GCAN-PLC-400

Programmable Logic Controller
User manual
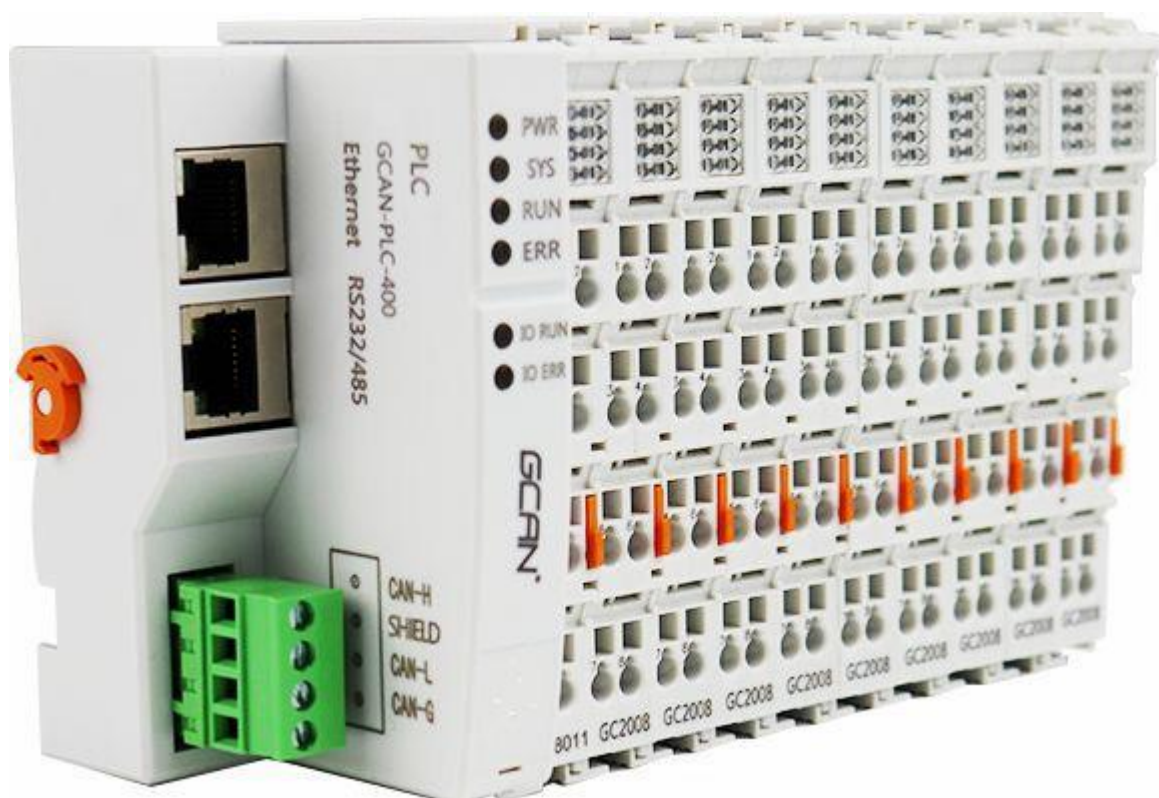
Document version V4.02（2021/03/24）

Revision History:

Ver	Date	Reason
V1.00	2016/12/20	Create
V2.01	2017/11/22	Add parameters
V3.01	2018/01/22	Add protocol part
V3.20	2018/07/18	Adjust structure
V3.25	2019/3/21	Selection table update
V4.00	2020/02/21	Update parameters
V4.01	2020/08/07	Update some content
V4.02	2021/3/24	Change the appearance

Content

1. Introduction

1.1. Overview

GCAN-PLC-400 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-400),1-32 arbitrary number of GC series terminal modules (GC-1008, GC-3804, etc.) and a terminal module.

The GCAN-PLC-400 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-400 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-400 configuration/programming interface is a Micro-USB interface that can be used to load PLC programs.

The GCAN-PLC-400 complies with the ISO 11898 CAN bus protocol. Support CANopen/ Modbus RTU/ Modbus TCP communication protocol and can be used as CANopen/ Modbus RTU/ Modbue 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/slave function
- 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 automatic configuration
- Supply power: DC+24V
- Input current, 400mA+ (total GC-bus current)
- Starting current: about 2.5 times continuous current
- Power contacts: maximum DC+30V
- 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.
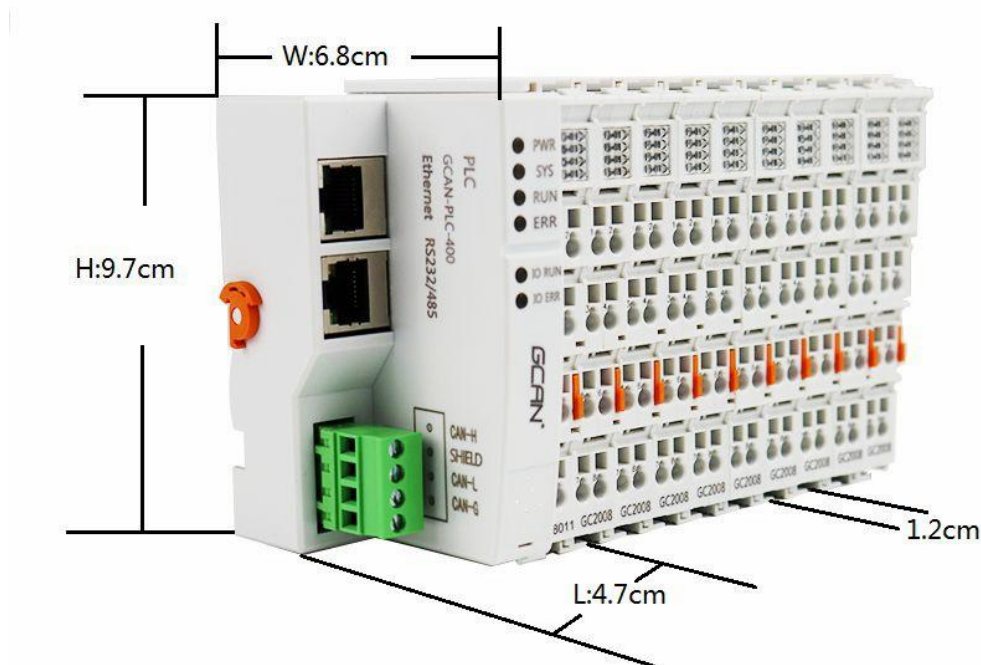
2. Installation

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

2.1 Module appearance

GCAN-PLC-400 appearance as shown in Figure 2.1
GCAN-PLC-400 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/RS485interface.

