

# GCAN-PLC-400

## Programmable Logic Controller

### User Manual



## Revision History:

Version	Date	Reason
V1.00	2016/12/20	Create document
V2.01	2017/11/22	Add some parameters
V3.01	2018/01/22	Add communication protocol part

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# 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 programmable controller 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 programmable controller 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 programmable controller 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, etc.

## 1.2 Performance

- One-channel CAN-Bus interface, one-channel Ethernet interface, one-channel RS232 serial interface
- Programming Software: OpenPCS ( according to IEC 61131-3 standard)
- Support CANopen protocol master/slave function

- Support Modbus RTU/TCP master/slave function
- CANopen PDO mode supports synchronization, looping, event-driven, polling
- Up to 32 bus terminal modules ( up to 32x8 I/O points)
- Transmit 4 PDOs ( CANopen) and receive 4 PDOs ( CANopen)
- Configuration mode is automatic configuration
- Supply power: 24V DC (18~36V)
- Input current, 70mA+ ( total GC-bus current), maximum 2.5A
- Starting current: about 2.5 times continuous current
- Power contacts: maximum 24V DC/maximum 10A
- Electrical isolation: 1500 Vrms
- Working temperature: -40.00℃~ 85.00℃
- Dimensions: 100mm(L) \* 69mm(W) \* 48mm(H)
- IP grade: IP20

## 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 programmable controller appearance as shown in Figure 2.1.

GCAN-PLC-400 programmable controller 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 interface.

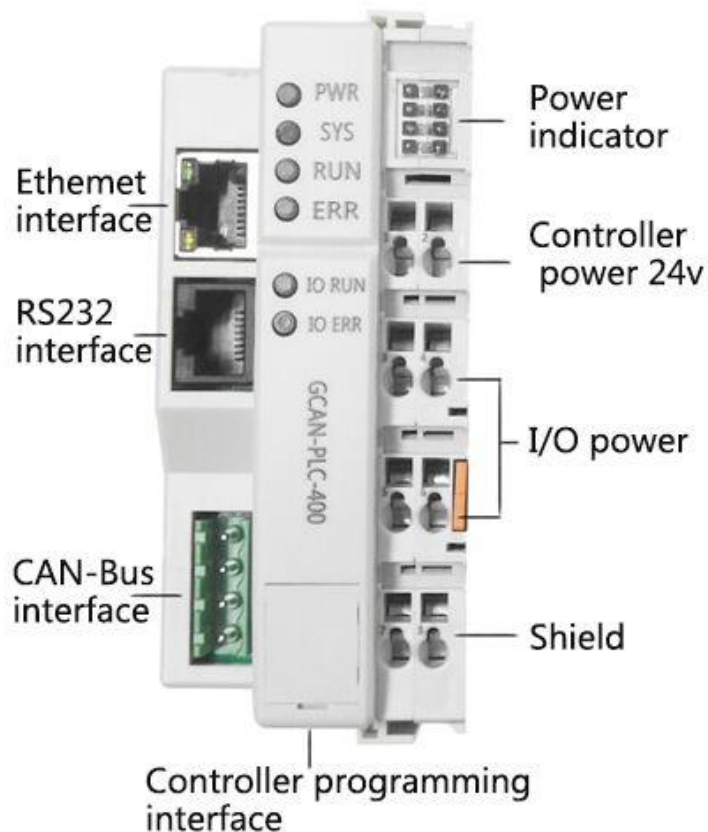


Figure 2.1 the appearance of GCAN-PLC-400 programmable controller

### 2.2 Fixed module

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

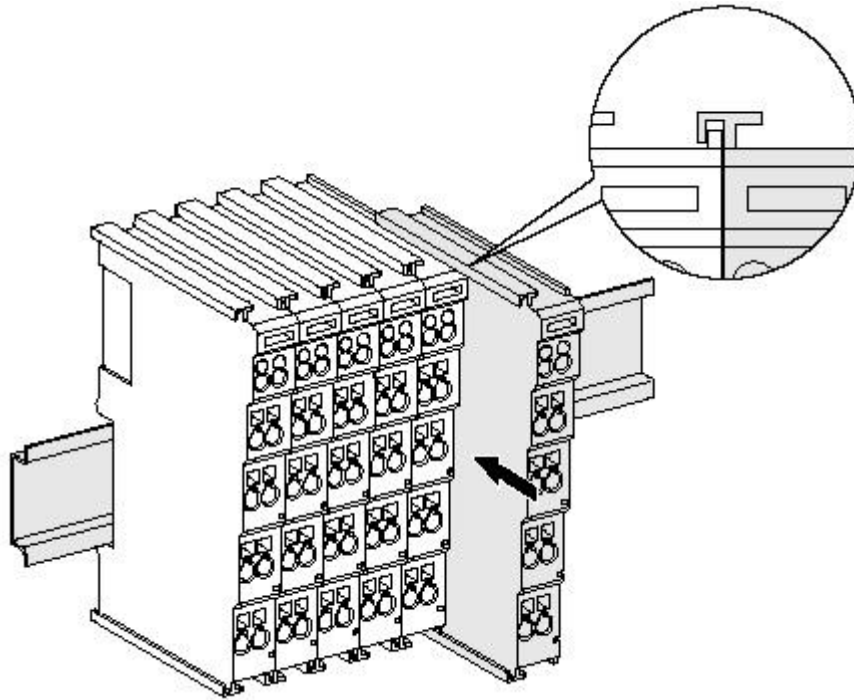


Figure 2.2 GCAN-PLC-400 programmable controller installation

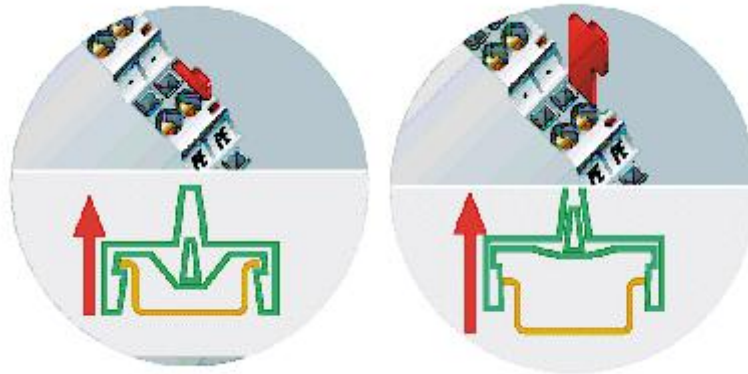


Figure 2.3 GCAN-PLC-400 programmable controller self-locking mechanism

As shown figure 2.2, install the GCAN-PLC-400 programmable controller 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 programmable controller 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 programmable controller 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. **At the right end of the entire node, you need to install terminal module.**

The terminal will guarantee the data transmission and power supply of the GC-Bus, or result in a system error without a terminal module.

