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PS00006239A11

# Easy301
# Programmable Logic Controller

## User Guide

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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.

# 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:**<br>EN 61131-2<br>**220 VAC products:**<br>EN 61131-2<br>EN 61000-3-2<br>EN 61000-3-3 |
| | LVD directive | 2014/35/EU | EN 61010-1<br>EN 61010-2-201 |
| | RoHS directive | 2011/65/EU amended by (EU) 2015/863 | EN IEC 63000 |
| UL/cUL certification | - | | UL 61010-1<br>UL 61010-2-201<br>CAN/CSA-C22.2 No. 61010-1<br>CSA C22.2 NO. 61010-2-201 |

| Certification | Directive | | Standard |
|---|---|---|---|
| KCC certification | - | | - |
| EAC certification | - | | - |
| UKCA certification | Safety regulations | Electrical Equipment (Safety) Regulations 2016 | EN 61010-1<br>EN 61010-2-201 |
| | EMC regulations | Electromagnetic Compatibility Regulations 2016 | **24 VDC products:**<br>EN 61131-2<br>**220 VAC products:**<br>EN 61131-2<br>EN 61000-3-2<br>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. |

| Document | Code | Description |
| --- | --- | --- |
| 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 *"2.3.1 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 *"4.2 Terminal Wiring" on page 38*. |
| January 2025 | A06 | Made minor corrections. |

| Date | Version | Description |
| --- | --- | --- |
| July 2024 | A05 | **Addition**<br>• Added input and output terminal wiring diagram in *"4.2 Terminal Wiring" on page 38*. |
| | | **Revision**<br>• Updated the caution note for restart in *"2.2 Components" on page 20*.<br>• Updated the program data capacity in *"2.3.1 General Specifications" on page 23*.<br>• Updated the number of axes supported in *"2.3.1 General Specifications" on page 23*.<br>• Updated the rated bus input current of the GL20-3232ETN-M expansion module in *"2.3.2 Power Supply Specifications" on page 24*. |
| March 2024 | A04 | **Addition**<br>• Added the Easy301 series programmable controller model and the GL20 series expansion module models in *" Appendix" on page 47*. |
| | | **Revision**<br>• Updated the descriptions of operation state indicators in *"2.2 Components" on page 20*.<br>• Updated the power supply specifications in *"2.3.2 Power Supply Specifications" on page 24*.<br>• Updated overcurrent protection device specifications in *"3.1 Installation Environment" on page 28*. |
| 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.

# 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.

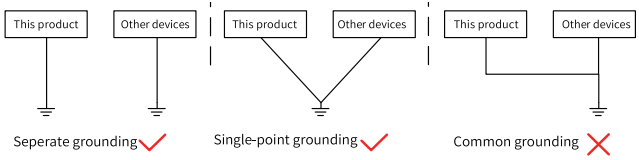



- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation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

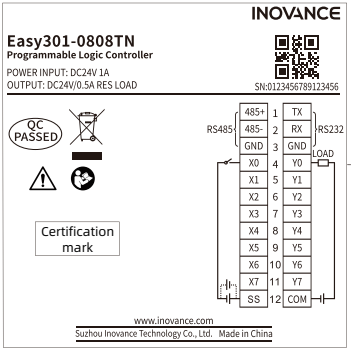
## 2.1 Model and Nameplate

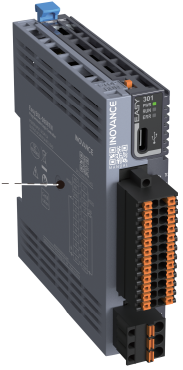
### ■ Model description

Easy 301 - 0808 TN
① ② ③ ④

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

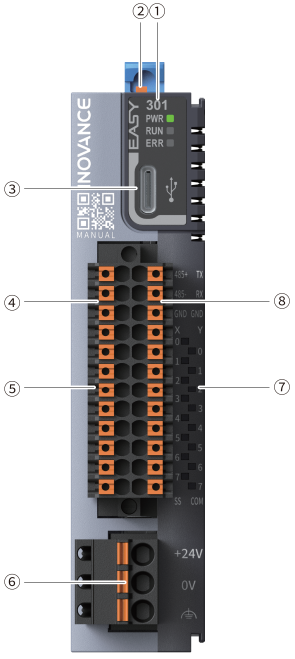
### ■ Nameplate description



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

## 2.2 Components



| No. | Type | Mark | Definition | Indicator Color | Description |
|---|---|---|---|---|---|
| ① | Operation status indicator | PWR | Power supply | Yellow-green | • Steady ON: Power supply normal<br>• OFF: Power supply off or abnormal |
| | | RUN | Normal running | Yellow-green | • Steady ON: User program running<br>• OFF: User program stopped |
| | | ERR | Running error | Red | • OFF: No major error<br>• 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 *"4.1 Terminal Layout" on page 37* |

| 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<br>• 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.