Figure 2.1 the appearance of GCAN-PLC-400

2.2 Fixed module

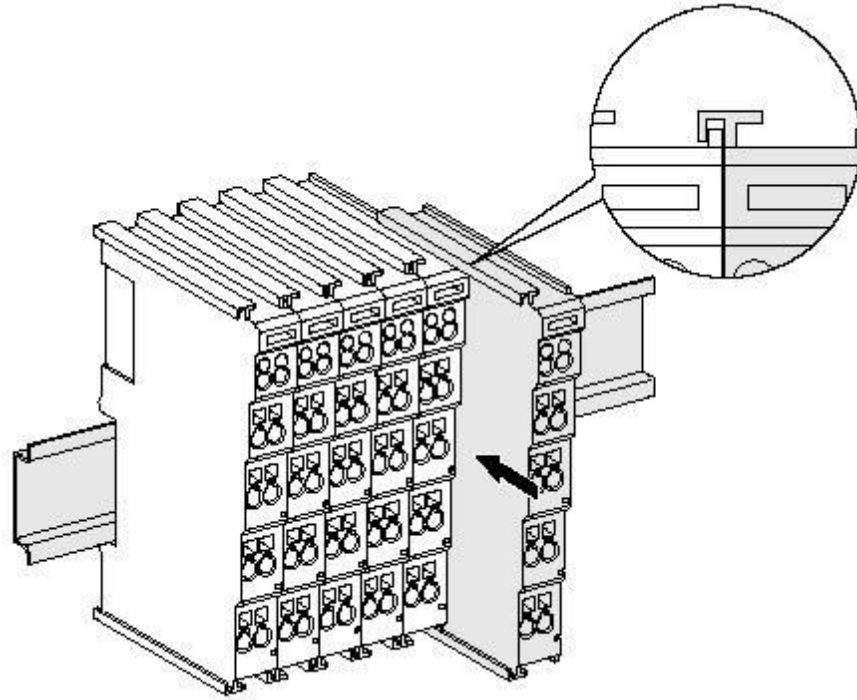GCAN-PLC-400 and its matching terminal installation method is shown in Figure 2.2
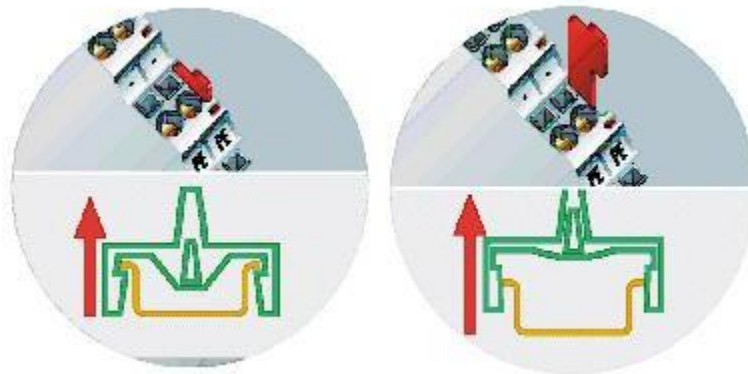
Figure 2.2 GCAN-PLC-400 installation

Figure 2.3 GCAN-PLC-400 self-locking mechanism

As shown figure 2.2, install the GCAN-PLC-400 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-400 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.

The GCAN-PLC-400 can connect up to 32 distributed bus terminal modules. When inserting the GC series terminal module, be sure to insert it along the groove on the right side of the existing module sequentially until the lock is stuck. When you assemble the nodes correctly, there is no obvious gap between the terminal modules. If the modules are not assembled correctly, the entire node will not operate normally.

Please note: When using the GCAN-PLC-400, 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.

Figure 2.4 GC-0001 Terminal resistance module installation method

2.3 Wiring method

The power wiring as shown in figure 2.5. First, use a flat-blade screwdriver to insert into the square hole, hold the top edge of the metal sheet in the square hole, and press toward the hole. Then, insert the wire into the hole. After plugging in, pull out the screwdriver and the wire can be firmly locked in the hole.
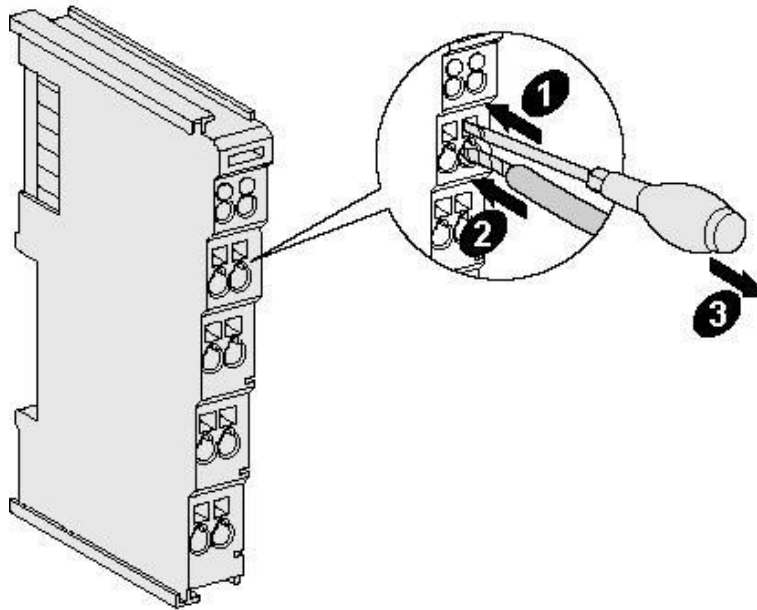
Figure 2.5 GCAN-PLC-400, the power wiring of programmable controller

2.4 Interface definition

The main control module of GCAN-PLC-400 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.
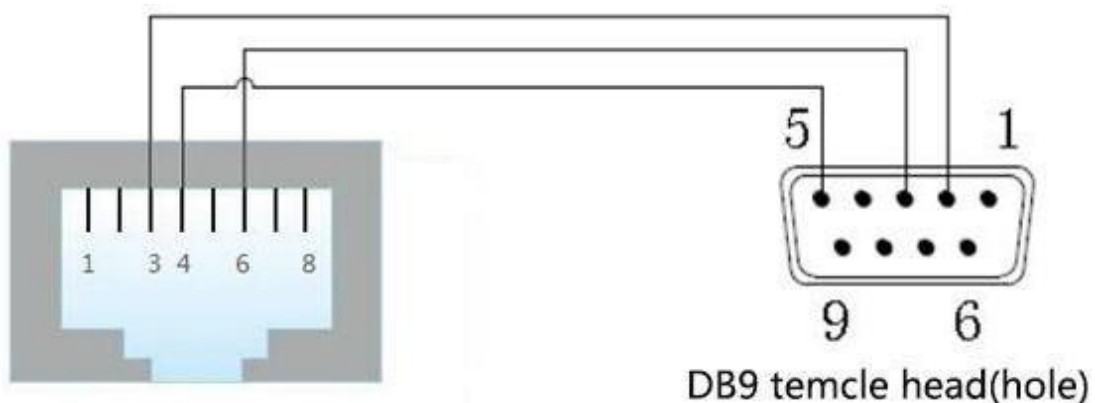

