ED-PLC2010

User Manual

by EDA Technology Co., Ltd

built: 2024-12-09

1 Hardware Manual

This chapter introduces the product overview, packing list, appearance, button, indicator and interface.

1.1 Overview

ED-PLC2010 is a programmable controller based on CODESYS. Depending on different application scenarios and user requirements, programmable logic systems with different specifications of RAM and eMMC can be selected.

- RAM can choose 1GB, 2GB, 4GB and 8GB
- eMMC can choose 8GB, 16GB and 32GB

> TIP
>
> As the CODESYS license of the product is stored in the OS by default, it is not recommended for users to flash to eMMC by themselves, and re-flashing to eMMC will result in the loss of the CODESYS license and affect the use.

ED-PLC2010 provides commonly used interfaces such as HDMI, USB, Ethernet, RS232 and RS485, and supports network access via Wi-Fi, Ethernet and 4G (optional); integrated supercapacitor backup power supply, RTC, Watch Dog, EEPROM, and encryption chip, which enhances the product's ease-of-use and reliability, and it's mainly applied to the industrial control field.

ED-PLC2010 supports the expansion of different types of I/O modules such as DI, DO, AI and AO, up to 32 I/O modules; integrated CODESYS Control runtime System, supports IEC 61131-3 programming standard and EtherCAT/Modbus TCP bus. Users can select the licenses of TargetVisu, WebVisu, Softmotion, CNC+Robotics, EtherCATMaster, Modbus TCP Master and OPC UA Server with different functions according to the actual needs.

1.2 CODESYS Software Introduction

CODESYS is a powerful industrial automation programming software, which is an open control programming platform mainly used for programming and controlling programmable logic controllers (PLC), industrial (IPC) and other devices. Its full name is "Controller Development System", which is widely used in the field of industrial automation, and is capable of realizing a variety of complex industrial control tasks, such as logic control, motion control, data processing, and so on.

CODESYS Features:

- CODESYS supports multiple programming languages, such as the five programming languages defined by the International Electrotechnical Commission (IEC) 61131 - 3 standard, including Ladder Diagram (LD), Function Block Diagram (FBD), Instruction List (IL), Structured Text (ST), and Sequential Function Chart (SFC).
- CODESYS has good cross-platform characteristics, it can run on many operating systems, such as Windows, Linux and so on. This cross-platform advantage allows users to choose the appropriate operating system environment for development according to actual needs.
- Provides a wealth of function libraries and function block libraries. These libraries cover a variety of functions in the field of industrial control, such as mathematical operations, communication protocol processing, motion control algorithms and so on. Users can directly call the functions and function blocks in these libraries, greatly reducing the development cycle.
- CODESYS supports a visual programming interface, which allows users to build program logic graphically. In terms of debugging, it provides powerful debugging tools, such as monitoring the values of variables online, executing the program in a single step, setting breakpoints, and so on. This enables developers to easily find and solve problems in their programs.

ED-PLC2010 supports CODESYS V3.5 SP19 and above.

1.3 Networking Application

Equipped with EtherCAT, Ethernet and RS485, RS232 interfaces, ED-PLC2010 can realize multi-level network communication, which can meet the application requirements of multiple scenarios. Typical application topology is shown below:
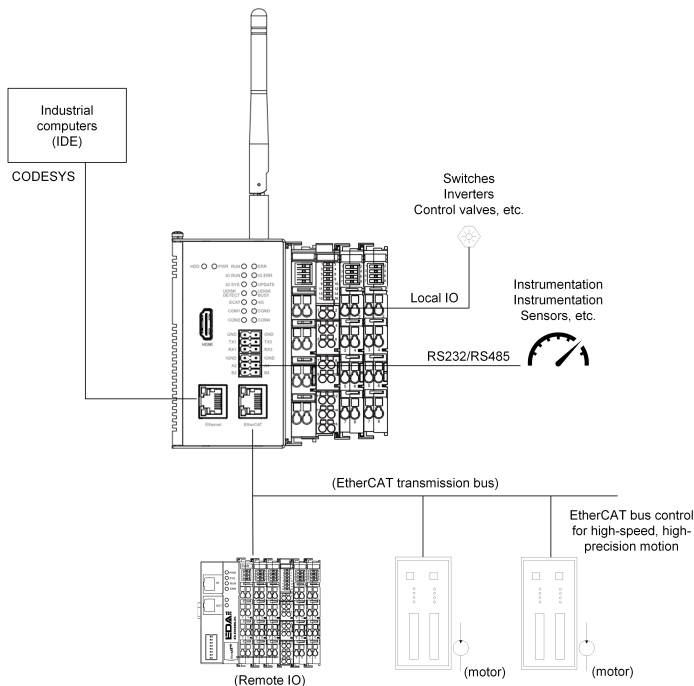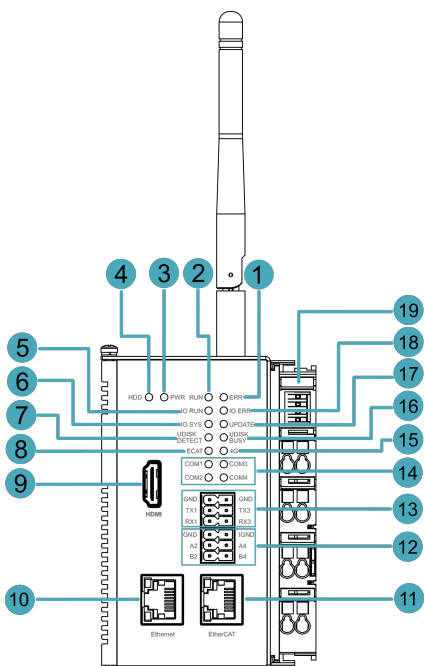
1.4 Packing List

- 1x ED-PLC2010 Unit
- [option Wi-Fi/BT version] 1x 2.4GHz/5GHz Wi-Fi/BT Antenna
- [option 4G version] 1x 4G/LTE Antenna

1.5 Appearance

Introducing the functions and definitions of interfaces on each panel.

1.5.1 Front Panel

This section introduces functions and definitions of front panel.

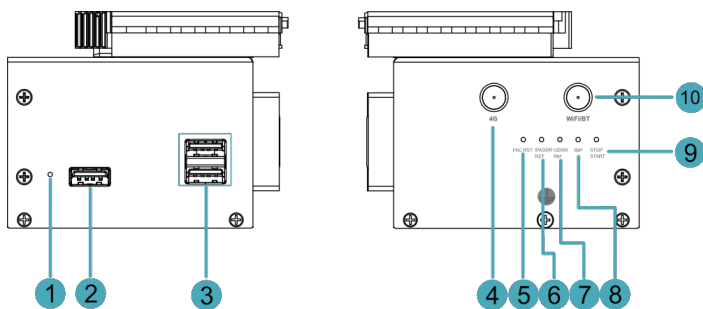| NO.	Function Definition
1	1 x red ERR indicator, which is used to see if there are any system errors.
2	1 x green RUN indicator, which is used to view the operational status of the device.
3	1 x red Power indicator, which is used to see the status of the device powering up and powering down.
4	1 x green HDD indicator, which is used to view the status of the device's eMMC read and write data.
5	1 x green IO RUN indicator, which is used to view the operational status of the IO expansion module.
6	1 x green IO SYS indicator, which is used to view the working status of the IO expansion module.
7	1 x green UDISK DETECT indicator, which is used to check the detection status of the USB flash driver.
8	1 x green ECAT indicator, which is used to check the connection status of the EtherCAT inputs
9	1 x HDMI, type A connector, compatible with HDMI 2.1 standard, resolution support 4K 60Hz.
10	1 x 10/100/1000M adaptive ethernet port, RJ45 connector, with led indicator. It can be used to access the network.
11	1 x EtherCAT OUT, RJ45 connector for connecting an EtherCAT slave.
12	2 x RS485, 6-Pin 3.5mm pitch Phoenix terminals with isolation protection, with ESD and surge protection, single signal defined as IGND/A/B.
13	2 x RS232, 6-Pin 3.5mm pitch Phoenix terminals, with ESD and surge protection, single signal defined as GND/TX/RX.
14	4 x Serial port indicators, green, for viewing the communication status of the serial port.
15	1 x green 4G signal indicator, which is used to check the status of the 4G signal.
16	1 x green UDISK BUSY indicator, which is used to check the mount status of a USB flash driver.
17	1 x red UPDATE indicator, which is used to check the status of program updates.
18	1 x red IO ERR indicator, which is used to see if there are any errors in the IO expansion module.
19	1 x Power supply module for powering the ED-PLC2010 and extended I/O modules.

1.5.2 Rear Panel

This section introduces interfaces and definitions of rear panel.
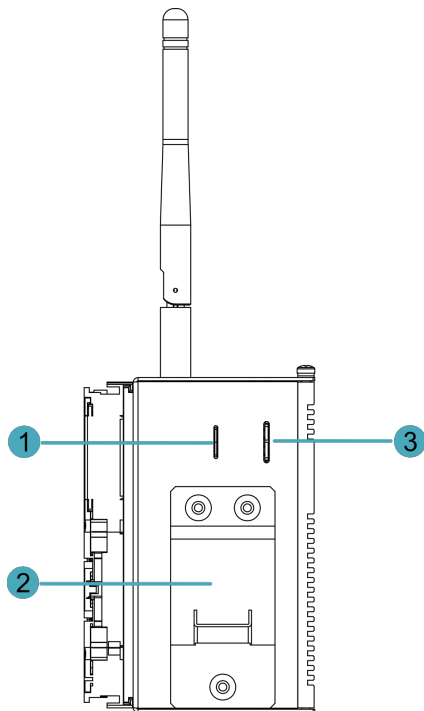
NO.	Function Definition
1	1 x Nano SIM slot, using to install a SIM card for acquiring 4G signals.
2	1 x DIN-rail bracket, install ED-PLC2010 Unit on the DIN-rail through the bracket.
3	1 x Micro-SD card slot, it supports the installation of SD card for storing user data.

1.5.3 Side Panel

This section introduces functions and definitions of side panel.

NO.	Function Definition
1	1 x Reset button, hidden button, press the button to restart the device.
2	1 x USB 2.0 port, type A connector, each channel supports up to 480Mbps.
3	2 x USB 3.0 ports, type A connector, each channel supports up to 5Gbps.
4	1 x 4G antenna port (optional), SMA connector, which can connect to 4G antenna.
5	1 x FAC RST button for restoring factory settings.
6	1 x IPADDR RST button for restoring the default IP address.

