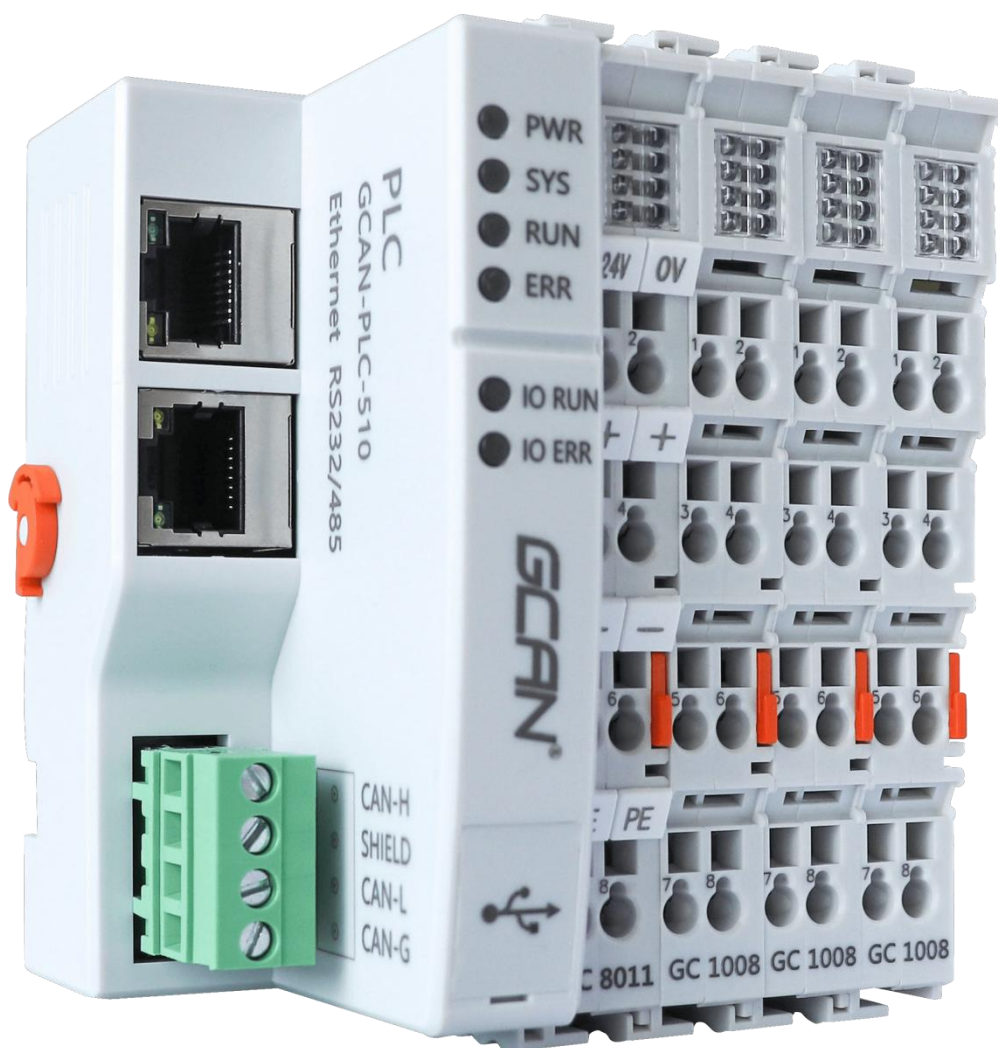


GCAN-PLC-510

Programmable Logic Controller

User manual



Document version V4.02 (2021/03/24)

Revision History:

| Version | Date | Reason |
|---------|------------|---------------------------|
| V1.00 | 2016/12/20 | Create |
| V2.01 | 2017/11/22 | Add parameters |
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| V4.02 | 2021/3/24 | Change the appearance |

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1. Introduction

1.1 Overview

GCAN-PLC-510 programmable logic controller is a bus module controller integrated with PLC function. It has the characteristics of compact, cost-effective, can be used to connect the CAN-Bus system, Modbus system and distributed bus terminal module, and these terminal modules can be expanded in a modular way.

A complete control system consists of a bus module controller (GCAN-PLC-510), 1-32 arbitrary number of GC series terminal modules (GC-1008, GC-3804, etc.) and a terminal module.

The GCAN-PLC-510 supports automatic configuration. You do not need to set parameters on the computer. The controller will automatically assign the I/O interface according to the positional relationship of the inserted terminal module.

The GCAN-PLC-510 is programmed according to the IEC 61131-3 standard using the OpenPCS programming system. OpenPCS programming system provides a variety of debugging features (such as breakpoints, single-step, monitoring, etc.) to make debugging easier. The GCAN-PLC-510 configuration/programming interface is a Micro-USB interface that can be used to load PLC programs.

The GCAN-PLC-510 complies with the ISO 11898 CAN bus protocol. Support CANopen/ Modbus RTU/ Modbus TCP communication protocol and can be used as CANopen/ Modbus RTU/ Modbus TCP master or slave. GC series programmable controller expansion module currently includes: digital input expansion module, digital output expansion module, analog input expansion module, analog output expansion module, Pulse input and output module, communication port expansion module (RS232/485, 4G, Bluetooth, WiFi, Zigbee, GPRS, etc.) For detailed selection list, please refer to Chapter 6 of this manual.

1.2 Performance

- One-channel CAN-Bus interface, one-channel Ethernet interface, one-channel RS232/485 (multiplexed) serial interface
- Programming Software: OpenPCS (according to IEC 61131-3standard)
- Support CANopen protocol master/slave function
- Support Modbus RTU/TCP master/slavefunction
- In the case of sufficient power supply (plus expansion power modules), the number of expandable IO modules is up to 32 (up to 32x8 DI/DO points)
- Transmit 4 PDOs (CANopen) and receive 4 PDOs (CANopen)
- Configuration mode is automaticconfiguration
- Supply power: 24V DC (18~30V)
- Input current, 400mA+ (total GC-bus current)
- Starting current: about 2.5 times continuouscurrent
- Power contacts: maximum24VDC
- Electrical isolation: 1500Vrms
- Working temperature: -40.00℃~85.00℃
- Protection level: IP20

1.3 Typical application

Connect with the distributed bus terminal module to form a complete programmable control node.

2. Installation

This chapter introduces the method installation and wiring, the meaning of the indicator and the interface.

2.1 Module appearance

GCAN-PLC-510 appearance as shown in **Figure 2.1**

GCAN-PLC-510 includes three communication interfaces, a controller programming interface, a set of controller power interface, two sets of I/O power interfaces, two sets of Shielding line interfaces. Among them, the communication interface includes one Ethernet interface, one CAN-Bus interface and one RS232/RS485 interface.

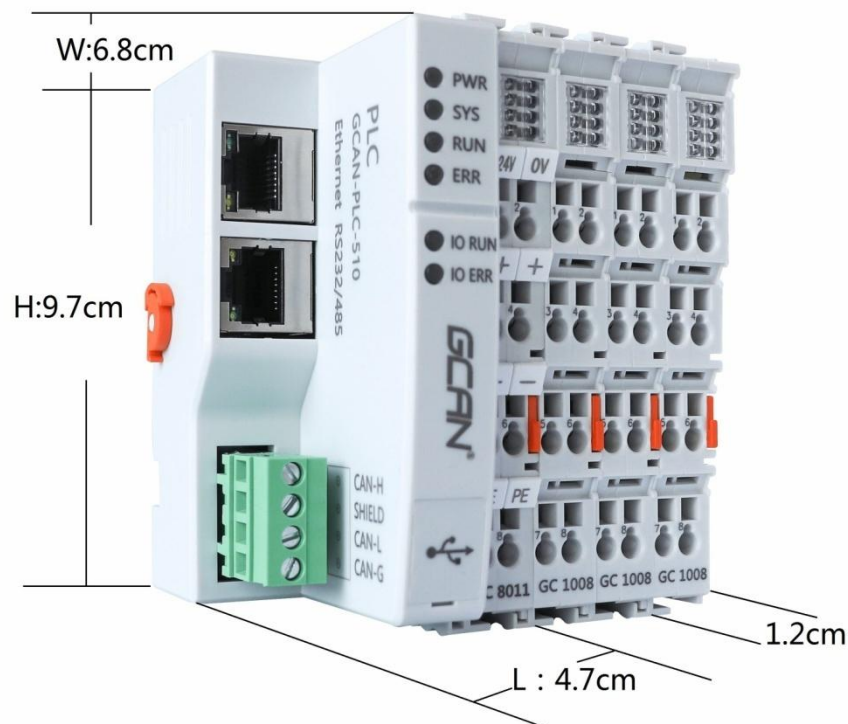


Figure 2.1 the appearance of GCAN-PLC-510

2.2 Fixed module

GCAN-PLC-510 and its matching terminal installation method is shown in **Figure 2.2**

