



## Easy301 Series Programmable Logic Controller User Guide



Industrial  
Automation



New Energy  
Vehicle



Intelligent  
Elevator



Intelligent  
Robot



Digital  
Energy



Rail  
Transit



Data code P500006239A09



# Legal Information

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## ■ Disclaimer of Liability

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

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

## ■ Waste Disposal

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

## ■ Qualified Personnel

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

## ■ Proper Use of the Product

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

# Preface

## ■ Introduction

This product is a new generation of small-sized, ultra-thin programmable logic controller (PLC) independently developed by Inovance. It supports RS485 and RS232 communication features and implements multi-layer network communication through the RS485 and RS232 ports. It allows process encapsulation and reuse through the Function Block (FB) and Function (FC) features. This product can accommodate a maximum of eight expansion modules. For module types supported, see the section "Local Expansion Modules" in the "H5U and Easy Series Programmable Logic Controller Programming Guide".

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

## ■ 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                                | <b>24 VDC products:</b><br>EN 61131-2<br><b>220 VAC products:</b><br>EN 61131-2<br>EN 61000-3-2<br>EN 61000-3-3 |
|               | LVD       | 2014/35/EU                                | EN 61010-1<br>EN 61010-2-201                                                                                    |
|               | RoHS      | 2011/65/EU<br>amended by (EU)<br>2015/863 | EN IEC 63000                                                                                                    |
| UL/cUL        | -         |                                           | 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           | -                  |                                                | -                                                                                                               |
| EAC           | -                  |                                                | -                                                                                                               |
| UKCA          | Safety Regulations | Electrical Equipment (Safety) Regulations 2016 | EN 61010-1<br>EN 61010-2-201                                                                                    |
|               | EMC Regulations    | Electromagnetic Compatibility Regulations 2016 | <b>24 VDC products:</b><br>EN 61131-2<br><b>220 VAC products:</b><br>EN 61131-2<br>EN 61000-3-2<br>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, installation and wiring, and programming examples of the GE20 series expansion card.                    |
| H5U and Easy Series Programmable Logic Controller Programming Guide | 19012249   | Describes the basics of PLC programming, quick start guide, communication, motion control, and high-speed counter usage.                   |
| H5U and Easy Series Programmable Logic Controller Instruction Guide | 19012250   | Describes the basic instructions and complex instructions used for programming applications, as well as examples of these instructions.    |
| Easy301 Programmable Logic Controller User Guide (this guide)       | PS00006239 | Describes the installation and wiring of the product, including product information, mechanical installation, and electrical installation. |

## ■ Revision History

| Date           | Version | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| January 2026   | A09     | Updated effect diagrams and the product code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| September 2025 | A08     | Corrected minor errors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| March 2025     | A07     | Modified input and output terminal wiring diagrams in <a href="#">"4.2 Terminal Wiring" on page 31</a>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| January 2025   | A06     | Corrected minor errors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| July 2024      | A05     | <b>New</b> <ul style="list-style-type: none"> <li>Added the I/O terminal wiring in <a href="#">"4.2 Terminal Wiring" on page 31</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               |
|                |         | <b>Modify</b> <ul style="list-style-type: none"> <li>Updated the note for power-off and restart in <a href="#">"2.2 Components" on page 13</a></li> <li>Updated the program data capacity in <a href="#">"2.3.1 General Specifications" on page 16</a></li> <li>Updated the number of axes supported in <a href="#">"2.3.1 General Specifications" on page 16</a></li> <li>Updated the rated current of bus input power for the GL20-3232ETN-M expansion module in <a href="#">"2.3.2 Power Supply Specifications" on page 17</a></li> </ul> |

