

Beckhoff TwinCAT PLC _Free Tag Names Ethernet(TCP)

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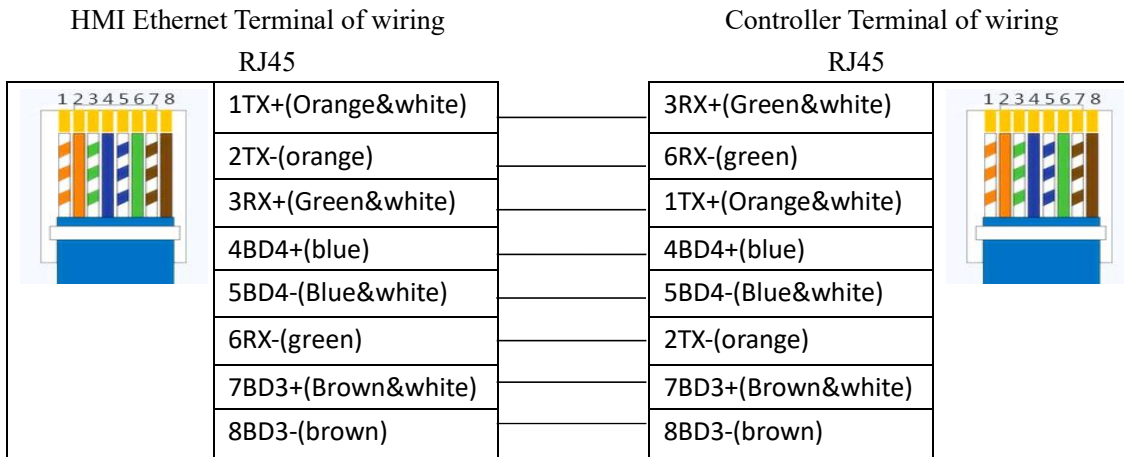
❖ 1 Introduction to Drive

Driver protocol	Beckhoff TwinCAT PLC _Free Tag Names Ethernet(TCP)
PLC Model number	CX9020
Website	https://www.beckhoff.com/en-en/
Means of communication	Ethernet
PLC interface	Ethernet
PLC port number	48898
On line simulation	support

Hardware wiring mode:

The PLC uses cross network cable without communicating directly with HMI through HUB or SWITCH; if communicating with HMI through HUB or SWITCH, direct connection or cross network cable can be used.