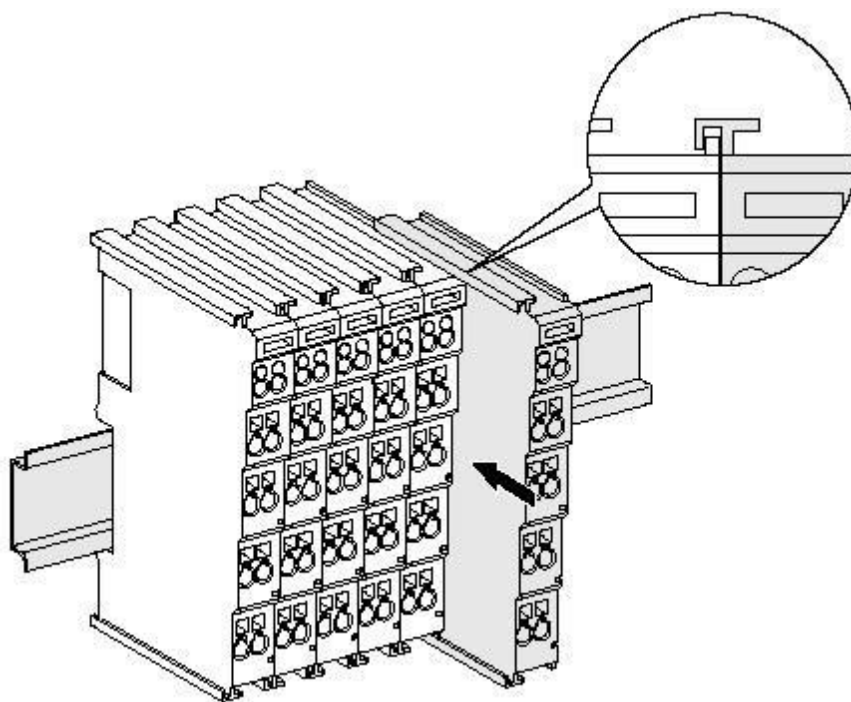


Figure 2.2 GCAN-PLC-510 programmable controller installation

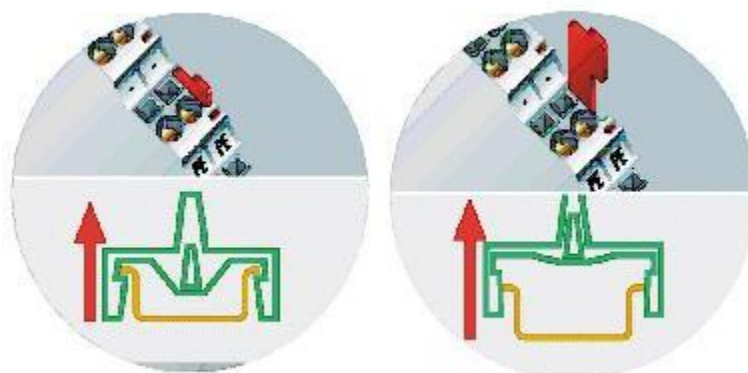


Figure 2.3 GCAN-PLC-510 self-locking mechanism

As shown [figure 2.2](#), install the GCAN-PLC-510 on the guide rail until the lock is stuck. Then you need to rotate the orange knob on the left end of the controller counterclockwise to fix the left end of the controller on the guide rail. The GCAN-PLC-510 has a self-locking mechanism that can effectively prevent equipment from falling.

As shown [figure 2.3](#), you can release the self-locking mechanism by pulling out the orange label and take out the controller or matching terminal module. Before taking out the controller, you need to rotate the orange knob on the left end of the controller clockwise to unlock it.

Please note: When using the GCAN-PLC-510 controller, you must ensure that you have installed terminal modul at the right end of the entire node, and the terminal resistance module has been fixed to the bottom without looseness, as shown in Figure 2.4. This terminal module will ensure the data transmission and power supply between GC series IO modules. The lack of this terminal module or improper installation will cause errors in the entire system.



2.3 Wiring method

8

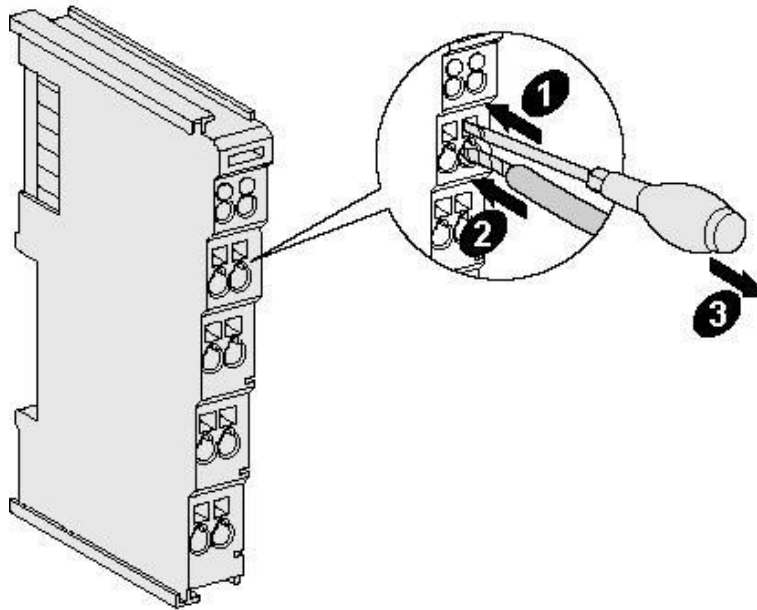


Figure 2.4 GCAN-PLC-510, the power wiring of programmable controller

2.4 Interface definition

The main control module of GCAN-PLC-510 is composed of bus communication module and power supply module. The bus communication module integrates an Ethernet interface, an RS232/485 multiplex interface, and a CAN bus interface, which are led out using RJ45 interface, RJ45 interface, and 4P terminal interface respectively. The RS232 and RS485 interface styles are shown in **Figure 2.6**, and the interface definitions are shown in **Table 2.1**; the CAN bus interface style is shown in **Figure 2.7**. The interface definition is shown in **Table 2.2**.

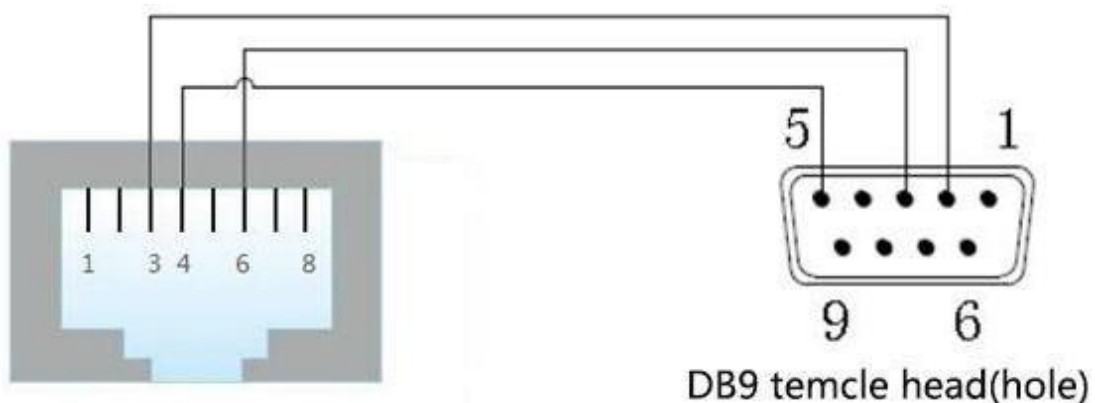


Figure 2.6 RS-232 interface style of GCAN-PLC-510

| Terminal | RJ45 number | DB9 number | Meaning |
|----------|-------------|------------|--------------------|
| RS232_TX | 3 | 2 | RS232 data send |
| RS232_RX | 6 | 3 | RS232 data receive |
| GND | 4 | 5 | Signal ground |
| RS485_A+ | 8 | 7 | RS485 signalA+ |
| RS485_B- | 1 | 8 | RS485 signal B- |

Table 2.1 RS232 and RS485 interface definition of GCAN-PLC-510

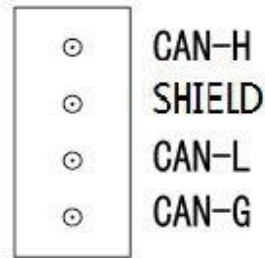


Figure 2.7 CAN bus terminal block of GCAN-PLC-510

| Terminal | Serial number | Meaning |
|----------|---------------|--------------|
| CAN-H | 1 | CAN bus-high |
| SHIELD | 2 | Shield |
| CAN-L | 3 | CAN bus-low |
| CAN-G | 4 | CAN bus-GND |

Table 2.2 CAN bus terminal definition of GCAN-PLC-510

The power wiring terminal block of GCAN-PLC-510 is shown in **Figure 2.8**, and its interface definition is shown in Table 2.3. The power supply part of GCAN-PLC-510 contains 8 terminals.

Note that: connecting between terminal 3 and terminal 4, terminal 5 and terminal 6, terminal 7 and terminal 8 inside the module.