| Date          | Version | Description                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| March 2024    | A04     | <b>New</b> <ul style="list-style-type: none"> <li>Added the Easy301 programmable controller models and the GL20 expansion module models in "<a href="#">Appendix</a>" on page 40</li> </ul>                                                                                                                                                                                                                    |
|               |         | <b>Modify</b> <ul style="list-style-type: none"> <li>Updated the descriptions of status indicators in "<a href="#">2.2 Components</a>" on page 13</li> <li>Updated the power supply specifications in "<a href="#">2.3.2 Power Supply Specifications</a>" on page 17</li> <li>Updated the overcurrent protection device specifications in "<a href="#">3.1 Installation Environment</a>" on page 21</li> </ul> |
| February 2024 | A03     | Corrected minor errors.                                                                                                                                                                                                                                                                                                                                                                                        |
| March 2023    | A02     | Updated the diagram of DIN rail buckles and added some product specification data.                                                                                                                                                                                                                                                                                                                             |
| October 2022  | A01     | Corrected minor errors.                                                                                                                                                                                                                                                                                                                                                                                        |
| August 2022   | 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**

Inovance provides an 18-month free warranty (subject to information indicated by the barcode on the product if not otherwise specified in the contract) from the date of manufacturing for product failure or damage under normal use conditions. A maintenance fee will be charged out of the 18-month warranty period.

Even in the 18-month 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 Fundamental Safety Instructions

## 1.1 Fundamental Safety Instructions

### ■ Safety Disclaimer

1. Read the safety precautions before installing, operating, and maintaining this product.
2. To ensure personal and equipment safety, follow all safety precautions marked on the product and described in the user guide when installing, operating, and maintaining this product.
3. "CAUTION", "WARNING", and "DANGER" messages in the guide are only examples and do not cover all safety precautions.
4. Use this product in an environment that complies with the design specifications. Malfunction or component damage caused by improper use is not covered by warranty.
5. Inovance shall not be liable for any physical injuries or property loss caused by improper use.

### ■ Safety Levels and Definitions



"DANGER" indicates that failure to comply with the notice will result in severe physical injuries or even death.



"WARNING" indicates that failure to comply with the notice may result in severe physical injuries or even death.



"CAUTION" indicates that failure to comply with the notice may result in minor or moderate physical injuries or equipment damage. Keep this guide properly for future reference and forward it to the end user.

## Control System Design



- Design a safety circuit to ensure that the control system can still work safely upon an external power outage or programmable controller failure.
- The product may catch fire or emit smoke in case of prolonged overcurrent due to overload or short circuit of load. Therefore, configure an external safety device such as a fuse or circuit breaker.



#### WARNING

- Design an external emergency stop circuit, protective circuit, forward and reverse rotation interlock circuit, as well as up and down limit interlock circuit to be connected to the programmable controller.
- Design an external protective circuit and a safety mechanism for output signals that may cause major incidents.
- When the programmable controller CPU detects a system exception, it may turn off all outputs. When partial circuit of the controller malfunctions, the controller outputs may become uncontrollable. To ensure proper operation, it is necessary to design an appropriate external control circuit.
- If a programmable controller output unit such as the relay or transistor is damaged, its output cannot be controlled to turn ON or OFF.
- The programmable controller is intended for use in an indoor electrical environment with an overvoltage class of II. The power system must contain a lightning arrester to prevent lightening from causing overvoltage on the power supply input, signal input, and control output terminals of the programmable controller and damaging the equipment.

## Installation



#### WARNING

- Only allow trained professionals with electrical expertise to install this product.
- Cut off all external power sources before you install or remove this product. Failure to comply may result in electric shock or faults or malfunctions of this product.
- Do not use the programmable controller in places with dirt, oily fume, conductive dust, corrosive gas, flammable gas, high temperature, condensation, wind and rain, vibration, or shock. Electric shock, fire, and improper operation will lead to damage and deterioration of the product.
- The controller is open-type equipment that must be installed in a control cabinet with lock (IP rating of the control cabinet enclosure > IP20). Only qualified professionals can open the cabinet.



#### CAUTION

- During installation, prevent metal chippings and cable ends from falling into the vent of the product. Failure to comply may result in fire, faults, or malfunctions.
- After installation, ensure that no unwanted objects exist on the ventilation surface. Failure to comply may result in poor heat dissipation, fire, faults, or malfunctions.
- During installation, tightly connect the product and its connectors and firmly lock its hooks. Improper module installation may lead to malfunctions, faults, and detachment.

