

# **Programmable Logic Controller**

## **C3351 Series**

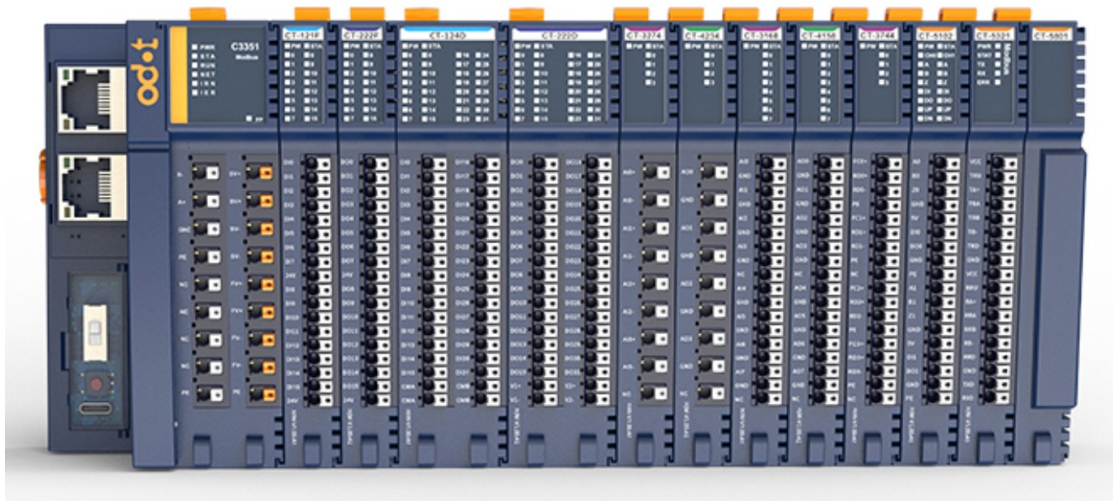
### **User Manual**

V1.30

Odor Automation System Co., Ltd.

Copyright ©2025 Odor Automation all rights reserved

## C3351 Series-Programmable logic controller



## 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.

Copyright © 2019 Sichuan ODOT Automation System Co., Ltd. all rights reserved

# 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.



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 networks.
- 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.

### Disclaimer of Warranties

### Product Usage

#### NOTE

- **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.

## About this manual

### Document Scope

This guide introduces the hardware implementation of C3351 programmable controller and CODESYS programming cases. It provides descriptions, characteristics, wiring diagrams and installation details for Modbus TCP and Modbus COM network adapters and Digital Input, Digital Output, Analog Input, Analog Output, and special modules.

### 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 these instructions will result in death or serious injury.**

#### **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 the instructions will result in serious consequences such as personal injury or death.**

## 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.**

## AVERTISSEMENT

### PERTE DE CONTROLE

Le concepteur de tout schéma de commande doit tenir compte de la défaillance possible de la trajectoire de commande et fournir un moyen pour que certaines fonctions critiques de commande puissent être restaurées à un état sûr pendant et après la défaillance de la trajectoire. Ces fonctions de contrôle essentielles comprennent l'arrêt d'urgence, l'arrêt en cas de course excessive, le redémarrage sous tension et d'autres mesures de sécurité semblables.

Pour les fonctions de contrôle critiques, des chemins de contrôle distincts ou redondants doivent être fournis.

Les chemins de commande du système peuvent comprendre des liaisons de communication. Il faut tenir compte des conséquences des retards de transmission imprévus ou des défaillances de liaison.

Respecter toutes les réglementations de prévention des accidents et les consignes de sécurité locales.

Pour garantir un bon fonctionnement, chaque installation de l'appareil doit être entièrement testée individuellement avant d'être mise en service.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences**

graves, comme des blessures ou des dommages à l'équipement.

## 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.**

## AVERTISSEMENT

### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Utilisez uniquement un logiciel approuvé par Sichuan ODOT Automation System Co., Ltd. pour une utilisation avec cet équipement.

Veuillez mettre à jour l'application après chaque modification de la configuration matérielle physique.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## WARNING

### UNINTENDED EQUIPMENT OPERATION

·Your 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.**

## AVERTISSEMENT

### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Votre évaluation des risques doit inclure la possibilité d'une panne de communication entre le contrôleur logique et tout module d'extension d'E/S.

Si le signal de sortie du module d'E/S «maintenir la valeur actuelle» ne répond pas aux exigences de votre application lorsque l'erreur du Bus d'extension d'E/S se produit, d'autres solutions doivent être utilisées pour s'assurer que l'application peut faire face aux événements d'erreur de Bus.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

# Table of contents

|                                                      |    |
|------------------------------------------------------|----|
| Legal Statement .....                                | 3  |
| Security Information .....                           | 4  |
| About this manual .....                              | 8  |
| Table of contents .....                              | 12 |
| 1 Product Overview .....                             | 16 |
| 1.1 Introduction.....                                | 16 |
| 1.2 Version Information .....                        | 17 |
| 1.3 Ownership Information.....                       | 17 |
| 1.4 Disclaimer .....                                 | 17 |
| 1.5 Software Download .....                          | 18 |
| 1.6 Selection Table .....                            | 19 |
| 1.7 Installation.....                                | 22 |
| 1.7.1 Installation and maintenance requirements..... | 22 |
| 1.7.2 Power cut off.....                             | 22 |
| 1.7.3 Environmental Specification.....               | 22 |
| 1.7.4 Programming Notes .....                        | 23 |
| 1.7.5 Operating Environment.....                     | 24 |
| 1.7.6 Installation Precautions .....                 | 24 |
| 1.7.7 Installation Guide.....                        | 25 |
| 1.7.8 Correct Installation Position .....            | 27 |
| 1.7.9 Incorrect Installation Location.....           | 28 |
| 1.7.10 Minimum Clearance.....                        | 29 |
| 1.8 Install I/O modules for C3351 .....              | 31 |
| 1.9 Removing the I/O Module from the C3351 .....     | 34 |
| 1.10 Wiring .....                                    | 36 |
| 1.10.1 Wiring Guidelines .....                       | 36 |
| 1.10.2 Push-in Terminal .....                        | 37 |
| 1.10.3 Cold-pressed Terminal .....                   | 38 |

|                                                        |    |
|--------------------------------------------------------|----|
| 1.11 Protects Outputs from Inductive Load Damage.....  | 41 |
| 1.12 Power Supply .....                                | 42 |
| 1.12.1 Features and Wiring .....                       | 42 |
| 1.12.2 DC Power Requirements.....                      | 43 |
| 1.13 Grounding .....                                   | 44 |
| 1.13.1 Functional grounding on the DIN rail.....       | 44 |
| 1.13.2 System Grounding .....                          | 44 |
| 1.13.3 Protective Earthing on the backplane (PE) ..... | 46 |
| 1.13.4 Shielded Cable Connection.....                  | 46 |
| 1.14 Dimensions .....                                  | 46 |
| 2 Module description .....                             | 47 |
| 2.1 Technical Parameters .....                         | 47 |
| 2.2 Device Preview .....                               | 49 |
| 2.3 LED indicator.....                                 | 50 |
| 2.4 Wiring .....                                       | 51 |
| 2.4.1 Ethernet interface .....                         | 52 |
| 2.4.2 485 interface.....                               | 52 |
| 2.4.3 Power interface .....                            | 53 |
| 3 IO-Config Software .....                             | 54 |
| 3.1 IO-Config Configure software installation .....    | 54 |
| 3.2 Software Interface .....                           | 56 |
| 3.2.1 Menu .....                                       | 56 |
| 3.2.2 Tool .....                                       | 57 |
| 3.2.3 Project Window.....                              | 58 |
| 3.2.4 Property Window .....                            | 58 |
| 3.2.5 Major Window .....                               | 59 |
| 3.2.6 Message Window .....                             | 61 |
| 3.2.7 Shortcut keys.....                               | 62 |
| 3.3 Software Function.....                             | 63 |
| 3.3.1 Function .....                                   | 63 |

|                                                              |     |
|--------------------------------------------------------------|-----|
| 3.3.2 Communication Interface.....                           | 63  |
| 3.3.3 Module Selection .....                                 | 63  |
| 3.3.4 View Configuration Parameters .....                    | 70  |
| 3.3.5 Modify Configuration Parameters .....                  | 71  |
| 3.3.6 Online Debugging .....                                 | 73  |
| 3.3.7 Device Firmware Upgrade .....                          | 74  |
| 3.3.8 Data Export .....                                      | 75  |
| 4 Programming Software (CODESYS) .....                       | 77  |
| 4.1 Programming software installation .....                  | 77  |
| 4.2 CODESYS Software Using .....                             | 82  |
| 4.2.1 Create a project .....                                 | 82  |
| 4.2.2 CODESYS Software Interface.....                        | 86  |
| 4.2.3 Configure the IO module .....                          | 86  |
| 4.3 Programming.....                                         | 89  |
| 4.4 Download, Monitor.....                                   | 90  |
| 4.5 Modbus TCP client/server functionality .....             | 91  |
| 4.6 Modbus RTU Master function .....                         | 105 |
| 4.7 Modbus RTU Slave Station Function .....                  | 111 |
| 5 Demo.....                                                  | 117 |
| 5.1 Control requirement .....                                | 117 |
| 5.2 Preparation .....                                        | 117 |
| 5.3 Project creation .....                                   | 117 |
| 5.4 Program download and monitoring .....                    | 118 |
| 6 Annex .....                                                | 120 |
| 6.1 Modbus-RTU Protocol Introduction .....                   | 120 |
| 6.1.1 Modbus Storage Area.....                               | 120 |
| 6.1.2 Modbus Function Code.....                              | 120 |
| 6.2 Brief introduction of serial port network topology ..... | 125 |
| 6.2.1 RS232.....                                             | 125 |
| 6.2.2 RS422.....                                             | 127 |

|                  |     |
|------------------|-----|
| 6.2.3 RS485..... | 128 |
|------------------|-----|

# 1 Product Overview

## 1.1 Introduction

C3351 series PLC is divided into A00 and B01 versions, corresponding to models C3351-A00 and C3351-B01 respectively, the programming environment is CODESYS, and the programmable controller that follows the IEC61131-3 international standard. It supports five programming languages such as ladder diagram (LD), instruction list (IL), structured text (ST), function block diagram (CFC/FBD) and Sequential Function Chart (SFC). The PLC supports to mount 32 modules. With built-in standard serial communication RS485 interface and RJ45 interfaces, it makes C3351 to be a small PLC with rich functions.

The C3351-A00 module supports 1 Mbytes of user program storage, 1 Mbytes of data memory, and 1.5K bytes of retentive memory. The C3351-B01 module supports 4 Mbytes of user program storage, 4 Mbytes of data memory, and 32 K bytes of retentive memory.

The C3351 series PLC is mainly responsible for executing the user's logic program, and is also responsible for all I/O data reception and communication data processing. It has rich instructions, reliable functions, good adaptability, compact structure, easy to expand, cost-effective, strong versatility, programming, monitoring, debugging, and on-site operation are very convenient, and the Ethernet interface on the CPU supports Modbus TCP client function and supports access to third-party Modbus TCP server data; Support Modbus TCP server function, support third-party Modbus TCP client to access data; The RS485 interface supports Modbus RTU master and Modbus RTU slave functions, and supports third-party devices to interact with PLC data through serial ports, which can be applied to a variety of automation systems.

The supported I/O expansion modules include:

- A. Digital Input Module
- B. Digital Output Module
- C. Analog Input Module
- D. Analog Output Module
- E. Special Function Module

## 1.2 Version Information

The document has been modified as follows:

| Date       | Version | Modify Content                           | Author |
|------------|---------|------------------------------------------|--------|
| 2023.07.26 | V1.00   | Initial Version of the Sample PLC Manual | YS     |
| 2023.11.17 | V1.10   | Official User Manual                     | YS/DFL |
| 2024.03.11 | V1.20   | Improve general parameter information    | YS     |
| 2025.08.25 | V1.30   | Added parameters of the C3351-B01 module | YPP    |

## 1.3 Ownership Information

This document may not be republished in whole or in part in paper or electronic form without the consent of the copyright owner.

## 1.4 Disclaimer

This document is only used to assist readers in using the product, and Sichuan ODOT Automation System Co., Ltd. is not responsible for losses or errors caused by using the information in this document. The products and texts described in this document are under continuous development and improvement. Sichuan ODOT Automation System Co., Ltd. reserves the right to modify this document without notifying users.

### NOTE

- **WHEN INSTALLING, OPERATING AND MAINTAINING EQUIPMENT, DO NOT EXCEED ANY RATING SPECIFIED IN THE ELECTRICAL CHARACTERISTICS;**
  - **WHEN INSTALLING, OPERATING, AND MAINTAINING EQUIPMENT, DO NOT EXCEED ANY OF THE RATINGS SPECIFIED IN THE ENVIRONMENTAL CHARACTERISTICS. DO NOT USE THE PRODUCT IN THE FOLLOWING PLACES: 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 PRODUCT DAMAGE;**
- IF NOT DONE AS DIRECTED, THE PROTECTION PROVIDED BY THE DEVICE MAY BE LOST, WHICH MAY RESULT IN MINOR BODILY INJURY OR DAMAGE TO THE DEVICE.**

### Disclaimer

The company is not responsible for equipment damage or failure 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 fire, flood, etc.);
3. Improper use: damage caused by overload, irregular 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 unrelated to the equipment itself.

#### Repair service

1. For 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 is not responsible for personal injury, death or property damage, or other related losses caused by the use of the equipment. All risks are at the user's own risk.

## 1.5 Software Download

Please log in to the official website of Sichuan ODOT Automation System Co., Ltd.: <https://www.odotautomation.com>, and click to download on the corresponding product page.

## 1.6 Selection Table

| No. | Module     | Function Description                                                                                                                                                                                                                                                                            | State        |
|-----|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1   | C3351-A00  | The programming environment is CODESYS, which follows the IEC61131-3 standard and supports five programming languages: LD, IL, ST, CFC/FBD, and SFC, supports Modbus TCP client/server, Modbus RTU master/slave, user program storage 1Mbytes, data memory 1Mbytes, retentive memory 1.5K bytes | Published    |
| 2   | C3351-B01  | The programming environment is CODESYS, which follows the IEC61131-3 standard and supports five programming languages: LD, IL, ST, CFC/FBD, and SFC, supports Modbus TCP client/server, Modbus RTU master/slave, user program storage 4Mbytes, data memory 4Mbytes, retentive memory 32K bytes. | Published    |
| 3   | CT-1218    | 8 Channels digital input PNP/24V valid                                                                                                                                                                                                                                                          | Published    |
| 4   | CT-121F    | 16 Channels digital input PNP/24V valid                                                                                                                                                                                                                                                         | Published    |
| 5   | CT-1228    | 8 Channels digital input NPN/0V valid                                                                                                                                                                                                                                                           | Published    |
| 6   | CT-122F    | 16 Channels digital input NPN/0V valid                                                                                                                                                                                                                                                          | Published    |
| 7   | CT-124H    | 32 Channels digital input PNP/24V valid NPN/0V valid                                                                                                                                                                                                                                            | Published    |
| 8   | CT-124D    | 32 Channels digital input PNP/24V valid NPN/0V valid                                                                                                                                                                                                                                            | Published    |
| 9   | CT-125F    | 16 Channels digital input PNP/24V valid                                                                                                                                                                                                                                                         | Published    |
| 10  | CT-126F    | 16 Channels digital input NPN/0V valid                                                                                                                                                                                                                                                          | Published    |
| 11  | CT-1314    | 4 Channels digital input 220VAC                                                                                                                                                                                                                                                                 | Published    |
| 12  | CT-2224    | 4 Channels digital output 2A/PNP/24V valid                                                                                                                                                                                                                                                      | Published    |
| 13  | CT-2218    | 8 Channels digital output 0.5A/NPN/0V valid                                                                                                                                                                                                                                                     | Published    |
| 14  | CT-2228    | 8 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                    | Published    |
| 15  | CT-222F    | 16 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                   | Published    |
| 16  | CT-222F-NP | 16 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                   | Published    |
| 17  | CT-222H    | 32 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                   | Published    |
| 18  | CT-222D    | 32 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                   | Published    |
| 19  | CT-221F    | 16 Channels digital output 0.5A/NPN/0V valid                                                                                                                                                                                                                                                    | Published    |
| 20  | CT-221H    | 32 Channels digital output 0.5A/NPN/0V valid                                                                                                                                                                                                                                                    | Published    |
| 21  | CT-221D    | 32 Channels digital output 0.5A/NPN/0V valid                                                                                                                                                                                                                                                    | Published    |
| 22  | CT-2244    | 4 Channels digital output 0.5A/PNP/24V valid NPN/0V valid                                                                                                                                                                                                                                       | Unpublished  |
| 23  | CT-225F    | 16 Channels digital output 0.25A/NPN/0V valid                                                                                                                                                                                                                                                   | Published    |
| 24  | CT-226F    | 16 Channels digital output 0.5A/PNP/24V valid                                                                                                                                                                                                                                                   | Published    |
| 25  | CT-2718    | 8 Channels relay output 1A/30VDC/30W                                                                                                                                                                                                                                                            | Discontinued |

|    |         |                                                   |                                                            |              |
|----|---------|---------------------------------------------------|------------------------------------------------------------|--------------|
| 26 | CT-2738 | 8 Channels relay output                           | 1A/30VDC/30W                                               | Published    |
| 27 | CT-2754 | 4 Channels relay output                           | 3A/30VDC/90W                                               | Published    |
| 28 | CT-2794 | 4 Channels relay output                           | 2A/250VAC/500VA                                            | Published    |
| 29 | CT-3158 | 8 Channels voltage input                          | 0~5VDC/0~10VDC/<br>±5VDC/ ±10VDC, 12 bits                  | Discontinued |
| 30 | CT-3134 | 4 Channels voltage input                          | 0~5VDC/0~10VDC/<br>±5VDC/±10VDC, 15 bits/16 bits           | Published    |
| 31 | CT-3168 | 8 Channels voltage input                          | 0~5VDC/0~10VDC/±5VDC/±10VDC,15 bits/16 bits                | Published    |
| 32 | CT-3234 | 4 Channels analog input                           | 0&4-20mA, 15 bits<br>single-ended                          | Published    |
| 33 | CT-3238 | 8 Channels analog input                           | 0&4-20mA, 15 bits<br>single-ended                          | Published    |
| 34 | CT-3258 | 8 Channels analog input                           | 0~20mA /-20~0mA<br>/±20mA, 12 bits single-ended bipolarity | Discontinued |
| 35 | CT-3268 | 8 Channels analog input                           | 0~20mA /-20~0mA<br>/±20mA, 15 bits single-ended bipolarity | Published    |
| 36 | CT-3274 | 4 Channels analog input                           | 0~20mA /4~20mA<br>/±20mA, 16 bits                          | Published    |
| 37 | CT-3713 | 3 Channels thermal resistive input                | RTD-PT100                                                  | Published    |
| 38 | CT-3723 | 3 Channels thermal resistive input                | RTD-PT1000                                                 | Published    |
| 39 | CT-3716 | 6 Channels thermal resistive input                | RTD-PT100                                                  | Published    |
| 40 | CT-3726 | 6 Channels thermal resistive input                | RTD-PT1000                                                 | Published    |
| 41 | CT-3734 | 4 Channels thermal resistive input                | RTD-PT100,<br>isolation between channels                   | Published    |
| 42 | CT-3744 | 4 Channels thermal resistive input                | RTD-PT1000,<br>isolation between channels                  | Published    |
| 43 | CT-3804 | 4 Channels thermocouple input                     | TC-J / K/ E / T / S /<br>R / B / N / C type                | Discontinued |
| 44 | CT-3808 | 8 Channels thermocouple input                     | TC-J / K/ E / T / S /<br>R / B / N / C type                | Discontinued |
| 45 | CT-3844 | 4 Channels thermocouple input (Filter adjustable) | TC-J / K/ E / T / S / R / B / N / C type                   | Published    |
| 46 | CT-3848 | 8 Channels thermocouple input (Filter adjustable) | TC-J / K/ E / T / S / R / B / N / C type                   | Published    |
| 47 | CT-4154 | 4 Channels voltage output                         | 0~5VDC/0~10VDC/±5VDC/±10VDC,16 bits                        | Published    |
| 48 | CT-4158 | 8 Channels voltage output                         | 0~5VDC/0~10VDC/±5VDC/±10VDC,16 bits                        | Published    |
| 49 | CT-4234 | 4 Channels analog output                          | 0&4-20mA/ 16-bit<br>single-ended                           | Published    |
| 50 | CT-4238 | 8 Channels analog output                          | 0&4-20mA/16-bit<br>single-ended                            | Unpublished  |

|    |         |                                                                                                     |              |
|----|---------|-----------------------------------------------------------------------------------------------------|--------------|
| 51 | CT-5000 | Virtual modules                                                                                     | Published    |
| 52 | CT-5102 | 2 Channels encoder input 5VDC                                                                       | Published    |
| 53 | CT-5112 | 2 Channels encoder input 24VDC                                                                      | Published    |
| 54 | CT-5122 | 2 Channels encoder input SSI input                                                                  | Published    |
| 55 | CT-5142 | 2 Channels encoder input differential input                                                         | Published    |
| 56 | CT-5212 | 8 channels of digital input, 2 channels of digital output, and 2 channels of pulse output           | Published    |
| 57 | CT-5224 | 4 channels digital input/4 channels digital output/4 channels PWM output                            | Published    |
| 58 | CT-5321 | 1 channel serial port module Modbus master/Modbus slave/free protocol                               | Published    |
| 59 | CT-5331 | 1 channel CANOpen master module                                                                     | Published    |
| 60 | CT-5341 | 1 channel Profibus DP master module                                                                 | Published    |
| 61 | CT-5711 | Bus extension master module                                                                         | Published    |
| 62 | CT-5721 | Bus Extension Slave Module                                                                          | Published    |
| 63 | CT-5800 | Terminal module                                                                                     | Discontinued |
| 64 | CT-5801 | Terminal module (stateless, no configuration required)                                              | Published    |
| 65 | CT-5802 | Terminal module (stateless, no configuration required)                                              | Unpublished  |
| 66 | CT-623F | 8 Channels digital input PNP/24V valid /NPN/0V valid & 8 Channels digital output 0.5A/PNP/24V valid | Published    |
| 67 | CT-7100 | Field power expansion module 24V/8A (Stateless, no configuration required)                          | Published    |
| 68 | CT-7220 | Power Expansion Module SV: 5V/2A FV:24V/8A (Stateless, no configuration required)                   | Published    |
| 69 | CT-7221 | Power Expansion Module SV: 5V/2A & FV:24V/8A                                                        | Published    |
| 70 | CT-730F | 18 Channels field power distribution module 18*0VDC                                                 | Published    |
| 71 | CT-731F | 18 Channels field power distribution module 18*24VDC                                                | Published    |
| 72 | CT-732F | 18 Channels field power distribution module 18*PE                                                   | Published    |
| 73 | CT-7339 | 18 Channels field power distribution module 9*24VDC/ 9*0VDC                                         | Published    |
| 74 | CT-7346 | 18 Channels field power distribution module 6*24VDC/6*0VDC/6*PE                                     | Published    |

## 1.7 Installation

### 1.7.1 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.

### 1.7.2 Power cut off

Before installing the control system on the DIN Rail, mounting plate or panel, all options and modules should be assembled; when disassembling, first remove the control system from the DIN Rail, mounting plate or panel, and then remove the equipment.



#### **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.

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

**Failure to follow the instructions will result in serious consequences such as personal injury or death.**

### 1.7.3 Environmental Specification

All expansion module components must be electrically isolated between

the internal circuitry and the input/output channels, and the device is intended for use in a pollution degree 2 industrial environment.

|  <b>WARNING</b>                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>UNEXPECTED EQUIPMENT OPERATION</b></p> <p>·Do not exceed any ratings specified in the Environmental and Electrical Characteristics Table.</p> <p><b>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.</b></p>                          |
|  <b>AVERTISSEMENT</b>                                                                                                                                                                                                                                                                                                            |
| <p><b>FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT</b></p> <p>Ne dépassez aucune estimation spécifiée dans le tableau des caractéristiques environnementales et électriques.</p> <p><b>Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.</b></p> |

#### 1.7.4 Programming Notes

|  <b>WARNING</b>                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>UNINTENDED EQUIPMENT OPERATION</b></p> <p>·Only use software approved by Sichuan ODOT Automation System Co., Ltd. for use with this equipment.</p> <p>·Please update the application after every change to the physical hardware configuration.</p> <p><b>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.</b></p> |
|  <b>AVERTISSEMENT</b>                                                                                                                                                                                                                                                                                                                                                                                       |
| <p><b>FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT</b></p> <p>Utilisez uniquement un logiciel approuvé par Sichuan ODOT Automation System Co., Ltd. pour une utilisation avec cet équipement.</p> <p>Veuillez mettre à jour l'application après chaque modification de la configuration matérielle physique.</p> <p><b>Le fait de ne pas suivre les instructions peut entraîner une défaillance de la</b></p>                                                                                      |

protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.

### 1.7.5 Operating Environment

In addition to the environmental characteristics, please refer to the product-related information at the beginning of this document for important information about installing this specific equipment in hazardous locations.

#### 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.**

#### AVERTISSEMENT

##### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Les modules ne sont pas adaptés pour une utilisation dans des environnements difficiles, tels que les environnements avec des gaz corrosifs ou des embruns salins.

Installer et faire fonctionner ces équipements conformément aux conditions décrites dans «caractéristiques environnementales».

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

### 1.7.6 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.**

## **AVERTISSEMENT**

### **FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT**

Utiliser des dispositifs de verrouillage de sécurité appropriés dans les situations où il peut y avoir un risque de blessures corporelles et/ou de dommages à l'équipement.

Installer et faire fonctionner l'équipement dans une enceinte verrouillée par un dispositif de verrouillage à clé et conforme au niveau de l'environnement dans lequel l'équipement fonctionne.

Utilisez l'alimentation du capteur et de l'actionneur uniquement pour alimenter les capteurs ou les actionneurs connectés au module.

Les circuits de câblage et de sortie doivent être câblés et fusionnés conformément aux réglementations locales et nationales pour l'ampérage et la tension nominale d'équipement spécifique.

N'utilisez pas cet appareil dans un environnement de machine critique pour la sécurité, sauf s'il est désigné comme un dispositif de sécurité fonctionnel et conforme aux réglementations et aux normes applicables.

Ne pas démonter, réparer ou modifier cet équipement.

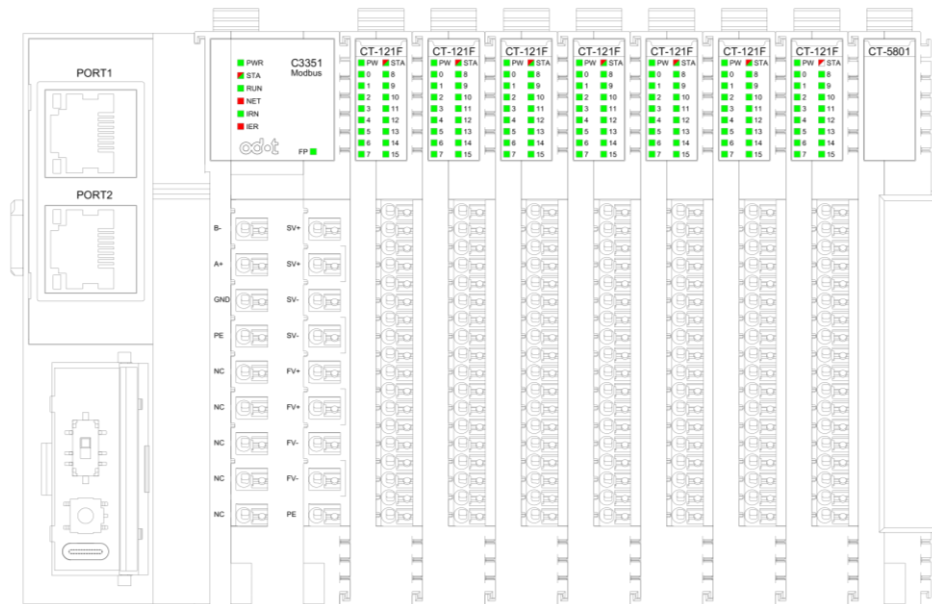
Ne connectez aucune ligne aux points de connexion inutilisés réservés, ou aux points de connexion indiqués comme aucune connexion (NC).

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## **1.7.7 Installation Guide**

The remote I/O module can be mounted on a 35mm DIN rail.

The C3351 series device is installed on the far left, followed by the other I/O modules (including digital input/output modules, analog input/output modules, and special function modules), and the terminal module is installed on the far right.



## 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.**

Power modules need to be added according to the actual number of I/O modules. The power modules are placed between the I/O modules, and the specific slots are not fixed. The drawing designer needs to consider the installation position of the power modules in advance.

## ⚠ WARNING

### UNINTENDED EQUIPMENT OPERATION

- If the total current of the I/O modules installed at the rear of the C3351 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.**



## FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Si le courant total des modules d'E/S installés à l'arrière du C3351 dépasse le courant fourni, mais qu'aucun module d'alimentation n'est ajouté, les canaux du module d'E/S fonctionneront anormalement.

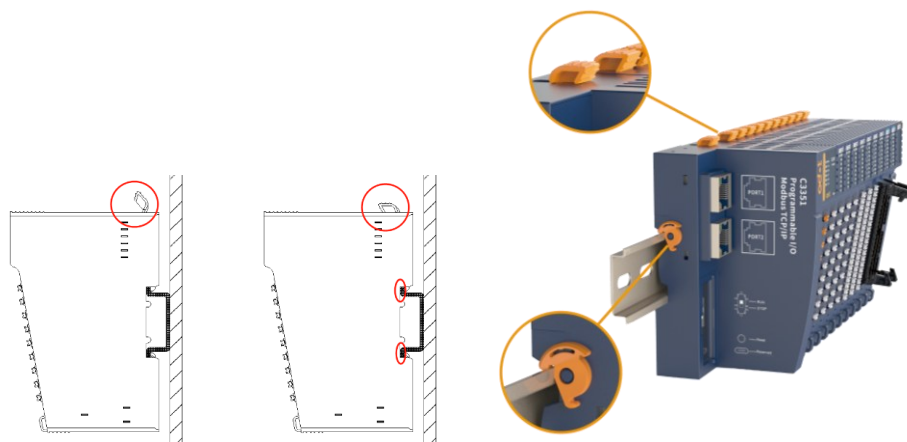
**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

### 1.7.8 Correct Installation Position

All modules should be installed horizontally on a vertical surface as much as possible, as shown in the following figure:



After the module is installed vertically, press the lock on the top of the module to ensure that the module is installed in place, and the distance between the module and the upper and lower contact surfaces of the 35mm Din rail is less than 1mm. Press the lock on the left side of the C3351 device counterclockwise to lock the Din rail.



#### 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.**

#### **AVERTISSEMENT**

#### PERTE DE CONTROLE

La serrure du module d'entrées/sorties doit être appuyée fermement; Sinon, la communication du module d'entrées/sorties peut être déconnectée.

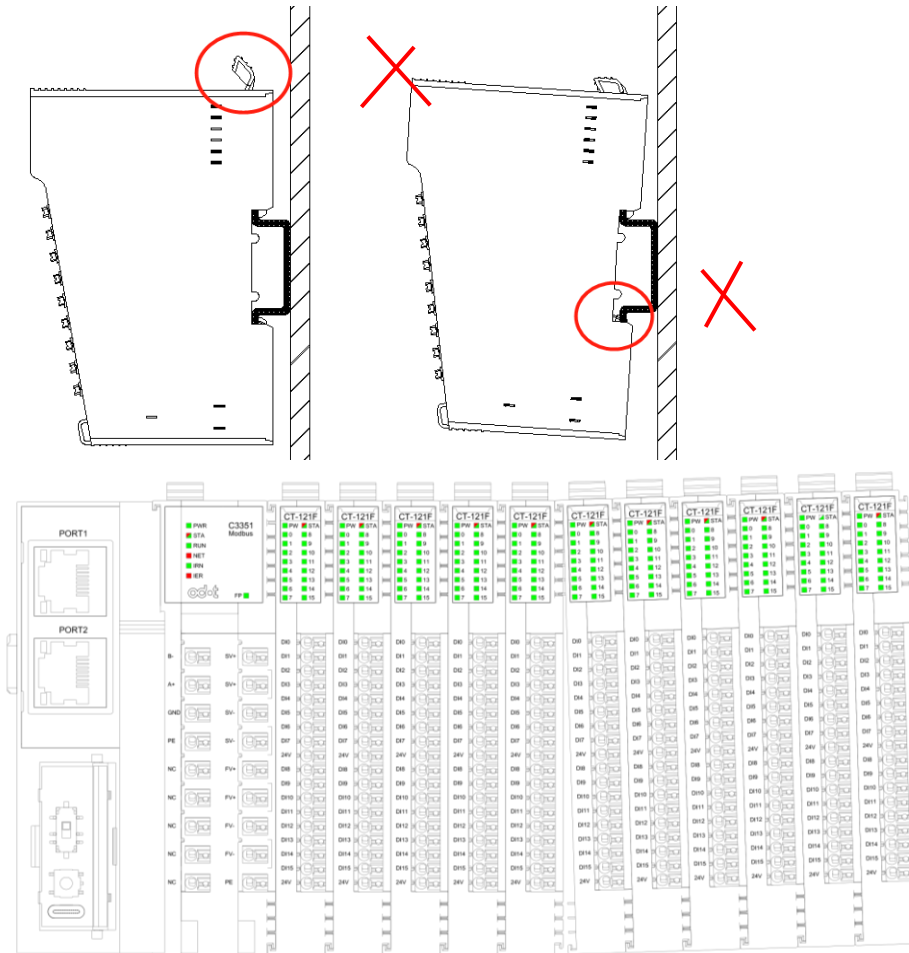
Le verrouillage du module d'entrées/sorties doit être pressé fermement, sinon le module risque de tomber.

Lors de l'installation du module d'entrées/sorties, aucun espace ne doit être laissé entre les modules. Sinon, le canal d'entrées/sorties peut ne pas fonctionner correctement.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

### 1.7.9 Incorrect Installation Location

- A. The lock on the left side of the C3351 series 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.



### 1.7.10 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.**

#### ⚠ AVERTISSEMENT

##### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Installez l'équipement qui dissipe le plus de chaleur au sommet de l'armoire pour assurer une bonne ventilation.

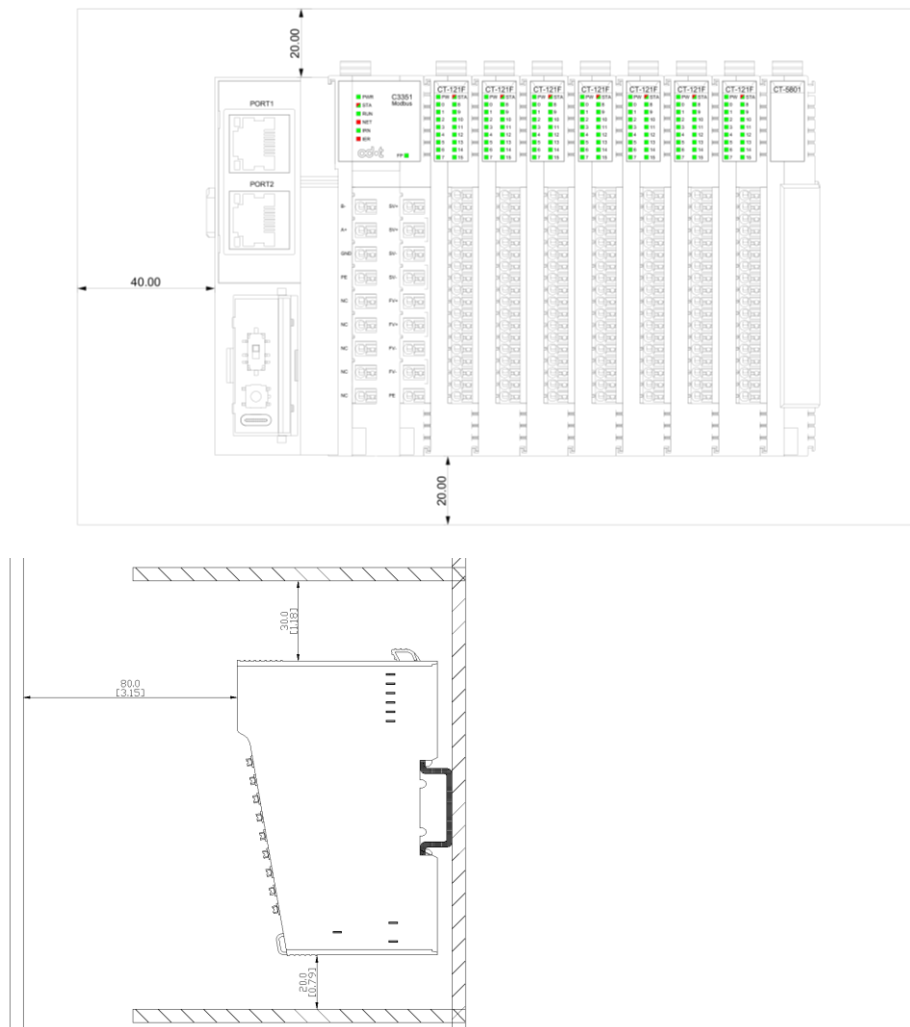
Veuillez ne pas placer cet appareil près ou au-dessus d'un équipement qui peut causer une surchauffe.

Installer l'équipement de façon à ce qu'il conserve le dégagement minimal indiqué dans le présent document pour toutes les structures et l'équipement se trouvant à proximité.

Installez tous les équipements selon les spécifications dans la documentation pertinente.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

The figure below shows the minimum clearances for all C-Series module models (mm) :



## 1.8 Install I/O modules for C3351

This section describes how to assemble the expansion I/O module to the C3351 programmable controller.

### 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 the instructions will result in serious consequences such as personal injury or death.**

After connecting the new module to the C3351 programmable controller Bus network, it needs to update the application program before putting the system into use. If the application program could not be updated and reflects the new modules, and the I/O on the expansion Bus may not function correctly.

### 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.**

### AVERTISSEMENT

#### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Utilisez uniquement un logiciel approuvé par Sichuan ODOT Automation System Co., Ltd. pour une utilisation avec cet équipement.