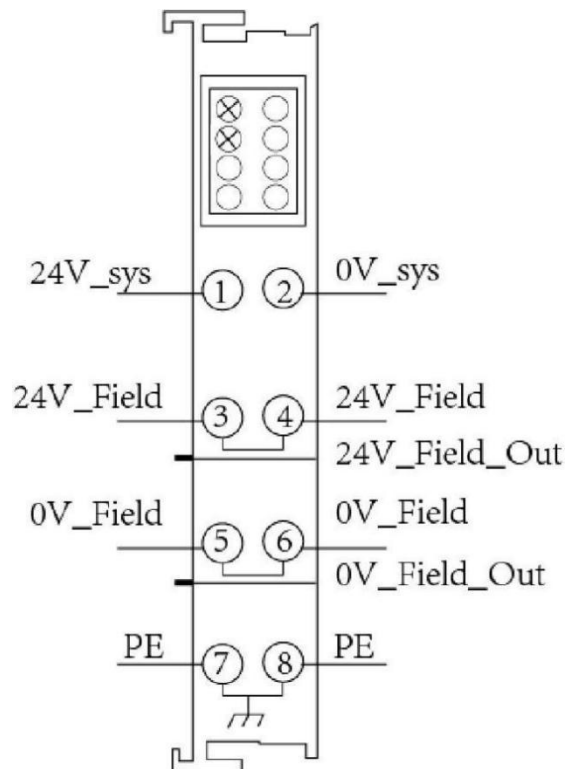


Figure 2.8 GCAN-PLC-510, Power terminal block

| Terminal | Number | Definition |
|----------|--------|-------------------|
| 24V | 1 | Input 24V power |
| 0V | 2 | GND power |
| + | 3 | IO positive power |
| + | 4 | IO positive power |
| - | 5 | IO negative power |
| - | 6 | IO negative power |
| PE | 7 | shield |
| PE | 8 | shield |

Table 2.3 GCAN-PLC-510, terminal definition

2.5 System status indicator

GCAN-PLC-510 has two sets of status indicators, contains 6 circular status indicators in the left area and 2 power indicators in the right area.

The specific indicating function of the indicator is shown in [table 2.4](#).

| Indicator | Color | Status |
|-------------------|-------|--------------|
| PWR | green | Power |
| SYS | green | System |
| RUN | green | Run |
| ERR | green | Error |
| IO RUN | green | GC-Bus run |
| IO ERR | green | GC-Bus error |
| NO.1 on the right | green | Power |
| NO.3 on the right | green | GC-Bus power |

Table 2.4 GCAN-PLC-510, indicators

| Indicator | Status | Meaning |
|------------------------|------------|----------------------------------|
| PWR | bright | Power supply normally |
| | not bright | Power supply abnormally |
| SYS | Blinking | Working status |
| | not bright | Initialization error |
| RUN | Blinking | Run normal |
| | not bright | stop |
| ERR | bright | System error |
| | not bright | System normal |
| IO RUN | Blinking | GC-Bus run normally |
| | not bright | GC-Bus stop |
| IO ERR | bright | GC-Bus error |
| | not bright | GC-Bus normal |
| Terminal module | | |
| NO.1 on the right | bright | Power supply normally |
| | not bright | Power supply abnormally |
| NO.3 on the right | bright | External power supply normally |
| | not bright | External Power supply abnormally |

Table 2.5 GCAN-PLC-510, indicators status

3. Communication connection

3.1 Serial connection

GCAN-PLC-510 uses standard serial port level (RS232: $\pm 3\sim 15V$), so the module can directly connect to the device with RS232 interface.

3.2 CAN connection

GCAN-PLC-510 connect to CAN-Bus as described in [figure 3.1](#), CAN-H connect CAN-H, CAN-L connect CAN L to make communication.

GCAN-PLC-510, must be installed two 120 ohms terminal resistance at the farthest end of CAN-Bus network; if the node number is more than 2, intermediate nodes needn't to install 120 ohms terminal resistance. For branch connections, the length should not exceed 3 meters.

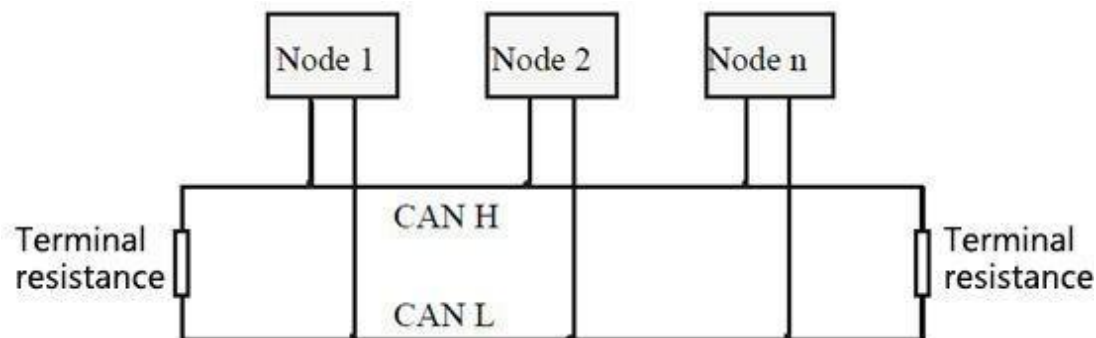


Figure 3.1 CAN-Bus network structure

Please note: CAN-bus cable can use ordinary twisted pair and shielded twisted pair. The theoretical maximum communication distance mainly depends on the bus baud rate. The relationship between the maximum bus length and the baud rate is shown in Table 3.1. If the communication distance exceeds 1km, the cross-sectional area of the line should be greater than $\Phi 1.0\text{mm}^2$. The specific specifications should be determined according to the distance. The general rule is to increase the distance as the distance increases.

| Baud rate | Distance |
|------------|----------|
| 1 Mbit/s | 40m |
| 500 kbit/s | 110m |
| 250 kbit/s | 240m |
| 125 kbit/s | 500m |
| 50 kbit/s | 1.3km |
| 20 kbit/s | 3.3km |
| 10 kbit/s | 6.6km |
| 5 kbit/s | 13km |

Table 3.1 the relationship between CAN-Bus length and baud rate.

3.3. CAN-Bus terminal resistance

In order to enhance the reliability of CAN communication and eliminate the interference of CAN bus terminal signal reflection, the two farthest endpoints of the CAN bus network usually need to add terminal matching resistors, as shown in **Figure 3.2**. The value of the terminal matching resistance is determined by the characteristic impedance of the transmission cable. For example, the characteristic impedance of the twisted pair is 120Ω , and the two end points on the bus should also be integrated with 120Ω terminal resistance. If other nodes on the network use different transceivers, the terminal resistance must be calculated separately.

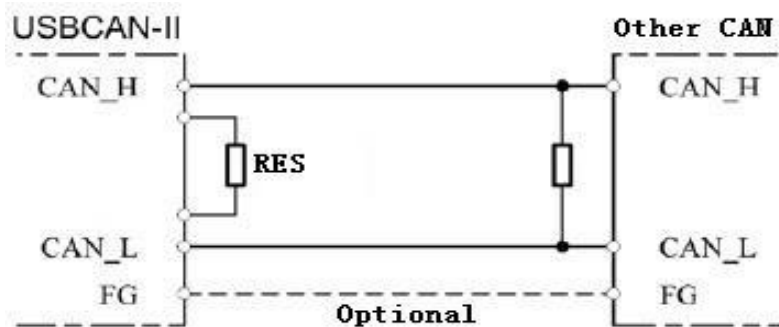


Figure 3.2 GCAN-PLC-510 connect with other nodes

Please note: GCAN-PLC-510 hasn't integrated 120Ω terminal resistance. If the number of nodes is more than 2, the middle node does not need to install 120Ω terminal resistance. When you need to use it, connect the both sides of the resistance to CAN_H and CAN_L

3.4 PLC program running switch and reset button

GCAN-PLC provides a core refresh USB interface, a running switch and a reset button. The physical drawing after opening the cover is shown in **Figure 3.3**.

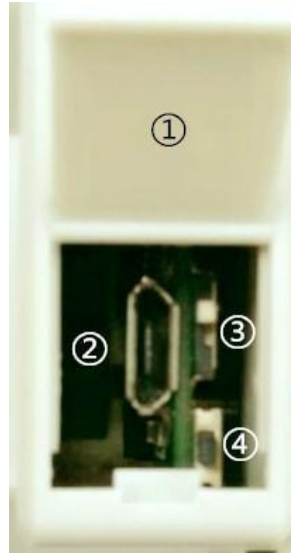


Figure 3.3 Physical Diagram of Kernel Refresh Interface

In **Figure 3.3**,

- ① is the USB interface cover. The default is closed. You can gently pry open the cover plate by using the attached screwdriver to close the gap under the cover plate.
- ② Micro-USB interface, which is the refresh interface of the kernel. GCAN-PLC programmable logic controller uses Micro-USB data line as download line of PLC core files. You can connect GCAN-PLC to USB-A interface of PC through Micro- USB cable
- ③ To run/stop the dial switch, and
- ④ to reset the button.

Note: When the dial number of the run/stop switch is above (on the side of the back reset button), it means that the PLC is in operation; when the dial number of the run/stop button is below (on the side of the reset button), it means that the PLC is in stop state. The reset button is used to upgrade the GCAN-PLC core. Please use the button under the guidance of our technical staff.