## **Wiring**



- Only allow trained professionals with electrical expertise to conduct wiring for this product.
- Cut off all external power sources before wiring. Failure to comply may result in electric shock or equipment faults or malfunctions.
- Properly insulate the cable terminals and ensure a proper insulation distance between the cables connected to the terminal block. Failure to comply will result in electric shock or equipment damage.



- Turn off the main power supply before connecting it to the product. Failure to comply may result in electric shock.
- Select a proper power supply according to the power supply specifications of the product in the "Technical Specifications" section. If the selected power supply is beyond the required range, the product may be damaged. Regularly check whether the DC power provided by the switching-mode power supply unit is stable.

## **Operation and Maintenance**



- Only allow trained professionals with electrical expertise to operate and maintain this product.
- Do not touch terminals when the power is on. Failure to comply may result in electric shock or malfunctions.
- Cut off all external power sources before you clean the product. Failure to comply may result in electric shock.
- Cut off all external power sources before you install and remove modules and communication cables. Failure to comply may result in electric shock or malfunctions.

### Safety suggestions

- In places where operators have direct contact with mechanical parts, such as loading and unloading places and areas with automatic machinery operation, carefully configure an on-site manual operating device or alternative means that works independently of the programmable controller and can start or stop the automatic operation.
- If programs need to be modified when the system is running, apply a lock or take other necessary measures to ensure that only authorized personnel can perform such modification.

### Disposal



- Dispose of this product as industrial wastes. Dispose of the battery separately in accordance with local laws and regulations.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

## 1.2 Industrial Information Security

This product provides an interface to connect to the network and transmit data through the network interface. To protect factories, systems, machines, and networks from cyber attacks, appropriate industrial information security protection mechanisms need to be implemented to ensure the safe operation of factories, systems, machines, and networks.

The customer is responsible for providing and continuously ensuring a secure connection between the product and the customer's network or any other network, to prevent unauthorized access to their factory, systems, machines, and networks. The system or machine may only be connected to the corporate network or the Internet when a secure connection is established and proper security measures are in place (for example, using antivirus software and installing firewalls).

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





## Caution

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 strictly:

- Always use the latest software version. If the product version is no longer supported or the latest program version is not applied, customers are at increased risk of cyberattacks.
  - Implement and maintain appropriate security measures (including but not limited to deploying anti-virus software, firewall, WAF, IPS/IDS, situational awareness system, ID verification, and data encryption) to prevent files in the removable storage device from being damaged by malware and to protect products, networks, systems, and interfaces from unauthorized access, disruption, intrusion, 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

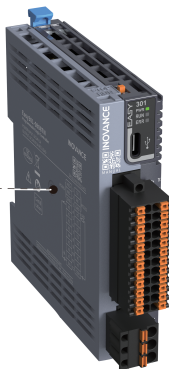
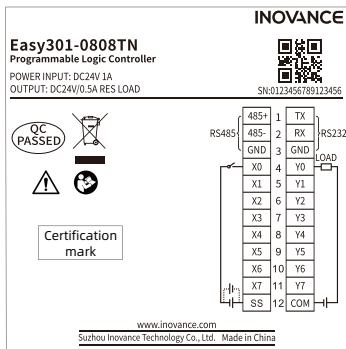
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③

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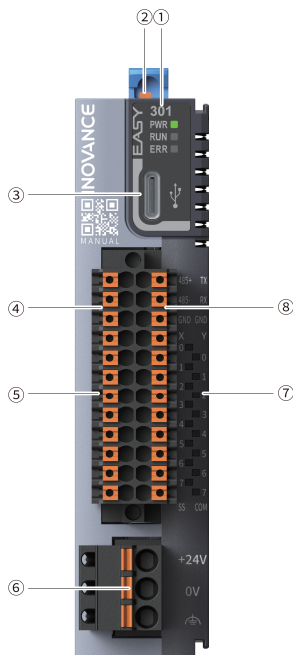
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <p>① <b>Product series</b></p> <p>Easy: Easy series programmable logic controller</p>                                                                         | <p>③ <b>Number of inputs/outputs</b></p> <ul style="list-style-type: none"> <li>● 08: 8 inputs</li> <li>● 08: 8 outputs</li> </ul> |
| <p>② <b>Series</b></p> <ul style="list-style-type: none"> <li>● 3: 300 series platform</li> <li>● 0: No Ethernet</li> <li>● 1: Model serial number</li> </ul> | <p>④ <b>Output type</b></p> <p>TN: Sink-type transistor</p>                                                                        |