Veuillez mettre à jour l'application après chaque modification de la configuration

matérielle physique.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## Installation Steps

The following describes how to assemble the C3351 device and I/O modules:

Unlock the buckles on the left and upper sides of the C3351 device, and install it vertically on a 35mm Din rail.

| Steps | Operations                                                                                                                                                                                                                                                                      |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Take all modules out of the box.                                                                                                                                                                                                                                                |
| 2     | Open the lock on the left and upper sides of the C3351 device, and install it vertically on a 35mm Din rail.                                                                                                                                                                    |
| 3     | Rotate the lock on the left side of the C3351 device counterclockwise to clamp the                                                                                                                                                                                              |
| 4     | Press the lock on the upper side of the C3351 device (there will be a 'click' sound to indicate that the lock is in place), so that the C3351 device is firmly fixed on the Din                                                                                                 |
| 5     | Open the lock on the upper side of the I/O module, move the module from top to bottom along the slot of the C3351 shell, and make the I/O module flush with the C3351 device, then press the lock on the upper side of the module, and it will be clamped with a 'click' sound. |
| 6     | Then install the next I/O module until all I/O modules are installed.                                                                                                                                                                                                           |
| 7     | After the I/O module is installed, please install the terminal module as the last                                                                                                                                                                                               |





## ⚠ WARNING

### UNINTENDED EQUIPMENT OPERATION

·The module model on the physical slot needs to correspond one-to-one with the module model on the configuration software slot, and please save it after the configuration is completed.

**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.**

## ⚠ AVERTISSEMENT

### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Le modèle de module sur la fente physique doit correspondre un à un avec le modèle de module sur la fente de logiciel de configuration, et s'il vous plaît l'enregistrer une fois la configuration terminée.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## 1.9 Removing the I/O Module from the C3351

### 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 the instructions will result in serious consequences such as personal injury or death.**

The following describes how to remove the C3351 programmable controller and I/O modules:

### 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.**

### AVERTISSEMENT

#### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Le module ne supporte pas la fonction hot swap. Lors du retrait ou du remplacement d'un module, il est nécessaire de s'éteindre avant de retirer ou de remplacer le module.

Lors du remplacement de modules d'entrées/sorties lors de la maintenance ultérieure, veuillez noter que le modèle et le numéro de slot doivent être remplacés en conséquence. Il n'est pas permis de remplacer par le mauvais modèle de module ou

de déplacer la séquence des modules d'entrées/sorties à volonté, sinon il y aura un risque de brûler le module ou d'endommager l'équipement de terrain.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

| Steps | Operations                                                                 |
|-------|----------------------------------------------------------------------------|
| 1     | Disconnect all power to the control system.                                |
| 2     | Open the lock of the module to be removed to release it from the Din rail. |
| 3     | Remove the wires from the channel of the module that needs to be           |
| 4     | Pull out the module to be removed in a vertical direction to the Din rail. |

## 1.10 Wiring

### 1.10.1 Wiring Guidelines

When wiring the system, the following rules must be followed:

- I/O and communication wiring must be done separately from power wiring. These two types of cables cannot be laid in the same cable duct.
- Please check that the operating conditions and environment are within the range allowed by the specification values.
- The specifications of the cables used must meet the voltage and current requirements.
- Please use copper wire.
- Please use shielded twisted pair cables for analog and/or fast I/O.
- Network and fieldbus should use shielded twisted pair 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 grounding for all fast I/O, analog I/O, and communication signals. [1]
- Please wire 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.**

#### AVERTISSEMENT

##### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Veillez utiliser des câbles blindés pour toutes les entrées/sorties rapides, les entrées/sorties analogiques et les signaux de communication.

Veillez utiliser des câbles blindés pour la mise à la terre à point unique pour toutes les entrées/sorties rapides, les entrées/sorties analogiques et les signaux de communication. [1]

Veillez câbler les câbles d'alimentation séparément des câbles de communication et des câbles d'entrée/sortie.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

[1] Multi-point grounding is permitted (and in some cases unavoidable) if connected to the equipotential grounding plane to avoid damage to the cable shield in the event of a power system short-circuit current. **NOTE:**

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

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

Copper interconnects are 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<sup>2</sup> (AWG20) and a temperature rating of at least 80°C (176°F).

**Failure to follow the instructions will result in serious consequences such as personal injury or death.**

### 1.10.2 Push-in Terminal

All module terminals adopt push-in terminals. Use the push-in connection method to connect single wires or crimp terminal (ferrule) wires without any additional tools to ensure fast wiring. Users can save wiring and disconnection time.

When the push-in terminals are disconnected, the pressing force should be 15 Newtons, and the maximum mechanical bearing pressure of the push-in terminals is 20 Newtons. Using a larger pressing force will affect the spring back of the terminal, and if the tool used for pressing is too sharp and it will damage the push-in terminals.



The module has a cable harness fixing end, which is used to fix the cable when the I/O module is connected to multiple cables.

## NOTICE

### DEVICE INOPERABLE

- When removing wires from the channel, please do not press the push-in terminals with more than the maximum pressing force specified for this terminal, otherwise it

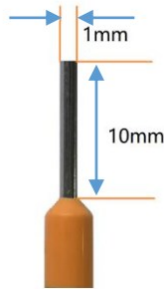
may damage the push-in terminals spring back force and affect the terminal spring back.

·When removing wires from the channel, please do not use sharp tools to press the push-in terminals, otherwise the push-in terminals will be damaged.

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

### 1.10.3 Cold-pressed Terminal

It is recommended to use a cable with a core less than  $1\text{mm}^2$ , and the parameters of the cold-pressed terminal are as follows:



## WARNING

### UNINTENDED EQUIPMENT OPERATION

- The length of stripping off the insulation layer of the wire should be greater than 10mm to ensure the reliable connection of the signal.
- It is recommended to use a wire with a wire core greater than or equal to 0.2mm<sup>2</sup> and less than or equal to 1mm<sup>2</sup> to ensure reliable signal connection.
- When the cold-press terminal is terminated, it should be terminated and inspected in strict accordance with the corresponding termination specifications or requirements, and terminated according to the corresponding node number.
- It is forbidden to power on the cold-press terminal before it is correctly connected or completely locked.

**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.**

## AVERTISSEMENT

### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

- La longueur de décapage de la couche d'isolation du fil devrait être supérieure à 10mm pour assurer la connexion fiable du signal.
- Il est recommandé d'utiliser un fil avec un noyau de fil supérieur ou égal à 0.2mm<sup>2</sup> et inférieur ou égal à 1mm<sup>2</sup> pour assurer une connexion de signal fiable.
- Lorsque le terminal de presse à froid est terminé, il devrait être terminé et inspecté en stricte conformité avec les spécifications ou les exigences de terminaison correspondantes, et terminé selon le numéro de noeud correspondant.
- Il est interdit d'alimenter le terminal de presse à froid avant qu'il ne soit correctement connecté ou complètement verrouillé.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## 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 the instructions will result in serious consequences such as personal injury or death.**

## 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.**

## AVERTISSEMENT

### PERTE DE CONTROLE

Le concepteur de tout schéma de commande doit tenir compte de la défaillance possible de la trajectoire de commande et fournir un moyen pour que certaines fonctions critiques de commande puissent être restaurées à un état sûr pendant et après la défaillance de la trajectoire. Ces fonctions de contrôle essentielles comprennent l'arrêt d'urgence, l'arrêt en cas de course excessive, le redémarrage sous tension et d'autres mesures de sécurité semblables.

Pour les fonctions de contrôle critiques, des chemins de contrôle distincts ou redondants doivent être fournis.

Les chemins de commande du système peuvent comprendre des liaisons de communication. Il faut tenir compte des conséquences des retards de transmission imprévus ou des défaillances de liaison.

Respecter toutes les réglementations de prévention des accidents et les consignes de sécurité locales.

Pour garantir un bon fonctionnement, chaque installation de l'appareil doit être entièrement testée individuellement avant d'être mise en service.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## 1.11 Protects Outputs from Inductive Load Damage

Depending on the load, the outputs of the controller and specific modules may require protection circuits. Inductive loads using DC voltages can create voltage reflections that cause overshoots that can damage or shorten the life of the output device.

### CAUTION

#### **DAMAGE TO OUTPUT CIRCUITS DUE TO INDUCTIVE LOADS**

·Use appropriate external protective circuits or devices to reduce the risk of damage to inductive loads.

**Failure to follow the instructions may result in personal injury or equipment damage.**

If the controller or module contains relay outputs, and these types of outputs can support up to 30 Vdc. Inductive damage to these types of outputs can result in fused contacts and loss of control. Every inductive load must be equipped with protective devices, such as RC circuits or freewheeling diodes. These relays do not support capacitive loads.

### WARNING

#### **RELAY OUTPUT FUSION CLOSURE**

·Always use appropriate external protective circuits or devices to protect relay outputs from inductive load damage.

·Please do not connect relay outputs to capacitive loads.

**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.**

### AVERTISSEMENT

#### **RELAIS SORTIE FUSION FERMETURE**

Toujours utiliser des circuits ou des dispositifs de protection externes appropriés pour protéger les sorties de relais contre les dommages causés par la charge inductive.

Veuillez ne pas connecter les sorties de relais aux charges capacitives.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## WARNING

### **THERE ARE CONSEQUENCES OUT OF CONTROL**

·Please install an RC surge suppressor or freewheeling diode on each relay output when connecting to a contactor or other form of inductive load.

**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.**

## AVERTISSEMENT

### **IL Y A DES CONSQUENCES HORS DE CONTROLE**

Veuillez installer un supprimeur de surtension RC ou une diode à roue libre sur chaque sortie de relais lors de la connexion à un contacteur ou à une autre forme de charge inductive.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## 1.12 Power Supply

### 1.12.1 Features and Wiring

## DANGER

### **FIRE HAZARD**

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

**Failure to follow the instructions may result in serious consequences such as personal injury or death.**

## 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.

## AVERTISSEMENT

### FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Ne dépassez aucune évaluation spécifiée dans le tableau de caractéristiques environnementales et électriques..

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

## 1.12.2 DC Power Requirements

The C3351 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. [1]

**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.**

## AVERTISSEMENT

### SURCHAUFFE ET RISQUE D'INCENDIE

Ne connectez jamais l'appareil directement à la tension de la ligne.

Veuillez utiliser uniquement une alimentation électrique SELV ou PELV isolée pour alimenter l'appareil. [1]

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

[1] To comply with UL (Underwriters Laboratories) requirements, field power uses SELV power to power the device. In no case should the current limit exceed the current limit of the electrical characteristics and wiring diagram of the equipment described in this document.

## 1.13 Grounding

### 1.13.1 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.

|  <b>WARNING</b>                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UNINTENDED EQUIPMENT OPERATION</b><br>·Connect the DIN rail to the functional grounding of the installed equipment.<br><b>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.</b>                |
|  <b>AVERTISSEMENT</b>                                                                                                                                                                                                                                                                 |
| <b>FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT</b><br>Raccorder le rail DIN à la mise à la terre fonctionnelle de l'équipement installé.<br><b>Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.</b> |

### 1.13.2 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.

|  <b>WARNING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UNINTENDED EQUIPMENT OPERATION</b><br>·Please use shielded cables for all fast I/O, analog I/O, and communication signals.<br>·Please use shielded cables for single point connection for all fast I/O, analog I/O and communication signals. [1]<br>·Arrange power cables separately from communication and I/O cables.<br><b>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.</b> |
|  <b>AVERTISSEMENT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT</b><br>Veuillez utiliser des câbles blindés pour toutes les entrées/sorties rapides, les                                                                                                                                                                                                                                                                                                                                                                                                                         |

entrées/sorties analogiques et les signaux de communication.

Veillez utiliser des câbles blindés pour une connexion à point unique pour toutes les entrées/sorties rapides, entrées/sorties analogiques et signaux de communication. [1]

Disposez les câbles d'alimentation séparément des câbles de communication et d'entrées/sorties.

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

[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 protective earthing (PE), 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

### 1.13.3 Protective Earthing on the backplane (PE)

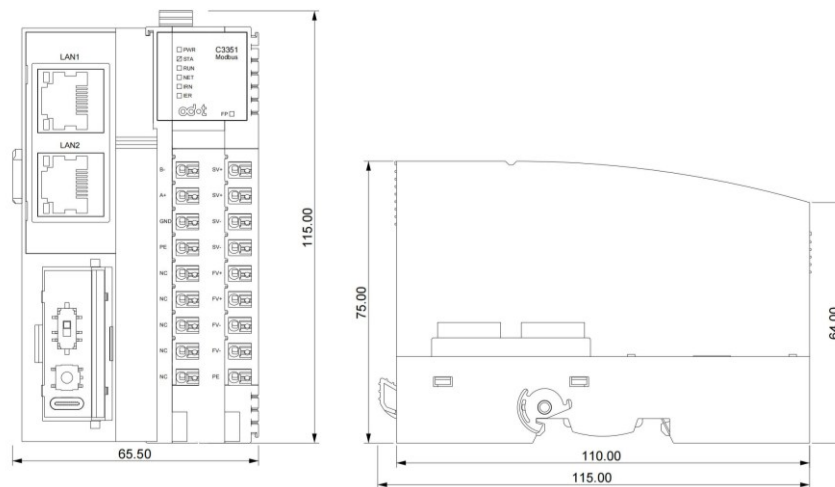
The protective earthing (PE) is connected to the conductive backplane by a heavy-duty conductor (usually a braided copper cable with the largest allowable cable cross-section). There is a metal spring plate on the back of the module, which is used for effective grounding with the Din rail, and the metal spring plate is connected to the inside of the terminal PE of the adapter module.

### 1.13.4 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 or protective earthing (PE) of the C3351 expansion module. The fieldbus communication cable shields must be connected to protective earthing (PE) via using connection clamps fastened to the conductive backplane installed.

## 1.14 Dimensions

C3351 Installation dimensions of the device: 115 \* 65.5 \* 75 mm



## 2 Module description

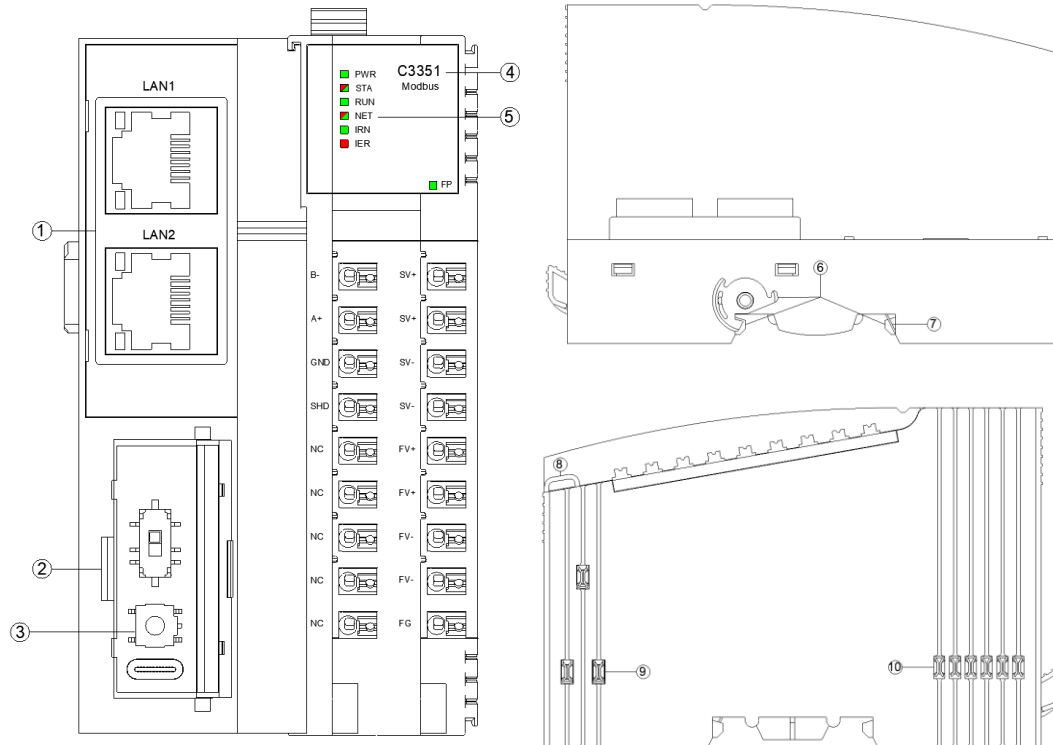
### 2.1 Technical Parameters

| Module Name                       | C3351-A00                                                                                                                                                                                                                                                                                                                                                                                                                           | C3351-B01 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Programming Software              | CODESYS V3.5.19.70                                                                                                                                                                                                                                                                                                                                                                                                                  |           |
| Programming Language              | IEC 61131-3 (LD, IL, ST, CFC/FBD, SFC)                                                                                                                                                                                                                                                                                                                                                                                              |           |
| Maximum State Task                | 5                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |
| Program Memory                    | 1M Bytes                                                                                                                                                                                                                                                                                                                                                                                                                            | 4M Bytes  |
| Data Storage                      | 1M Bytes                                                                                                                                                                                                                                                                                                                                                                                                                            | 4M Bytes  |
| Power-down Protection Area        | 1.5K Bytes                                                                                                                                                                                                                                                                                                                                                                                                                          | 32K Bytes |
| Bit Instruction Cycle             | 0.0738us                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| Word Transfer Cycle               | 0.33us                                                                                                                                                                                                                                                                                                                                                                                                                              |           |
| Float Operation Cycle             | 0.38us                                                                                                                                                                                                                                                                                                                                                                                                                              |           |
| RTC                               | Not Supported                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| Maximum Expansion Module          | 32                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |
| Modbus Master Max Channel Numbers | 10                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |
| Modbus Master Command Max Length  | Function Code 1(Read Coils): 2000/per channel<br>Function Code 2(Read Discrete Inputs): 2000/ per channel<br>Function Code 3(Read Holding Registers): 125/ per channel<br>Function Code 4(Read Input Registers): 125/ per channel<br>Function Code 15(Write Multiple Coils): 440/ per channel<br>Function Code 16(Write Multiple Registers): 27/ per channel<br>Function Code 23(Read/Write Multiple Registers): 25+25/ per channel |           |
| General Parameters                |                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |
| System Power                      | 19.2~28.8VDC (Nominal: 24VDC)<br>Anti-inversion protection: support                                                                                                                                                                                                                                                                                                                                                                 |           |
| System supply current             | Max. DC 2A                                                                                                                                                                                                                                                                                                                                                                                                                          |           |
| Module Consumption                | 110mA@24VDC                                                                                                                                                                                                                                                                                                                                                                                                                         |           |
| Internal Bus Supply Current       | Max: 2.0A@5VDC                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| Field Power                       | 19.2~28.8VDC (Nominal: 24VDC)                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| Field Power Current               | Max. DC 8A                                                                                                                                                                                                                                                                                                                                                                                                                          |           |
| Wirring Diameter                  | Max.1.5mm <sup>2</sup> (AWG 16)<br>Min.0.2mm <sup>2</sup> (AWG 24)                                                                                                                                                                                                                                                                                                                                                                  |           |
| Installation                      | 35mm DIN rail                                                                                                                                                                                                                                                                                                                                                                                                                       |           |
| Dimension                         | 115 * 65.5 * 75mm                                                                                                                                                                                                                                                                                                                                                                                                                   |           |

|                                                   |                                                             |
|---------------------------------------------------|-------------------------------------------------------------|
| Weight                                            | 170g                                                        |
| Interface Parameters                              |                                                             |
| Interface                                         | 2 * RJ45, 1 * RS485                                         |
| Network Protocol                                  | Modbus TCP, Modbus RTU                                      |
| RS485 Parameter                                   | Support Modbus RTU/ASCII<br>the baud rate is 2400~115200bps |
| Ethernet Parameter                                | 10/100Mbps, Adaptive and full duplex                        |
| Modbus TCP Client                                 | Max supports for connecting 6 Modbus TCP servers            |
| Modbus TCP Server                                 | Max supports for 6 Modbus TCP clients connected             |
| Modbus RTU Master                                 | Max supports for connecting 5 slave devices                 |
| Modbus RTU Slave                                  | Max supports for connecting 1 master device                 |
| Environmental Parameters                          |                                                             |
| Operating Temperature of Vertical Installation    | -35℃-70℃                                                    |
| Operating Temperature of Vertical Installation    | -35℃-60℃                                                    |
| Relative Humidity                                 | 5-95%RH (No Condensation)                                   |
| Storage Temperature                               | -40℃-85℃                                                    |
| Storage Humidity                                  | 5-95%RH (No Condensation)                                   |
| Manufacturing Test Temperature                    | -40℃-75℃                                                    |
| Ingress Protection Rating                         | IP20                                                        |
| Anti-pollution Rating of the Intended Environment | Pollution level 2                                           |
| Altitude                                          | < 2000 m                                                    |

Note: To confirm the model of the device, please check the side marking information of the C3351 device or check the device firmware information through the IO Config software. The device profile of the C3351-A00 is different from that of the C3351-B01 version, so please select the corresponding version of the file to use.

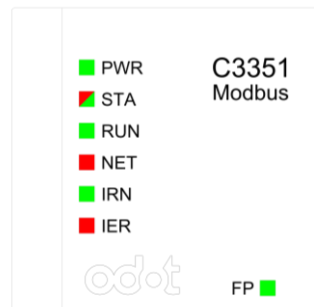
## 2.2 Device Preview



- ①: Network Interface
- ②: RUN/STOP Switch
- ③: Reset Button
- ④: Module Name
- ⑤: Module State Indicator
- ⑥: Buckle
- ⑦: Grounding Spring Sheet
- ⑧: Fixed Wiring Harness
- ⑨: Field Power
- ⑩: Internal Bus

## 2.3 LED indicator

The user can easily check the power status, running status, Bus status, and I/O module status of C3351 through the LED status indicators.



### **PWR — Power Status Indicator (Green):**

- On: The system power supply is normal.
- Off: The system power supply is abnormal.

### **FP—Power Status Indicator (Green):**

- On: The field power supply is normal.
- Off: The field power supply is abnormal.

### **STAT— Module status indicator (Red/Green):**

- Red flashes twice: The module is abnormal and has been softly restarted.
- Green on: Operating mode
- Green single flash: Stop mode
- Red and Green alternately flashing (slow): The current status is upgrade mode.
- Red and Green alternately flashing (fast): Firmware upgrade in progress

### **RUN — Device running indicator (Green):**

- On: The PLC is running.
- Off: The PLC is not running.

### **NET — Network Status Indicator (Green/Red):**

- Green on: The current module is consistent with the PLC configuration.
- Red flash: The current module and PLC configuration are inconsistent.
- Off: No error

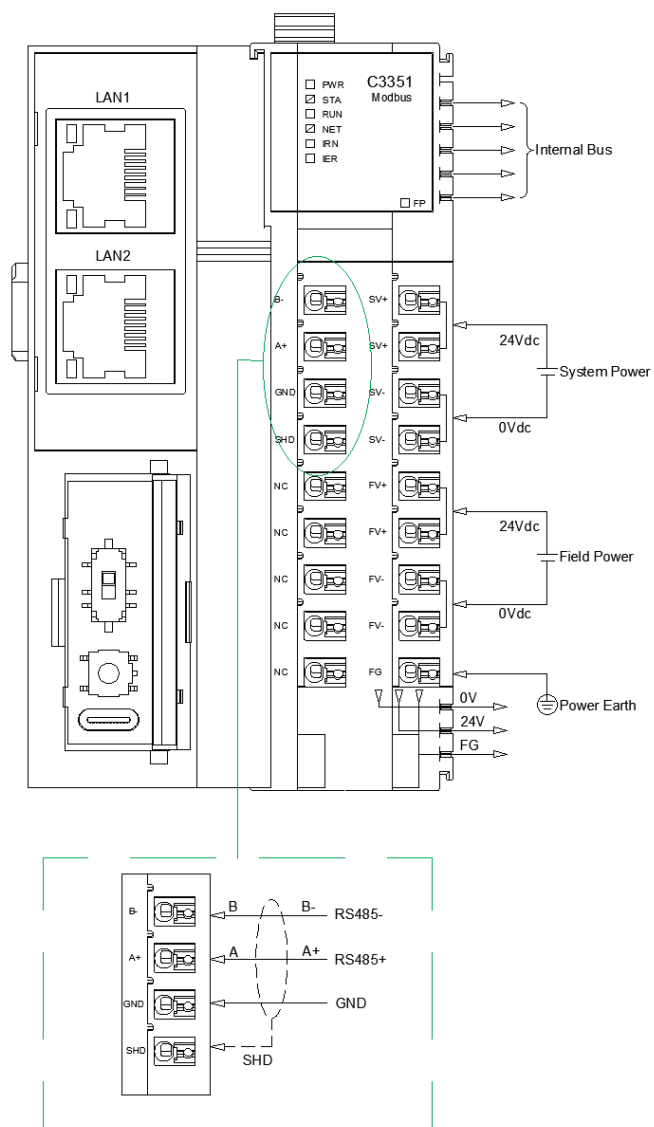
### **IRN —IO Running indicator (Green):**

- On: IO initialization is normal.
- Off: IO initialization error

### **IER —IO Error indicator (Red):**

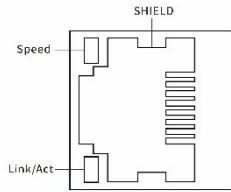
- Off: IO communication is normal.
- Flash twice: IO communication error

## 2.4 Wiring



### 2.4.1 Ethernet interface

Port1/Port2 support switch cascading function, 10Mbps/100Mbps adaptive rate.



**Speed** Network speed indicator (Green)

On: 100Mbps

Off: 10Mbps

**Link/Act** Link status indicator / Active indicator (orange)

On: Connected

Off: Not connected

Flashing: Active link

**SHIELD** RJ45 crystal head shield interface

| Pin | Definition | Description    |
|-----|------------|----------------|
| 1   | TD+        | Transmitting + |
| 2   | TD-        | Transmitting - |
| 3   | RD+        | Receiving +    |
| 6   | RD-        | Receiving -    |

### 2.4.2 485 interface

RS485 terminal adopts the top 4 pins of the terminal, which are defined as follows:

| Pin | Definition | Description     |
|-----|------------|-----------------|
| 1   | B-         | RS485 B-        |
| 2   | A+         | RS485 A+        |
| 3   | GND        | Signal ground   |
| 4   | SHD        | Cable shielding |

## ⚠ WARNING

### UNEXPECTED EQUIPMENT OPERATION

·Connecting the RS485 interface to a voltage exceeding the rated voltage will cause permanent damage, and the rated voltage is DC  $\pm 5V$ .

**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.**

## ⚠ AVERTISSEMENT

## FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

La connexion de l'interface RS485 à une tension supérieure à la tension nominale causera des dommages permanents, et la tension nominale est DC  $\pm 5V$ .

**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

### 2.4.3 Power interface

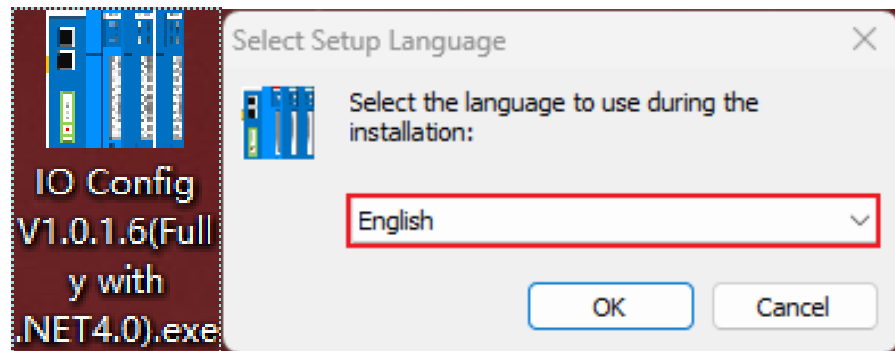
It is powered by 24VDC and the module pins are defined as follows:

| Pin | Definition | Description                  |
|-----|------------|------------------------------|
| 1   | SV+        | System power supply positive |
| 2   | SV+        | System power supply positive |
| 3   | SV-        | System power supply negative |
| 4   | SV-        | System power supply negative |
| 5   | FV+        | Field power supply positive  |
| 6   | FV+        | Field power supply positive  |
| 7   | FV-        | Field power supply negative  |
| 8   | FV-        | Field power supply negative  |
| 9   | FG         | Functional Grounding         |

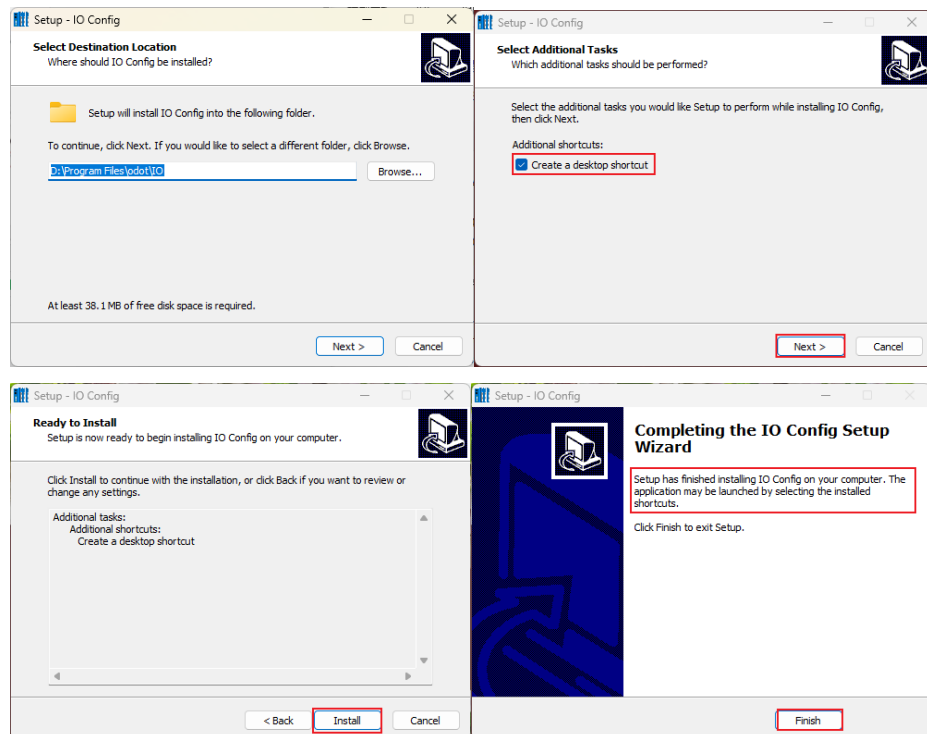
## 3 IO-Config Software

### 3.1 IO-Config Configure software installation

ODOT Automation provides IO Config software for customers. Once receiving the software, customers just double click the software and select language English and click to confirm it, the default language is Chinese.

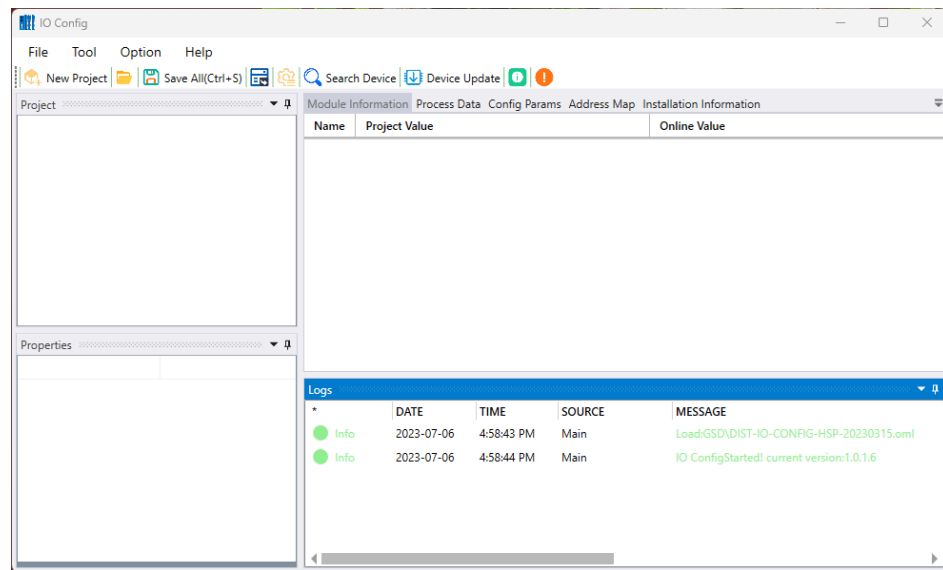


Confirm the installation directory and click “Next” when the window pops out, select and create “Desktop logo”, then click “next”, click “install”. Once installation is finished, then IO Config logo will be created on the desktop.





## 3.2 Software Interface



**Menu:** IO-Config software

**Tool:** Common user menu

**Project Window:** projects set down are showed.

**Property Window:** Current projects' main specific parameters are showed.

**Major Window:**

Basic Information: it could view module name, module number, hardware version, software version, module description, electrical current consumption and manufacturer name.

Process Data: it could be used for online monitoring of channel data.

Configured parameters: modifiable module parameters.

Address Table: the address area occupied by the I/O module.

Installation Information: it could view module description, current consumption, module size, residual current, and product images.

Message Window: It could output the operation log of the current operation.

### 3.2.1 Menu

File

| Menu    | Sub-Menu     | Description                         |
|---------|--------------|-------------------------------------|
| Project | New project  | Create new project                  |
|         | Open project | Open saved project                  |
|         | Save all     | Save current project                |
|         | Save as      | Save current project as new project |
| Exit    |              | Exit Software                       |

#### Tool

| Menu             | Description                                                                   |
|------------------|-------------------------------------------------------------------------------|
| Search devices   | Pop up a new window to search devices through network or serial communication |
| Upgrade hardware | Pop up a new window to upgrade hardware for C3351 and IO Module               |

#### Options

| Menu          | Description                                                                     |
|---------------|---------------------------------------------------------------------------------|
| Configuration | The displayed language and color and device described file path can be modified |

#### Help

| Menu                    | Description                                                                                                                |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------|
| About                   | Company information and software version information can be checked.                                                       |
| Help for abnormal issue | A new window pops up with an abnormal exit reminder. For Windows 7 Sp1/XP systems below, please install Microsoft patches. |

### 3.2.2 Tool

Menu general shortcut logo.

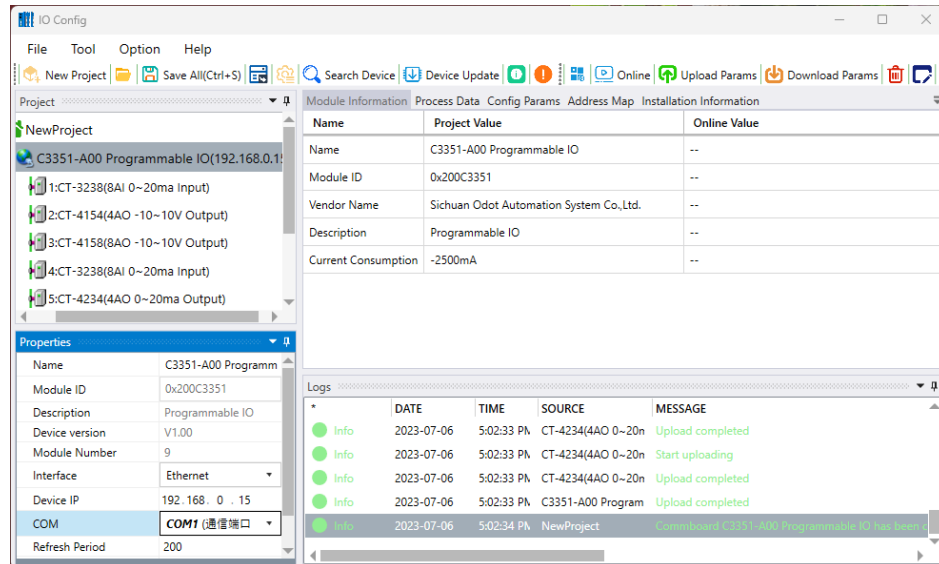


| Logo | Name                    | Menu                      | Description                                                                                             |
|------|-------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|
|      | New project             | File-Project-New project  | Create New project                                                                                      |
|      | Open project            | File-Project-Open project | Open saved project                                                                                      |
|      | Save all                | File-Project-Save all     | Save current project                                                                                    |
|      | Save as                 | File-Project-Save as      | Save current project as new project                                                                     |
|      | Config                  | Options - Configuration   | Modify language, color, device described file.                                                          |
|      | Search Device           | Tool-search device        | Pop-up new window and search device                                                                     |
|      | Upgrade hardware        | Tool-hardware upgrade     | Pop-up new window for module hardware upgrade                                                           |
|      | About                   | Help-about                | Configuration software version can be checked.                                                          |
|      | Help for abnormal issue | Help for abnormal issue   | A new window pops up with an abnormal exit reminder. For Windows 7 Sp1/XP systems below, please install |

|  |  |  |                    |
|--|--|--|--------------------|
|  |  |  | Microsoft patches. |
|--|--|--|--------------------|

### 3.2.3 Project Window

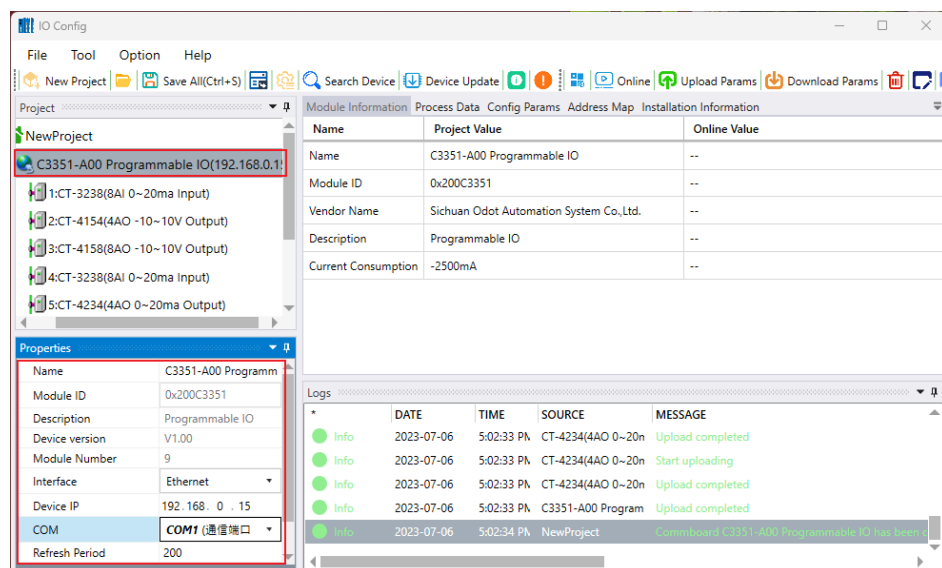
Display the currently created projects.