A. Wiring diagram of cross network cable

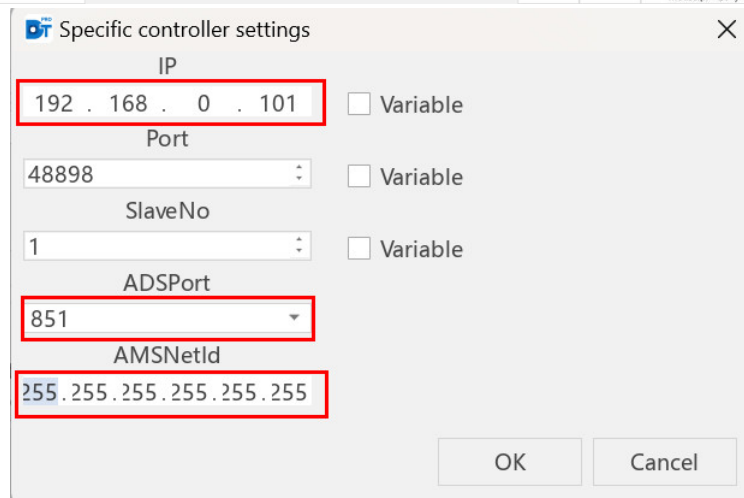
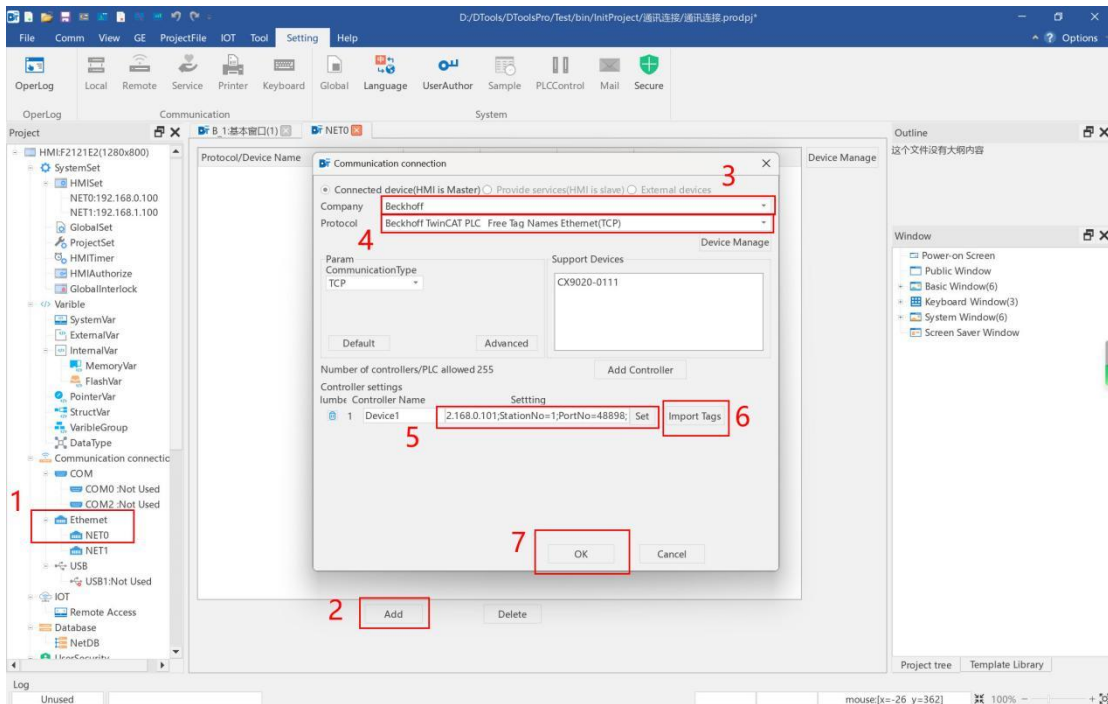