NO.	Function Definition
7	1 x UDISK RM button for safe removal of USB storage devices.
8	1 x IMP button for importing PLC programmes from a USB memory device or SD card.
9	1 x STOP/START button to start/stop the PLC when it is running.
10	1 x Wi-Fi/BT antenna port (optional), SMA connector, which can connect to Wi-Fi/BT antenna.

1.6 Button

The ED-PLC2010 device contains 6 buttons, all of which are hidden and silk-screened on the case as 'RESET', 'FAC RST', 'IPADDR RST', 'UDISK RM', 'IMP ', 'STOP START'.

Button	Function Definition
RESET	Press the button to restart the device
FAC RST	Press and hold for more than 5 seconds to restore the device to its factory settings, short press is invalid. Possible operation purpose: Delete application, delete codesys login user name and password, restore default configuration file, while RUN or ERR indicator will be off and then on.
IPADDR RST	Press and hold more than 5 seconds to restore the device IP as default IP, short press is invalid. Default IP address: 192.168.0.100 for Ethernet port and 192.168.1.100 for EtherCAT port.
UDISK RM	Press and hold for more than 1 second to uninstall the USB flash driver, wait for the indicator light 'UDISK BUSY' to go out, it means uninstallation is successful; short press is invalid.
IMP	Press and hold for more than 1 second to start importing the application from the USB stick, wait for the indicator 'UPDATE' to flash, then it means the import is successful; short press is invalid. Application placement directory: USB drive root directory "Application"
STOP START	Press and hold for more than 1 second to start/stop the programme alternately, when the programme stops running, the indicator light 'ERR' is always on; short press is invalid.

1.7 Indicator

Introducing the various statuses and meanings of indicators contained in ED-PLC2010 series device.

Indicator	Status	Description
PWR	On	The device has been powered on.
	Blink	Power supply of the device is abnormal, please stop the power supply immediately.
	Off	The device is not powered on.

Indicator	Status	Description
HDD	On	Device is reading and writing data via eMMC
	Off	Device is not reading or writing data via eMMC
RUN	On	Codesys runs fine
	Off	Codesys does not run fine
ERR	On	Press and hold the 'STOP START' button to stop the programme
	Off	No program is imported or the imported program is running normally
IO RUN	On	The user programme is running
	Blink	I/O expansion modules have been recognized
	Off	I/O expansion module not recognized
IO ERR	On	I/O expansion module running error
	Off	I/O expansion module running normally
IO SYS	On	I/O expansion module running abnormally
	Blink	I/O expansion module running normally
	Off	I/O expansion module not running
UPDATE	Blink	User programme updates
	Off	User programme not updated
UDISK DETECT	On	The device has detected the USB flash driver
	Off	The device has not detected the USB flash driver
UDISK BUSY	On	The USB flash driver is mounted to the device
	Off	The USB flash driver is not mounted to the device
ECAT	Slow Blink	EtherCAT communication is not connected
	Quick Blink	EtherCAT communication is connected
4G	Blink	4G connection is normal
	Off	4G connection is abnormal
Yellow indicator of Ethernet port	On	The data transmission is abnormal.
	Blink	Data is being transmitted over the Ethernet port.
	Off	The Ethernet connection is not set up.
Green indicator of Ethernet port	On	The Ethernet connection is in the normal state.

Indicator	Status	Description
	Blink	The Ethernet connection is abnormal.
	Off	The Ethernet connection is not set up.
COM1~COM4	On/Blink	Data is being transmitted.
	Off	The device is not powered on or there is no data transmission.

1.8 Interface

Introducing the definition and function of each interface in the product.

1.8.1 Card Slot

ED-PLC2010 series device includes an SD card slot and a Nano SIM card slot.

1.8.1.1 SD Card Slot

The silkscreen on the case of Micro SD card slot is " " , which is used to install SD card for storing user data.

1.8.1.2 SIM Card Slot (optional)

The silkscreen on the case of Nano SIM card slot is " " , which is used to install SIM card for obtaining 4G signals.

1.8.2 Power Supply Interface

The ED-PLC2010 device contains 1 power input module, including system power interface and Field power interface, with an input voltage of DC 24V (±20%) and an output system current of up to 2A.

Power module port definition:
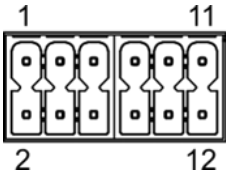
Pin ID	Pin Name	Pin ID	Pin Name
1	24V SYS	2	0V SYS
3	24V Field	4	24V Field
5	0V Field	6	0V Field
7	PE	8	PE

1.8.3 RS485/RS232 Interface

ED-PLC2010 series devices include 2 RS485 interfaces and 2 RS232 interfaces, with RS485 single interface silk-screened as "IGND/A/B" and RS232 single interface silk-screened as "GND/TX/RX".

Pin Definition

Terminal pins are defined as follows:

Pin ID	Pin Name
1	RS485-2_B
2	RS485-4_B
3	RS485-2_A
4	RS485-4_A
5	IGND
6	IGND
7	RS232-1_RX
8	RS232-3_RX
9	RS232-1_TX
10	RS232-3_TX
11	GND
12	GND

The pin names of CM4 corresponding to RS485/RS232 interface are as follows:

Signal	CM4 GPIO Name	CM4 Pin Out
RS485-2_B	GPIO13	UART5_RXD
RS485-4_B	GPIO9	UART4_RXD
RS485-2_A	GPIO12	UART5_TXD
RS485-4_A	GPIO8	UART4_TXD
RS232-1_RX	GPIO5	UART3_RXD
RS232-3_RX	GPIO1	UART2_RXD
RS232-1_TX	GPIO4	UART3_TXD
RS232-3_TX	GPIO0	UART2_TXD

Connecting Cables

Schematic diagram of RS485 wires is as follows:
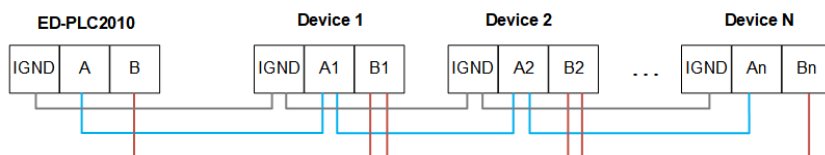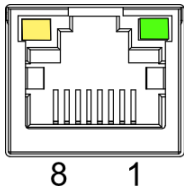
Schematic diagram of RS232 wires is as follows:

1.8.4 1000M Ethernet Interface

The ED-PLC2010 device includes one adaptive 10/100/1000M Ethernet port, and the silkscreen is"Ethernet". The connector is RJ45, which is used to access the Ethernet. The pins corresponding to the terminals are defined as follows:

	Pin ID	Pin Name
	1	TX1+
	2	TX1-
	3	TX2+
	4	TX2-
	5	TX3+
	6	TX3-
	7	TX4+
	8	TX4-

1.8.5 EtherCAT Interface

ED-PLC2010 series device includes one EtherCAT port, the silkscreen is "EtherCAT", The connector is RJ45, which is used to connect EtherCAT slaves.

1.8.6 HDMI Interface

ED-PLC2010 series device includes one HDMI port, the silkscreen is "HDMI". The connector is type A HDMI, which can connect to an HDMI display and supports up to 4Kp60.

1.8.7 USB 2.0 Interface

ED-PLC2010 series device includes one USB 2.0 port, the silkscreen is " ". The connector is type A USB, which can connect to standard USB 2.0 peripherals and supports up to 480Mbps.

1.8.8 USB 3.0 Interface

ED-PLC2010 series device includes 2 USB 3.0 ports, the silkscreen is " ". The connector is type A USB, which can connect to standard USB 3.0 peripherals and supports up to 5Gbps.

1.8.9 Antenna Interface (optional)

The ED-PLC2010 contains up to 2 SMA antenna ports, the silkscreens are "4G" and "WiFi/BT". They can be connected to the 4G antenna and Wi-Fi/BT antenna.。

1.8.10 Local Extended IO Interface

ED-PLC2010 supports expansion of different types of I/O modules such as DI, DO, AI and AO, up to 32 I/O modules.

Model	Description
ED-EIO8XP	8-channel digital input module (PNP)
ED-EIO8XN	8-channel digital input module (NPN)
ED-EIO16XP	16-channel digital input module (PNP)
ED-EIO16XN	16-channel digital input module (NPN)
ED-EIO8YP	8-channel digital output module (PNP)
ED-EIO8YN	8-channel digital output module (NPN)
ED-EIO16YP	16-channel digital output module (PNP)
ED-EIO16YN	16-channel digital output module (NPN)
ED-EIO4YR	4-channel digital output module (Relay)
ED-EIO4ADV	4-channel analog input module (voltage), -5~5V/0~10V/-10~10V, configurable
ED-EIO4ADA	4-channel analog input module (current), 4-20mA/0-20mA, configurable
ED-EIO8ADA	8-channel analog input module (current), 4-20mA/0-20mA, configurable
ED-EIO4AD	4-channel analog input module (voltage/current mixed), -5~5V/0~10V/-10~10V/4-20mA/0-20mA, configurable
ED-EIO4DAV	4-channel analog output module (voltage), -5 ~ 5V/0 ~ 10V/-10 ~ 10V, configurable
ED-EIO4DAA	4-channel analog output module (current), 4-20mA/0-20mA, configurable
ED-EIO4RTD	4-channel RTD Module
ED-EIO4TC	4-channel TC Module
ED-EIO2HCD	2-channel High Speed Counter Module
ED-EIOPWR	Power Expansion Supply Module

Model	Description
ED-EIOTERM	Bus End Cover

1.9 Supercapacitor

ED-PLC2010 integrates a super capacitor backup power supply with the following functions:

- Power down data saving: When the PLC device suddenly loses power, the super capacitor can provide a short power support for some key circuits in the PLC. Depending on the load, it will last for about one minute if the load is small, and about 30s if the load is large. Some important data (such as the current state of the program operation, the current values of the counters and timers, etc.) can be stored in it and will not be lost due to a sudden power failure. This is critical for industrial applications that need to be able to quickly resume production processes after a power failure without losing critical information.
- Maintaining the real-time clock: The real-time clock in a device is important for functions such as recording the chronological sequence of events, and the supercapacitor can provide enough power for the real-time clock circuitry to continue to function properly for a period of time in the event of a mains power failure.
- Helping device to shut down smoothly: Supercapacitor can also help equipment to carry out some of the necessary, organized shutdown operations in the event of a power failure. It can provide energy for the PLC internal control circuits, so that the equipment can be in accordance with the pre-set program to safely shut down some of the running function modules, such as orderly shutdown of communication ports, stop the execution of some complex calculations and so on.