Figure 2.6 RS-232 interface style of GCAN-PLC-400

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	RS48 signal B-

Table 2.1 RS232 and RS485 interface definition of GCAN-PLC-400

Figure 2.7 CAN bus terminal block of GCAN-PLC-400

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-400

The power wiring terminal block of GCAN-PLC-400 is shown in Figure 2.8, and its interface definition is shown in Table 2.3. The power supply part of GCAN-PLC-400 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.
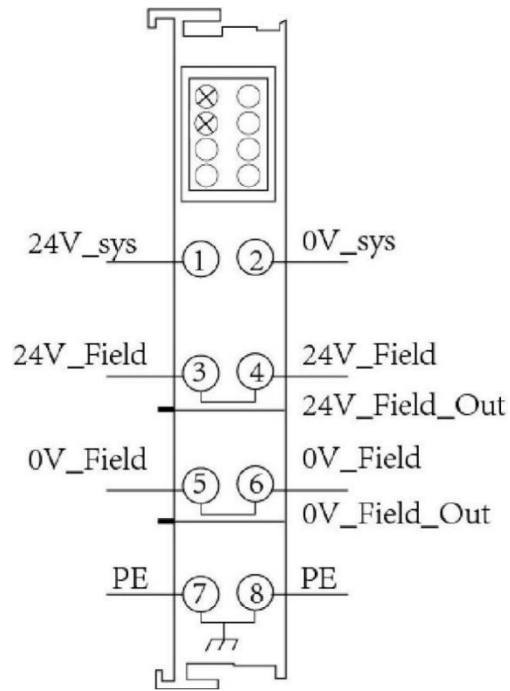
Figure 2.8 GCAN-PLC-400, Power terminal block

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-400, terminal definition

2.5 System status indicator

GCAN-PLC-400 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-400, 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-400, indicators status

3. Communication connection

3.1 Serial connection

GCAN-PLC-400 uses standard serial port level（RS232: ±3~15V), so the module can directly connect to the device with RS232 interface.

3.2 CAN connection

GCAN-PLC-400 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-400, 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.
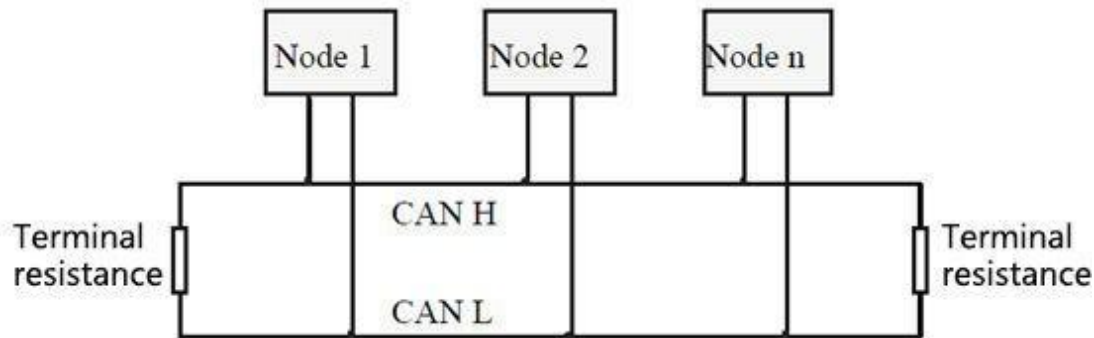

Figure 3.1 CAN-Bus network structure

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 Φ1.0mm2. 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.
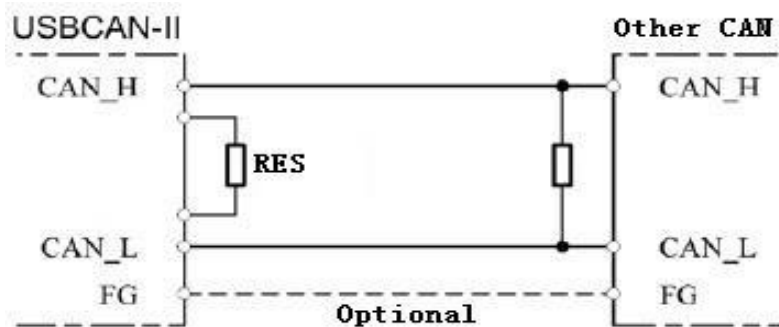

Figure 3.2 GCAN-PLC-400 connect with other nodes

Please note: GCAN-PLC-400 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.
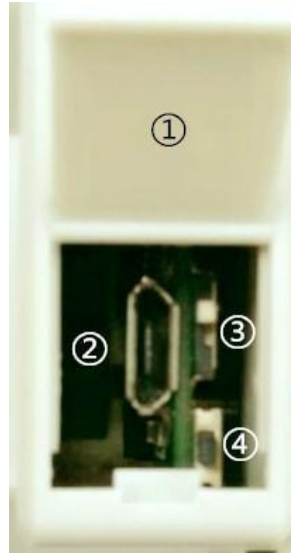

Figure 3.3 Physical Diagram of Kernel Refresh Interface

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-400 provides a program running switch and a reset button.
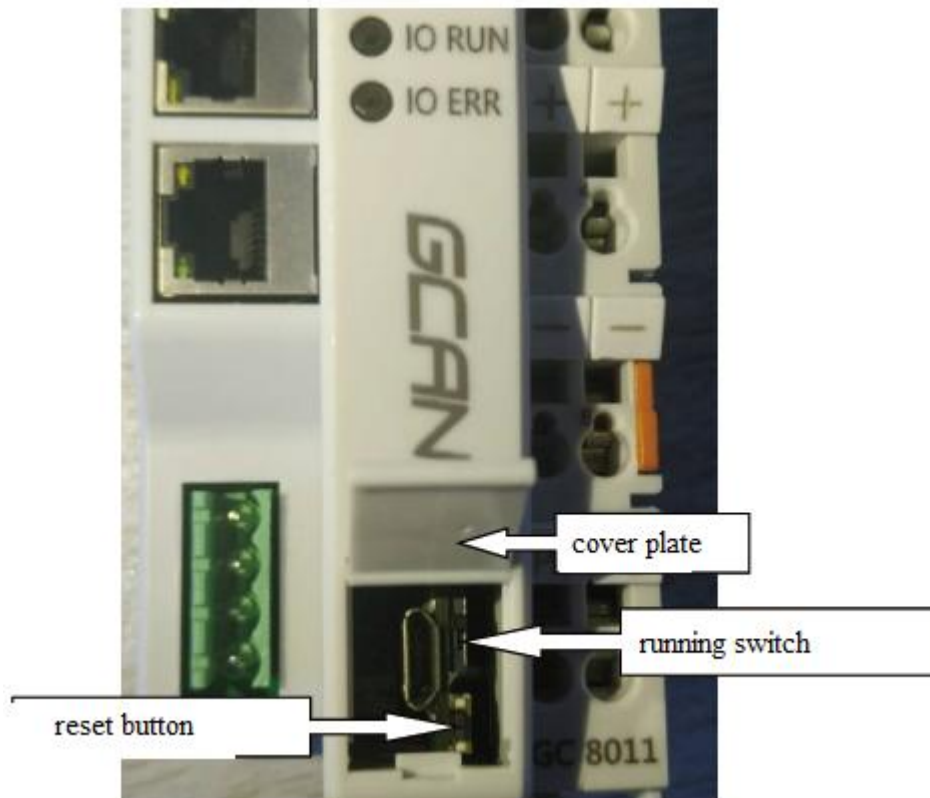Physical picture after opening cover plate as shown in Figure 4.1:

