Programmable Logic Controller DU03L

IEC 61499/IEC 61131-3 Standard

User Manual

V1.00

DU03L Programmable Logic Controller

Version Information

Date	Version	Modification	Author
2025-09-23	V1.00	Release Version	YPP

Ownership Rights Information

Disclaimer

This document is only intended to assist the reader in using the products, and the company shall not be responsible for any loss or error caused by the use of the information in this document. The product and text described in this document are under constant development and refinement. Odot Automation System Co., Ltd. has the right to modify this document without notifying users.

Software Download

Please log on the official website: www.odotautomation.com and click on the corresponding product page to download.

Catelog

Legal Statement

The ODOT Automation brand and any trademarks of Sichuan ODOT Automation System Co., Ltd. (hereinafter referred to as ODOT Automation) and its affiliates mentioned in this guide are the property of Sichuan ODOT Automation System Co., Ltd. or its subsidiaries. All other brands mentioned in this document are the trademarks of their respective owners. This guide and its contents are protected by applicable copyright laws and are provided for informational purposes only. No part of this guide may be reproduced or transmitted for any purpose, in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of Sichuan ODOT Automation System Co., Ltd.

Sichuan ODOT Automation System Co., Ltd. grants no right or license to commercial use of this guide or its contents, other than a non-exclusive personal license to consult on an "AS IS" basis.

The products and equipment of Sichuan ODOT Automation System Co., Ltd. shall be installed, operated, serviced and maintained by qualified personnel.

As standards, specifications and designs change from time to time, the information contained in this guide is subject to change without notice.

To the extent permitted by applicable laws, Sichuan ODOT Automation System Co., Ltd. and its affiliates will not assume any responsibility or liability for any errors or omissions in the information content of this document, or for the consequences caused or arising from the use of the information contained herein.

As part of a responsible, inclusive business, we will update content that includes non-inclusive terms. However, until we complete the update process, our content may still contain standardized industry terminology that our customers deem inappropriate.

Security Information

Important Information

Before attempting to install, operate, service, or maintain the equipment, please read the following instructions carefully and look to familiarize yourself with the equipment. Specific information described below may appear elsewhere in the text or on the device to alert the user to potential hazards, or to call attention to information that clarifies or simplifies a procedure. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The addition of this symbol to a DANGER or WARNING label indicates the presence of an electric shock hazard which, if instructions are not followed, will result in personal injury.

This is a symbol to remind you to be safe. Remind users of the possible danger of personal injury. Please follow all safety precautions with this symbol to avoid possible personal injury or even death.

DANGER

DANGER INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH.

WARNING

WARNING INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN SERIOUS INJURY OR DEATH.

CAUTION

CAUTION INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY OR DEATH.

NOTICE

NOTICE INDICATES A HAZARD NOT RELATED TO PERSONAL INJURY.

Attention

Installation, operation, repair and maintenance of electrical equipment is restricted to qualified personnel only. Sichuan ODOT Automation System Co., Ltd. shall not be responsible for any consequences arising from the use of this user manual.

Qualified personnel are those who have the skills and knowledge related to the manufacturing and operation of electrical equipment and its installation, and who have been trained in safety to be able to detect and avoid related hazards.

Personnel Qualification

Only properly trained personnel who are familiar with and understand the contents of this manual and all other related product documentation are authorized to use this product.

Qualified personnel must be able to detect possible hazards arising from setting parameters and modifying parameter values, usually from mechanical, electrical or electronic equipment. Qualified personnel must be familiar with the various standards, rules and regulations aimed at preventing industrial accidents and must comply with them when designing and building systems.

Expected Usage

The products described or referred to in this document, together with their software, accessories and options, are expansion modules designed for industrial use and should be used in accordance with the relevant instructions, guide, examples and safety instructions in this document and other supporting documents.

This product must be used in compliance with all applicable safety laws and regulations, specified requirements and technical parameters.

Due to planned application, you must perform a risk assessment before using this product. Appropriate safety-related measures must be taken based on the results of the evaluation.

Since this product should be used as an integral part of the entire machine or process, the safety of personnel must be ensured through the design of the entire system.

This product must be used with the specified cables and accessories. Please use only original spare parts and original replacement parts.

Any use other than that expressly permitted is prohibited as unintended hazards may result.

Network Safety Tips

A. Use controllers and devices only in protected environments to minimize

network exposure and ensure inaccessibility from the outside.

B. Use a firewall to protect the control system network and separate it from other.

C. If remote access is required, please use a VPN (Virtual Private Network) tunnel.

D. Restrict access to development and control systems by physical means, operating system capabilities, etc.

E. Protect development and control systems with the latest virus detection solutions.

About This Manual

Document Scope

This guide introduces DU03L and expansion IO modules, and provides an overview of the features, function descriptions, configuration methods, wiring diagrams, and installation details of related products.

Validity Statement

In accordance with our policy of continuous improvement, we will continue to revise the content of this manual to make it clearer and more accurate.

Sichuan ODOT Automation System Co., Ltd. reserves the right of final interpretation of this manual.

Product Information

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Disconnect power from all equipment (including connected equipment) before removing any covers, or installing or removing any accessories, hardware, cables, or wires, unless otherwise specified in the corresponding hardware guide for this equipment.

As directed, at the appropriate place and time, it is important to always use a properly rated voltage sensing devices to detect if the power is off.

Replace and secure all covers, accessories, hardware, cables and wires, and verify proper ground connection before powering on the device.

When operating this equipment and related products, the specified voltage must be used.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

DANGER

POSSIBLE EXPLOSION HAZARD

Do not connect or disconnect equipment unless it is unplugged or the location is known to be non-hazardous.

Use the USB port (if equipped) only if the work area is known to be non-hazardous.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

WARNING

OUT OF CONTROL

The designer of any control scheme must account for the possible failure of the control path and provide a means for certain critical control functions could be restored to a safe state during and after path failure. These critical control functions include emergency stop, over-travel stop, power-off restart, and similar safety measures.
For critical control functions, separate or redundant control paths must be provided.
System control paths may include communication links. Consideration must be given to the implications of unforeseen transmission delays or link failures.
Comply with all accident prevention regulations and local safety guidelines.
To guarantee proper operation, each implementation of the device must be fully tested individually before being placed into service.
Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Only use software approved by Sichuan ODOT Automation System Co., Ltd. for use with this equipment.

Please update the application after every change to the physical hardware configuration.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

The risk assessment should include the possibility of a communication failure between the logic controller and any I/O expansion modules.

If the I/O module output signal "maintain current value" does not meet your application requirements when the I/O expansion Bus error occurs, other solutions should be used to ensure that the application can cope with Bus error events.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

1 Product Overview

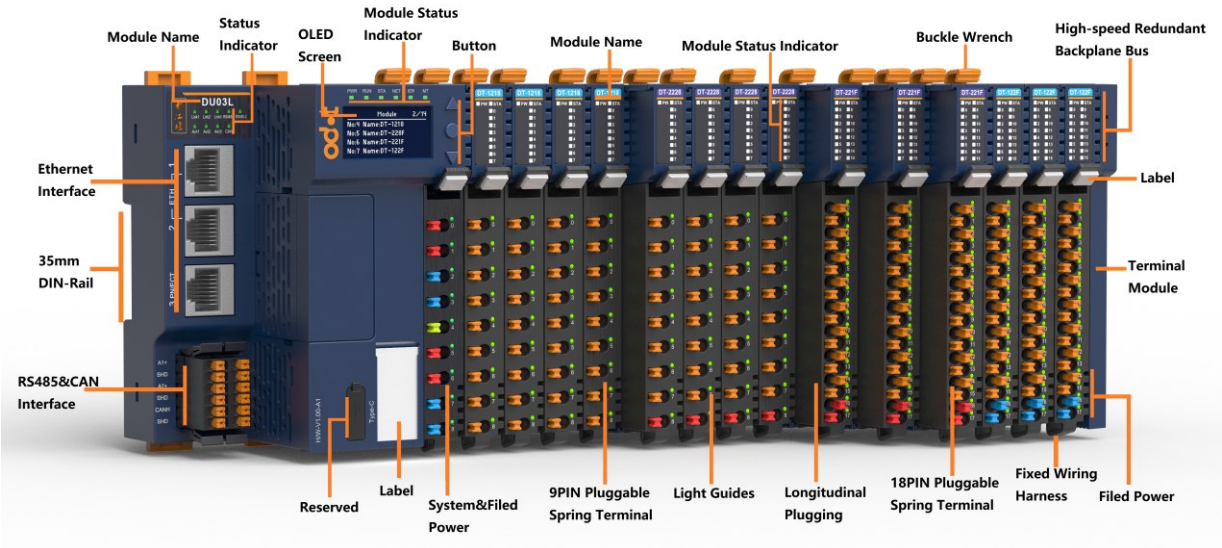
The DU03L controller programming platform is AIOSYS, support web programming, can be installed on a local PC or remote server, support Linux and Windows installation environment, and supports IEC 61499 and IEC 61131-3 standards, and supports LD, ST, and C programming. The controller supports motion control of EtherCAT servo axes, and supports single-axis control and multi-axis control.

It adopts high-speed redundant backplane bus, which can be used with D series I/O modules, with a maximum number of mounted modules of 32, and the extended I/O modules are mainly divided into digital input modules, digital output modules, analog input modules, analog output modules, etc.; I/O modules can be freely combined according to requirements, and lower cost requirements can be achieved when there are many points.

Multiple communication protocols are supported: EtherCAT master/PROFINET master (choose 1 of 2, configurable) (PROFINET master functions will be implemented in the future), Modbus TCP client/server, Modbus RTU master/slave, CAN transparent transmission, and TCP and UDP free port communication, and the controller supports PID control.

The module has diagnostic function, which can diagnose the working status of the module and the installation status of the terminals, and adopts staggered layout spring light guide terminals and pluggable terminals, and the wiring wire diameter can be connected to 0.2mm² (AWG 24) ~ 1.5mm² (AWG 16) cables, which is easy to maintain and replace the module. The module LCD display panel can view the relevant parameters of the module, and obtain some important information without relevant software.

1.1 Hardware Description

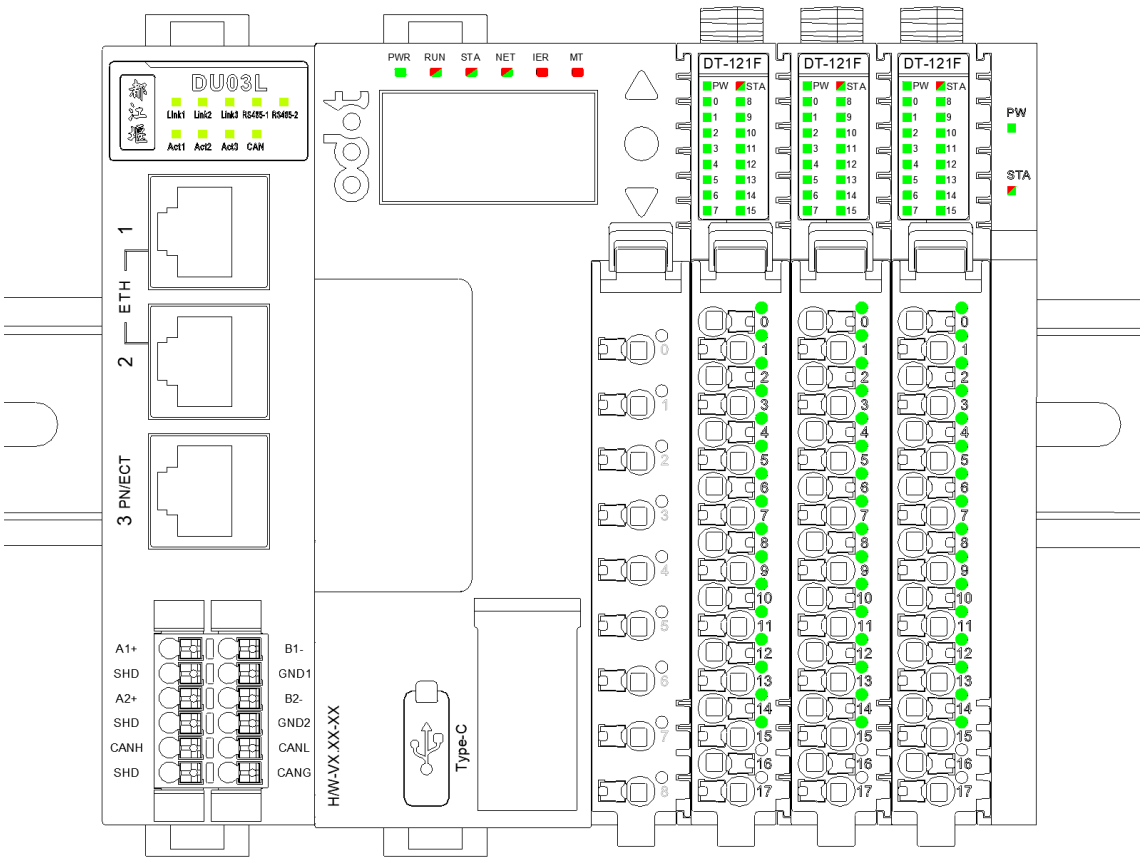


1.2 Selection Table

Module	Function Description	Status
DU03L	The programming platform is AIOSYS, which supports both IEC 61499 standard and IEC 61131-3 standard, supports LD, ST and C programming languages, supports EtherCAT master/PROFINET master (PROFINET master function will be implemented in the future), Modbus TCP client/server, Modbus RTU master/slave, CAN transparent transmission, and TCP, UDP free port communication, controller supports PID control, Supports motion control of EtherCAT servo axes, single-axis control and multi-axis control	Published
Digital Input Module		
DT-121F	16 Channels digital input module 24VDC/PNP/high level is valid	Published
DT-122F	16 Channels digital input module 24VDC/NPN/ low level is valid	Published
DT-1314	4 Channels digital input module 110 VAC /220VAC	Published
Digital Output Module		
DT-221F	16 Channels digital output module 24VDC/NPN/low level is valid	Published
DT-222F	16 Channels digital output module 24VDC/PNP/high level is valid	Published
DT-2794	4 Channels relay output module 2A@250VAC/30VDC (Resistive load), 1A@250VAC/30VDC (Inductive load)	Published
Analog Input Module		
DT-3168	8 Channels voltage input module 0~5VDC/ 0~10VDC/ ±5VDC/ ±10VDC, 16-bit	Published
DT-3238	8 Channels current input module 0&4-20mA, 16-bit	Published
DT-3364	4 Channels voltage input module 0~5VDC/ 0~10VDC/ ±5VDC/ ±10VDC, 16 bits	Published
DT-3434	4 Channels current input module 0& 4~20mA, 16 bits	Published
Temperature Acquisition Module		
DT-3714	4 Channels RTD input module RTD-PT100	Published
DT-3804	4 Channels thermocouple input module TC-J / K/ E / T / S / R / B / N Type	Published
Analog Output Module		
DT-4164	4 Channels voltage output module 0~5VDC/ 0~10VDC/ ±5VDC/ ±10VDC, 16 bits	Published
DT-4234	4 Channels current output module 0&4-20mA, 16 bits	Published
Terminal Module		
DT-5800	Terminal module, required module	Published
Power Expansion Module		
DT-7221	System power and field power expansion module SV: 2A @5VDC /FV: 8A @24VDC	Published

1.3 LED Indicator

Users can easily check the power status, operating status of the controller and I/O module through the LED status indicator. For detailed indicator status, refer to the controller or IO module indicator description section.



⚠ WARNING

OUT OF CONTROL

For details about the indicator status of the network adapter module, see related chapters.

For details about the indicator status of the I/O module, see related chapters.

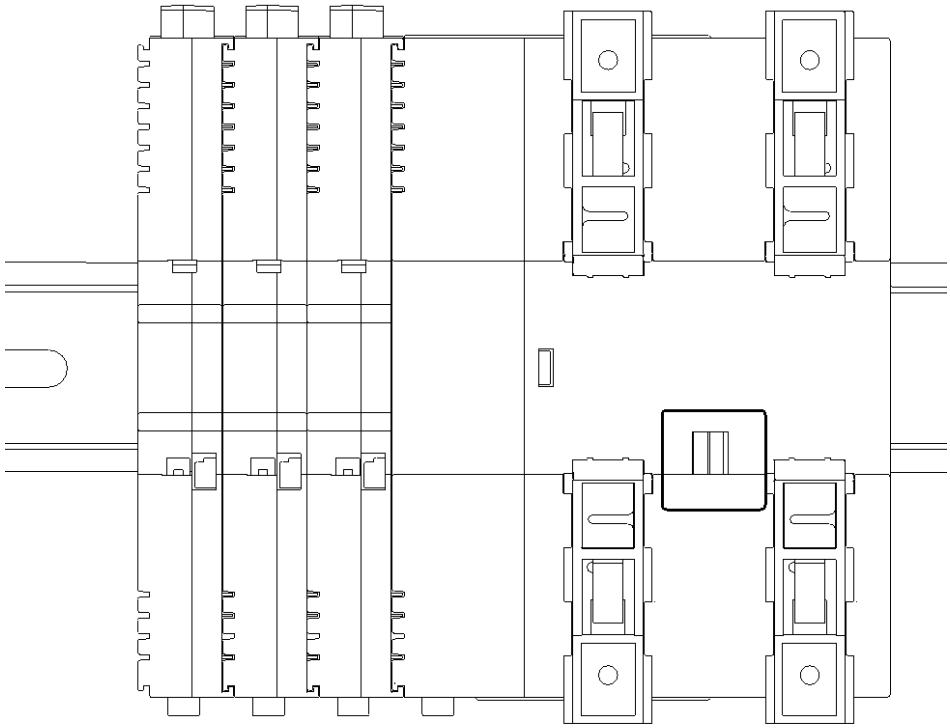
Different indicator states indicate that the module is in different working states.

The indicator status is incorrect, and the module is not working properly.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

1.4 Grounding

There is one metal Spring sheet on the back of the module, which is used for effective grounding with the guide rail.



Functional grounding on the DIN rail

The system DIN rail is the common functional grounding plane and must always be mounted on a conductive backplane.

The functional grounding (FG) is connected to the conductive backplane by a heavy-duty conductor (usually a braided copper cable with the largest allowable cable cross-section). There is a metal spring plate on the back of the module, which is used for effective grounding with the Din rail, and the metal spring plate is connected to the inside of the terminal PE of the adapter module. The conductor needs to be made of copper wire with a core greater than 0.2mm² and less than 1.5mm² , and an impedance of less than 10 ohms.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

·Connect the DIN rail to the functional grounding of the installed equipment.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

System Grounding

Due to the influence of electromagnetic interference, cables carrying fast I/O, analog I/O and fieldbus communication signals must be shielded cables.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

·Please use shielded cables for all fast I/O, analog I/O, and communication signals.

·Please use shielded cables for single point connection for all fast I/O, analog I/O and communication signals. [1]

·Arrange power cables separately from communication and I/O cables.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

[1] Multi-point grounding is permitted (and in some cases unavoidable) if it is connected to the equipotential grounding plane to avoid damage to the cable shield in the event of a power system short-circuit current. When using shielded cables, the following wiring rules need to be followed:

For the functional grounding (FG), metal pipes or wires can be used as part of the shield length, the premise is it should provide the entire earthing connection continuously without interruption. For functional grounding, shielding is used to reduce electromagnetic interference and the shielding must be continuous throughout the cable without interruption. If for both functional and protective purposes (This is usually the case for communication cables), the shielding of the cable must be continuous without interruption.

Cables carrying different types of signals or power should be separated whenever possible.

Shielded Cable Connection

Cables carrying fast I/O, analog I/O and fieldbus communication signals must be shielded. The shielded cable must be firmly grounded. The fast I/O and analog I/O shields can be connected to the functional grounding (FG) of the expansion module. The fieldbus communication cable shields must be connected to functional grounding (FG) via using connection clamps fastened to the conductive backplane installed.

1.5 Wiring

Use push-in method to connect single-wire or crimp terminal wires without any other tools. Users can save wiring time and ensure a safe operation regardless of wiring experience.

The module equips with a wiring fixed end for cable harness, which is used to fix the cable when the IO module is wired with multiple cables.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Use shielded cables for all fast I/O, analog I/O, and communication signals.

Single-point grounding with shielded cables for all fast I/O, analog I/O, and communication signals.

Route power cables separately from communication cables and I/O cables.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

If connected to an equipotential ground to avoid damaging the cable shield in the event of a short circuit current in the power system, multi-point grounding is allowed (which in some cases is unavoidable).

Note: Surface temperatures may exceed 60°C (140°F).

To comply with the IEC-61010 standard, the main wiring (the wires connected to the main power supply) should be arranged separately and separated from the secondary wiring (the ultra-low voltage wiring from the intermediate power supply). If separate wiring is not possible, double insulation, such as conduit or cable gain, must be performed.

Note: Copper wire is required.

⚠ DANGER

FIRE HAZARD

Only use the correct wire rules for the maximum current capacity of the I/O channels and power supplies.

For relay output (2A) wiring, please use conductors with a cross-sectional area of at least 0.5 mm^2 (AWG20) and a temperature rating of at least 80°C (176°F).

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

1.6 Installation

1.Installation and maintenance requirements

The use and application of the information contained in this chapter requires expertise in the design and programming of automatic control systems. Only the user, machine builder or integrator can clearly understand the various situations and factors that may arise during installation and set-up, operation and maintenance, and therefore can determine the effective and correct use of automation and associated equipment, related safety devices and interlocks equipment. When selecting automation and control equipment and any other related equipment or software for a particular application, all applicable local, regional or national standards and/or regulations must also be considered.

In particular, observe any safety information, different electrical requirements and regulatory standards applicable to the machine or the use of the equipment.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

2.Cut off the power supply

All options and modules should be assembled before the equipment is installed on the mounting rails, mounting plates or panels; To disassemble, remove the control system from the mounting rails, mounting plates, or panels before disassembling the unit.

DANGER

THERE IS A RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- DISCONNECT ALL EQUIPMENT FROM THE POWER SUPPLY (INCLUDING CONNECTED DEVICES) BEFORE REMOVING ANY COVER, OR INSTALLING OR REMOVING ANY ACCESSORIES, HARDWARE, CABLES, OR WIRES, EXCEPT AS OTHERWISE SPECIFIED IN THE CORRESPONDING HARDWARE GUIDE FOR THIS DEVICE.
- ACCORDING TO THE INSTRUCTIONS, IT IS IMPORTANT TO USE VOLTAGE SENSING EQUIPMENT WITH APPROPRIATE RATINGS TO DETECT WHETHER THE POWER IS LOST AT THE APPROPRIATE PLACE AND TIME.
- ACCORDING TO THE INSTRUCTIONS, IT IS IMPORTANT TO USE VOLTAGE SENSING EQUIPMENT WITH APPROPRIATE RATINGS TO DETECT WHETHER THE POWER IS LOST AT THE APPROPRIATE PLACE AND TIME.
- REPLACE AND FASTEN ALL COVERS, ACCESSORIES, HARDWARE, CABLES AND WIRES, AND CONFIRM THAT THE GROUND CONNECTION IS CORRECT BEFORE POWERING ON THE EQUIPMENT.