#### 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    | <ul style="list-style-type: none"> <li>Steady ON: Power supply normal</li> <li>OFF: Power supply off or abnormal</li> </ul> |
|     |                            | RUN                                                                               | Normal running                         | Yellow-green    | <ul style="list-style-type: none"> <li>Steady ON: User program running</li> <li>OFF: User program stopped</li> </ul>        |
|     |                            | ERR                                                                               | Running error                          | Red             | <ul style="list-style-type: none"> <li>OFF: No major error</li> <li>Blinking<sup>[1]</sup>: Major error occurred</li> </ul> |
| 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 <sup>[2]</sup>                                                                | RS485 communication ground             | -               | -                                                                                                                           |
| ⑤   | I/O terminal               | -                                                                                 | 8-channel input and 8-channel output   | -               | For details, see <a href="#">"4.1 Terminal Layout" on page 30</a>                                                           |

| 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 <sup>[2]</sup> | -               | -                                                                                                                              |
| ⑦   | I/O indicator     | X/Y                                                                               | I/O status                        | Yellow-green    | <ul style="list-style-type: none"> <li>● Steady ON: Input or output active</li> <li>● OFF: Input or output inactive</li> </ul> |
| ⑧   | RS232             | TX                                                                                | RS232 signal transmission         | -               | -                                                                                                                              |
|     |                   | RX                                                                                | RS232 signal reception            | -               | -                                                                                                                              |
|     |                   | GND <sup>[2]</sup>                                                                | RS232 communication ground        | -               | -                                                                                                                              |



## Caution

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

## 2.3 Product Specifications

### 2.3.1 General Specifications

| Item                        | Specification                                                                                                                                                                                                                                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program data capacity       | <ul style="list-style-type: none"><li>• User program: 256 kB</li><li>• User-defined variables: 1 MB, 128 kB of which is retentive at power failure</li><li>• Soft elements: Approx. 150 kB (retentive at power failure after No. 1000; non-retentive at power failure when the PLC is only powered by USB)</li></ul> |
| Instruction execution speed | 20 k-step in 2 ms                                                                                                                                                                                                                                                                                                    |
| Bit operation               | 0.144 $\mu$ s/instruction                                                                                                                                                                                                                                                                                            |
| Word transmission           | 0.338 $\mu$ s/instruction                                                                                                                                                                                                                                                                                            |
| Floating point operation    | 0.779 $\mu$ s/instruction                                                                                                                                                                                                                                                                                            |
| Ethernet                    | -                                                                                                                                                                                                                                                                                                                    |
| EtherCAT communication      | -                                                                                                                                                                                                                                                                                                                    |
| Number of axes              | Up to 4 (local pulse axis: 4; virtual axis: 16)                                                                                                                                                                                                                                                                      |
| Serial communication        | Up to 2 channels (1 for RS485 and 1 for RS232)                                                                                                                                                                                                                                                                       |
| CAN communication           | -                                                                                                                                                                                                                                                                                                                    |
| High-speed input            | Single-phase: 8 channels at 200 kHz                                                                                                                                                                                                                                                                                  |
| High-speed output           | 4 axes at 200 kHz; PWM supported                                                                                                                                                                                                                                                                                     |
| Expansion module            | Up to 8 local expansion modules                                                                                                                                                                                                                                                                                      |
| Expansion card              | -                                                                                                                                                                                                                                                                                                                    |
| Programming language        | LD (FB/FC supported), ST, and SFC                                                                                                                                                                                                                                                                                    |
| Type-C                      | <ul style="list-style-type: none"><li>• Supports program upload/download and firmware upgrade</li><li>• Communication distance of 3 m by using a USB cable</li></ul>                                                                                                                                                 |
| IP rating                   | IP20                                                                                                                                                                                                                                                                                                                 |