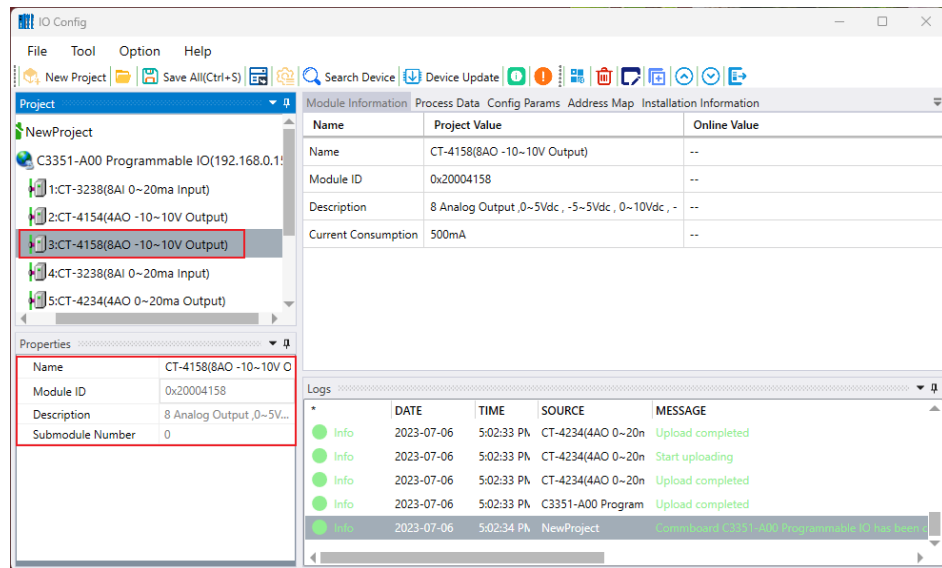
### 3.2.4 Property Window

Property window shows current specific parameter.

IO Adapters, PLC (Module name, module number, module description, device version, modules quantity, interface option, device IP address, serial port number, online refreshing period)

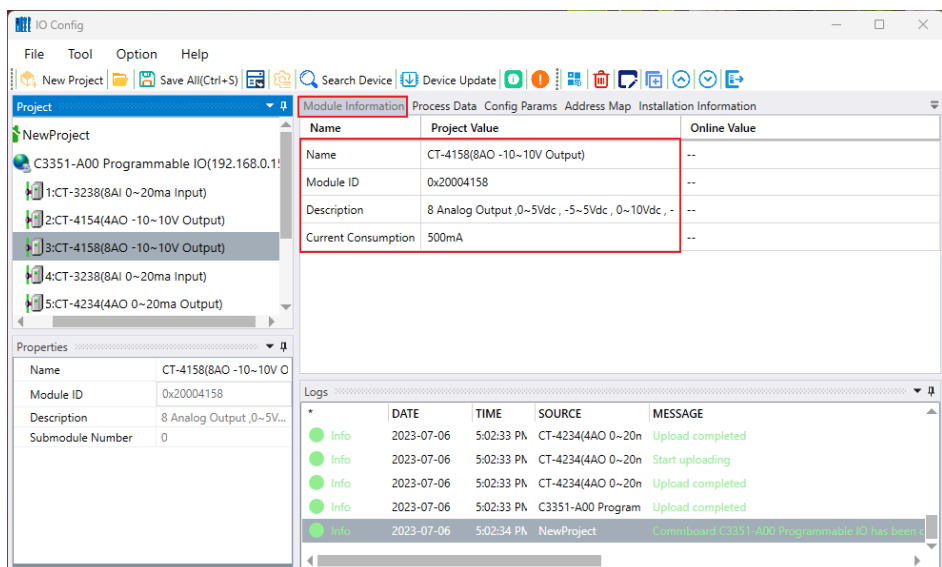


IO Module (module name, module number, module description, extended module numbers)

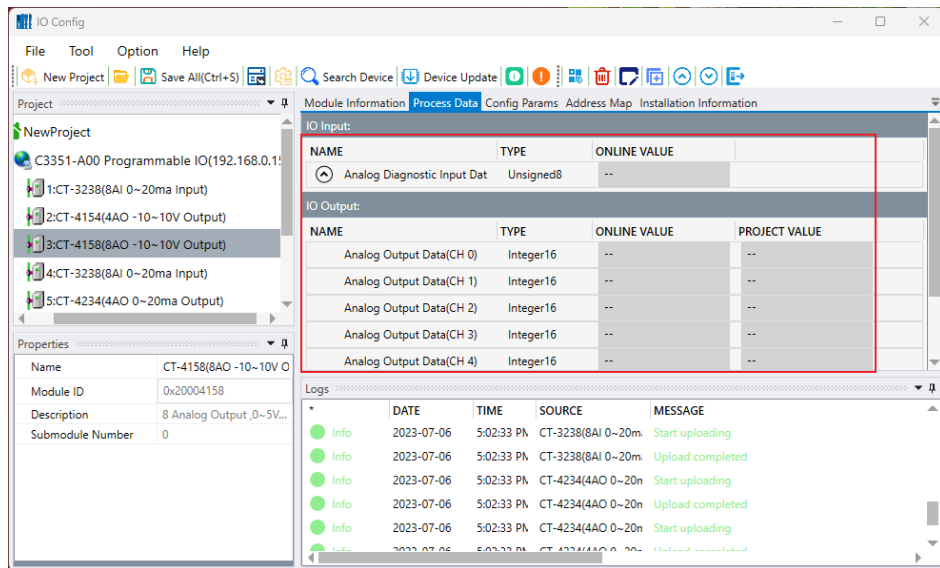


### 3.2.5 Major Window

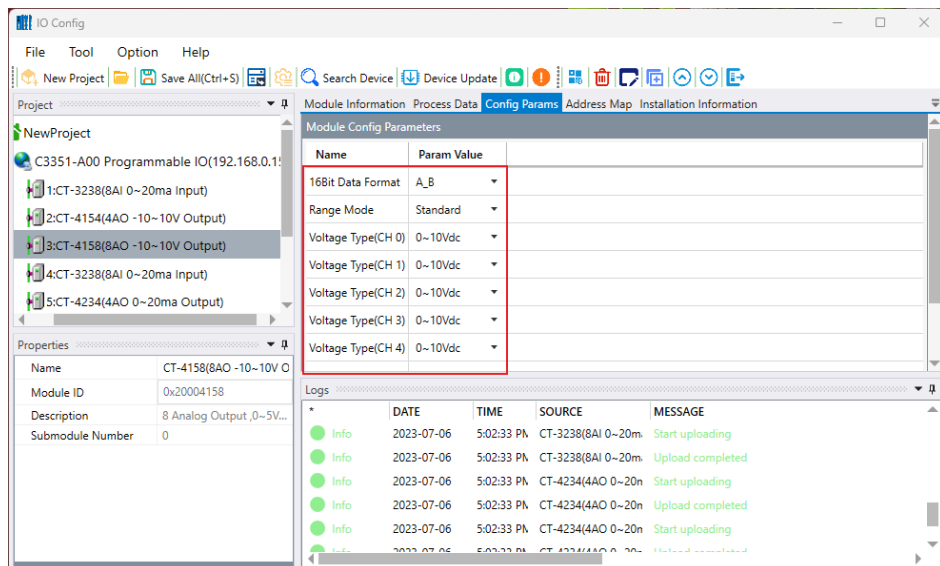
Basic information: IO Adapter module, PLC and IO Module name, module number, hardware version, software version, module description, electrical consumption and manufacturer can be showed.



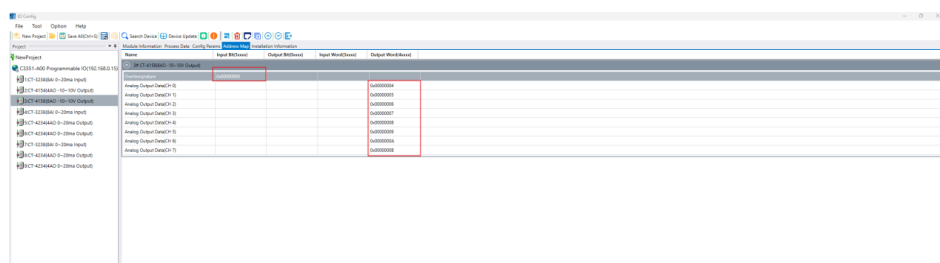
Process data: The channel information of IO Modules can be showed, which is used for online monitoring the channel data.



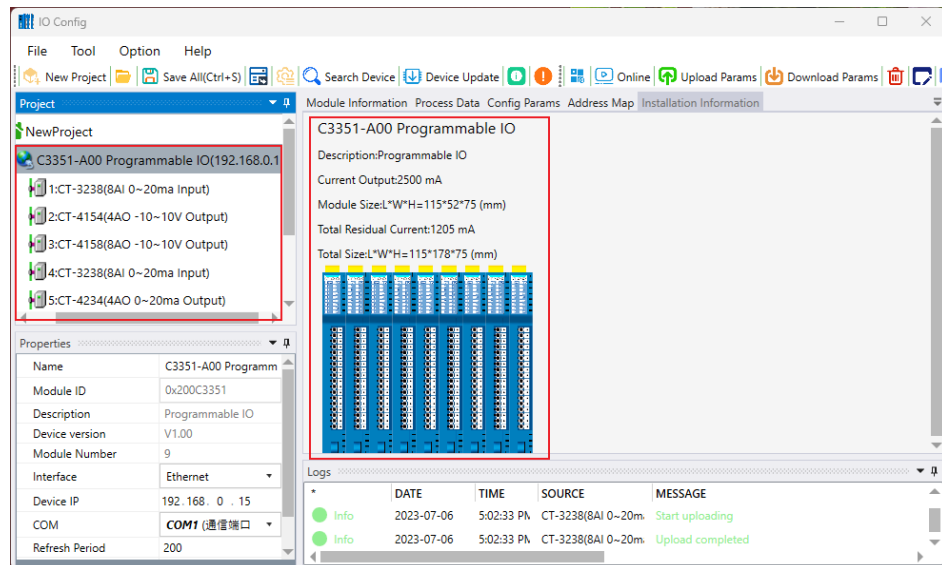
Configured parameter: The module parameter information can be showed and modified, such as IO adapter module, PLC and I/O modules



Address sheet: The storage area of I/O Module input and output channel can be displayed.

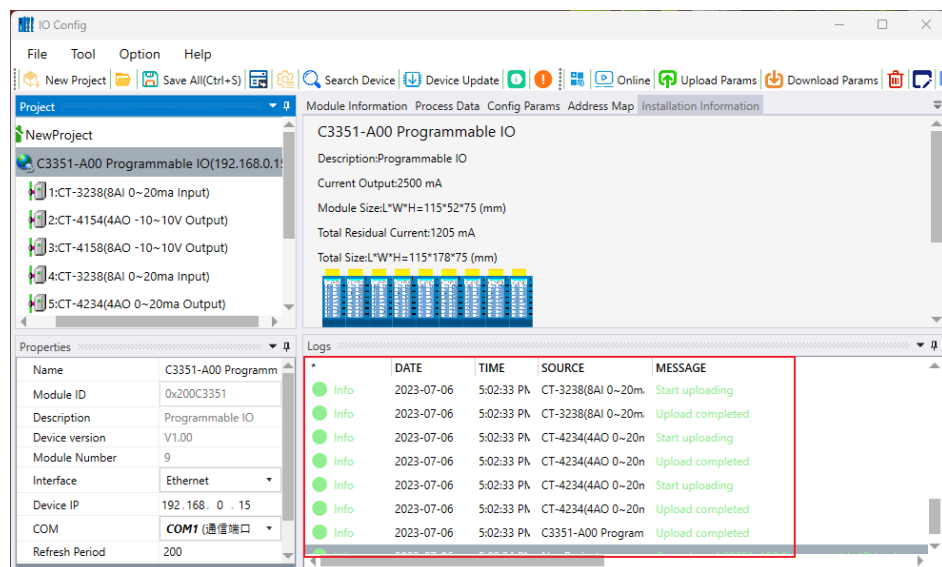


Installation information: The below information can be showed, such as IO Adapter modules, PLC, IO module including module description, current consumption, modules dimension, residual current and product picture.



### 3.2.6 Message Window

The timely operation information can be showed, such as new project, uploading, downloading, configured parameter modification, copy, paste and etc. all operation details.



### 3.2.7 Shortcut keys

| Shortcut keys | Menu                                 | Description                                                  |
|---------------|--------------------------------------|--------------------------------------------------------------|
| Ctrl + C      | Project/PLC, IO Adapter -Copy        | Copy project, PLC, IO Adapter and IO Module                  |
| Ctrl + V      | Project/PLC, IO Adapter -Paste       | Paste project, PLC, IO Adapter and IO Module                 |
| Delete        | Project/PLC, IO Adapter -Delete      | Delete project, PLC, IO Adapter and IO Module                |
| Ctrl + S      | File-Project-Save all                | Save configured project                                      |
| Ctrl + M      | PLC, IO Adapter-Output address sheet | Output project, PLC, IO Adapter and the address of IO Module |

## 3.3 Software Function

### 3.3.1 Function

- A. Module selection.
- B. Check the module configuration parameters and the data address of the module.
- C. Modify module configuration parameters.
- D. Online debugging module.
- E. Search for devices.
- F. Firmware upgrade

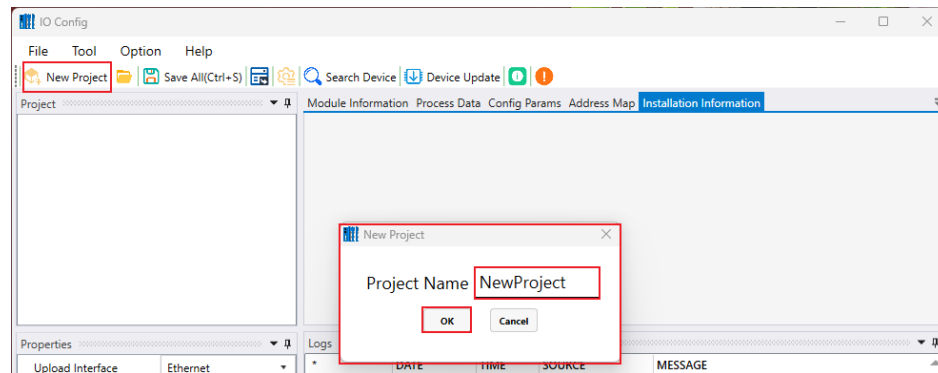
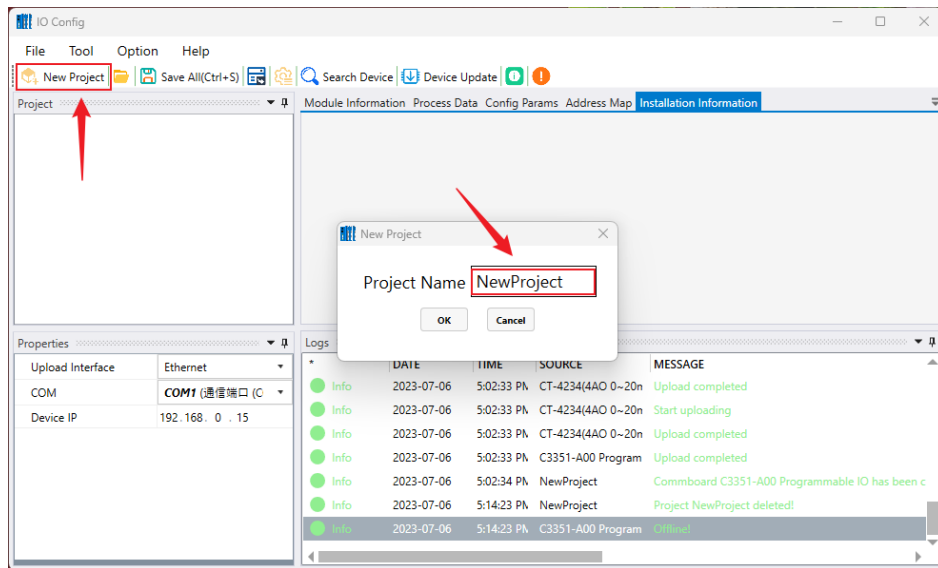
### 3.3.2 Communication Interface

The PLC program upload and download of the C3351 device, the upload and download of the I/O module, the modification of the mounted I/O module parameters, the online test, and the firmware upgrade all use the Ethernet interface as the communication interface.

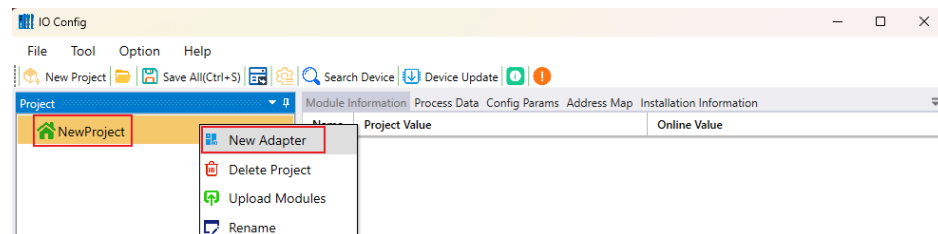
### 3.3.3 Module Selection

The customer could use the IO-Config software to select the I/O module offline, **the main purpose is to determine whether the selected I/O module needs to add an additional power module.** Of course, the user can also calculate whether to add a power module according to the internal bus power supply current of the adapter module and the power consumption of the I/O module itself. Export the corresponding files of adapter modules, PLC and I/O modules could be convenient for purchasing, drawing, etc.

Double-click the IO-Config shortcut icon to pop up the initial interface of the configuration software, and click the right button in the project directory bar → 'Project' → 'New Project' or click the shortcut key of 'New Project' or the menu bar 'File' → 'Project' → 'New Project', then enter the project name manually, and create a new project.



Right-click the newly created project in the project directory bar → 'New Adapter'.



Select 'C3351 Programmable I/O' in the pop-up interface, select 'Ethernet' for the interface, and click 'OK'.

**New Adapter**

Project Name  
NewProject

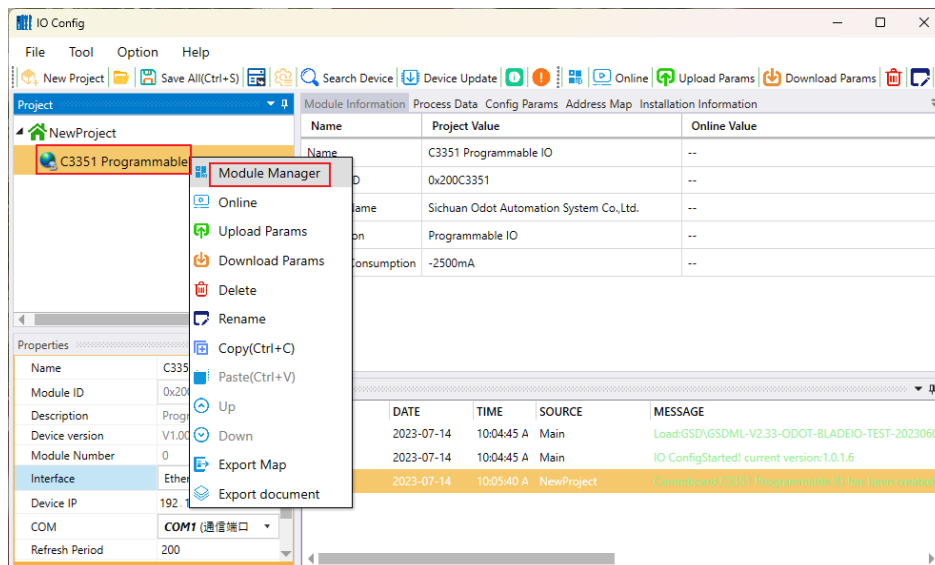
Name  
CN-8033 EtherCAT  
CN-8033-P EtherCAT  
CN-8034 EtherNet/IP  
CP-9131 Programmable IO  
CT-5331(CANopen Master)  
**C3351 Programmable IO**

Description  
Programmable IO

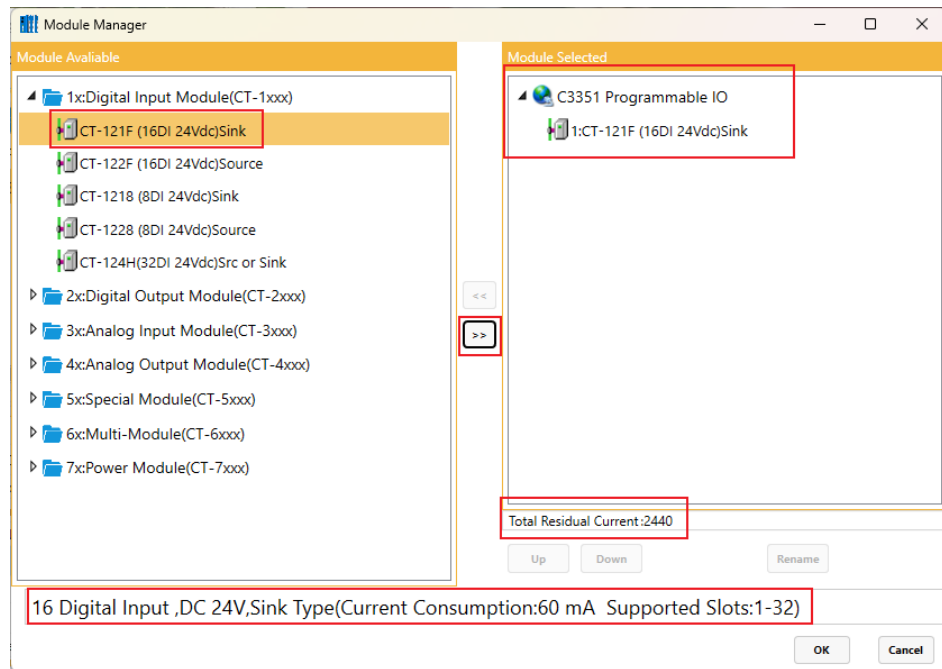
Communication Setting  
Interface: **Ethernet**  
COM: COM1 (通信端口)  
Device IP: 192.168.1.100

OK Cancel

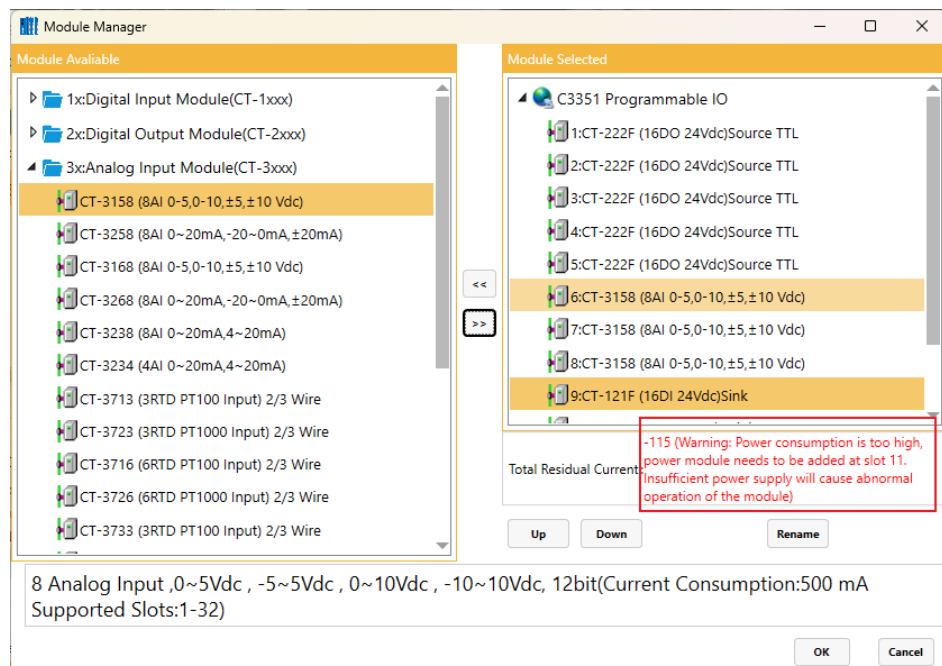
Right-click the 'C3351 Programmable I/O' device generated in the project bar, and click 'Module Manager'.



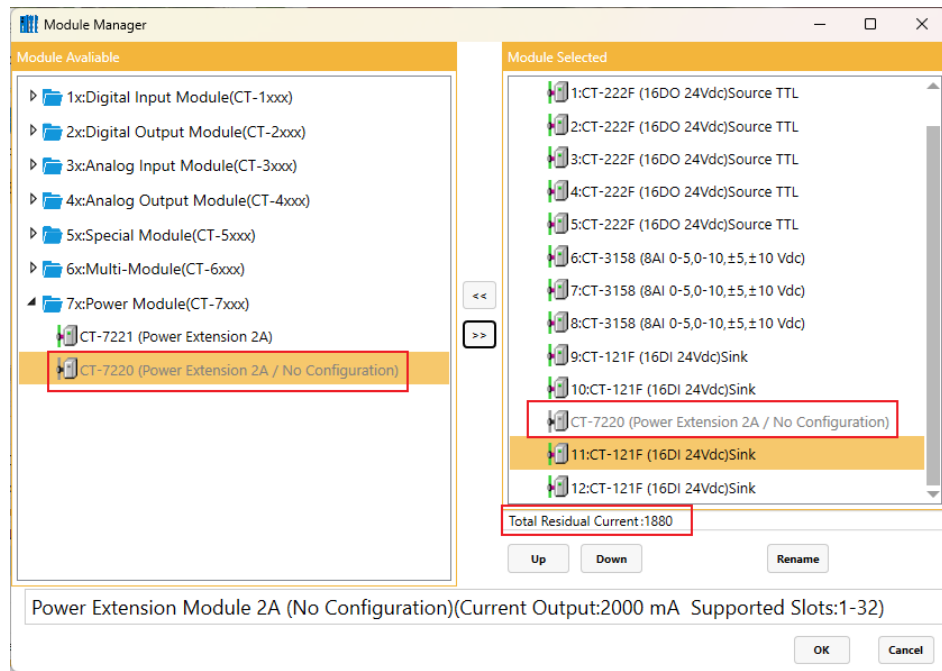
In the pop-up dialog box, please select the I/O module required by the user, and double-click the I/O module or select the module and click the two-way right arrow " >> ".



The power consumption of the selected I/O module will be displayed in the lower left corner. After configuration to the rear side, the total remaining current will be displayed on the lower right side. When the current is exhausted, the font will be displayed in red. At this time, a power module needs to be added.



In this example, it is indicated that the power module should be inserted into slot 11. After the power module is added, the total remaining current displayed on the lower side of the selected module will change to a black font, and other I/O modules can be added behind it.



When actually installing the module, it needs to add a power module (CT-7220) to slot 11. The CT-7220 power module does not require configuration and does not occupy any slot. So, it is grayed out in the screenshot.

**⚠ WARNING****ABNORMAL WORKING STATUS OF THE MODULE**

- In the configuration software, there is a configuration function to calculate the power consumption value and prompt the customer whether to add a power module.
- Insufficient current will cause the module channel to operate abnormally.
- The power module does not require configuration and does not occupy a slot. Just add it to the corresponding slot as needed.

**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.**

**⚠ AVERTISSEMENT****FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT**

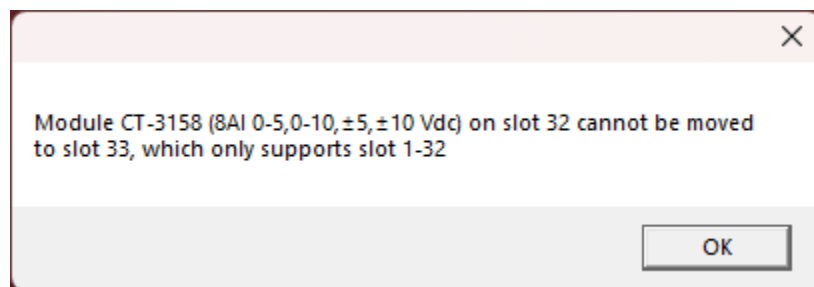
Dans le logiciel de configuration, il y a une fonction de configuration pour calculer la valeur de consommation d'énergie et inciter le client à ajouter un module d'alimentation.

Un courant insuffisant entraînera un fonctionnement anormal du canal du module.

Le module d'alimentation ne nécessite pas de configuration et n'occupe pas de fente. Il suffit de l'ajouter à la fente correspondante au besoin.

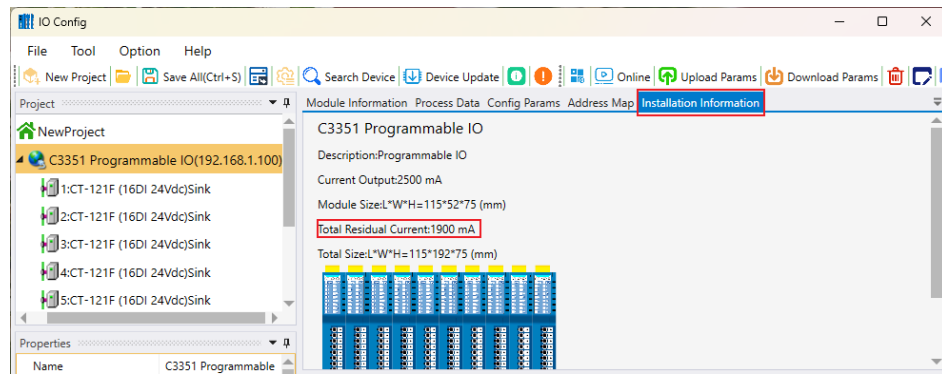
**Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.**

Continue to configure I/O modules for the C3351 device. When the number of modules exceeds 32, and the following window will pop up. It prompts that the C3351 device only supports slots 1-32. If the customer needs to use more I/O modules, and the customer can add another C3351 device or Modbus adapter to add a new station.

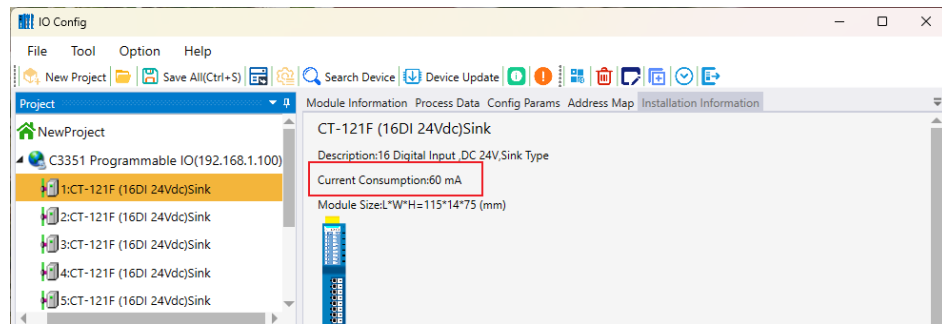


After the I/O module is added, it could click the OK button to automatically generate the I/O module in the project bar.

On the installation information interface on the right, it can see that the 'output current' of the C3351 device is 2500mA, and the current 'remaining total current' is 1900mA after adding the module.



It could click a single I/O module icon to pop up the hardware information of the corresponding module.



### 3.3.4 View Configuration Parameters

For C3351 devices and different I/O modules, it could click Configuration Parameters to view the default configuration parameters of the modules.

## NOTICE

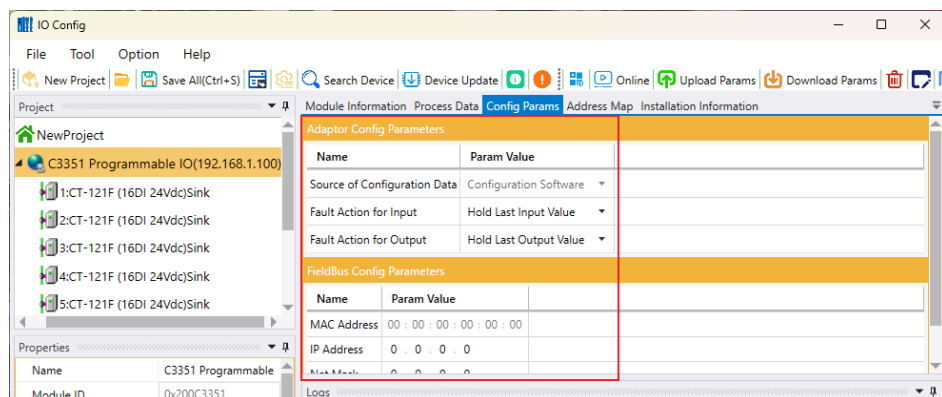
### DEVICE INOPERABLE

·It can only communicate with the IO-Config software in the PC through the Ethernet interface and view the parameters.

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

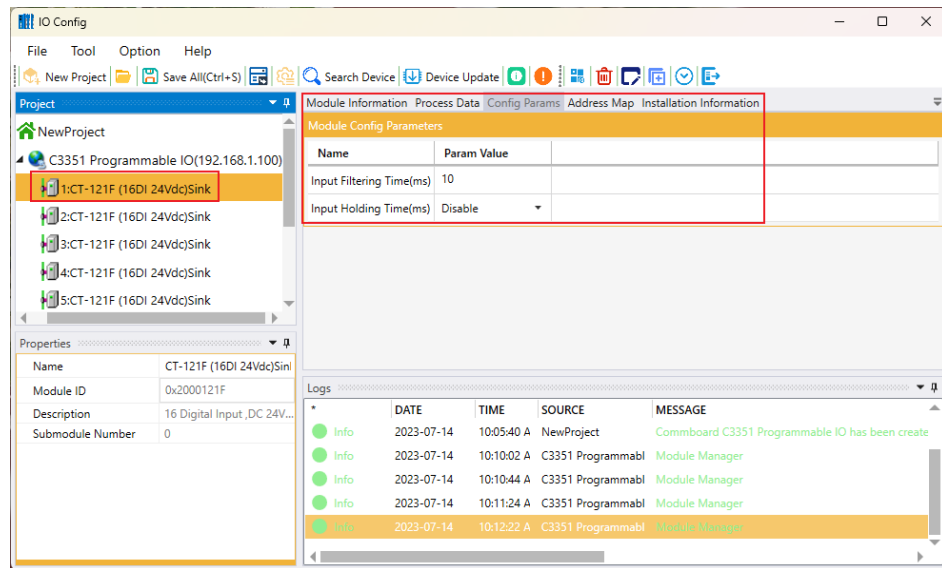
## C3351

Default parameter interface.



## I/O Module

Taking the 16DI module (CT-121F) as an example, the default parameter interface is as follows, and the configuration parameters of other I/O modules are checked in the same way. And the module default parameter will not be explained one by one.



### 3.3.5 Modify Configuration Parameters

The configuration parameters of C3351 and I/O module can be modified in the IO-Config software. After the modification of the I/O module parameters is completed, it needs to right-click the adapter module → download configuration. C3351 must use IO-Config software to modify parameters.

## NOTICE

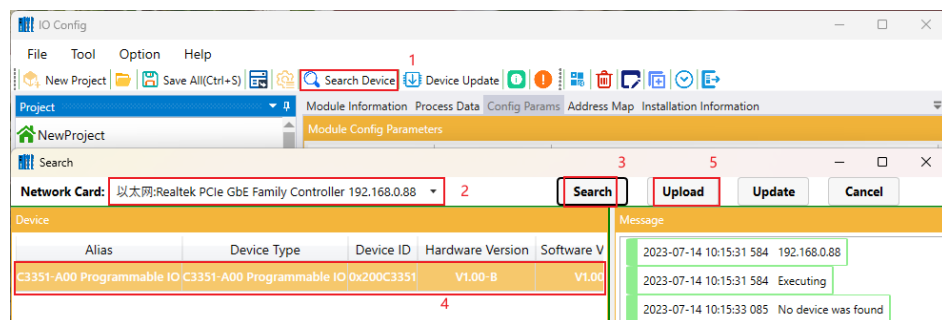
### DEVICE INOPERABLE

For the time being, C3351 can only modify parameters through the Ethernet interface.

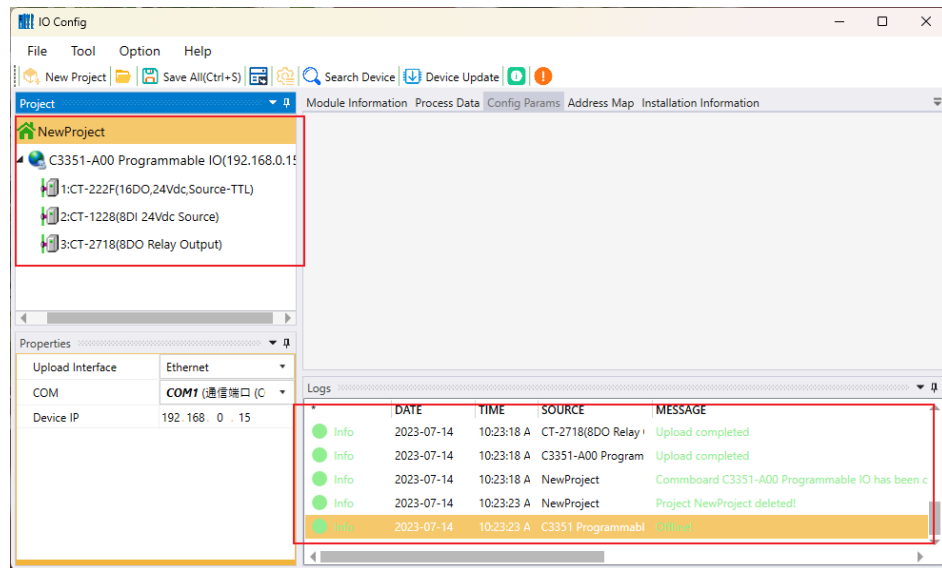
**Failure to follow the above instructions could result in damage to the equipment.**

Take C3351 PLC and CT-222F, CT-1228, CT-2718 and other modules as examples to demonstrate module parameter configuration.