B. Wiring diagram of direct network cable



❖ 2 HMI Configuration

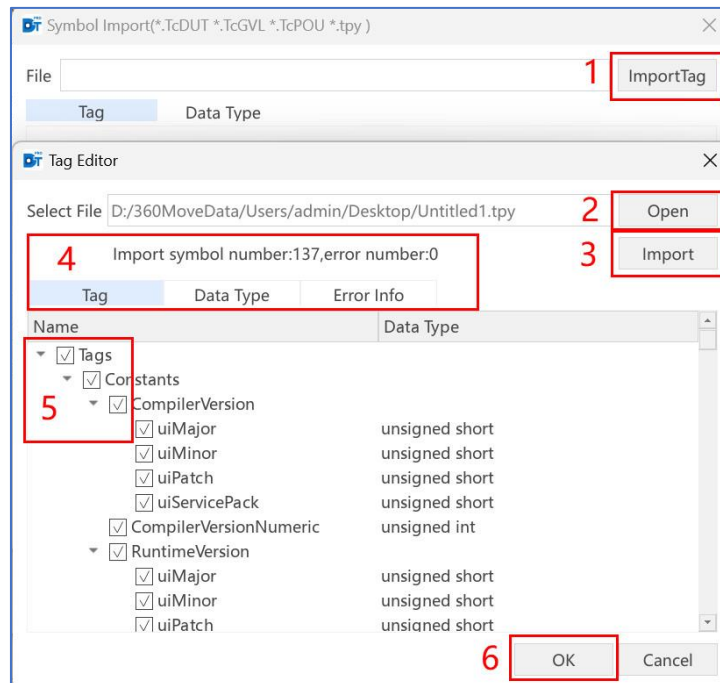
➤ Add driver protocol



- (1) Engineering - Communication Connection - Ethernet - Network 0: clicks the "Add" button;
- (2) The input field after the word "Company" selects the manufacturer; the input field after the word "Protocol" selects the corresponding communication protocol. Here, the external controller brand Beckhoff is selected. (If there is no corresponding controller manufacturer, please refer to the manual <<Common Device Management>> for configuration);
- (3) The Beckhoff TwinCAT PLC _Free Tag Names Ethernet (TCP) protocol was selected as the communication protocol;
- (4) Set controller IP/station number/port number/AMSNetID ((The default port number is 48898, please do not modify it, such as self-modification may lead to unsuccessful communication);
- (5) Import Tags;
- (6) Click OK to configure the communication connection. If you do not see the OK button in the

communication connection window, please scroll down the screen with your mouse.

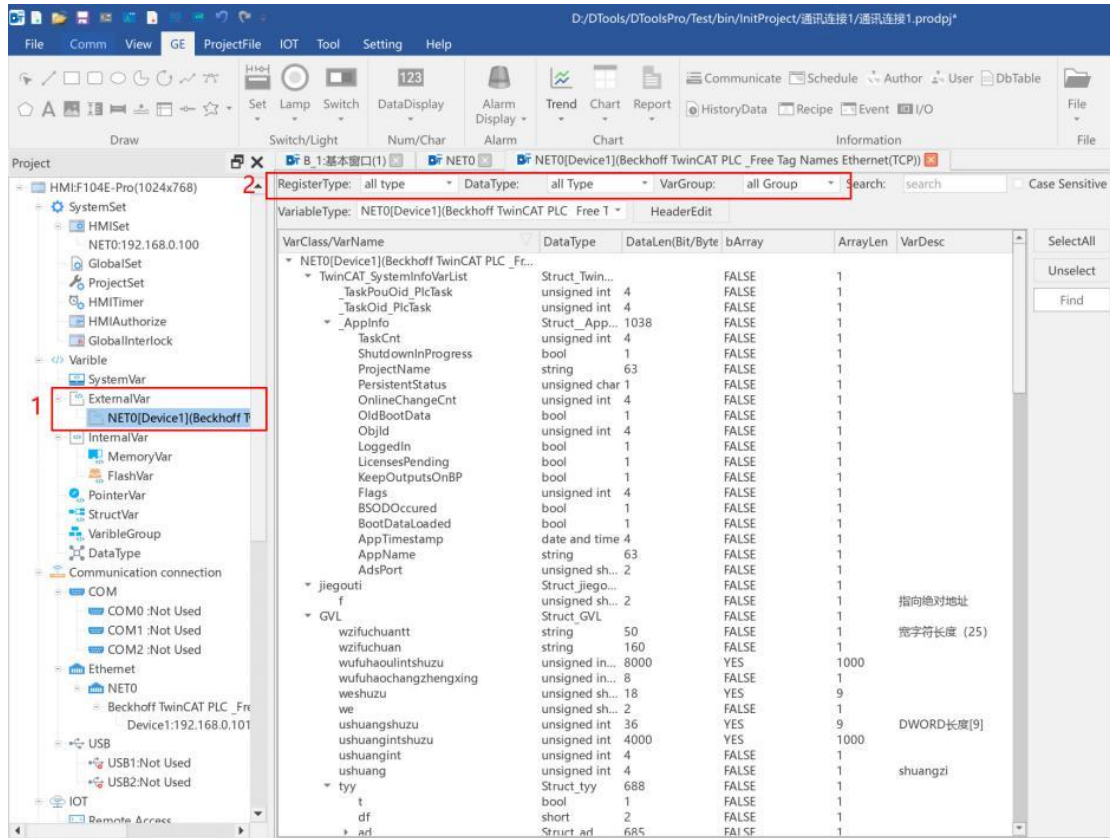
➤ Import tag variables



- (1) Click the "Import Tag" button, which will bring up the tag editor;
- (2) Click on "Open" and select the TcDUT, TcGVL, TcPOU, tpy files generated in the Beckhoff software, i.e. the label files;
- (3) Click "Import" to import the labels;
- (4) Tags Here you can view information about the completed tags, data type information, and specific error messages for failed imports;
- (5) The tag name column can optionally import tags;
- (6) Click the "OK" button to finish importing the labels.