4. Program operation switch and reset button

The GCAN-PLC-510 provides a program running switch and a reset button. Physical picture after opening cover plate as shown in Figure 4.1:

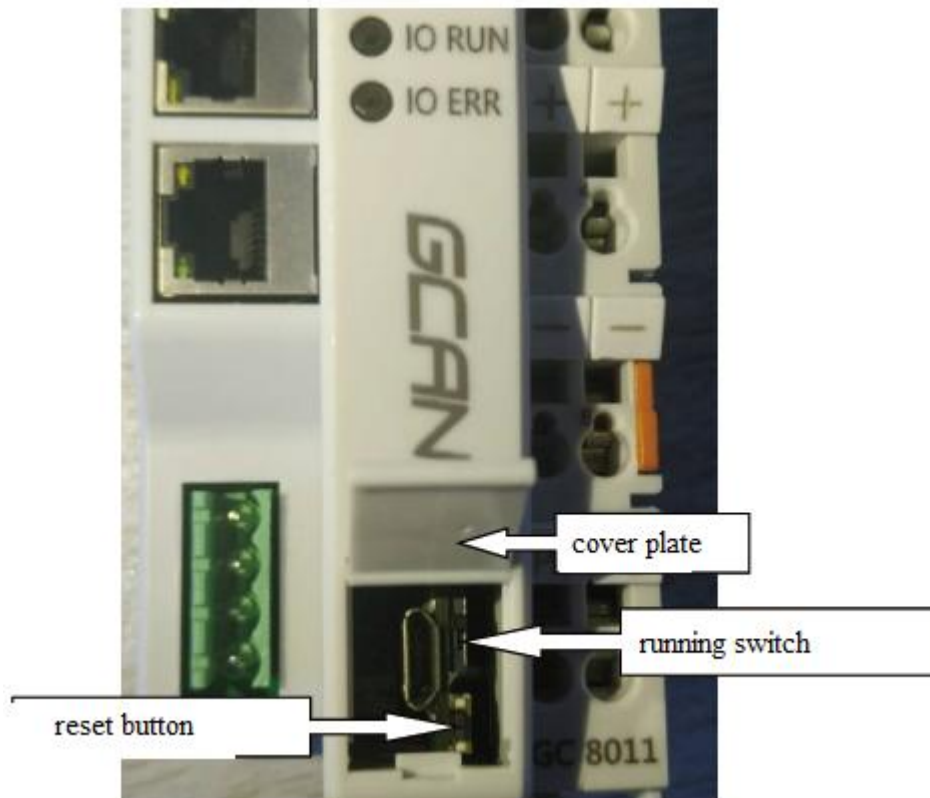


Figure 4.1 Physical picture after opening cover plate

Note:

1. When the dip switch of the running switch is up (facing away from the reset button), the PLC is in operation state; When the dip switch of the running button is located down (towards the reset button side), it represents the PLC In the stopped state.
2. After power-on, hold down the reset button until the ERR indicator blinks to restore the PLC, factory IP address: 192.168.1.30.

5 OpenPCS Programming software usage

5.1 Installation of OpenPCS

OpenPCS programming software download address:

http://gcgd.net/tecinfo1_1086.html

5.2 Programming interface

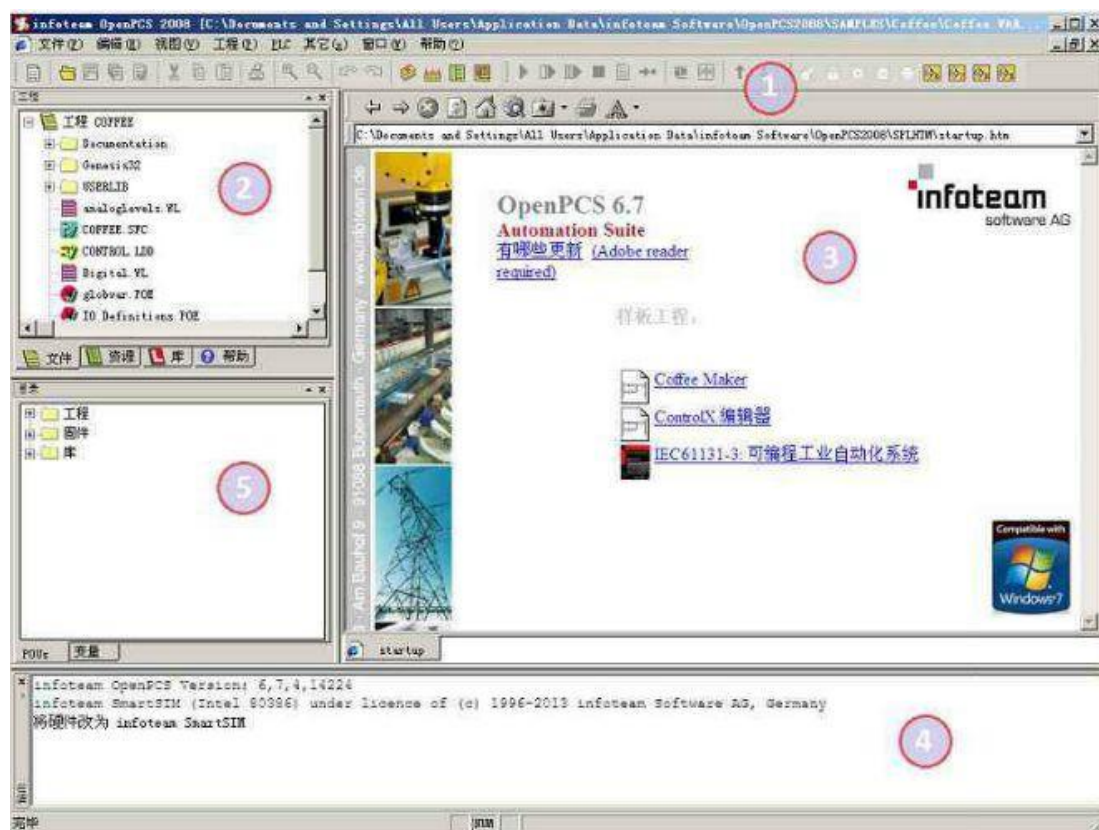


Figure 5.1 OpenPCS programming interface

Programming interface of OpenPCS mainly contains:

- 1) Menu
- 2) Project window
- 3) Edit window
- 4) Output window
- 5) Catalog window

5.3 Create project and download program

Note: GCAN series PLC uses the network port to download the program, and the factory IP address of the PLC: 192.168.1.30.

5.3.1 Create project

Click “File”, than select ”New” to create a new file, as shown in **Figure 5.2**.

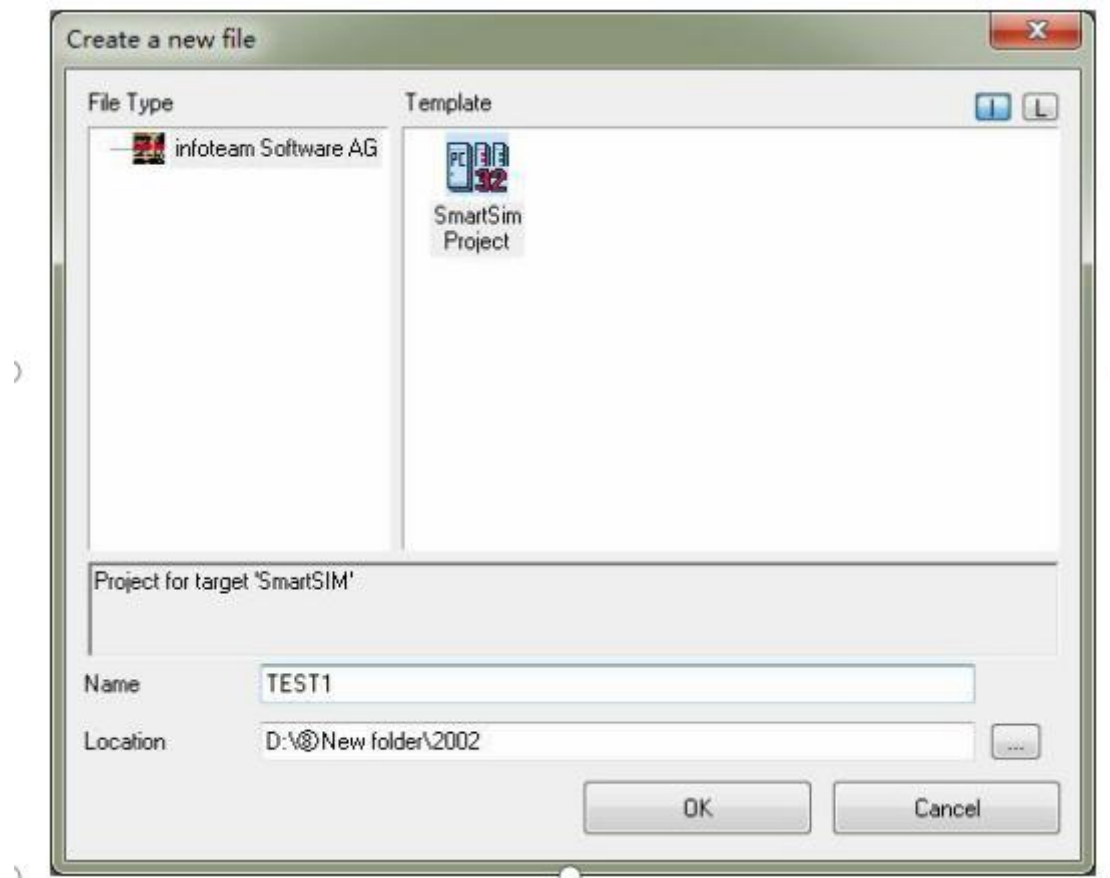


Figure 5.2 Create project

5.3.2 Add program page file

Add files to the project (for example: add a program page ST, Program written in ST language), as shown in **Figure 5.3**.