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.

### 2.3 Wiring method

The power wiring as shown in figure 2.4. 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.

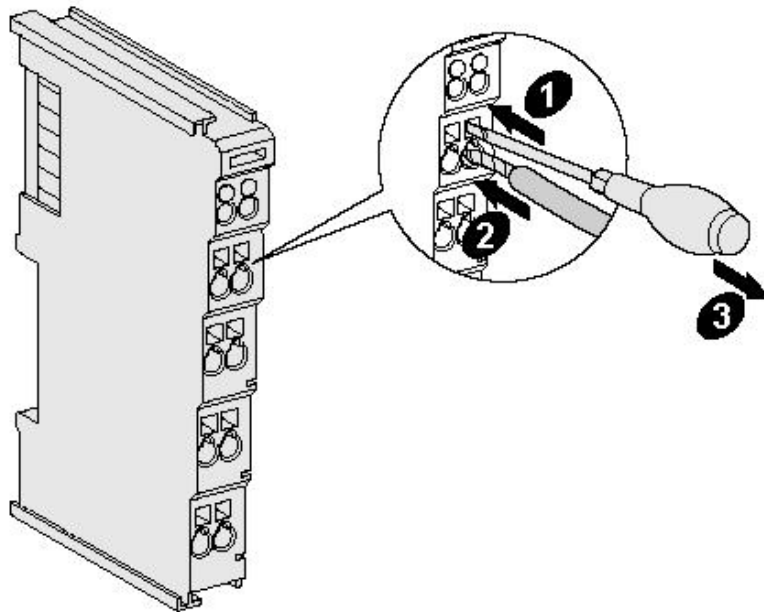


Figure 2.4 GCAN-PLC-400, the power wiring of programmable controller



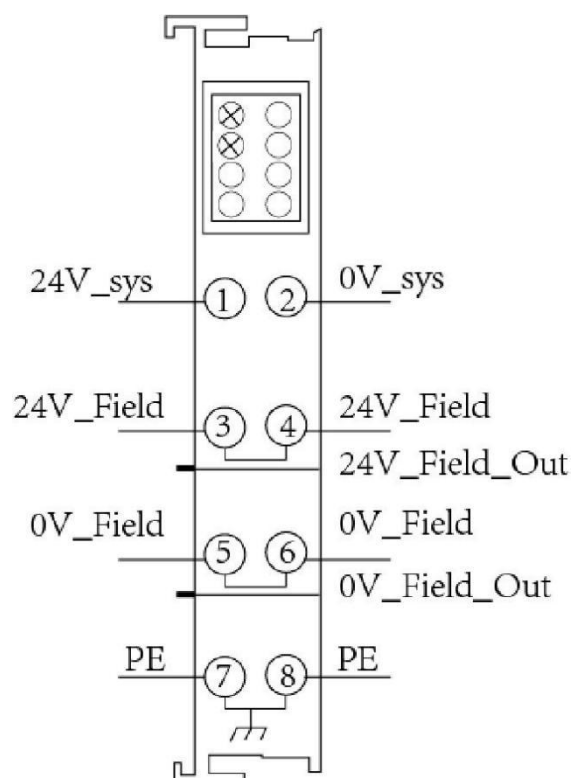


Figure 2.5 GCAN-PLC-400, Power terminal block

The power terminal block of the GCAN-PLC-400 programmable controller is shown in Figure 2.5, including 8 terminals. The number corresponding to each terminal and its meaning are shown in Table 2.1.

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

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 2.1 GCAN-PLC-400, terminal definition

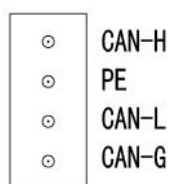


Figure 2.6 GCAN-PLC-400, CAN-Bus terminal block

The CAN-Bus terminal block of the GCAN-PLC-400 programmable controller is shown in Figure 2.6, including 4 terminals. The number corresponding to each terminal and its meaning are shown in Table 2.2.

Terminal	Number	Definition
CAN-H	1	CAN-Bus-High
PE	2	Shield
CAN-L	3	CAN-Bus-Low
CAN-G	4	CAN-Bus- GND

Table 2.2 GCAN-PLC-400, CAN-Bus terminal definition

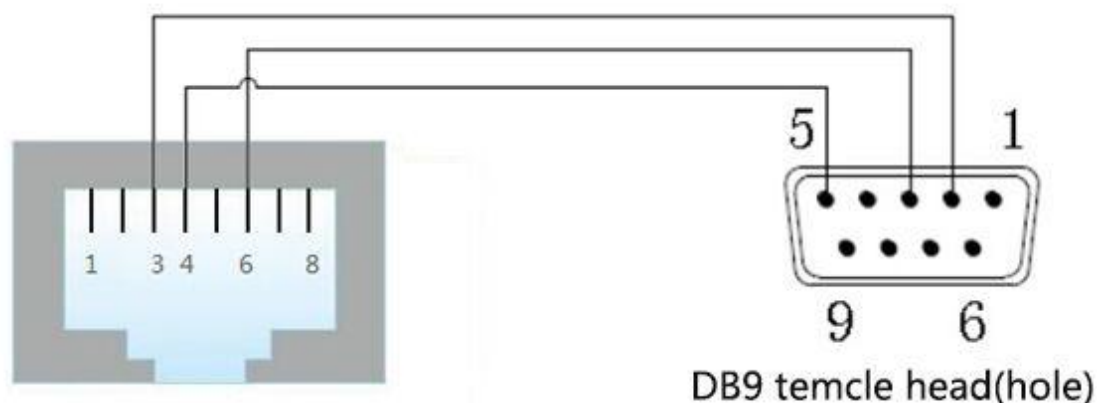


Figure 2.7 GCAN-PLC-400, RS-232 interface

As shown in figure 2.7, RS-232 interface of GCAN-PLC-400 programmable controller uses RJ45 interface.

The specific definitions are shown in Table 2.3

Terminal	RJ45 Number	DB9 Number	Definition
TXD	3	2	Transmit data
RXD	6	3	Receive data
GND	4	5	Signal ground

Table 2.3 GCAN-PLC-400, CAN-Bus terminal definition

## 2.4 System status indicator

GCAN-PLC-400 programmable controller 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
<b>Terminal module</b>		
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 Programmable Controller 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-400 programmable controller connect to CAN-Bus as described in figure 2.2, 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.