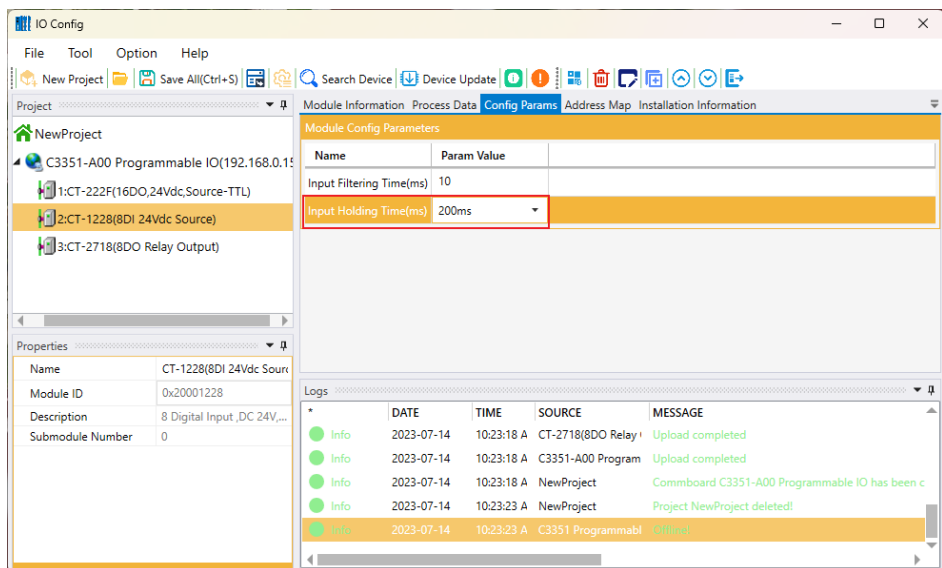
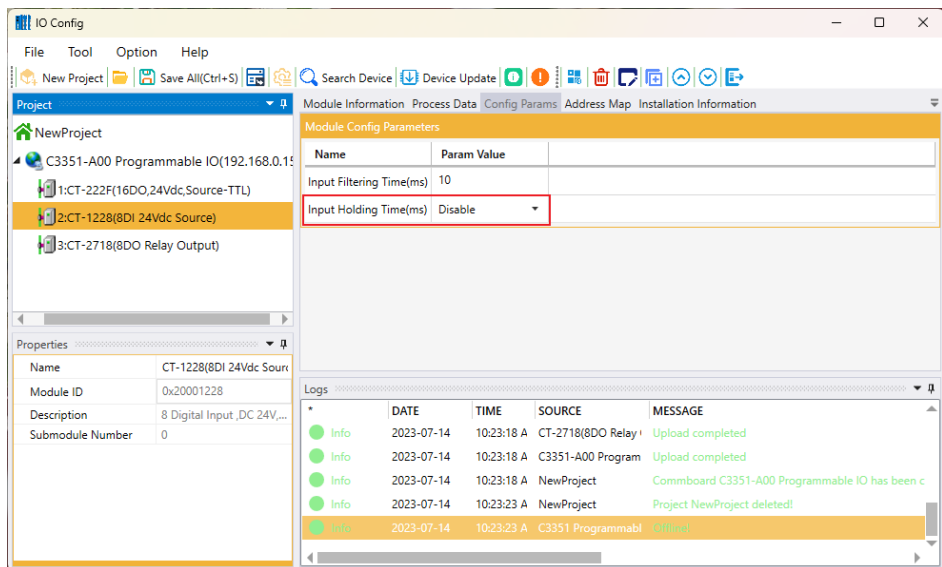
C3351 uses the Ethernet configuration interface, and uploads the device according to the steps in the figure below.



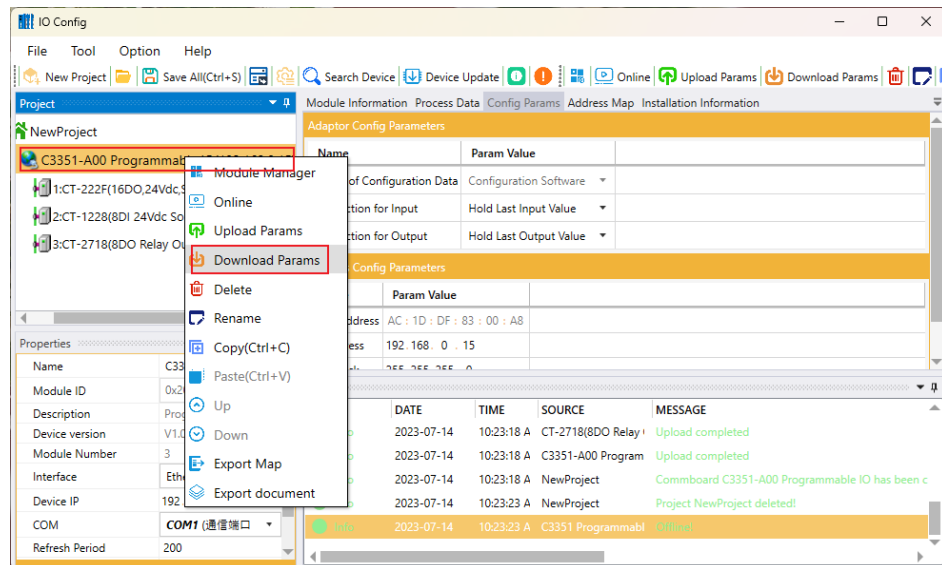
The software will automatically create the project, as shown in the figure below.



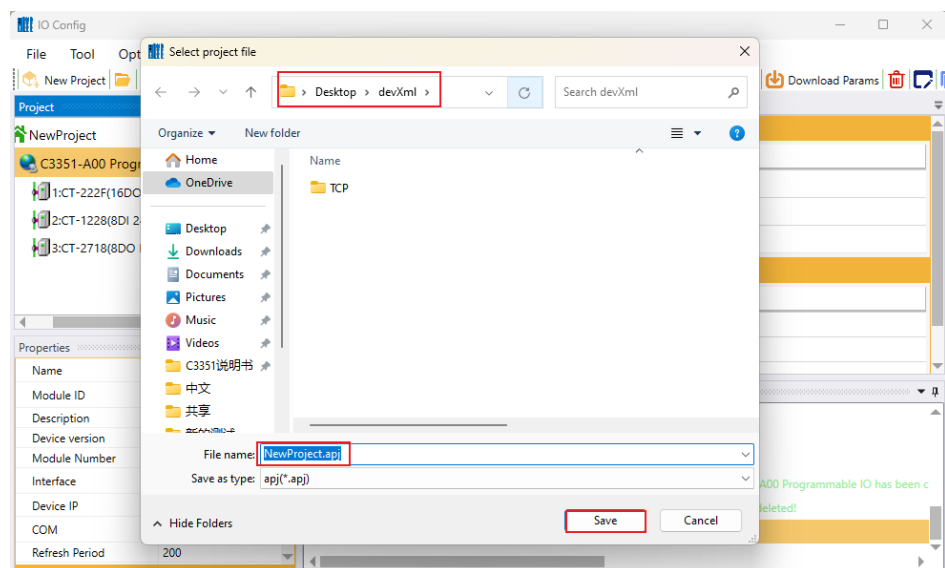
Then modify the parameters of the module.



After the setting is complete, right click on the C3351 device in the project directory bar → 'Download Params'. It can realize the modification of configuration parameters of C3351 equipment and I/O modules.



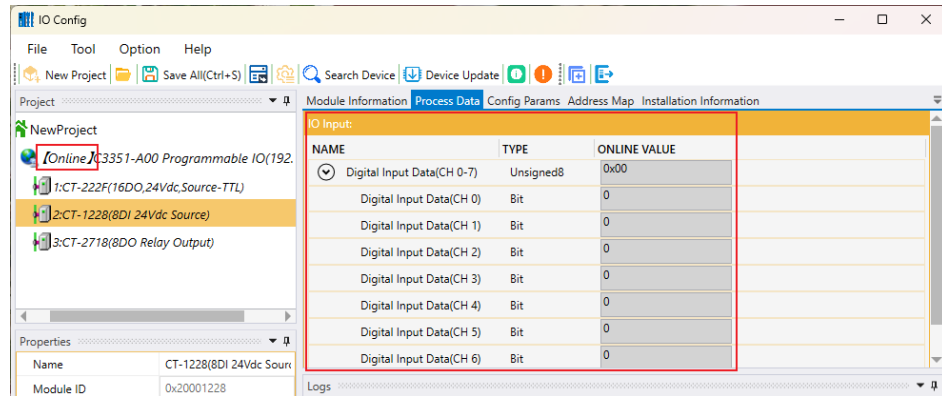
After modifying all module parameters, click the shortcut key 'Save All' or press the keyboard shortcut key 'Ctrl + S' to save the entire configuration project file.



### 3.3.6 Online Debugging

Refer to chapter [4.3.5 Modify Configuration Parameters](#), please search device and upload the project, then right click C3351 device and select Online. The real-time data of I/O modules can be monitored on the "Process Data" interface of the main window.

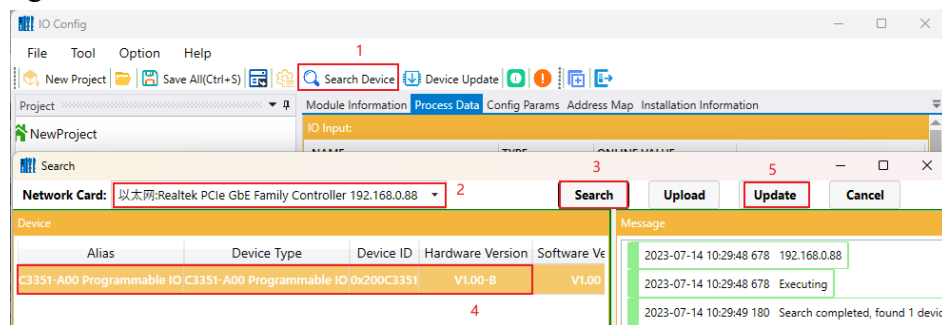
Example: The CT-1228 module in slot 2, as shown in the figure below, it can view the real-time changes of IO points.



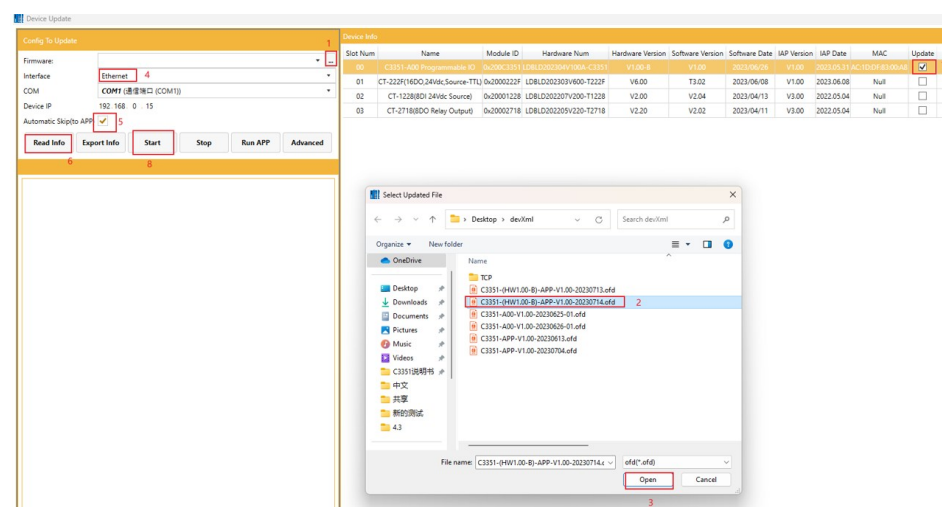
Note: For digital input modules, it could right-click the module and manually add a 'counting sub-module'. After the addition is complete, the configuration must be downloaded again.

### 3.3.7 Device Firmware Upgrade

Open the IO-Config configuration software and follow the steps in the figure below.



In the pop-up interface, it needs to set the upgrade file, and select the interface to set 'Ethernet', then 'Read Info', and selects the device to be upgraded, and sets 'Automatic Skip (to APP) ', then click 'Start ' and wait for the upgrade to complete.

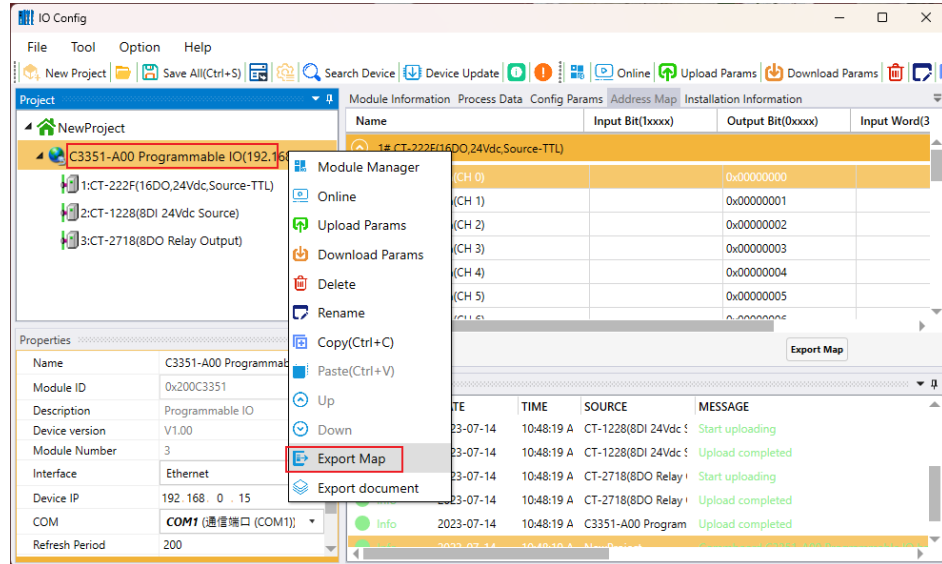


The above is the firmware upgrade process. Similarly, it can use this method to upgrade the equipped I/O module.

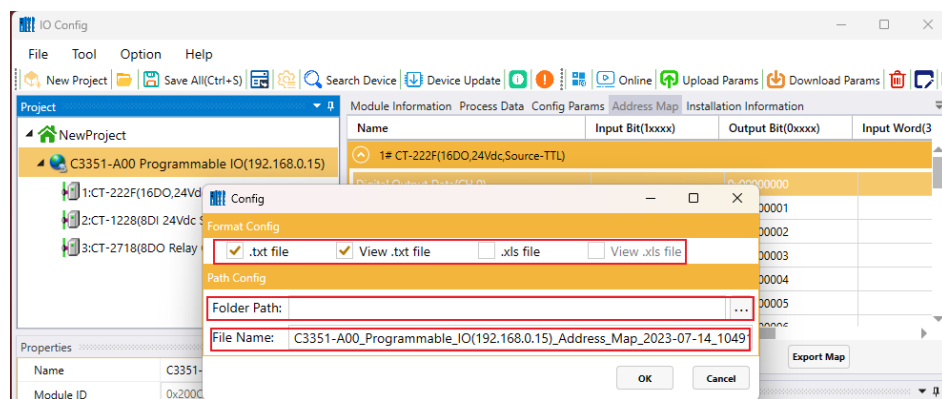
### 3.3.8 Data Export

#### Export Address Table

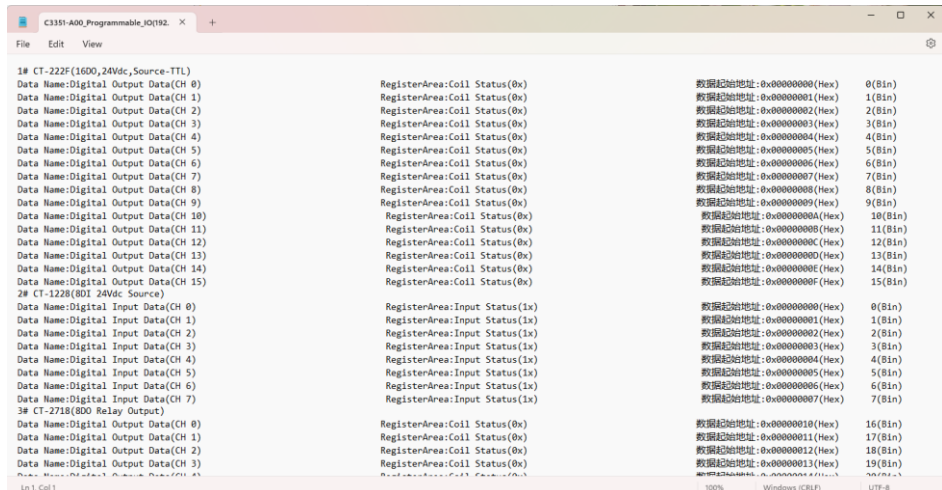
After the project is established, pls right-click on 'C3351 Device' and select 'Export Map'.



In the pop-up window, it could select the file format, output Folder Path, and File Name, and then click OK.

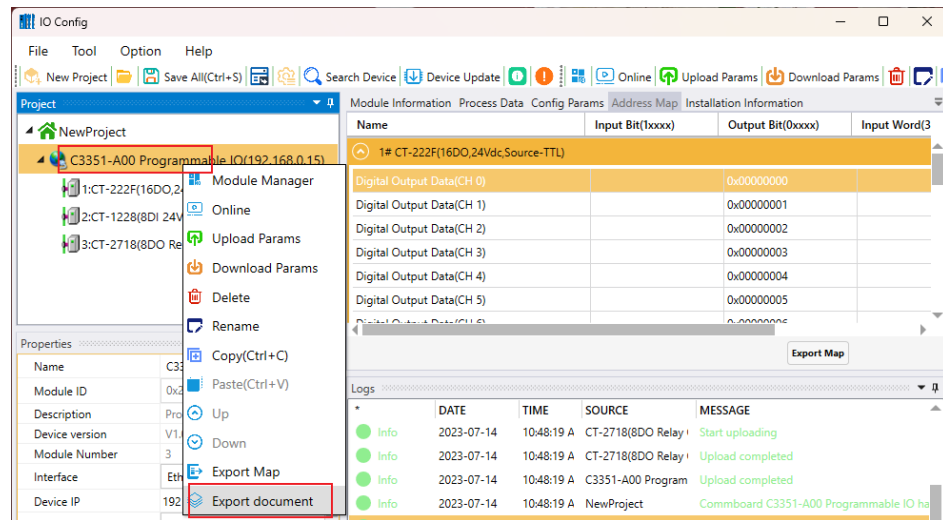


An example of the generated file is as follows:

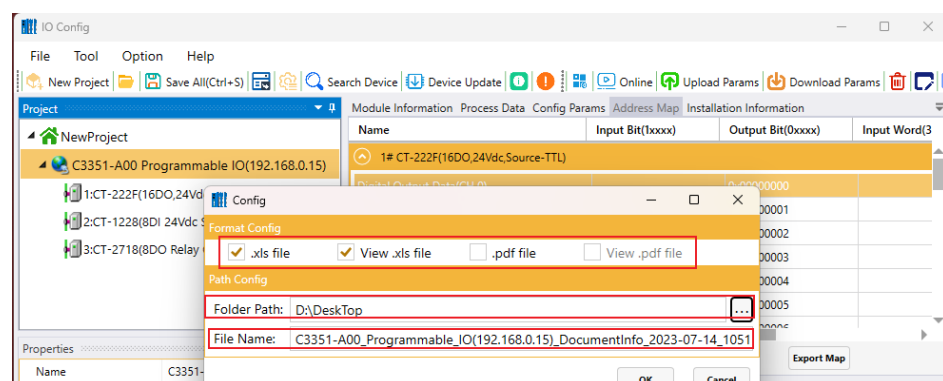


## Export Document

After the project is established, please right click on the C3351 device and select Export Document.



In the pop-up window, please select the file format, output Folder Path, and File Name, and then click OK.



The example of the generated file is as follows, and a total of 5 aspects of information are generated, including the overview of the submodules, the statistics of the number of submodules, the schematic diagram of the submodules, the address table, and the parameter settings of the submodules:

| 1 Node Overview                         |                                |           |           |      |                   |        |
|-----------------------------------------|--------------------------------|-----------|-----------|------|-------------------|--------|
| Node name: C3351-A00 Programmable IO    |                                |           |           |      |                   |        |
| Adapter                                 | Module                         | Submodule | Order Num | Slot | Des               |        |
| C3351-A00 Programmable IO(192.168.0.15) | CT-222F(16DO,24Vdc,Source-TTL) |           | C3351     | 0-0  | 16 Digital Output | Progra |
|                                         | CT-1228(8DI,24Vdc,Source)      |           | CT-222F   | 1-0  | 8 Digital Input   | D      |
|                                         | CT-2718(8DO,Relay Output)      |           | CT-1228   | 2-0  | 8 Digital Output  | R      |
|                                         |                                |           | CT-2718   | 3-0  |                   |        |

## 4 Programming Software (CODESYS)

### 4.1 Programming software installation

Please go to CODESYS official website to download the Codesys V3.5.19.70 or install it according to the software installation package provided by our company. Here, the SP19 version is used as an example to install and demonstrate.

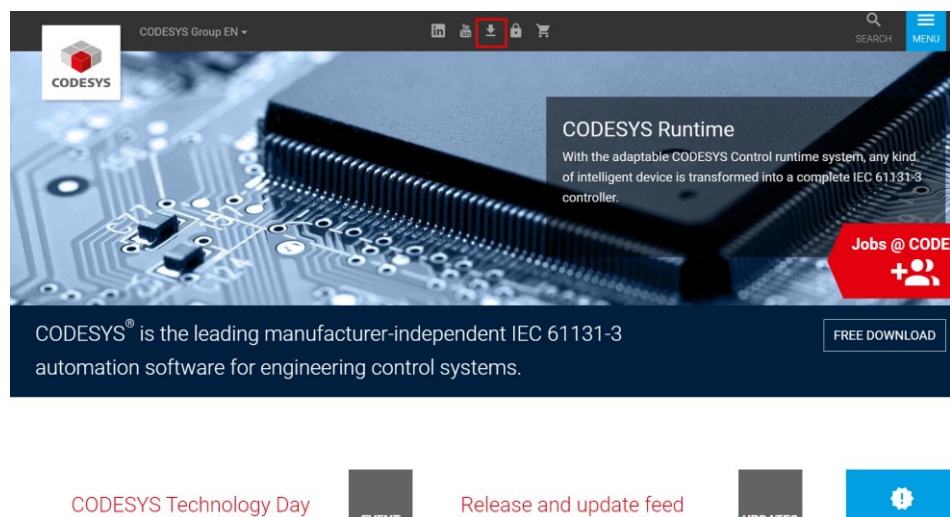
Please log in <https://www.codesys.com/>, then find the download area and click:

#### Attention

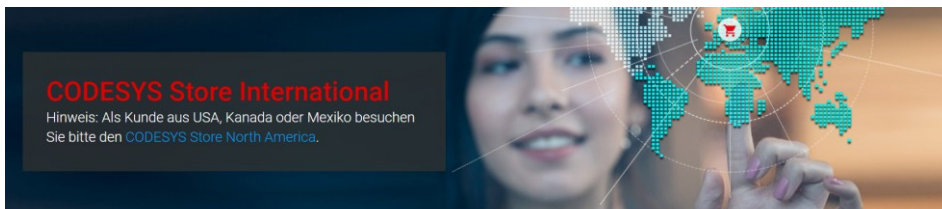
##### Device inoperable

This website is not the website of our company, and our company has nothing to do with the loss caused by visiting this website.

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



Then enter the download page, <https://store.codesys.com/de/>, then select the appropriate installation package to download according to the configuration of the computer:



**CODESYS Store International**  
Hinweis: Als Kunde aus USA, Kanada oder Mexiko besuchen Sie bitte den [CODESYS Store North America](#).

**CODESYS - die führende herstellerunabhängige IEC-61131-3-Automatisierungssoftware.**



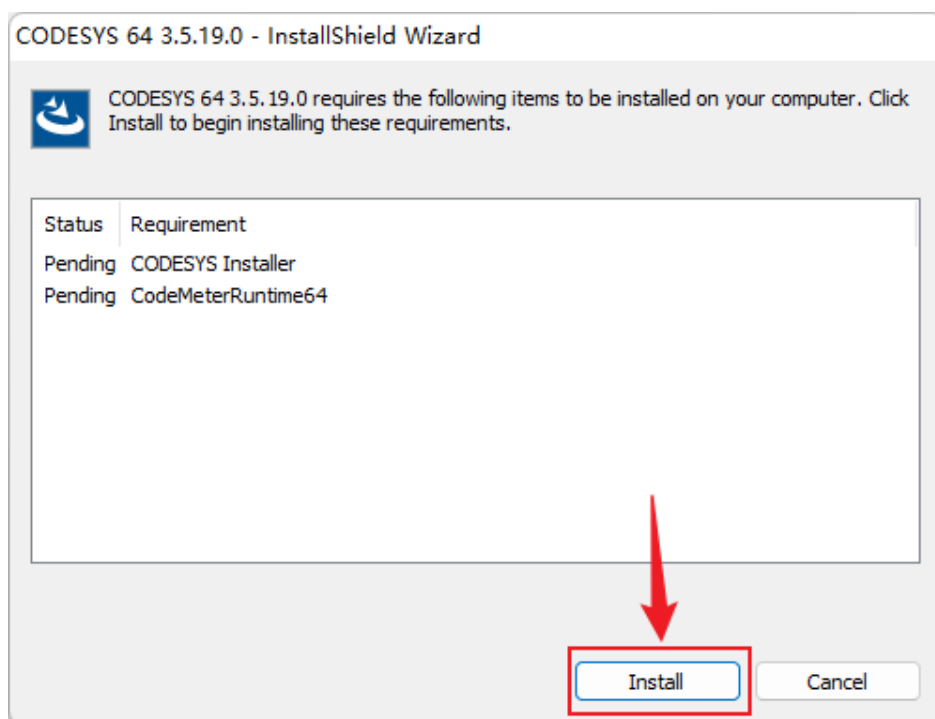
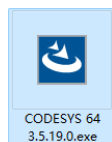
**CODESYS Development System V3**

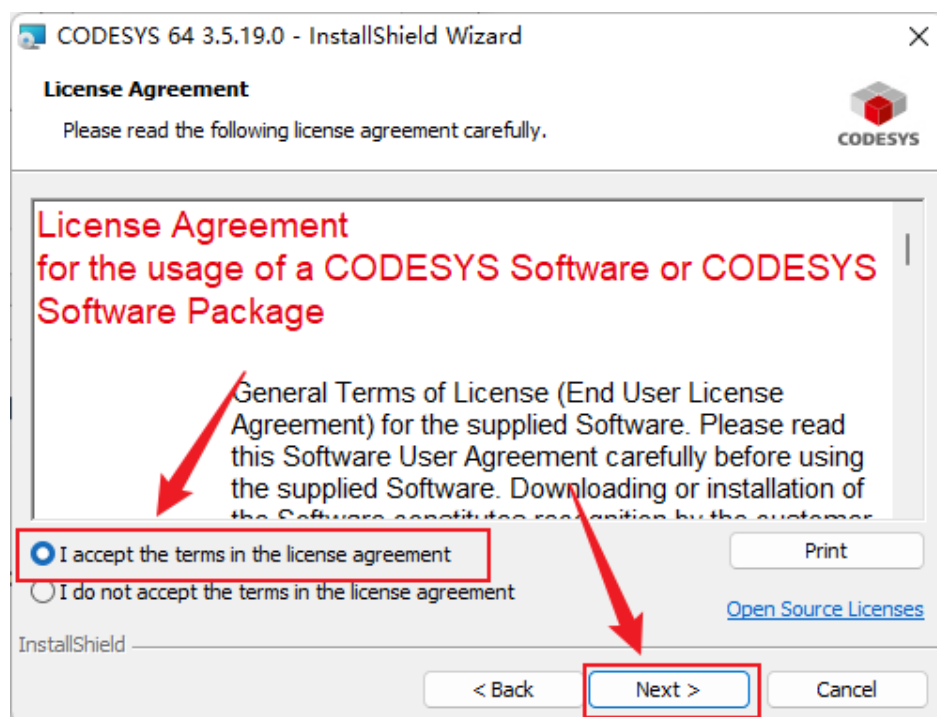
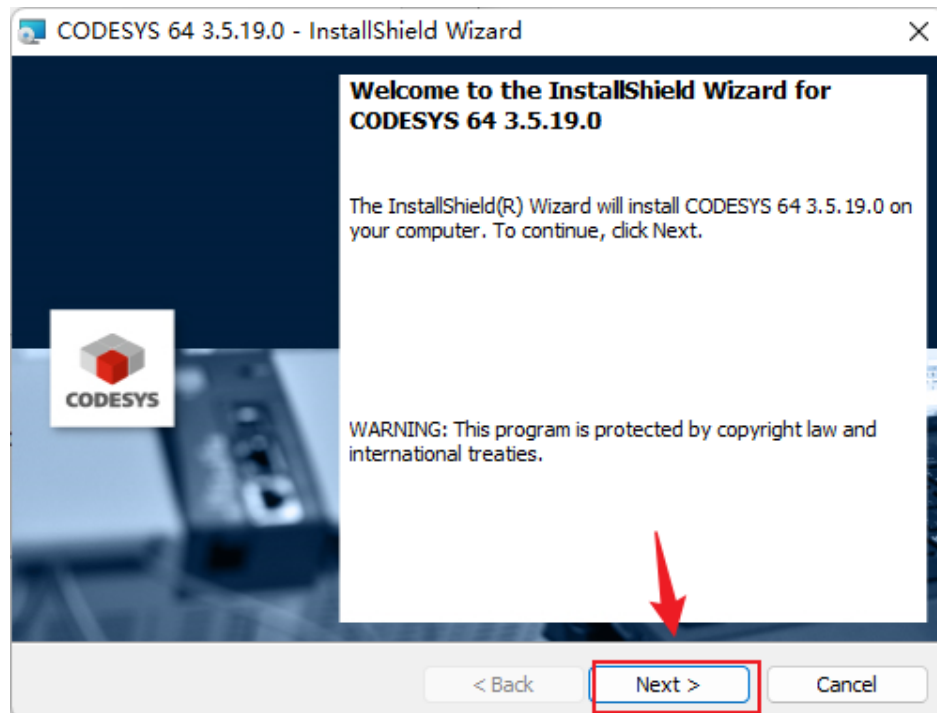
[Download 32 Bit](#) [Download 64 Bit](#)

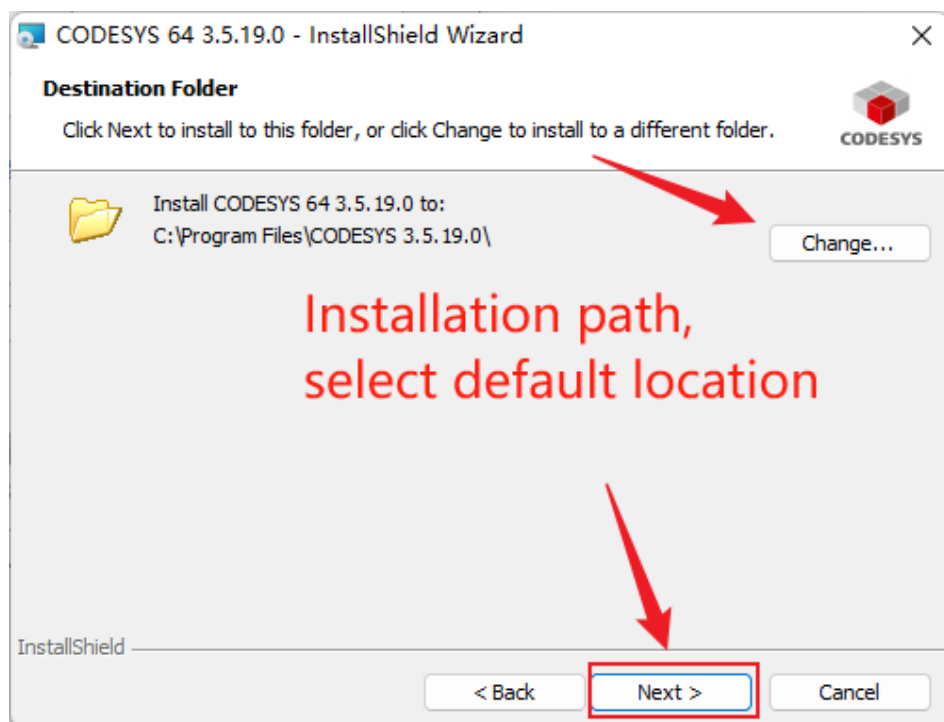
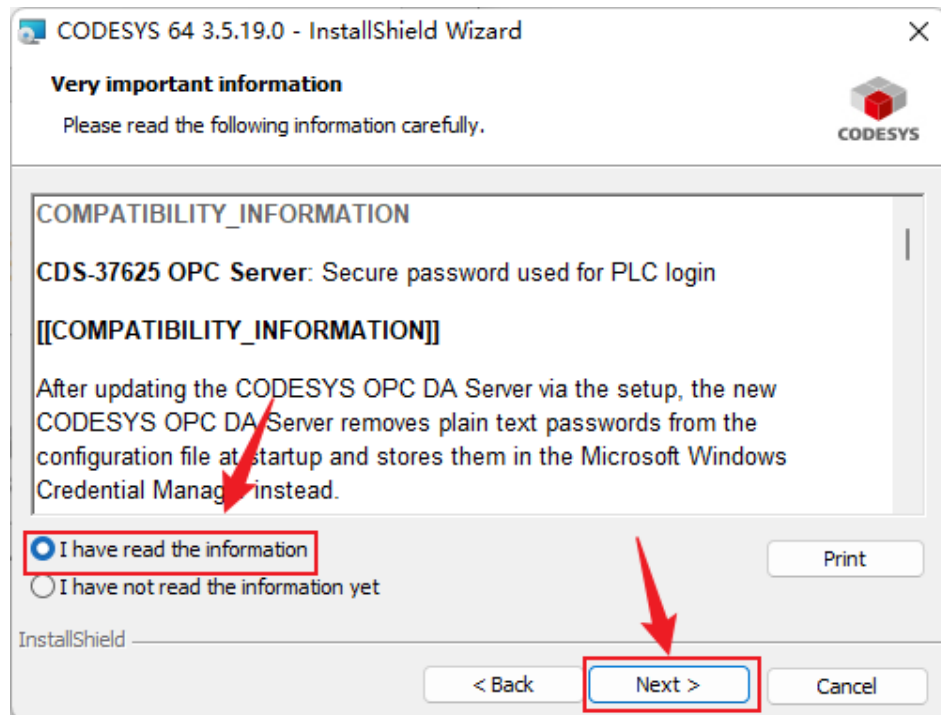
Das CODESYS Development System ist das IEC 61131-3 Programmierwerkzeug für die industrielle Steuerungs- und Automatisierungstechnik, verfügbar in einer 32-Bit und einer 64-Bit-Version.

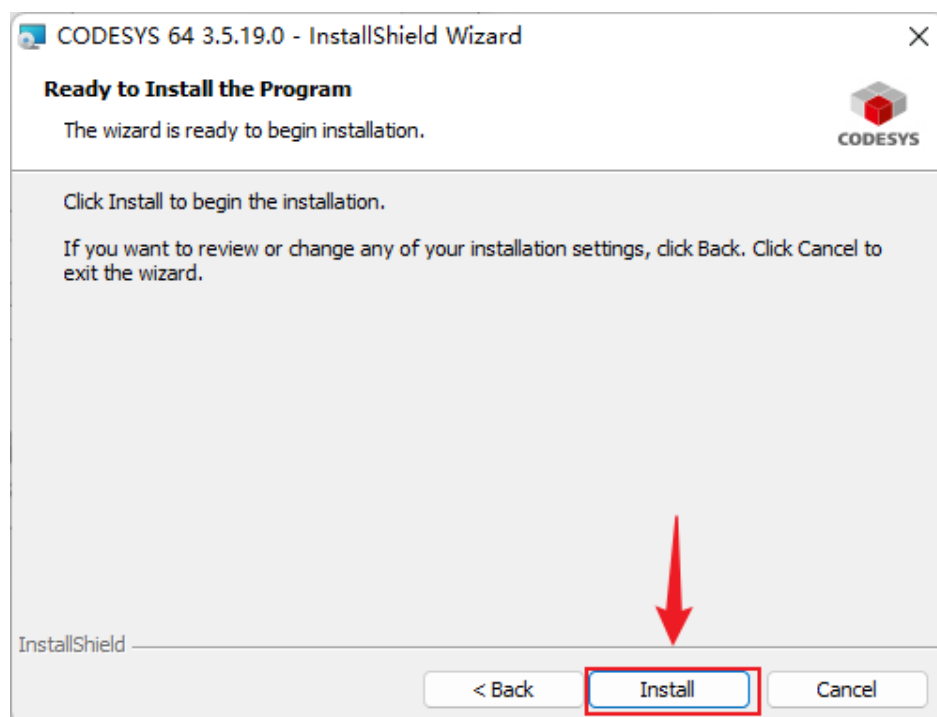
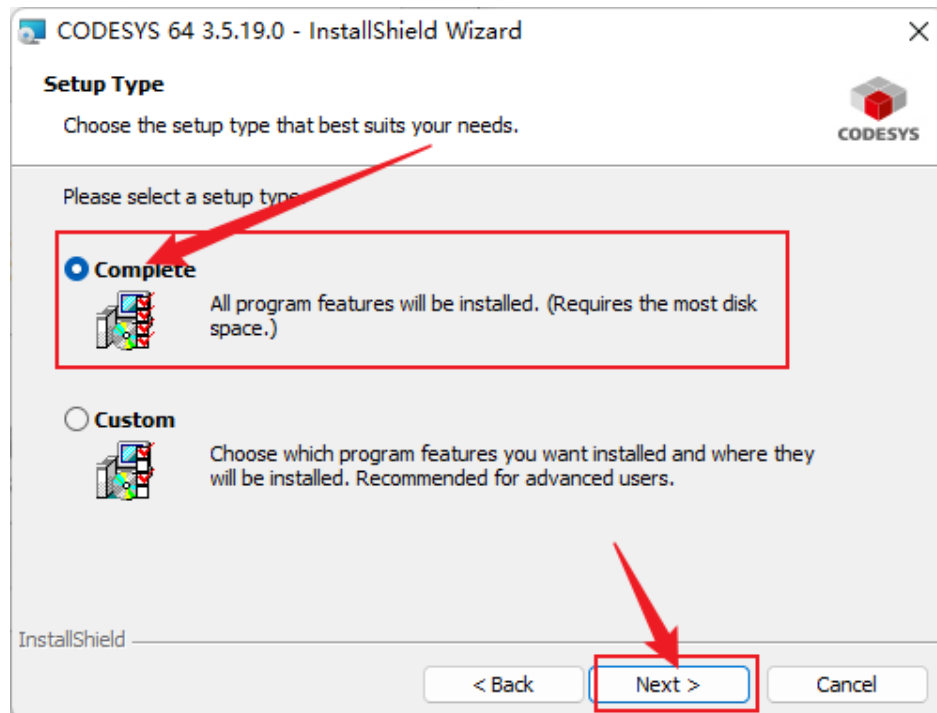
[Details](#)

Double-click after getting the installation package, and follow the steps in the pop-up window:





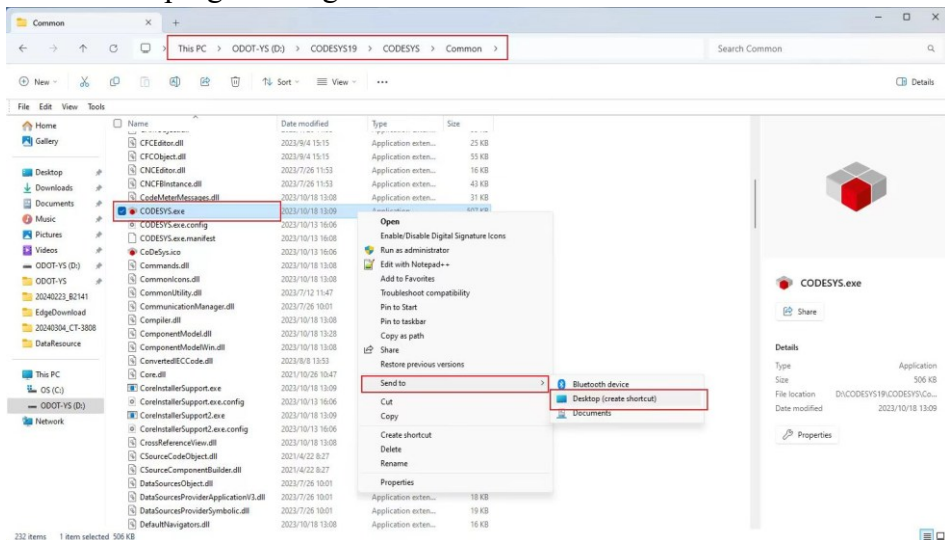




Just wait for the installation to be completed.