# 2.3 Product Specifications

## 2.3.1 General Specifications

| Item | | Specification |
|---|---|---|
| Program data capacity | | • 128K steps of user program<br>• User-defined variables: 1 MB, 128 KB of which is retentive at power failure<br>• 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<br>• 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 |

### 2.3.2 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).

### 2.3.3 Input Specifications

| Item | Specification |
| --- | --- |
| Input type | Digital input |
| Number of input channels | 8 |

| Item | | Specification |
|---|---|---|
| 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<br>• 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. |

### 2.3.4 Output Specifications

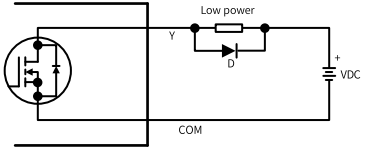
| Item | Specification |
|---|---|
| Output type | NPN transistor output |
| Number of output channels | 8 |
| Output voltage class | 24 VDC±10% (21.6 VDC to 26.4 VDC) |

| 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.



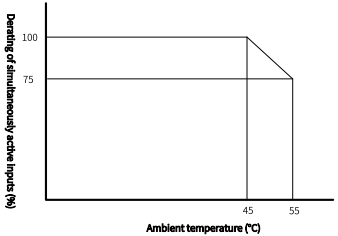
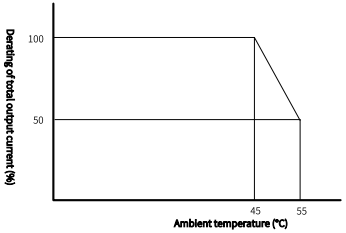
# 3 Mechanical Installation

## 3.1 Installation Environment

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

| Item | Specification |
| --- | --- |
| 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.<br>• 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<br>• Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse |
| Storage temperature and humidity | • Temperature: –20°C to +60°C<br>• Relative humidity: < 90%, non-condensing |
| Transportation temperature and humidity | • Temperature: –40°C to +70°C<br>• 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)<br>• Relative humidity: < 95%, non-condensing<br>**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.<br>Installation limit:<br>• Horizontal installation:<br>■ 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.<br><br><br>■ 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.<br><br> |

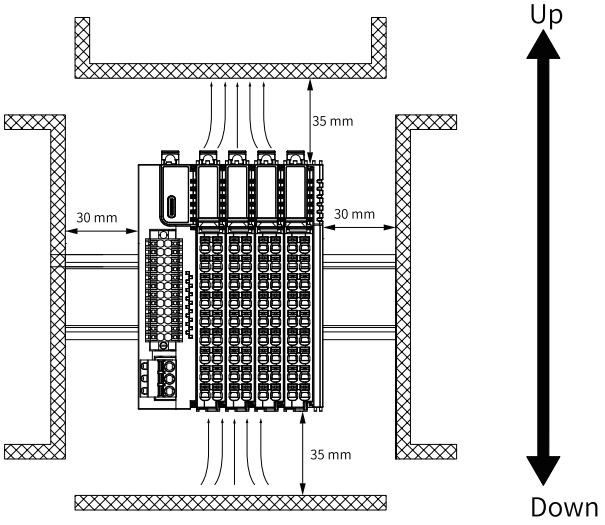
| Item | Specification |
| --- | --- |
| Installation position and limit | • When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A. |

## 3.2 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 *"3.1 Installation Environment" on page 28*.

### ■ 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.

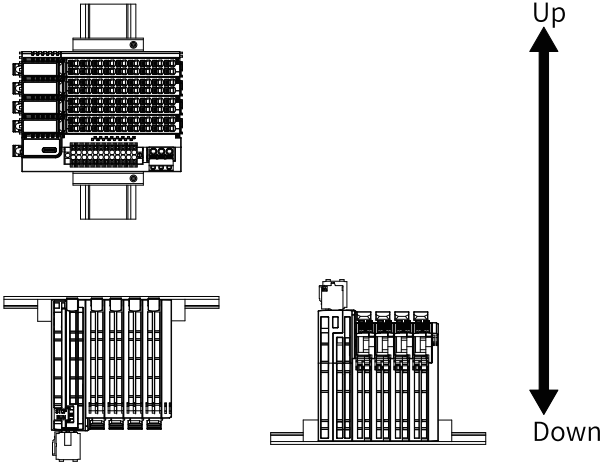


## *Note*

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:

