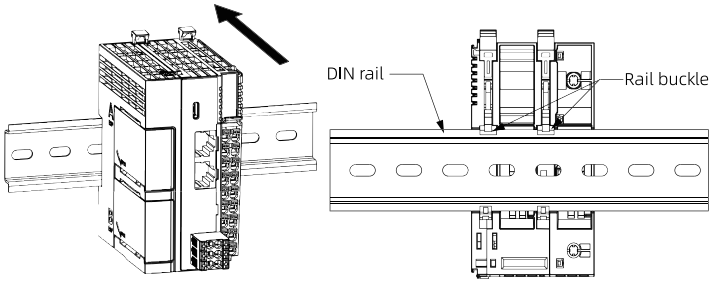


Caution

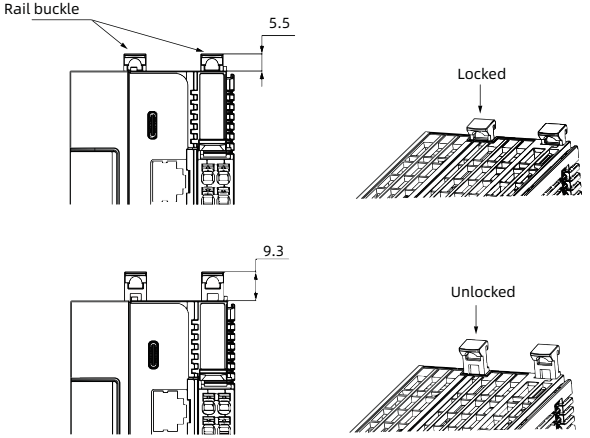
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

■ Installing the PLC

1. Align the PLC with the DIN rail and push 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.

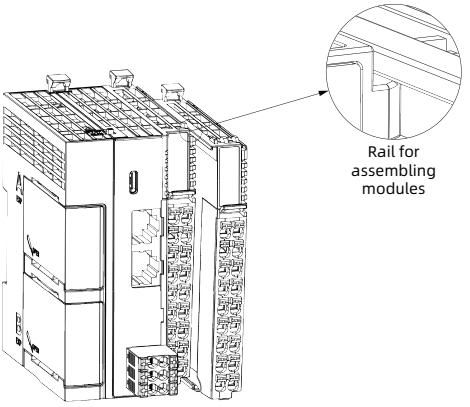
Pressing the buckles locks them.

Caution

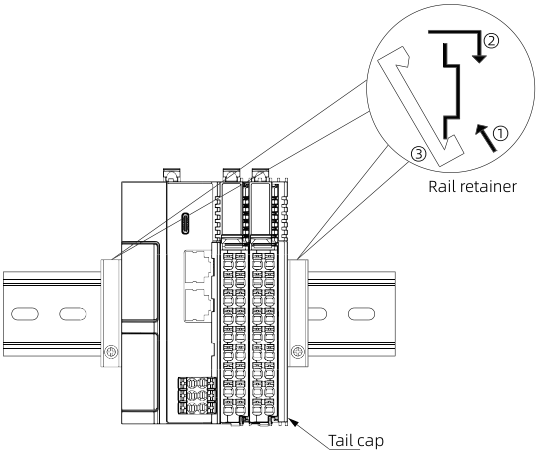
When the PLC is not installed on the rail, keep the mounting hook in the locked state. Keeping the mounting hook unlocked for a prolonged time may cause the hook to fail.

■ Inserting modules to the PLC

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

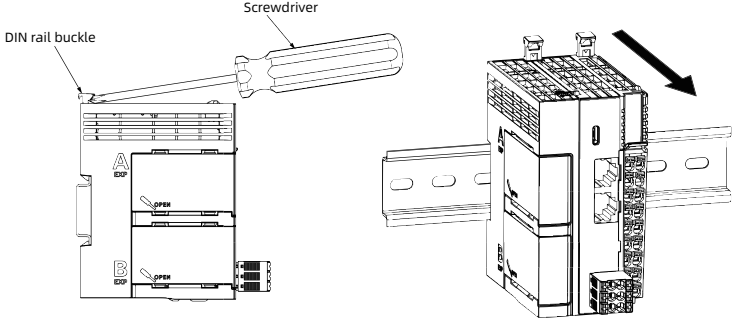


2. Mount an end plate on a side of the PLC or expansion module. When you install a rail retainer, hook the bottom of the retainer to the bottom of the rail, rotate the retainer to make its top hook the top of the rail, and then tighten the screw to fasten the rail retainer, as shown in the figure below.



■ 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.