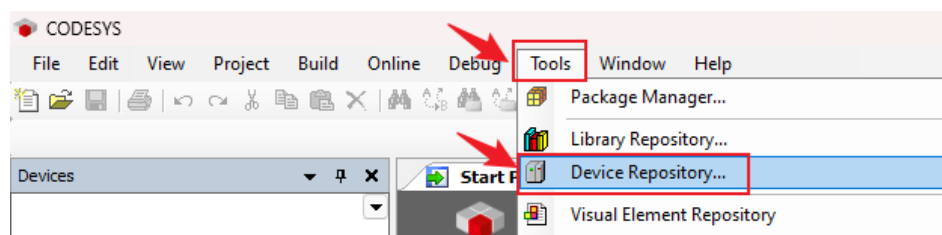
## 4.2 CODESYS Software Using

Find CODESYS.exe in the installation location, right-click to create a new desktop shortcut, and double-click on the desktop to run the CODESYS programming software.

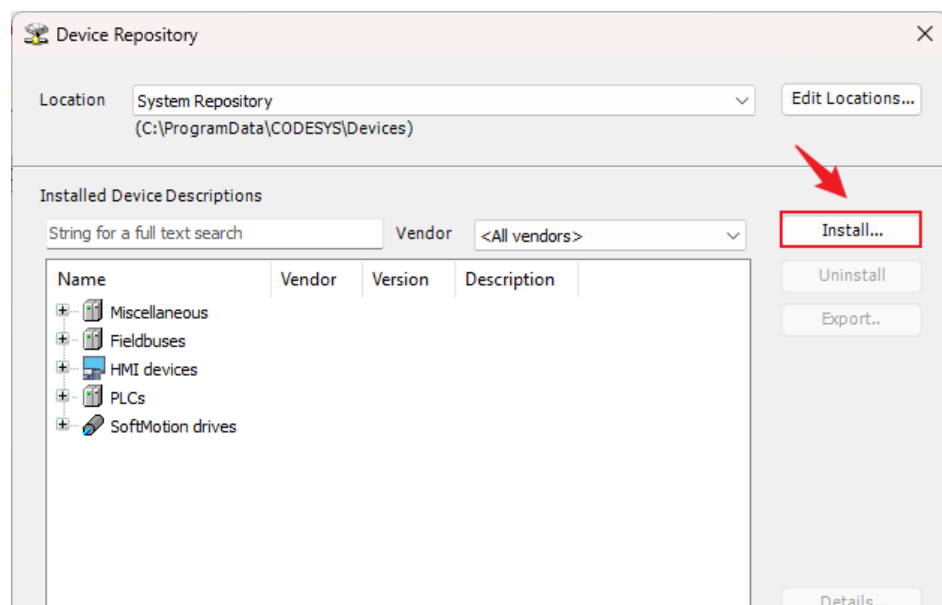


### 4.2.1 Create a project

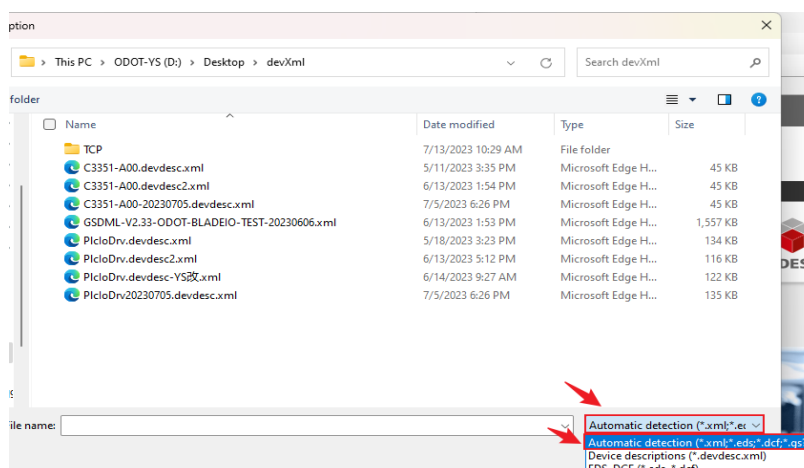
Firstly, open the CODESYS software and select 'Tools' - 'Device Storage Library' in the menu bar.



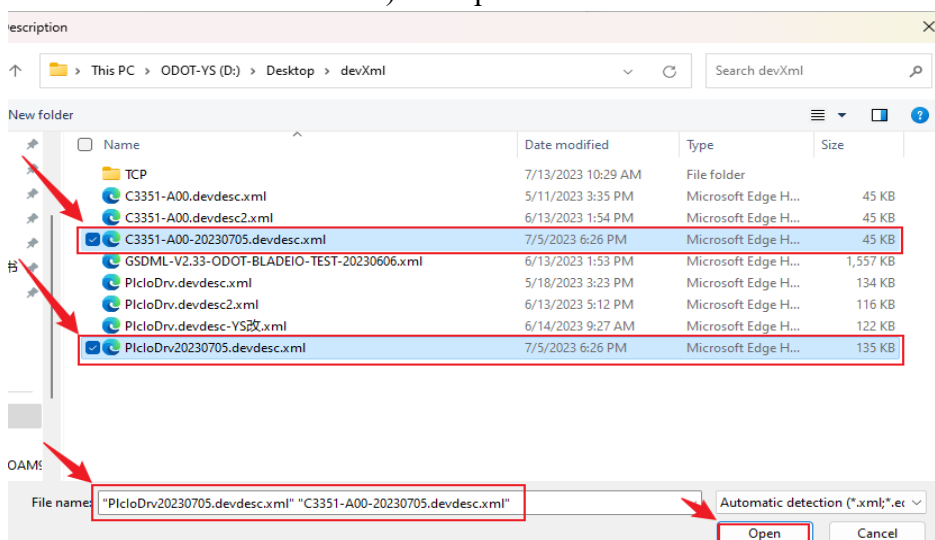
Select Install on the pop-up page.



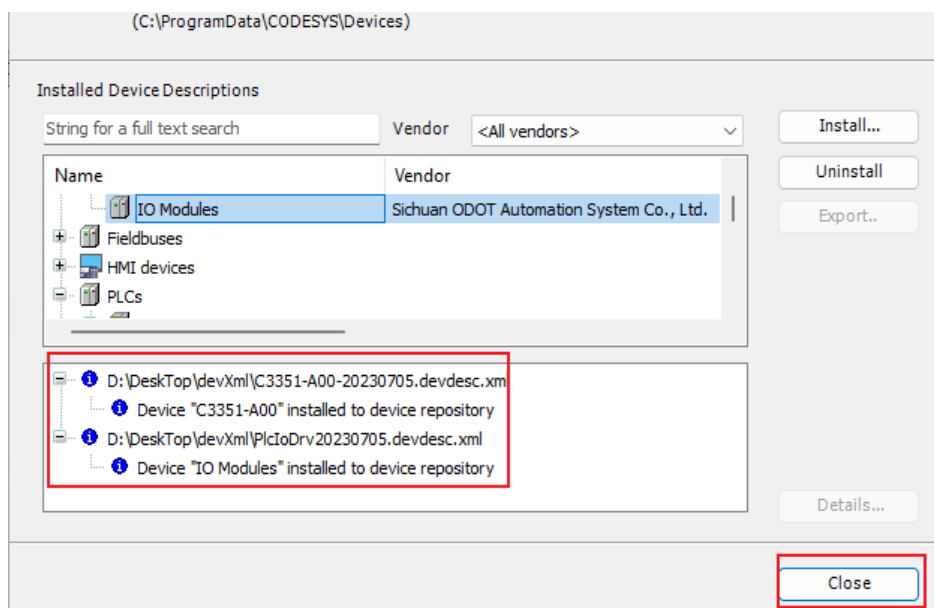
Select Automatically detect file types in the pop-up page.



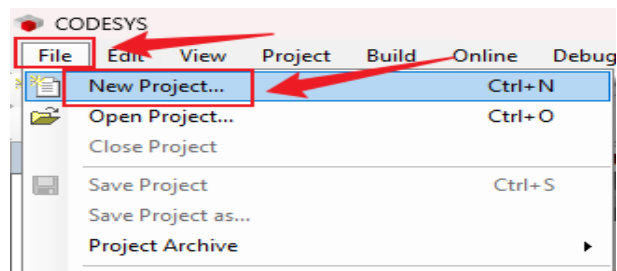
Select (multiple choice) the xml file provided by our company (including C3351 device and IO module) and open it



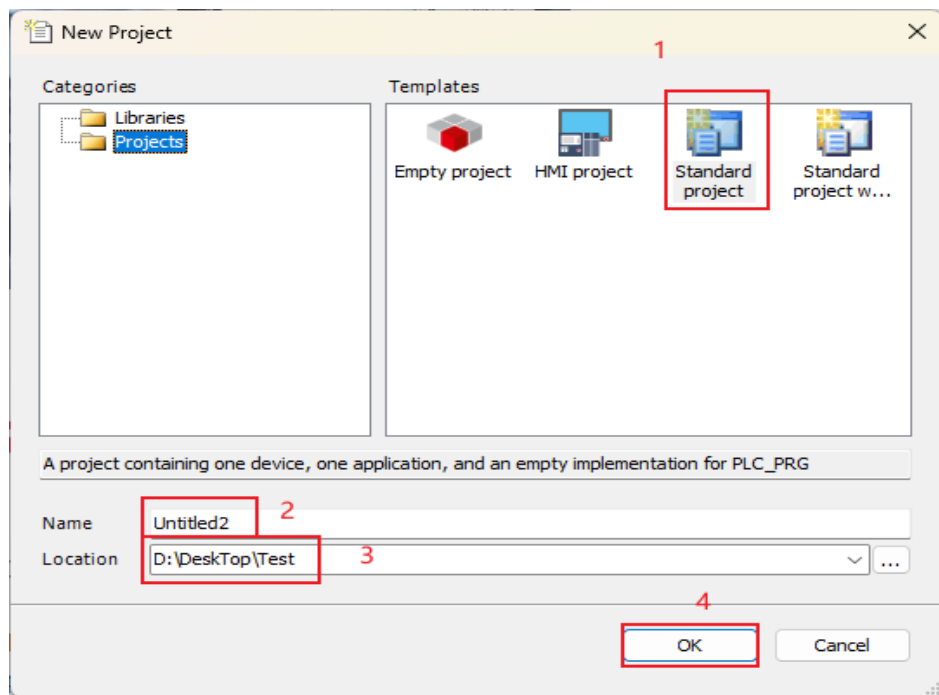
Close the device repository interface when done.



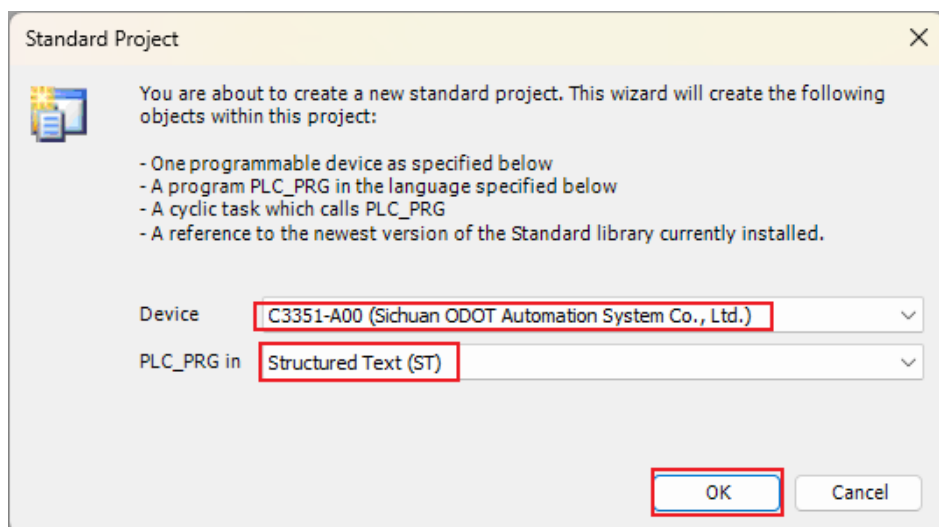
Select 'File' → 'New Project' from the menu bar.



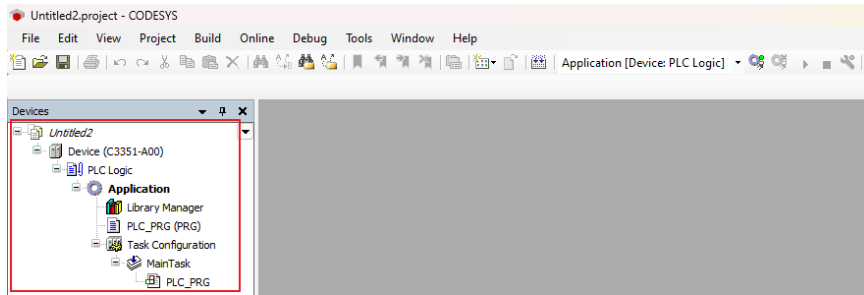
Select Standard Project in the pop-up menu, name it and select a storage location, and then click OK.



Then the device creation page will pop up automatically, select the C3351 device and confirm.



Wait for a while, and the software will automatically create a standard project file tree for the user.



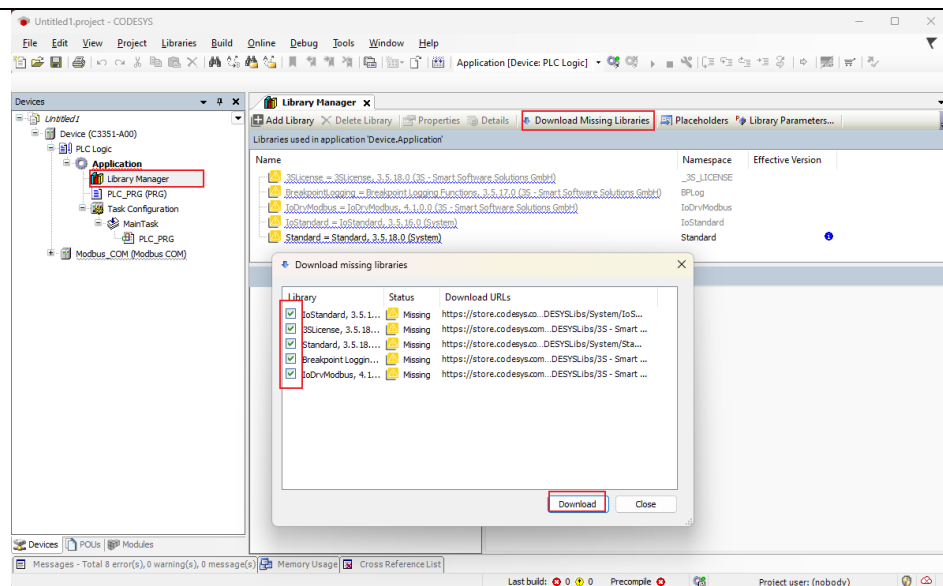
So far, the project has been established.

## Attention

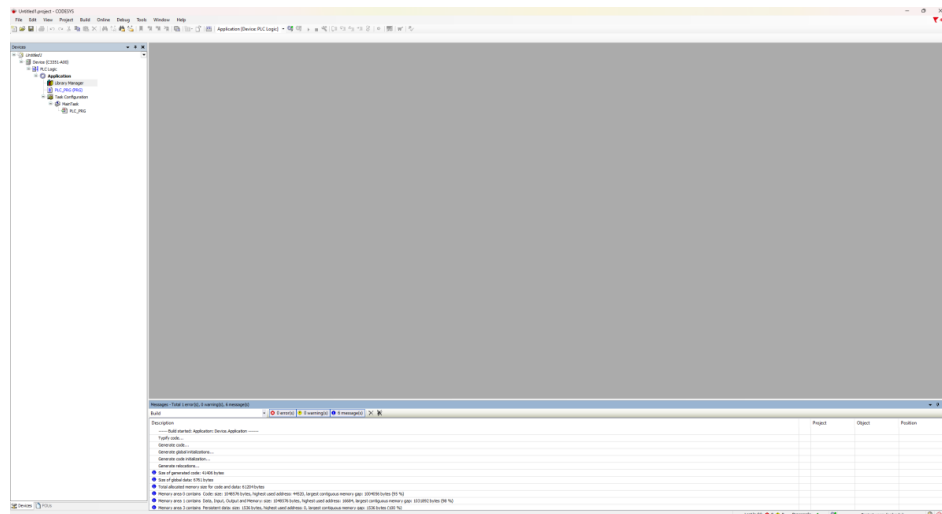
### DEVICE INOPERABLE

The first time when install CODESYS and build a project to compile, it will find many missing items. The solution is to open the library manager, then click Download the missing library-select all-start download, wait for the download to complete, and compile again.

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



## 4.2.2 CODESYS Software Interface



For detailed function introduction, please refer to "The BOOK of CODESYS"., <https://us.store.codesys.com/the-book-of-codesys.html>.

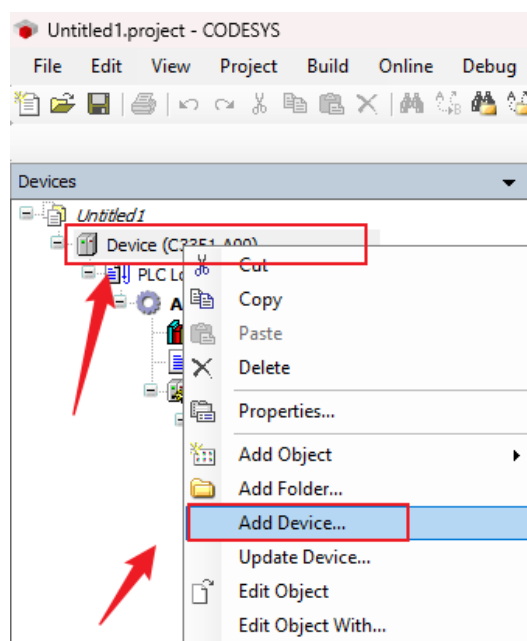
## NOTICE

### DEVICE INOPERABLE

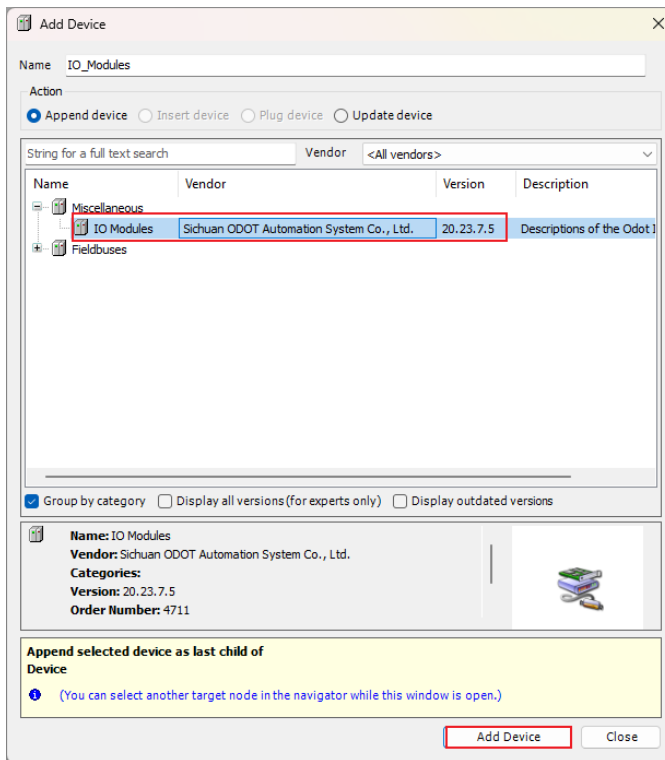
This basic programming and application guide are not written by our company.  
**Failure to follow the above instructions could result in damage to the equipment.**

## 4.2.3 Configure the IO module

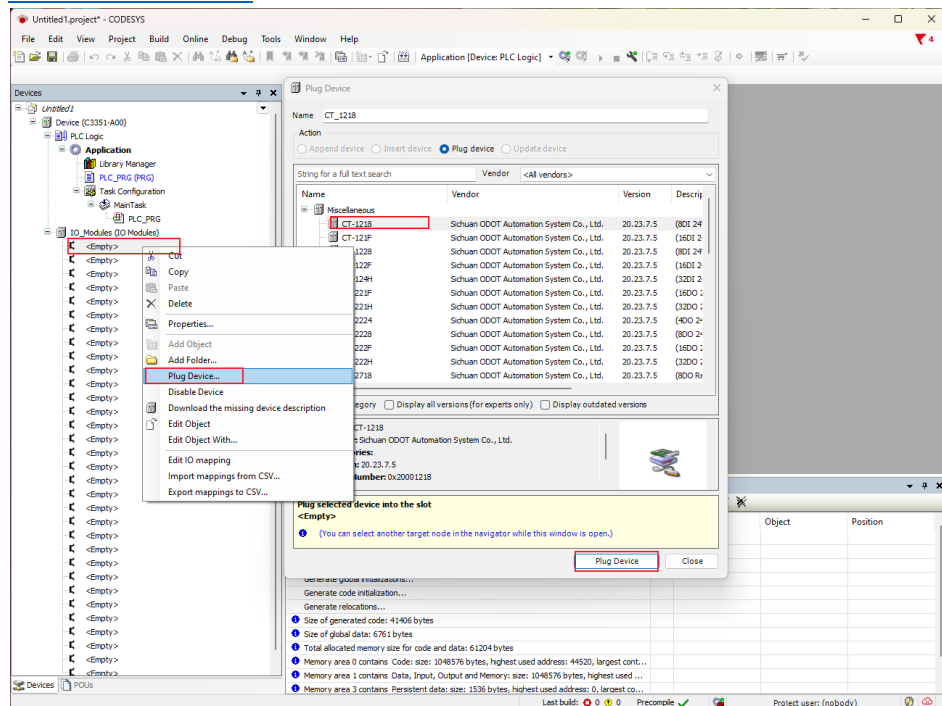
Firstly, after the project is established, right-click the C3351 device icon → 'Add Device'.



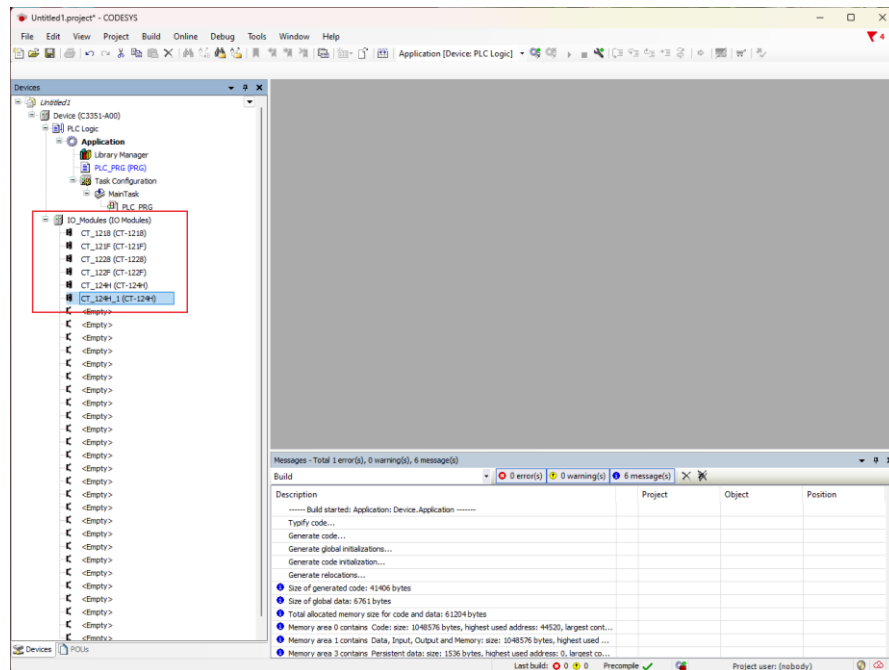
Find the IO-Modules device provided by our company in the pop-up window, select it and click 'Add Device', you don't need to close this page after adding.



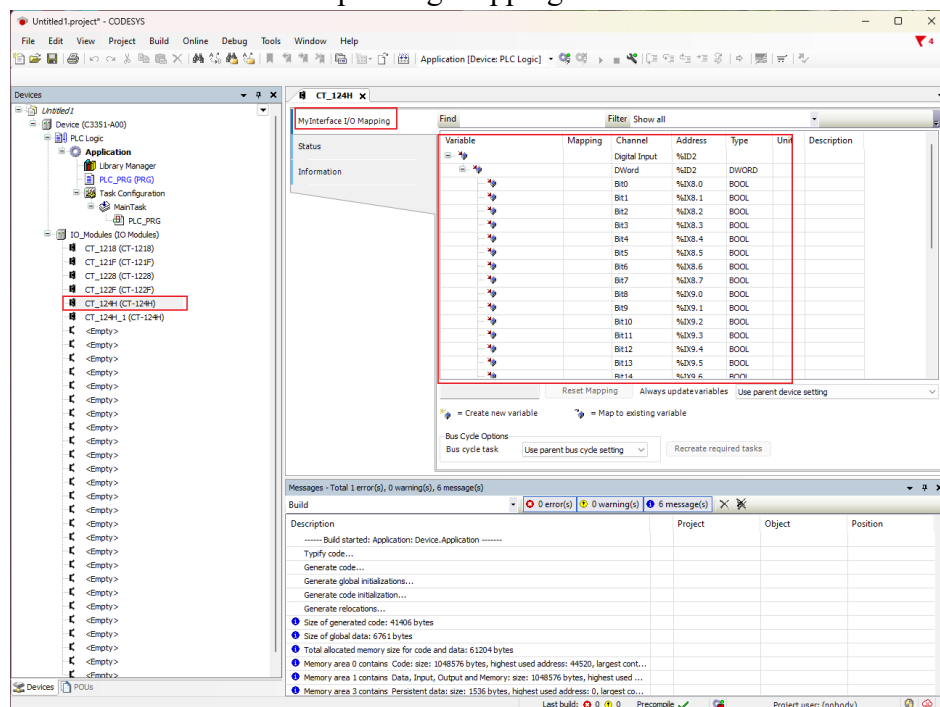
Then select the 'empty' slot, right-click and select 'Insert Device', and insert the required module. For the function of the module, refer to the [1.7 Selection Table](#).



The figure below is the view after inserting the module:



Double-click the corresponding module to view the corresponding I/O address and set the corresponding mapping relation.

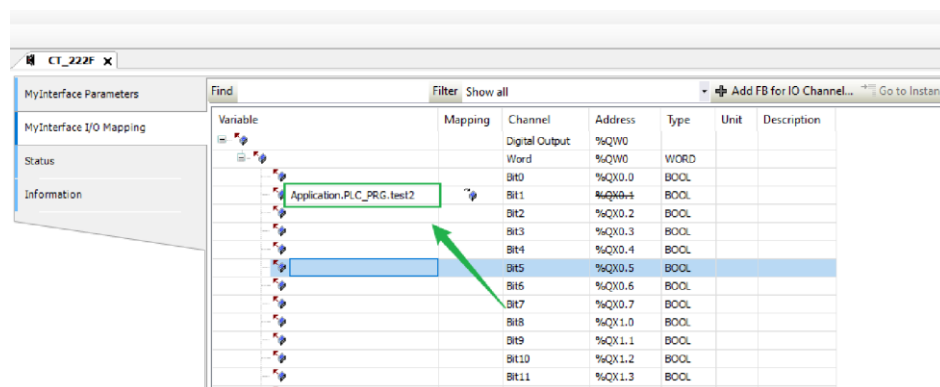
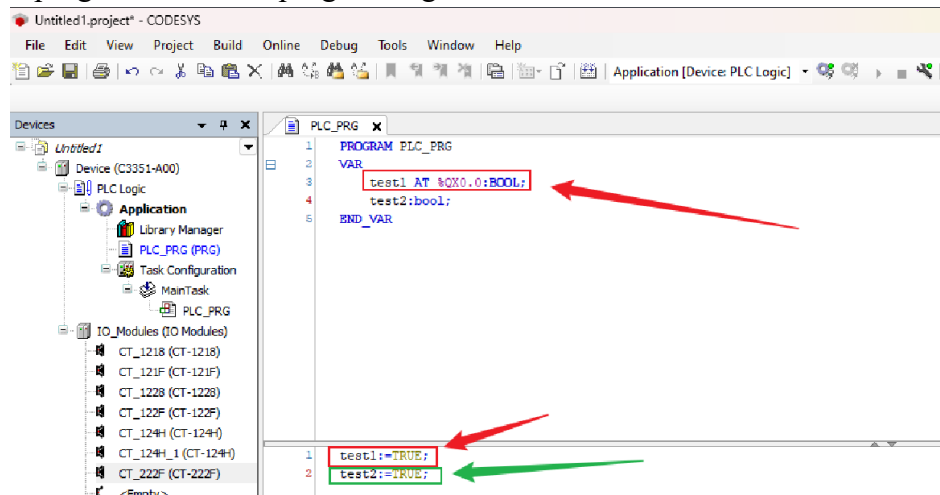


## 4.3 Programming

This chapter is recommended to try after referring to "The BOOK of CODESYS", <https://us.store.codesys.com/the-book-of-codesys.html>.

ODOT-C3351 supports five programming languages including Instruction List (IL), Ladder Diagram (LD), Structured Text (ST), Function Block Diagram (CFC/FBD), and Sequential Function Chart (SFC).

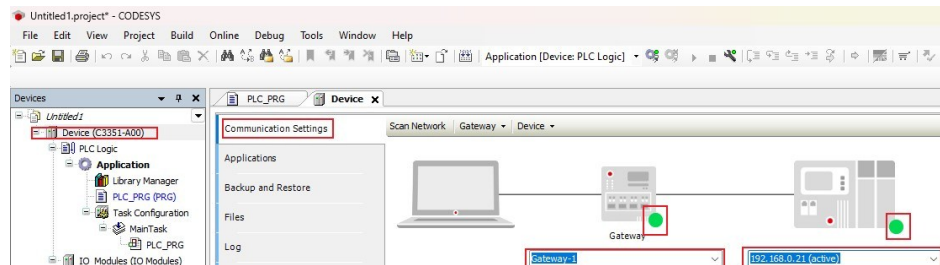
In the project management tree, double-click the PLC\_PRG (PRG) program under the program organization unit.



It could make a simple output variable assignment program, and observe the changes of the indicator lights of the C3351 physical equipment. Connect QX0.0 and QX0.1 of BT-221F to the variables test1 and test2 in two ways. The first way is the way marked in green in the above picture, and the second way is the way marked in red in the picture above. Two ways can associate channels with variables.

## 4.4 Download, Monitor

Double-click the device icon, enter the IP address of the C3351 device in the "Communication Settings" and press Enter, wait for the device to be activated successfully. For the IP address, refer to [4.3.4 view the configuration parameters](#) the IP address of the C3351 device obtained from.



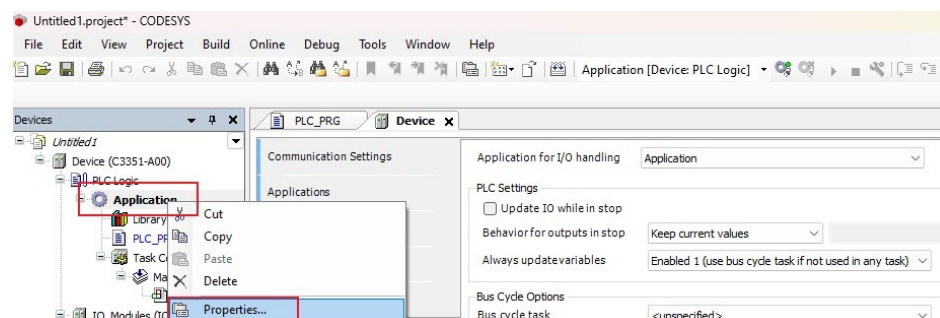
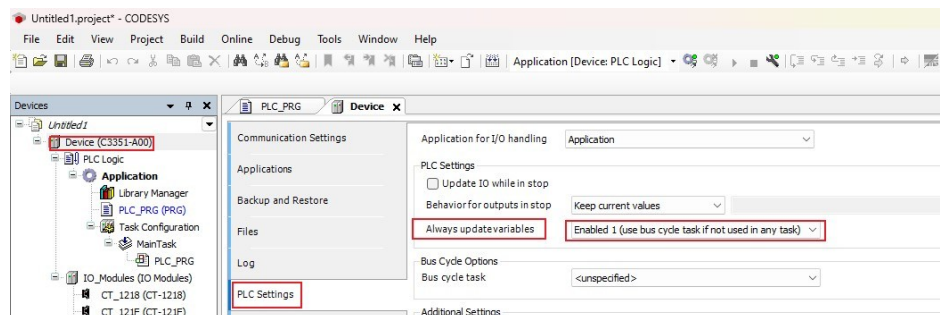
After activation, log in to the device and run the program. At this point, you can observe the change of the indicator light of the IO device. You can see that the indicator light of the first and second channels of BT-221F is lit, indicating that the program is successfully written.

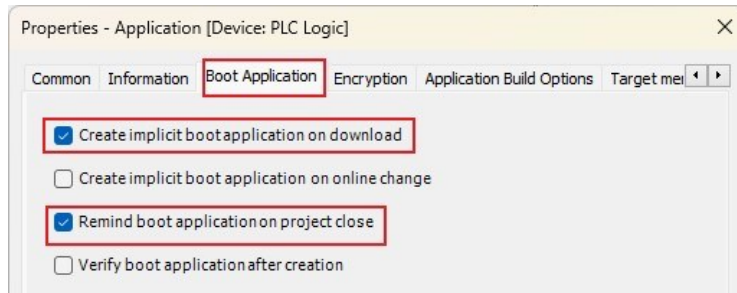
## NOTICE

### DEVICE INOPERABLE

- To observe the current value of the I/O map in real time, it must set 'always update variables' to enable 1 in the PLC settings of the C3351 device.
- To run the PLC program as soon as the power is turned on, create an implicit start application in the Application-properties.

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

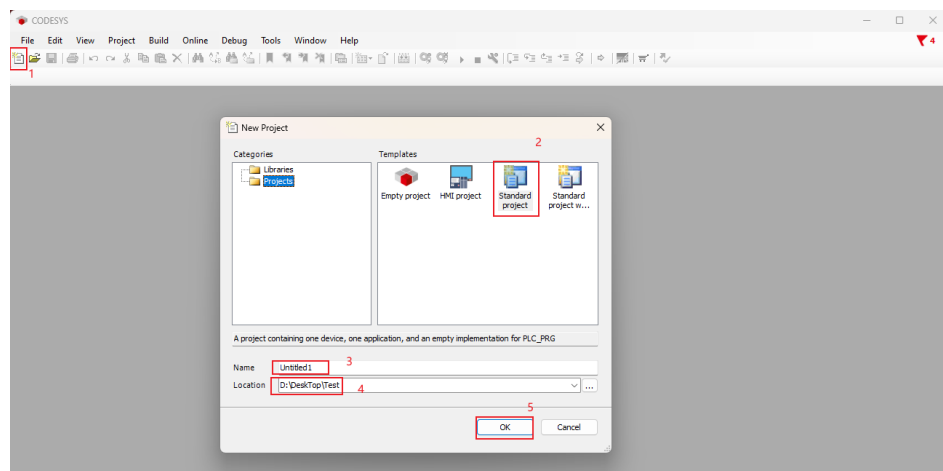




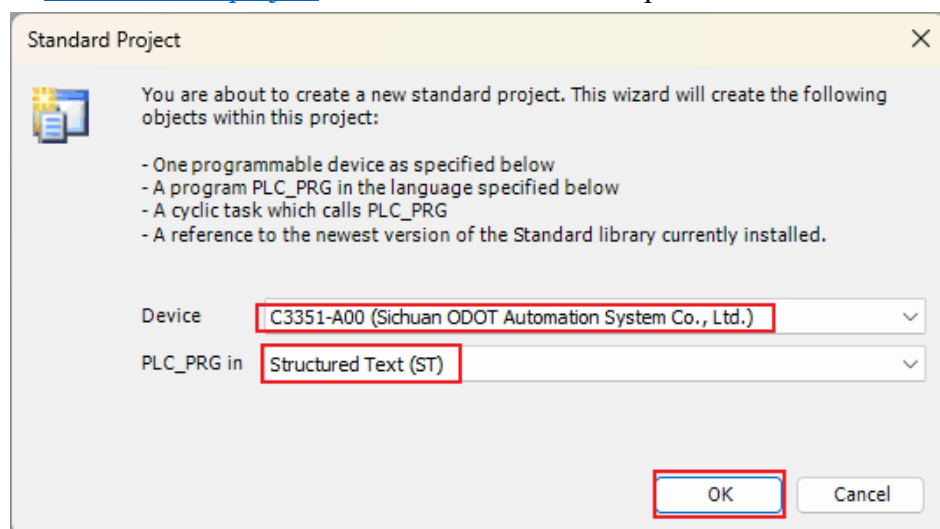
## 4.5 Modbus TCP client/server functionality

It is recommended to read [Annex 7](#) before performing operations in this section.