• WHEN OPERATING THIS EQUIPMENT AND RELATED PRODUCTS, THE SPECIFIED VOLTAGE MUST BE USED.

FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN THE LOSS OF PROTECTION PROVIDED BY THE DEVICE, WHICH CAN RESULT IN SERIOUS CONSEQUENCES SUCH AS DEATH OR INJURY OR DAMAGE TO THE DEVICE.

3.Environmental Requirements

All expansion module components must be electrically isolated between the internal circuit and the input/output channel, and the modules must be installed in a control cabinet or electric control room. The equipment is intended for use in industrial environments with pollution class 2 and altitudes below 2000 m.

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not exceed any ratings specified in the Environmental and Electrical Characteristics Table.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

The modules are not suitable for use in harsh environments, such as environments with corrosive gases or salt spray.

Install and operate this equipment in accordance with the conditions described in "Environmental Characteristics".

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

4.Installation Precautions

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Use appropriate safety interlocks in situations where there may be a risk of personal injury and/or equipment damage.

Install and operate the equipment in an enclosure that is locked by a key locking device and complies with the level of the environment in which the equipment operates.

Use the sensor and actuator power supply only for powering the sensors or actuators connected to the module.

Wiring and output circuits must be wired and fused in accordance with local and national regulations for specific equipment rated amperage and voltage.

Do not use this device in a safety-critical machine environment unless it is designated as a functional safety device and complies with applicable regulations and standards.

Do not disassemble, repair or modify this equipment.

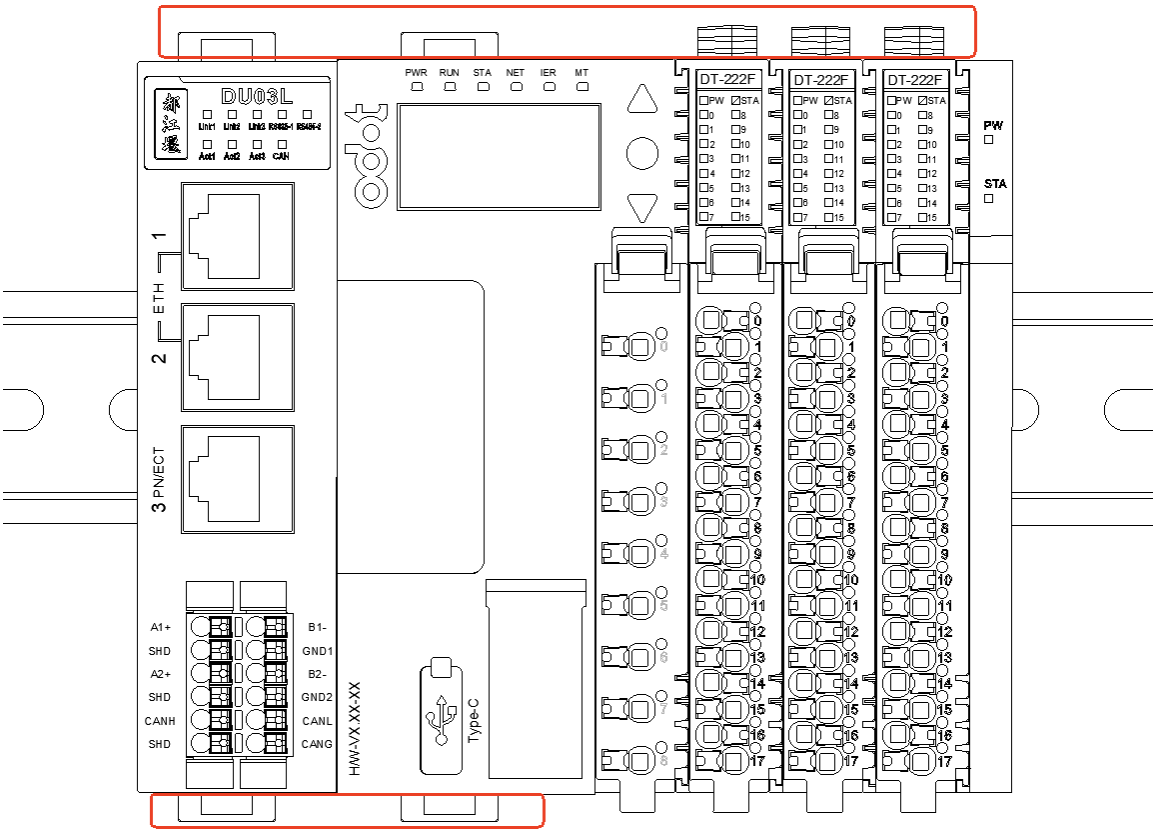
Do not connect any lines to reserved unused connection points, or connection points indicated as No Connection (NC).

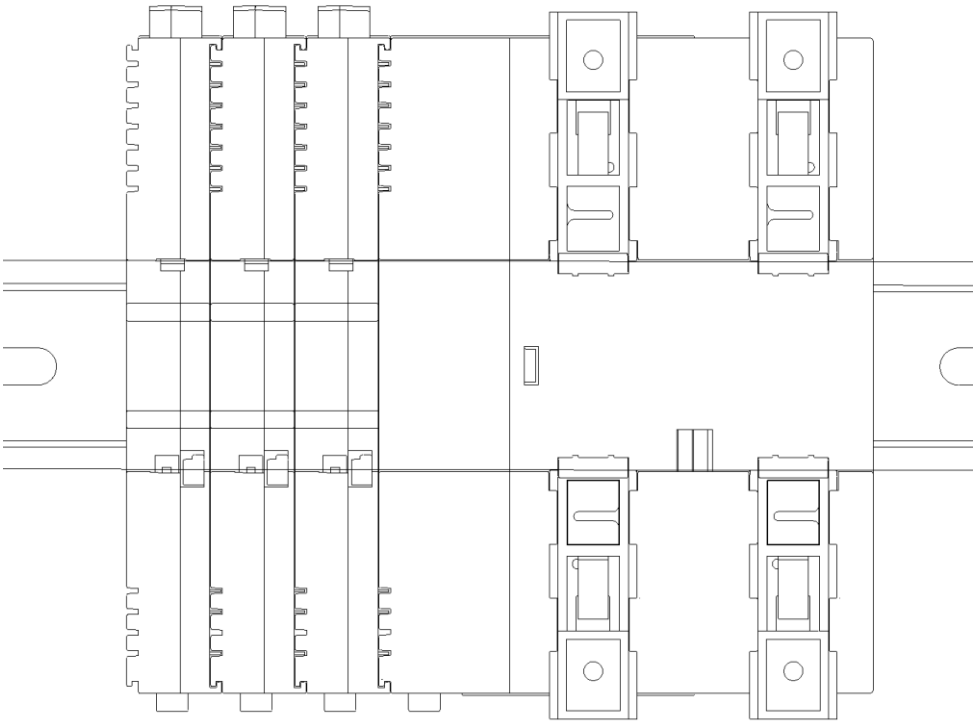
Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

5.Correct Installation

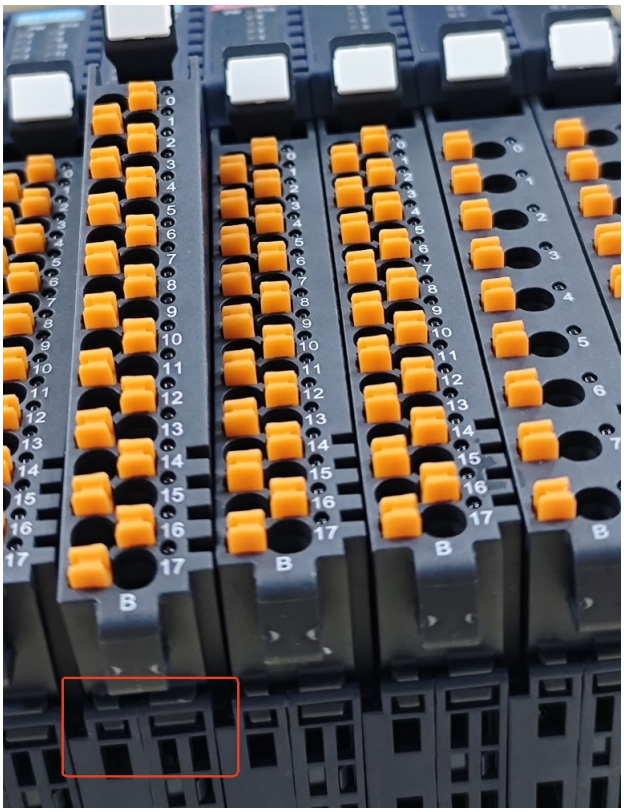
DIN-Rail Lock could be safely and reliably installed on 35 mm DIN-Rail. There is a manual closure buckle on the upper side of all modules for locking, and a manual buckle is on the left side of the adapter for locking the guide rail.

The network adapter is installed on the far left, followed by other I/O modules (including digital input/output modules, analog input/output modules, etc., and the terminal modules are installed on the far right).

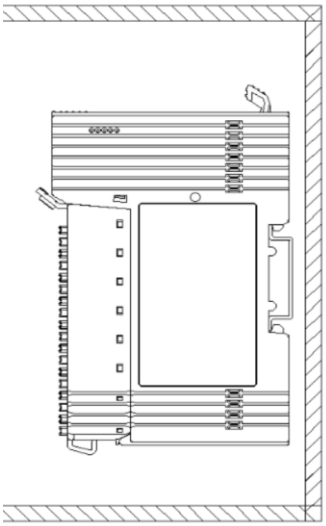




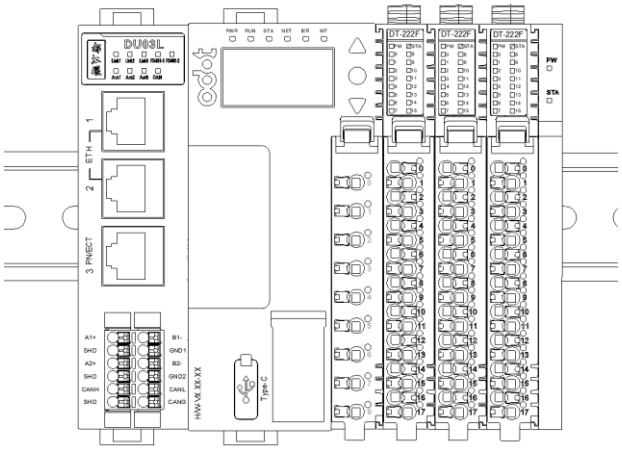
When installing the terminal block, please place the bottom of the terminal block correctly in the card slot, and then press the terminal block inward, and you can hear a "click" sound after successful installation or judge whether the terminal block is installed in place through the STA indicator light of the module.



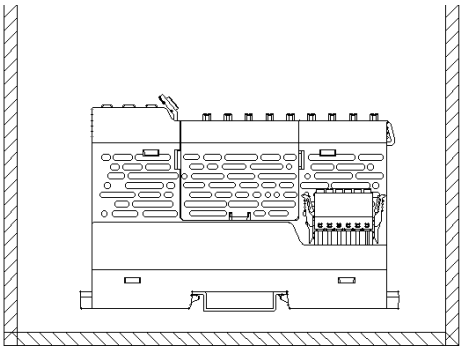
The module can be installed vertically or horizontally, and the schematic diagram of vertical and horizontal installation is as follows:



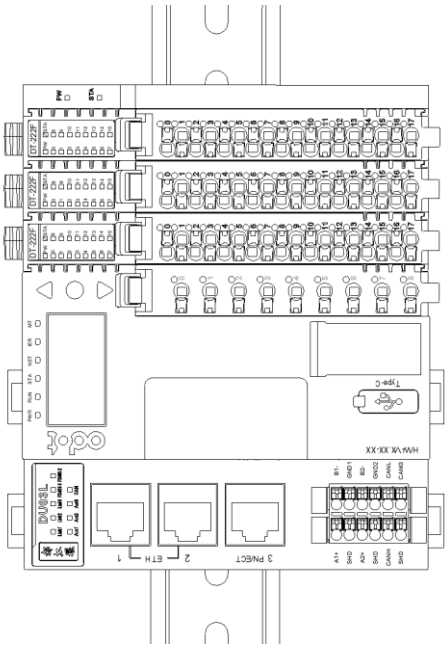
①Right view of horizontal installation



②Horizontal installation



③Vertical installation of the top view



④Vertical installation

⚠WARNING

OUT OF CONTROL

The lock of the I/O module must be pressed firmly; otherwise, the communication of the I/O module may be disconnected.

The lock of the I/O module must be pressed firmly, otherwise the module may fall off.

When installing the I/O module, no gap should be left between the modules. Otherwise, the I/O channel may not work properly.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

Notice

DEVICE INOPERABLE

The installation position of the I/O module in the middle is not fixed. According to the layout position needed by customer, after the actual project confirms the installation position, it is not allowed to move the position of the I/O module.

Each station needs to add terminal modules.

Failure to follow the above instructions could result in damage to the equipment.

6 The Use of Power Modules

Power modules need to be added based on the actual number of I/O modules. The positions of power modules are not fixed between I/O modules. Therefore, the designer must determine the installation positions of power modules in advance.

⚠WARNING

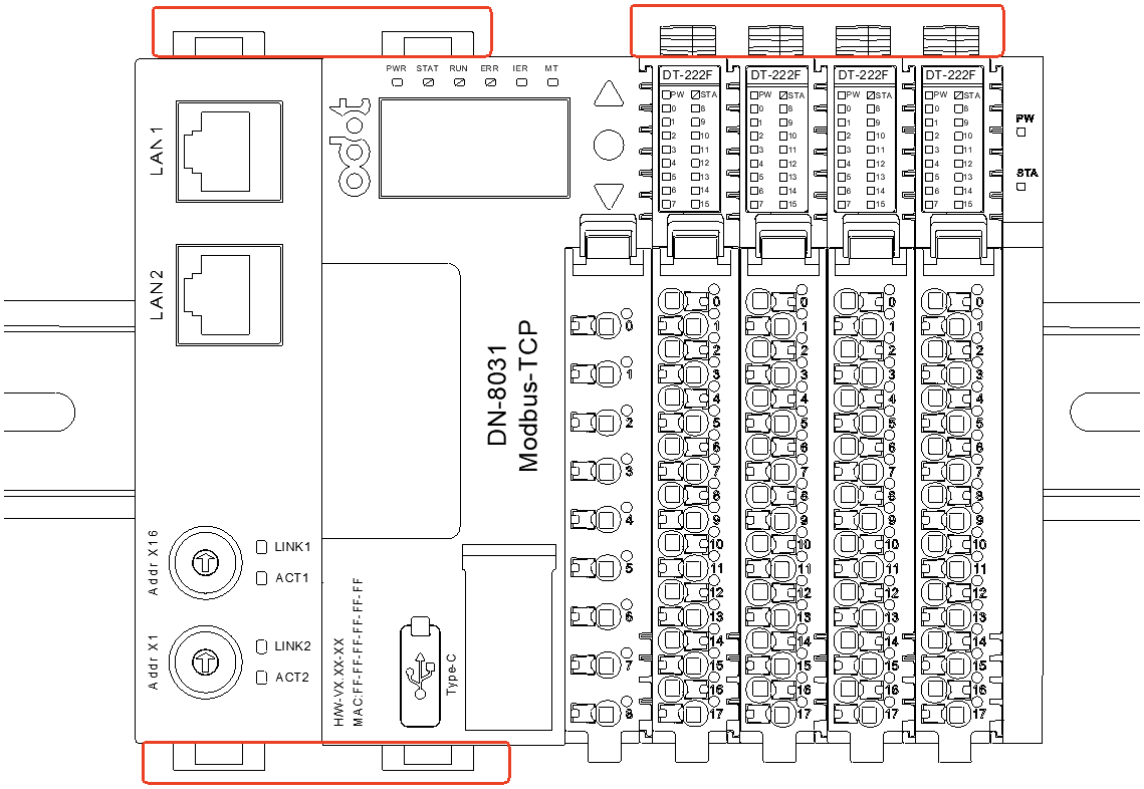
UNINTENDED EQUIPMENT OPERATION

If the total current of the I/O modules installed at the rear of the adapter device exceeds the provided current, but no power module is added, the I/O module channels will work abnormally.

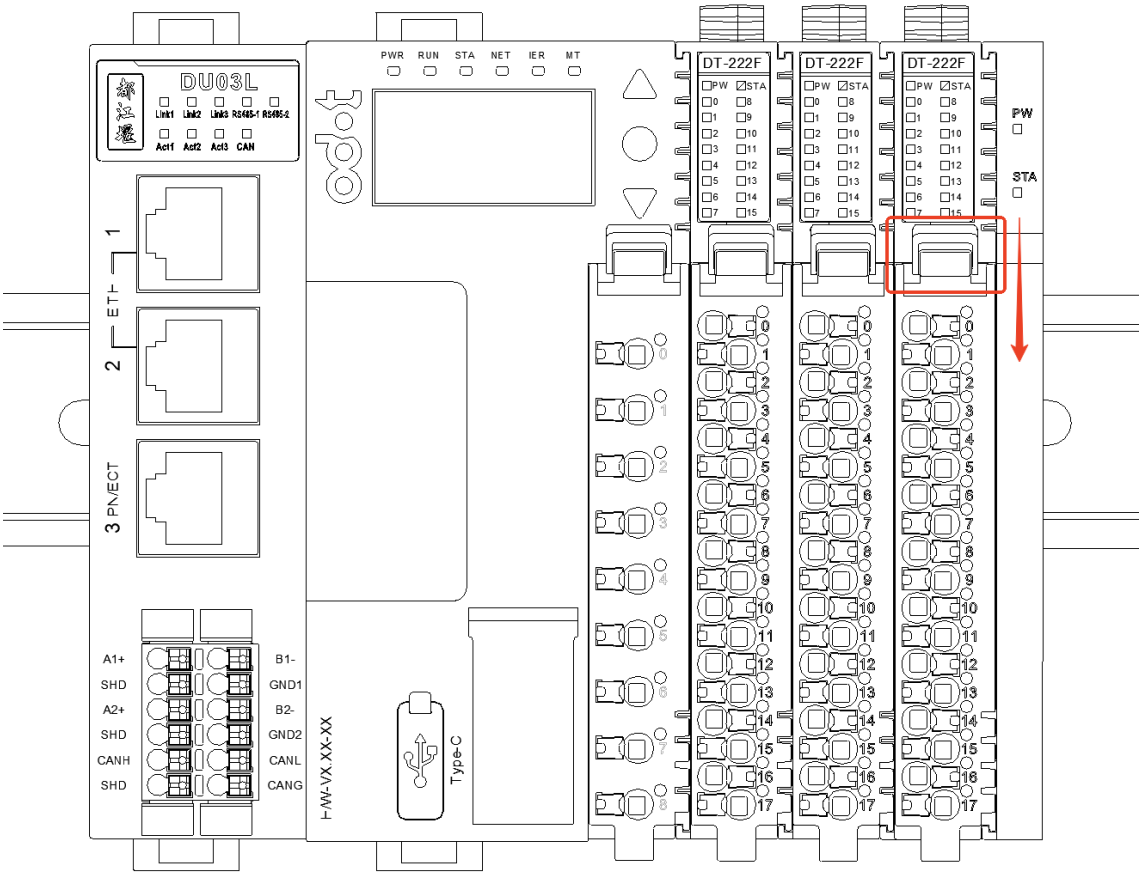
Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

7 Removal

When the module is removed, it needs to manually unlock the guide rail on the upper side of the module.



If need to remove the terminal block, first press down on the terminal block snap while removing the terminal block outward.



⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

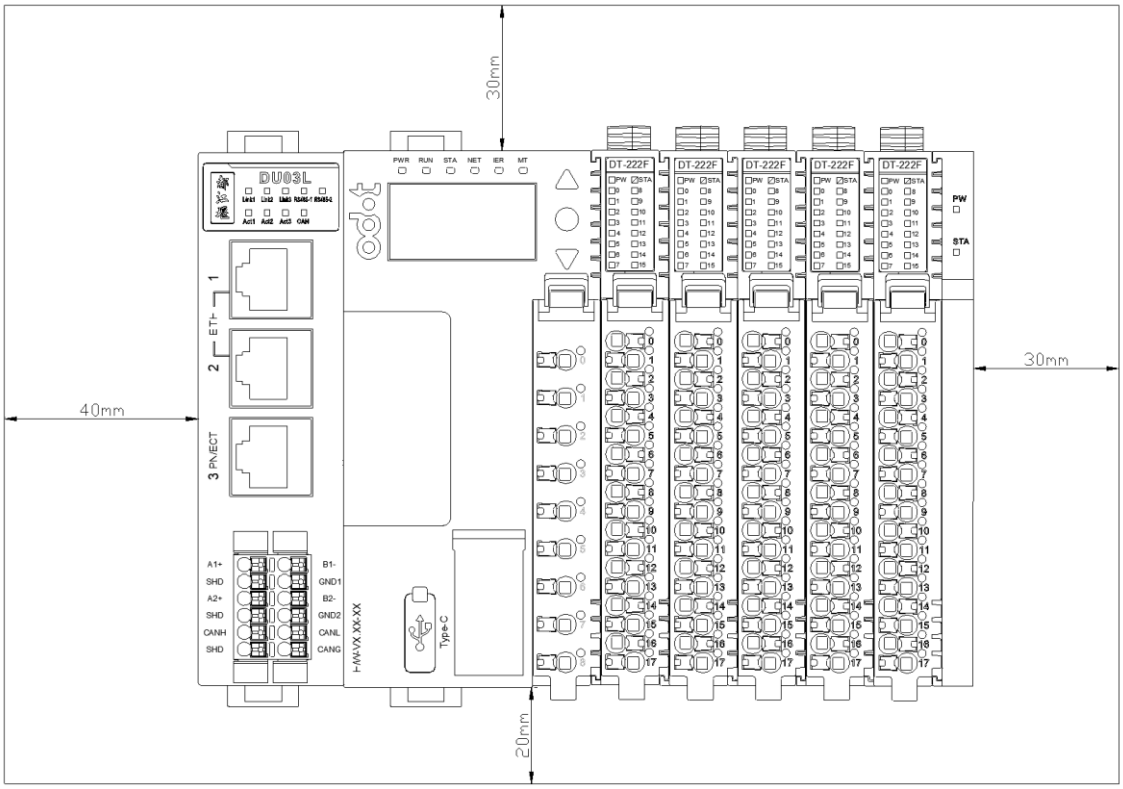
The module does not support the hot swap function. When removing or replacing a module, it is necessary to power off before removing or replacing the module.