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:
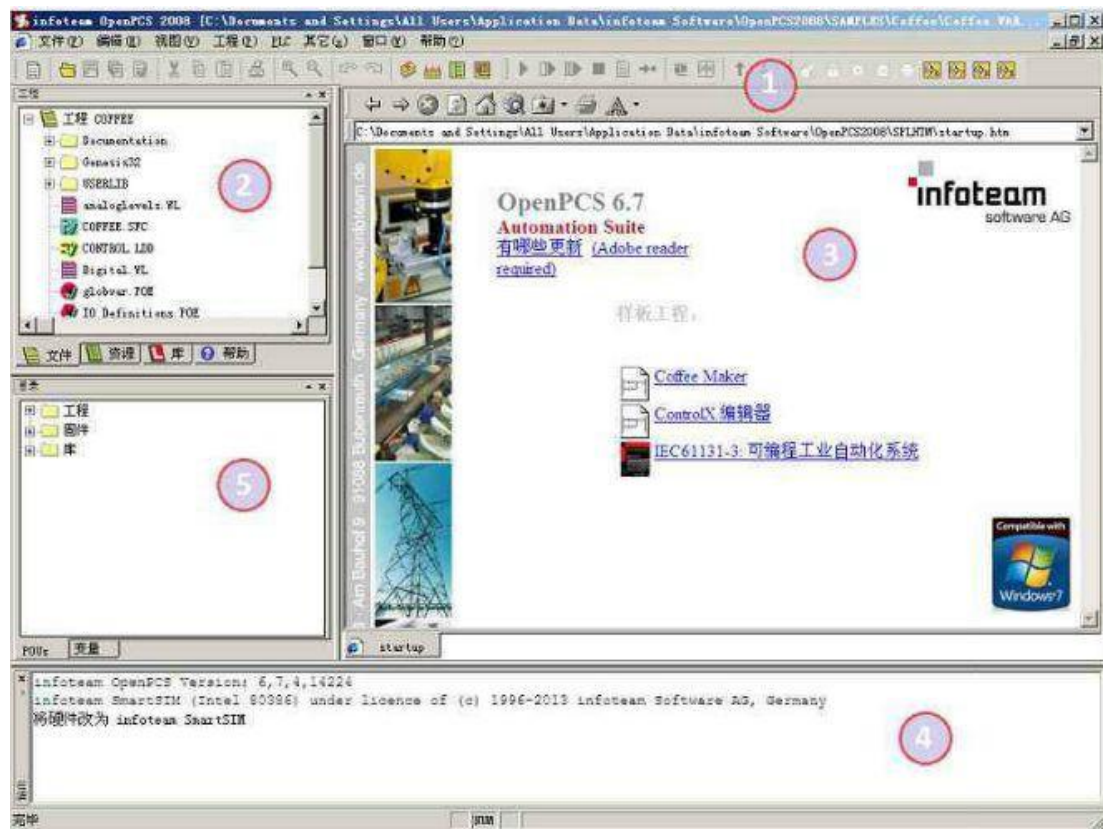http://gcgd.net/tecinfo1_1086.html

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.
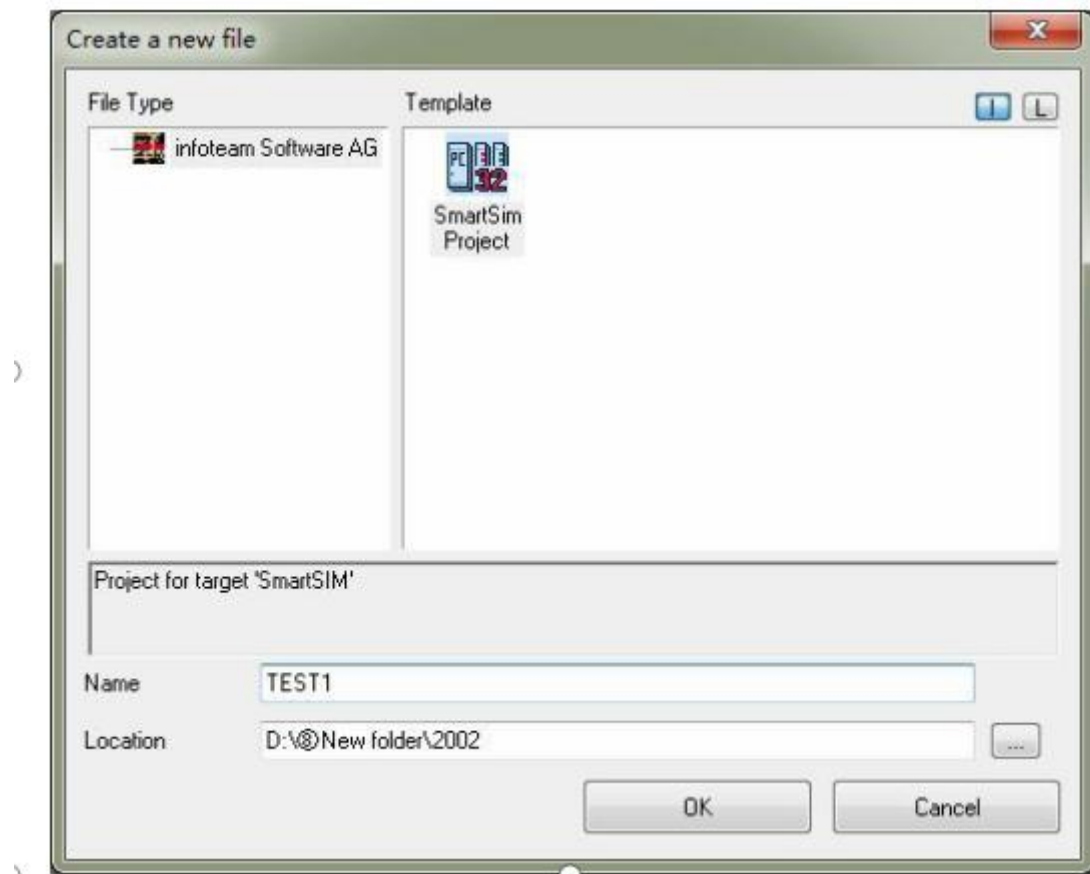