※ If you import tags multiple times, the later imported tags will overwrite the already existing tag file and only the variables of the currently imported tag file will be displayed, the previous tag variables will be deleted automatically, the tag variables already associated with the component will not change, but the red exclamation mark will be displayed in the component properties panel, and the direct compilation will report an error (the newly imported tag file does not have the duplicated variables of the previous tag file).

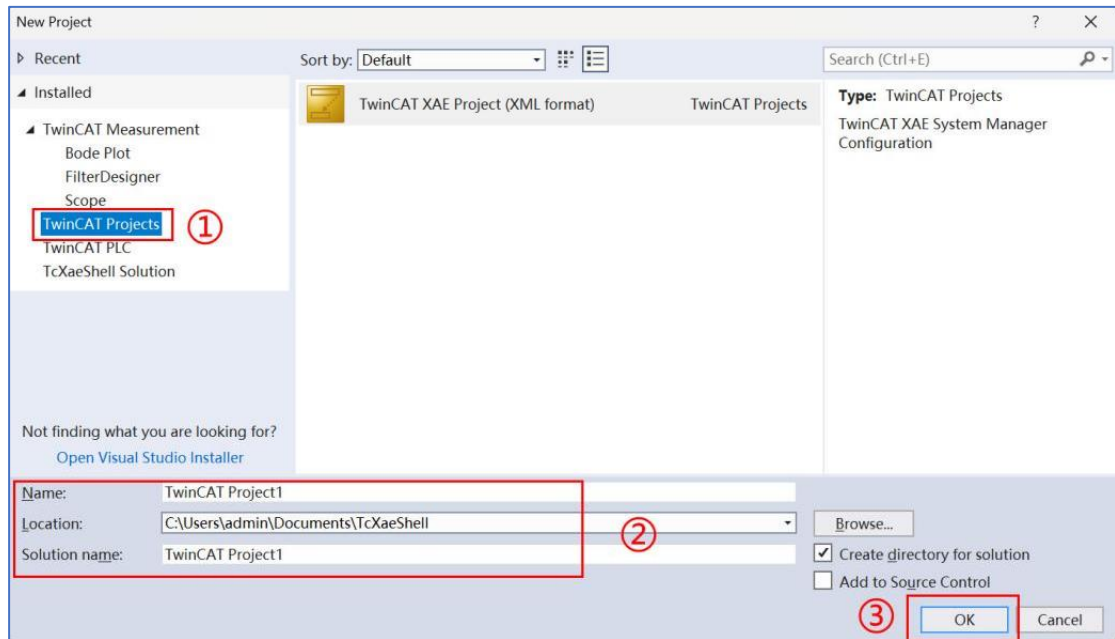
➤ View Variables



- (1) Variable - ExternalVar, where you can view the PLC's variables;
- (2) Register type, data type and other information can be filtered to view the PLC's variable addresses;