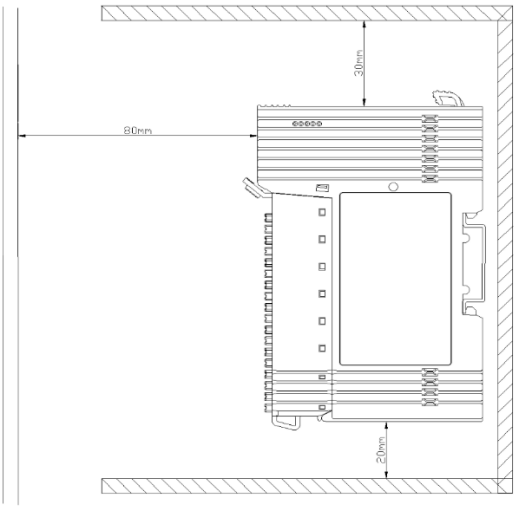
When replacing I/O modules in later maintenance, please note that the model and slot number should be replaced correspondingly. It is not allowed to replace with the wrong module model or move the sequence of I/O modules at will, otherwise there will be a risk of burning out the module or damaging the field equipment.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

8 Installation Clearance

When installing or removing a module, leave a minimum clearance.





⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

·Install the equipment that dissipates the most heat at the top of the cabinet to ensure proper ventilation.

·Please do not place this device near or above equipment that may cause overheating.

·Install the equipment so that it maintains the minimum clearances stated in this document to all nearby structures and equipment.

·Install all equipment according to the specifications in the relevant documentation.

Failure to follow instructions specified by the manufacturer may result in serious

consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

9 Incorrect Installation Location

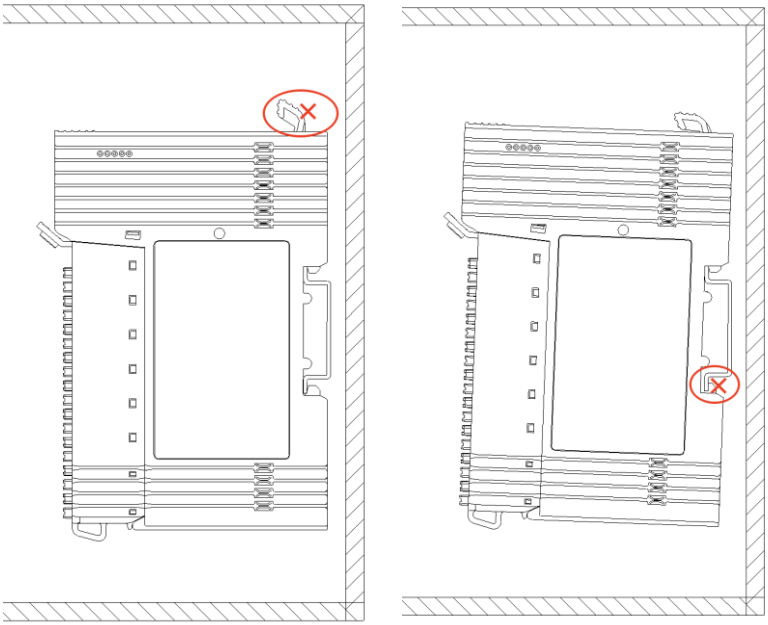
A. The lock on the left side of the C3351 device is not pressed firmly to the Din rail.

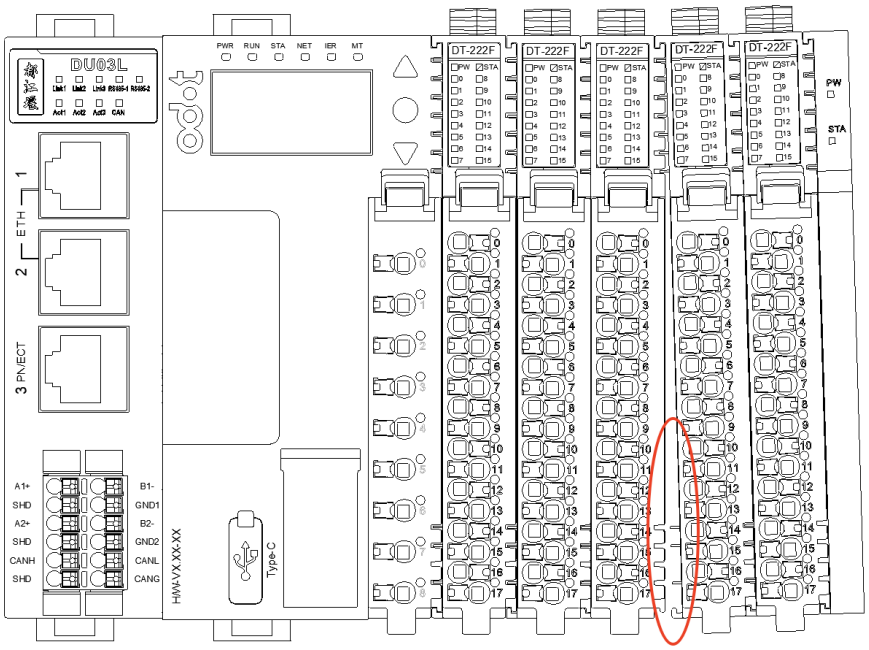
B. After the installation is completed, the lock on the upper side of the module is not pressed to lock the Din rail, or the pressed position is not in place.

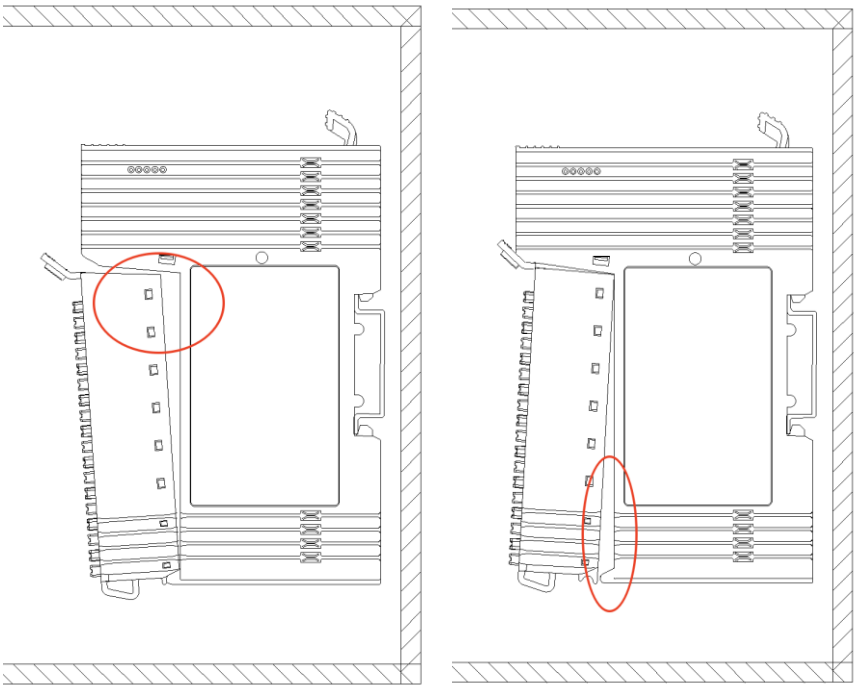
C. After the installation is completed, the lower part of the side of the module is not installed in place, and the module is not installed vertically, but is inclined to the backplane.

D. There are gaps between modules.

E. The terminal blocks are not installed in place

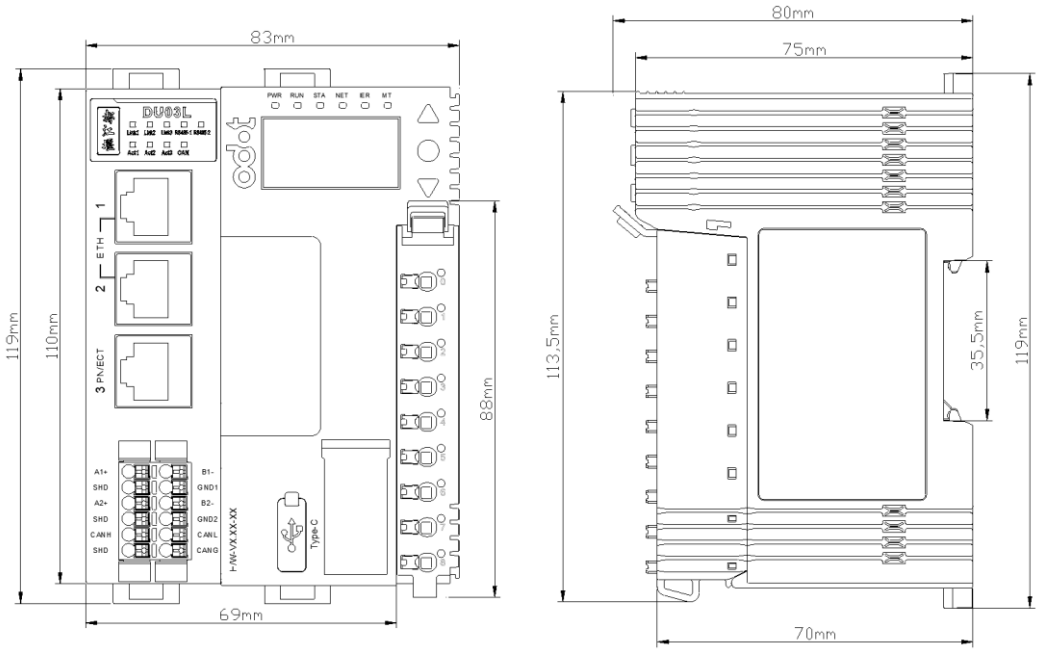



DU03L
PWR RUN STA NET IER MT
DT-222F
ETH
PN/ECT
A1+
SHD
A2+
SHD
CANH
SHD
B1-
GND1
B2-
GND2
CANL
CANG
HW-VX.XX-XX
Type-C
PW
STA

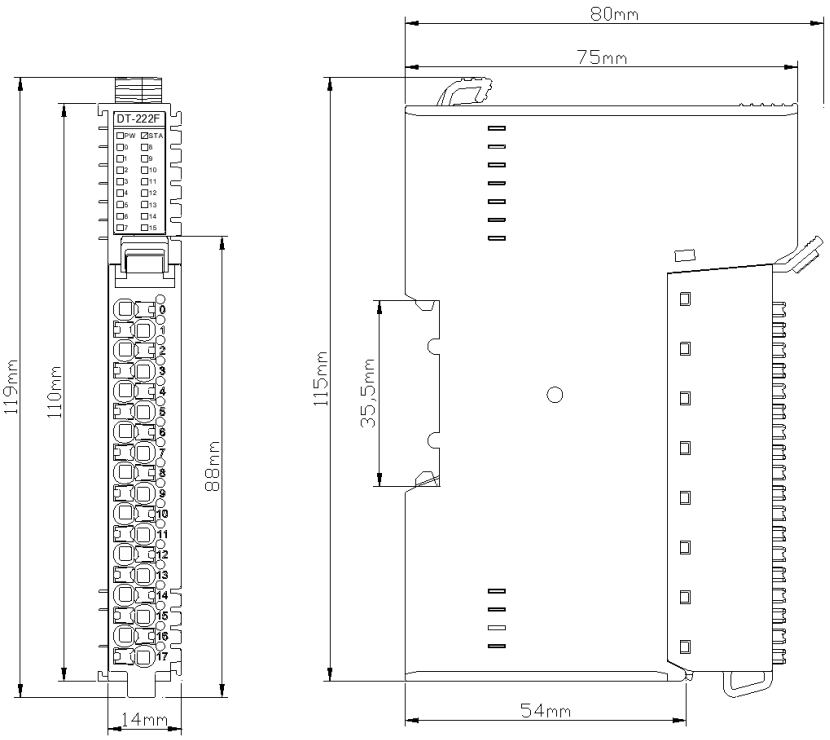


10 Installation Size

The installation size of DU03L: 119*83*80mm



The installation size of I/O module: 119*14*80mm



1.7 Power Supply

⚠ DANGER

FIRE HAZARD

Use only the correct wire specifications for the maximum current capacity of the power supply.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Please do not exceed any ratings specified in the Environmental and Electrical Characteristics table.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

The device and associated expansion modules require a power supply rated at 24 VDC. According to IEC 61140, the 24 VDC power supply must be rated safety extra-low voltage (SELV) or protective extra-low voltage (PELV). These power supplies are isolated between its electrical input and output circuit.

⚠ WARNING

OVERHEATING AND FIRE HAZARD

Never connect the device directly to the line voltage.

Please use only insulated SELV or PELV power supply to power the device.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

1.8 Ventilation Requirements

NOTICE
IO module, please install in the control cabinet with door lock (control cabinet shell protection >IP20); Installation can not be placed under the heat generating elements, the surrounding ventilation and heat dissipation space should be large enough, there should be more than 30MM between the basic unit and the expansion unit; The upper and lower parts of the switchgear should have ventilated shutters to prevent direct sunlight exposure; During installation, avoid metal shavings and wire tips falling into the controller's ventilation holes, which may cause fire, failure, and misoperation. **Failure to follow the above instructions could result in damage to the equipment.**

1.9 Scrap Processing

Scrap condition:

1. The use time has exceeded the specified service life, the main structure is obsolete, the components are aging, the performance indicators are reduced, and the basic requirements of use are not met;

2. The damage is so severe that it is beyond repair or the repair cost is close to or exceeds the price of the new purchase of similar electronic equipment;

3. Serious pollution of the environment endangers personal safety and health, technical transformation is difficult or the cost of transformation is uneconomical;

4. Backward technical performance, high energy consumption, low efficiency, maintenance and use of uneconomical.

5. The quality is inferior, does not meet the technical standards, and does not meet the minimum performance indicators in the application.

6. Equipment that cannot be used for other reasons and should not be transferred to other enterprises without retaining value.

⚠ WARNING
Since this product cannot be discarded with other household waste, when the end user intends to discard this product, it must be sent to the appropriate facility for recovery and recycling.

Do not discard directly in the trash.
Comply with the relevant laws and regulations, the destruction process should choose a legitimate organization for processing.

1.10 Equipment maintenance and repair

NOTICE
It is prohibited to replace the detachable power cord with an inappropriate rated wire. Any parts that can only be inspected or supplied by the manufacturer or its agents. Only for the manufacture of electrical equipment and the operation of personnel with relevant skills and knowledge. Confirm the safety status of the equipment after maintenance **Failure to follow the above instructions could result in damage to the equipment.**

1.11 Disclaimer of Warranties

Product Usage

NOTICE
• **WHEN INSTALLING, OPERATING, AND MAINTAINING THE EQUIPMENT, DO NOT EXCEED ANY OF THE RATINGS SPECIFIED IN THE ELECTRICAL CHARACTERISTICS;** • **WHEN INSTALLING, OPERATING, AND MAINTAINING THE EQUIPMENT, DO NOT EXCEED ANY OF THE RATINGS SPECIFIED IN THE ENVIRONMENTAL CHARACTERISTICS. DO NOT USE THE PRODUCT IN THE FOLLOWING PLACES: PLACES WITH DUST, OIL FUMES, CONDUCTIVE DUST, CORROSIVE GASES, AND FLAMMABLE GASES; DO NOT EXPOSE TO HIGH TEMPERATURES, CONDENSATION, WIND AND RAIN; VIBRATION AND SHOCK WILL ALSO CAUSE DAMAGE TO THE PRODUCT;** **FAILURE TO FOLLOW THE INSTRUCTIONS MAY RENDER THE PROTECTION PROVIDED BY THE DEVICE NULL AND MAY RESULT IN MINOR BODILY INJURY OR DAMAGE TO THE DEVICE.**

Disclaimer of Warranties

The Company shall not be liable for any damage or malfunction of the equipment caused by:

1. Transportation damage: equipment damage caused by improper transportation or packaging;

2. Natural factors: damage caused by lightning strikes, voltage fluctuations, water ingress or natural disasters (such as fires, floods, etc.);

3. Improper use: damage caused by overload, non-standard operation, unauthorized modification or use of unqualified accessories;

4. Unauthorized maintenance: equipment failure caused by unauthorized maintenance or alteration;

5. Other non-product reasons: damage caused by other reasons that have nothing to do with the equipment itself.

Repair services

1. For the damage caused by the above reasons, the company will charge the repair fee according to the actual situation.

2. Outside the warranty period, the company provides paid maintenance services, and the cost is charged according to the maintenance situation.

Assumption of Risk

The company shall not be liable for casualties, property damage or other related losses caused by the use of the equipment. All risks are borne by the user.

2 Module Parameter

2.1 Module Feature

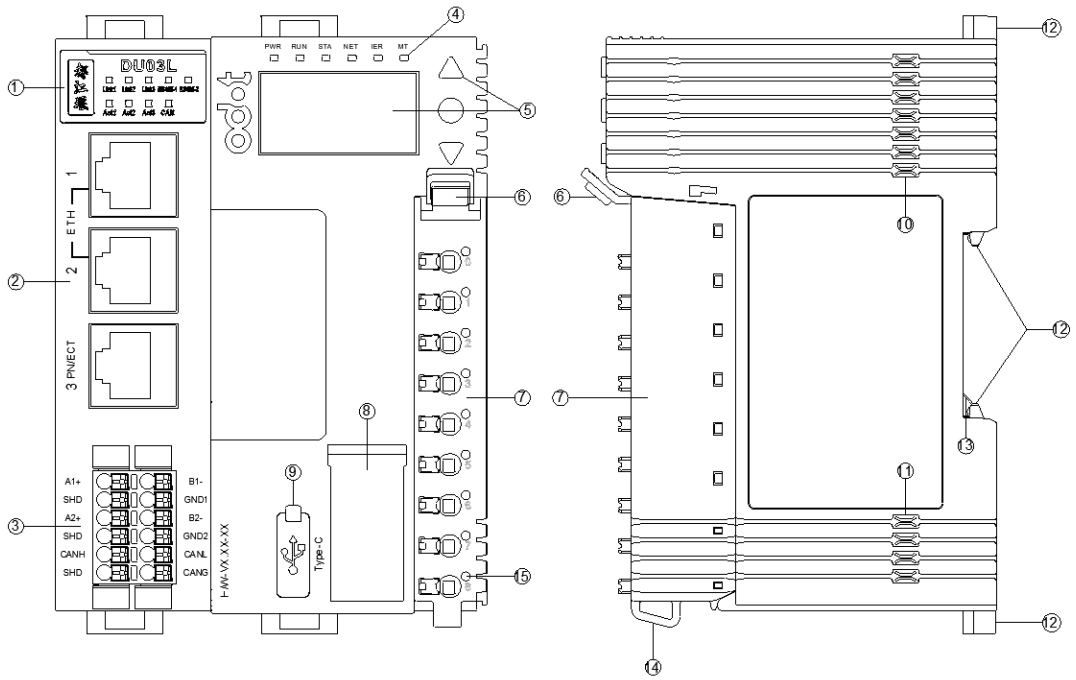
- The programming platform of the DU03L module is AIOSYS, which supports both IEC 61499 standard and IEC 61131-3 standard, and supports LD, ST and C programming languages.
- The module supports motion control of EtherCAT servo axes, and supports uniaxial and multi-axis control.
- The module has 3 RJ45 interfaces, Port1 and Port2 can be used as debugging or communication interfaces, with switch function, support Modbus TCP client function, support Modbus TCP server function; Support TCP and UDP free port communication; Port3 supports configuration as EtherCAT master or PROFINET master (PROFINET master function will be implemented in the future).
- The module has 2 RS485 interfaces, and the two serial ports work independently, and can be configured as Modbus RTU master, Modbus RTU slave or free port communication.
- The module has 1 CAN interface;
- It can be used with D series IO modules, and up to 32 IO modules can be expanded on the right side, and the IO modules can be flexibly selected to be used with PLC;
- The module supports PID control;
- Module removable installation is more convenient, staggered layout spring light guide terminals, and the terminal is pluggable, it is easy to maintenance and replacement, the wiring diameter is 0.2mm² (AWG 24) ~ 1.5mm² (AWG 16);
- The OLED screen can view the module related parameters, it can acquire some important information without the software;

2.2 Technical Parameter

General Parameters	
Module Consumption	130mA@24VDC
System Power	19.2~28.8VDC (Nominal: 24VDC) Anti-inversion protection: support
Internal Bus Supply Current	Max.2A@5VDC
Field Power	19.2~28.8VDC (Nominal: 24VDC)
Field Power Current	Max. DC 8A
Wirring Diameter	Min.0.2mm²(AWG24) Max.1.5mm²(AWG16)
Terminal Pluggable	Support
The Maximum Number of Expansion Modules	32
Backplane Bus	Double bus redundancy
Installation	35mm DIN-Rail
Dimension	119*83*80mm
Product Certification	CE Certification
Hardware Interface	
Ethernet	3*RJ45, Port1 and Port2 are debugging or communication interfaces, port3 is the EtherCAT/ PROFINET master interface (The PROFINET master function will be implemented later)
	10/100 Mbit/s, Full duplex, automatic MDI/MDIX
CAN Interface	1*CAN interface, terminal wiring
	Transmission rate: 10 kbit/s~1000 kbit/s
RS485 Interface	2*RS485 interface, terminal wiring
	Transmission rate: 300bps-500Kbps
Type-C Interface	1 (Reserved interface)
TF Card Interface	1
Hardware Interface	
Data Storage	1GB
Program Storage	1GB
Retentive Memory	512K Bytes
Real-time Clock	Support
Motion Control	
Type of Axis	Real axis, Imaginary axis
Type of Real Axis	EtherCAT Servo axis
Uniaxial Control	Speed control, Position control
Multi-axis Linkage	Electronic cam, Electronic gear
Communication Parameter	
Modbus TCP Server	Function code: 01/02/03/04/05/06/15/16/23
Modbus TCP Client	Support up to 8 servers to connect
	Function code: 01/02/03/04/05/06/15/16/23
Modbus RTU/ASCII Master	Function code: 01/02/03/04/05/06/15/16/23
Modbus RTU/ASCII Slave	Support
CAN Free-port Communication	Protocols: CAN 2.0A/B
TCP/UDP Free-port Communication	Support
Programming software	
Programming Platform	AIOSYS
Programming Language	LD, ST, C

Complex Variables	Support structural variables
Configuration (Own Parameters and Communication)	Support
Global Variable	Support
Engineering Encryption	Support
PLC Program Debugging	Support
TRACE	Support
Emulation	Support
Data Record	Support
Formulation	Support
Environmental Parameters	
Horizontal Installation Operating Temperature	-30℃~60℃
Vertical Installation Operating Temperature	-30℃~50℃
Storage Temperature	-40℃~85℃
Environment Humidity	5%~95%RH (No condensation)
Installation Altitude	<2000m
Pollution Degree	II
Protection Grade	IP20
Mechanical Properties	Comply with IEC61131-2, IEC60068-2-6, IEC6008-2-27
Insulation Withstand	Comply with IEC61131-2
EMC Performance	Comply with IEC61131-2、IEC61000-4