> TIP
>
> The supercapacitor needs to be fully charged after the device has been powered up for at least five minutes, and a full charge ensures proper functioning.

2 Installing Components

This chapter describes how to install optional components.

2.1 Install Antenna (optional)

If the selected ED-PLC2010 series device includes 4G and Wi-Fi functions, the antenna need to be installed before using the device.

Preparation:

The corresponding antennas have been obtained from the packaging box. If there are multiple antennas, they can be distinguished by the labels on the antennas.

Steps:

1. Locate the antenna port where the antenna is to be installed, as shown in the red box in the figure below.

2. Align the ports on both sides of the device and the antenna, then tighten them clockwise to ensure that they will not fall off.

2.2 Install Micro SD Card

Preparation:

The Micro SD card has been obtained.

Steps:

1. Locate the Micro SD card slot where the Micro SD is to be installed, as shown in the red box below.
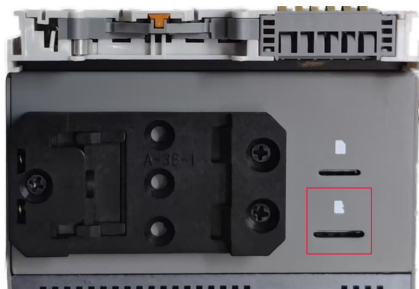
2. Insert the Micro SD card with the chip side down into the corresponding card slot, and hear a sound to indicate that the installation is complete.
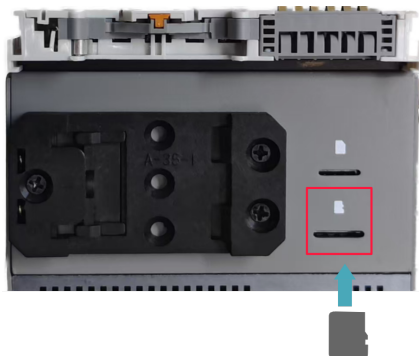
2.3 Install Nano SIM Card (optional)

1. Preparation:
   The 4G Nano SIM card has been obtained.
   Steps:
   1. Locate the Nano SIM card slot where the Nano SIM card is to be installed, as shown in the red box below.
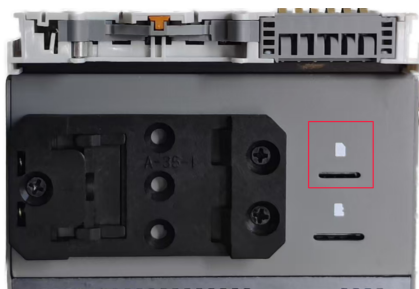
2. Insert the Nano SIM card with the chip side up into the corresponding card slot, and hear a sound to indicate that the installation is complete.
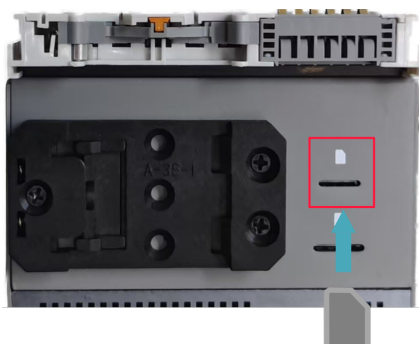
3 Installing Device

This chapter introduces how to install the device.

3.1 PLC equipment installation

When the ED-PLC2010 series device leaves the factory, the DIN-rail bracket is installed as standard by default.

Steps:

1. Face the side of the DIN-rail bracket to the rail to be installed, and the upper side of the bracket is sleeved on the upper side of the rail.

Sleeve on the upper side of the track
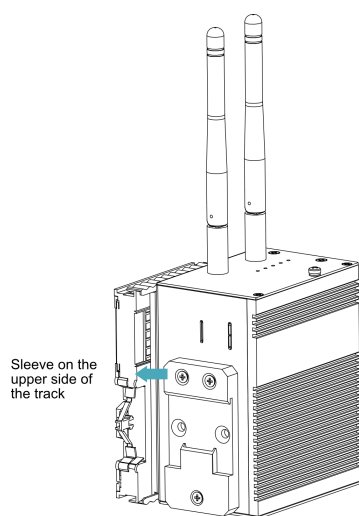
2. Press down the buckle on the lower side of the DIN-rail bracket until the bracket can be buckled on the rail, and the installation is completed.
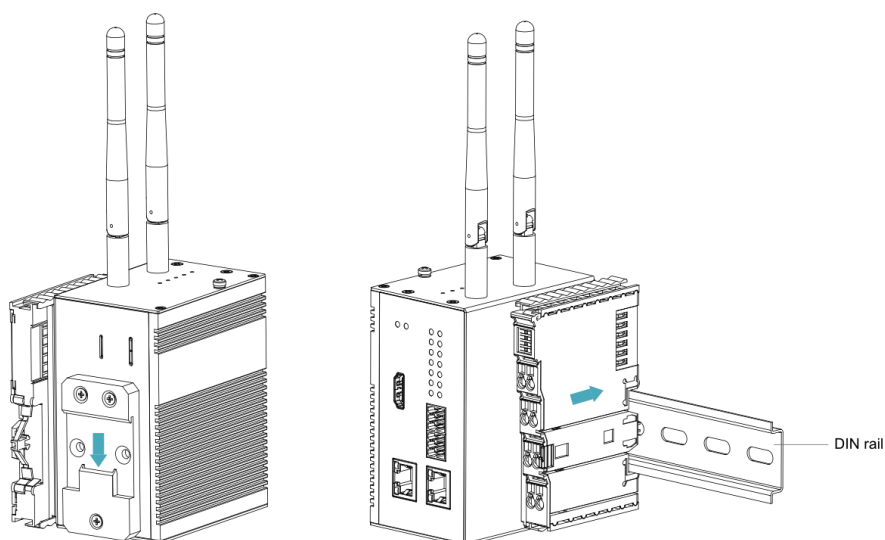
DIN rail

3.2 I/O Modules Installation

The I/O modules support mounting on DIN rails.

Steps:

The following is an example of the installation of an 8-terminal module only.

1. Align the notches in the I/O module.
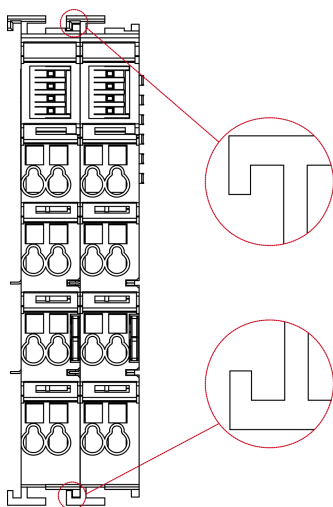
2. Secure the I/O module to the DIN rail by pushing the I/O module in the direction of the arrow onto the DIN pin.

DIN rail

Snap pin
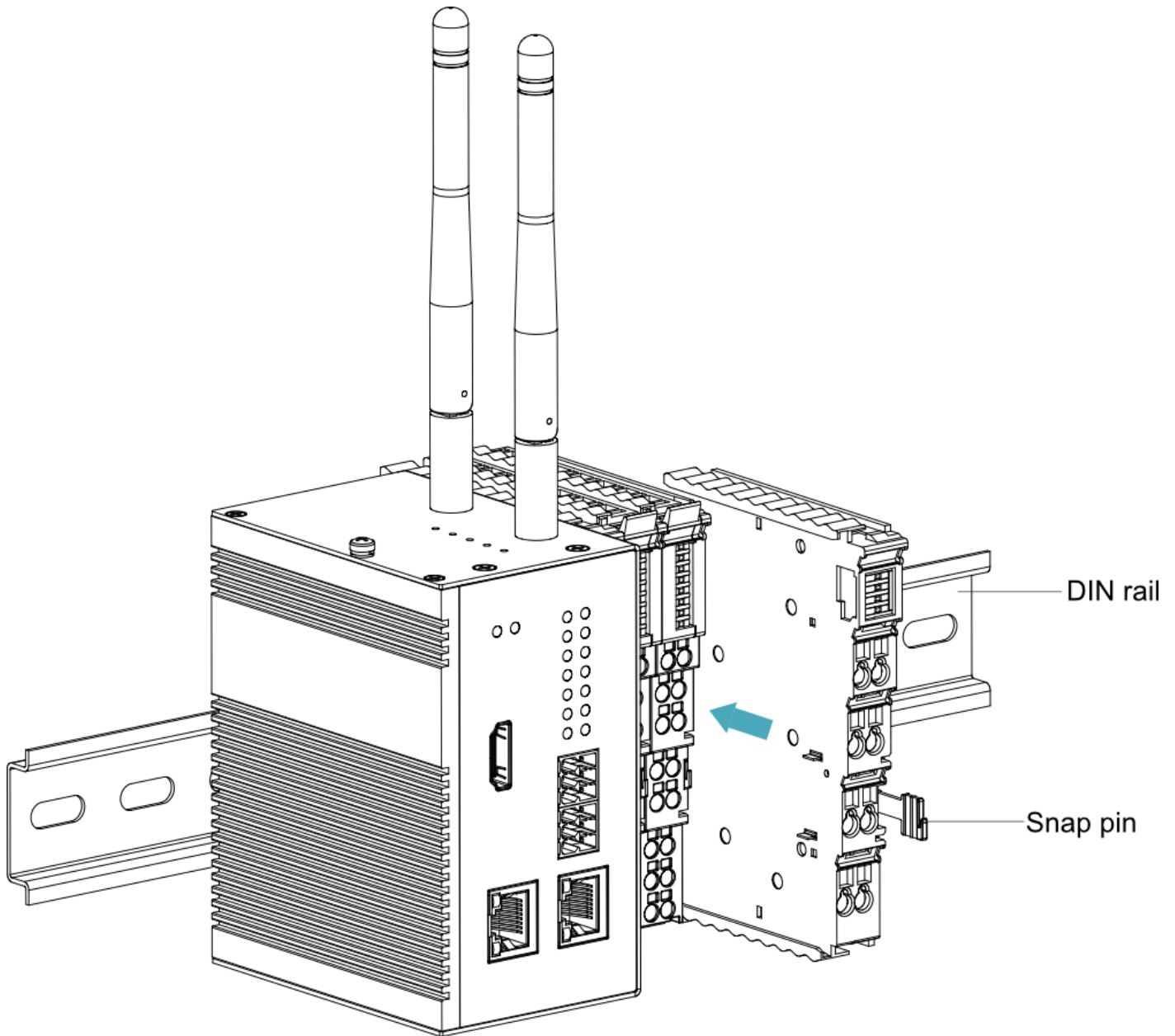
4 Booting The Device

This chapter introduces how to connect cables and boot the device.