| Item                   | Specification          |
|------------------------|------------------------|
| 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 voltage of terminal input power supply            | 24 VDC $\pm$ 10% (21.6 VDC to 26.4 VDC)                           |
| Rated current of terminal input power supply            | 1 A (max@24 V)                                                    |
| Rated voltage of bus output power supply                | 5 VDC (4.75 VDC to 5.25 VDC)                                      |
| Rated current of bus output power supply <sup>[1]</sup> | 1 A (typical value @5 V)                                          |
| 24 V input power supply protection                      | Protection against short circuit and reversed polarity 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 ( $\leq 1$  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 ( $1 \text{ A}/250 \text{ mA} = 4$ ).

## 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 $\pm$ 10% (21.6 VDC to 26.4 VDC) |

| Item                           |                                 | Specification                                                                                                                                   |
|--------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| High-speed input<br>(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 $\mu$ s (RC time)                                                                                                                             |
|                                | Maximum input frequency         | 200 kHz                                                                                                                                         |
|                                | Input impedance                 | 2.7 k $\Omega$                                                                                                                                  |
| ON voltage                     |                                 | $\geq$ 15 VDC                                                                                                                                   |
| OFF voltage                    |                                 | $\leq$ 5 VDC                                                                                                                                    |
| Software filter time           |                                 | <ul style="list-style-type: none"> <li>Low-speed: 2 ms to 1000 ms</li> <li>High-speed: 2 <math>\mu</math>s to 1000 <math>\mu</math>s</li> </ul> |
| 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 $\pm$ 10% (21.6 VDC to 26.4 VDC) |

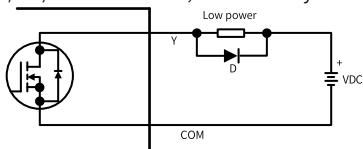


| Item                             |                               | Specification                                                                                                                                         |
|----------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 $\mu$ s (OFF→ON); < 2 $\mu$ s (ON→OFF)                                                                                                            |
|                                  | Load current requirements     | Load current $\geq$ 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 $\mu$ s (OFF→ON, ON→OFF)                                                                                                                        |
|                                  | Load current requirements     | $\geq$ 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 $\mu$ s; minimum resolution: 2.5 $\mu$ s; adjustable duty cycle <sup>[1]</sup> : 0.01% to 99.99% |
| Leakage current upon OFF         |                               | < 30 $\mu$ A 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 <sup>[2]</sup> 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.



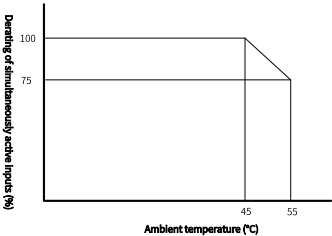
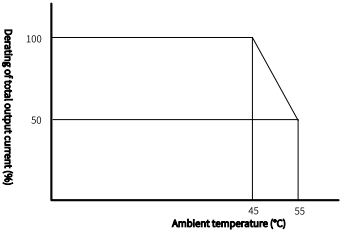
# 3 Mechanical Installation

## 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                    | <ul style="list-style-type: none"><li>● 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.</li><li>● Transport scenario: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01 g<sup>2</sup>/Hz; 200 Hz, 0.001 g<sup>2</sup>/Hz, G<sub>rms</sub> of 1.14 g, 30 min each in X, Y and Z directions.</li></ul> |
| 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           | <ul style="list-style-type: none"><li>● Easy301: 1.1 A fuse</li><li>● Easy302/Easy501/Easy502/Easy52X: 1.5 A fuse</li></ul>                                                                                                                                                                                                                                                                                                         |
| Storage temperature and humidity        | <ul style="list-style-type: none"><li>● Temperature: -20°C to +60°C</li><li>● Relative humidity: &lt; 90%, non-condensing</li></ul>                                                                                                                                                                                                                                                                                                 |
| Transportation temperature and humidity | <ul style="list-style-type: none"><li>● Temperature: -40°C to +70°C</li><li>● Relative humidity: &lt; 95%, non-condensing</li></ul>                                                                                                                                                                                                                                                                                                 |