Figure 5.2 Create project

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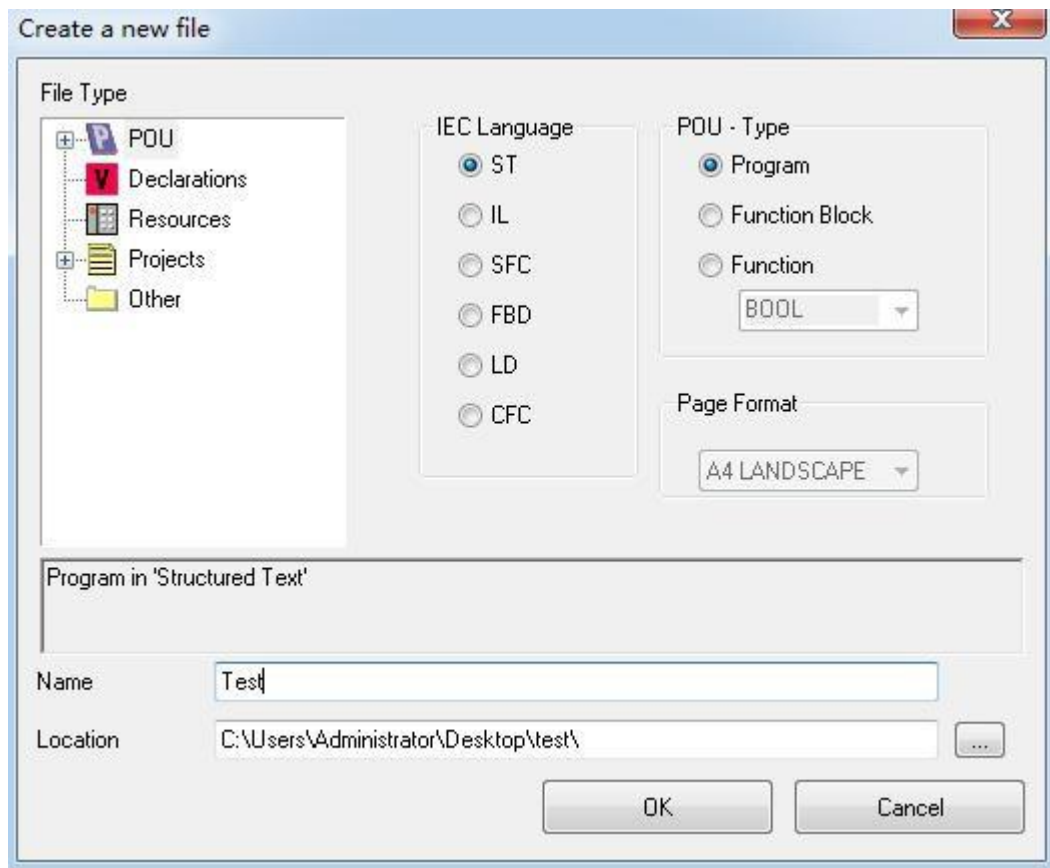Please note that: the string entered in the name field cannot start with a number.

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

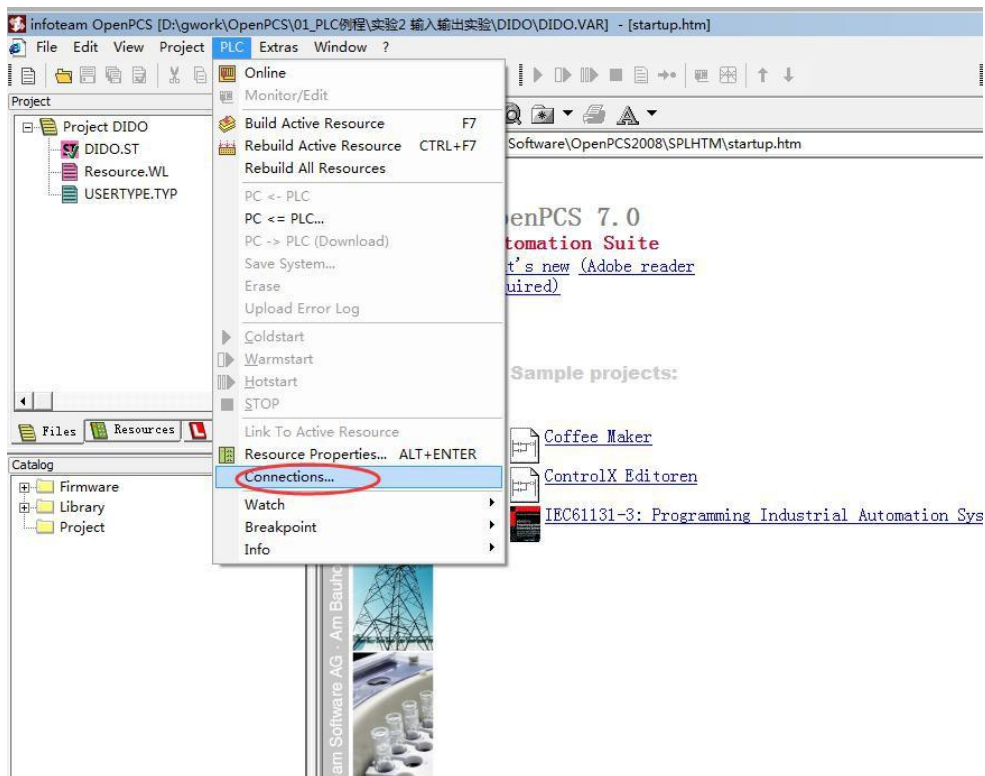Click "PLC", then select "Connections..", as shown in Figure5.4.

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.
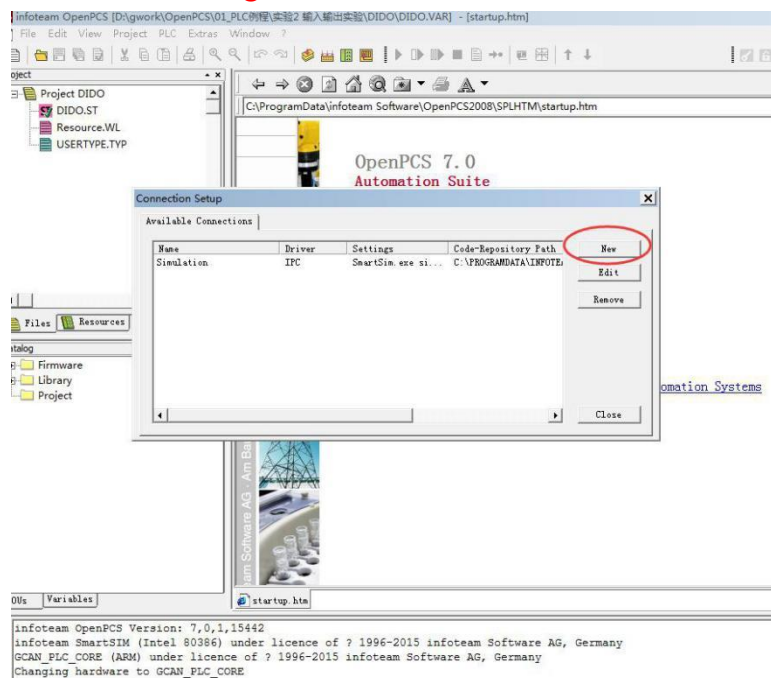