4.1 Connecting Cables

This section describes how to connect cables.

Preparation:

- Accessories such as display, mouse, keyboard，IO Expansion Modules and power adapter that can be used normally have been ready.
- A network that can be used normally.
- Get the HDMI cable and network cable that can be used normally.

Schematic diagram of connecting cables:

Please refer to 1.8 Interface for the pin definition of each interface and the specific method of wiring.
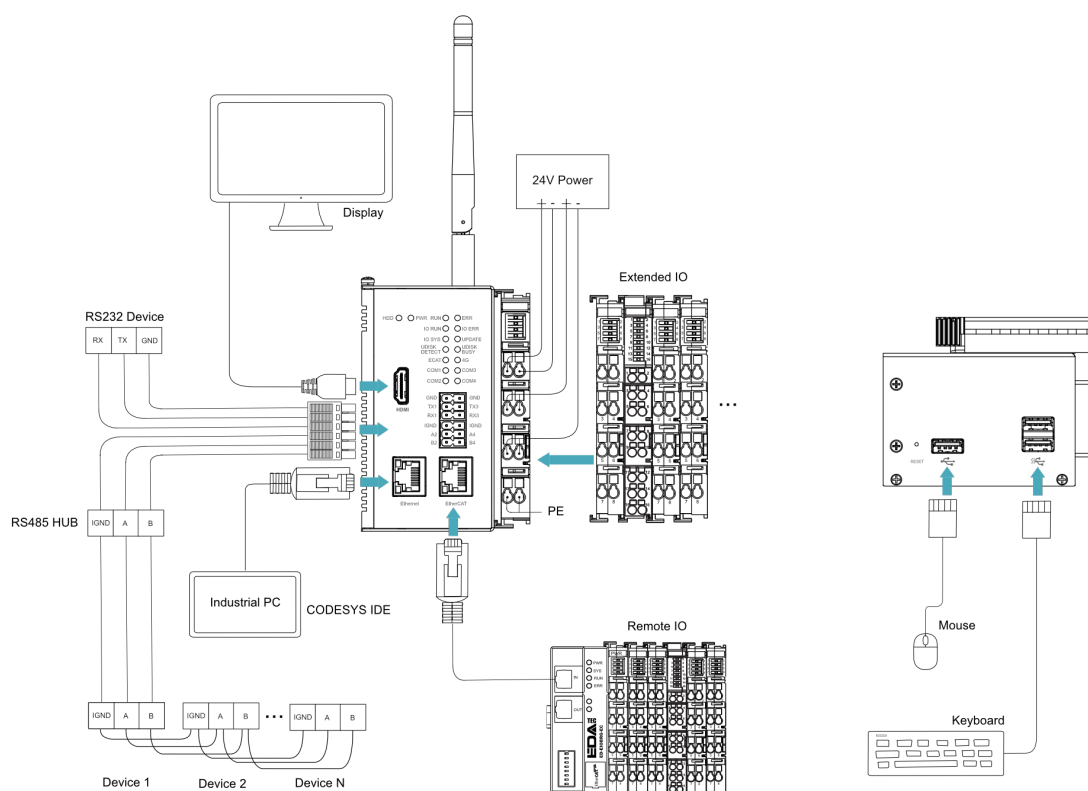
4.2 Booting The System For The First Time

ED-PLC2010 series devices do not have a power switch. After connecting to the power supply, the red PWR lamp will light up, indicating that the device has been normally powered and the system will start.

> **TIP**
>
> Default username is pi, Default password is raspberry.

4.2.1 Raspberry Pi OS (Desktop)

If the Desktop version of the system is installed when the product leaves the factory, after the device is started, it will directly enter the desktop, as shown in the following figure.
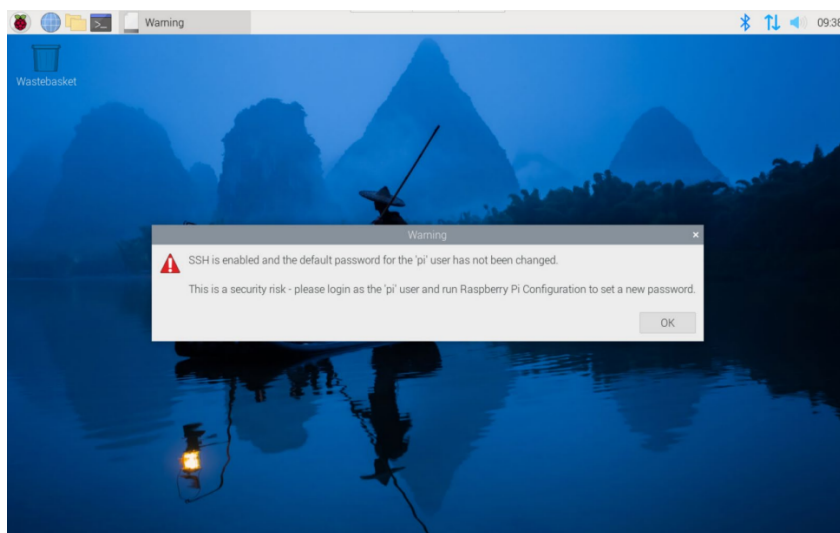
4.2.2 Raspberry Pi OS (Lite)

If the Lite version of the system is installed at the factory, the default username pi will be used to automatically log in after the device is started, and the default password is raspberry. The following figure shows that the system has been started normally.

5 CODESYS Programming

This chapter introduces how to go about programming with the codesys IDE.

> **TIP**
>
> As the CODESYS license of the product is stored in the OS by default, it is not recommended for users to flash to eMMC by themselves, and re-flashing to eMMC will result in the loss of the CODESYS license and affect the use.

5.1 CODESYS software download and installation

> **TIP**
>
> The installed CODESYS IDE version needs to be 3.5.19 and above, and the PC operating system requires Windows 10 or Windows 11 (64-bit recommended).

Steps:

1. Download the installation package from the official CODESYS website, download URL：https://store.codesys.com/de/. (https://store.codesys.com/de/)

> **TIP**
>
> The first time you enter the official website to download, you need to register and log in to your account.

2. Right-click on the downloaded installation package and run it as administrator.
3. Click "Install" in the installation page that opens, and just keep the default configuration during the installation process.
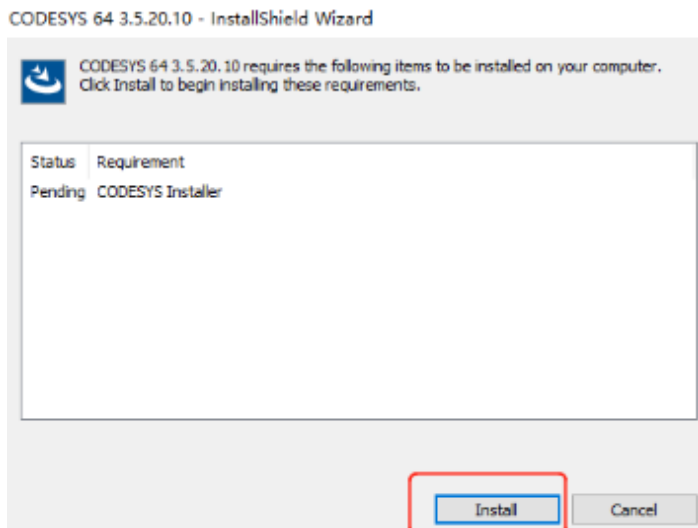
4. When the installation is complete, click "Finish" to close the installation page.
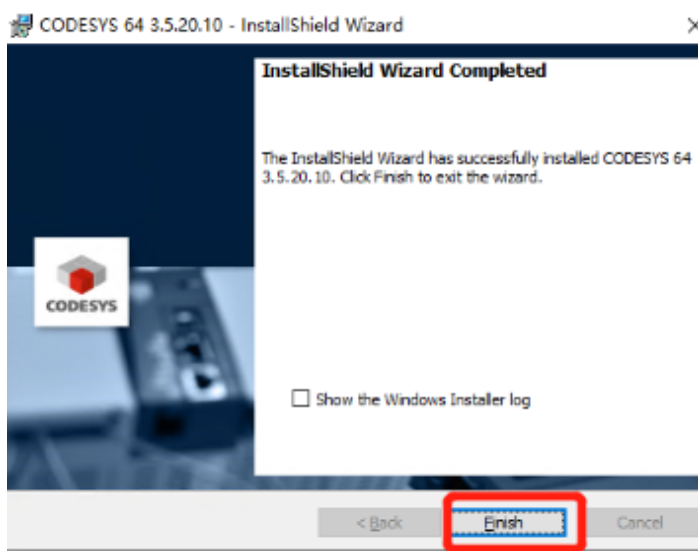
5.2 Obtaining and Installing Device File

Before connecting the device via CODESYS, you need to download and install the device file.

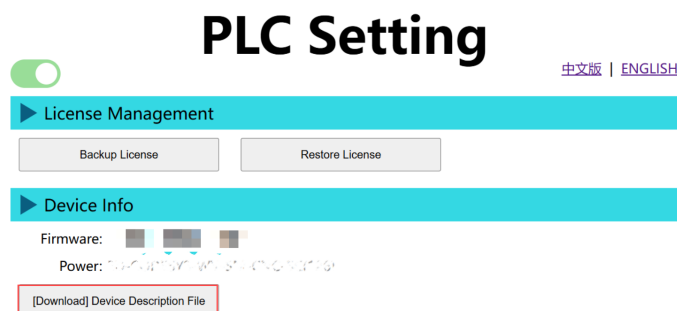## 5.2.1 Get device description file

> TIP
>
> The default IP address of Ethernet port is 192.168.0.100, and the IP address of EtherCAT port is 192.168.1.100, if you need to modify, please refer to Configuring Ethernet IP.

Preparation:

- A CODESYS authorised device has been acquired.
- A working network cable has been obtained.
- A working PC has been acquired and is on the same network segment as the device.

Steps:

1. Connect the Ethernet network port of the ED-PLC2010 to a PC computer via a network cable to power up the device.
2. Enter the default IP address 192.168.0.100 of the Ethernet port of ED-PLC2010 into the browser and enter "PLC Setting".
3. Click "[Download] Device Description File"in "Device Information" to download the corresponding device description file in ".xml" format.