2.3 Hardware Interfaces



①: Interface Indicator

②: Network Interface

③: Bus Interface

④: Status Indicator

⑤: LCD Screen and Buttons

⑥: Terminal Block Labels

⑦: Removable Terminal Blocks

⑧: Labels

⑨: Reserve Interfaces

⑩: High-speed Redundant Backplane Bus

⑪: Field Power

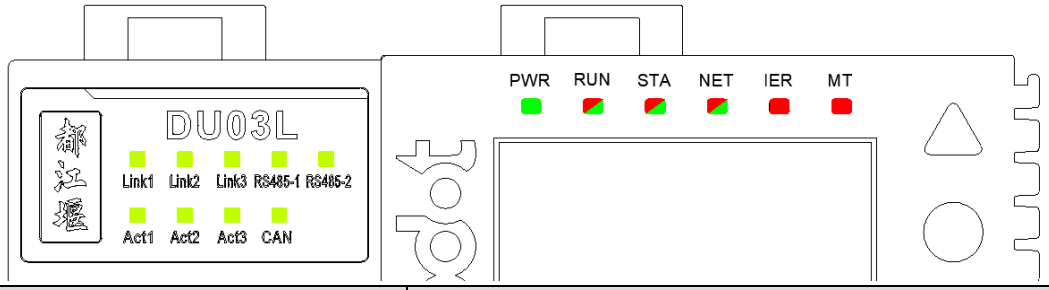
⑫: Buckle

⑬: Grounding Spring Sheet

⑭: Fixed Wiring Harness

⑮: No Instruction Functions

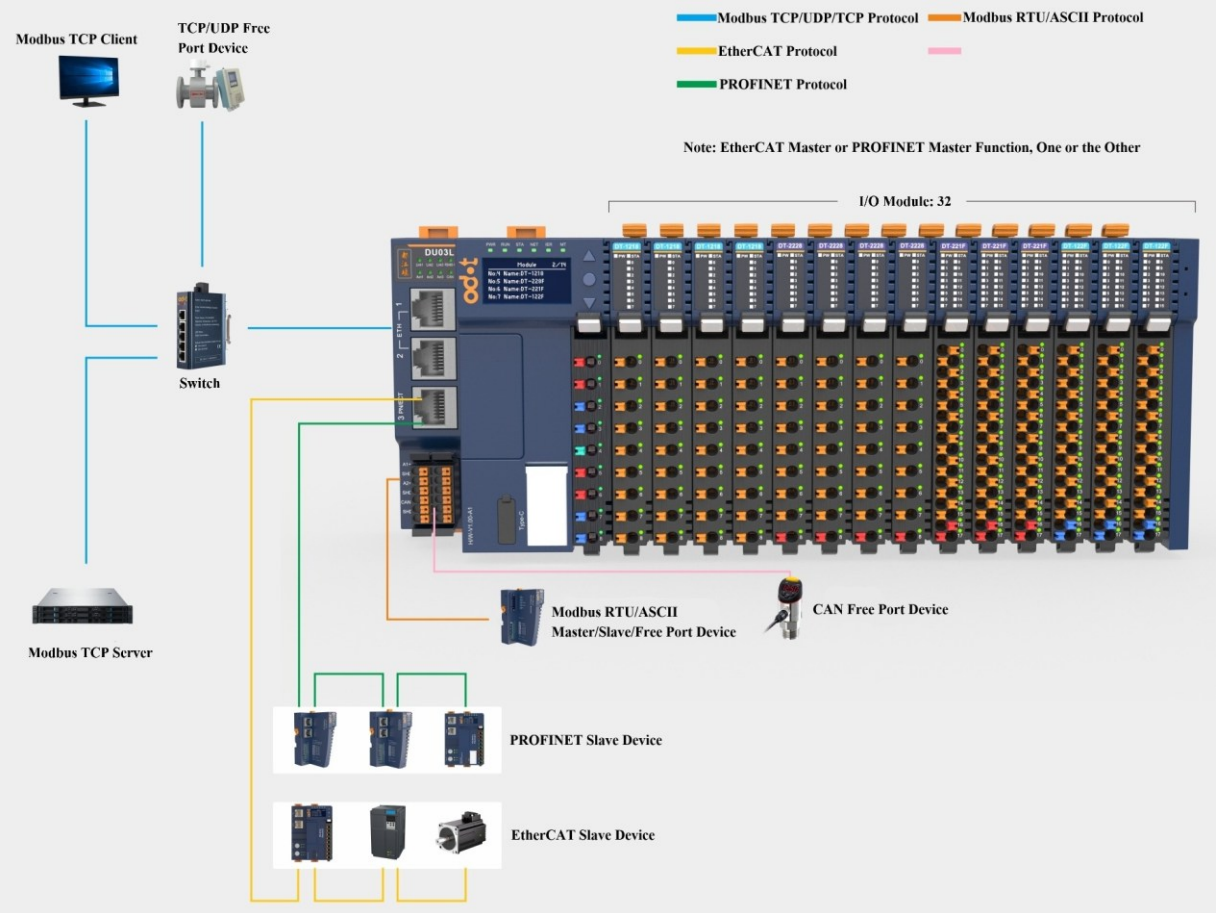
Indicator Definition



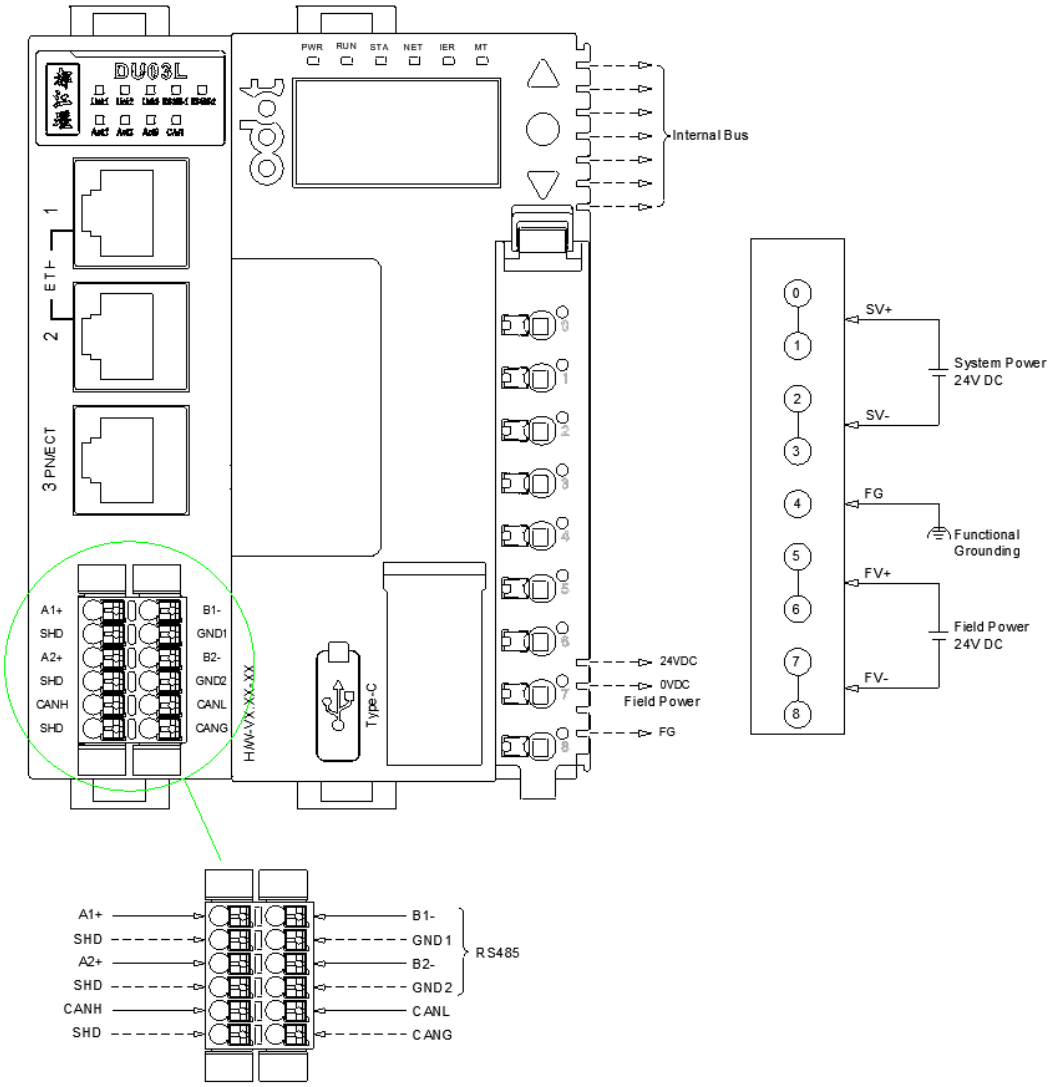
PWR Power Indicator (Green)	Definition
ON	The system power supply is normal
OFF	The system power supply is abnormal
RUN Running Indicator (Red/Green)	Definition
ON (Green)	Running mode
Flash (Red)	Stop mode
ON (Red)	There is no program for the device
STA State Indicator (Red/Green)	Definition
ON (Green)	Operating mode
Slow flash (Red)	Power-on default state
Fast flash (Green)	Firmware Upgrading
Flash 2 times (Red)	Module exception restarted
NET Network state indicator (Red/Green)	Definition
ON (Green)	The software configuration is consistent with the actual module
ON (Red)	The software configuration is inconsistent with the actual module
IER Error Indicator (Red)	Definition
OFF	IO communication is normal
Flash	IO communication is error
MT Error Indicator (Red)	Definition
OFF	The system is running normally
ON	The system is running abnormally and requires maintenance
Link1/ Link2/ Link3 Network Connection State Indicator (Green)	Definition
ON	The network is connected
OFF	The network is not connected
Act1/ Act2/ Act3 Network Data Transmission and Reception Indicator (Green)	Definition
Flash	Data is exchanging
OFF	There is no data exchanging
RS485-1/ RS485-1 Data Transmission and Reception Indicator (Green)	Definition
Flash	Data is exchanging
OFF	There is no data exchanging
CAN Data Transmission and Reception Indicators (Green)	Definition
Flash	Data is exchanging
OFF	There is no data exchanging

2.4 Communication Topology

The following figure shows the communication topology of the controller:

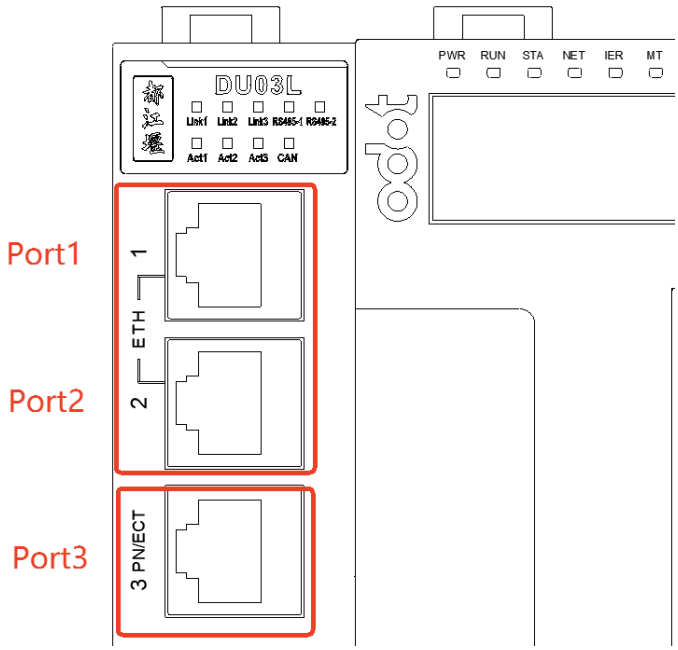


2.5 Wiring



Ethernet interface

The DU03L has 3 Ethernet interfaces, Port 1/Port 2 can be used as debugging interfaces or communication interfaces, support Modbus TCP client/server, and Port 3 can be configured as EtherCAT master communication interfaces.



Port1/Port2: Supports switch cascade function, 10Mbps/100Mbps adaptive rate, can be used as Modbus TCP communication interface or debugging interface.

Port3: 10Mbps/100Mbps adaptive rate for EtherCAT master interface.

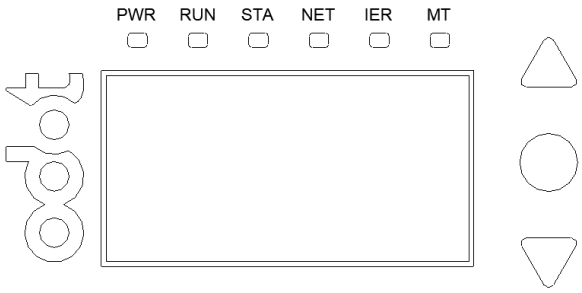
Power Interface

Pin	Definition	Description
0	SV+	System power positive
1	SV+	
2	SV-	System power negative
3	SV-	
4	FG	Functional ground
5	FV+	Field power positive
6	FV+	
7	FV-	Field power negative
8	FV-	

Communication Interface

Description	Pin	Pin	Description
RS485-1 A+ Signal line	A1+	B1-	RS485-1 B- Signal line
RS485-1 Shield	SHD	GND1	RS485-1 Signal ground
RS485-2 A+ Signal line	A2+	B2-	RS485-2 B- Signal line
RS485-2 Shield	SHD	GND2	RS485-2 Signal ground
CAN_H Signal line	CANH	CANL	CAN_L Signal line
CAN Shield	SHD	CANG	CAN Signal ground

2.6 OLED Interface



Key definition:

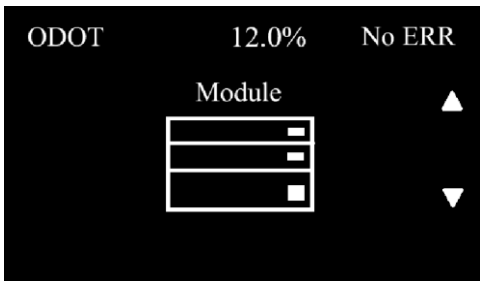
▲ is the page up button, ● is the confirmation and exit button, ▼ is the page down Button.

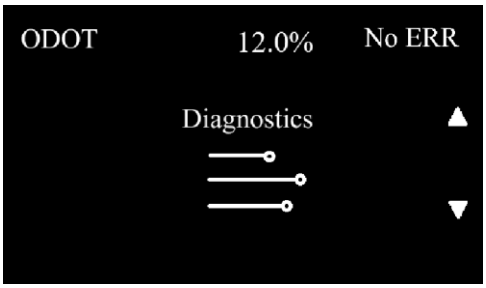
Special application notes:

1. Press the up and down buttons ▲ and ▼ at the same time, and the screen will appear “Is it reset ?”, the network adapter parameters can be reset by pressing the ● button.
2. Short press the middle button ● to confirm, and long press to exit.

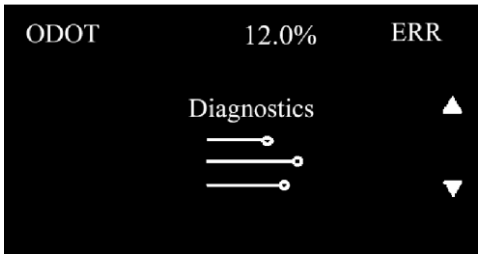
Display interface:

After the initial configuration is completed after power on, there are two interfaces, in which "Module" displays the basic information and channel information of the module. "Diagnostics" is displayed for diagnostic records. Toggle the display by clicking the ▲ and ▼ buttons.

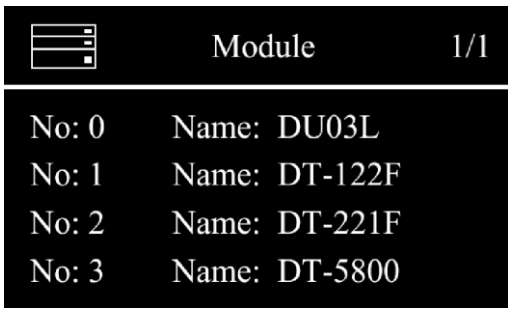




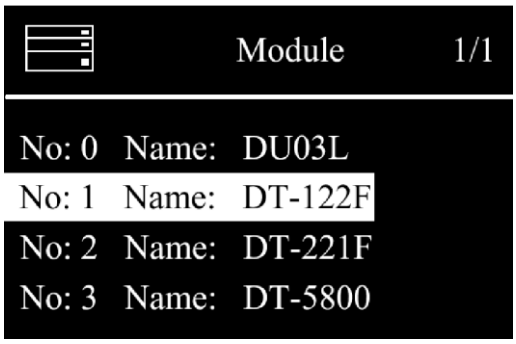
When there is an error, the "ERR" logo will flash in the upper right corner.



Click ● on the "Module" interface to enter the next-level module selection interface, and switch the display page by press the ▲ and ▼ buttons, as shown in the following figure. At this time, press and hold the ● button to return to the previous level.

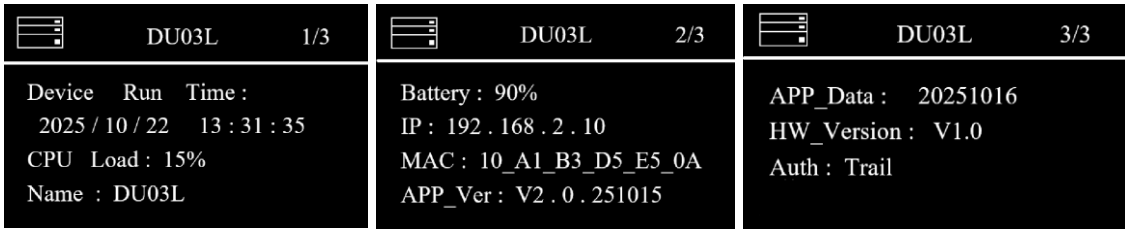


Click the ● button in the figure above to enter the next level module selection interface, and click the ▲ and ▼ buttons to switch module selection. At this time, press and hold the ● button to return to the previous level



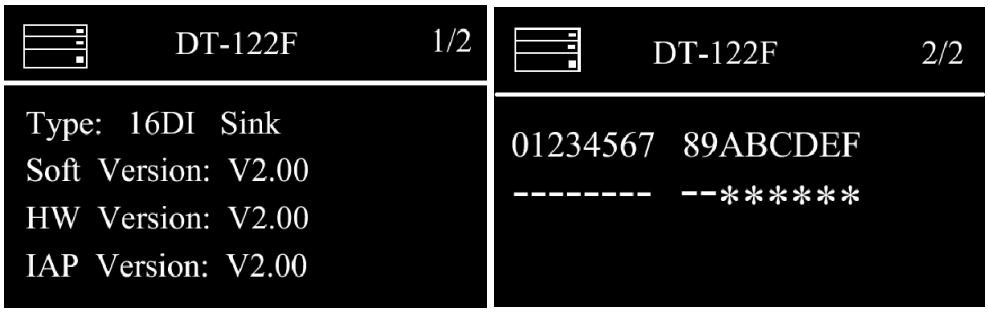
.

Enter the module information display interface and switch the display by clicking the ▲ and ▼ buttons, as shown in the figure below. At this time, press and hold the ● button to return to the previous level.



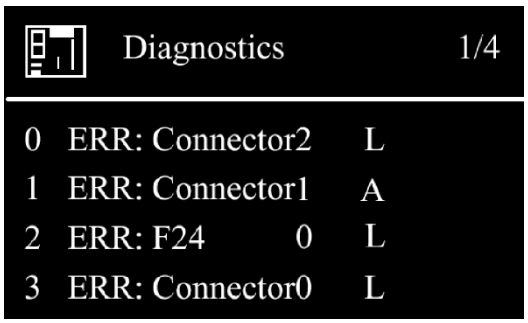
(Note: The network adapter displays: APP version and date, IAP version and date,

hardware version, IP address, MAC address, and other information. Module display: module type, software version, hardware version, IAP version, and channel status.)



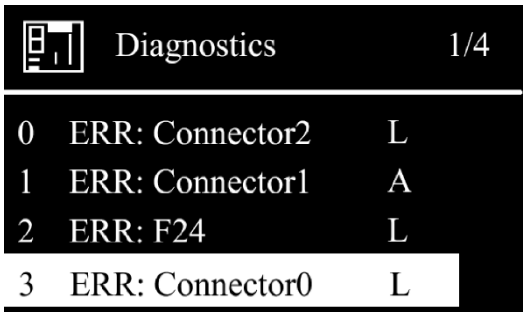
Diagnosis interface:

Display the module diagnostic information on the Diagnostics screen, and click the ▲ and ▼ buttons to switch the display page. At this time, press and hold the ● button to return to the previous level.

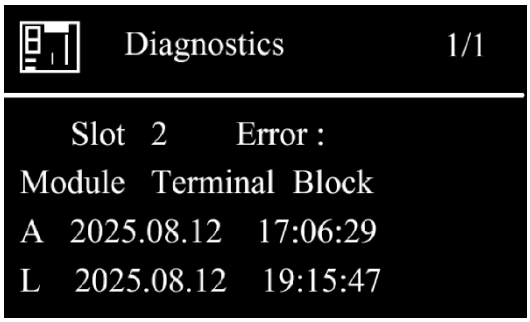


(Note: The error that occurs after this interface is displayed first, with a maximum of 200 items, as shown in the above figure, "A" and "L" represent respectively, the error still exists and the error has been eliminated, "Connector" is the specific error of the current error, and "28" is the slot number)

Click the ● button in the interface as shown in the figure above to enter the next level of diagnostic data selection interface, and click the ▲ and ▼ buttons to select and switch the diagnostic data. At this time, press and hold the ● button to return to the previous level.

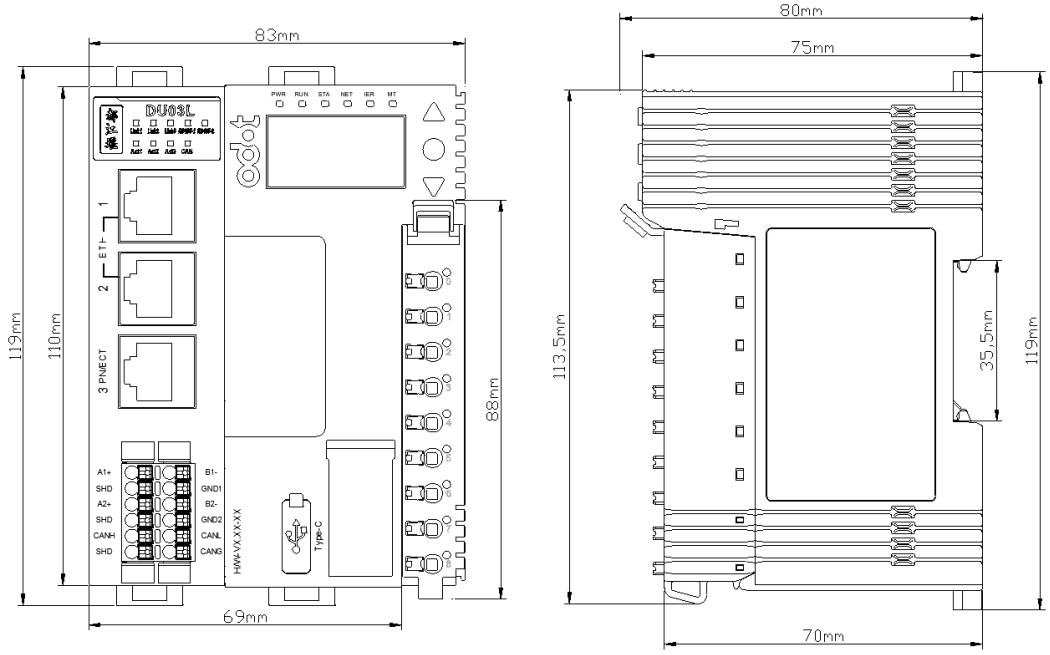


Enter the module error information display interface, as shown in the figure below, press and hold the ● button to return to the previous level.