Figure 5.5 Connection Setup
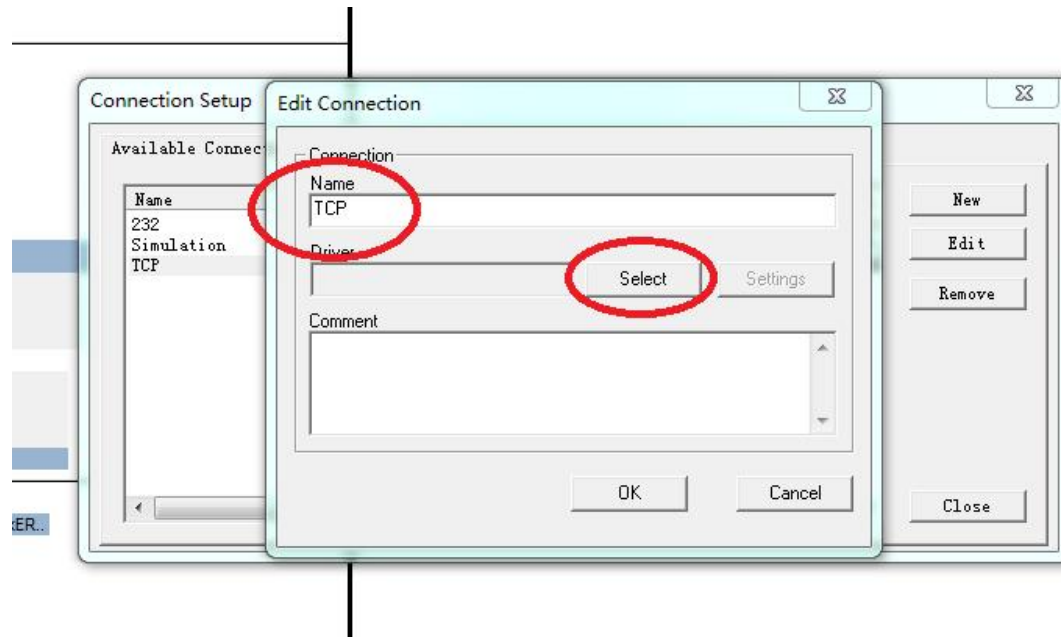
Enter "TCP" in Name and click" Select".

Figure 5.6 Click "Select"
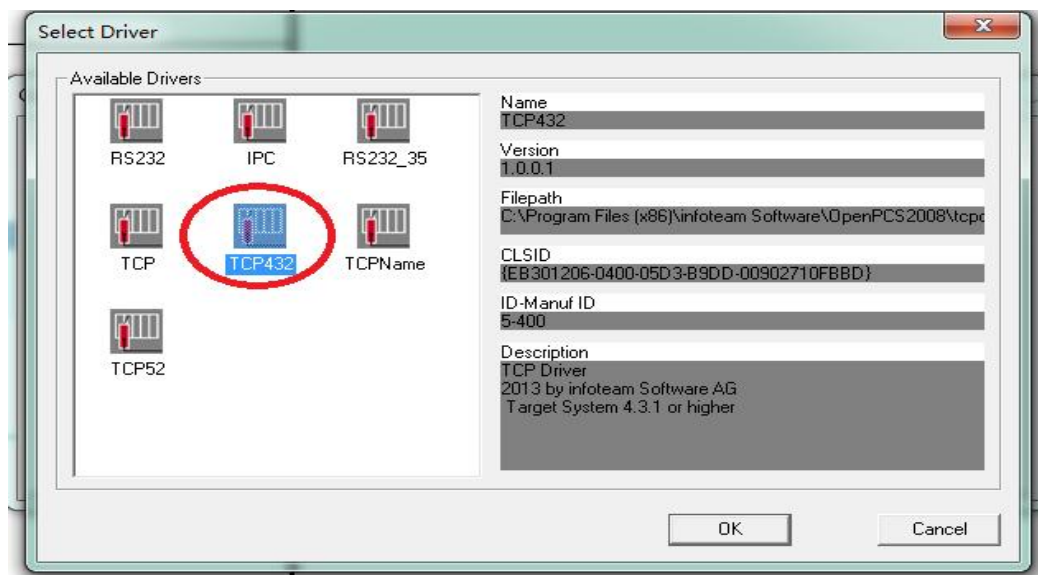
Select"TCP432" TCP432, then click"OK".

Figure 5.7 Select TCP432
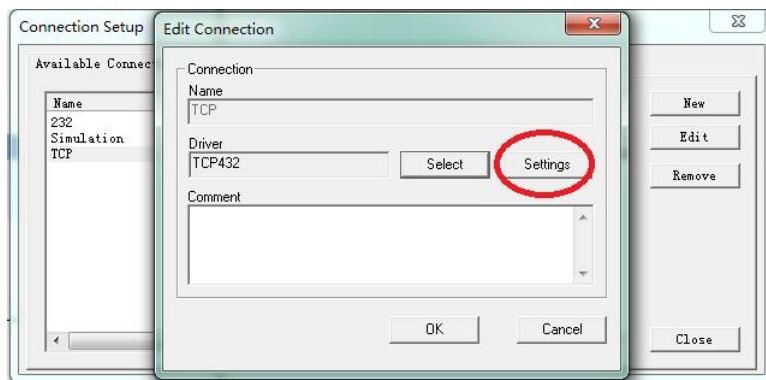
Click "Settings" .

Figure 5.8 Click "Settings"

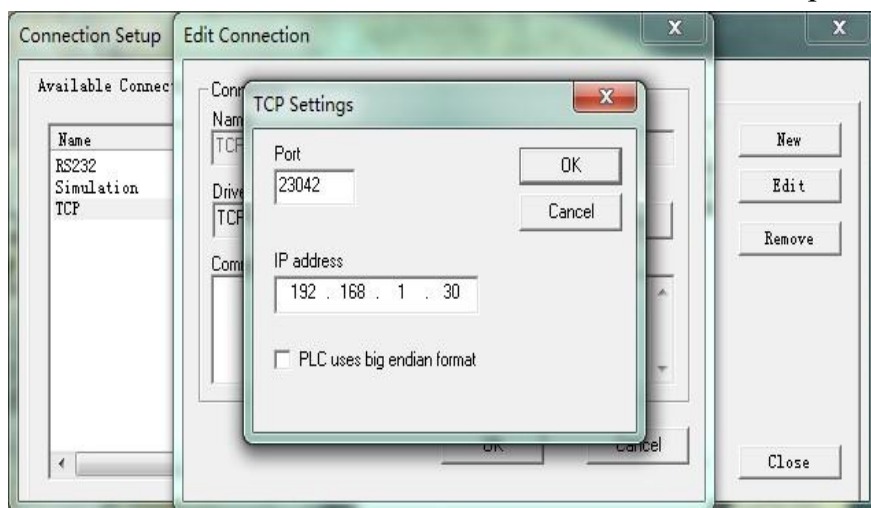Please enter 23042 for Port. IP address 192.168.1.30, set the back point OK

Figure 5.9 IP Address and Port Number Settings

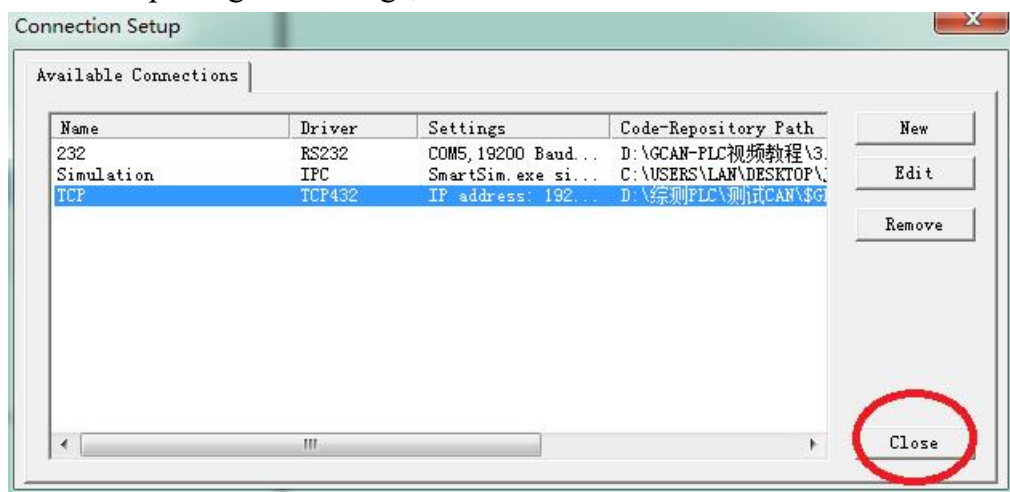After completing the settings, click "Close"