PLC Setting

中文版 | ENGLISH

▶ License Management

| Backup License | Restore License |

▶ Device Info

Firmware:

Power:

[Download] Device Description File

> TIP
>
> Also available directly in the document ED-PLC2010 Device Description File.

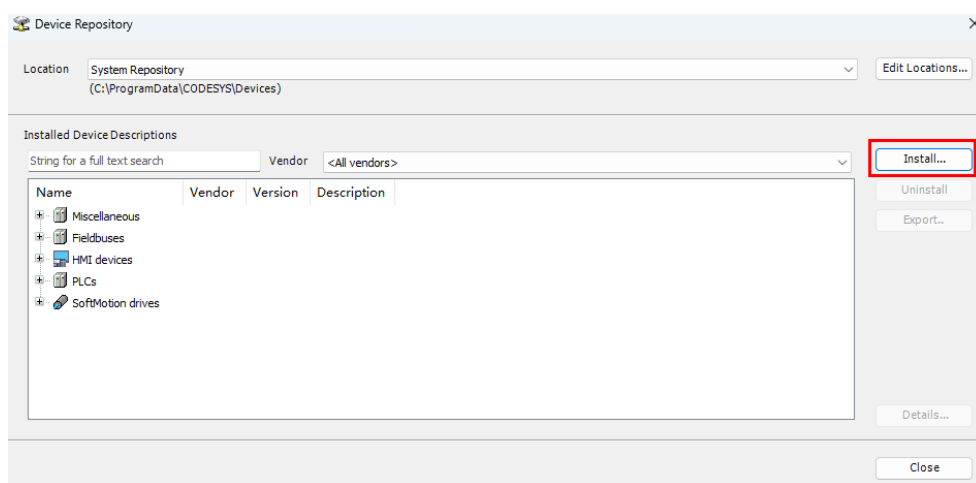## 5.2.2 Installing the Device File

Preparation:

- A PC with CODESYS software version V3.5 SP19 (64bit) and an IP address on the same network segment as the device.
- A working network cable has been obtained.
- One ED-PLC2010 has been licensed by CODESYS and the corresponding device file has been obtained.
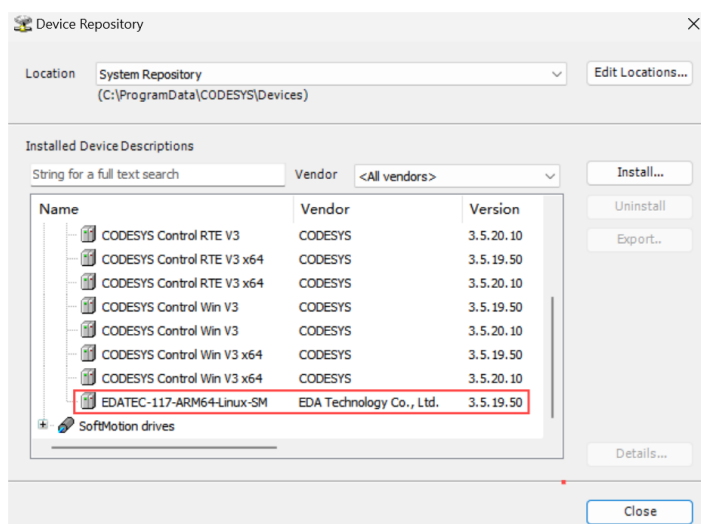
Steps:

1. Double-click the CODESYS icon on the PC desktop to open the CODESYS software. Select "Tools" → "Device Repository" in the menu bar.
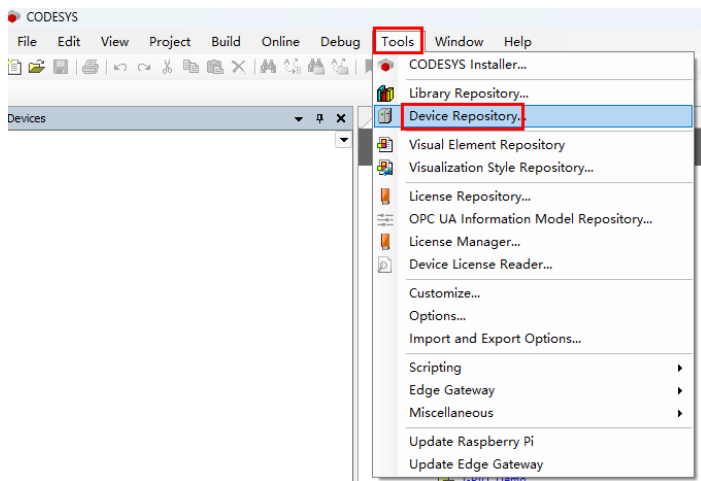
2. In the "Device Repository" pane, click "Install", select the device file and click "Open" to install it.

3. After successful installation, you can see that the device file has been added successfully in the "Device Repository".

5.3 Hardware configuration

Preparation:

- A PC with CODESYS software version V3.5 SP19 (64bit) and an IP address on the same network segment as the device.
- The device file has been installed.
- Local I/O modules have been connected to the ED-PLC2010 via E-bus contacts.
- The remote I/O module has been connected to the EtherCAT port of the ED-PLC2010 via a network cable.
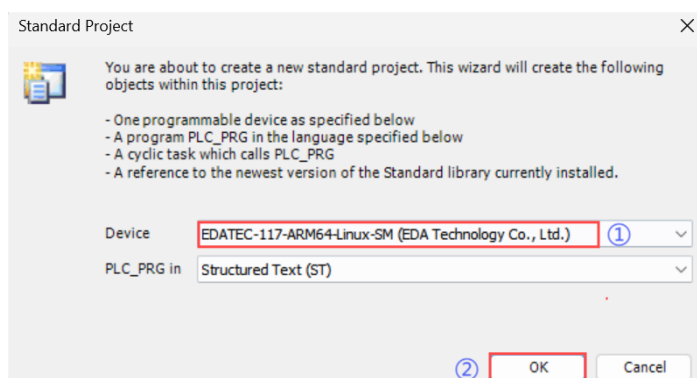
5.3.1 Create a new project and connect the device

Steps:

1. Power up the ED-PLC2010 and remote I/O module and open the CODESYS software on the PC. In the menu bar, select "File"-> "New Project", open the "New Project" pane, create a standard project.
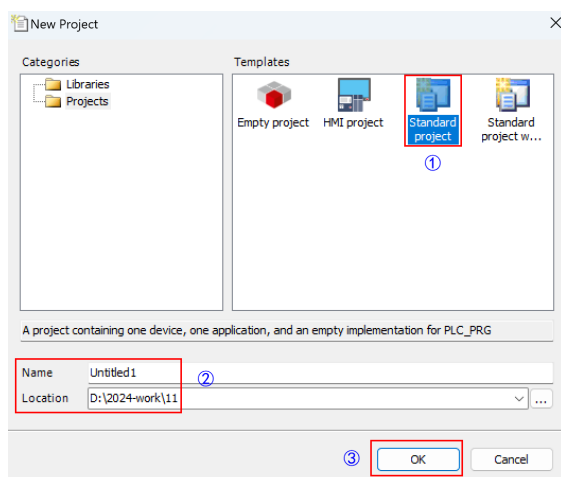
2. Select the device for which the device file has been installed and click OK.

3. Double left-click the device, select "Scan for Networks" on the right, then select the scanned device, and finally click "OK".
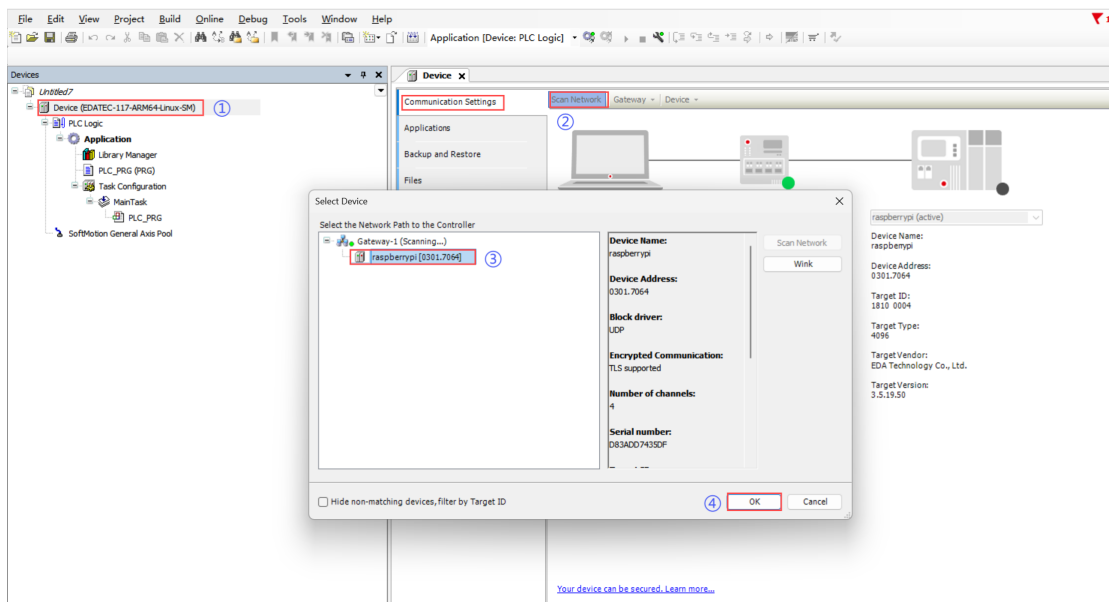
> **TIP**
>
> If the device user login pop-up appears, you will need to log in with your username and password or follow the prompts to register.