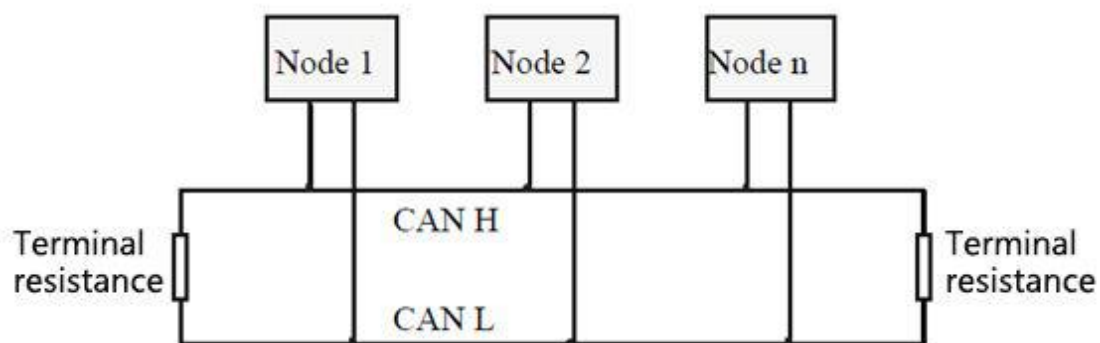


Figure 3.1 CAN-Bus network structure

**Note: CAN-Bus cable can be used with ordinary twisted-pair and shielded twisted-pair.**

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

GCAN-PLC-400 Programmable Controller 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.

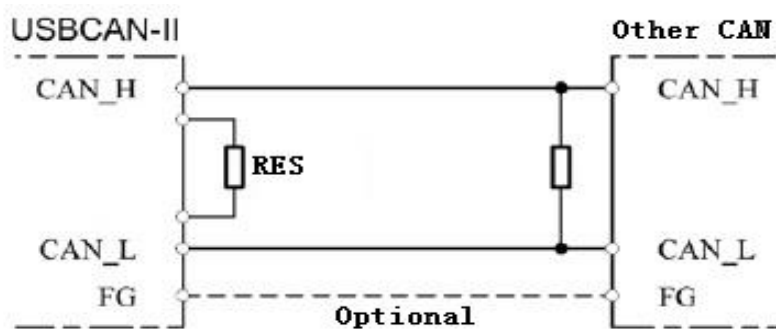


Figure 3.2 GCAN-PLC-400 connect with other nodes

## 4 PLC Kernel Refresh

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 4.1.

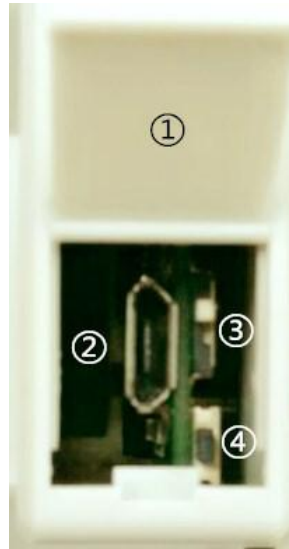


Figure 4.1 Physical Diagram of Kernel Refresh Interface

In Figure 4.1, 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.**

## 5 OpenPCS Programming software usage

### 5.1 Installation of OpenPCS

OpenPCS 2008 programming software can be download on the internet.

### 5.2 Programming interface

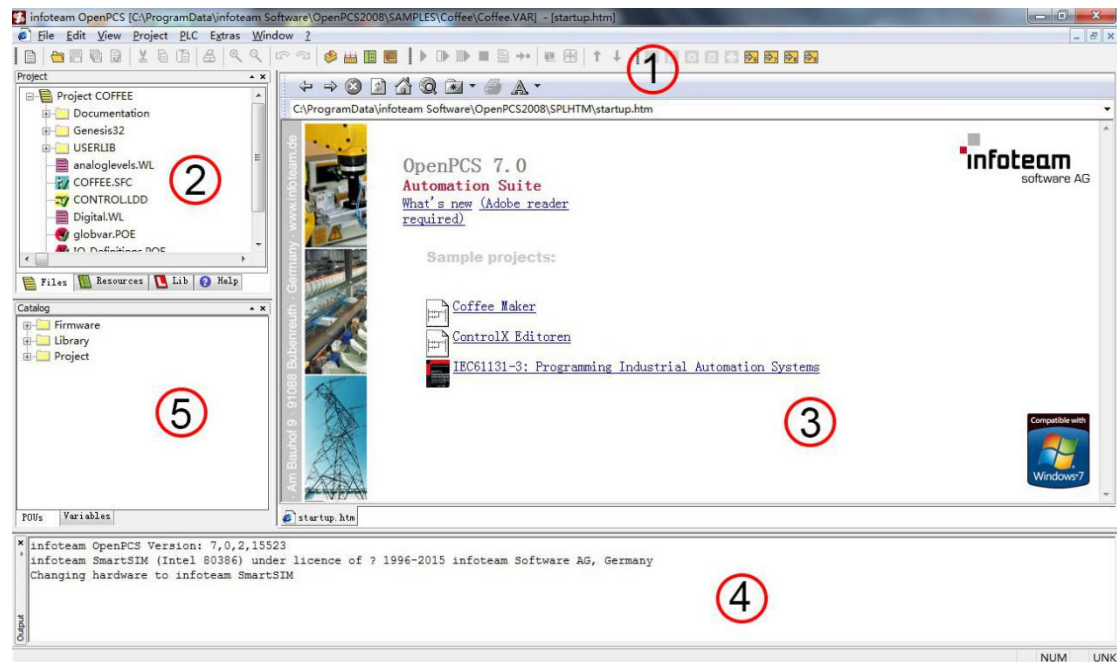


Figure 5.1 OpenPCS programming interface

Programming interface of OpenPCS mainly contains:

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

### 5.3 Project creation

#### 5.3.1 Create project

Click “File”, than select ”New” to create a new file, as shown in Figure 9.2.