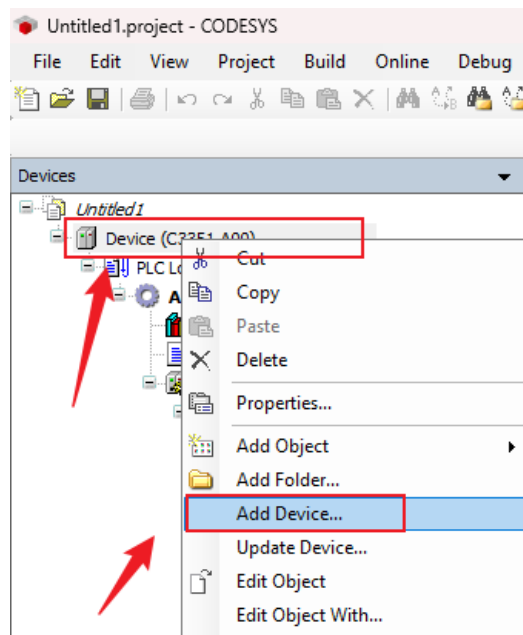
The first step is to establish the project, as follows:



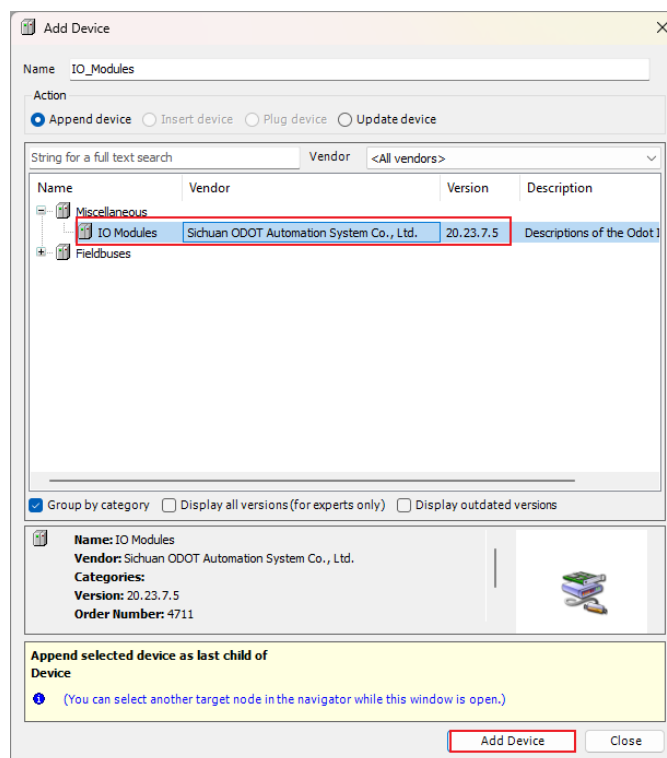
Then select the C3351 device. If the device cannot be found, please refer to [5.2.1 Create a project](#) installation device description file.



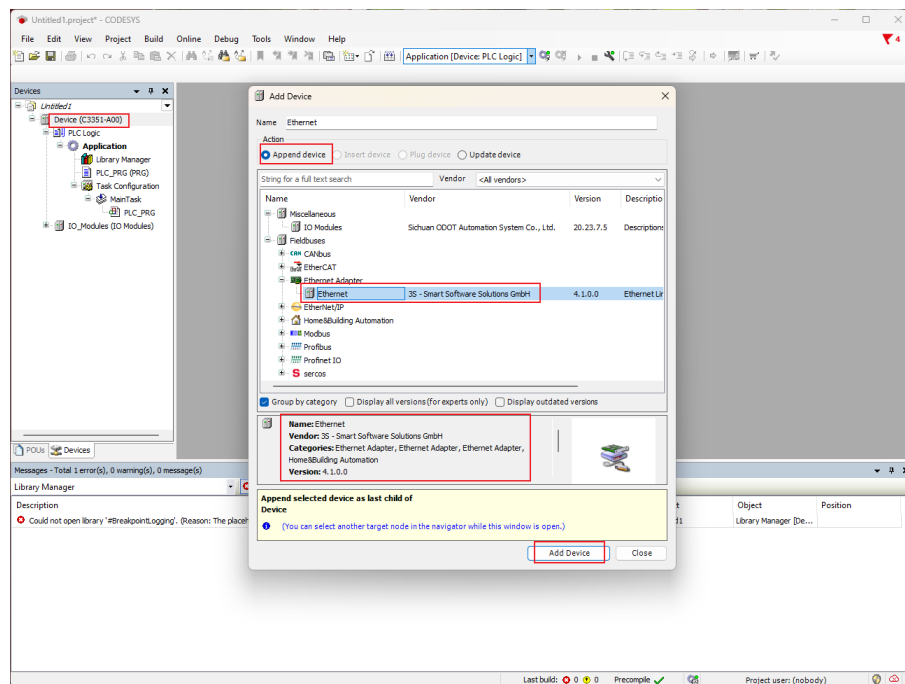
The project file tree will be created automatically, right click on the C3351 device → 'Add Device':



Add an 'IO Modules device' to the project in the pop-up interface. If this device is not found, refer to [5.2.1 to create a project](#) and install device description file.

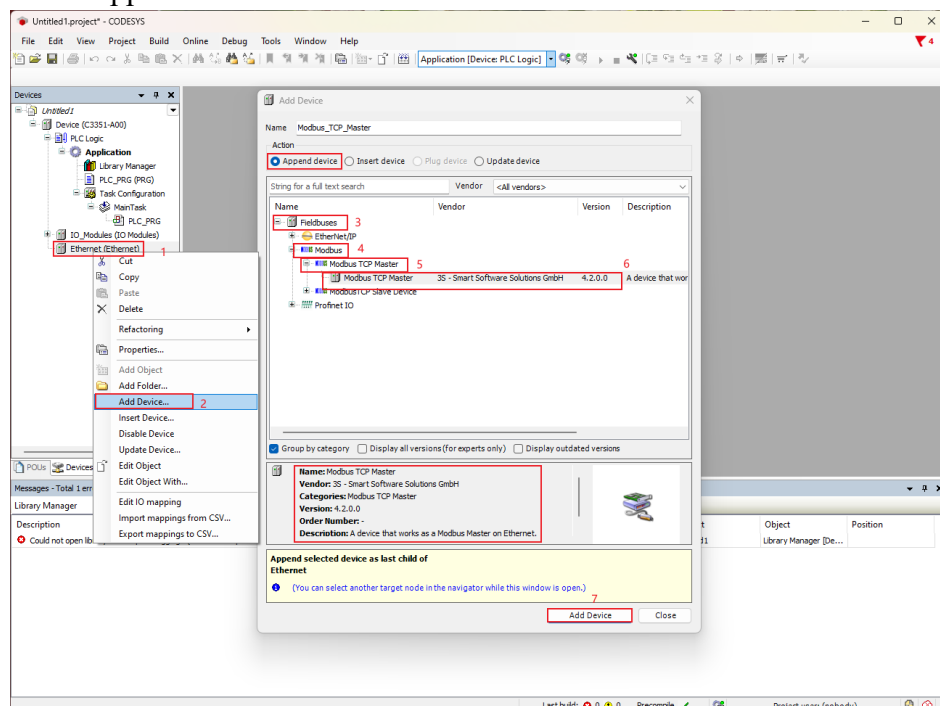


Similarly, find 'Ethernet Device' and add it to the project:

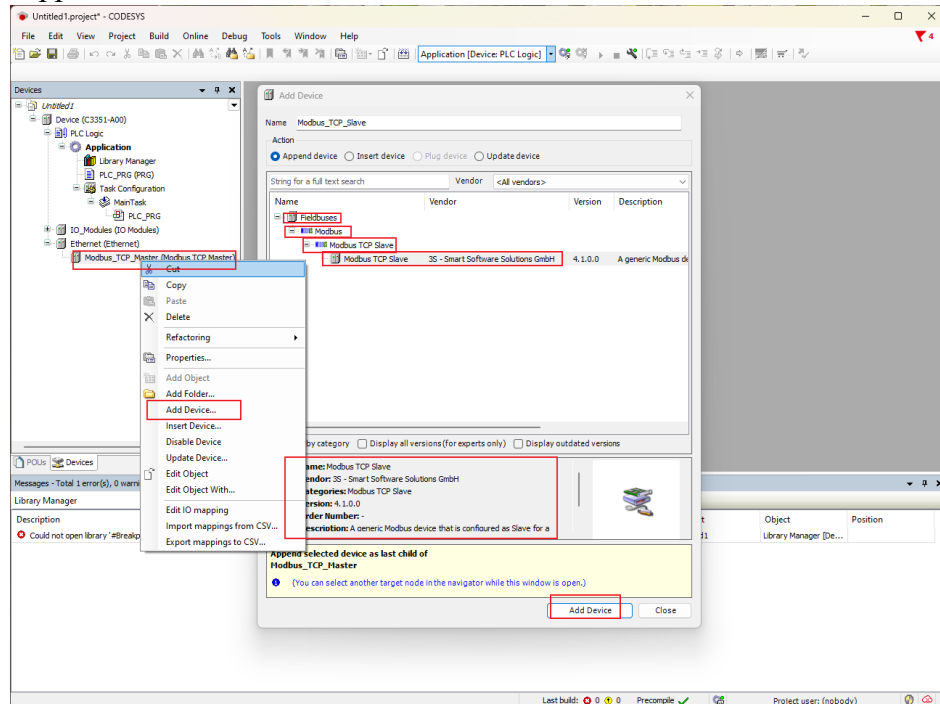


The next step is to create a TCP client and server:

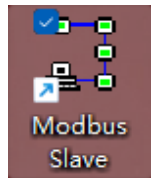
**When treating C3351 as a client**, right click on the Ethernet device in the project - 'Add Device' - add a device named 'Modbus TCP Master', the supplier is 3S – Smart Software Solutions GmbH.



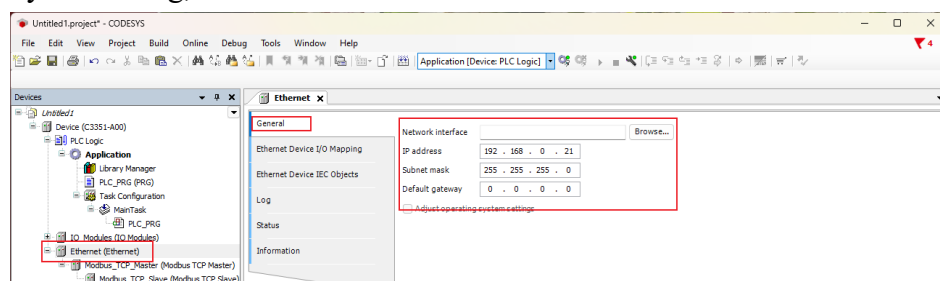
Similarly, right-click the 'Modbus TCP Master Device' just added to the project → 'Add Device' → add a device named 'Modbus TCP Slave', the supplier is 3S – Smart Software Solutions GmbH.



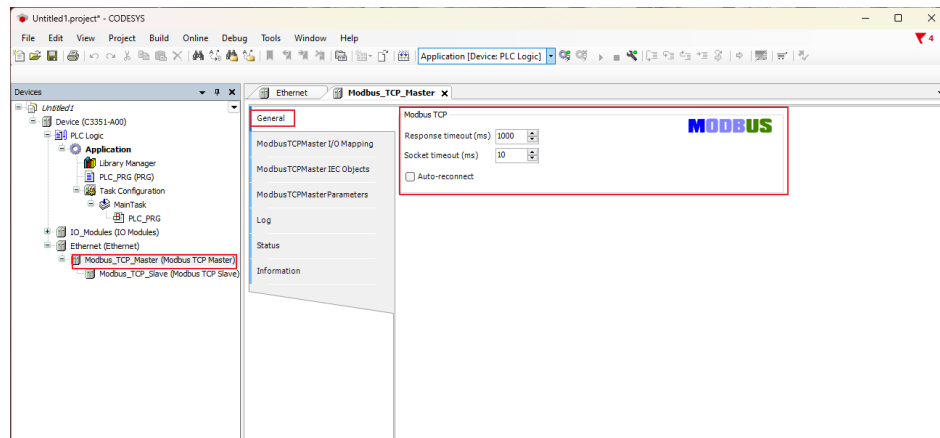
Next, let's set the parameters of the master station and the third-party slave station. Here, the third-party simulation software Modbus Slave is used to simulate the connection of the slave station device:



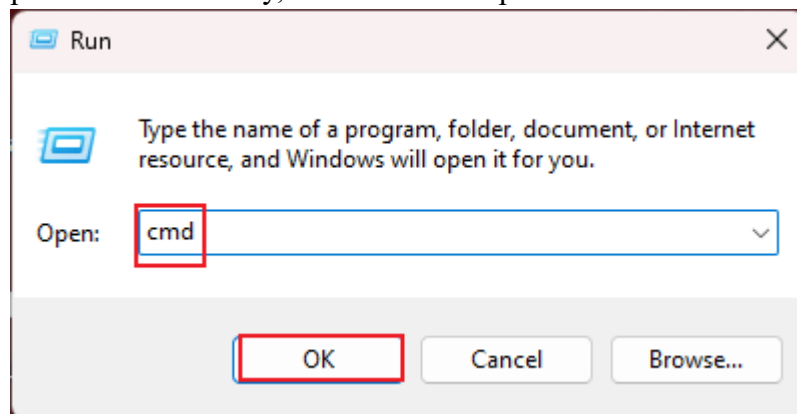
Double-click 'Ethernet Device' in the CODESYS interface - select 'General' in the main interface on the right, and we will see the settings of the network interface. For the IP address here, refer to [4.3.4 to view the configuration parameters](#) the IP address of the C3351 device scanned by IO-Config, and fill it in:



Similarly, double-click 'Modbus TCP Master Device' in the CODESYS interface → select the general setting of Modbus TCP's 'Response Timeout' time and 'Socket Timeout' time in the main interface on the right, and it is recommended to click the Auto-reconnect function:



Similarly, double-click the 'Modbus TCP Slave device' in the CODESYS interface - select the general settings of Modbus TCP's 'slave station IP address', 'response timeout' time and 'port number' in the main interface on the right. This IP address is the IP address of the third-party slave station simulation software, that is, the IP address set by the local PC, press the Win+R key, enter CMD and press Enter:



Enter ipconfig in the pop-up window and press Enter

```

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.22621.1992]
(c) Microsoft Corporation. All rights reserved.

C:\Users\13521>ipconfig

Windows IP Configuration

Wireless LAN adapter 本地连接* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter 本地连接* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

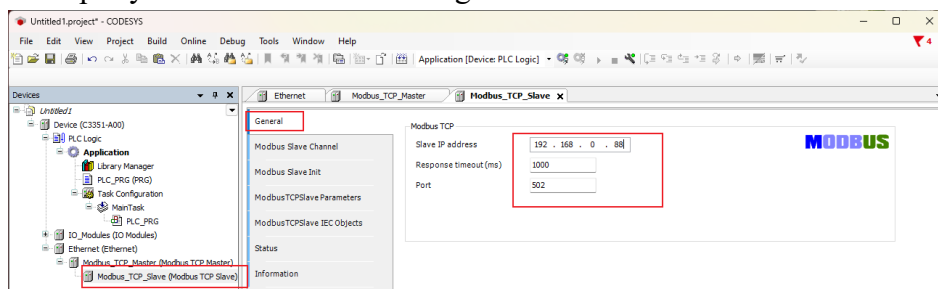
Ethernet adapter 以太网:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::88eb:abab:3182:e187%9
    IPv4 Address. . . . . : 192.168.0.88
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

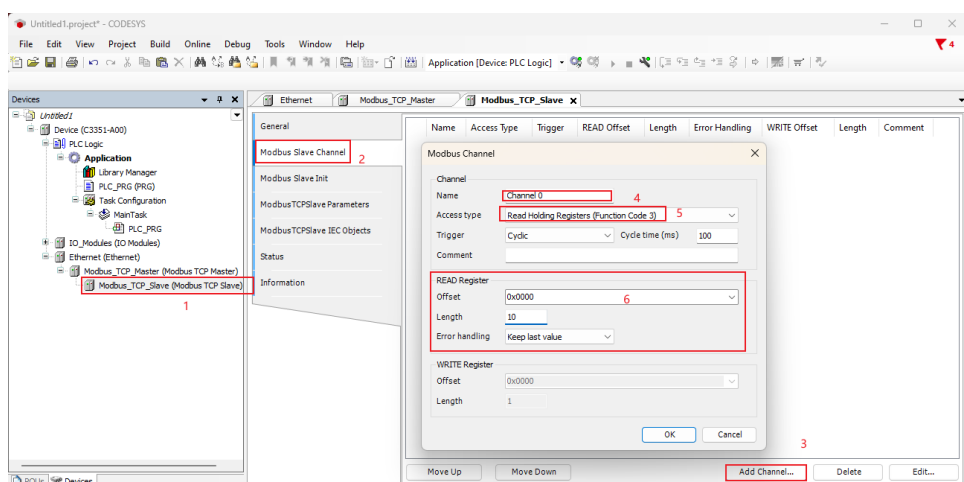
Ethernet adapter VMware Network Adapter VMnet1:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::46e:10ce:dc76:eea6%8
  
```

It can be seen that the IPv4 address used here is 192.168.0.88, so the IP address of the slave station it should enter in the CODESYS interface is 192.168.0.88, and the port can be consistent with the port set by the third-party slave station. The setting here is 502.



Next, continue to set the Modbus slave station channel of the "Modbus TCP Slave device" →the step "Add Channel" as shown in the figure below, here a channel type of "Read Holding Registers" is added, and its length is 10 WORD:



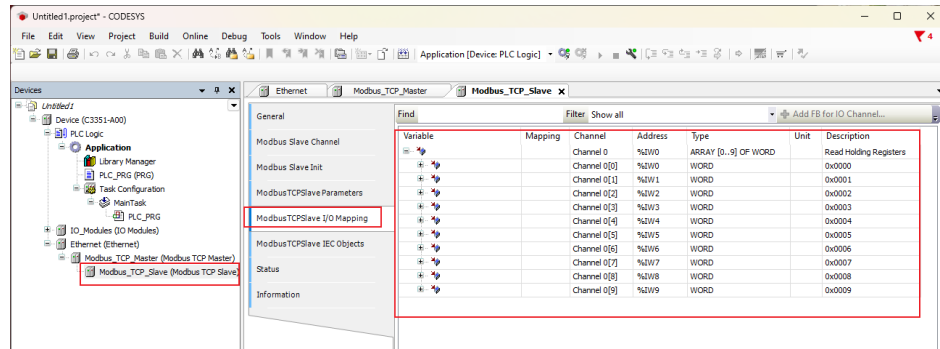
After the addition is complete, we can find that there is an option of 'Modbus TCP Slave I/O Mapping' in the menu on the right. Click this option to view the address mapped in the C3351 device by the channel just established.

## NOTICE

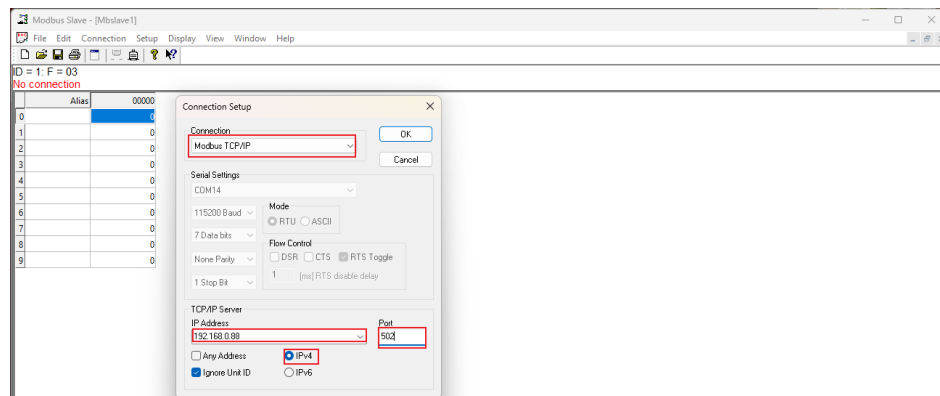
### DEVICE INOPERABLE

·The channel length is limited, please refer to [3.3 Programming Specifications](#).

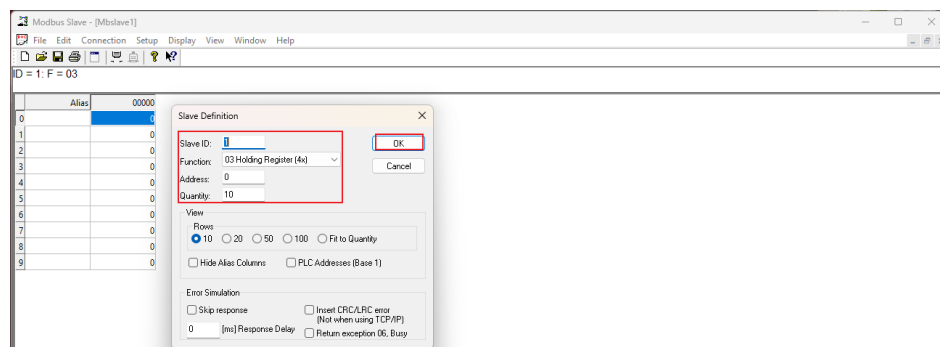
**Failure to follow the above instructions could result in damage to the equipment.**



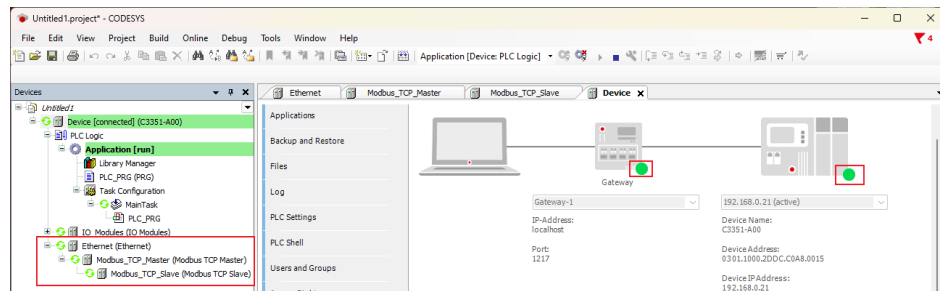
Next, we open the third-party slave station simulation software 'Modbus Slave', and press 'Ctrl+N' to create a new Mbslave1 window, and press 'F3' to connect, and then set the following settings on the pop-up page. The 'IP Address' should be filled in the 192.168.0.88 just checked through CMD:



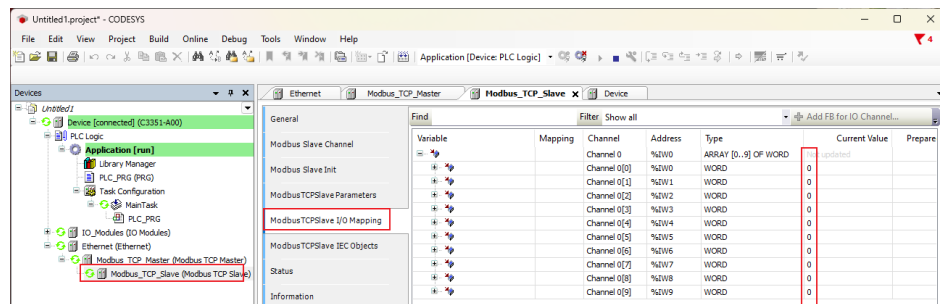
Right-click on the blank space of the Mbslave1 window - select 'Slave Definition', and set as follows in the pop-up window. The specific parameters should correspond to the channel parameters set by the 'Modbus TCP Slave device' in CODESYS. If the parameters do not correspond, it may cause errors and Communication exception:



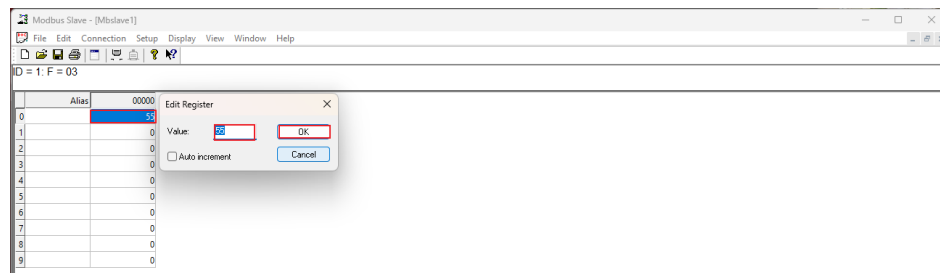
After completion, return to the CODESYS interface, download and log in to the C3351 device. For the method, refer to [5.4 download, monitor:](#)



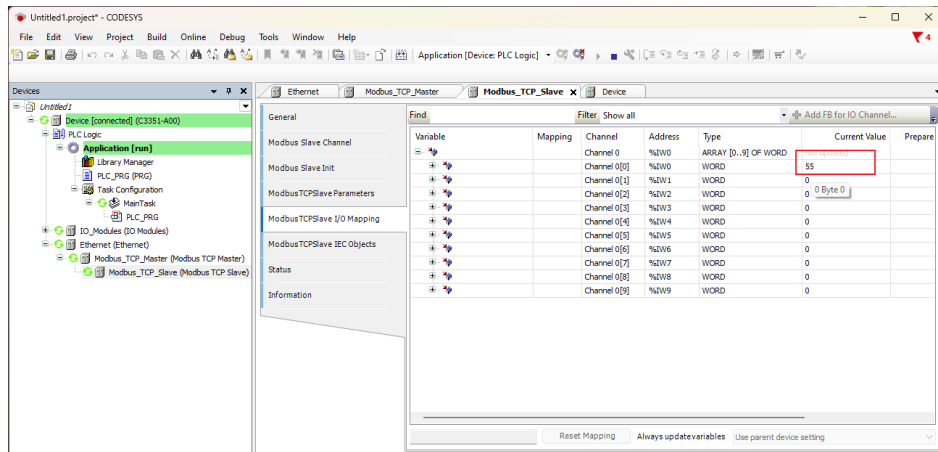
All devices are in the running state, indicating that the connection is successful. Now click on the 'ModbusTCPSlaveI/O Mapping' menu of the 'Modbus TCP Slave Device' to monitor the current value of the channel mapping:



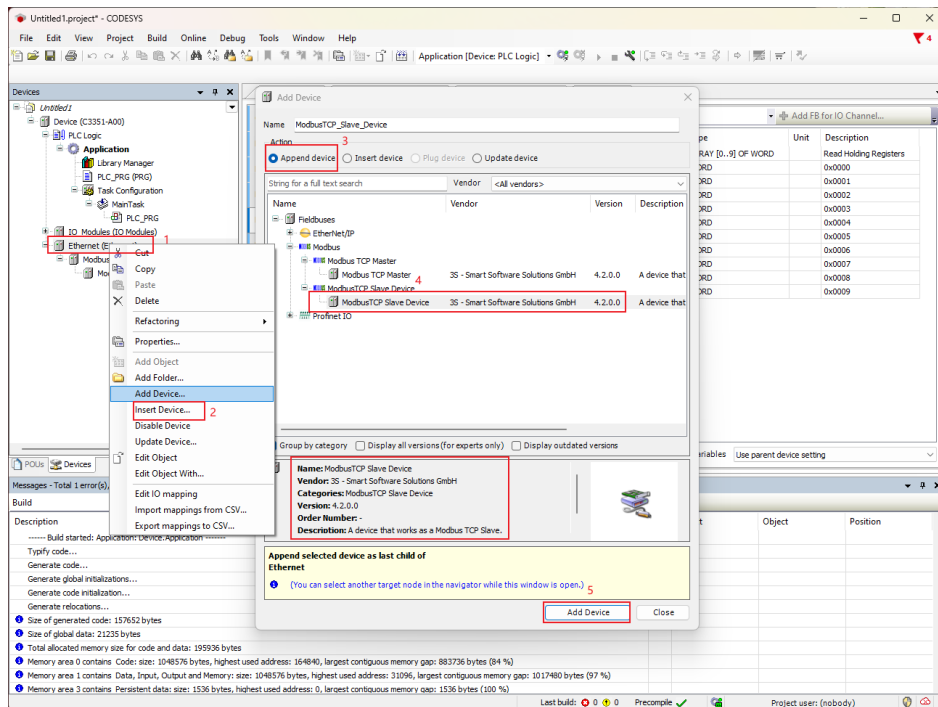
Go back to the third-party slave station simulation software Modbus Slave, double-click the first data, a modification window will pop up, modify the value of 'Value' to 55 and click 'OK':



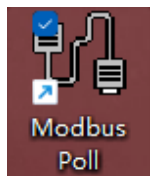
Back to the CODESYS page, we can find that the current value of the WORD type data with the address %IW0 has been changed to 55, indicating that the communication is normal and the master station function is successfully implemented:



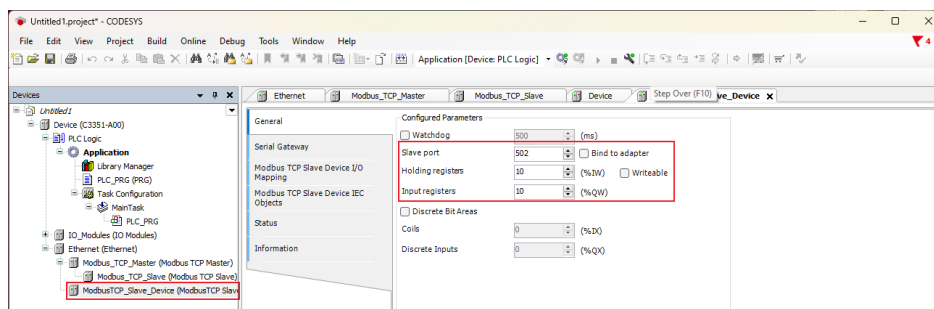
When C351 is regarded as a server, on the previous basis, right-click 'Ethernet Device' in the project → 'Add Device' → add a device named 'Modbus TCP Slave Device', the supplier is 3S – Smart Software Solutions GmbH.



Next, let's set the parameters of the server and the third-party client. Here, the third-party client simulation software 'Modbus Poll' is used to simulate the connection of the server device:



Double-click 'Modbus TCP Slave Device', select 'General' in the main interface on the right, and set the length of 'Slave port', 'Holding registers', 'Input registers', 'Coils', 'Discrete inputs' in the configuration parameters:



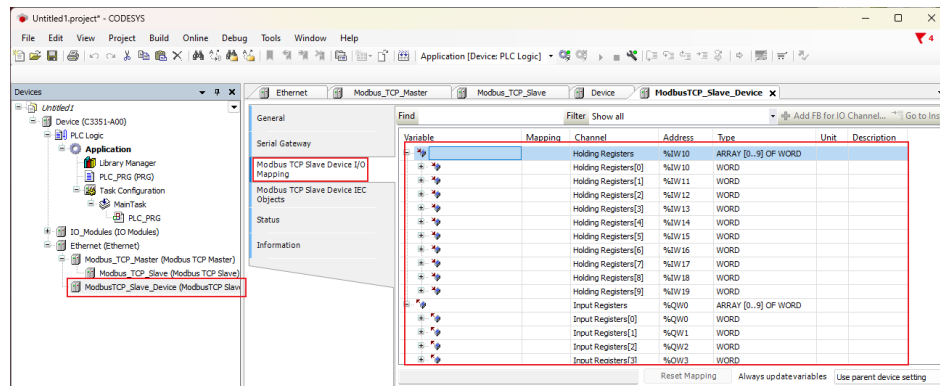
After the setting is complete, we click the option of 'ModbusTCPSlaveDeviceI/O Mapping' to view the address mapped in the C3351 device by the newly established slave device.

## Notice

### DEVICE INOPERABLE

·The channel length is limited, please refer to [3.3 Programming Specifications](#).

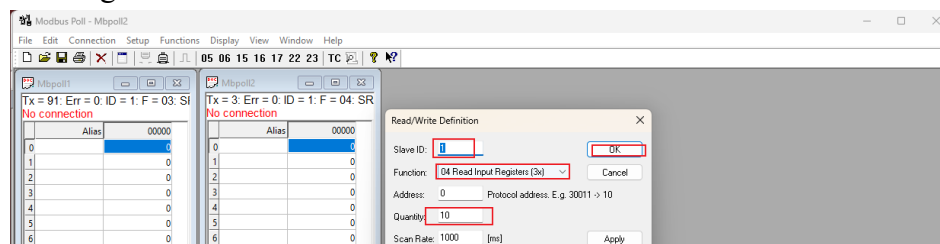
**Failure to follow the above instructions could result in damage to the equipment**



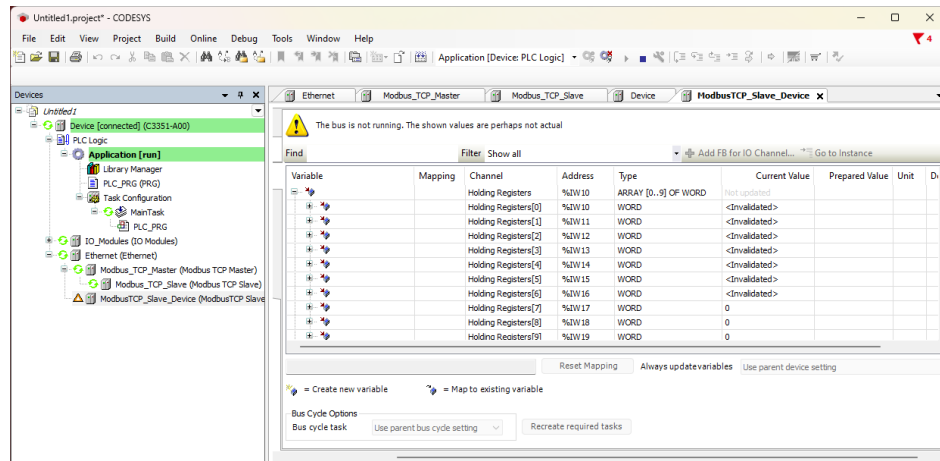
Next, open the third-party master station simulation software 'Modbus Poll', and press 'Ctrl+N' to create two Modbus Poll windows, right-click on the blank space of the two windows respectively - select the 'Read/Write Definition' setting.

Click the 'Function' of the 1<sup>st</sup> window and select '03 Read Holding Registers (4x)', and 'Quantity' could be set to the holding register length configured in CODESYS.