❖ 3 External Controller Configuration

1. New Project Wizard. Open TcXaeShell software, click New Project, the following is the New Project Wizard:

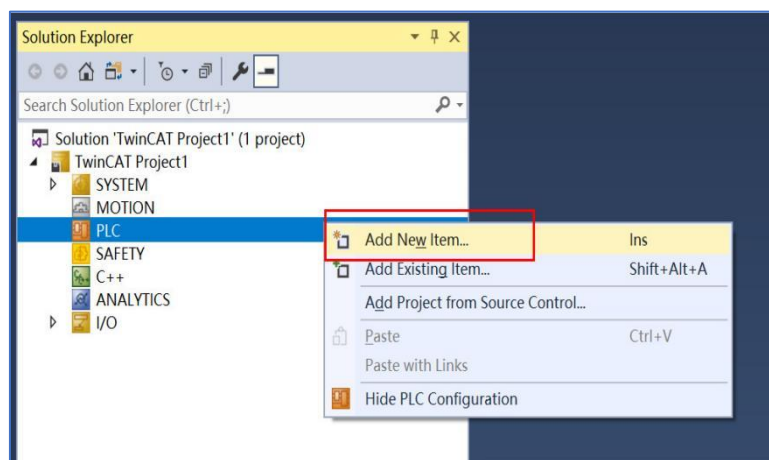


(1) Select "Twin CAT Projects", the default is TwinCAT XAE Project (XML format).

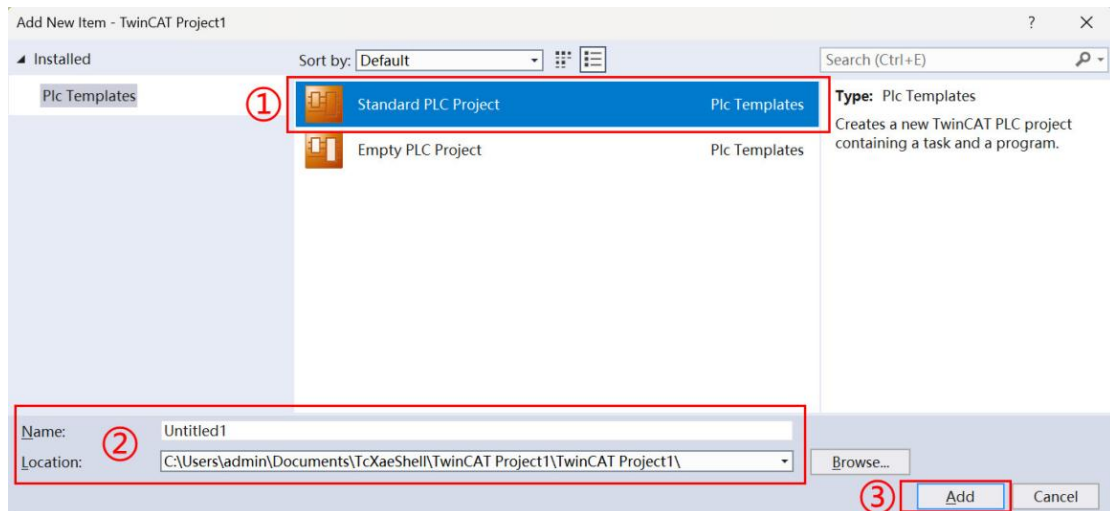
(2) Setting the name, location, etc.;

(3) Click on "OK";

2. Right-click on the PLC and select "Add New Item";



3. In the Add New Item dialog box, press the following settings;



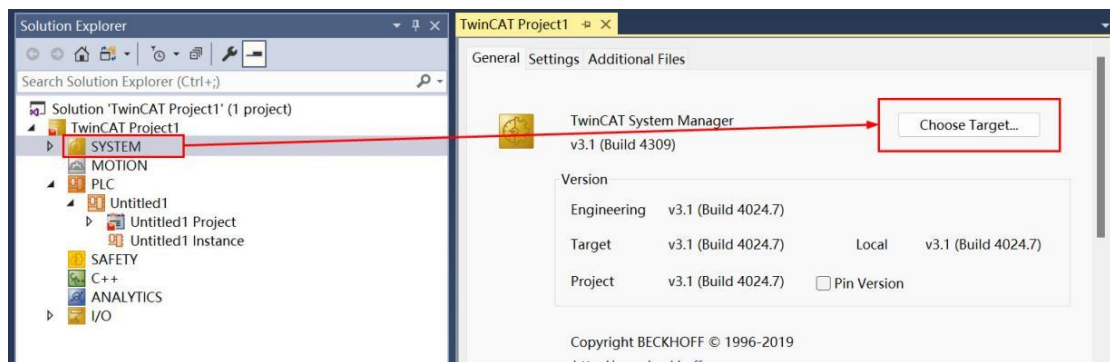
(1) Select "Standard PLC Project";