| Item                               | Specification                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature and humidity | <ul style="list-style-type: none"> <li>● Temperature: -20°C to +55°C (for horizontal installation), -20°C to +45°C (for non-horizontal installation)</li> <li>● Relative humidity: &lt; 95%, non-condensing</li> </ul> <p><b>Note: When the ambient temperature exceeds the upper limit, a cooling fan or air conditioner must be installed along the heat dissipation hole direction.</b></p> |

| Item                            | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation position and limit | <p>Installation position: The PLC can be installed horizontally, vertically, on the top of the cabinet, or at the bottom of the cabinet.</p> <p>Installation limit:</p> <ul style="list-style-type: none"> <li>Horizontal installation: <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>  <ul style="list-style-type: none"> <li>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.</li> </ul>  |

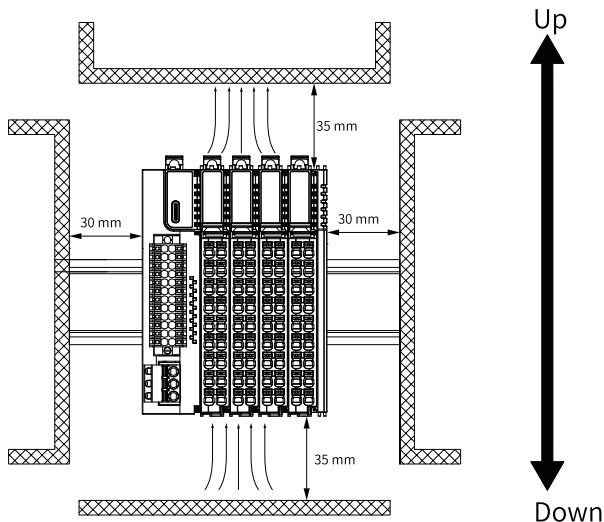
| Item                            | Specification                                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation position and limit | <ul style="list-style-type: none"> <li>When installed non-horizontally: The maximum number of inputs should not exceed 6 and the maximum output current should not exceed 1 A.</li> </ul> |

## 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 21](#).

### ■ 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.



---

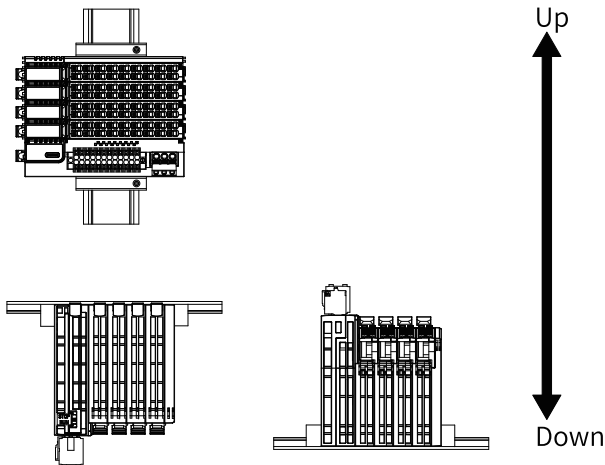
## Note

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:

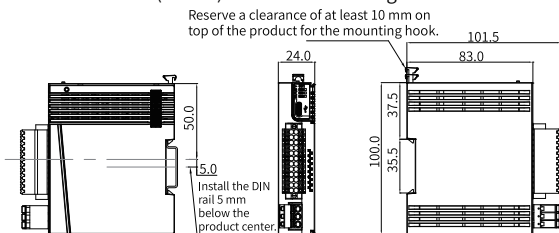
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

### 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

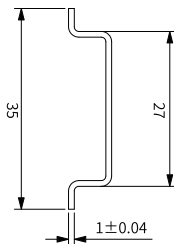
The installation dimensions (in mm) are shown in the figure below.