Please note that: the string entered in the name field cannot start with a number.

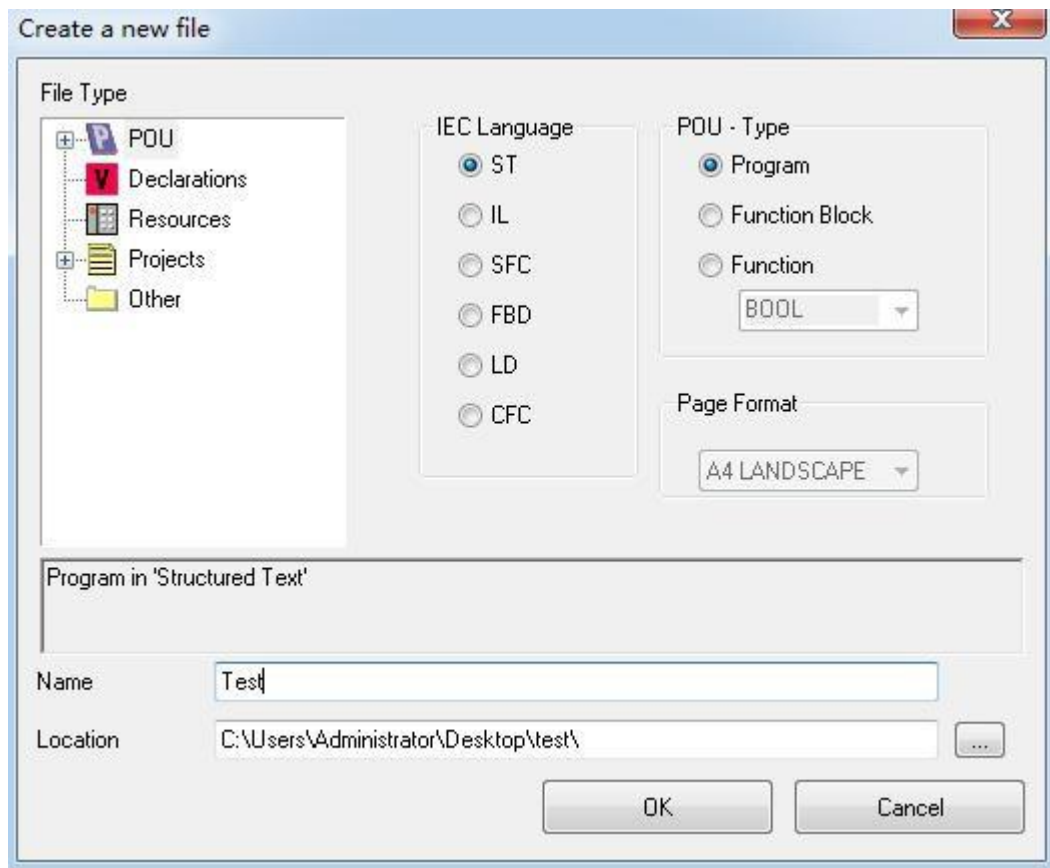


Figure 5.3 Create a new file

5.3.3 Programming

First define the variable in the variable area (VAR to END_VAR) VAR

v1:INT:=0; v2:INT:=0;

oled at%Q0.0:Byte; END_VAR

After the variable is defined, start programming. The following is a simple routine statement written in ST:

LED Marquee routines:

IF v1<100 then v1:=v1+1;

ELSE

v1:=0; v2:=v2+1;

if v2>=255 then v2:=0;

end_if;

oled:=int_to_byte(v2); end_if;

5.3.4 Set up debug connection

Click “PLC”, then select “Connections..”, as shown in Figure5.4.

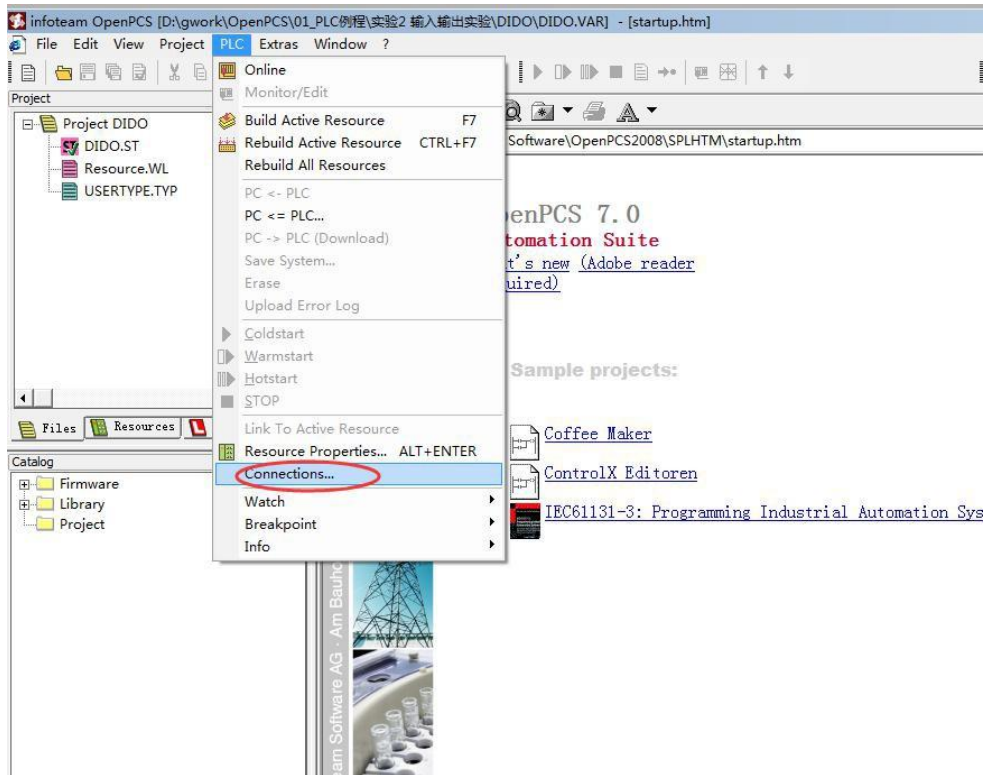


Figure 5.4 Debug connection

Click “New” to set up parameters, port number is the actual serial port number of the computer, shown in **Figure 5.5**.

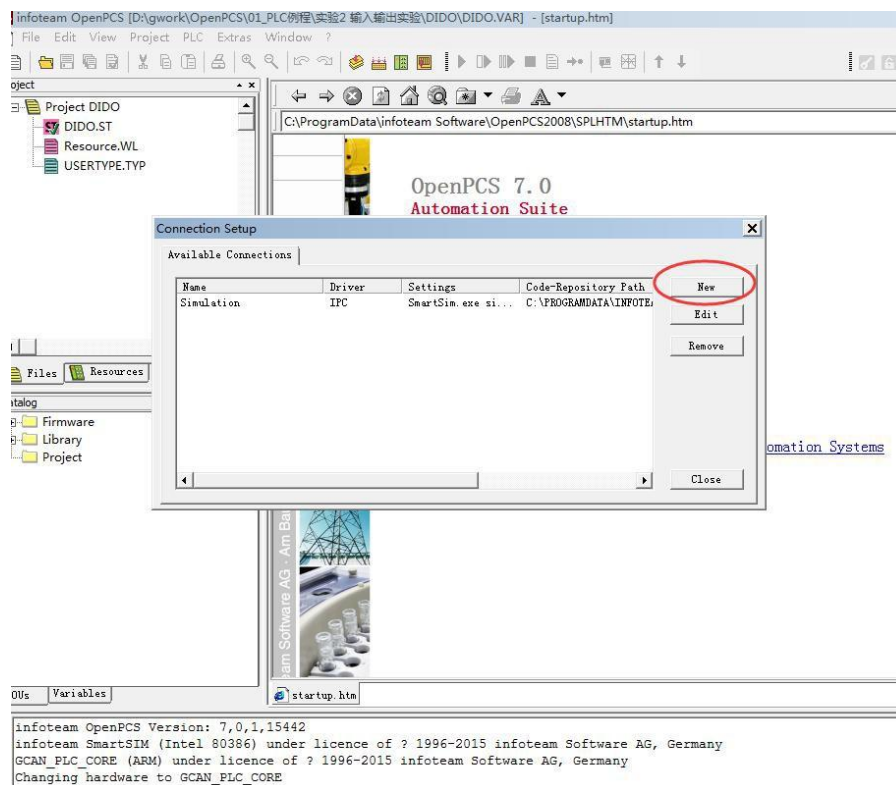


Figure 5.5 Connection Setup

Enter “TCP” in Name and click “Select”.