4 Electrical Installation

4.1 Terminal Layout



Left Signal	Left Terminal Mark	Right Terminal Mark	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	A9	B9	Output common terminal

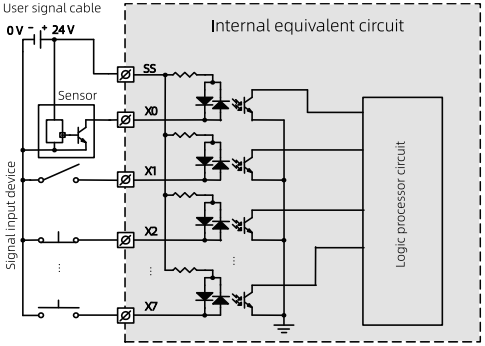
Caution

- 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.

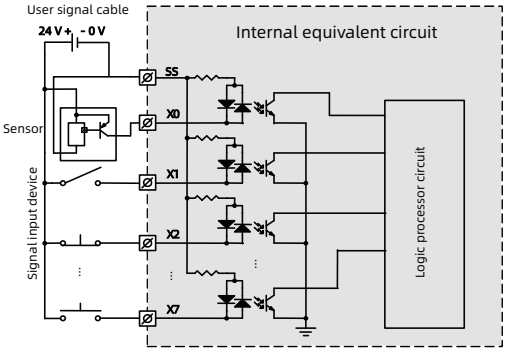
4.2 Terminal Wiring

■ Input terminal circuit diagram

- **Sink input**

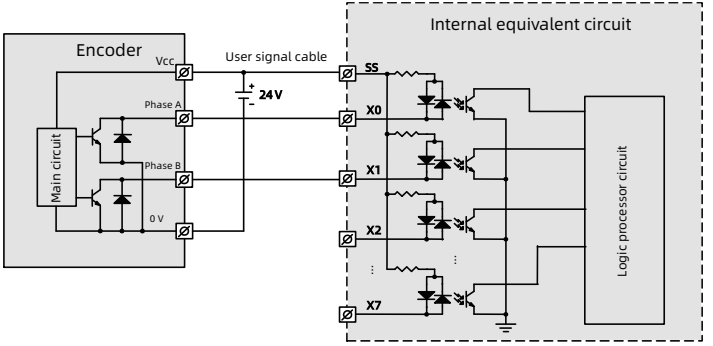


- **Source input**



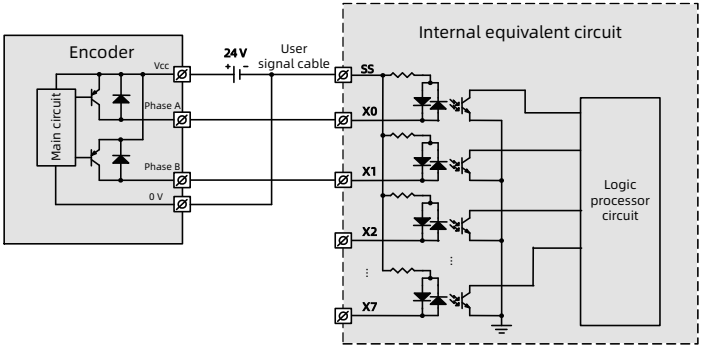
- **Phase A/B encoder sink input**

  The following section uses a group of inputs X0 (phase A) and X1 (phase B) as an example. The PLC supports a total of four groups of inputs: X0 (phase A) and X1 (phase B), X2 (phase A) and X3 (phase B), X4 (phase A) and X5 (phase B), and X6 (phase A) and X7 (phase B).



- **Phase A/B encoder source input**

  The following section uses a group of inputs X0 (phase A) and X1 (phase B) as an example. The PLC supports a total of four groups of inputs: X0 (phase A) and X1 (phase B), X2 (phase A) and X3 (phase B), X4 (phase A) and X5 (phase B), and X6 (phase A) and X7 (phase B).

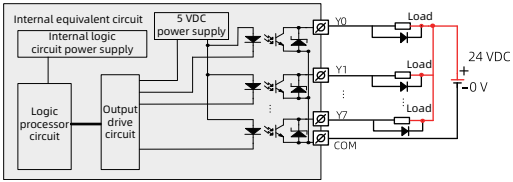


Note

The phase A/B pulse can be set to operate in frequency multiplication by 1, 2, or 4.