(Note: "Module Terminal Block" is the specific error of the current error, and "slot" is the slot number where the error occurred.) "A" is the time when the error occurred. "L" is the time when the error left)

2.7 Dimension



3 AIOSYS Use

AIOSYS platform web site: https://ide.aiosys.cn/

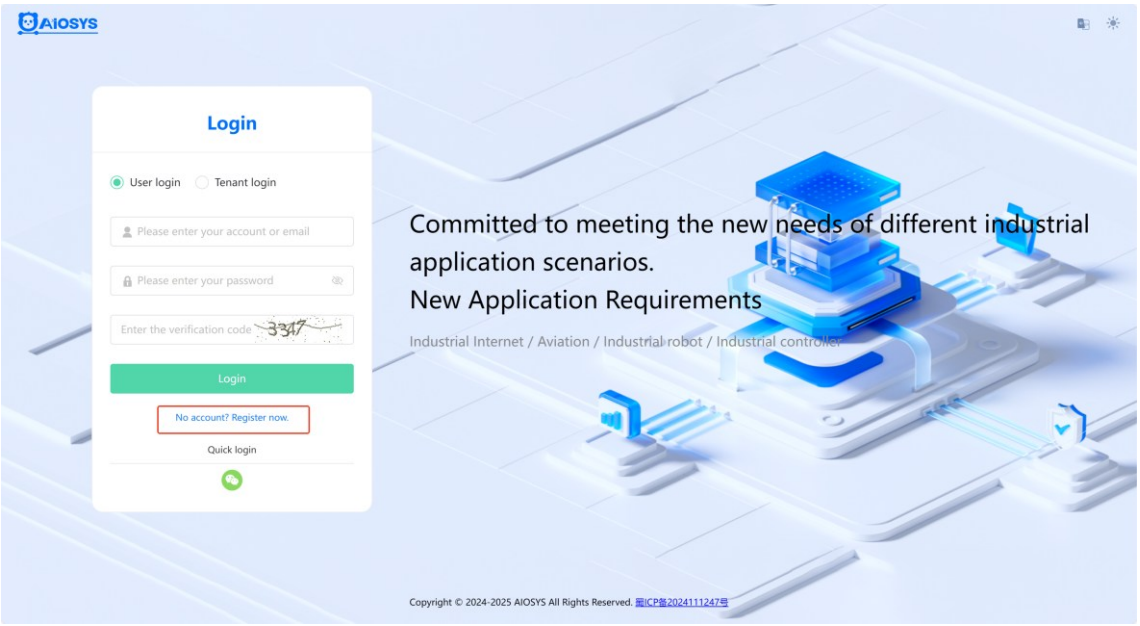
Please refer to the AIOSYS instruction manual for details:

https://ide.aiosys.cn:19200/

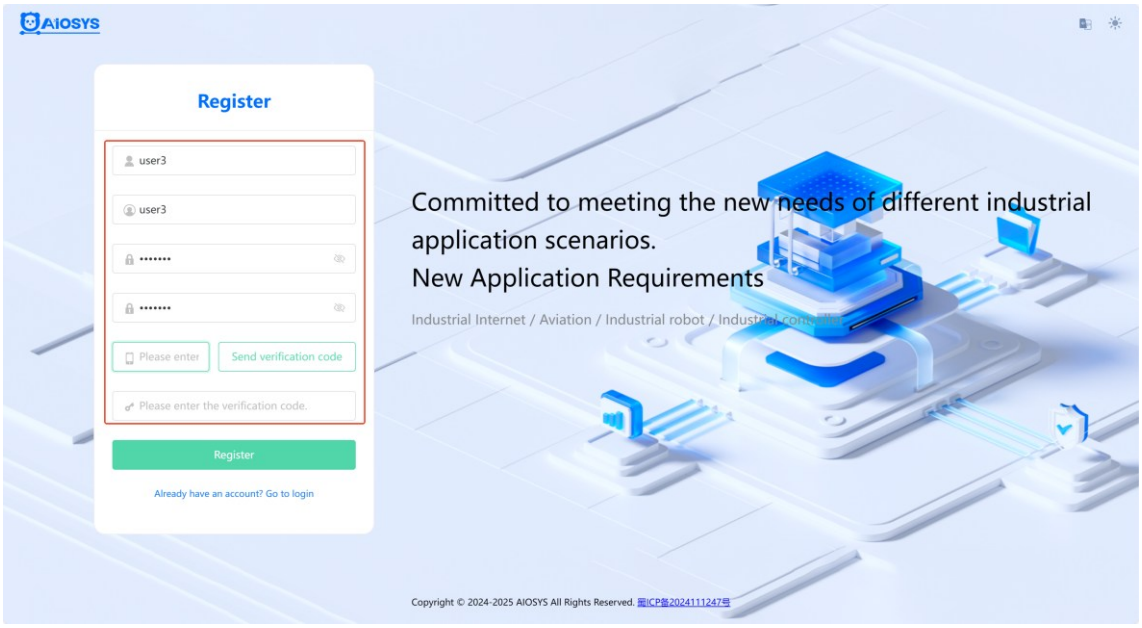
3.1 Quick to use

Open a browser, such as Edge, Firefox, etc., enter the address: https://ide.aiosys.cn/ to enter the login interface.

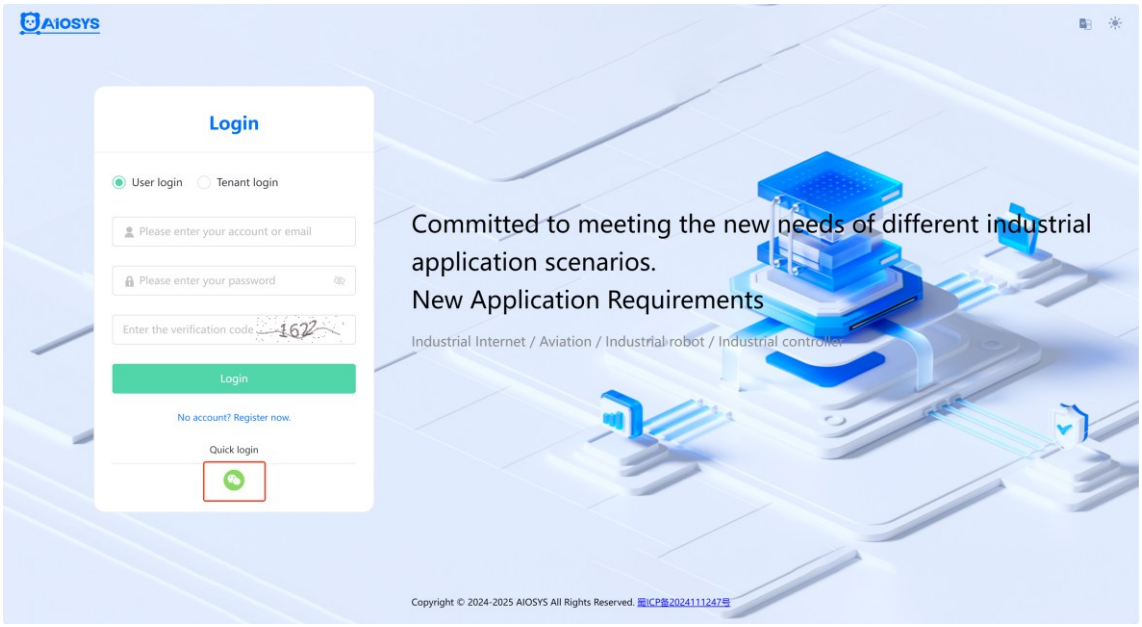
Users need to register an account for the first time, and click "No account? Register now".



On the register page, enter account number, username and password, then enter mobile phone number, click Send Verification Code, fill in the verification code received, and click the Register button. After the registration is completed, return to the login screen to log in.

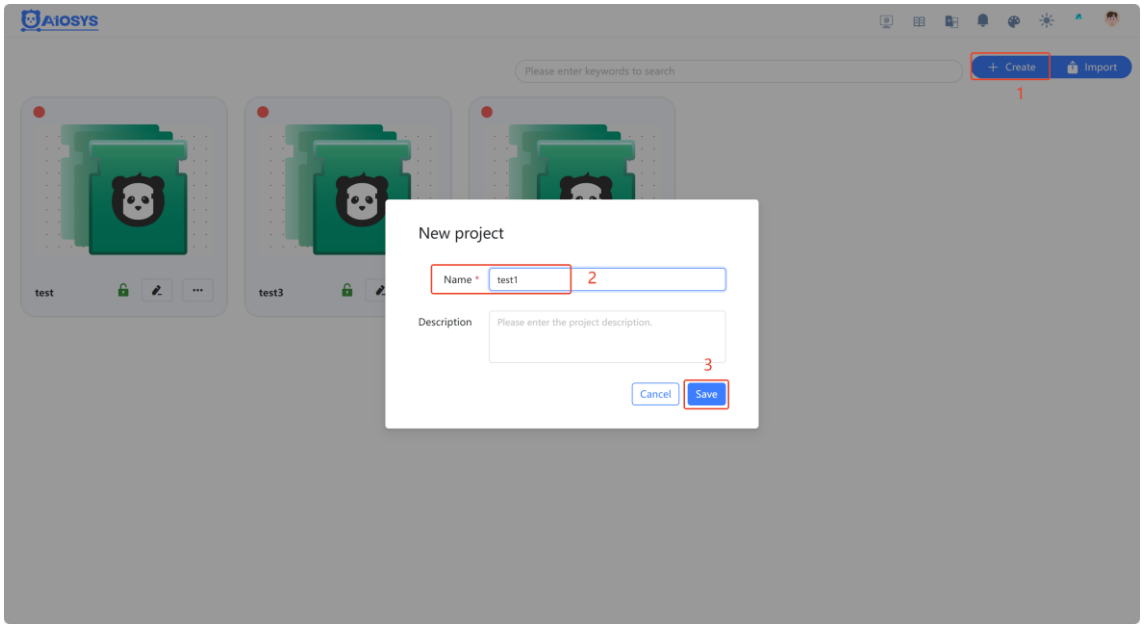


Or click the "WeChat" icon below the quick login on the login interface and use WeChat to scan the code to register an account to log in.

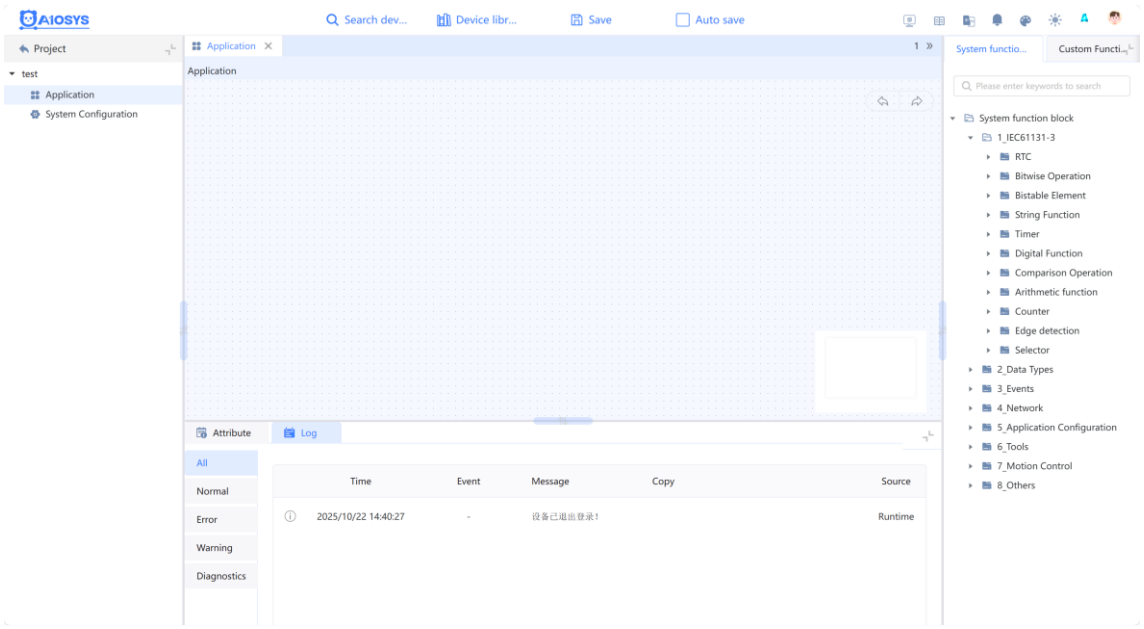


After successfully logging in, enter the homepage page, click the shortcut icon in the interface to quickly open the software manual, configure the theme color or enter the personal center and other operations.

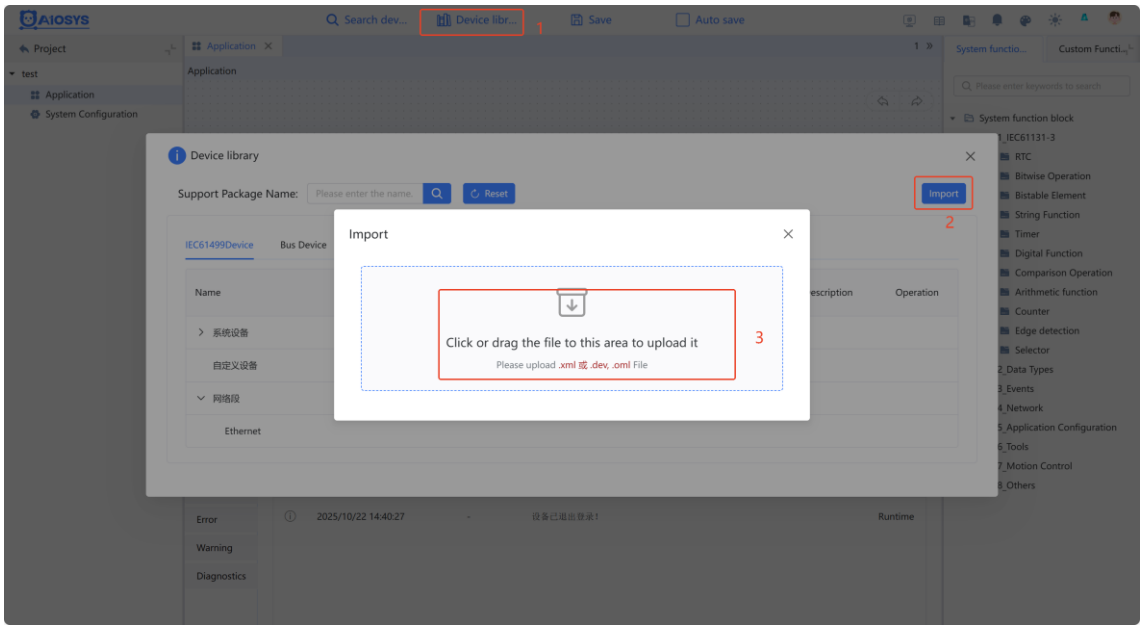
Click IEC 61499 or IEC 61131-3 to enter the programming platform, click "New", create a new project, set the project name and description in the pop-up window, and click OK.



Double-click the project "test1" that has been created to enter the project view.



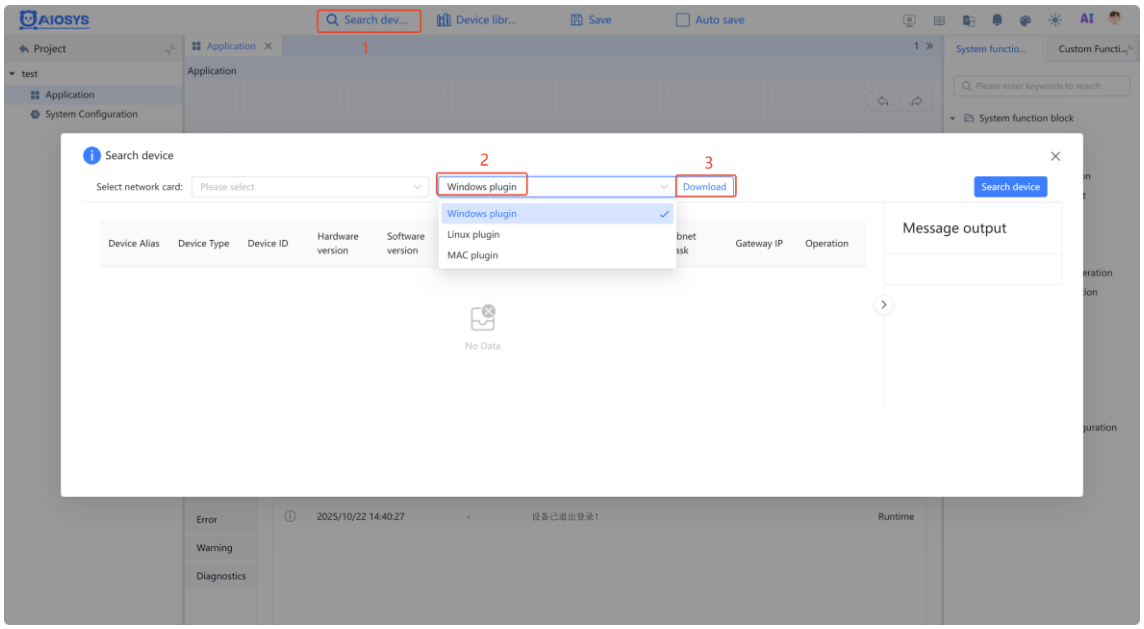
Click Device Library, click Import in the pop-up interface, and upload the xml file of the DU03L module.



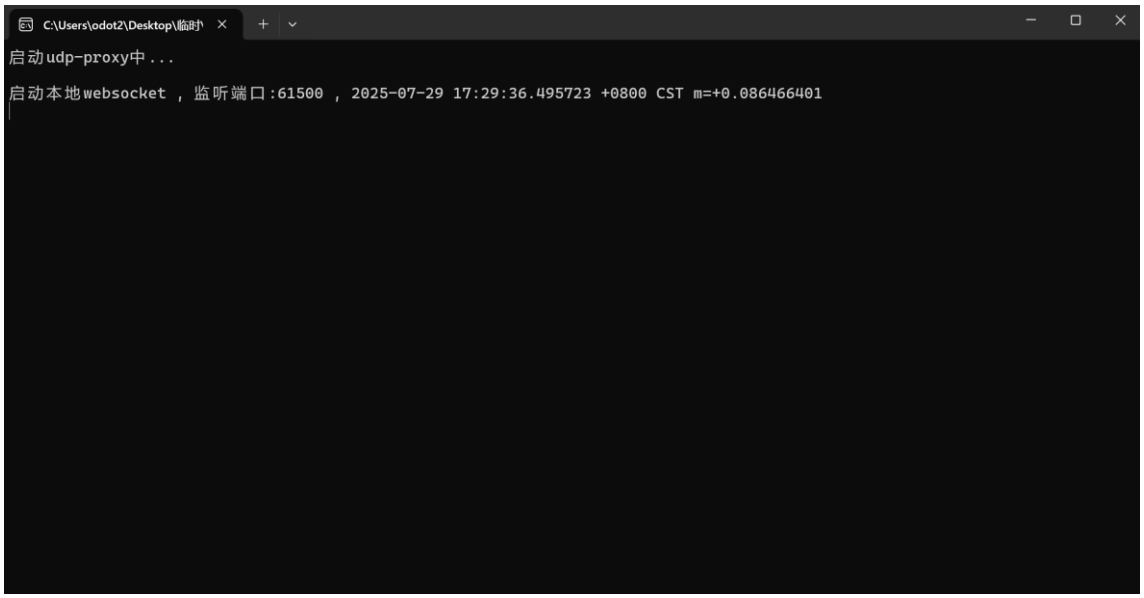
There are two ways to add DU03L devices to a project: manually add and search for device additions.

Search Device to Add

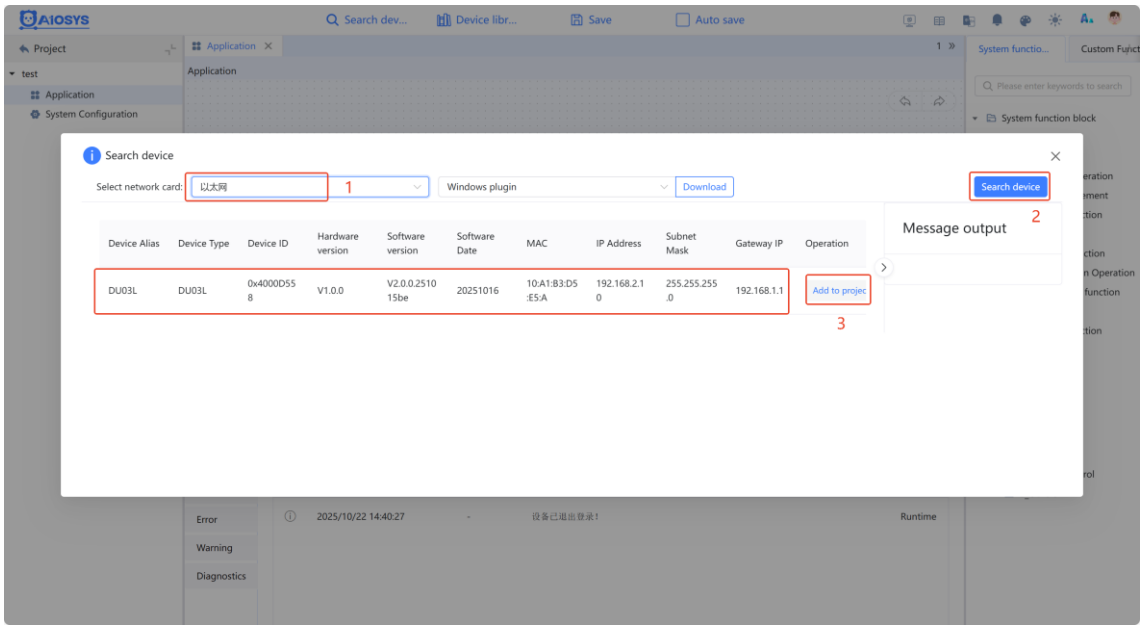
Click search device, if it is the first time to use it, need to select the appropriate plugin according to the system you are using to download it.