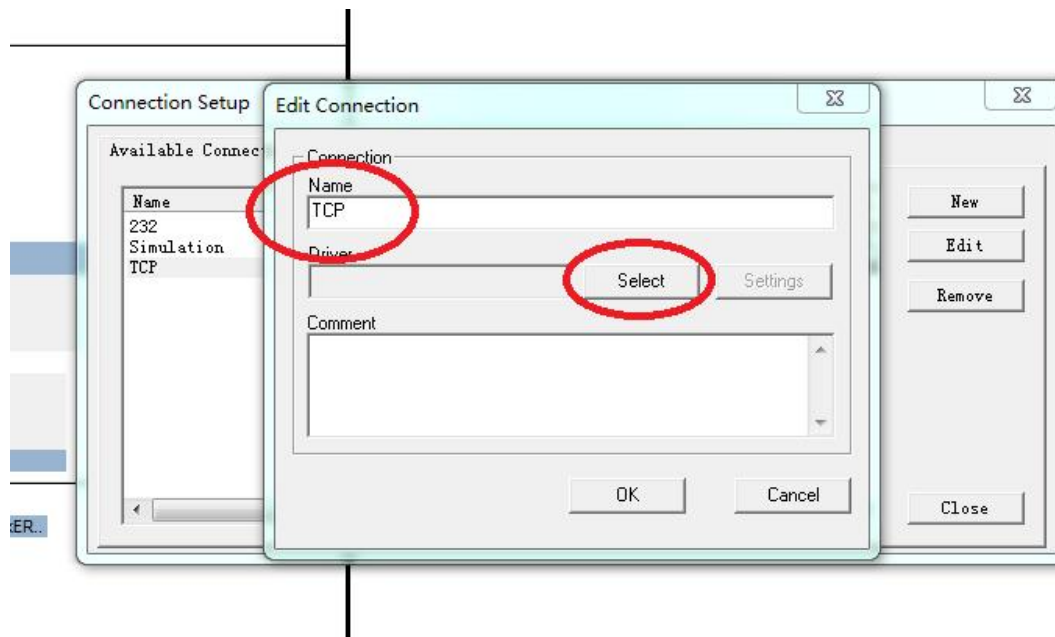


Figure 5.6 Click “Select”



Select “TCP432” TCP432, then click “OK”.

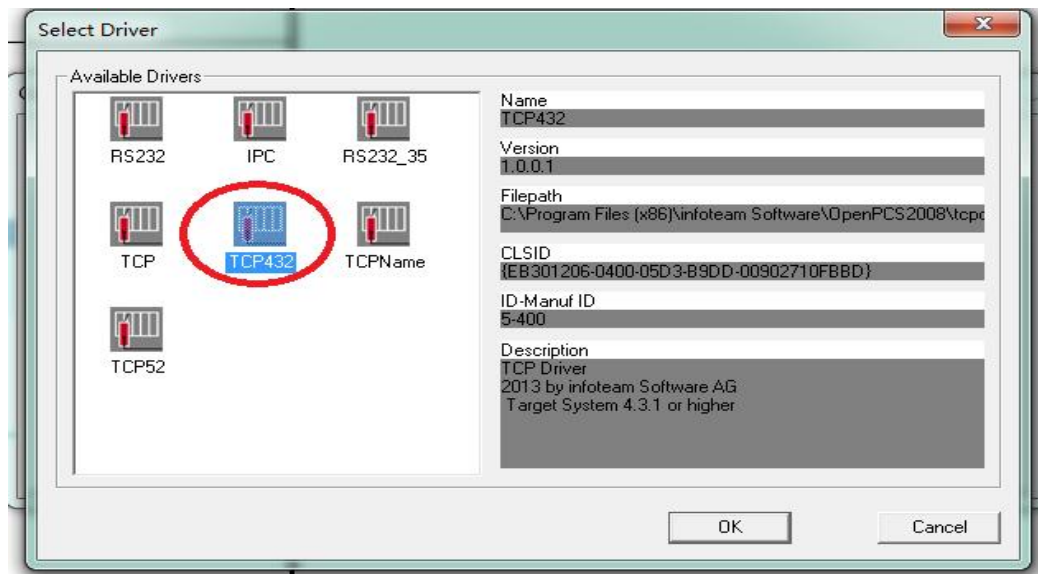


Figure 5.7 Select TCP432

Click “Settings”.

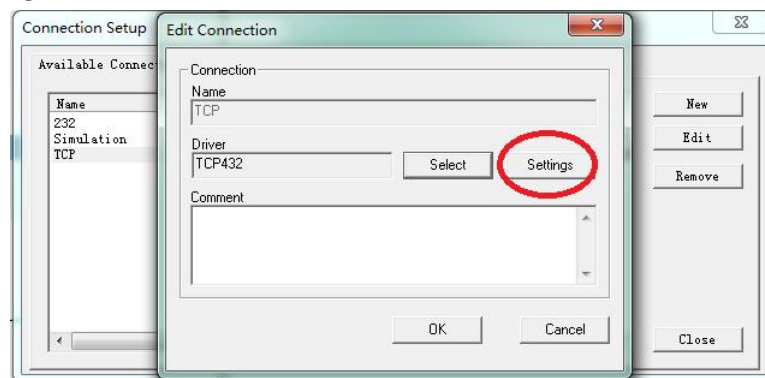


Figure 5.8 Click “Settings”

Please enter 23042 for Port. IP address 192.168.1.30, set the back point OK

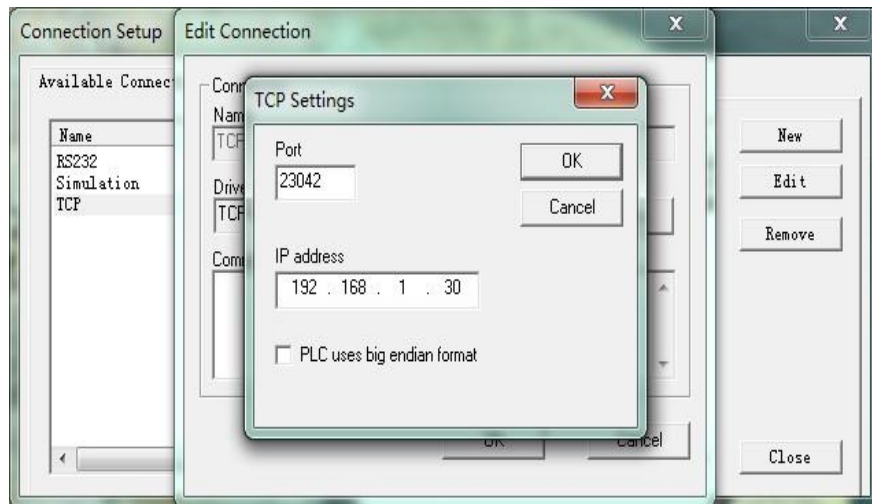


Figure 5.9 IP Address and Port Number Settings

After completing the settings, click “Close”

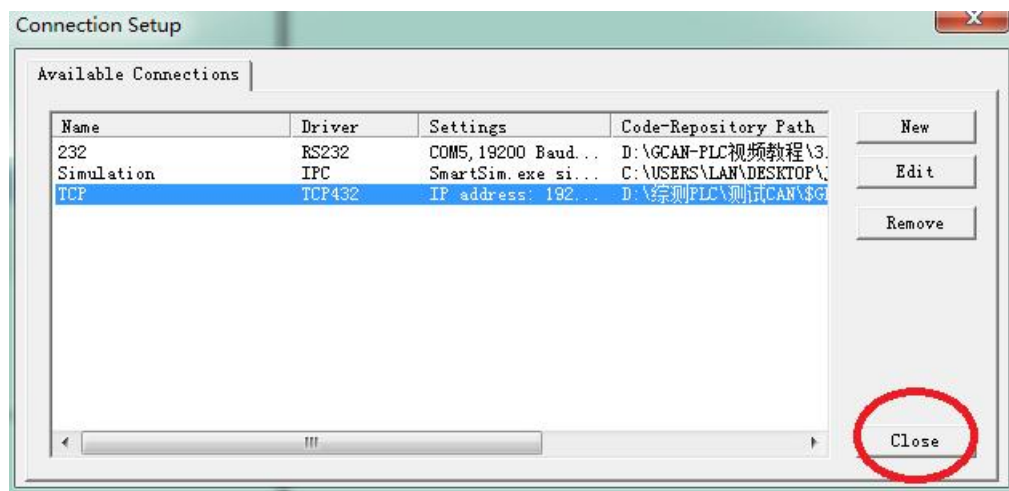


Figure 5.10 Click ”Close”

Set “Resource Properties”