■ Output terminal circuit diagram

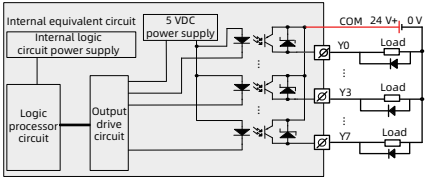
- **Sink output**



Note

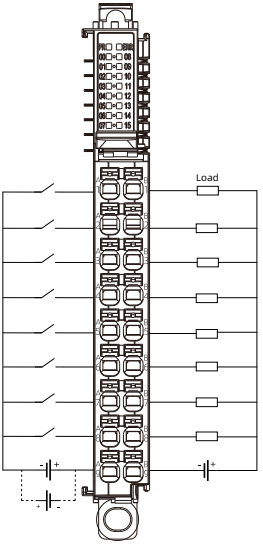
An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

- **Source output**

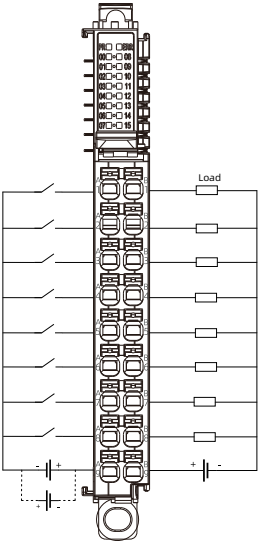


■ Input and output terminal wiring

- **Sink input and output**



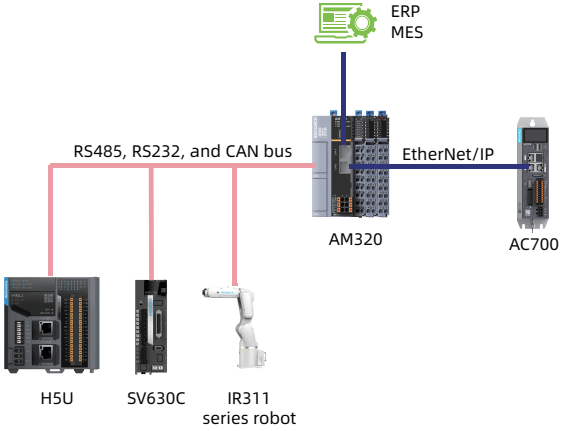
- **Source input and output**


Load

5 Communication Connection

5.1 Communication Networking

This PLC can connect to other PLCs, ERP, MES and other systems through Ethernet ports, and can connect to products such as H5U, SV630C, IR311 series robots through GE20 series expansion cards that provide RS485, RS232, or CAN communication, as shown below.

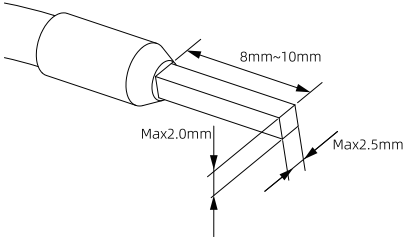


5.2 Cable Selection

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

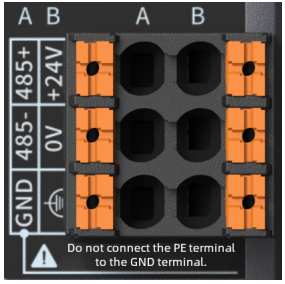
If other tubular lugs are used, crimp them to twisted cables. The following figure shows requirements on the shape and size.



5.3 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

- Wiring

  Select proper tube cables according to *"5.2 Cable Selection" on page 48* 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.

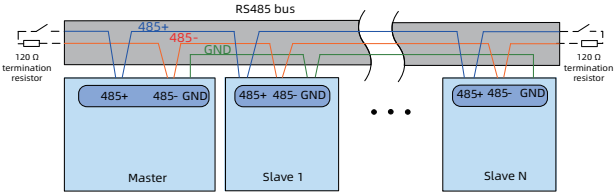
- Insert the registered jack on the cable into the Ethernet port (RJ45 port) until a click is heard.
- To remove the RJ45 network cable, press and hold the tail of the registered jack, and then pull it out along the direction parallel with the PLC.

5.4 RS485 Communication

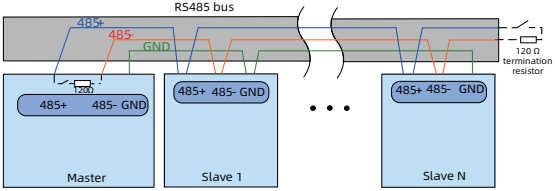
Pay attention to the following points during RS485 wiring:

- 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 AM300/500 series hosts



RS485 communication of GE20 series extension cards

To avoid interference, do not bundle the cable together with an AC power cable or high voltage cable.

6 Operation and Maintenance

6.1 Start and Stop

After programs are written into the PLC, perform the following steps to run and stop the PLC:

To run the PLC:

1. Set the system to RUN.
2. Confirm that the RUN indicator is steady ON in yellow-green.
3. Set the system to the "STOP" state, or stop the PLC in the background by using the host controller.