(2) Setting the name, location;

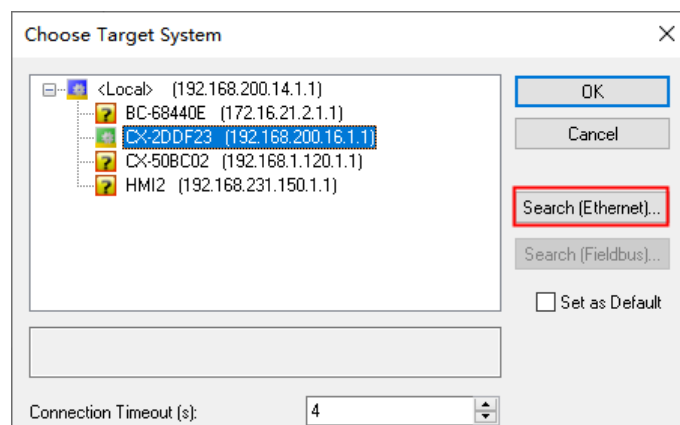
(3) Click Add.

4. Connect the controller to add the routing of HMI

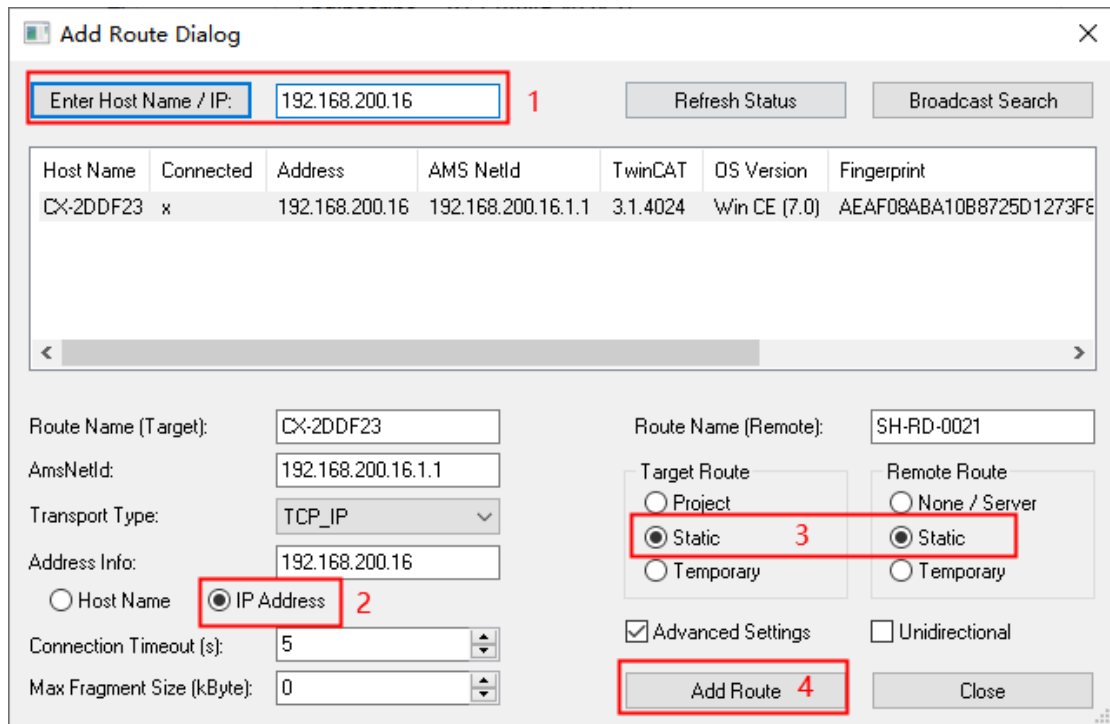
(1) Click on "SYSTEM" and click on "Choose Target System" in the General directory.