6. As shown in the following figure, it indicates that the device is connected.
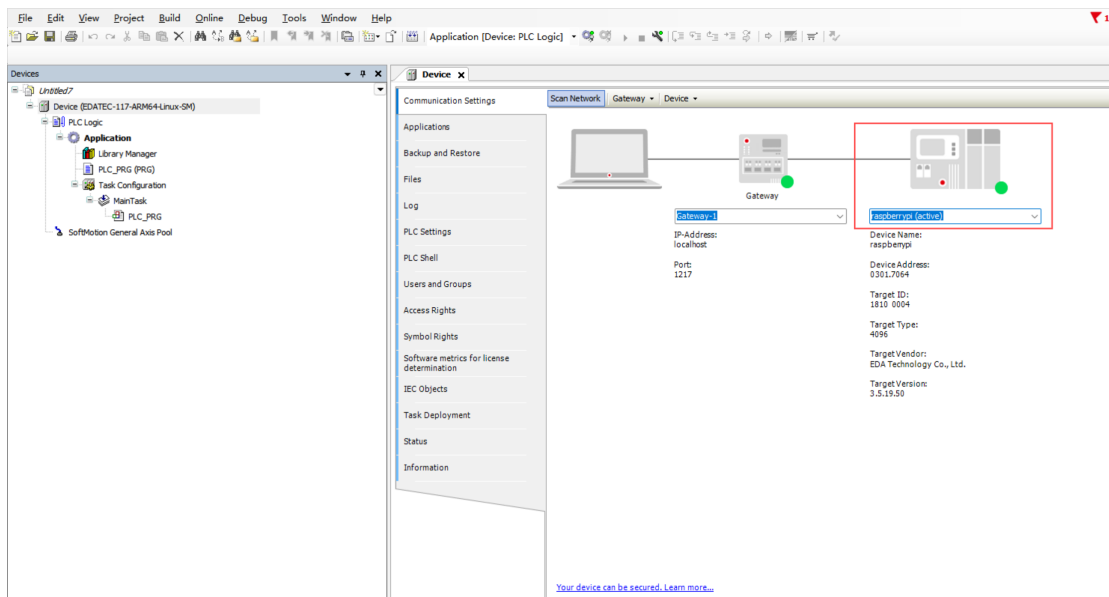
5.3.2 Adding Local I/O and Remote I/O Modules

Steps:

1. Right-click "Device" and select "Add Device" in the menu to add the master EtherCAT Master.
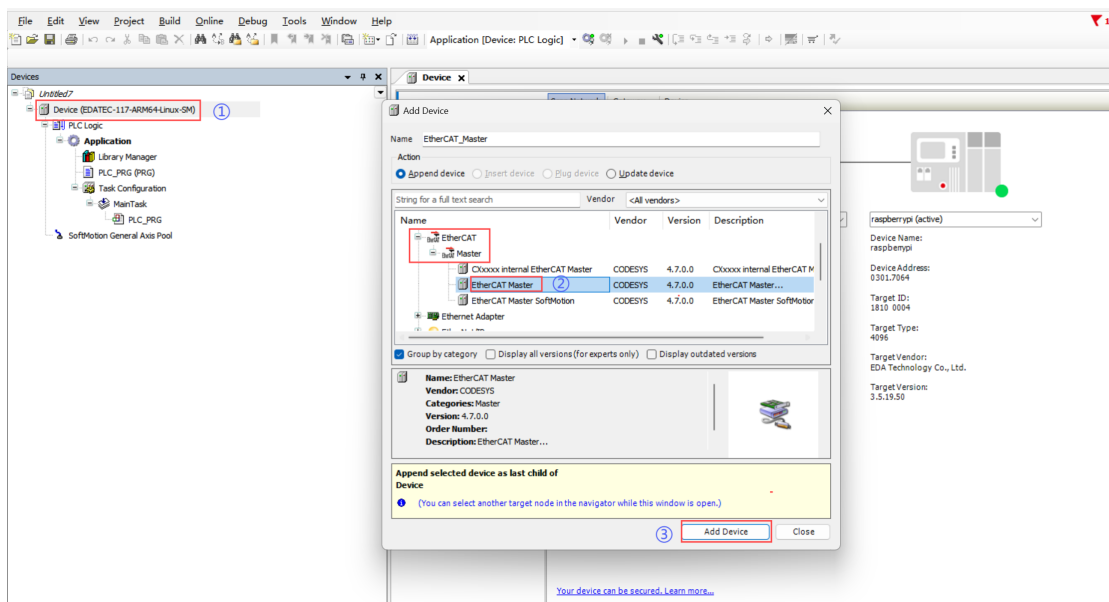
2. Double-click on the EtherCAT master device to set the source address (the exact name can be seen in the pc network manager).
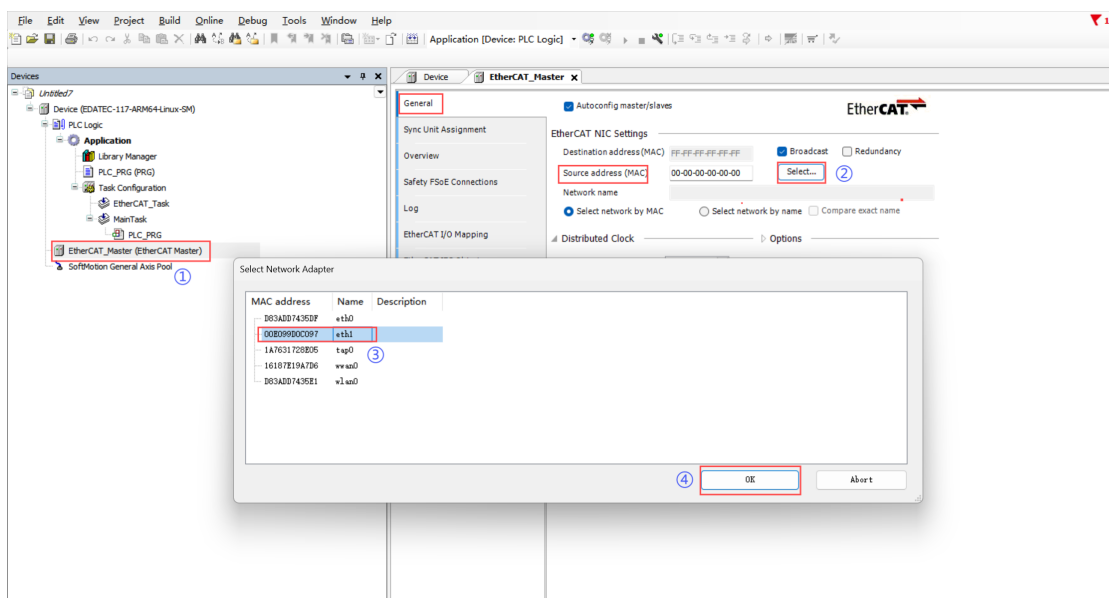
3. Click on the EtherCAT master device, select "Scan for Devices" in the right-click menu, and copy all devices to the project after scanning is completed.
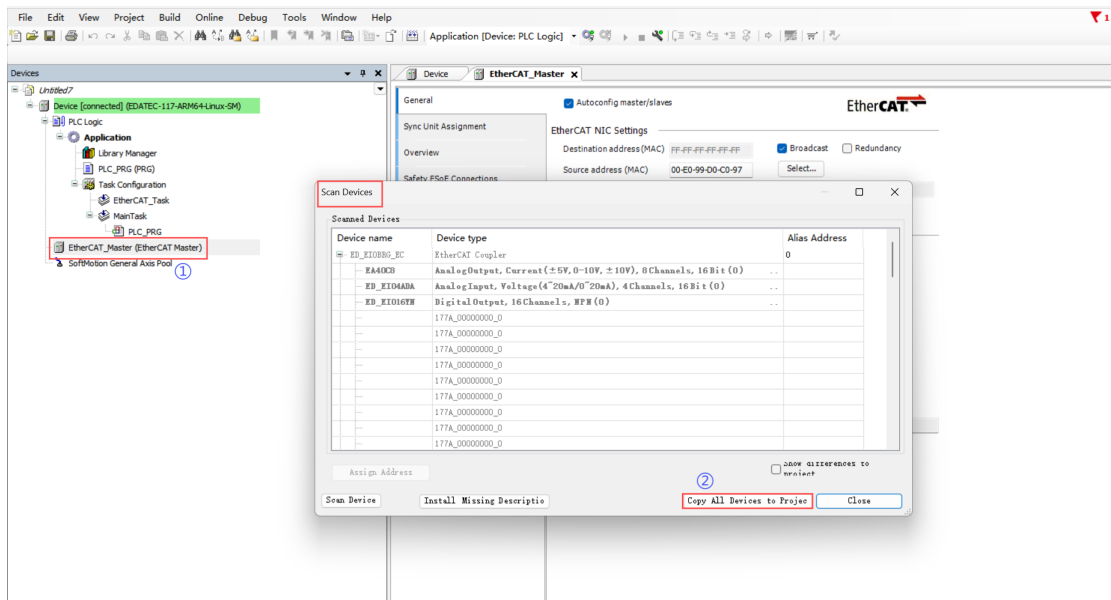
4. To set up the slave, double-click on the slave, enable "Expert settings", and enable " Select DC" and "Sync0".
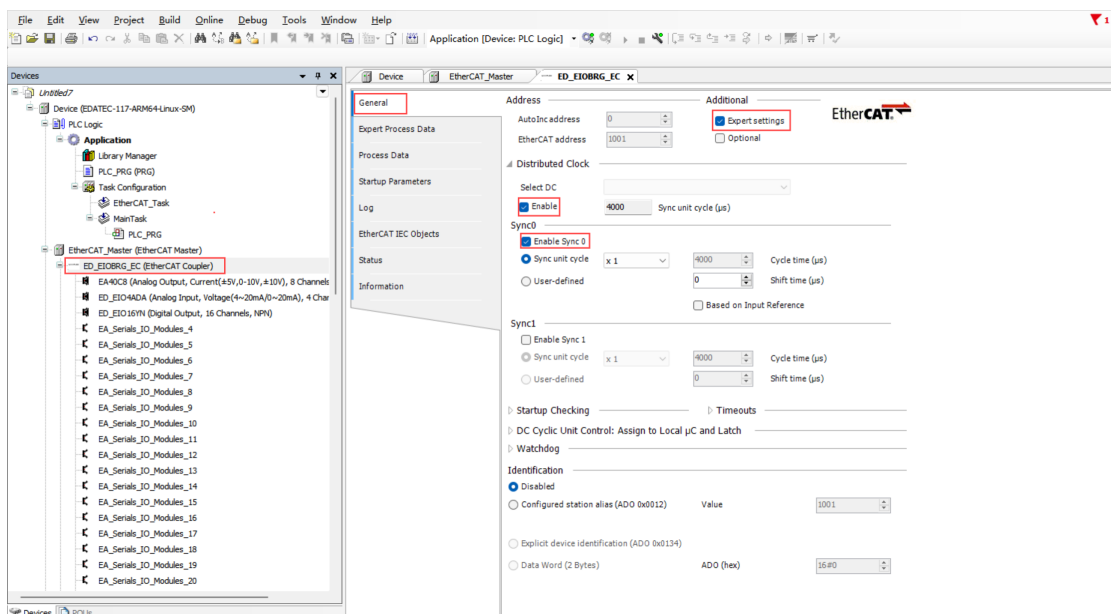
5. Click Login and Run to connect successfully.