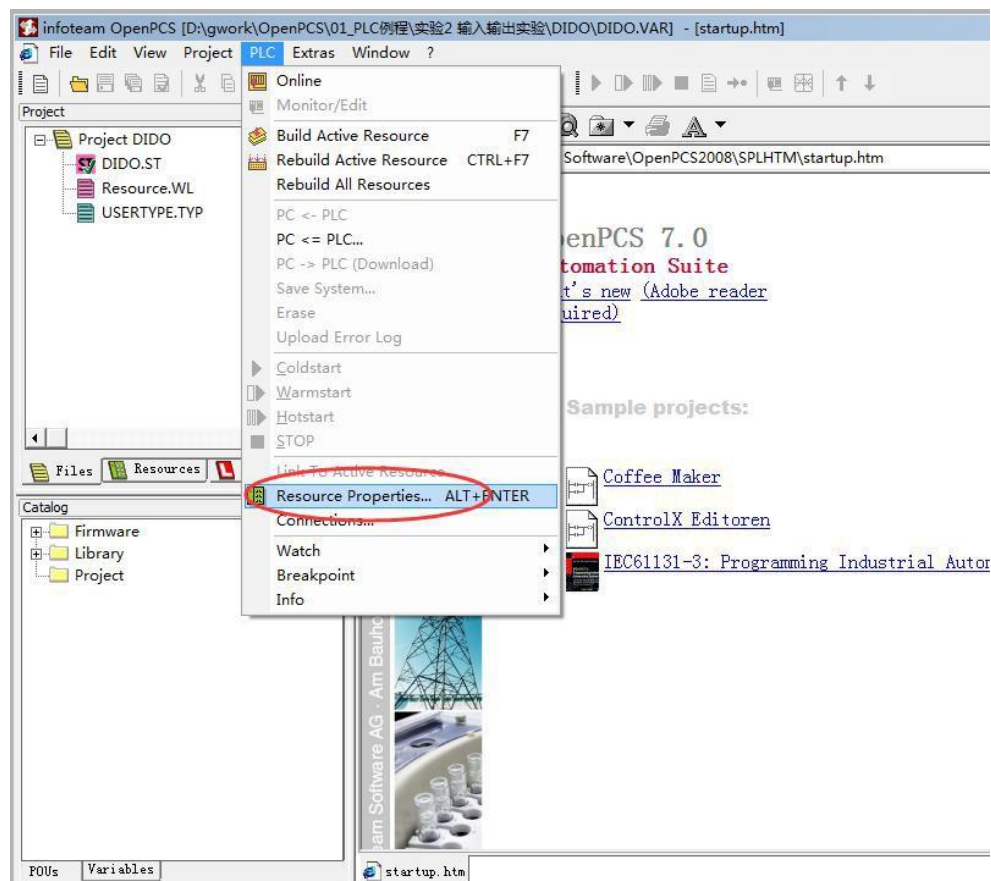


Figure 5.11 Set “Resource Properties”

Select ”GCAN_PLC” and “TCP”, then click “OK” to complete the setting

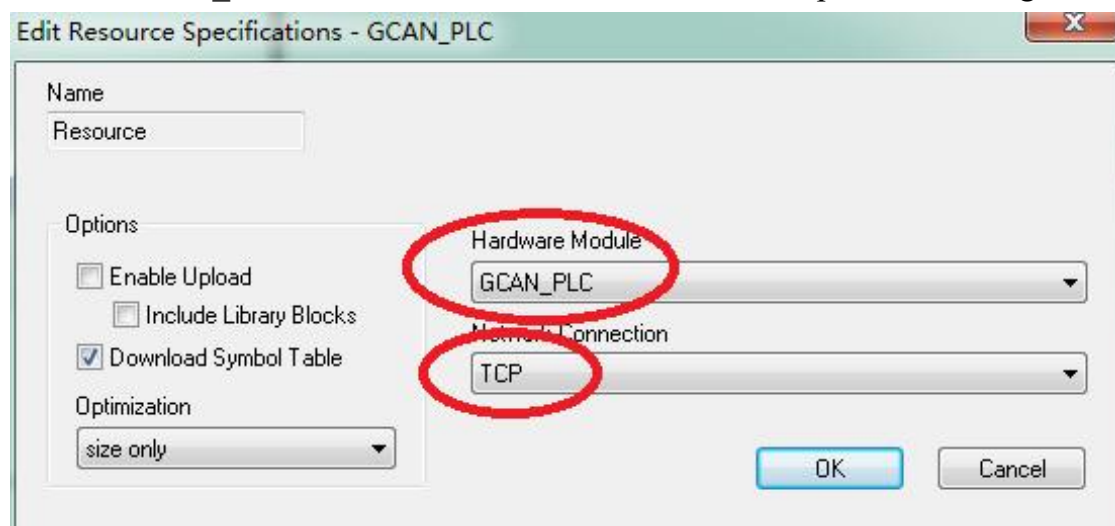


Figure 5.12 Select “GCAN_PLC” and “TCP”

5.3.5 Download the program and debug

After completing the program, click “Build Active Resource”.

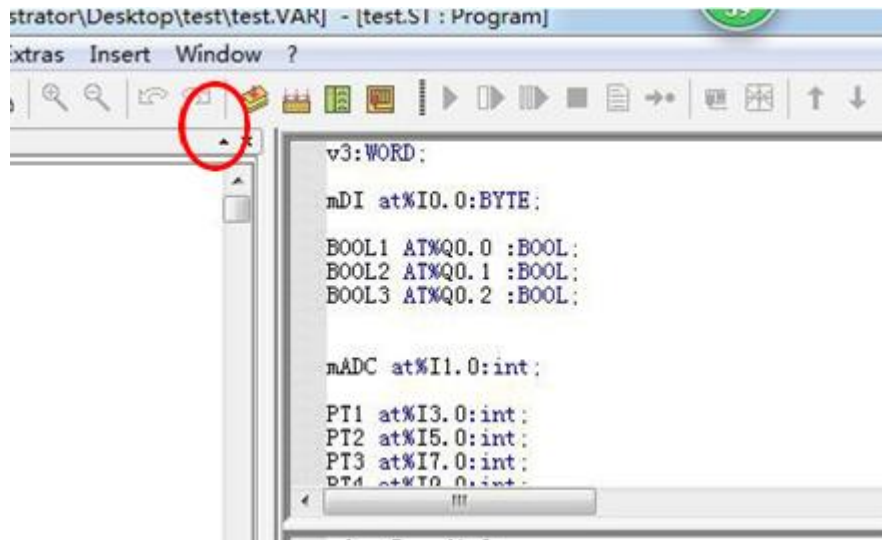


Figure 5.13 Completing the program

Please check if there is an error/warning after completing the program.

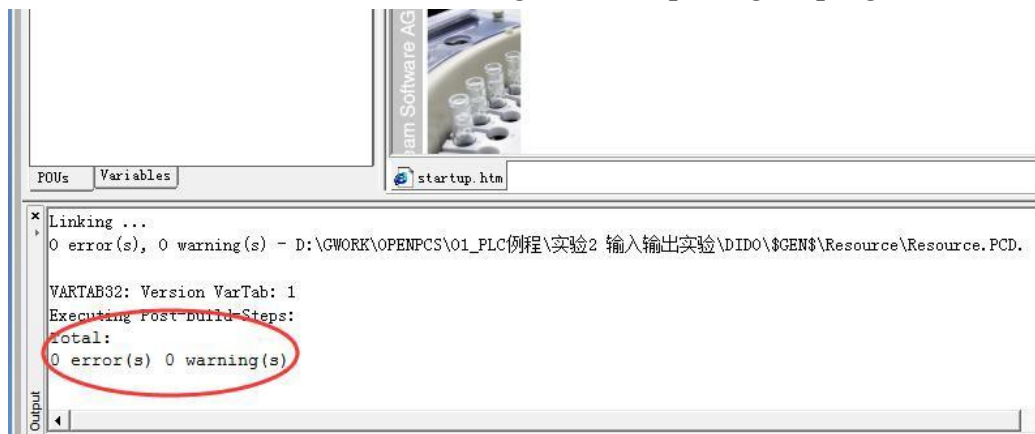


Figure 5.14 Check error and warning

Click “PLC”, then select “Online”.