Figure 5.10 Click "Close"

Set "Resource Properties"
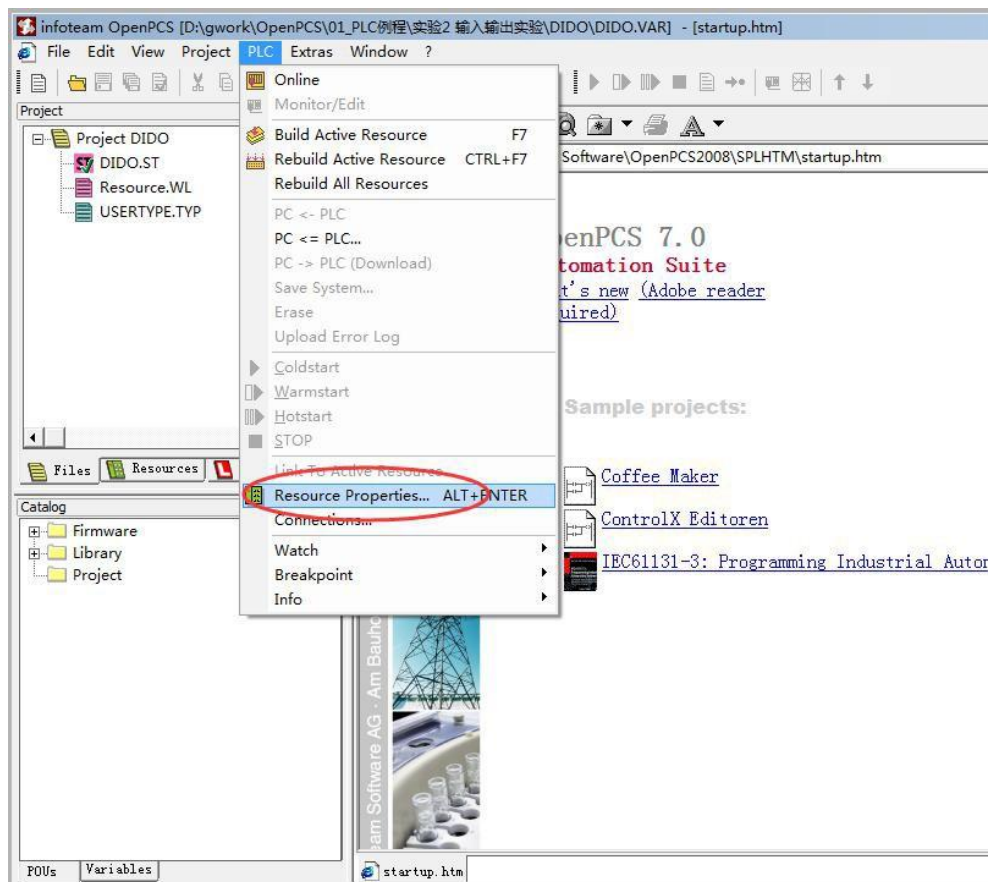
Figure 5.11 Set "Resource Properties"

Select "GCAN_PLC" and "TCP", then click "OK" to complete the setting
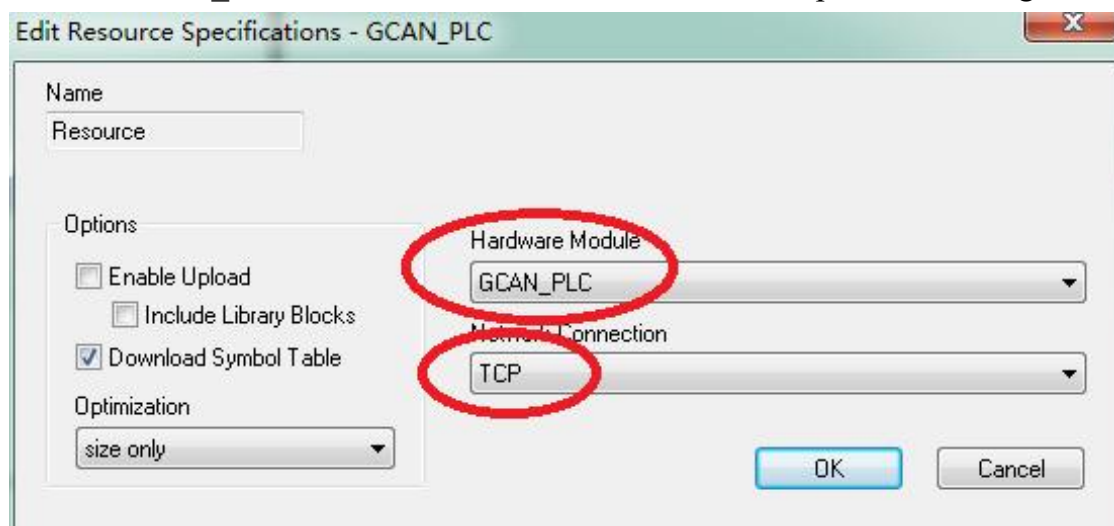
Figure 5.12 Select "GCAN_PLC" and "TCP"

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 theprogram.