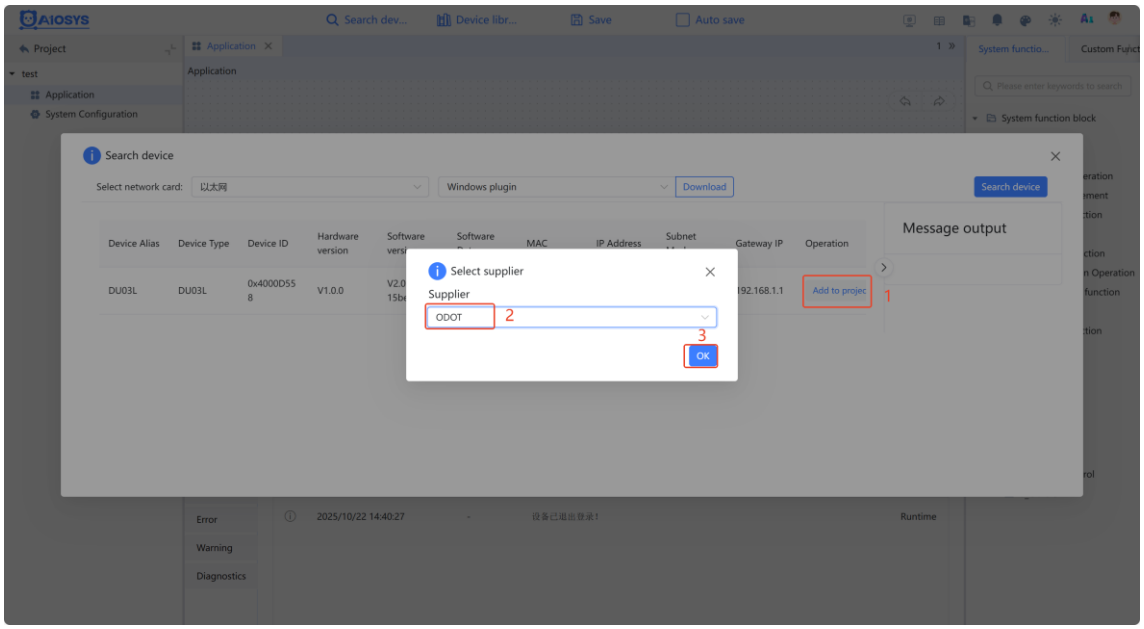
Run the plugin after the download is complete:

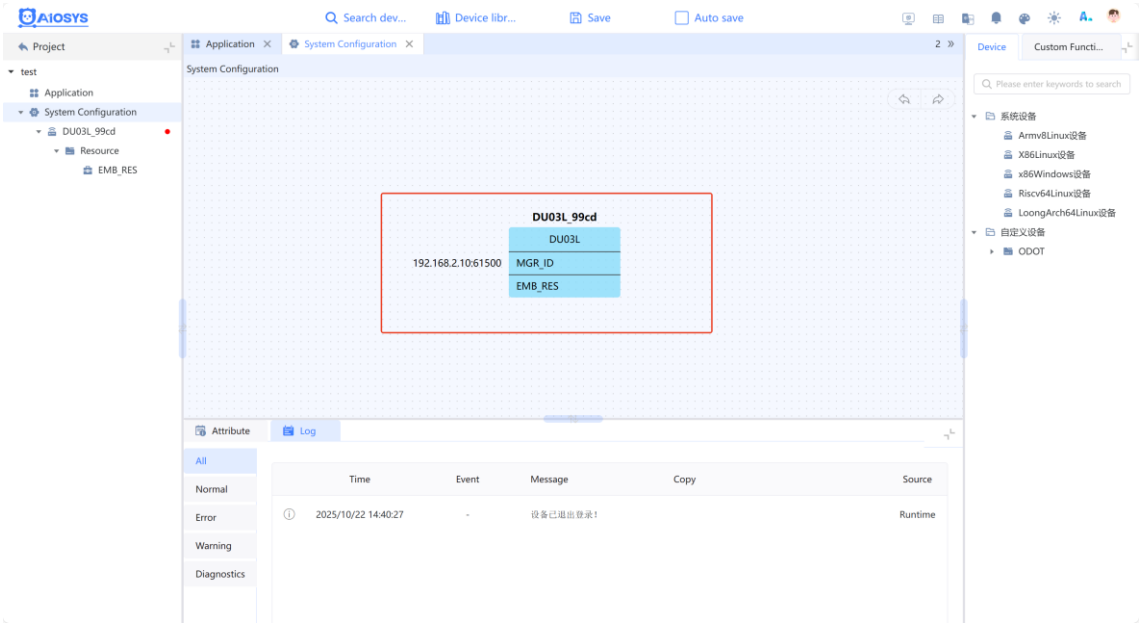


Back to the project interface, click Search Device again, select the corresponding network card, and then click Search Device. Note: Searching for devices requires turning off the firewall.



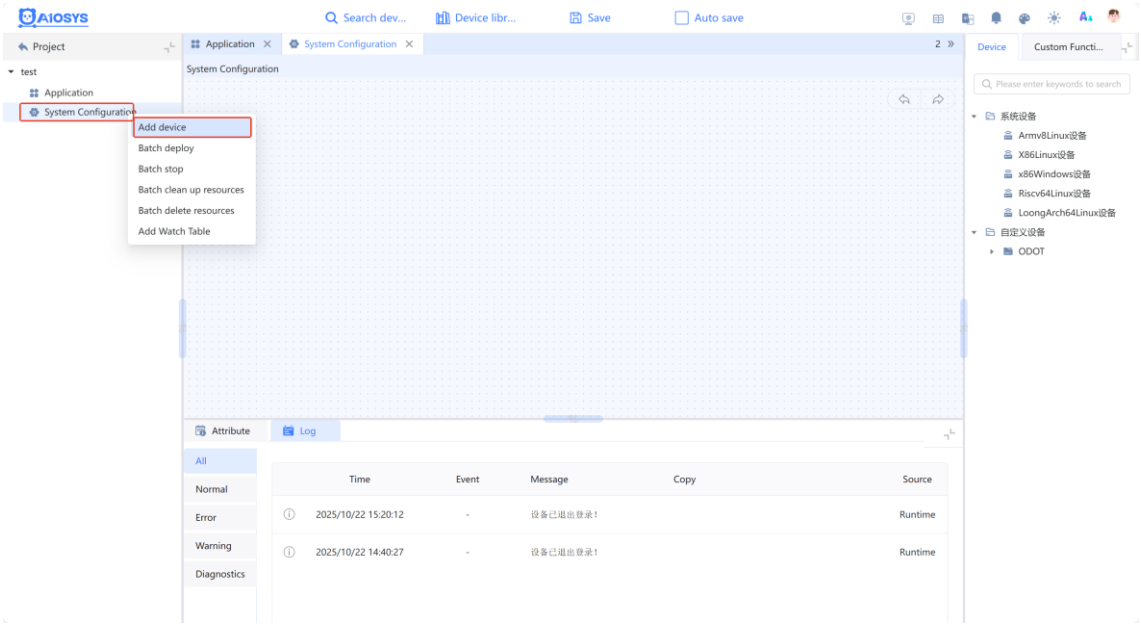
Click Add to Project to add the searched device to the project, and in the "Select supplier" window that pops up, set the Supplier to "ODOT" and click OK.



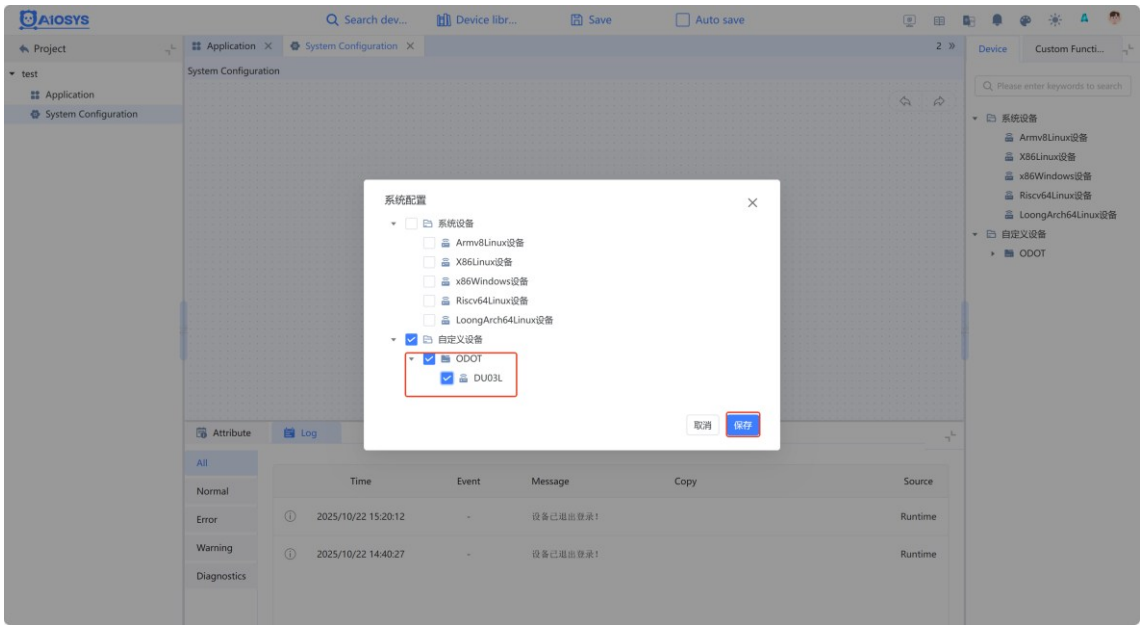


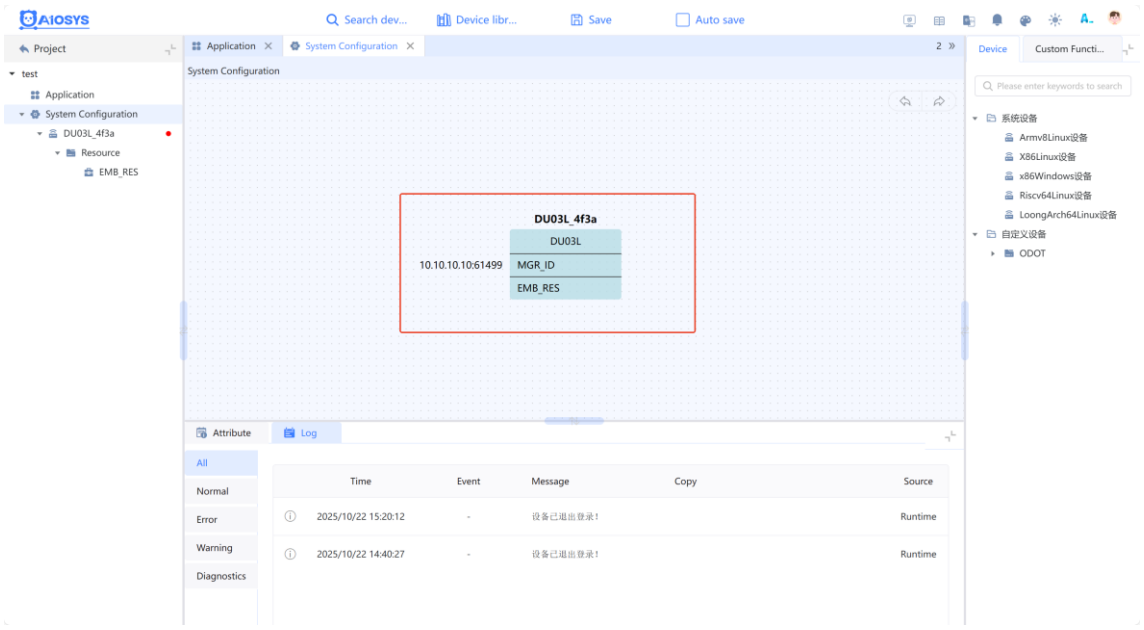
Add manually

Right-click System Configuration and select Add Device.

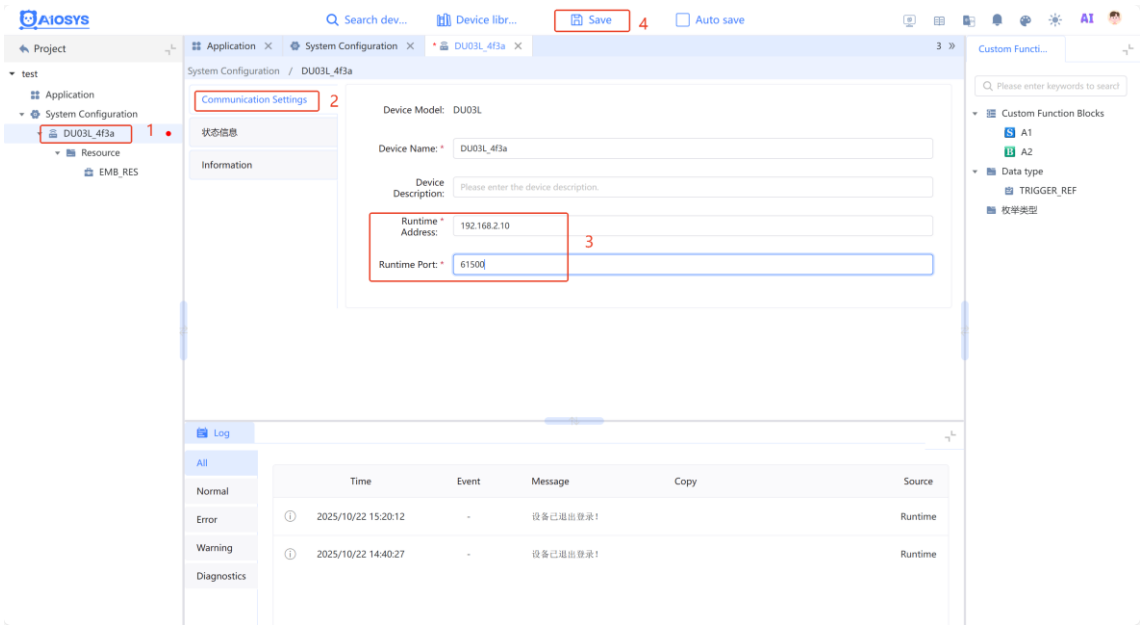


Select the DU03L device in the pop-up interface and click Save.

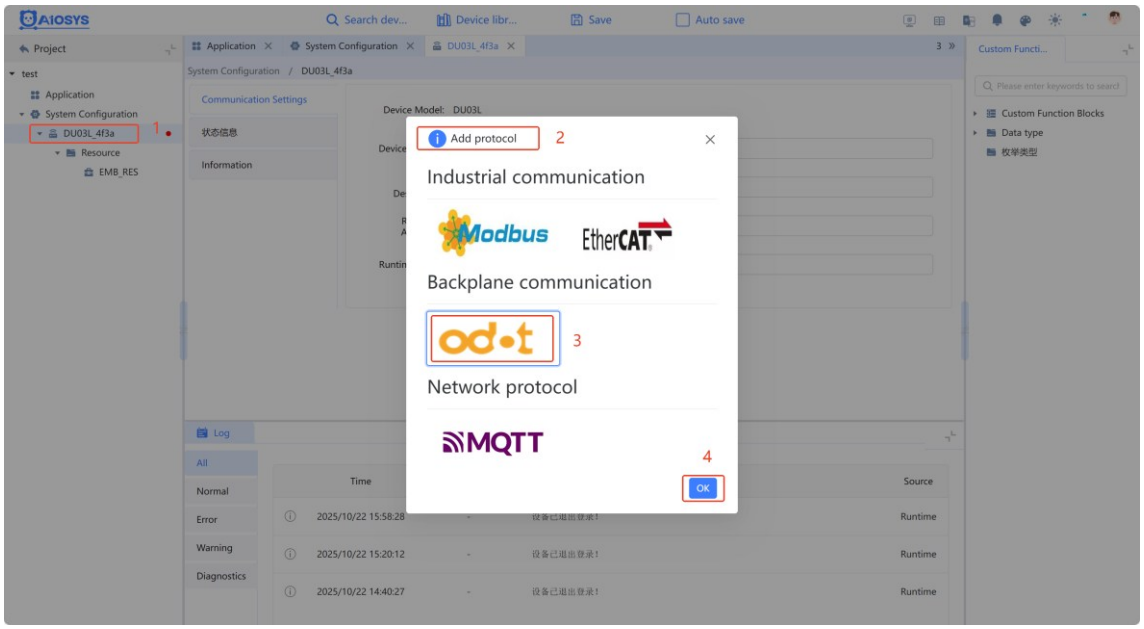




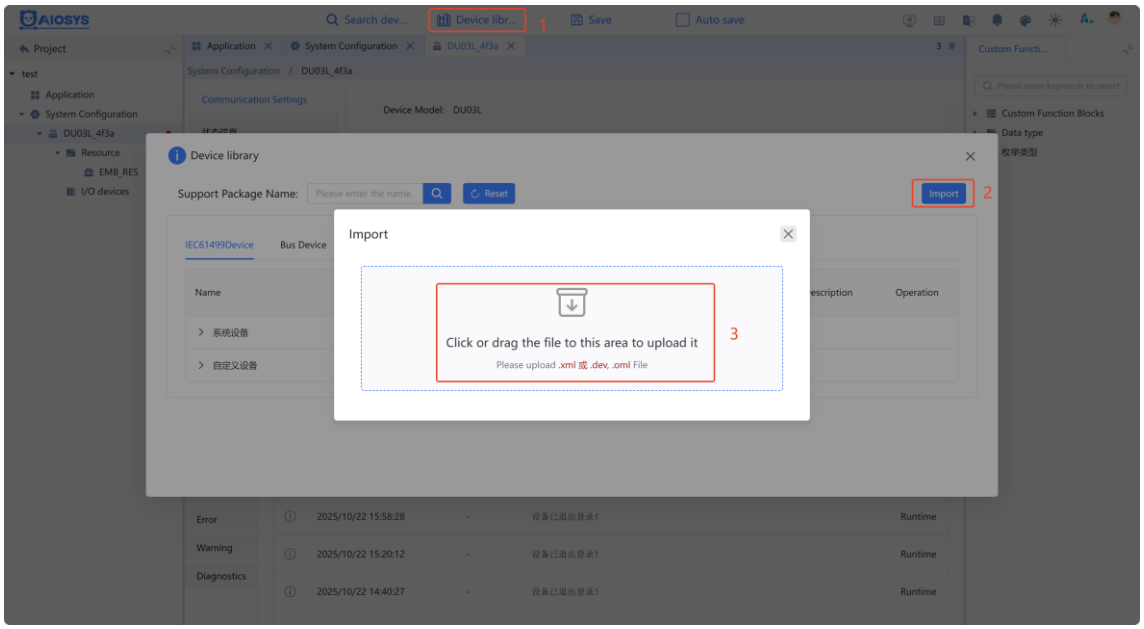
Select device DU03L, select the communication configuration, modify the device name, set the module runtime address and runtime port (in the example, the device IP address is 192.168.2.10), and click Save.



Right-click DU03L, select Add Protocol, click Backplane Communication "ODOT", and click OK.

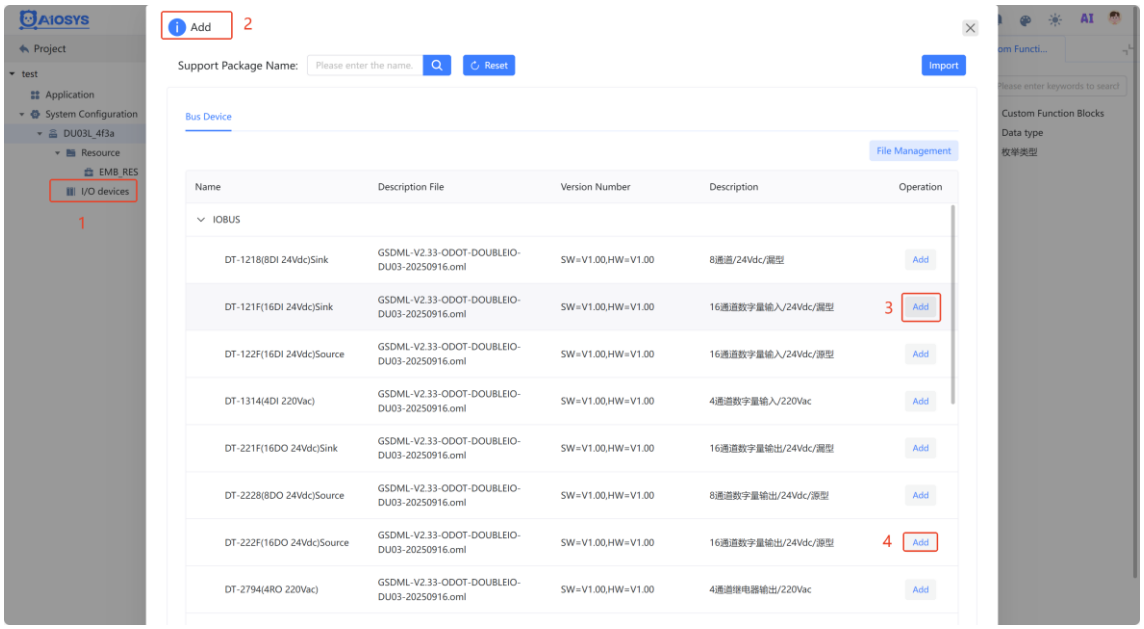


After the addition is successful, "I/O Devices" will appear in the project, and it needs to import the device profile of the IO module when using it for the first time. Click Device Library, click "Import" in the pop-up window, select the corresponding file and click OK.