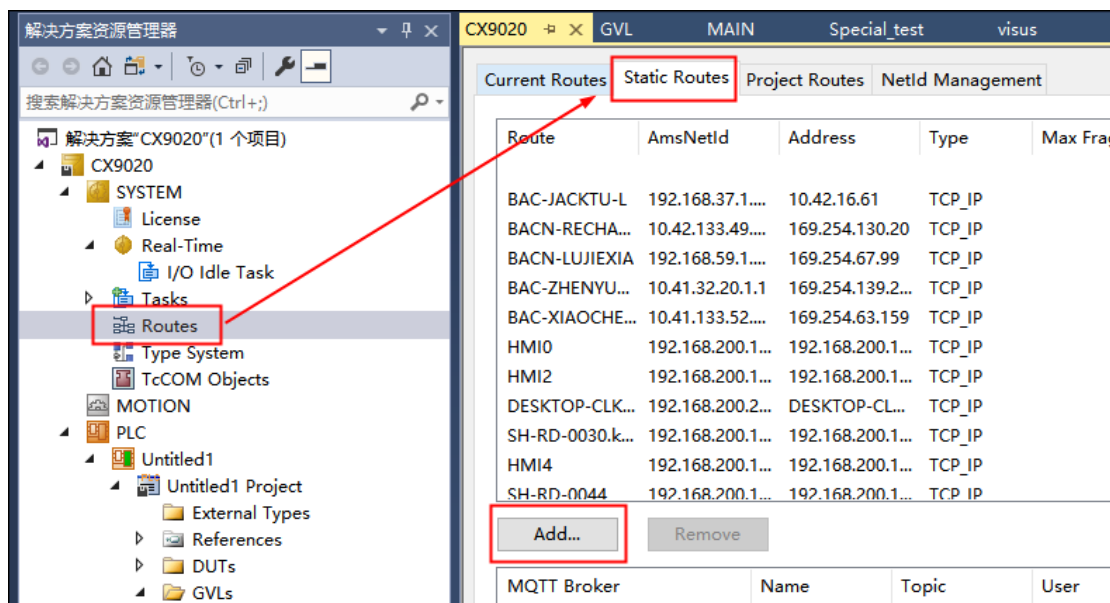
(2) pop-up "Choose Target System" form, click "Search Ethernet"



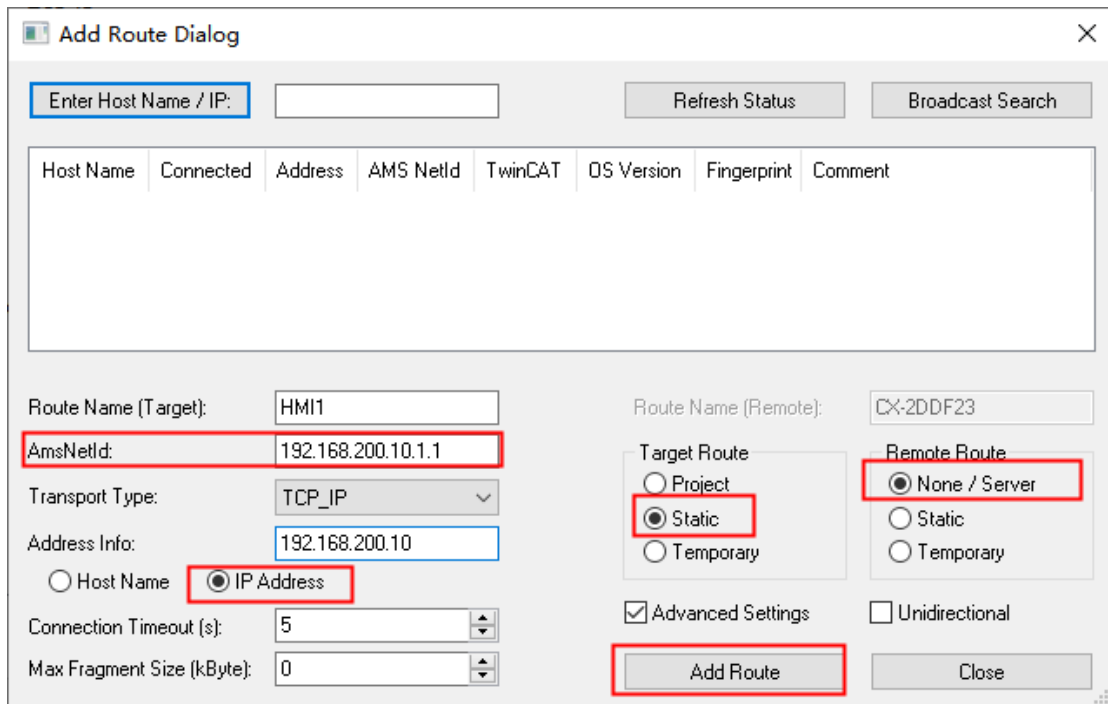
(3) In the pop-up form, enter the IP address of the target controller, enter, and if the communication is successful, an X mark will appear as shown in the figure below. Click "Add Route", and then close this dialog box.