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

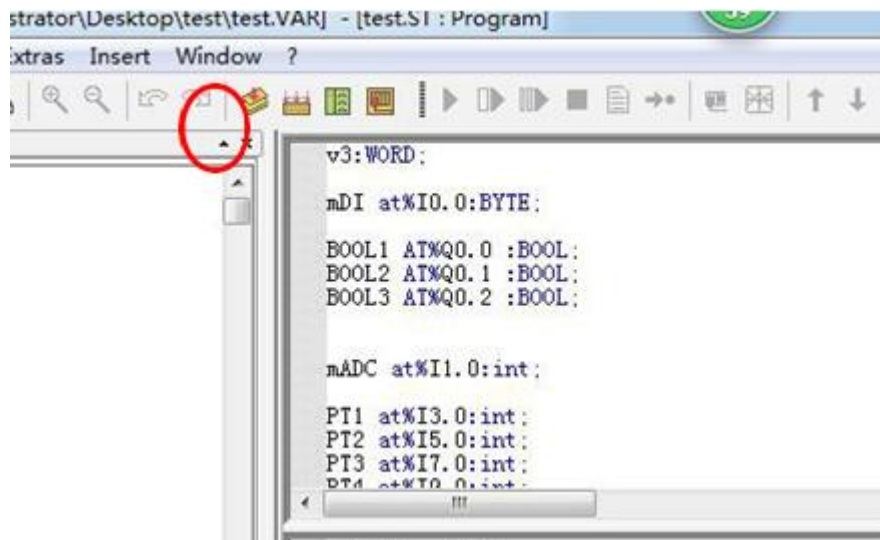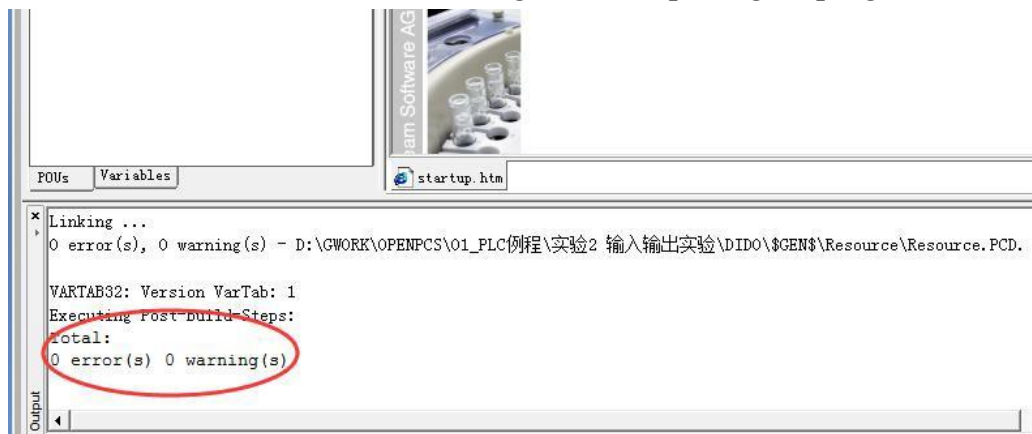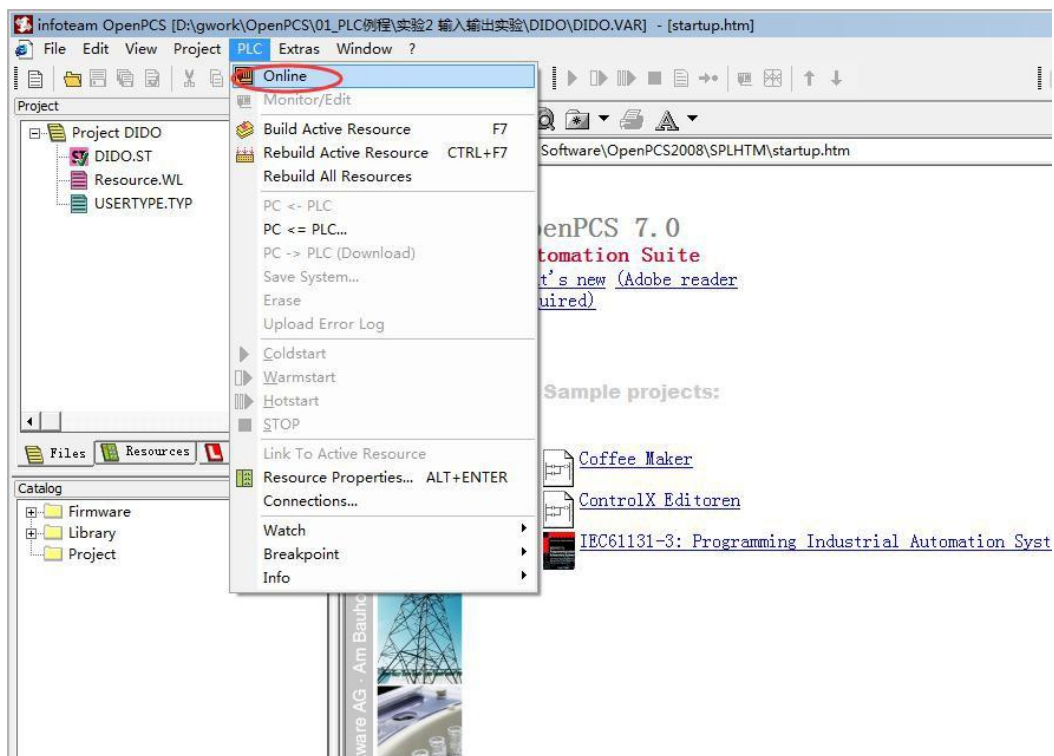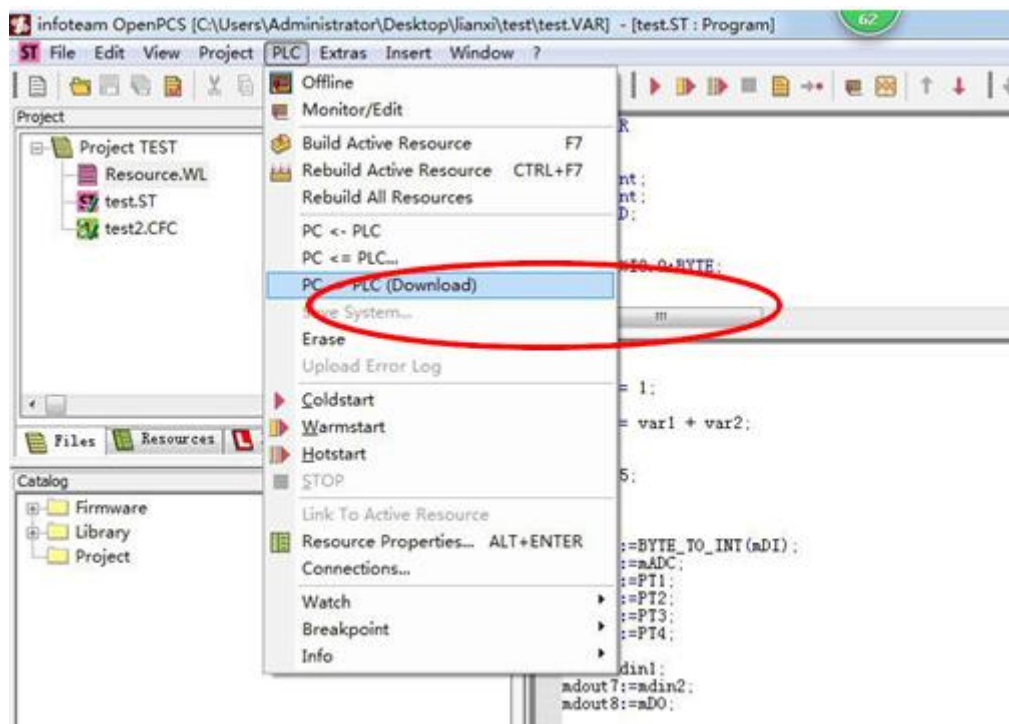GCAN-PLC-400 series products consist of a programmable main control module, several GC series IO modules and a terminal resistance module. GC series IO modules currently include five categories: digital input, digital output, analog input, analog output, and communication extension. The specific selection 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

7. Technical specifications

PLC Parameters	
Programming environment	OpenPCS software
Flash（Program storage）	16M bytes
SRAM（Data storage）	512k 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 online modified	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 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	250g

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

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