5.4 Programming

The following section describes specific programming with a specific programming example.

5.4.1 Programming Process

```
        ┌─────────────────┐
        │  commencement   │
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │   Obtaining and  │
        │ installing device│
        │ description files│
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │ New construction │
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │ Connected device │
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │  Configuration   │
        │    hardware      │
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │   Programming    │
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │Compile, Login, Run│
        └─────────────────┘
                 │
                 ▼
        ┌─────────────────┐
        │      ends        │
        └─────────────────┘
```
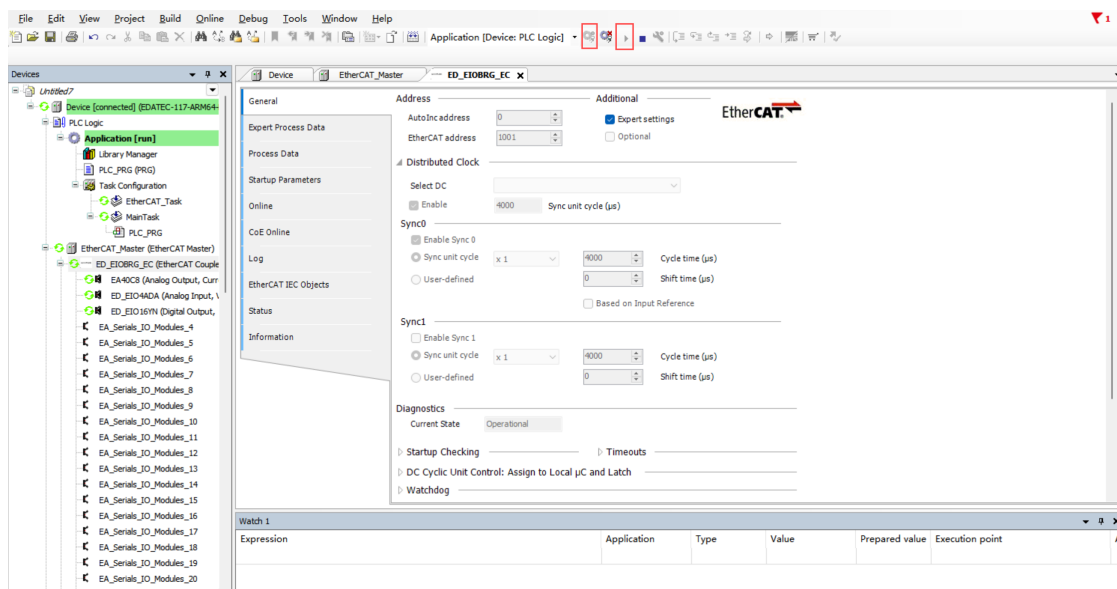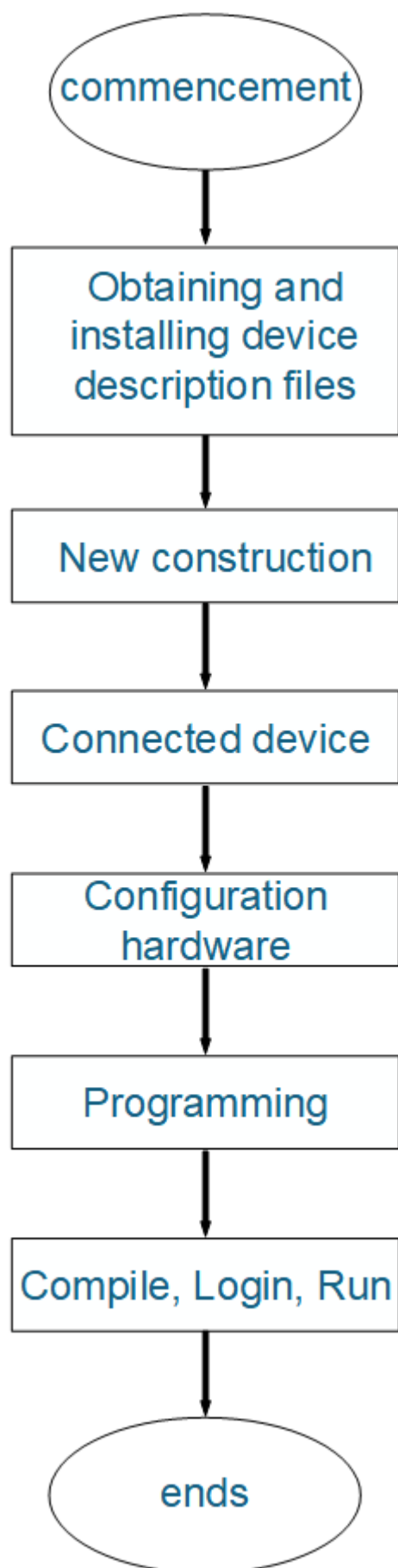
## 5.4.2 Programming Example

Complete the writing and debugging of a program to flash 1 LED at 0.5 second intervals, using an 8-port I/O output module (PNP type).

Preparation:

- A new standard project has been completed.
- Hardware configuration has been completed.
- 1 x 24v compact LED has been connected to the local DO module.

Steps:

1. Confirm the address of the output point of the DO module connected to the LED, click the DO output module connected to the LED, select "ModuleI/O Mapping->Output" in the right interface, you can check the address of each output point, in the example, we use the first output point, the address is %QX18.0.
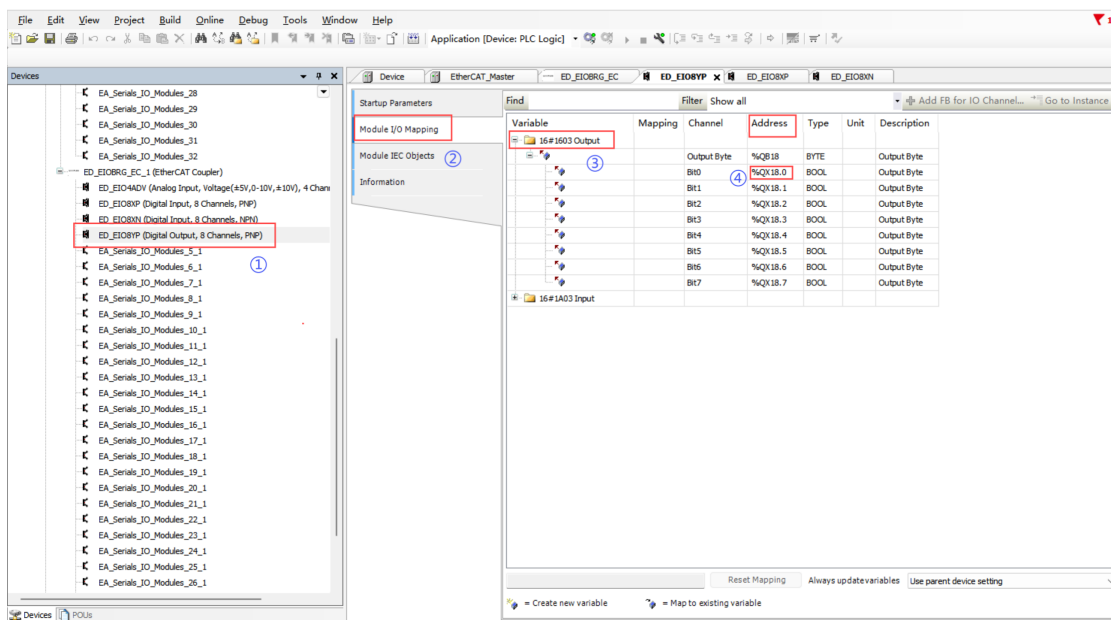
2. Click "PLC_PLG" to open the program writing interface, the upper side is the declaration variable area, the lower side is the main program writing area.
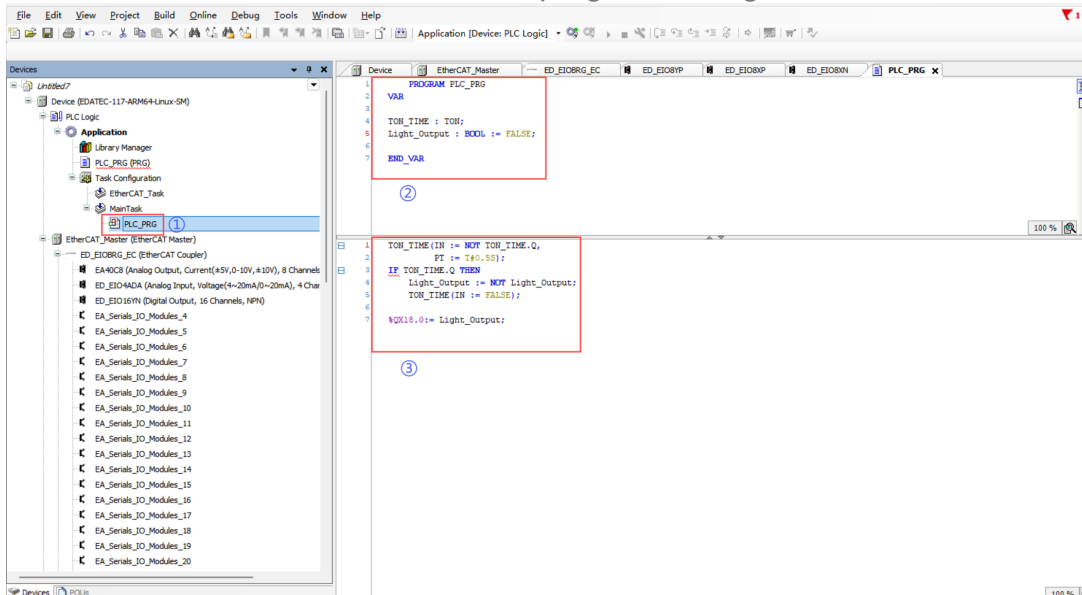
3. Write the program code as follows.

```sh
    PROGRAM PLC_PRG
VAR

TON_TIME : TON;
Light_Output : BOOL := FALSE;

END_VAR
```

```sh
    TON_TIME(IN := NOT TON_TIME.Q,
             PT := T#0.5S);
    IF TON_TIME.Q THEN
        Light_Output := NOT Light_Output;
        TON_TIME(IN := FALSE);
    END_IF

    %QX18.0:= Light_Output;
```
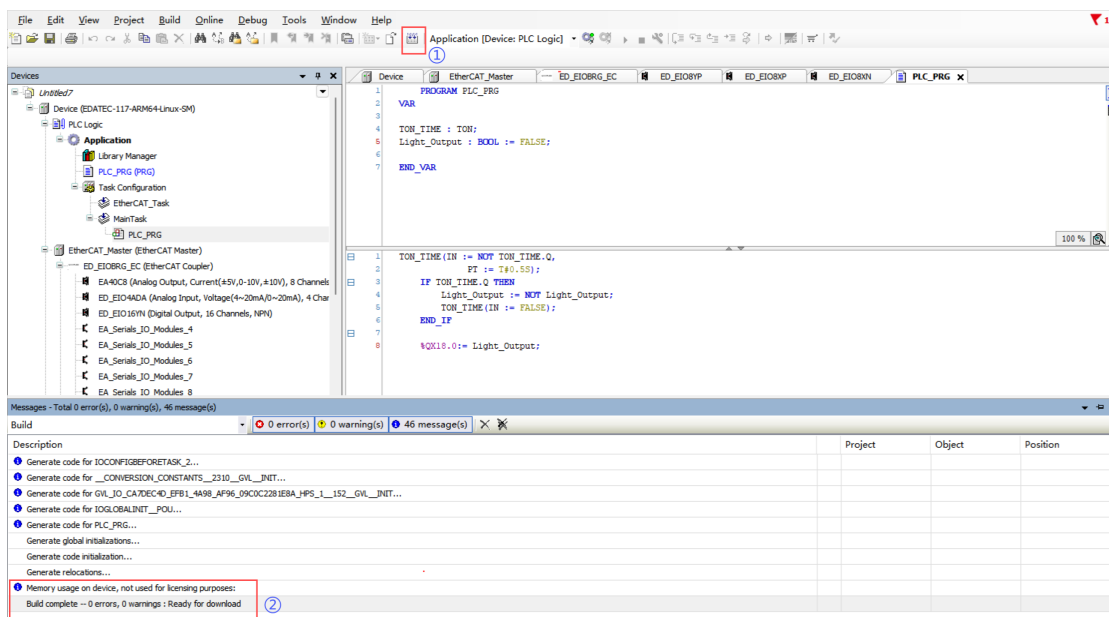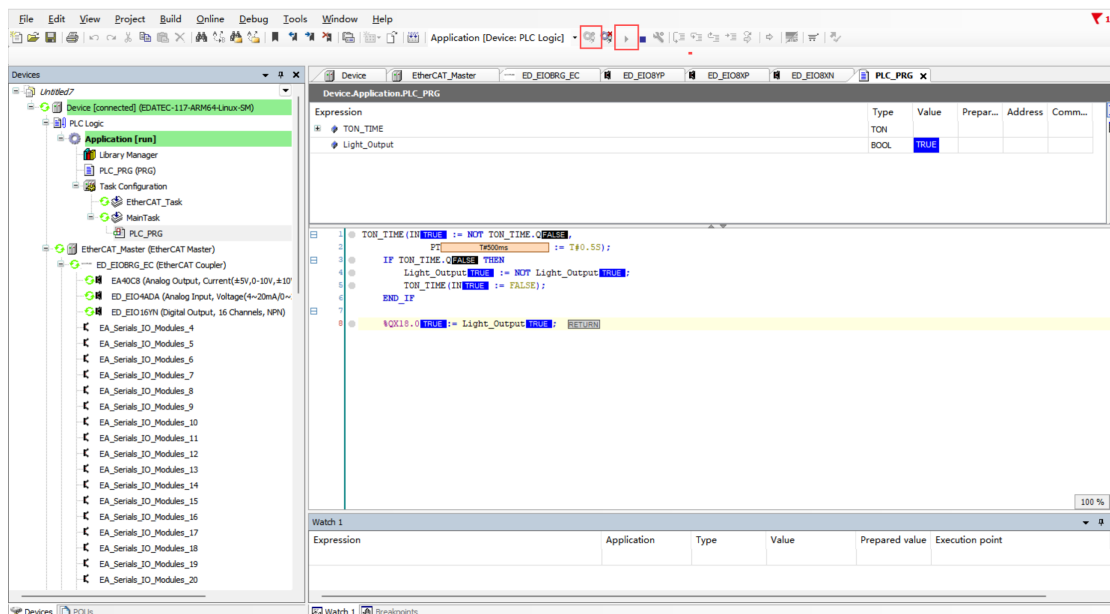
4. Once the program has been written, click Compile, and make sure the program reports no errors.