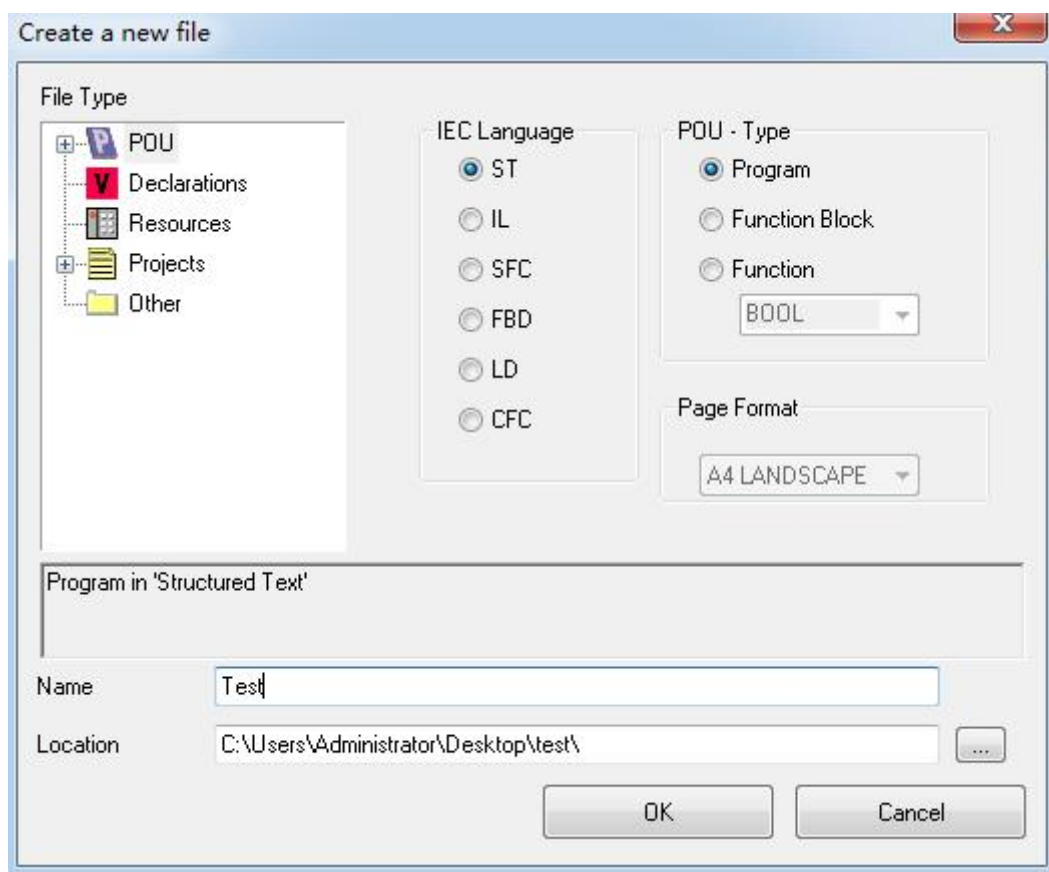


Figure 5.2 Create a new file

### 5.3.2 Add files

Add files for project (eg: add function blocks -Sample FC), as shown in Figure 5.3.