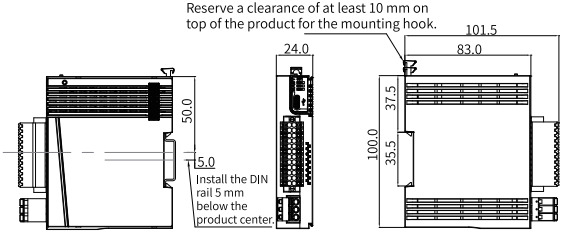
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

## 3.3 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.

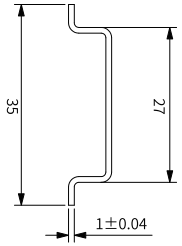
## 3.4 Installation Dimensions

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




## 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.

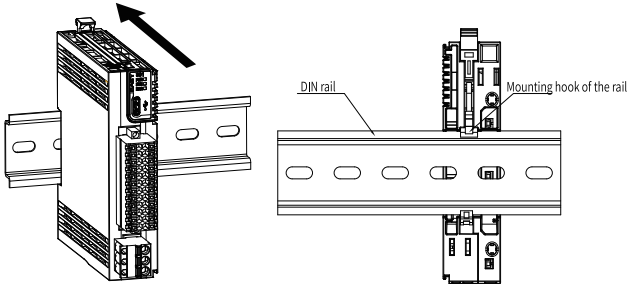



Caution

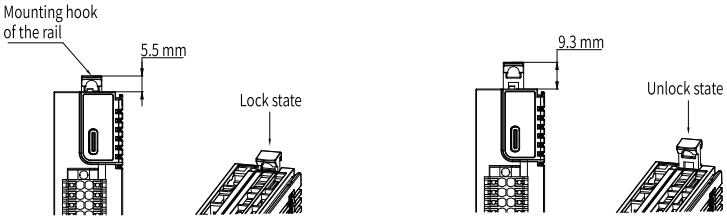
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

## ■ 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.

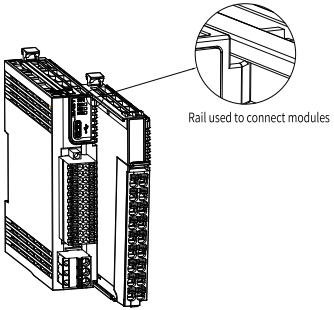
To lock the PLC to the DIN rail, press down the mounting hook.

**Caution**

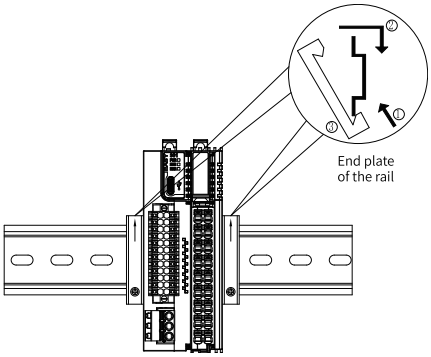
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

## ■ Installing the module to the PLC

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

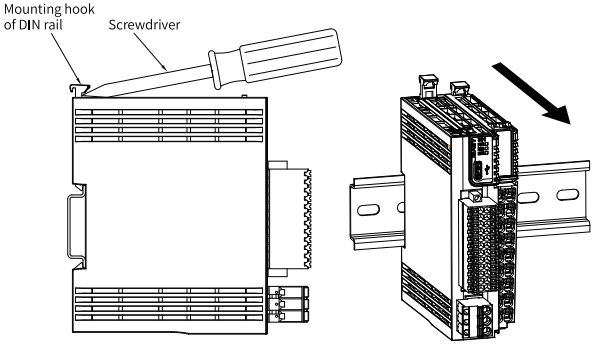



Mount a DIN rail end plate on both sides of the PLC or expansion module. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



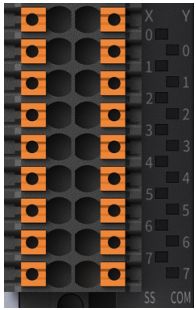

## ■ Removing the module

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.