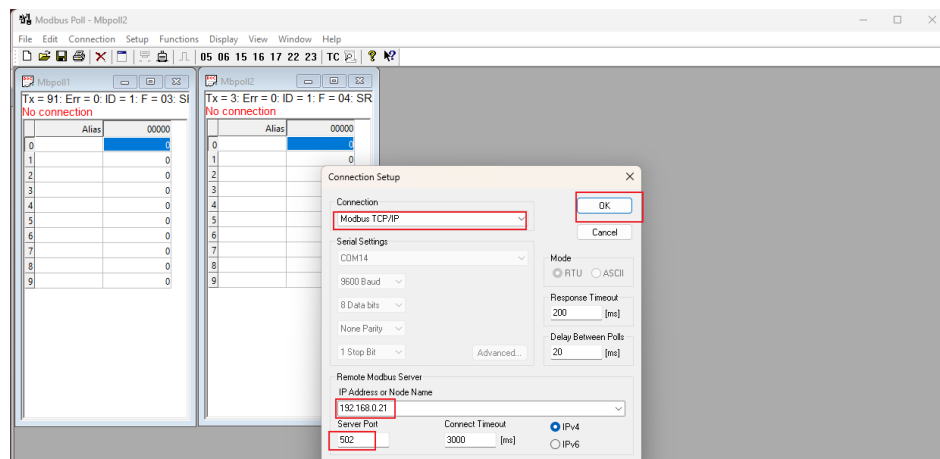
Click the 'Function' of the 2<sup>nd</sup> window and select '04 Read Input Registers (3x)', and 'Quantity' could be set to the input register length configured in CODESYS:



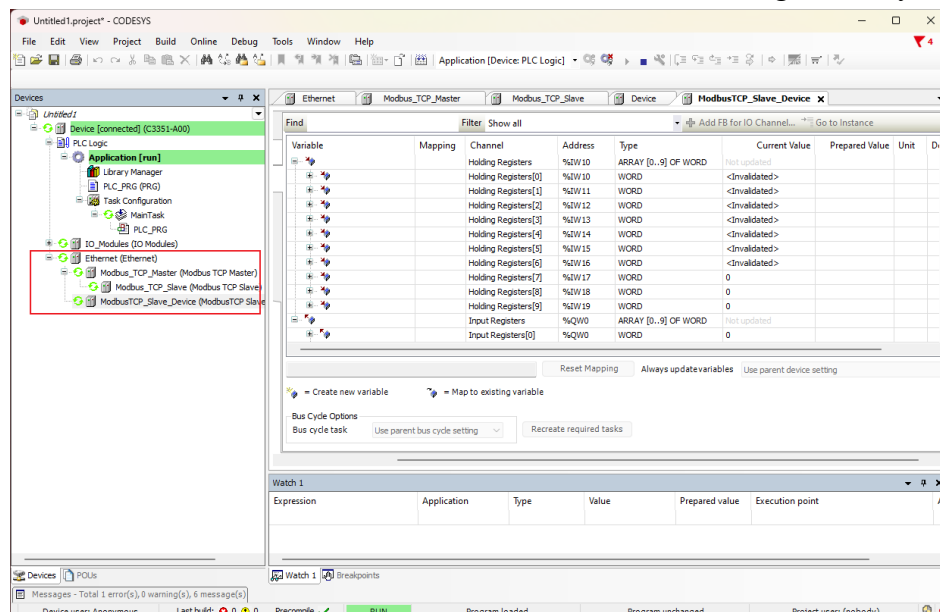
After the completion, return to the CODESYS interface, re-download and log in to the C351 device. For the method, refer to [5.4 download, Monitor](#). At this time, it will prompt that the Bus is not running. This is a normal situation:



Go back to the 'Modbus Poll' software, and press 'F3' to connect, and set the 'Connection Setup' type, IP address and port number in the pop-up interface:

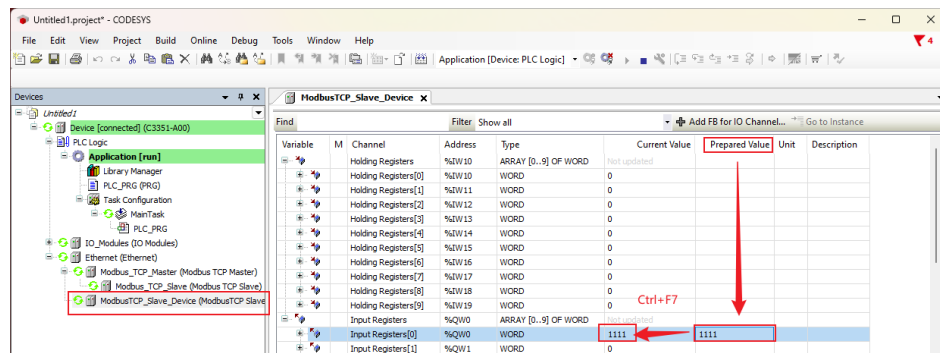


Back to CODESYS, it could find that all devices are running normally:

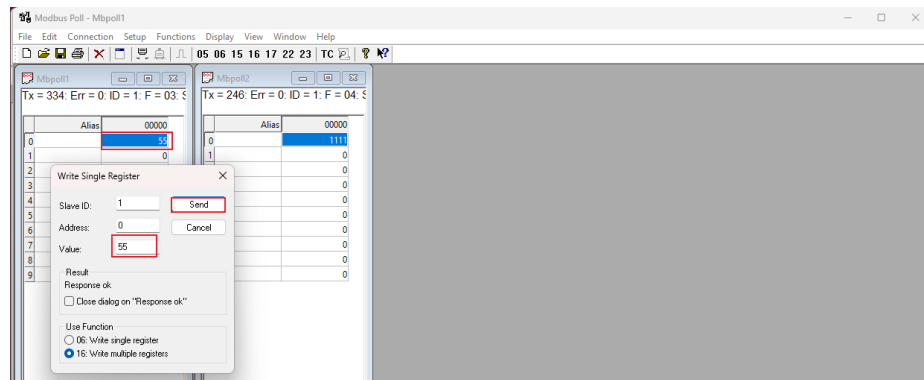


The following is the verification of the communication. The first step is to double-click to modify the input register Prepared Value to 1111 in the

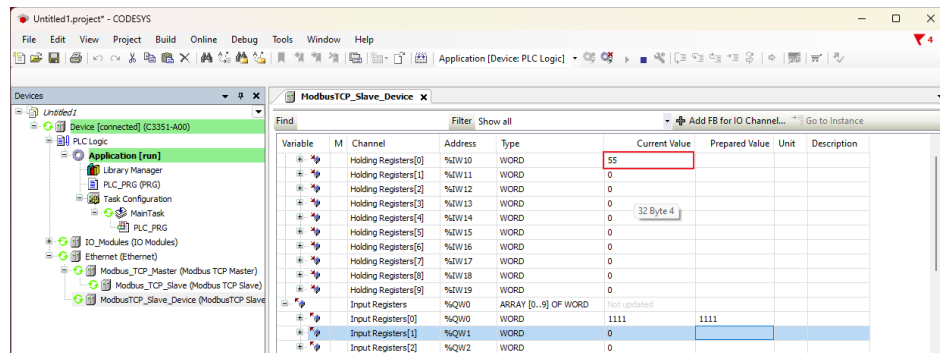
'ModbusTCPSlaveDeviceI/O Mapping' of the 'Modbus TCP Slave Device', and press 'Ctrl+F7' to write:



Back to the 'Modbus Poll' software, you will find that the value of Mbpoll2 has been modified successfully, now double-click the first data of Mbpoll1, and modify the 'Value' to 55:



Back to the CODESYS software, we will find that the first data value of the holding register has been modified to 55, this indicating that the communication function is normal:



So far, the Modbus TCP client/server function test of the C3351 device is completed.

## 4.6 Modbus RTU Master function

### NOTICE

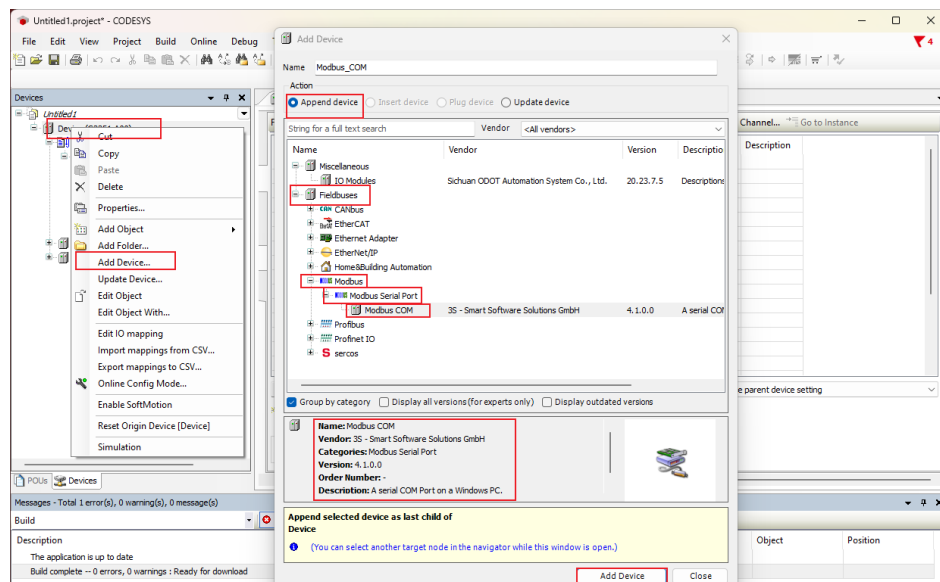
#### DEVICE INOPERABLE

This section involves the use of USB to 485 converter equipment. It is recommended to read [Annex 7.2.3](#) in advance and purchase relevant equipment to connect to the 485 interface of the C3351 device before performing operations in this section. Refer to [2.3.2 485 interface](#).

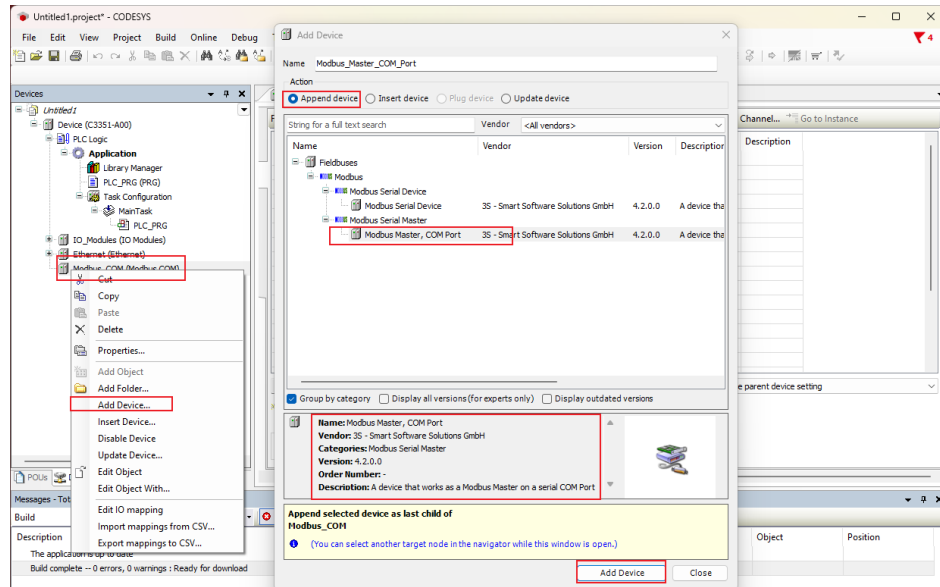
**Failure to follow the above instructions could result in damage to the equipment.**

Next, we continue to demonstrate the Modbus RTU master function.

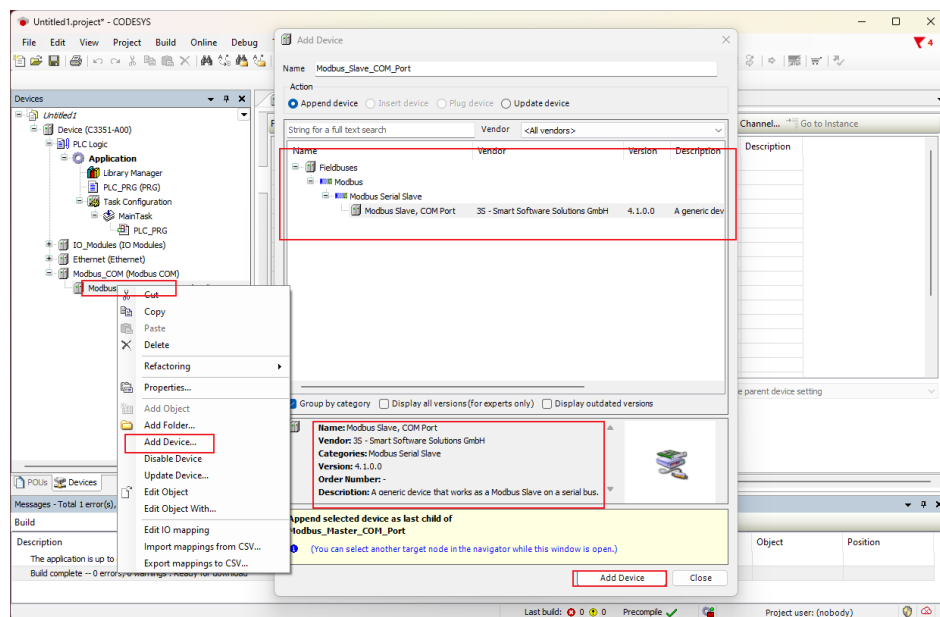
Continue to use the project in the previous section, right-click the C3351 device → 'Add Device', and select Modbus-Modbus serial port 'Modbus COM' in the pop-up page, the supplier is 3S – Smart Software Solutions GmbH.



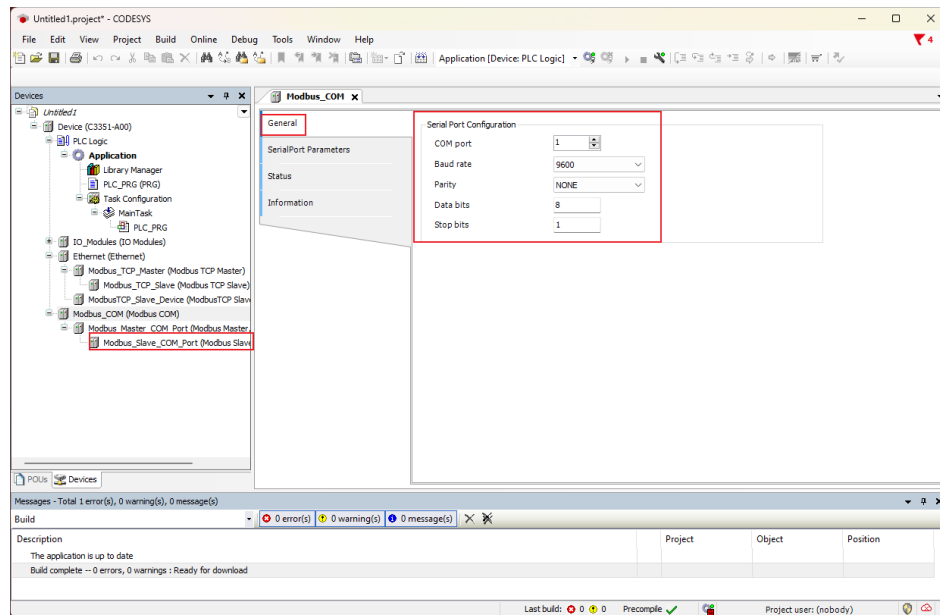
Right-click the 'Modbus\_COM' just created in the project tree, select 'Add Device' → add a device named 'Modbus Master, COM Port'.



Right-click the 'Modbus Master, COM Port' device just created in the project tree, select 'Add Device' → add a device named 'Modbus Slave, COM Port'.



The required equipment has been created. Next, we configure the parameters of the master station and the third-party slave station simulation software Modbus Slave. Double-click the 'Modbus COM device' in the project tree-select 'General' in the main interface on the right, and then configure the serial port according to the actual situation:



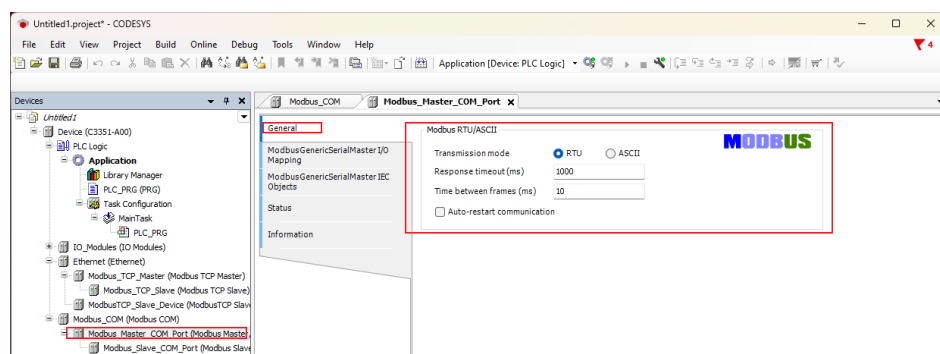
## NOTICE

### DEVICE INOPERABLE

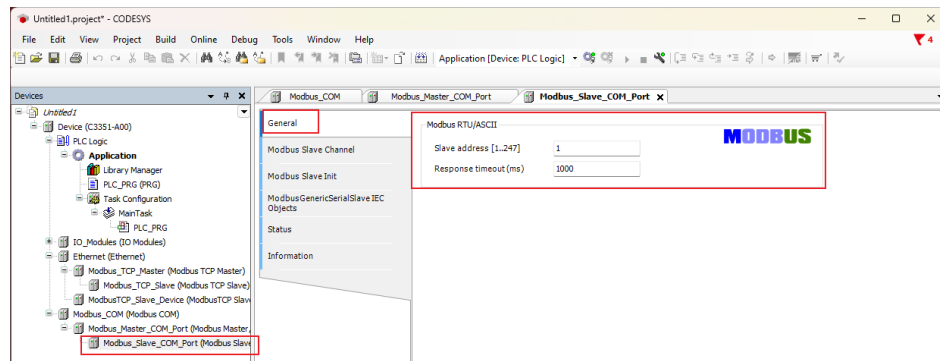
·The COM port here must be set to 2.

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

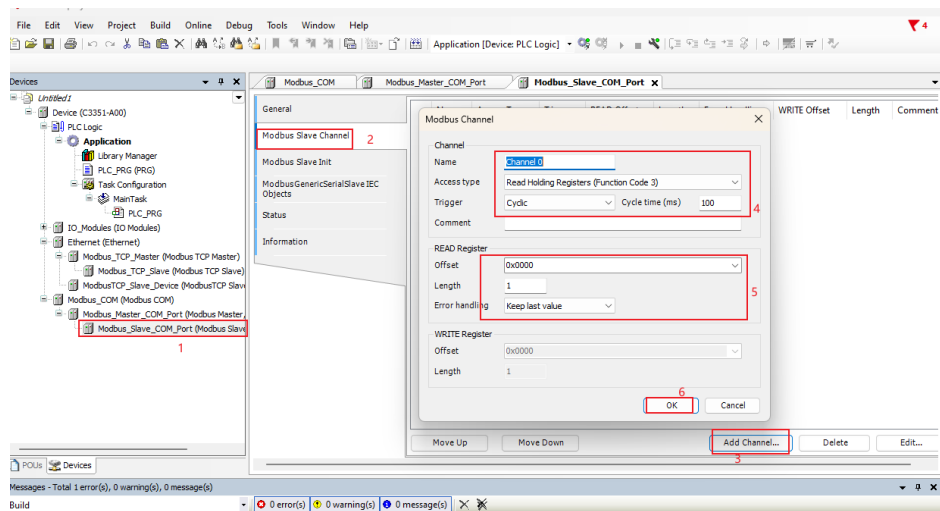
Next, double-click 'Modbus Master COM Port Device' → select 'General' on the main interface on the right, and set the transmission mode to RTU, and set the response timeout time, frame interval time. It is recommended to click 'Auto-restart communication':



Next, double-click 'Modbus Slave COM Port Device' → select 'General' on the main interface on the right, and set the slave station address and response timeout time:



Then select 'Modbus Slave Channel' - 'New Channel', and set various parameters in the pop-up window:



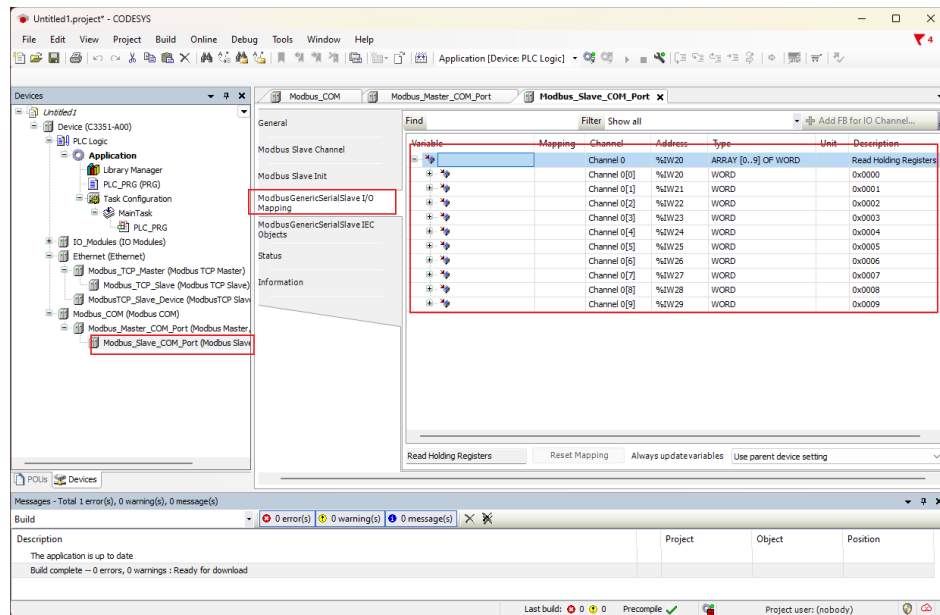
After the addition is complete, we can find that there is an option of 'ModbusGenericSerialSlaveI/O Mapping' in the menu. Click this option to view the address mapped in the C3351 device by the channel just established.

## NOTICE

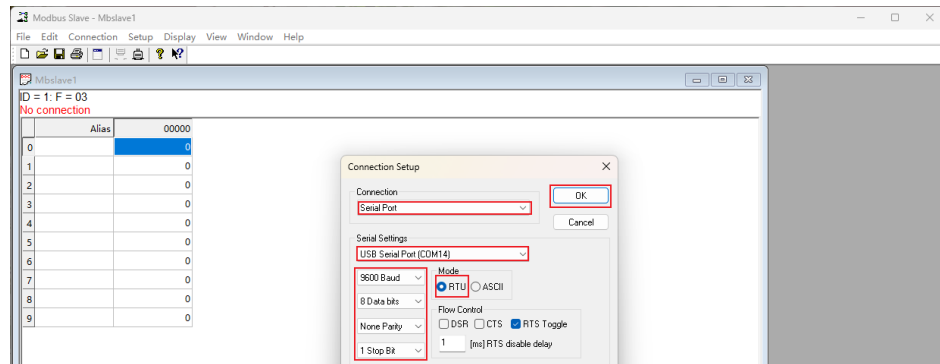
### DEVICE INOPERABLE

·The channel length is limited, please refer to [3.3 Programming Specification](#)

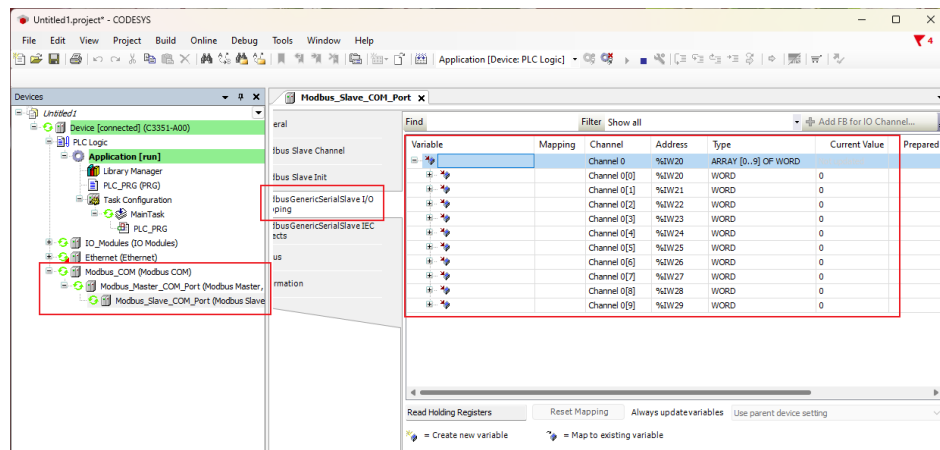
**Failure to follow the above instructions could result in damage to the equipment.**



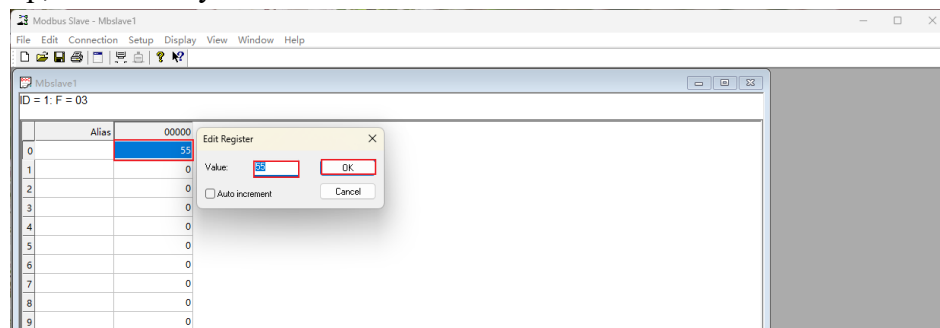
Now it needs to open the 'Modbus Slave' third-party slave station simulation software. And press 'F3' to open the connection setting page, then set 'Connection' to 'Serial Port'. The Serial Settings include COM port selection, baud rate selection, data bit selection, parity check, stop bit selection and mode selection, which should match the parameters of the Modbus COM device in CODESYS:



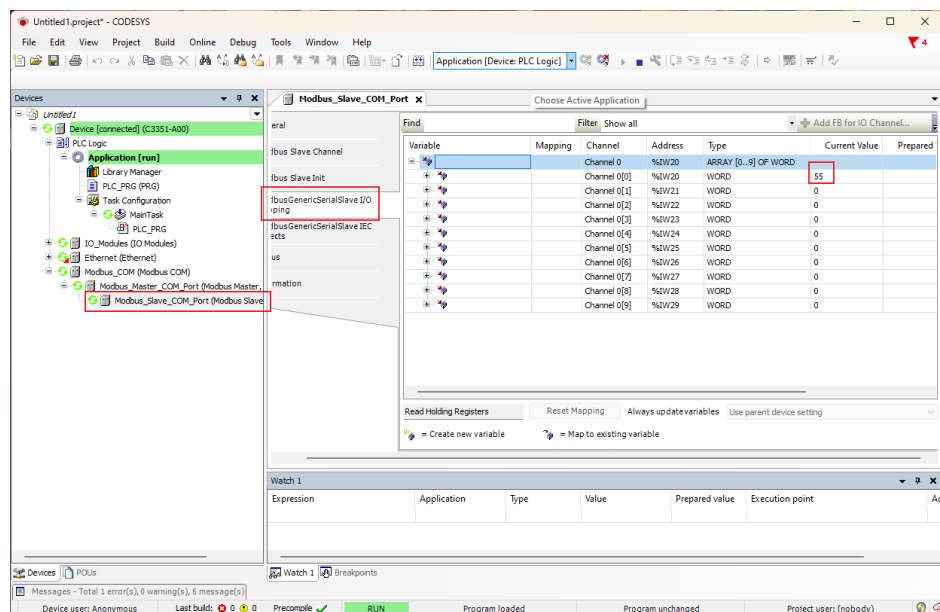
After completion, return to the CODESYS interface, it could download and log in to the C3351 device. For the method, please refer to [5.4 download, Monitor](#). Then it could find all devices are in the running status, which indicates that the connection is successful. Now click on the 'ModbusGenericSerialSlaveI/O Mapping' option of the 'Modbus Slave COM Port Device', it can monitor the current value of the channel map:



Go back to the third-party slave station simulation software 'Modbus Slave', double-click the first data, and a modification window will pop up, then modify the value of the first data to 55:



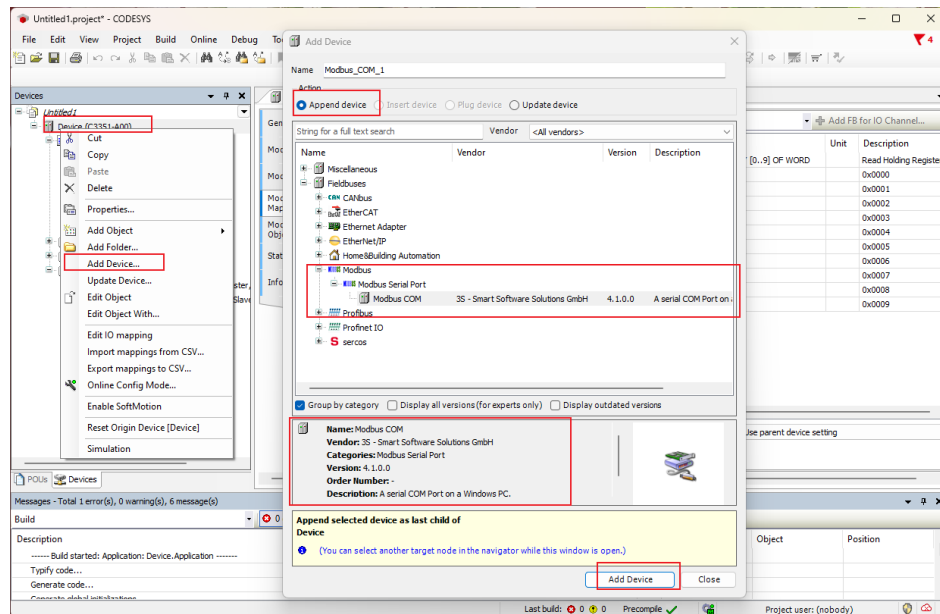
Going back to the CODESYS page, we can find that the current value of the WORD type data with the address %IW20 has been changed to 55, indicating that the communication is normal and the master station function is successfully implemented:



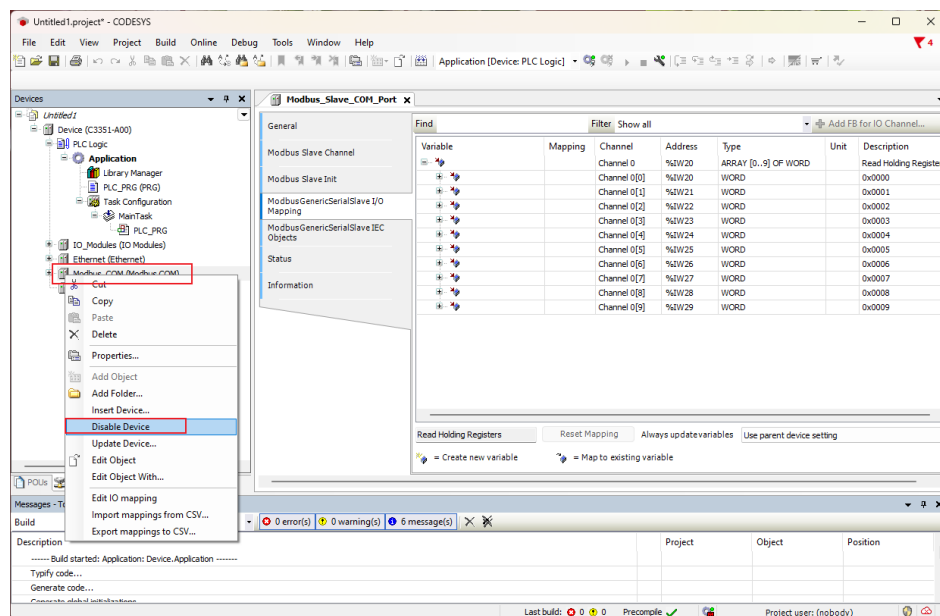
So far, the Modbus RTU master function test of the C3351 device is completed.

## 4.7 Modbus RTU Slave Station Function

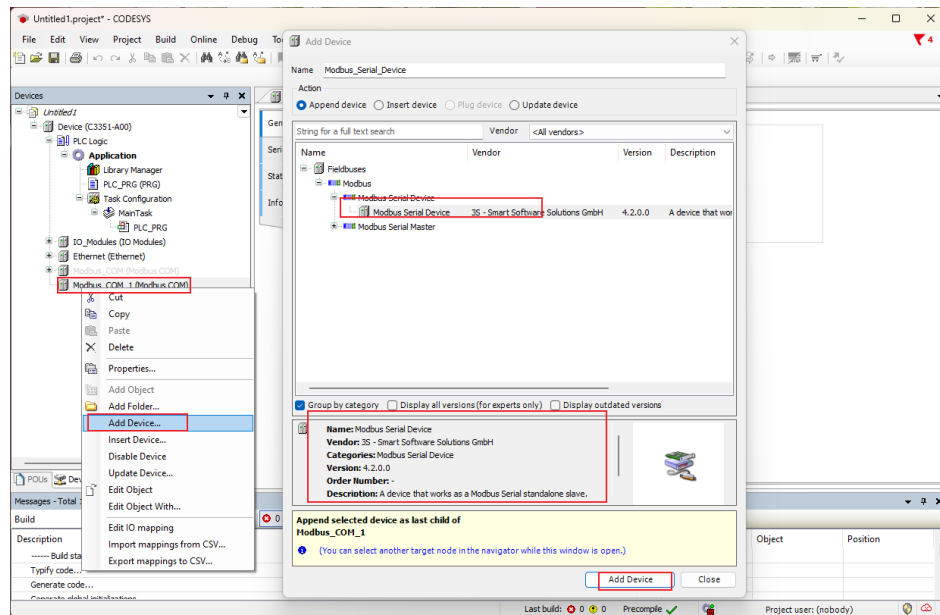
We continue to demonstrate the Modbus RTU master functionality. Continue to use the project in the previous section, right-click on the C3351 device → 'Add Device', and select Modbus-Modbus Serial Port → 'Modbus COM' in the pop-up page. The supplier is 3S – Smart Software Solutions GmbH.



The difference is that we need to disable the Modbus COM device added in the previous section, and it needs to right click on the device and select Disable Device.



Right-click the newly created Modbus COM 1 in the project tree, select Add Device → add a device named 'Modbus Serial Device'.



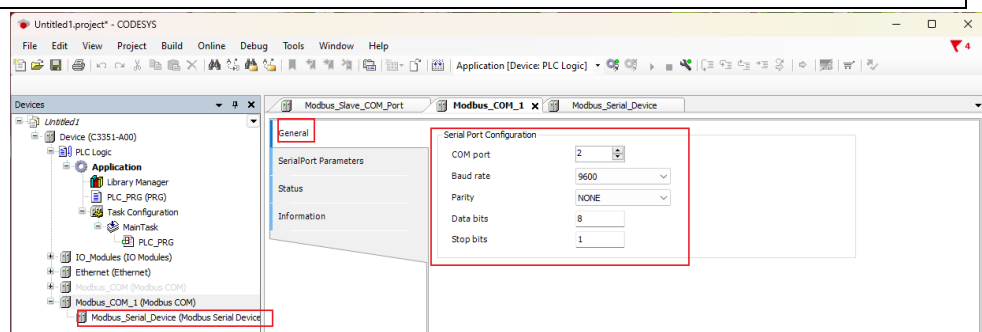
Next, it could set the parameters of the slave station and the third-party master station. Here, the third-party master station simulation software Modbus Poll is used to simulate the connection of the slave station device. Similarly, double-click the Modbus COM 1 device just added to the project → select 'General' option and configure the serial port.

## NOTICE

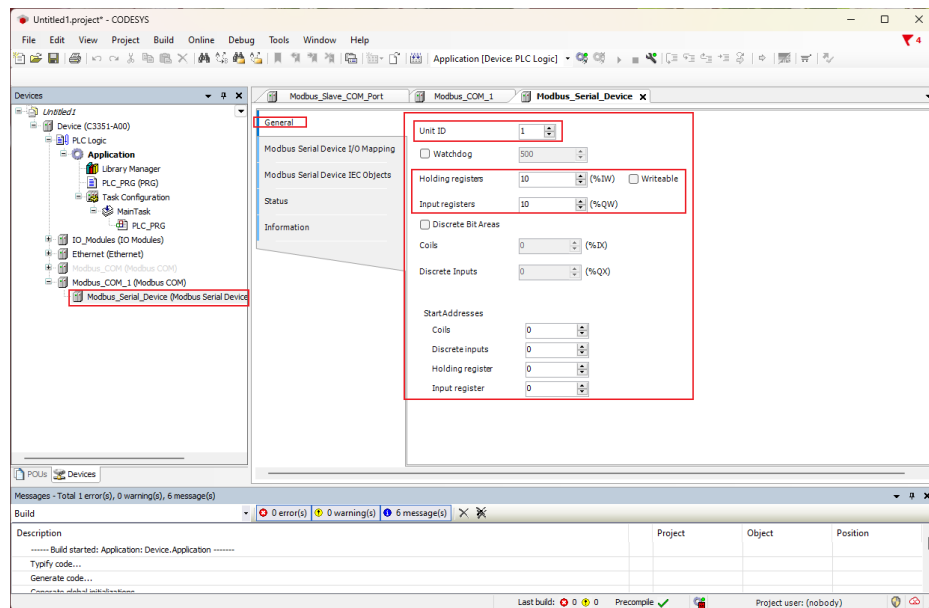
### DEVICE INOPERABLE

·Here the COM port must be set to 2.

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



Double-click 'Modbus Serial Device', and select 'General' in the main interface on the right, and set the unit ID, holding register length, and input register length in the configuration parameters:

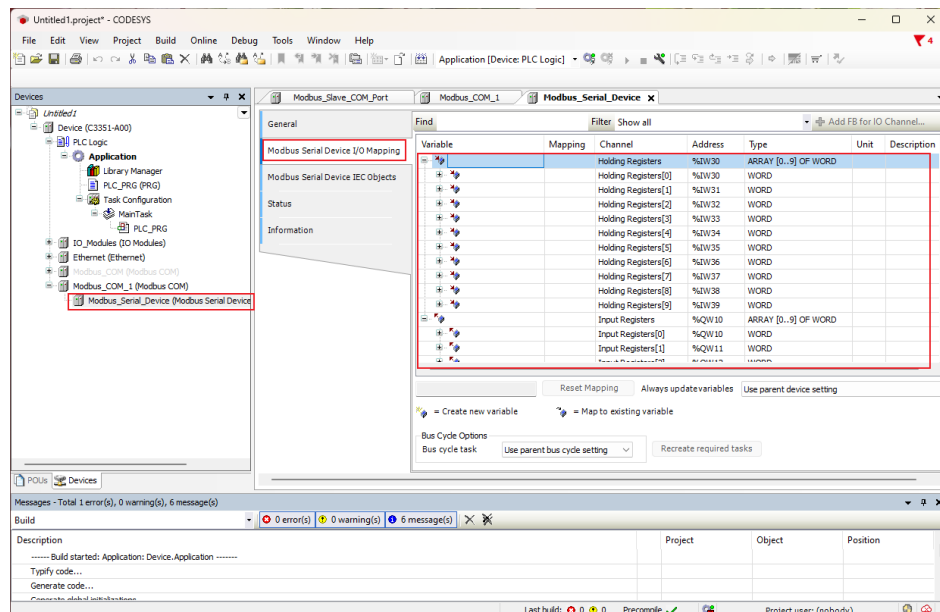


After the setting is complete, we click the option of 'Modbus Serial Device I/O Mapping' to view the address mapped in the C3351 device by the newly established slave device.