**Note: Names cannot start with numbers**

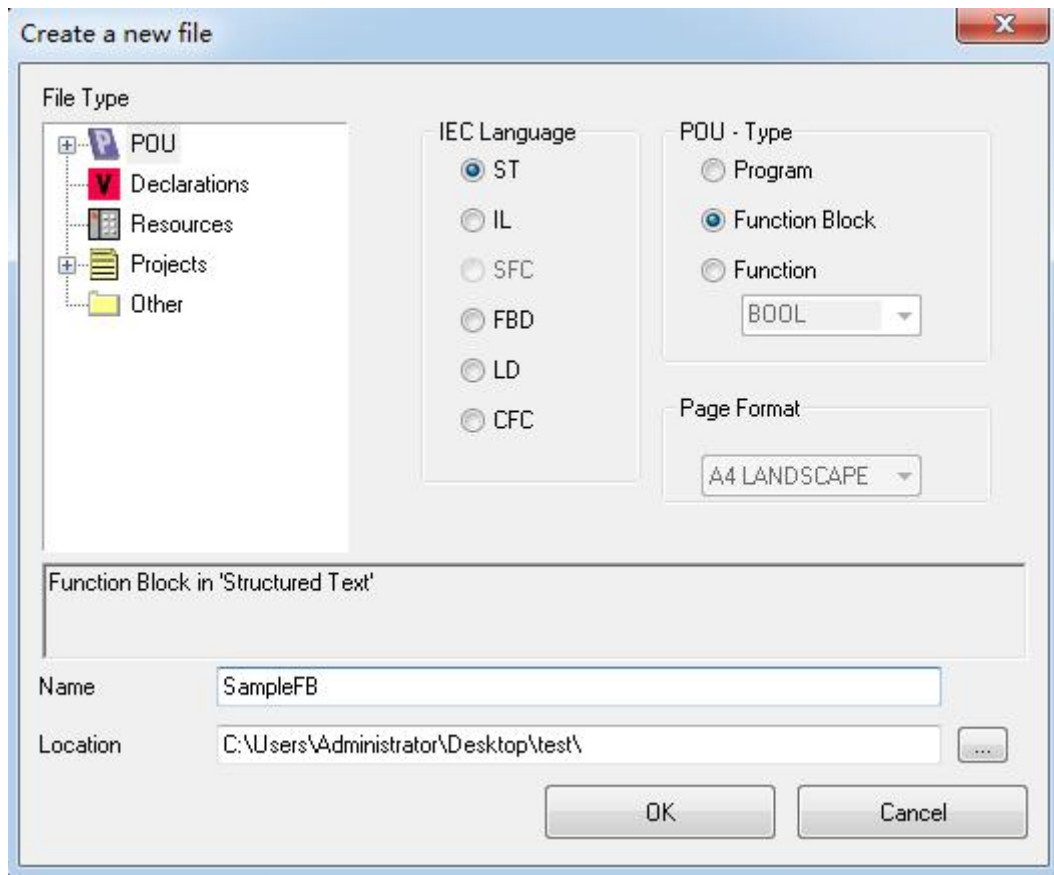


Figure 5.3 Add function block

### 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

1. Click “PLC”, then select “Connections..”, as shown in Figure 5.4.

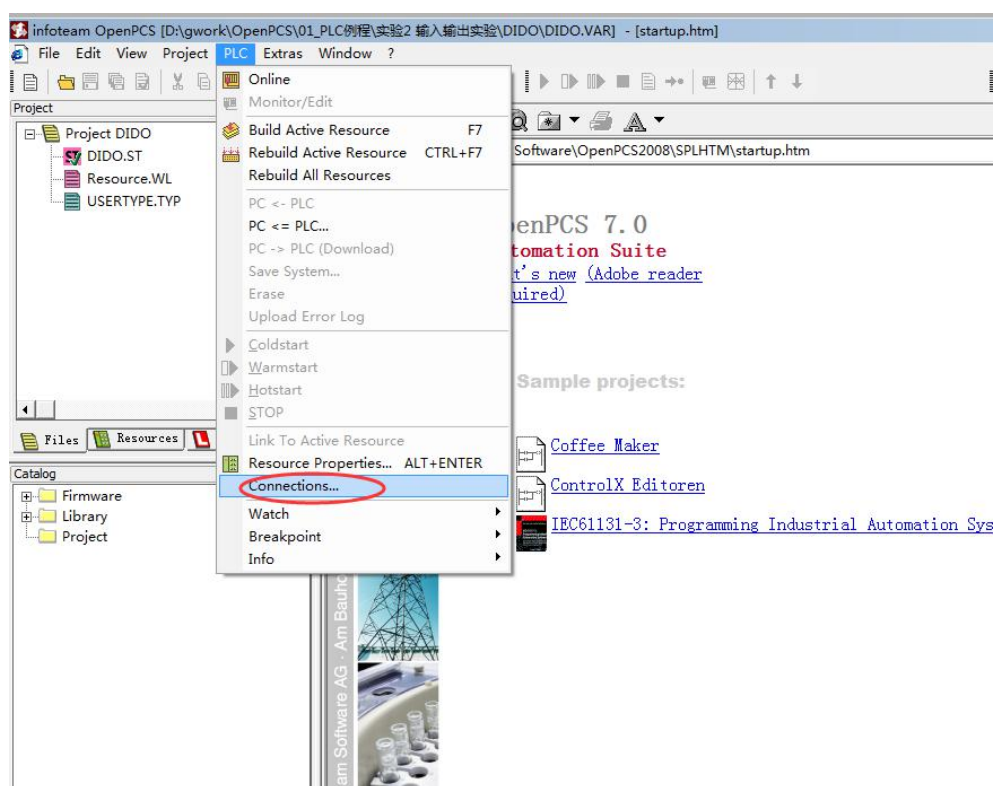


Figure 5.4 Debug connection

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

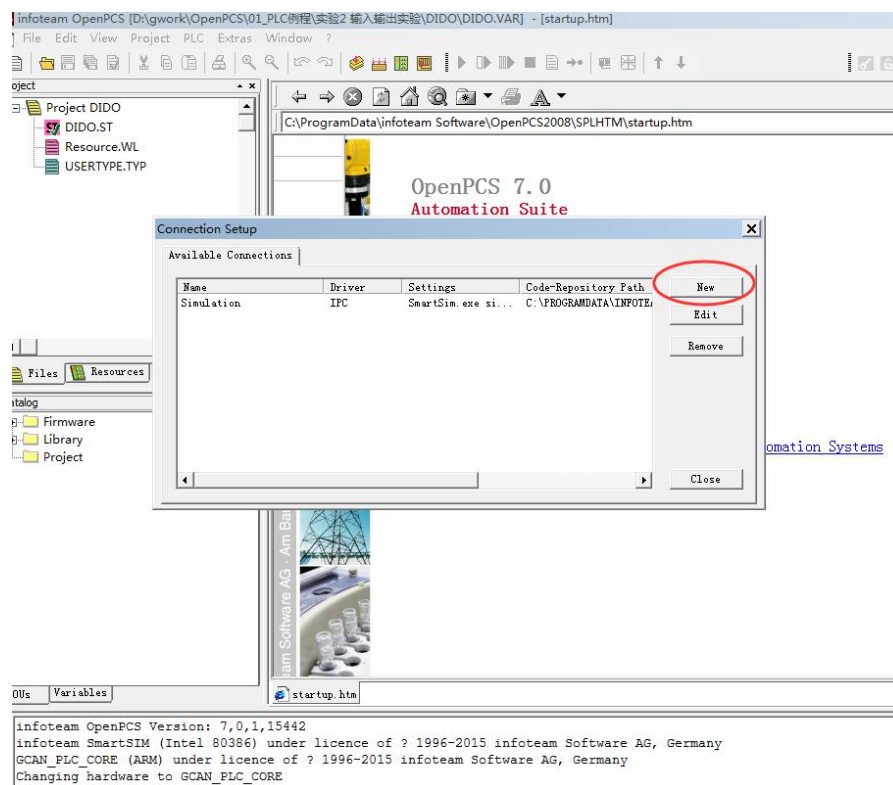


Figure 5.5 Connection Setup

3. Enter "TCP" in Name and click "Select".

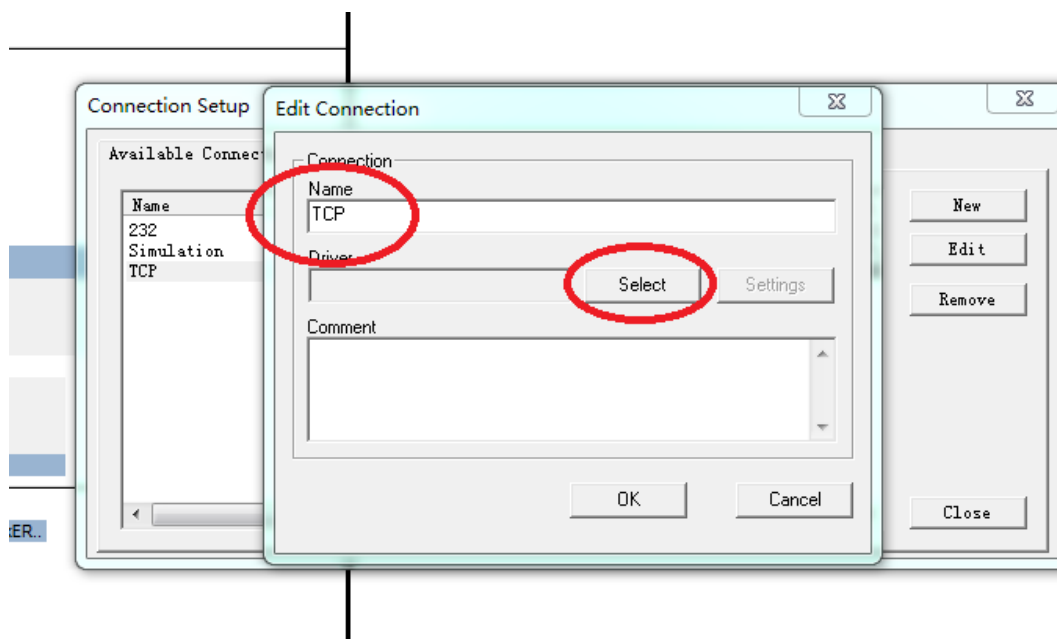


Figure 5.6 Click "Select"