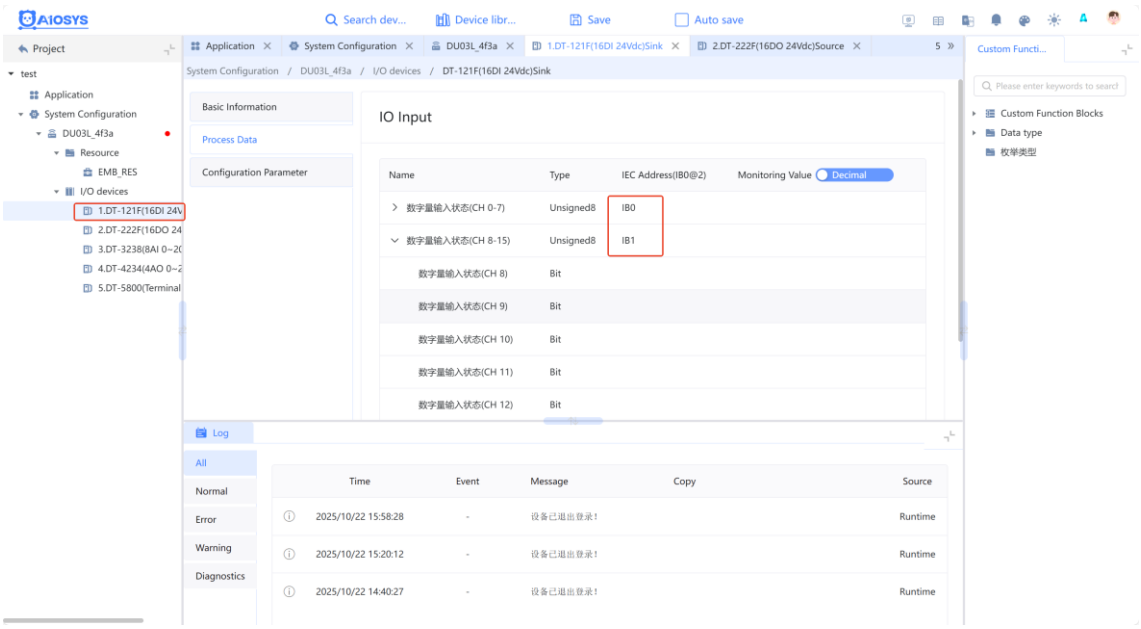


Right-click the I/O device, select Add I/O device, and add the corresponding model module in the pop-up window. (In the example, the hardware is DU03L+ DT-121F+DT-222F+DT-3238+DT-4234+DT-5800)

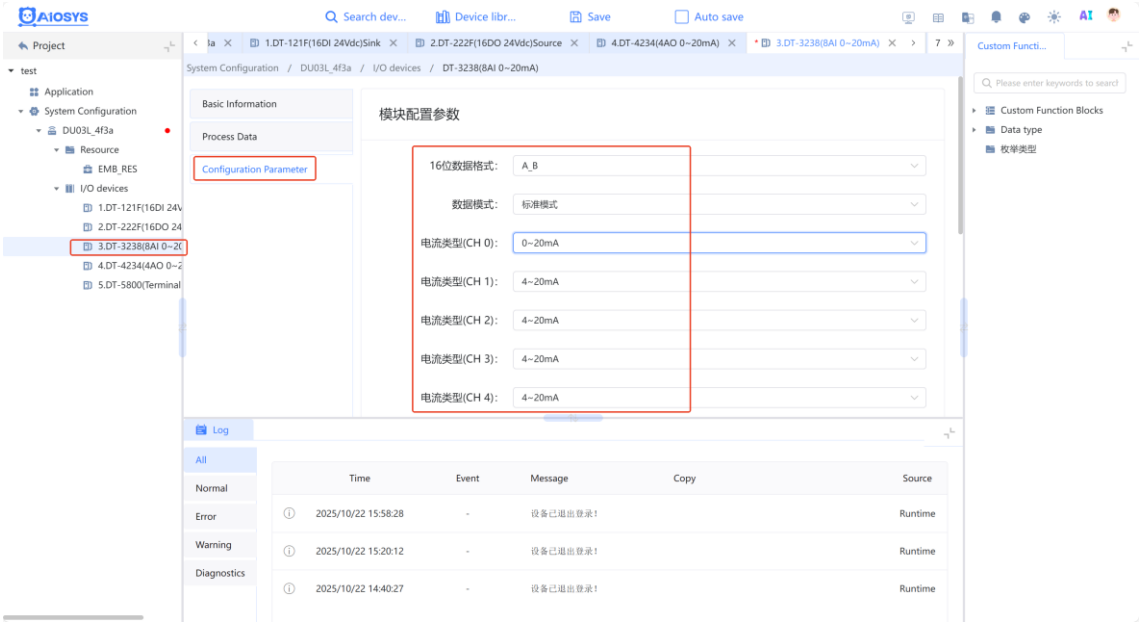
Note that the module added needs to be consistent with the actual module.



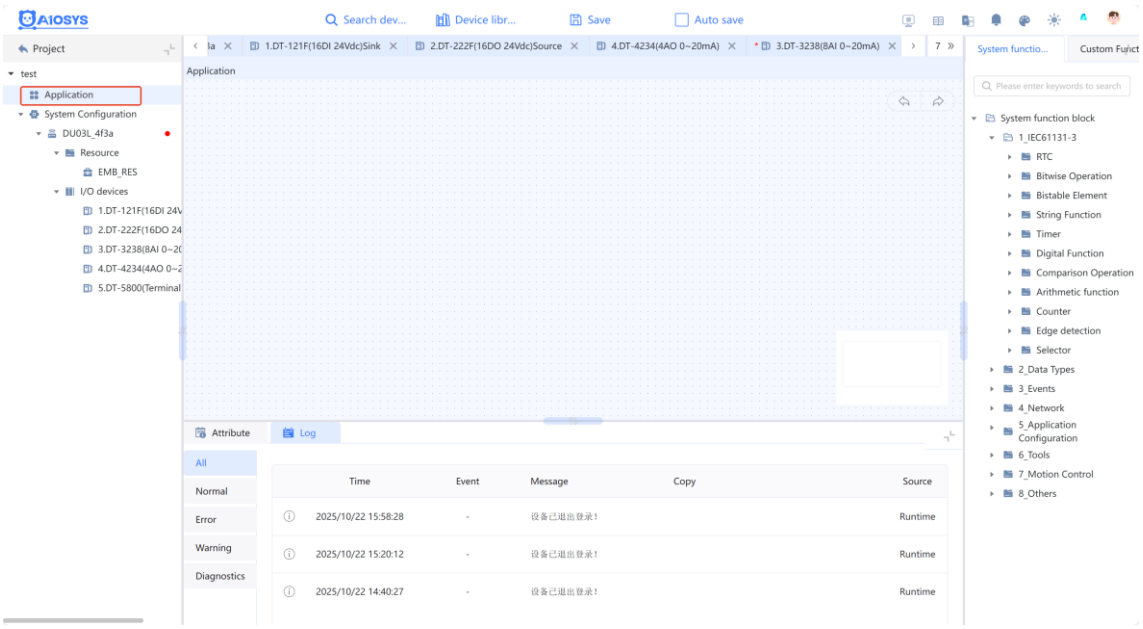
After the module is added, click on the DT-121F module and select the process data to view the assigned IEC address.



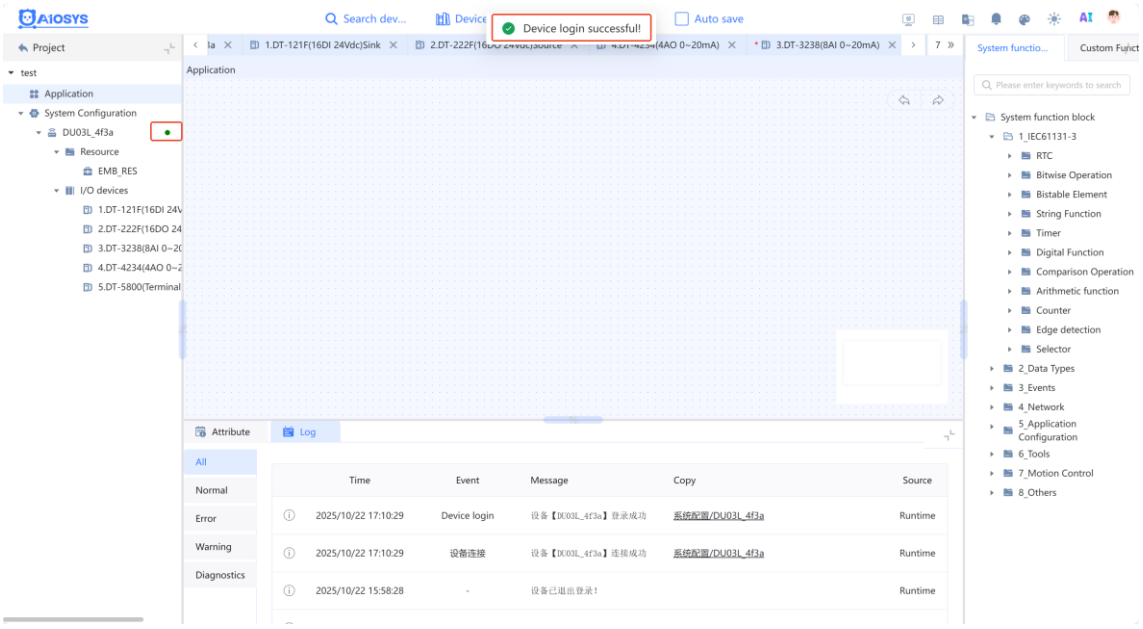
After selecting a module, click Configure Parameters to modify the module's parameter settings.



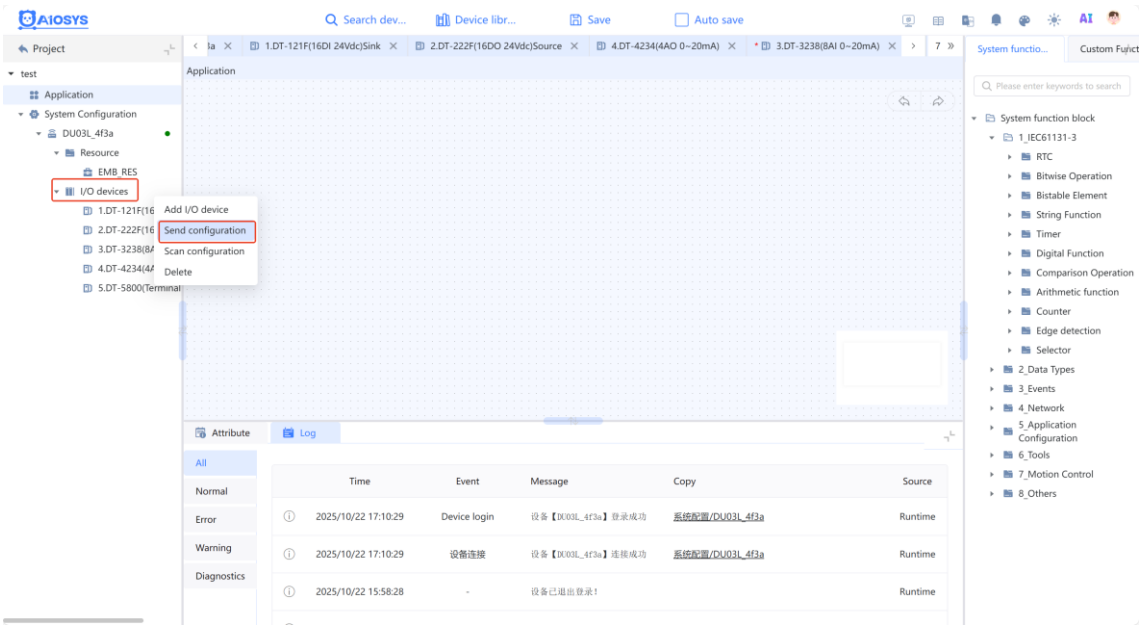
Click the application to enter the programming interface, please refer to AIOSYS User Guide: https://ide.aiosys.cn:19200/ for detailed information.



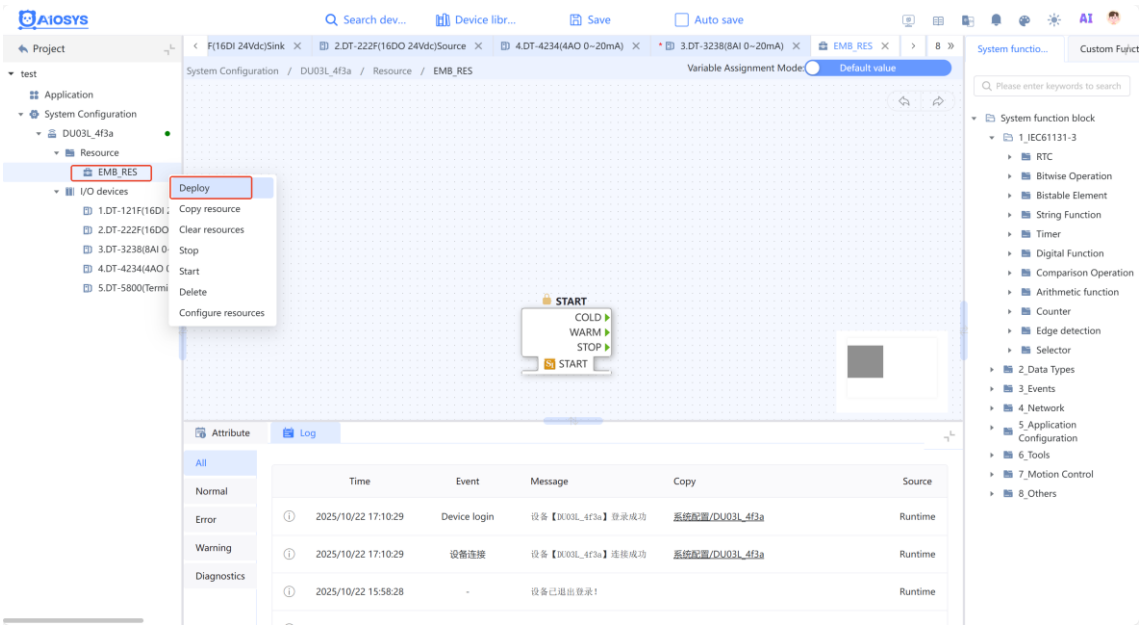
After the parameter configuration is completed, right-click DU03L and select device login, after the device login is successful, the dot on the right side of DU03L will turn green, and the device will be prompted to log in successfully.



After the device is successfully logged in, right-click the I/O device and select Send Configuration.

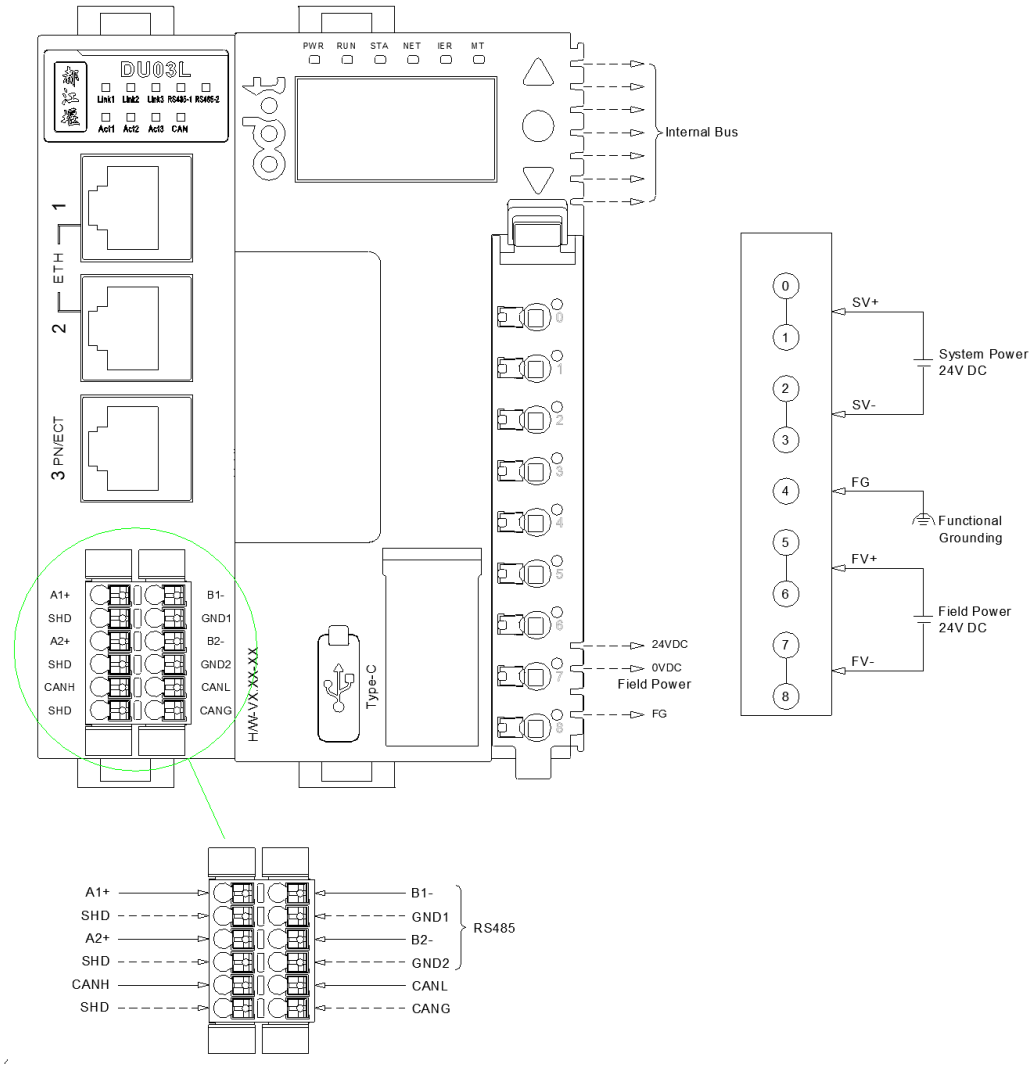


Right-click EMB_RES resource and click Deploy.