## NOTICE

### DEVICE INOPERABLE

- The channel length is limited, please refer to [3.3 Programming Specification](#).
- Failure to follow the above instructions could result in damage to the equipment.**

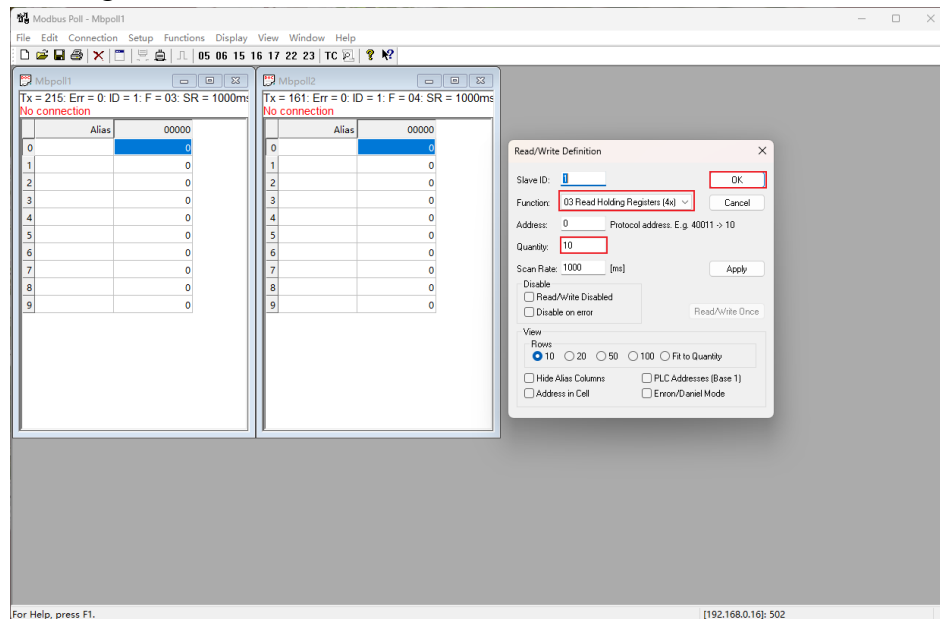


Next, please open the third-party master station simulation software 'Modbus Poll', and press 'Ctrl+N' to create two Mbpoll windows, and

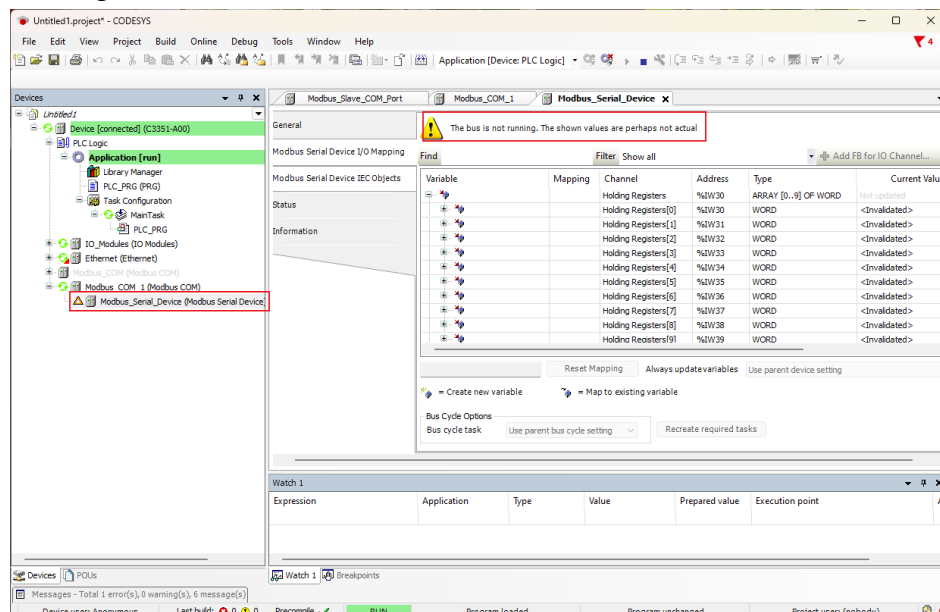
right-click on the blank space of the two windows respectively - select the 'Read/Write Definition' setting.

Click the 'Function' of the 1<sup>st</sup> window and select '03 Read Holding Registers (4x)' and 'Quantity' could be set to the holding register length configured in CODESYS.

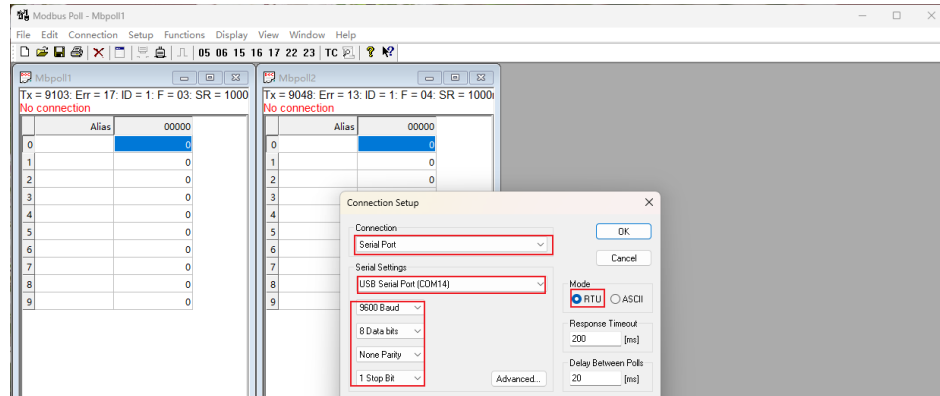
Click the 'Function' of the 2<sup>nd</sup> window and select '04 Read Input Registers (3x)', and 'Quantity' could be set to the input register length configured in CODESYS:



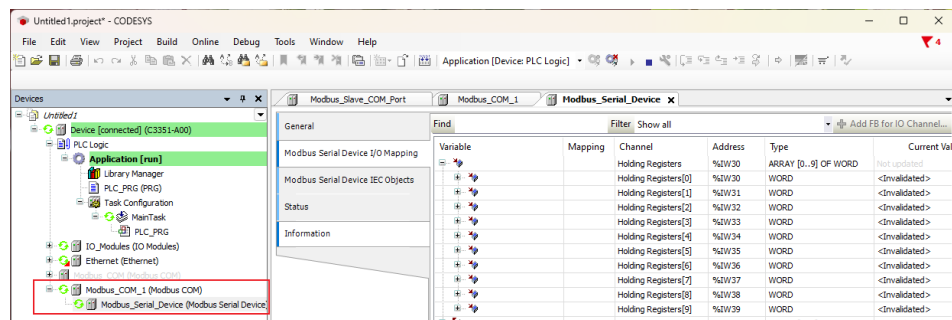
After the completion, please return to the CODESYS interface, re-download and log in to the C3351 device. For the method, pls refer to [5.4 Download, monitor](#). At this time, it will prompt that the Bus is not running. This is a normal situation:



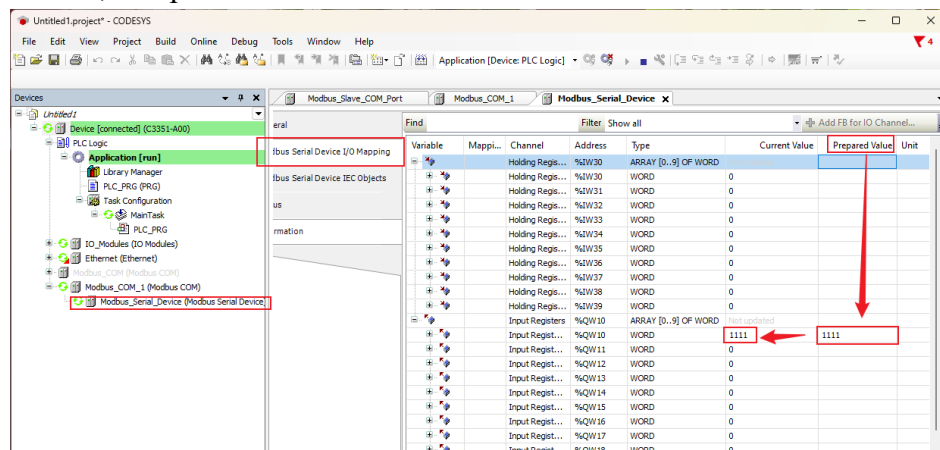
Go back to the Modbus Poll software, press 'F3' to connect. And it could set the type of 'Connection Setup' to Serial Port in the pop-up interface, and select the correct COM port, baud rate and other parameters are consistent with the parameters configured in the CODESYS software:



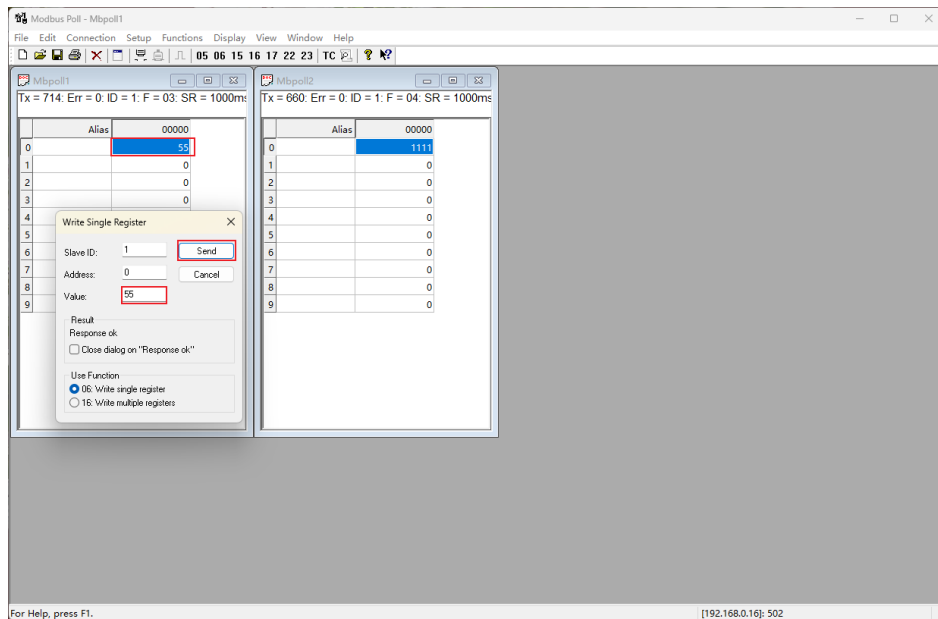
Back to CODESYS, it could find that all devices are running normally:



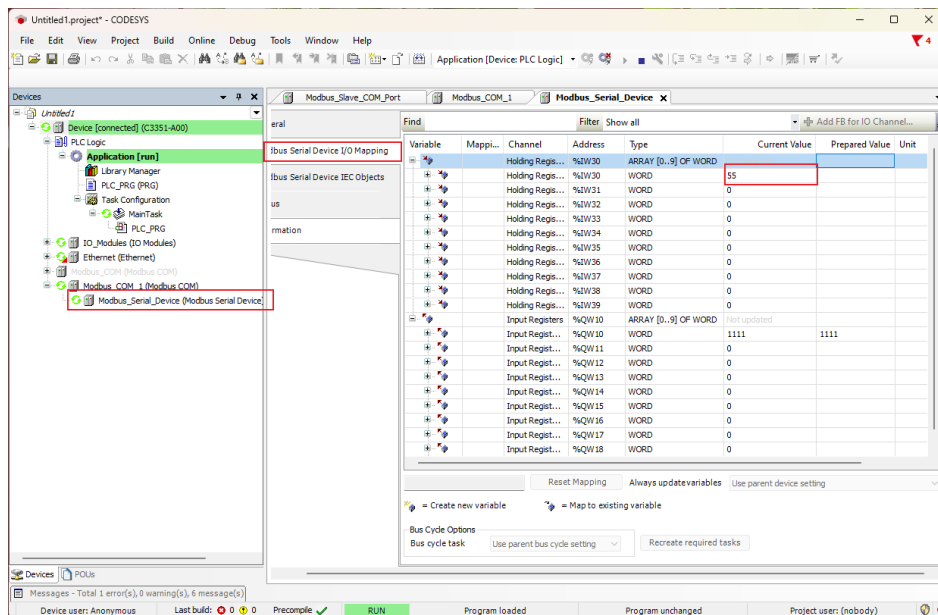
The following is the verification of the communication. The first step is to double-click to modify the input register preparation value to 1111 in the 'ModbusSerialDeviceI/O Mapping' of the 'Modbus Serial Device', and press 'Ctrl+F7' to write:



Back to the 'Modbus Poll' software, it could find that the value of Mbpoll2 has been modified successfully. Now we double-click the first line of Mbpoll1 to modify the value to 55:



Back to the CODESYS software, it could find that the first WORD value of the holding register has been changed to 55, indicating that the communication function is normal:



So far, the Modbus RTU slave function test of the C3351 device is completed.

## 5 Demo

### 5.1 Control requirement

Project name: Water conservancy valve control system

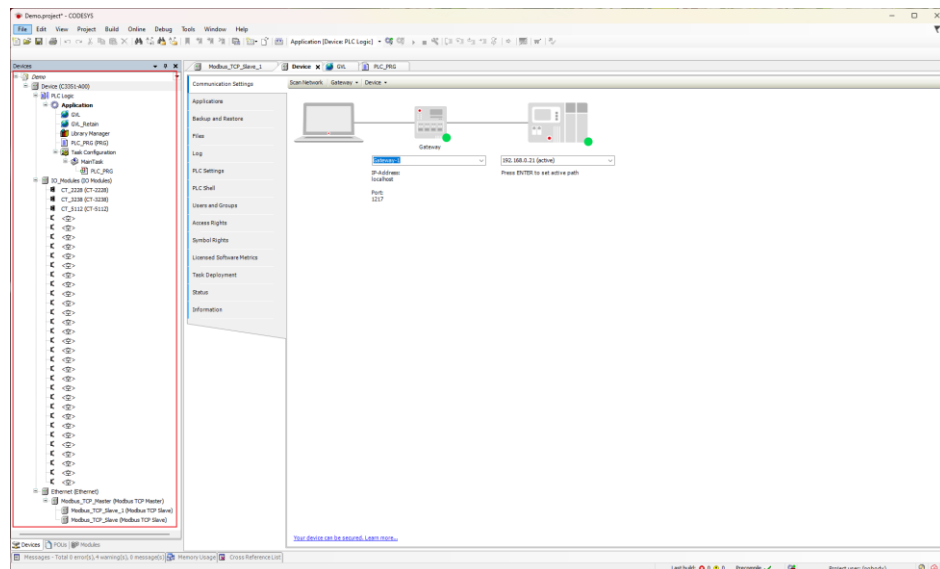
Project function: Controlling the opening of the drain valve according to the water level of the reservoir and water level growth rate.

### 5.2 Preparation

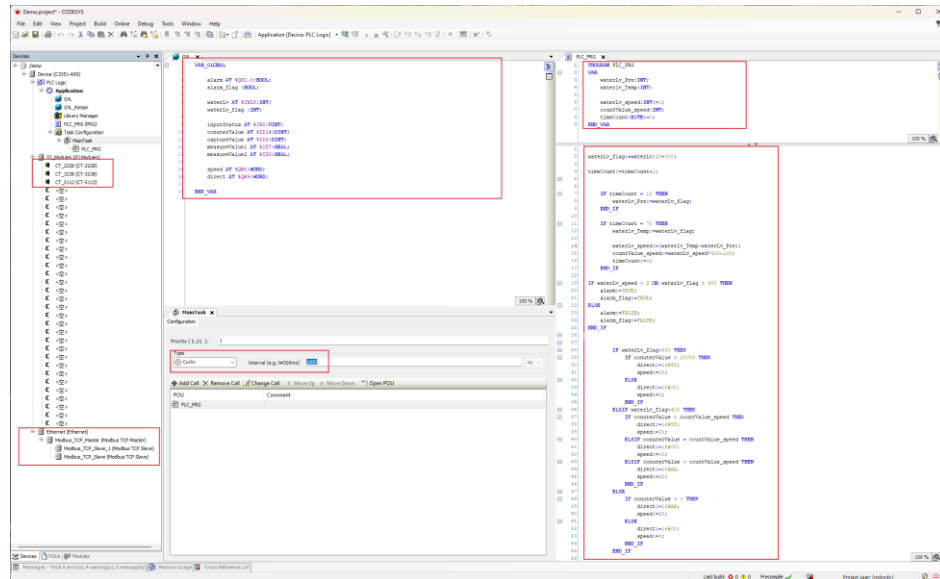
Project Analysis: According to the actual situation of C3351 and the module selection table: selecting module CT-2228 to be used as alarm controller, the alarm accepts 24V high level alarm; selecting module CT-3238 to be as water level sensor signal input; selecting module CT-5112 as valve opening value reading, and get data from encoder; using Modbus TCP master function to control the steering and speed of the valve motor. It is assumed that the motor controller D CAC only needs these two parameters to control the motor.

### 5.3 Project creation

Create the project as shown below



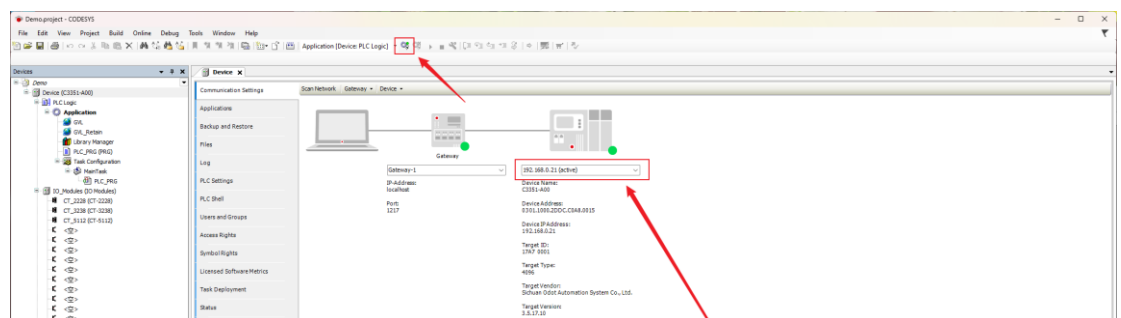
Programming and Setting parameters



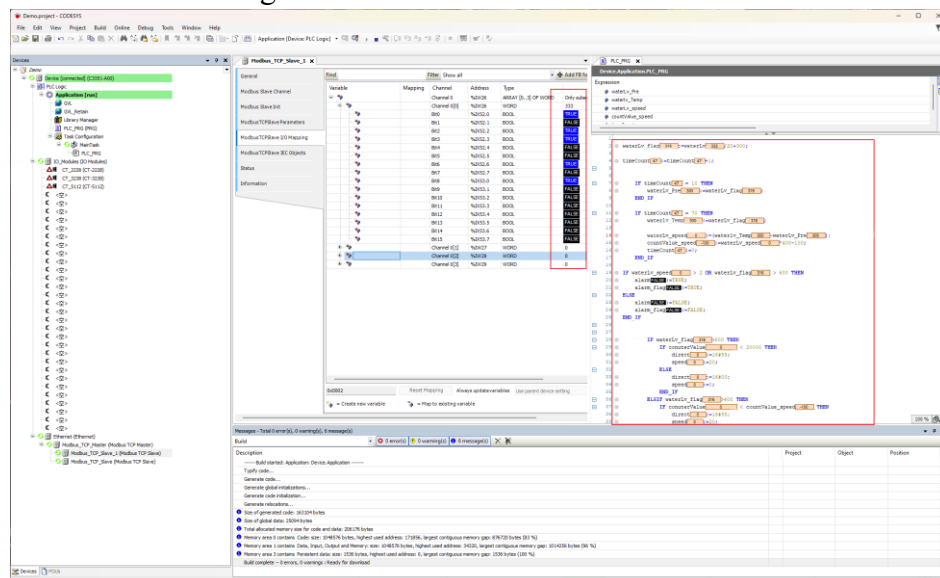
The above program can realize simple water conservancy valve control, but the results are not 100% accurate.

## 5.4 Program download and monitoring

Activate the device, then log in to the device.



It can monitor changes in variables in real time.



Above are all the demo, the relevant file can be found in the attached Demo.



## 6 Annex

### 6.1 Modbus-RTU Protocol Introduction

For user, it is important to understand that Modbus has 8 important function codes corresponding to 4 areas: 4 read, 2 write a single bit or register, and 2 write multiple bits or multiple registers (Address description adopts PLC address).

#### 6.1.1 Modbus Storage Area

The storage area of the controller (or Modbus device) involved in Modbus is identified by 0XXXX, 1XXXX, 3XXXX and 4XXXX.

| Storage ID | Name                     | Data Type | Read/Write | Storage Unit Address                        |
|------------|--------------------------|-----------|------------|---------------------------------------------|
| 0XXXX      | Output Coil              | Bit       | Read/Write | 00001~0XXXX,<br>XXXX: related to the device |
| 1XXXX      | Discrete Input           | Bit       | Read Only  | 10001~1XXXX,<br>XXXX: related to the device |
| 3XXXX      | Input Register           | Word      | Read Only  | 30001~3XXXX,<br>XXXX: related to the device |
| 4XXXX      | Output/Holding Registers | Word      | Read/Write | 40001~4XXXX,<br>XXXX: related to the device |

#### 6.1.2 Modbus Function Code

Modbus messages are relatively fixed, so it could know the structure after reading a few messages, and users can inquire about it when necessary.

(1) Read output coil status

Function Code: 01H

Master station inquiry message format:

| Address | Function Code | Start Address High Byte | Start Address Low Byte | Number of coils High Byte | Number of coils Low Byte | CRC  |
|---------|---------------|-------------------------|------------------------|---------------------------|--------------------------|------|
| 0x11    | 0x01          | 0x00                    | 0x13                   | 0x00                      | 0x25                     | xxxx |

Function: Read slave station output coil 0XXXX status.

Note: Some device coil start address is 00000, which corresponds to address 00001 in the device, and the sequence is postponed.

In this example: read the output coil of the slave station No. 0x11, the register start

address is 0x13=19, and the number of coils is 0x0025H=37.

Therefore, the function of this query message is: read the output coil 00019-00055 of the slave station No. 0x11 (17), A total of 37 coil status.

Slave station response format:

| Address | Function Code | Byte Count | Coil Status 19-26 | Coil Status 27-34 | Coil Status 35-42 | Coil Status 43-50 | Coil Status 51-55 | CRC  |
|---------|---------------|------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| 0x11    | 0x01          | 0x05       | 0xCD              | 0x6B              | 0xB2              | 0x0E              | 0x1B              | xxxx |

Function: Slave returns to output coil 0XXXX status.

(2) Read discrete input status

Function Code: 02H

Master station query message format:

| Address | Function Code | Start Address High Byte | Start Address Low Byte | Number of coils High Byte | Number of coils Low Byte | CRC  |
|---------|---------------|-------------------------|------------------------|---------------------------|--------------------------|------|
| 0x11    | 0x02          | 0x00                    | 0xC4                   | 0x00                      | 0x16                     | xxxx |

Function: Read the status of slave station input coil 1XXXX.

Note: Some equipment coil start address is 10000, which corresponds to the address of 10001 in the device, and the sequence is postponed.

In this example: read the input coil of the slave station No. 0x11, the starting address is 0x00C4=196, and the number of coils is 0x0016=22.

Therefore, the function of this query message is: read the input coil 10196-10217 of the slave station No. 0x11 (17), a total of 22 discrete input status.

Slave station response format:

| Address | Function Code | Byte Count | DI 10196-10203 | DI 10204-10211 | DI 10212-10217 | CRC  |
|---------|---------------|------------|----------------|----------------|----------------|------|
| 0x11    | 0x02          | 0x03       | 0xAC           | 0xDB           | 0x35           | xxxx |

Function: Slave returns to input coil 1 XXXX status.

(3) Read output/holding register

Function Code: 03H

Master station query message format:

| Address | Function Code | Register Start Address High Byte | Register Start Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | CRC |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|-----|
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|-----|

|      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 0x11 | 0x03 | 0x00 | 0x6B | 0x00 | 0x03 | xxxx |
|------|------|------|------|------|------|------|

Function: Read slave station holding register 4XXXX value.

Note: The starting address of some device registers is 40000, which corresponds to the address 40001 in the device, and the sequence is postponed.

In this example: read the holding register value of the slave station No. 0x11, the starting address is 0x006BH=107, and the number of registers is 0x0003.

Therefore, the function of this query message is: read the value of 3 holding registers 40107-40109 of the slave station No. 0x11 (17H).

| Address | Function Code | Byte Count | Register 40107 High Byte | Register 40107 Low Byte | Register 40108 High Byte | Register 40108 Low Byte | Register 40109 High Byte | Register 40109 Low Byte | CRC  |
|---------|---------------|------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|------|
| 0x11    | 0x03          | 0x06       | 0x02                     | 0x2B                    | 0x01                     | 0x06                    | 0x2A                     | 0x64                    | xxxx |

Function: The slave returns to the value of the holding register: (40107)=0x022B, (40108)=0x0106, (40109)=0x2A64

#### (4) Read the input register

Function code: 04H

Master station query message format:

| Address | Function Code | Register Start Address High Byte | Register Start Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | CRC  |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|------|
| 0x11    | 0x04          | 0x00                             | 0x08                            | 0x00                          | 0x01                         | xxxx |

Function: Read slave station input register 3XXXX value.

Note: In some devices, the register start address is 30000, which corresponds to the address 30001 in the device, and the sequence is postponed.

In this example: read the input register value of the slave station No. 0x11, the start address is 0x0008H, and the register number is 0x0001.

Therefore, the function of this query message: read the value of 1 input register 30008 of slave station No. 0x11 (17).

Slave station response format:

| Address | Function Code | Byte Count | Input Register 30008 High Byte | Input Register 30008 Low Byte | CRC  |
|---------|---------------|------------|--------------------------------|-------------------------------|------|
| 0x11    | 0x04          | 0x02       | 0x01                           | 0x01                          | xxxx |

Function: The slave station returns to the value of the input register 30008; (30008)=0x0101

### (5) Force a single coil

Function code: 05H

Master station query message format:

| Address | Function Code | Coil Address High Byte | Coil Address Low Byte | Break Flag | Break Flag | CRC  |
|---------|---------------|------------------------|-----------------------|------------|------------|------|
| 0x11    | 0x05          | 0x00                   | 0xAC                  | 0xFF       | 0x00       | xxxx |

Function: Force the 0XXXX value of slave station coil 0x01 (17). In some devices, the coil start address is 00000, which corresponds to the address 00001 in the device, and the sequence is postponed.

Break Flag = FF00, force the coil ON.

Break Flag = 0000, force the coil OFF.

Example: The starting address is 0x00AC=172. Force No. 17 slave station coil 0172 to ON status.

Function: Force No. 17 slave device coil 0172 ON and return to the original text

| Address | Function Code | Coil Address High Byte | Coil Address Low Byte | Break Flag | Break Flag | CRC  |
|---------|---------------|------------------------|-----------------------|------------|------------|------|
| 0x11    | 0x05          | 0x00                   | 0xAC                  | 0xFF       | 0x00       | xxxx |

### (6) Preset single holding register

Function Code: 06H

Master station query message format:

| Address | Function Code | Register Start Address High Byte | Register Start Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | CRC  |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|------|
| 0x11    | 0x06          | 0x00                             | 0x87                            | 0x03                          | 0x9E                         | xxxx |

Function: Preset single holding register 4XXXX value. In some devices, the coil start address is 40000, which corresponds to the address 40001 in the device, and the sequence is postponed.

Example: Preset the value of the single holding register 40135 of No. 17 slave device to 0x039E;

| Address | Function Code | Register Start Address High Byte | Register Start Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | CRC  |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|------|
| 0x11    | 0x06          | 0x00                             | 0x87                            | 0x03                          | 0x9E                         | xxxx |

|      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 0x11 | 0x06 | 0x00 | 0x87 | 0x03 | 0x9E | xxxx |
|------|------|------|------|------|------|------|

Function: Preset the No. 17 slave device single holding register 40135 value to 0x039E and return to the original text.

#### (7) Force Multi-coil

Function Code: 0FH

Master station query message format:

| Address | Function Code | Coil Start Address High Byte | Coil Start Address Low Byte | Number of coils High Byte | Number of coils Low Byte | Byte Count | Coil Status 20-27 | Coil Status 28-29 | CRC  |
|---------|---------------|------------------------------|-----------------------------|---------------------------|--------------------------|------------|-------------------|-------------------|------|
| 0x11    | 0x0F          | 0x00                         | 0x13                        | 0x00                      | 0x0A                     | 0x02       | 0xCD              | 0x00              | xxxx |

Function: Force multiple continuous coils 0XXXX to ON/OFF status.

Note: In some devices, the coil start address is 00000, which corresponds to the address 00001 in the device, and the sequence is postponed.

In this example: Force multiple continuous coils in slave station 0x11, the start address of the coil is 0x0013=19, and the number of coils is 0x000A=10.

Therefore, the function of this query message is: to force the value of 00019-00028 of the 10 coils of slave station No. 0x11 (17); CDH→00019-00026; 00H→00027-00028.

Slave station response format:

| Address | Function Code | Coil Start Address High Byte | Coil Start Address Low Byte | Number of coils High Byte | Number of coils Low Byte | CRC  |
|---------|---------------|------------------------------|-----------------------------|---------------------------|--------------------------|------|
| 0x11    | 0x0F          | 0x00                         | 0x13                        | 0x00                      | 0x0A                     | xxxx |

#### (8) Preset multiple registers

Function Code: 10H

Master station query message format:

| Address | Function Code | Start Register Address High Byte | Start Register Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | Byte Count | Data High Byte | Data Low Byte | Data High Byte | Data Low Byte | CRC  |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|------------|----------------|---------------|----------------|---------------|------|
| 0x11    | 0x10          | 0x00                             | 0x87                            | 0x00                          | 0x02                         | 0x04       | 0x01           | 0x05          | 0x0A           | 0x10          | xxxx |

Function: Preset multiple holding register values 4XXXX of the slave station.

Note: In some devices, the holding register start address is 40000, which corresponds to the address 40001 in the device, and the sequence is postponed.

In this example: Preset multiple holding register values of slave station 0x11, the register start address is 0x0087=135, and the number of coils is 0x0002=2.

Therefore, the function of this query message is: preset the value of 2 holding registers of slave station No. 0x11 (17);  
0105H→40135; 0A10H→40136.

Response Format:

| Address | Function Code | Start Register Address High Byte | Start Register Address Low Byte | Number of Registers High Byte | Number of Registers Low Byte | CRC  |
|---------|---------------|----------------------------------|---------------------------------|-------------------------------|------------------------------|------|
| 0x11    | 0x10          | 0x00                             | 0x87                            | 0x00                          | 0x02                         | xxxx |

## 6.2 Brief introduction of serial port network topology

### 6.2.1 RS232

RS232 is one of serial communication interfaces controlled by industry. It is widely used to connect computer serial interface with peripherals. RS232 using a signal and a signal transmission form, return lines were in the land of the three wire connection mode, can realize full-duplex communications, the transmission signals for single ended, the total transmission of easy to generate common-mode interference, so the noise resistance is weak, the transmission distance is limited, RS232 interface standards stipulated in the code element distortion maximum transmission distance is less than 4% under the condition of standard values of 50 feet (15 meters) (more than 15 m long distance communication, need to adopt modem), the maximum transmission distance is also associated with communication baud rate, in the process of practical application, if the transmission distance is far, Please reduce the baud rate. In order to reduce the electromagnetic interference from the outside during the signal transmission, please use the shielded cable as the communication cable.

RS232 interface standard specifies that TXD and RXD:

RS232 USES negative logic to transmit signals and takes the signal of -(3~15) V as logic "1". Take the signal of +(3~15) V as logical "0"; Voltages between -3 and +3V are meaningless, as are voltages lower than -15V or higher than +15V.

## RS232 Interface Classification:

DB9 header interface

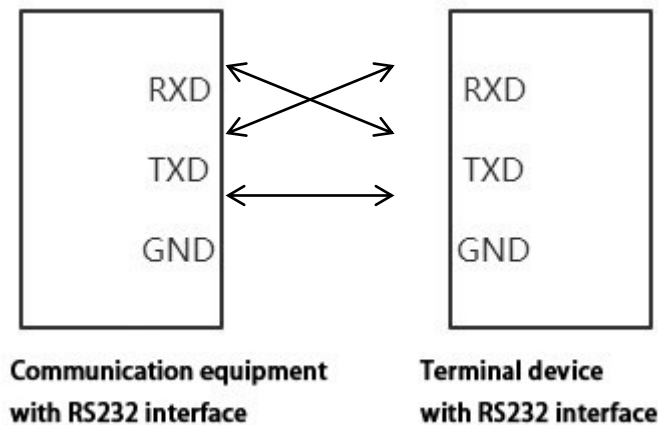


The top left corner is 1, the bottom right corner is 9

| 9-pin RS232 serial port (DB9) |      |                     |
|-------------------------------|------|---------------------|
| Pin                           | Name | Function            |
| 1                             | CD   | Carrier detect      |
| 2                             | RXD  | Receive data        |
| 3                             | TXD  | Send data           |
| 4                             | DTR  | Data terminal ready |
| 5                             | GND  | Signal ground       |
| 6                             | DSR  | Data ready          |
| 7                             | RTS  | Request to send     |
| 8                             | CTS  | Clear to send       |
| 9                             | RI   | Ring alert          |

As the RS232 interface has the above electrical characteristics, it can only realize point-to-point communication.

RS232 communication wiring diagram is shown in the figure below:



## 6.2.2 RS422

The full name of RS422 interface standard is "Electrical Characteristics of Balanced Voltage Digital Interface Circuit", which defines the characteristics of the interface circuit. RS422 adopts four-wire plus ground wire (T+, T-, R+, R-, GND), full-duplex, differential transmission, multi-point communication data transmission protocol. It USES a balanced transmission line that is unidirectional/non-reversible, with or without an enabling end. Because the receiver USES a high input impedance and the sending driver is stronger than RS232, it is allowed to connect multiple receiving nodes on the same transmission line, up to 10 nodes. That is, one Master device (Master), the rest are slave devices (Slave), and the slave devices cannot communicate with each other, so RS-422 supports point-to-many two-way communications.

The RS-422 has a maximum transmission range of 4,000 feet and a maximum transmission rate of 10Mb/s. The length of the balanced twisted pair is inversely proportional to the transmission rate, and the maximum transmission distance can be reached only if the rate is below 100KB /s. The highest rate of transmission can be obtained only over very short distances. Generally, the maximum transmission rate obtained on 100 meters long twisted pair is only 1Mb/s.

The RS-422 requires a terminal resistance that is approximately equal to the characteristic impedance of the transmission cable. In short distance transmission, no final resistance is required, that is, no final resistance is generally required below 300 meters. The final resistance is connected to the farthest end of the transmission cable.

In a master multi-slave network connection, all the sending terminals of the slave connect to the receiving terminals of the master station by daisy-chain. All the receiving ends of the slave

stations are connected by daisy-chain to the sending end which is finally connected to the master station.

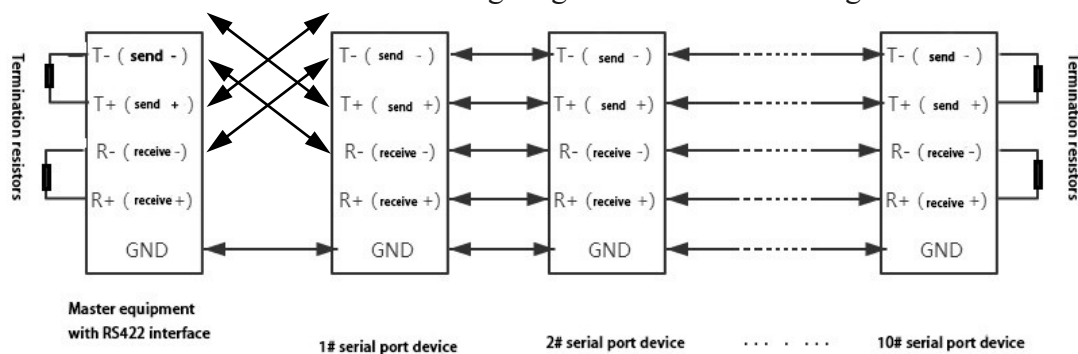
The RS422 pin definition:

| RS422 (9 Pin) |    | Function           | Remark       |
|---------------|----|--------------------|--------------|
| 3             | R- | Receive negative   | Must connect |
| 2             | T- | Send negative      | Must connect |
| 7             | R+ | Receiving positive | Must connect |
| 8             | T+ | Send positive      | Must connect |



The upper left corner is 1, the lower right corner is 9.

The RS422 communication wiring diagram is shown in the figure:



## 6.2.3 RS485

Since the RS-485 is developed from the RS-422, many electrical provisions of the RS-485 are similar to those of the RS-422. If they all adopt the balanced transmission mode, they all need to connect the final resistance on the transmission line, etc. The RS-485 can adopt two - wire and four - wire mode, and the two - wire system can realize real multi - point two - way communication.

RS485 is a standard for defining the electrical characteristics of drivers and receivers in a balanced digital multipoint system, using a combination of balanced drivers and differential receivers for enhanced common-mode dry resistance, i.e., good noise interference resistance. Because the

semi-duplex network composed of RS485 interface generally adopts the wiring mode of two-wire system and adopts differential signal to transmit data, the voltage difference between the two lines is  $-(2-6)V$  to represent logic "0", and the voltage difference between the two lines is  $+(2-6)V$  to represent logic "1".

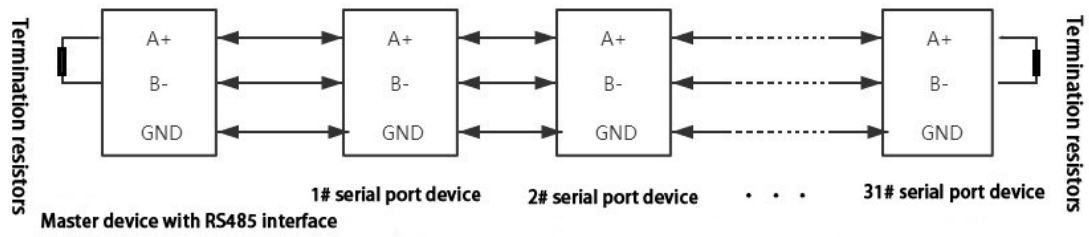
RS485 signal transmission distance is related to communication baud rate, the higher the baud rate, the shorter the transmission distance, under the condition of the baud rate is not higher than 100 KBPS, theory of the maximum communication distance is about 1200 meters, in the process of practical application, Due to electromagnetic interference and other factors, often cannot meet the maximum communication distance, if in a long-distance communication, please reduce the baud rate, to reduce the signal during transmission by external electromagnetic interference, please use twisted-pair shielded cable as a communication cable.

RS485 bus in the case of no trunk to support a maximum of 32 nodes, node and node between the "Daisy chain" connection mode, in the communication cable at both ends need to add terminal resistance, the resistance value is required to be approximately equal to the transmission cable characteristic impedance. In short distance transmission, no final resistance is required, that is, no final resistance is generally required below 300 meters. The final resistance is connected at the ends of the transmission cable.

RS485 9 pin definition:

| Pi<br>n | Name          | Function           | Remark       |
|---------|---------------|--------------------|--------------|
| 1       | Data-/B-/485- | Send positive      | Must connect |
| 2       | Data+/A+/485+ | Receiving positive | Must connect |
| 5       | GND           | Ground wire        |              |

The RS485 communication wiring diagram is shown in the figure:



---

**Odor Automation System Co., Ltd.**

Add: Plant No. 204 MianYang Comprehensive Bonded Zone, Eastern section of  
FeiYun Avenue, MianYang, Sichuan Province, China. 621000



Tel: +86-0816-2538289

Zip Code: 621000

Email: [sales@odotautomation.com](mailto:sales@odotautomation.com)

Web: [www.odotautomation.com](http://www.odotautomation.com)