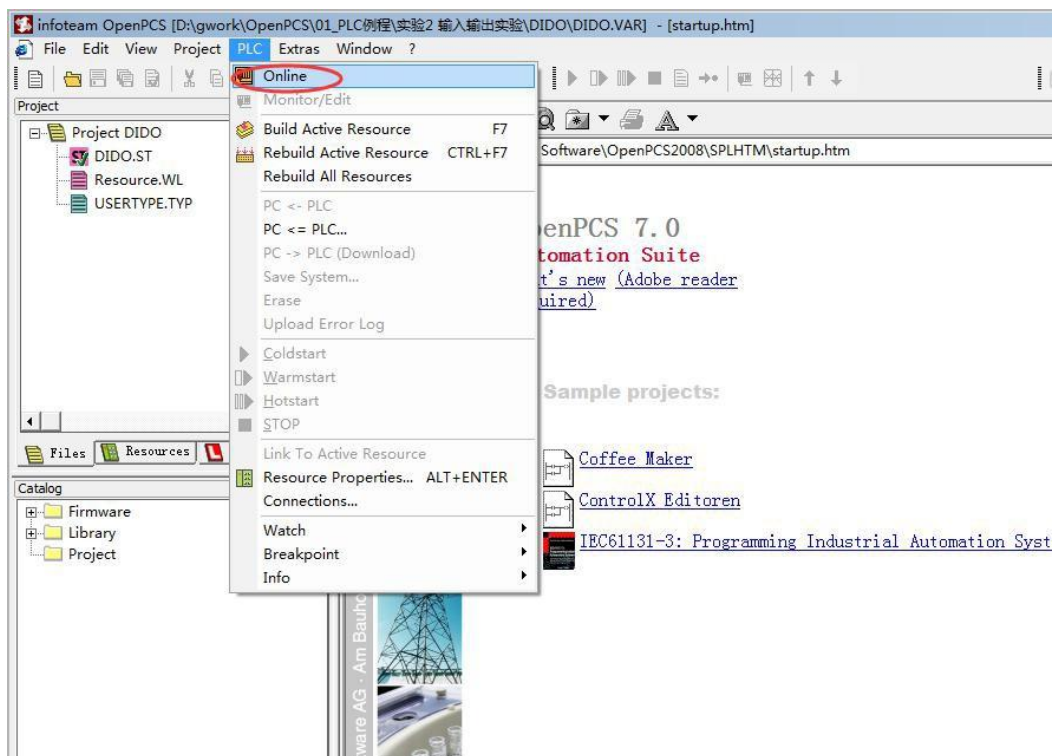


Figure 5.15 Select Online

Click “PV->PLC(Download)” to download program

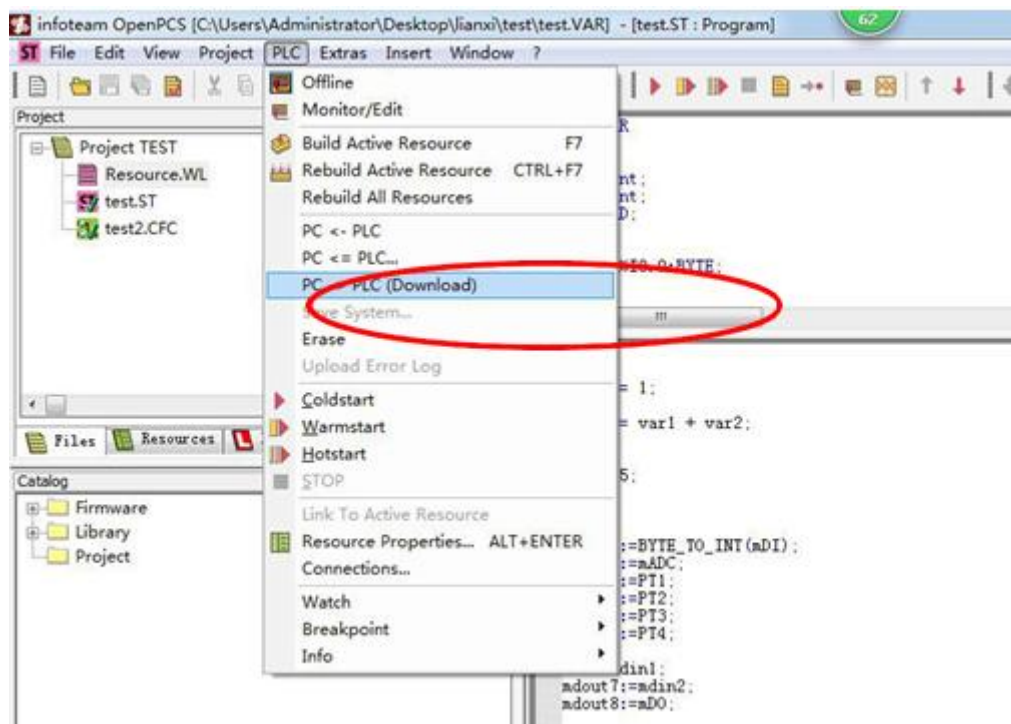


Figure 5.16 Program download

6 Module selection table

GCAN-PLC-510 series products consist of a programmable main control module, several GC series IO modules and a terminal resistance module. GC series IO modules currently include five categories: digital input, digital output, analog input, analog output, and communication extension. The specific selection table is shown in **Table 6.1**.

| I/O | Type | Characteristic | Signal | Channel |
|--------------------------|--------------|------------------------|-----------------------|-----------|
| PLC Control module | GCAN-PLC-400 | CPU:168M | - | - |
| | GCAN-PLC-510 | CPU:400M | - | - |
| | GCAN-PLC-511 | CPU:400M (2CAN) | - | - |
| Digital input | GC-1008 | Digital input (PNP) | 24V DC | 8-channel |
| | GC-1018 | Digital input (NPN) | 24V DC | 8-channel |
| | GC-1502 | Counter (200kHz max) | - | 2-channel |
| Digital output | GC-2008 | Digital output (PNP) | 24V DC | 8-channel |
| | GC-2018 | Digital output (NPN) | 24V DC | 8-channel |
| | GC-2204 | relay output | - | 4-channel |
| | GC-2302 | PWM (20Hz~200kHz) | - | 2-channel |
| Analog input | GC-3604 | Voltage input, 16 bits | -5~+5V | 4-channel |
| | GC-3624 | Voltage input, 16 bits | 10V~+10V | 4-channel |
| | GC-3644 | Current input, 16 bits | 0-20mA | 4-channel |
| | GC-3654 | Current input, 16 bits | 4-20mA | 4-channel |
| | GC-3664 | Voltage input, 16 bits | 0~+5V | 4-channel |
| | GC-3674 | Voltage input, 16 bits | 0~+10V | 4-channel |
| | GC-3804 | 2-wire PT100, 16 bits | Thermal resistance | 4-channel |
| | GC-3822 | 3-wire PT100, 16 bits | Thermal resistance | 2-channel |

| | | | | |
|----------------|-------------------|---------------------------------------|--------------|-----------|
| | GC-3844/3854/3864 | K type / S type / T type thermocouple | Thermocouple | 4-channel |
| Analog output | GC-4602 | Voltage output, 16 bits | -5V~+5V | 2-channel |
| | GC-4622 | Voltage output, 16 bits | -10V~+10V | 2-channel |
| | GC-4642 | Current output, 16 bits | 0-20mA | 2-channel |
| | GC-4652 | Current output, 16 bits | 4-20mA | 2-channel |
| | GC-4662 | Voltage output, 16 bits | 0~5V | 2-channel |
| | GC-4672 | Voltage output, 16 bits | 0~10V | 2-channel |
| | GC-4674 | Voltage output, 12 bits | 0~10V | 4-channel |
| Special module | GC-6101 | RS232/RS485 extension | - | - |
| | GC-6201 | GPRS extension | - | - |
| | GC-6221 | 4G extension | - | - |
| | GC-6501 | WiFi extension | - | - |

Table 6.1 Selection table

Technical specifications

| PLC Parameters | |
|---|--|
| Programming environment | OpenPCS software |
| Flash (Program storage) | 32M bytes |
| SRAM (Data storage) | 16M bytes |
| User data store | 2k bytes |
| Run-Time system | A PLC mission |
| PLC cycle time | 1000 instructions need about 1ms (ignore I/O circulation and GC-bus) |
| Programming modified online | Not support |
| Programming language implementation standard | IEC 61131-3 |
| Programming language | SFC (Sequentialfunctionchart)、LD (Ladderdiagram)、FBD (Functionblock)、ST (Structuredtext)、IL (Instruction List) |
| Local I/O | None, need extend GC series module |
| Extend terminal module quantity | Up to 32 modules |
| Digital I/O signal | 256 input/output |
| Analog I/O signal | 64 input/output |
| Configuration mode | automatic configuration |
| Real-time clock | Built-in |
| Floating point operations | Support |
| Communication interface | |
| Communication interface | One-channel CAN interface, one-channel Ethernet interface, one-channel RS232/RS485 interface |
| CANopen protocol master/slave function | Support |
| Modbus RTU/TCP protocol master/slave function | Support |
| Electrical parameters | |
| Power | 24V DC (-15%/+20%) |
| Input current | 70mA+ (total GC-bus current) /maximum2.5A |
| Starting current | About 2.5 times continuous current |
| Fuse capacity | ≤10A |
| Power contacts | Maximum 24V DC/maximum 10A |
| Electrical isolation | 1500 Vrms |
| Environmental testing | |
| Working temperature | -40℃~+85℃ |
| Working humidness | 95%RH, without condensation |

| | |
|---|--------------------------------------|
| EMC test | EN 55024:2011-09 EN 55022:2011-12 |
| Anti-vibration / impact resistance performance | EN 60068-2-6/EN 60068-2-27/29 |
| Anti-electromagnetic interference/radiation performance | EN 61000-6-2 /EN 61000-6-4 |
| IP grade | IP 20 |
| Basic information | |
| Dimension | 100mm *69mm *48mm |
| Weight | 100g |

Sales and service



Shenyang Vhandy Technology Co., Ltd.

Address: Room 401, D11 Block, SISP., Hunnan District, Shenyang, Liaoning, China

E-mail: sygckj@gmail.com

Tel/ Whatsapp: +86 13644001762

Skype: live:sygckj

WeChat: gckj777

Website: gcanbus.com