4. Select "TCP432"  TCP432 , then click "OK".

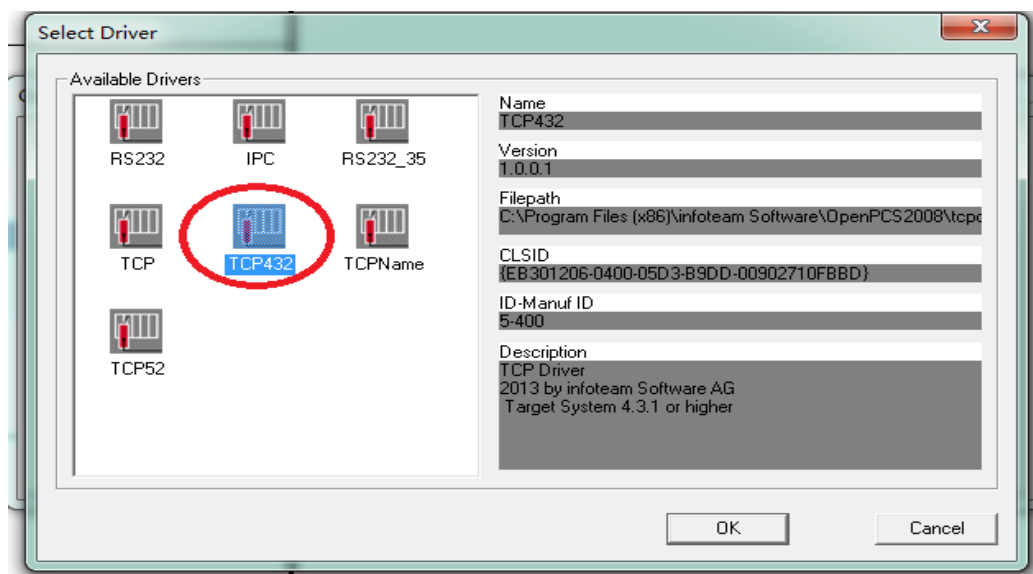


Figure 5.7 Select TCP432

5. Click “Settings”.

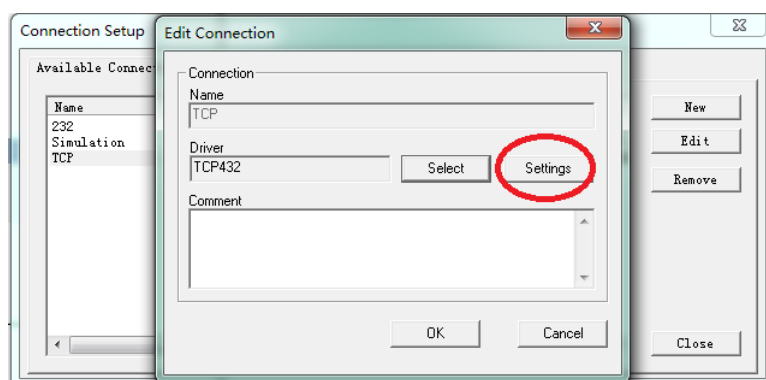


Figure 5.8 Click “Settings”

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

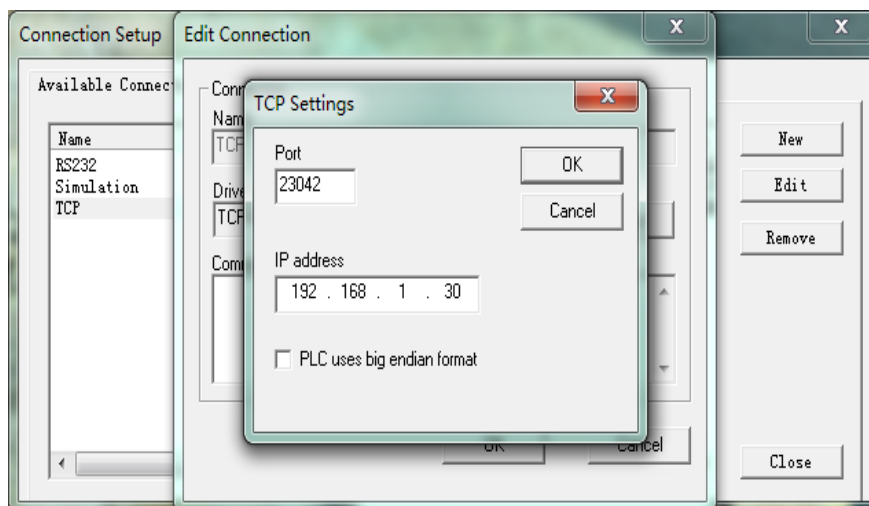


Figure 5.9 IP Address and Port Number Settings

7. After completing the settings,click “Close”

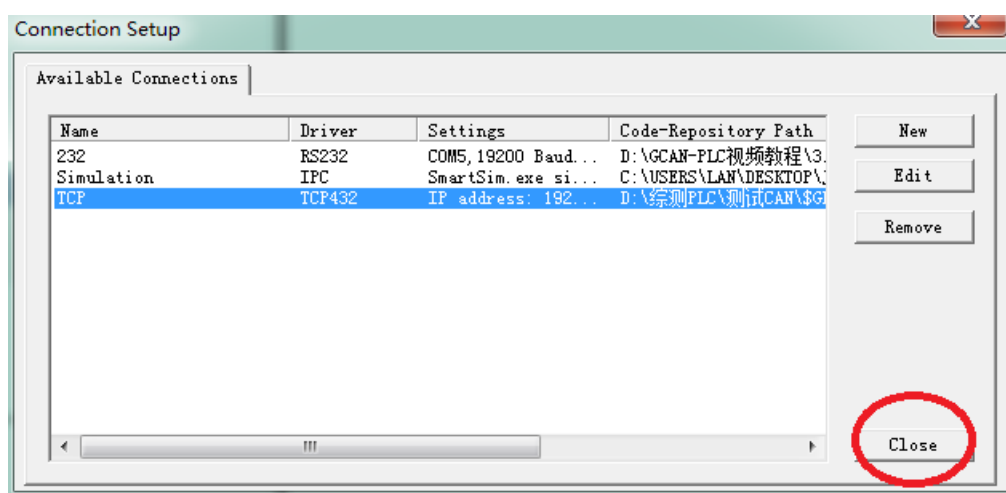


Figure 5.10 Click "Close"