6.2 User Program Download with a TF Card

Prerequisites

- A TF (Micro SD) card with a capacity of 32 GB or less and a FAT32 file system is prepared.
- The product is powered off.

Procedure

1. Use the software tool InoProShop to generate the "Application.userprg" file. For details, see Section 9.5.2 "Upgrade Using an SD Card" in the *Medium-Sized PLC Programming Software User Guide*.
2. Create the "PLCProgram" directory in the root directory of the Micro SD card and copy the "Application.userprg" file to the "PLCProgram" directory.
3. Insert the Micro SD card into a GE20-TF expansion card, and then install the expansion card onto the PLC.
4. Power on the PLC again. The PLC starts loading the user program from the Micro SD card, and the RUN indicator blinks quickly at 4 Hz during the download process.
5. After successful downloading, the RUN indicator blinks slowly at 1 Hz. Remove the GE20-TF expansion card after the PLC enters the "STOP" state.
   If the ERR indicator blinks slowly, downloading fails. Check whether the PLC model that downloads the file is the same as the actual PLC model. If the problem persists, contact Inovance for technical support.
6. Power off and then power on the PLC and check whether it restores to normal.

6.3 Firmware Programming with a TF Card

Prerequisites

- The firmware is obtained. (If not, contact Inovance technical support.)
- A TF (Micro SD) card with a capacity of 32 GB or less and a FAT32 file system is prepared.
- The product is powered off.

Procedure

1. Insert the Micro SD card for firmware programming into a GE20-TF expansion card, and then install the expansion card onto the PLC.
2. Power on the PLC again.
   - If the RUN and ERR indicators on the PLC blink quickly, firmware programming is in progress.
   - If the RUN and ERR indicators on the PLC are OFF, firmware programming succeeds.
   - If the RUN and ERR indicators on the PLC blink slowly, firmware programming fails.
3. Power off the PLC after firmware programming is complete, and then remove the GE20-TF expansion card.
4. Power on the PLC again.

7 Appendix

■ GE20 expansion cards

Type	Model	Description	Code	Slot	ID
Digital input/ output	GE20-4DI-INT	4-channel input 24 VDC input Source/Sink	01480130	A/B	13
	GE20-4DO-TN-INT	4-channel sink transistor output 24 VDC output	01480115	A/B	5
Analog input/ output	GE20-2AD1DA-I-INT	2-channel analog input and 1-channel analog output (current type)	01480138	A/B	11
	GE20-2AD1DA-V-INT	2-channel analog input and 1-channel analog output (voltage type)	01480107	A/B	3
Commu-nication	GE20-CAN-485-INT	CAN and RS485 communication (RJ45)	01480114	A	15
	GE20-232/ 485-INT	RS232 or RS485 communication	01480119	A/B	7
	GE20-232/ 485-RTC-INT	RS232 or RS485 communication (with RTC)	01480122	B	14
Storage	GE20-TF-INT	TF expansion card	01480109	B	1
	GE20-TF-RTC-INT	Memory expansion card (with integrated RTC)	01480132	B	6
Clock	GE20-RTC-INT	Clock expansion 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 extension module

Module	Model	Description	Code
Digital	GL20-0016ETP-INT	16-channel digital output (PNP)	01441069
	GL20-1600END-INT	16-channel digital input	01441085
	GL20-0016ETN-INT	16-channel digital output (NPN)	01441063
	GL20-0800END-INT	8-channel digital input	01441054
	GL20-0008ETP-INT	8-channel digital output (PNP)	01441062
	GL20-0008ETN-INT	8-channel digital output (NPN)	01441058
	GL20-0808ETN-INT	8-channel digital input and 8-channel digital output (NPN)	01441072
	GL20-0008ER-INT	8-channel relay output module	01441064
	GL20-3200END-INT	32-channel digital input	01441067
	GL20-0032ETN-INT	32-channel digital output (NPN)	01441079
	GL20-0404ETP-5V-INT	5 VDC, 4-channel digital input and 4-channel digital output (about to release)	01441070
	GL20-3232ETN-M-INT	32-channel digital input and 32-channel digital output (NPN), with external terminal block wiring	01441080
Analog	GL20-4AD-INT	4-channel analog input	01441075
	GL20-4DA-INT	4-channel analog output	01441089
	GL20-8ADV-INT	8-channel analog input	01441086
	GL20-8ADI-INT	8-channel analog input	01441092
Temper-ature measure-ment	GL20-4PT-INT	4-channel thermistor input type	01441074
	GL20-4TC-INT	4-channel thermocouple input type	01441066

Module	Model	Description	Code
Communication	GL20-2SCOM-INT	2-channel serial module (third-party products 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	01441056

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.