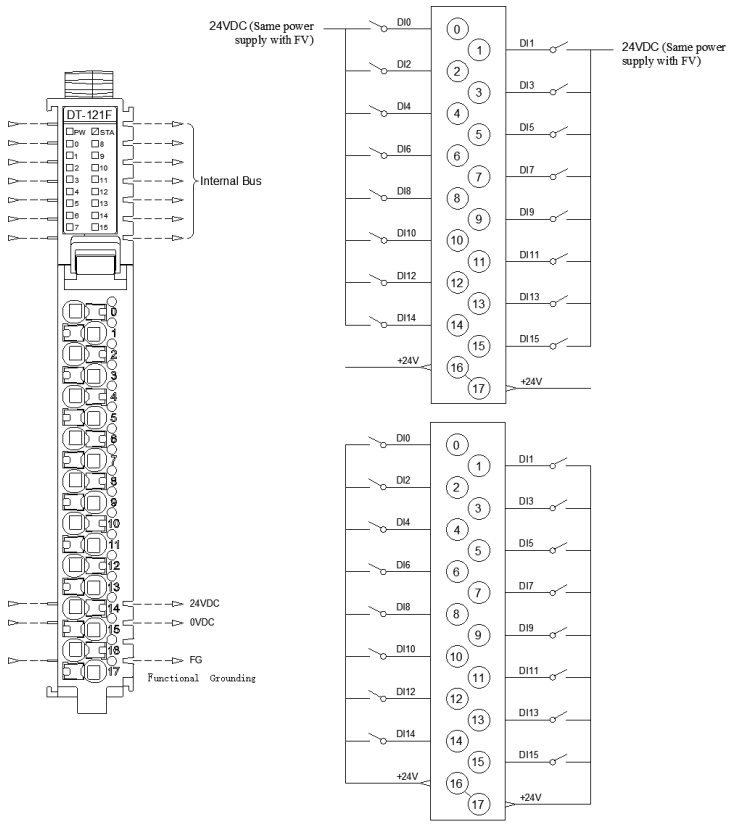


4 Appendix - IO modules Wiring Diagram

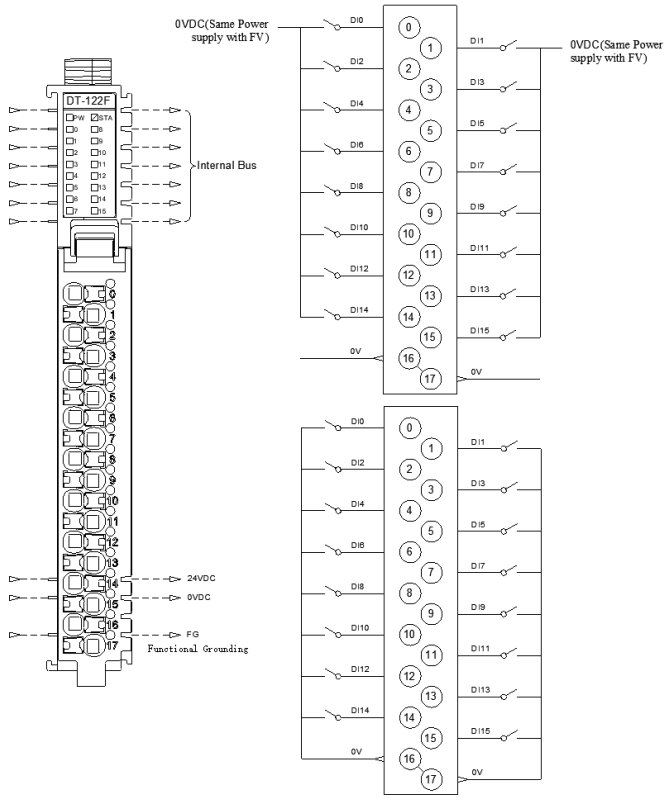
DU03L



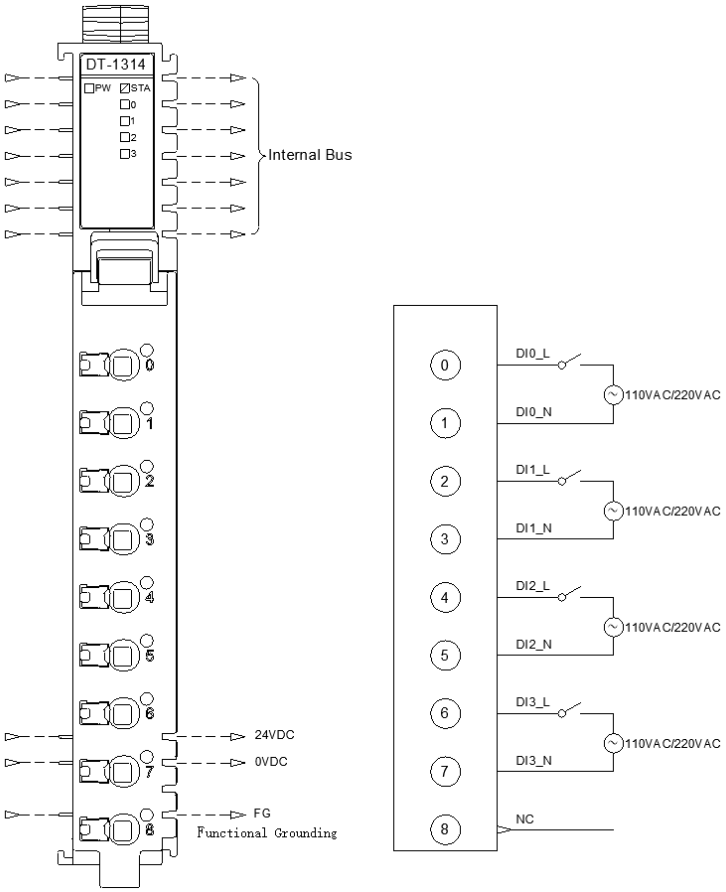
DT-121F



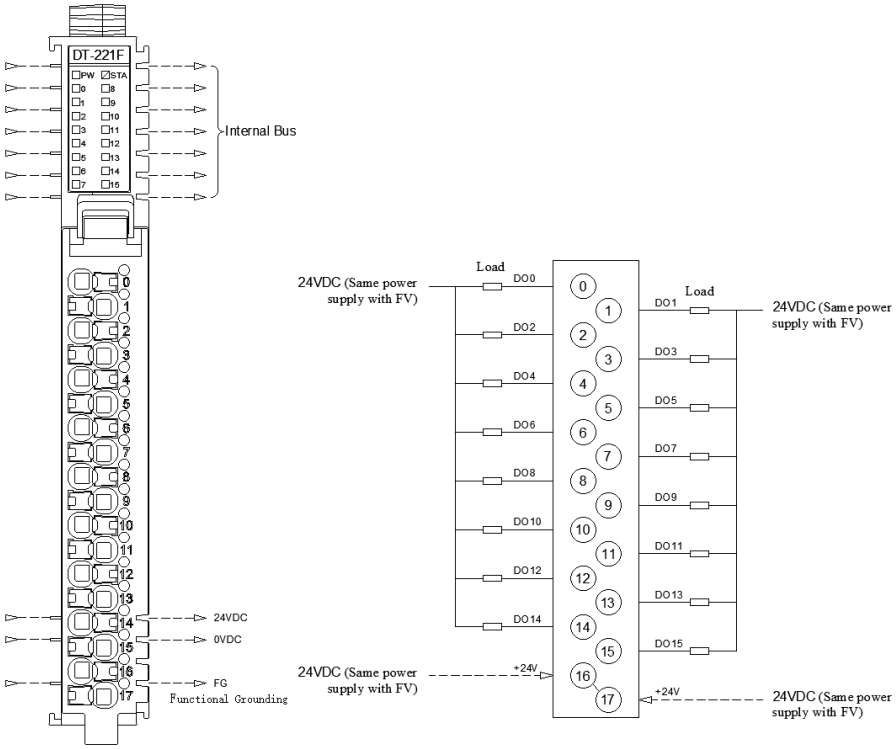
DT-122F



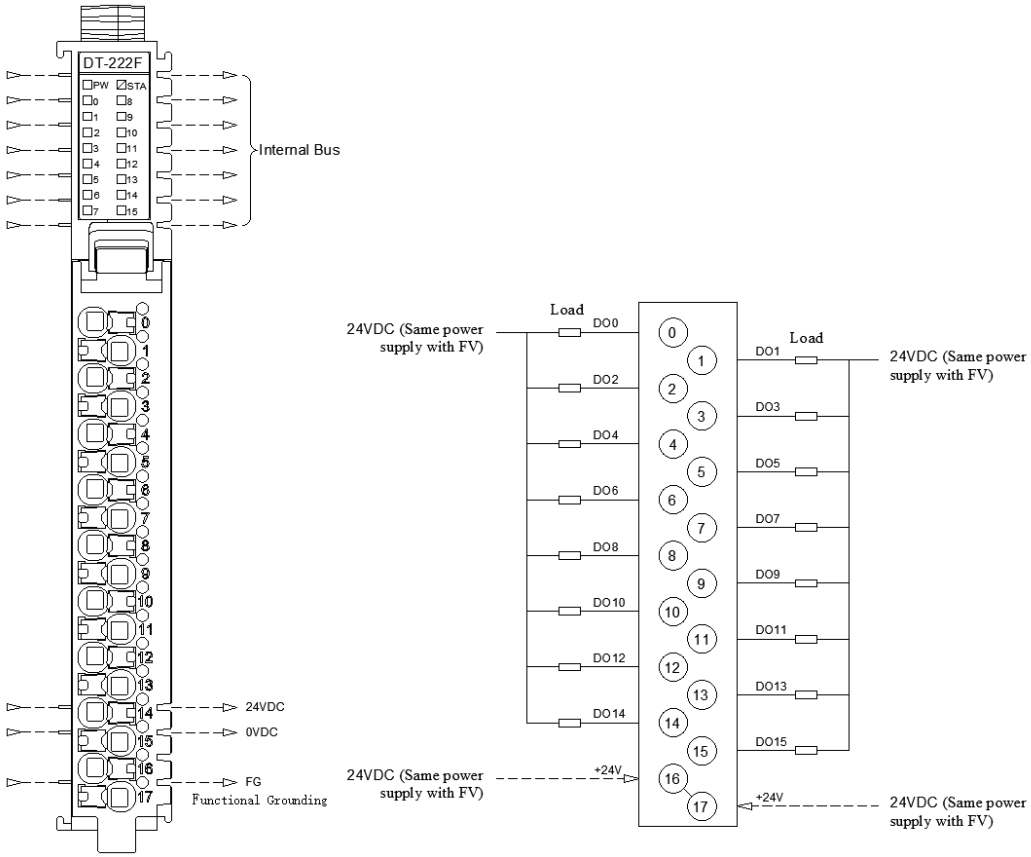
DT-1314



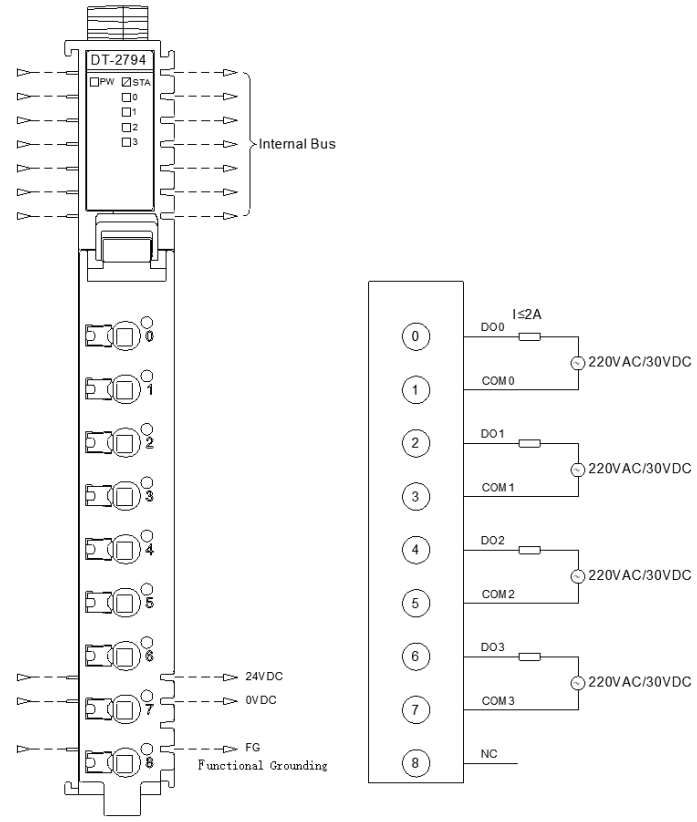
DT-221F



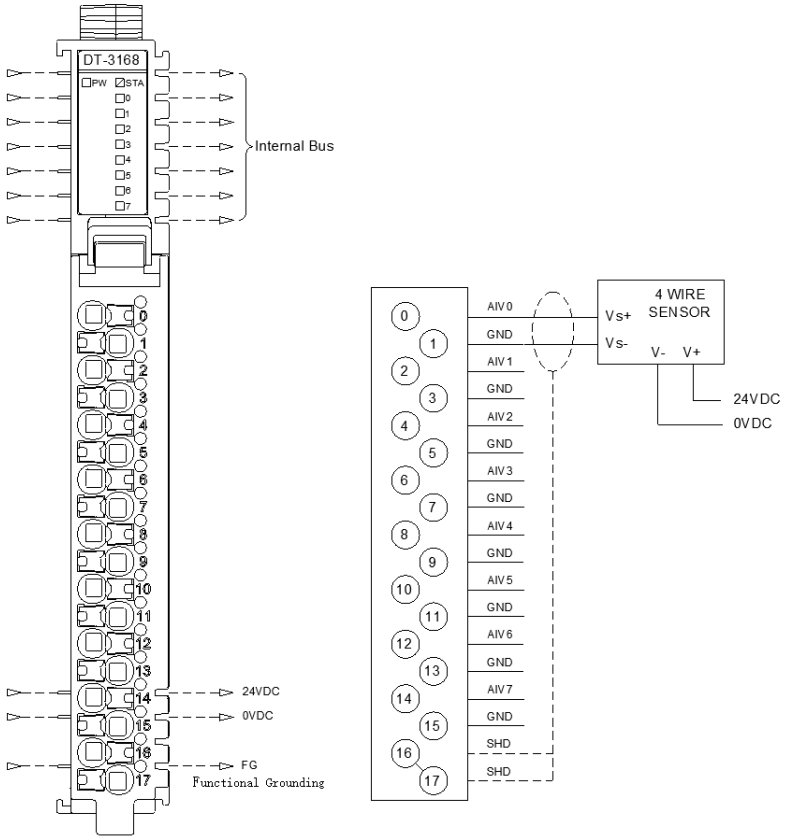
DT-222F



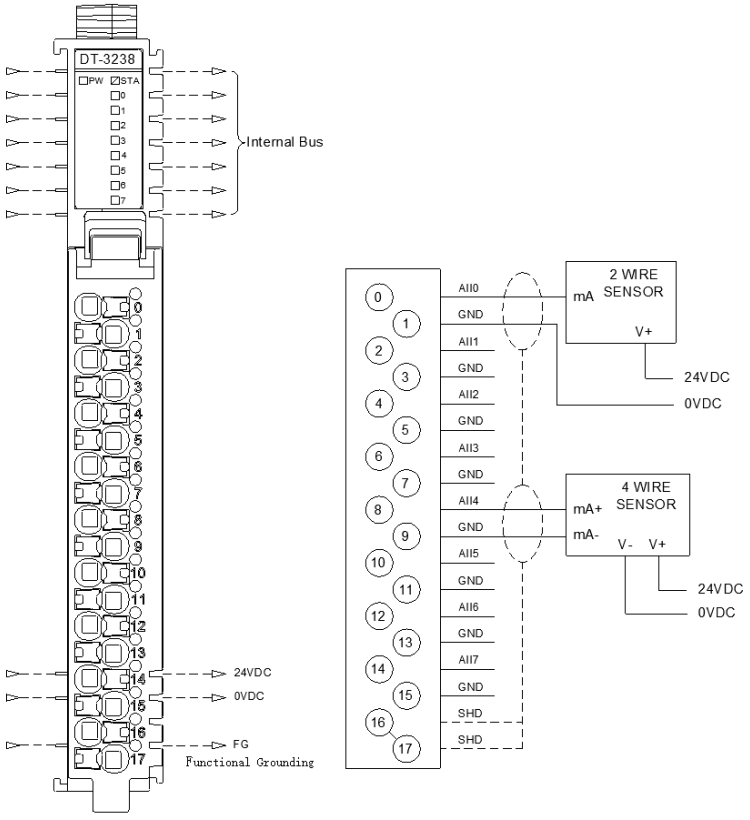
DT-2794



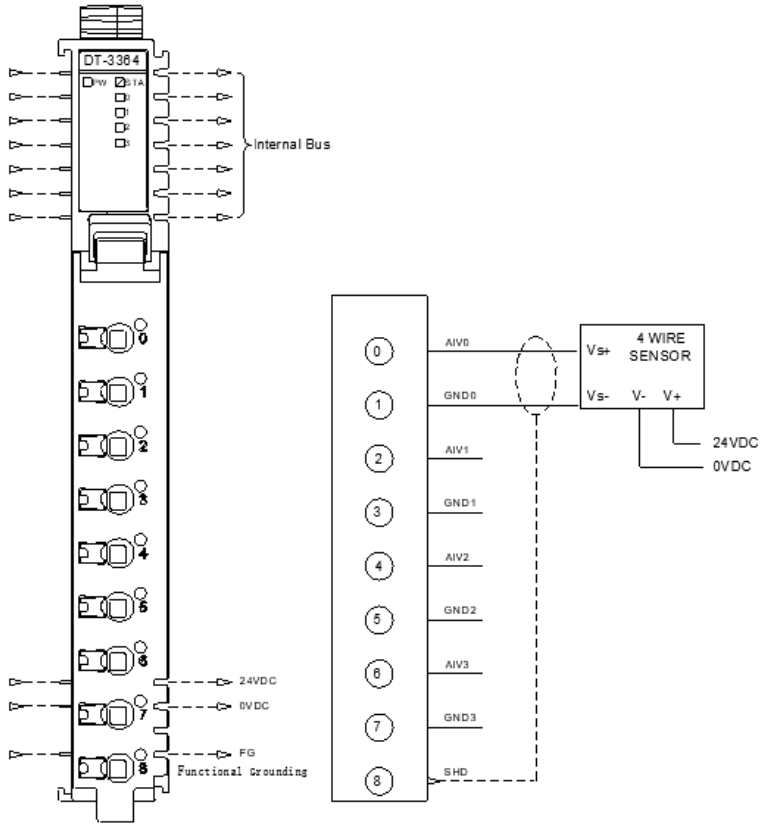
DT-3168



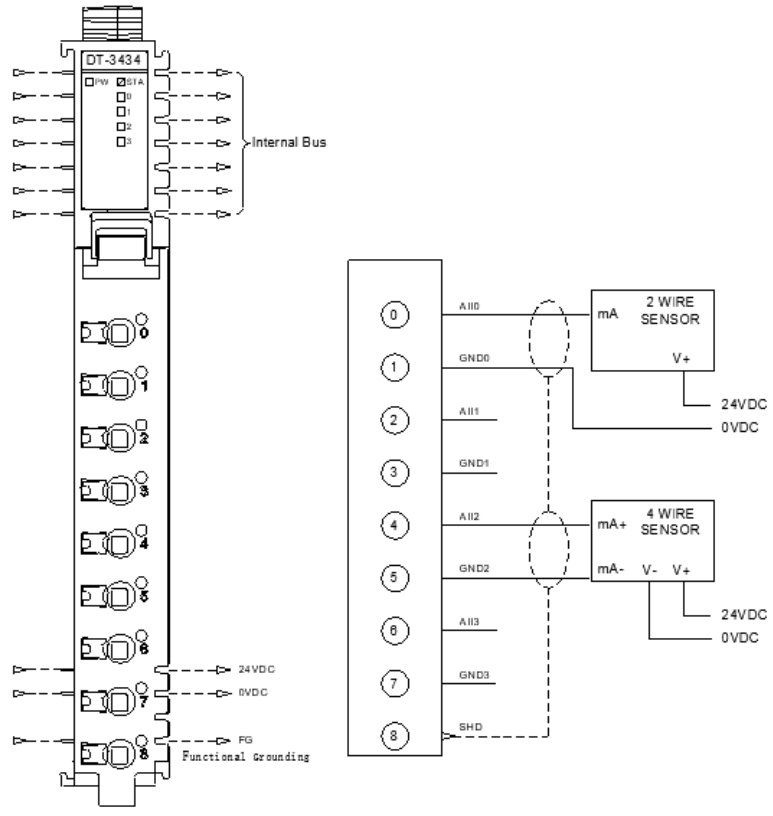
DT-3238



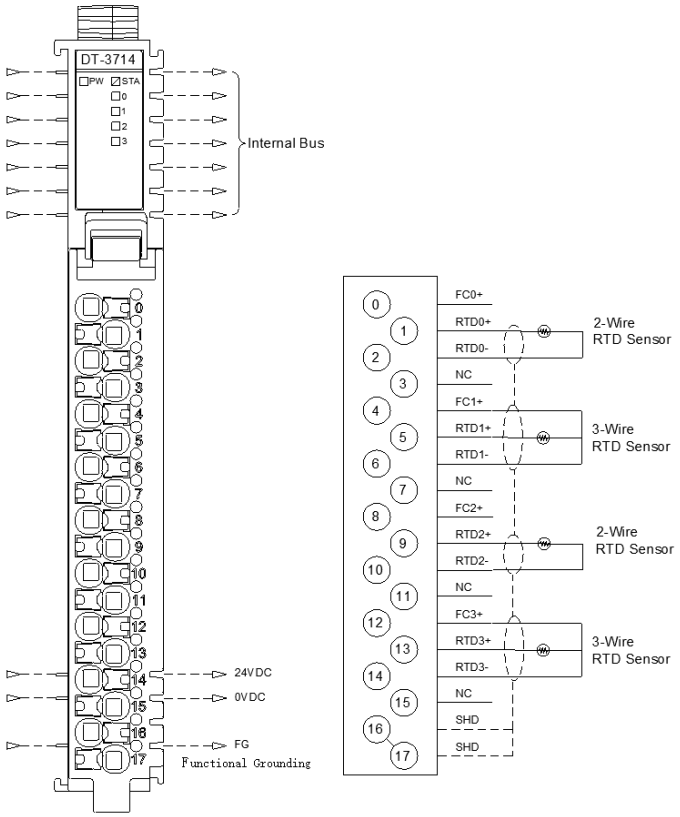
DT-3364



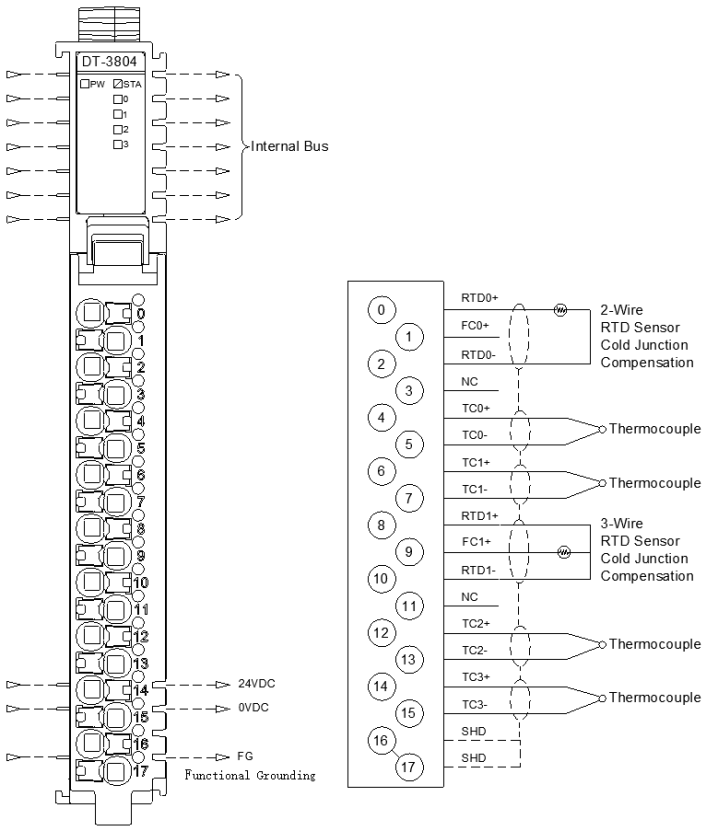
DT-3434



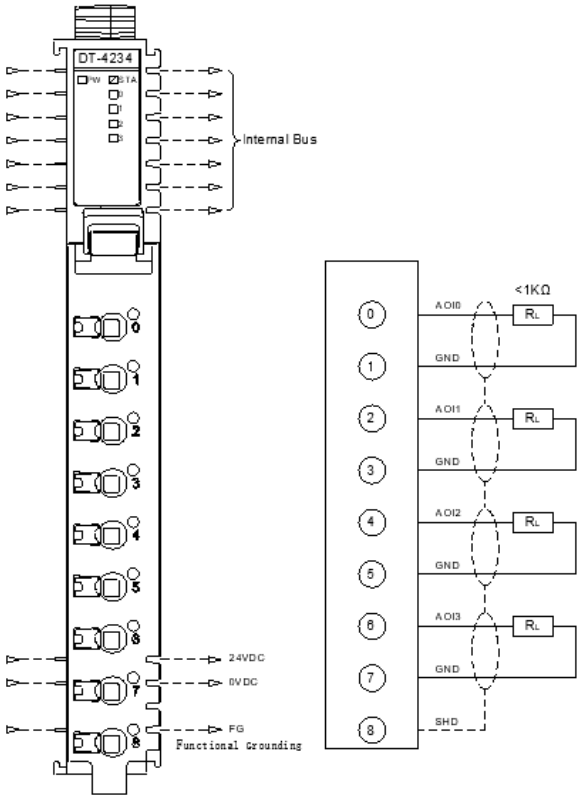
DT-3714



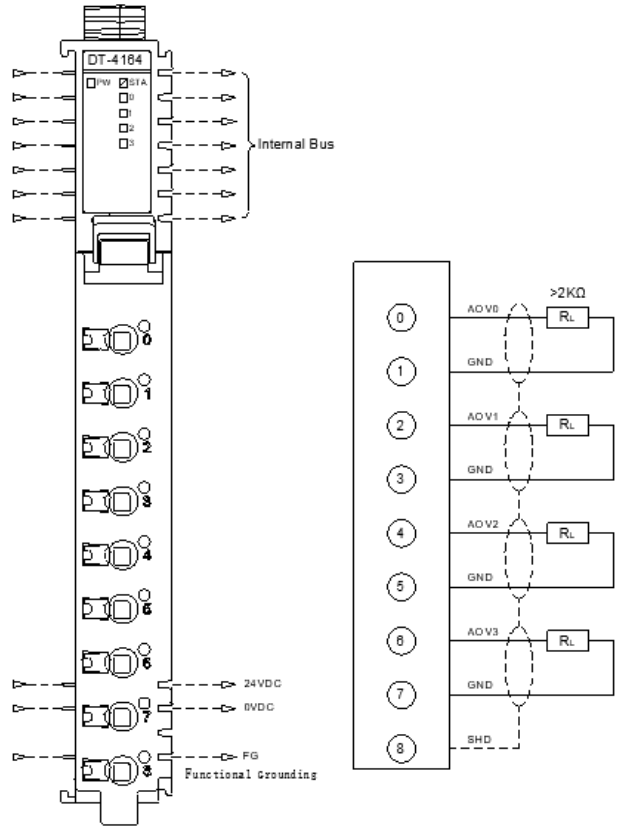
DT-3804



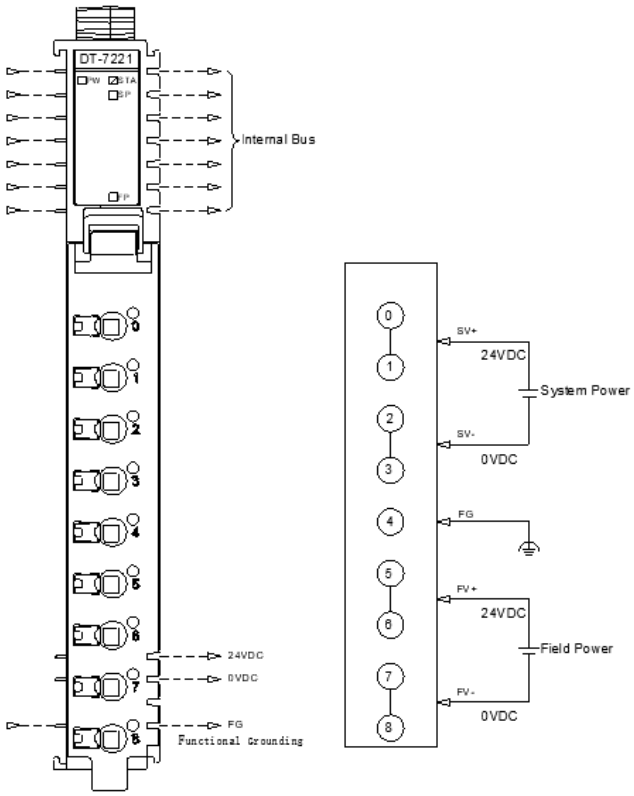
DT-4234



DT-4164



DT-7221


DT-7221
Internal Bus
24VDC
0VDC
FG
Functional Grounding
0
1
2
3
4
5
6
7
8
SV+
24VDC
System Power
SV-
0VDC
FG
FV+
24VDC
Field Power
FV-
0VDC

Odot Automation System Co., Ltd.

Plant 204, Comprehensive Bonded Zone, No. 261, Feiyun Avenue, Mianyang,

Sichuan, China.

Tel: +86-0816-2538289

Zip Code: 621000

Email:sales@odotautomation.com

Web: www.odotautomation.com