8. Set “Resource Properties”

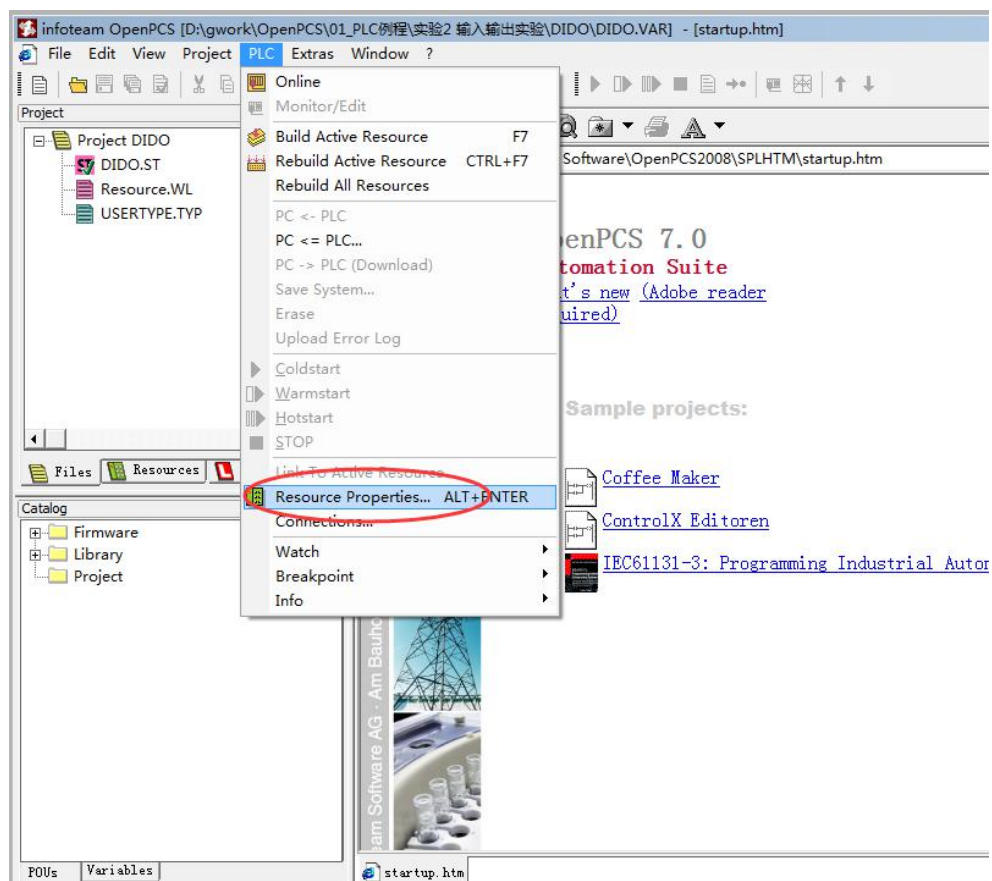


Figure 5.11 Set “Resource Properties”

9. Select "GCAN\_PLC" and "TCP", then click "OK" to complete the setting

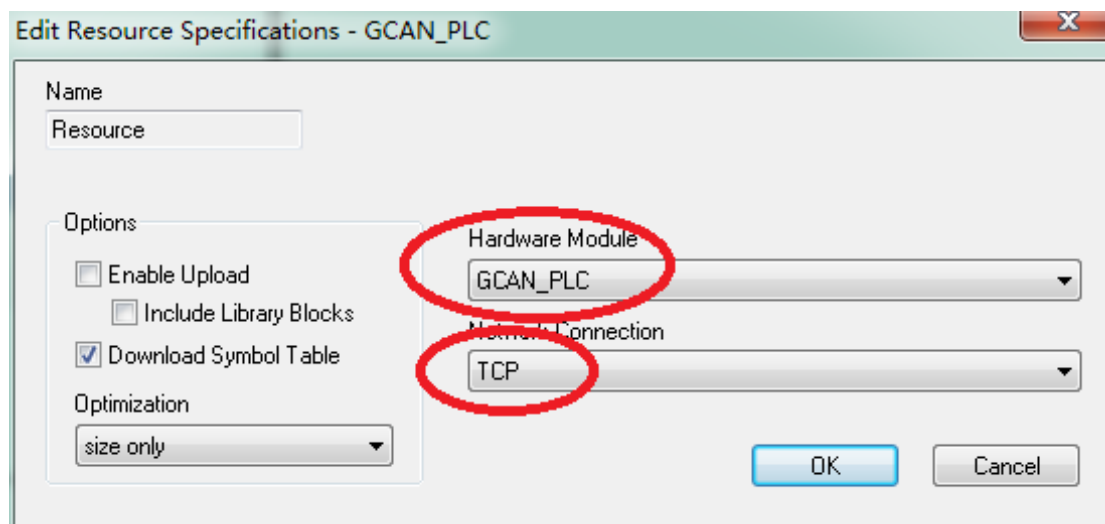


Figure 5.12 Select "GCAN\_PLC" and "TCP"