### 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.



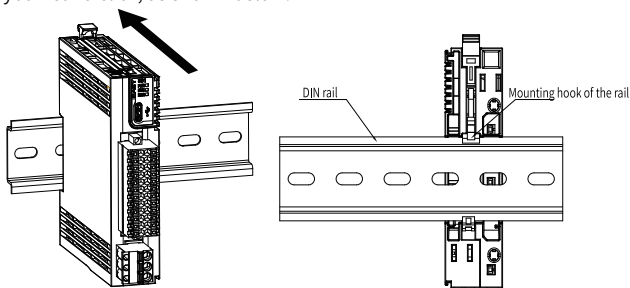


## Caution

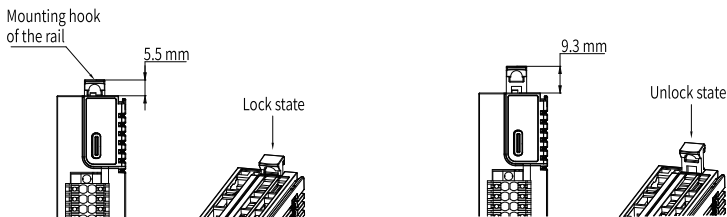
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

### ■ 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.

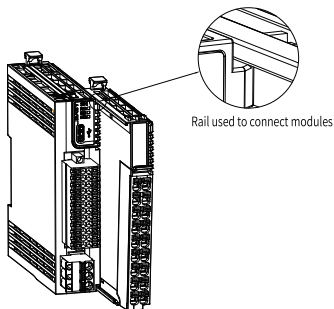


**Caution**

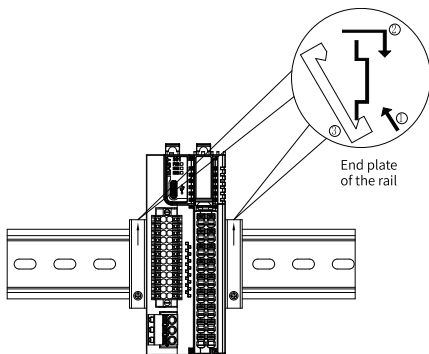
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

## ■ Installing the module to the PLC

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

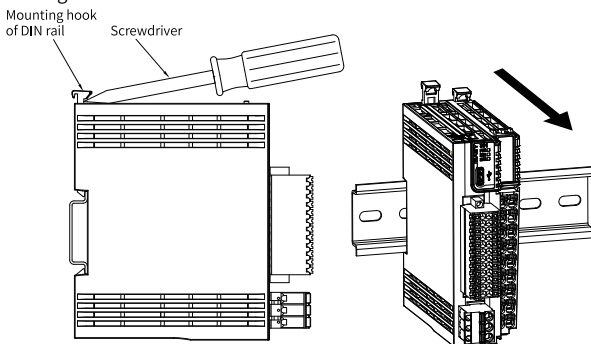


Mount a DIN rail end plate on both sides of the PLC or expansion module. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



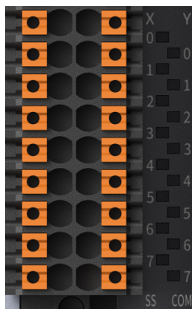
## ■ Removing the module

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 |



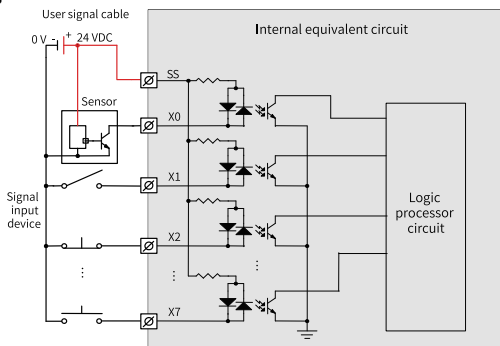
## Caution

- 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.