5. Click Login and download the program to the device, then click Run, you can see the LED blinking every 0.5S.

5.5 Operation and Maintenance

5.5.1 Program operation and shutdown operation

After writing the program, perform the run and stop operations as shown in the following table.

| State	Operation
Run the program	1. Click the Login button in the software interface
	2. After importing the program update from the USB flash drive, press and hold the hidden button "STOP START" on the device to run the program.
Stop the program	1. Click on the Stop button in the software interface
	2. Press and hold the hidden button "STOP START" of the device, the indicator "ERR" lights up and the program stops running.

5.5.2 Importing a USB flash drive user program

Preparation:

• Completed writing the program and compiled it without errors.
• Obtained a USB flash drive for normal use

Steps:

1. To export the application, select "Online" -> "Create Boot Application" in the main menu.
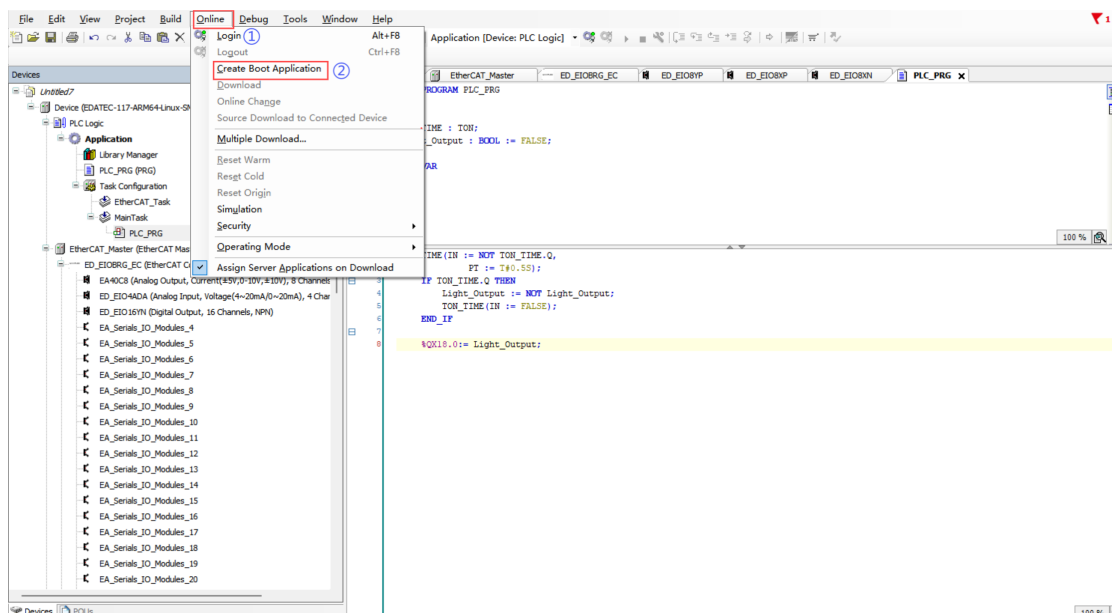
2. "Application.app" and "Application.crc" files are generated by default, choose to customize the path where they are stored.

3. Format the USB flash drive and create a folder named "Application" in the root directory, copy the "Application.app" and "Application.crc" files to the "Application" folder.

4. Insert the USB flash drive into the USB 3.0 port of the device, at this time, the indicator of "UDISK DETECT" and "UDISK BUSY" will be always on, indicating that the device has recognized the USB flash drive.

5. Press and hold the hidden button "STOP START" of the device, if the device has a program running at this time, it will stop running and the indicator "ERR" will be always on. At this time, Press and hold the "IMP" button again, the indicator "UPDATE" will flash once, indicating that the program has been updated. Press and hold the button "STOP START" again, the indicator "ERR" will go out, and the program imported from the USB flash drive will start to run normally.

6. To uninstall the USB flash drive, press and hold the "UDISK RM" button, wait for the "UDISK BUSY" indicator to go out, then unplug the USB flash drive from the device, and the USB flash drive import program will end.

> TIP
>
> The hardware configuration of the imported program and the hardware configuration of the device must be the same when importing a program from a USB flash drive, otherwise an error will occur during importing and the indicator "IO ERR" will be always on.

6 Configuring System

This chapter introduces how to configure system.

> TIP
>
> As the CODESYS license of the product is stored in the OS by default, it is not recommended for users to flash to eMMC by themselves, and re-flashing to eMMC will result in the loss of the CODESYS license and affect the use.

6.1 Finding Device IP

Finding Device IP

6.2 Remote Login

Remote Login

6.3 Configuring Storage Devices

Configuring Storage Devices

6.4 Configuring Ethernet IP

Configuring Ethernet IP

6.5 Configuring Wi-Fi (Optional)

Configuring Wi-Fi

6.6 Configuring Bluetooth (Optional)

Configuring Bluetooth

6.7 Configuring 4G (Optional)

Configuring 4G

6.8 Configuring RTC

Configuring RTC

6.9 Configuring Serial Port

This chapter introduces the configuration method of RS232 and RS485.

6.9.1 Installing picocom tool

In the Linux environment, you can use the picocom tool to debug the serial ports RS232 and RS485.

Execute the following command to install the picocom tool.

```sh
sudo apt-get install picocom
```

6.9.2 Configuring RS232

ED-PLC2010 series includes 2 RS232 ports with their corresponding COM ports and device files, as shown in the table below:

Number of RS232 Ports	Corresponding COM Port	Corresponding Device File
2	COM1, COM3	/dev/com1, /dev/com3

Preparation:

The RS232 ports of ED-PLC2010 has been connected with external device.

Steps:

1. Execute the following command to open the serial port com1, and configure the serial port baud rate to 115200.

```sh
picocom -b 115200 /dev/com1
```

2. Input commands as needed to control external device.

6.9.3 Configuring RS485

ED-PLC2010 series includes 2 RS485 ports with their corresponding COM ports and device files, as shown in the table below:

Number of RS485 Ports	Corresponding COM Port	Corresponding Device File
2	COM2, COM4	/dev/com2, /dev/com4

Preparation:

The RS485 ports of ED-PLC2010 has been connected with external device.

Steps:

1. Execute the following command to open the serial port com4, and configure the serial port baud rate to 115200.

```sh
picocom -b 115200 /dev/com2
```

2. Input commands as needed to control external device.