### 5.3.5 Download the program and debug

1. After completing the program, click "Build Active Resource".

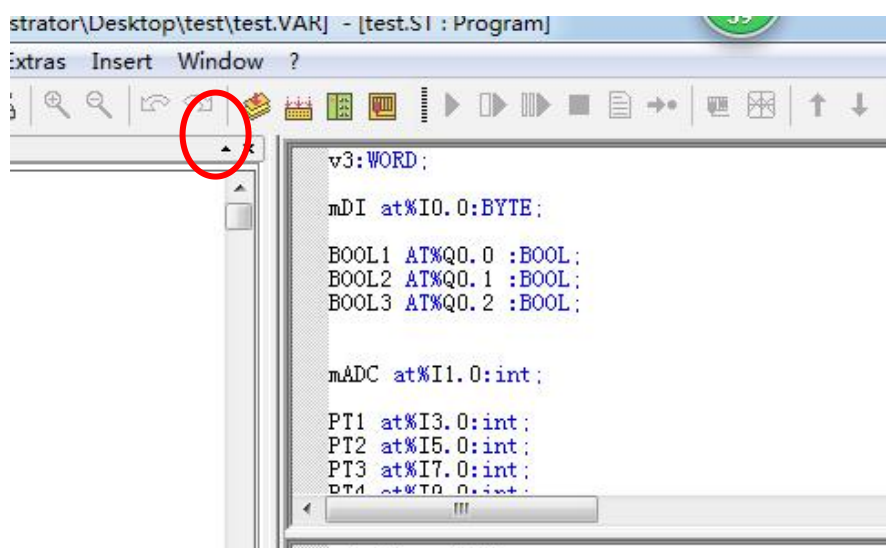


Figure 5.13 Completing the program



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

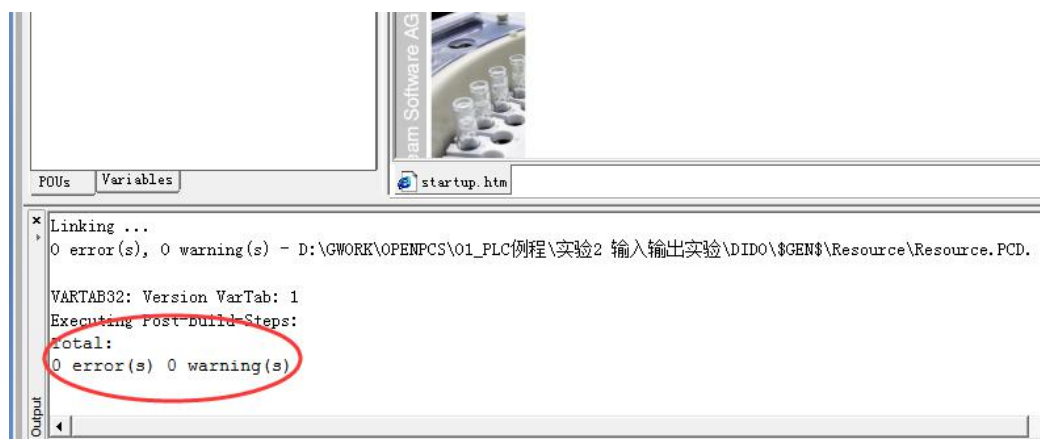


Figure 5.14 Check error and warning

3. Click “PLC”, then select “Online”.

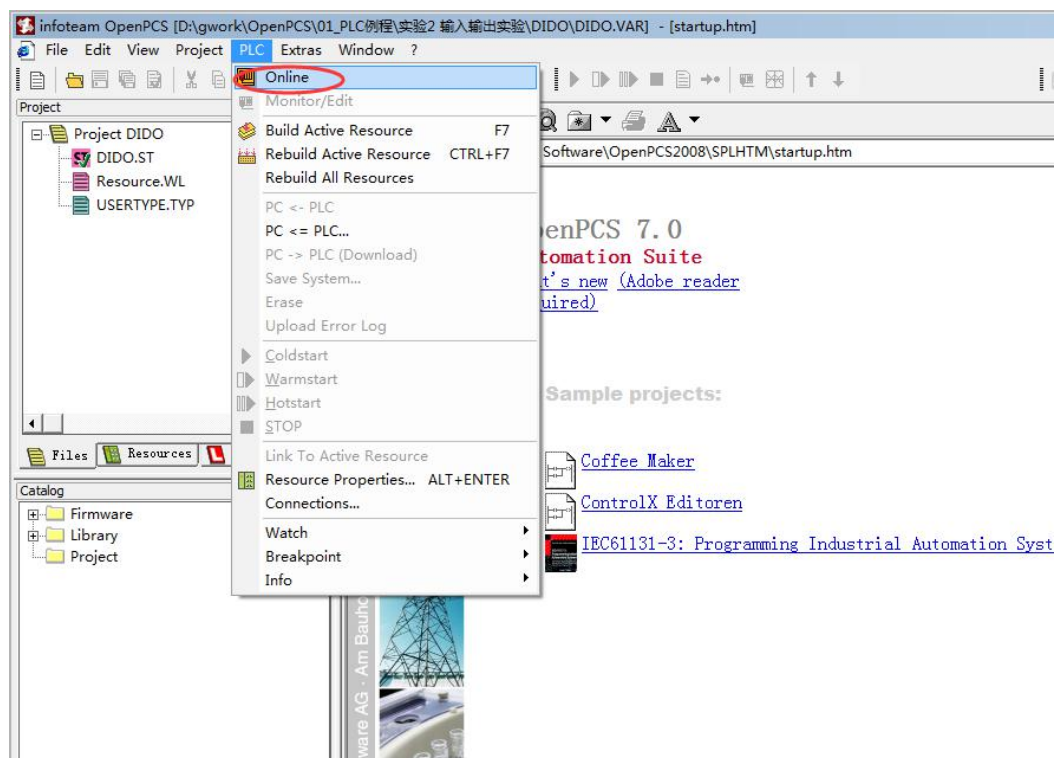


Figure 5.15 Select Online

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

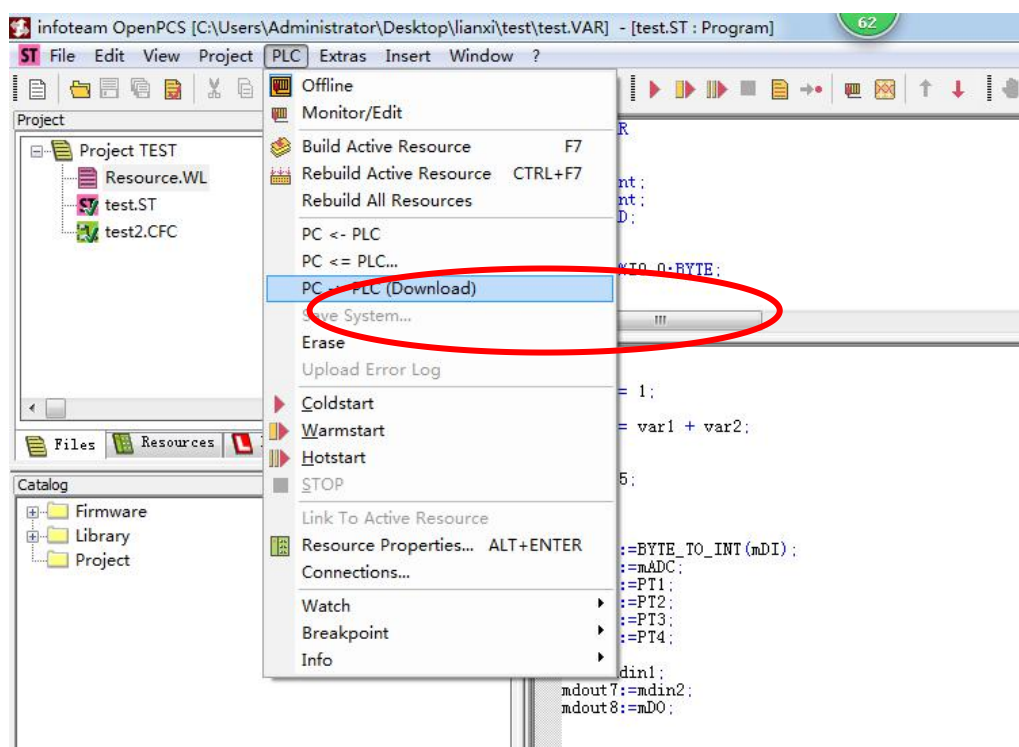


Figure 5.16 Program download

## 6 Module selection table

I/O	Type	Characteristic	Signal	Channel
<b>Digital input</b>				
	GC-1008	NPN, filtering 3.0ms	24V DC	8-channel
	GC-1018	PNP, filtering 3.0ms	24V DC	8-channel
	GC-1502	Add/Subtract 24V DC, 100kHz	counter	2-channel
<b>Digital output</b>	GC-2008	PNP, I <sub>max</sub> =0.5A	24V DC	8-channel
	GC-2018	NPN, I <sub>max</sub> =0.5A	24V DC	8-channel
	GC-2302	24V DC, 0.1A	PWM	2-channel
<b>Analog input</b>	GC-3604	Common single-ended input, 16 bits	-5~+5V	4-channel
	GC-3654	16 bits	4-20mA	4-channel
	GC-3624	4x2 wiring connection, 16 bits	-10~+10V	4-channel
	GC-3644	4x2 wiring connection, 16 bits	0-20mA	4-channel
	GC-3804	PT100, 16 bits	Thermal resistance	4-channel
<b>Analog output</b>	GC-4602	12 bits	-5~+5V	2-channel
	GC-4652	4x2 wiring connection, 12 bits	4-20mA	2-channel
	GC-4622	12 bits	-10~+10V	2-channel
	GC-4642	4x2 wiring connection, 12 bits	0-20mA	2-channel

## 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 3ms (ignore I/O circulation and GC-bus)
Programming modified online	Not support
Programming language implementation standard	IEC 61131-3
Programming language	SFC (Sequential function chart)、LD (Ladder diagram)、FBD (Function block)、ST (Structured text)、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
CAN-Bus interface	One OPEN terminal interface, 4Pin
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
<b>Basic information</b>	
Dimension	100mm *69mm *48mm
Weight	100g

## Sales and service

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