# 4 Electrical Installation

## 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 |

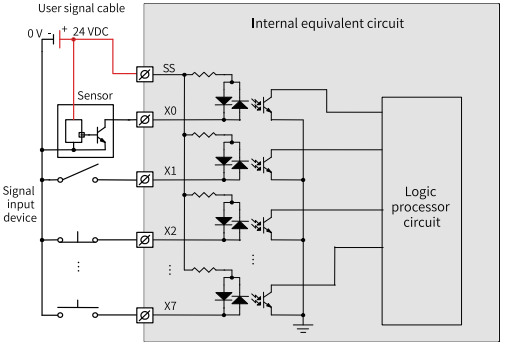
**Caution**

- 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.

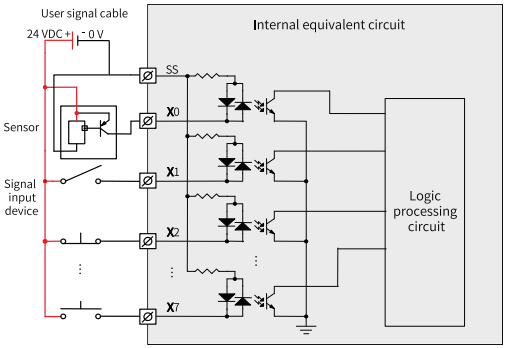
## 4.2 Terminal Wiring

### ■ Input terminal circuit diagram

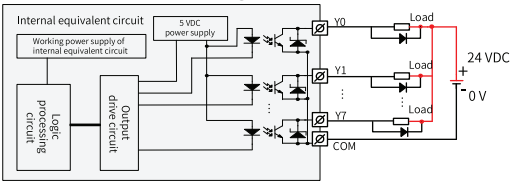
- **Sink wiring**




- **Source wiring**



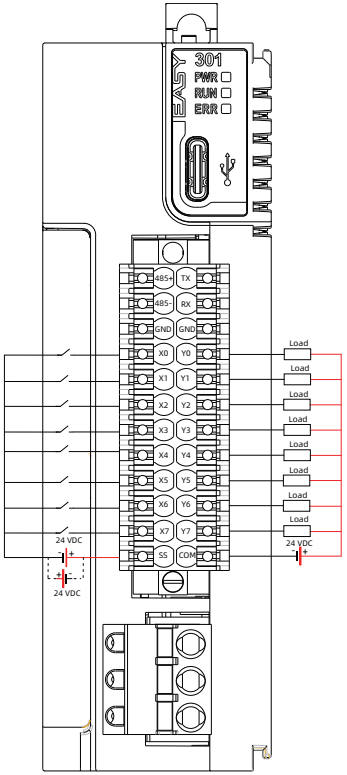

## ■ Output terminal circuit diagram




# *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



# 5 Communication Connection

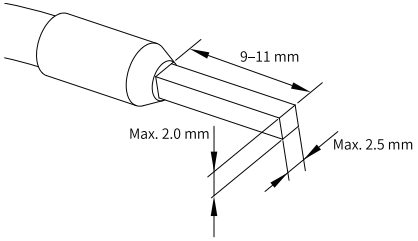
## 5.1 Cable Selection

- 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.

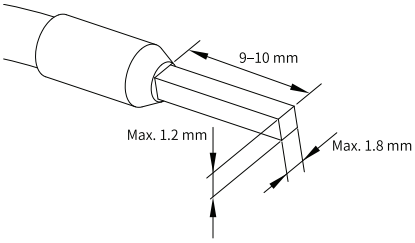



- Communication cable

  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.




## 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 | 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 |

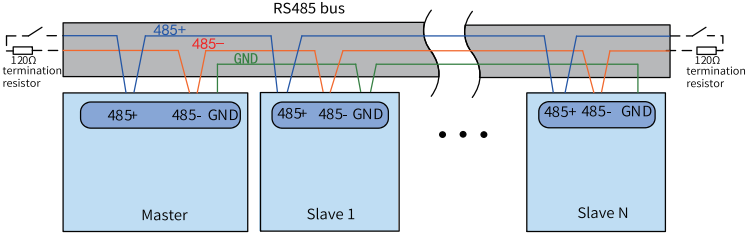
## ■ Wiring

See *"5.1 Cable Selection" on page 41* to select the communication cable and plug it into the communication port.

## 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.



# 6 Operation and Maintenance

## 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.<br>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. |

## 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.

## 6.3 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.

# 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 |

# 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.

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