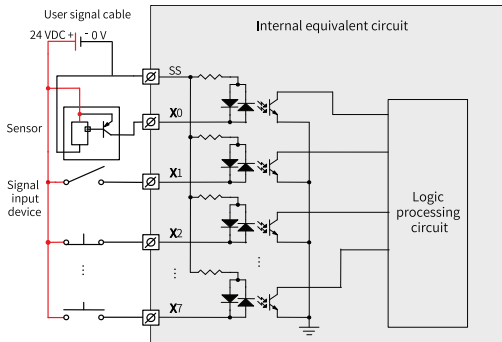
## 4.2 Terminal Wiring

### ■ Input terminal circuit diagram

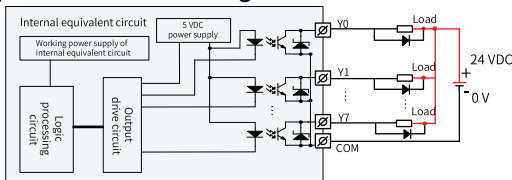
#### ● Sink wiring



#### ● Source wiring



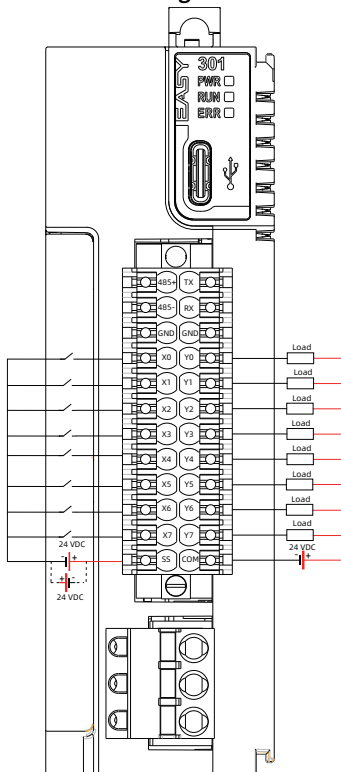
## ■ Output terminal circuit diagram



## 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

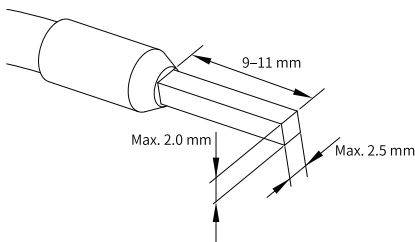
### 5.1 Cable Selection

- Power cable

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

| Material Name | Applicable Cable Diameter |     |
|---------------|---------------------------|-----|
|               | mm <sup>2</sup>           | 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.



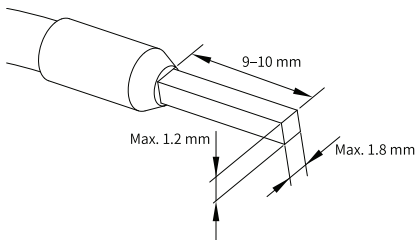
- Communication cable

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

| Material Name | Applicable Cable Diameter |     |
|---------------|---------------------------|-----|
|               | mm <sup>2</sup>           | 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 |



## Caution

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

## ■ RS485 communication specifications

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

## ■ RS232 communication specifications

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

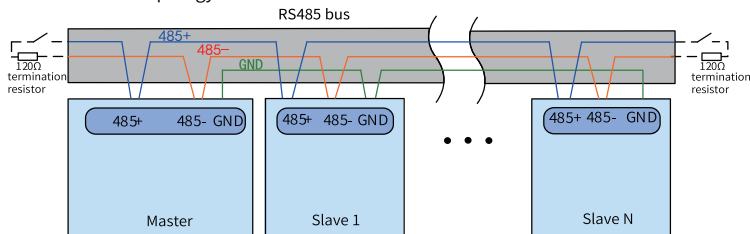
## ■ Wiring

See ["5.1 Cable Selection" on page 34](#) 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  $\Omega$  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 firmware 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 controllers

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

### ■ 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 |

| Module                  | Model          | Description                                                                                                        | Code     |
|-------------------------|----------------|--------------------------------------------------------------------------------------------------------------------|----------|
| Temperature measurement | GL20-4PT-INT   | 4-channel thermistor input type                                                                                    | 01441074 |
|                         | GL20-4TC-INT   | 4-channel thermocouple input type                                                                                  | 01441066 |
| 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](mailto: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.