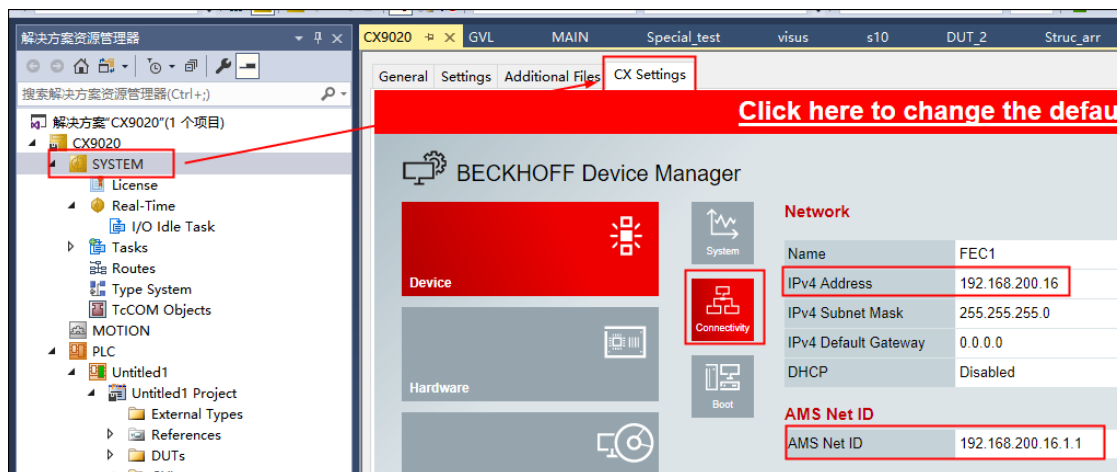
(4) Click "Routes"->"Add" to enter the interface to add static routes



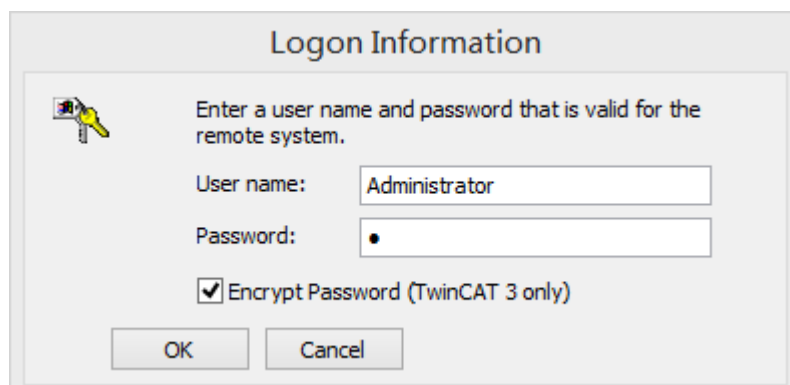
(5) static route interface, add the HMI static route (IP address and touch screen IP address to maintain consistency), click "Add Route", and then click "Close"



5. Modify the IP and NetID of the controller, the connection status, select "CX Settings", enter this interface to modify

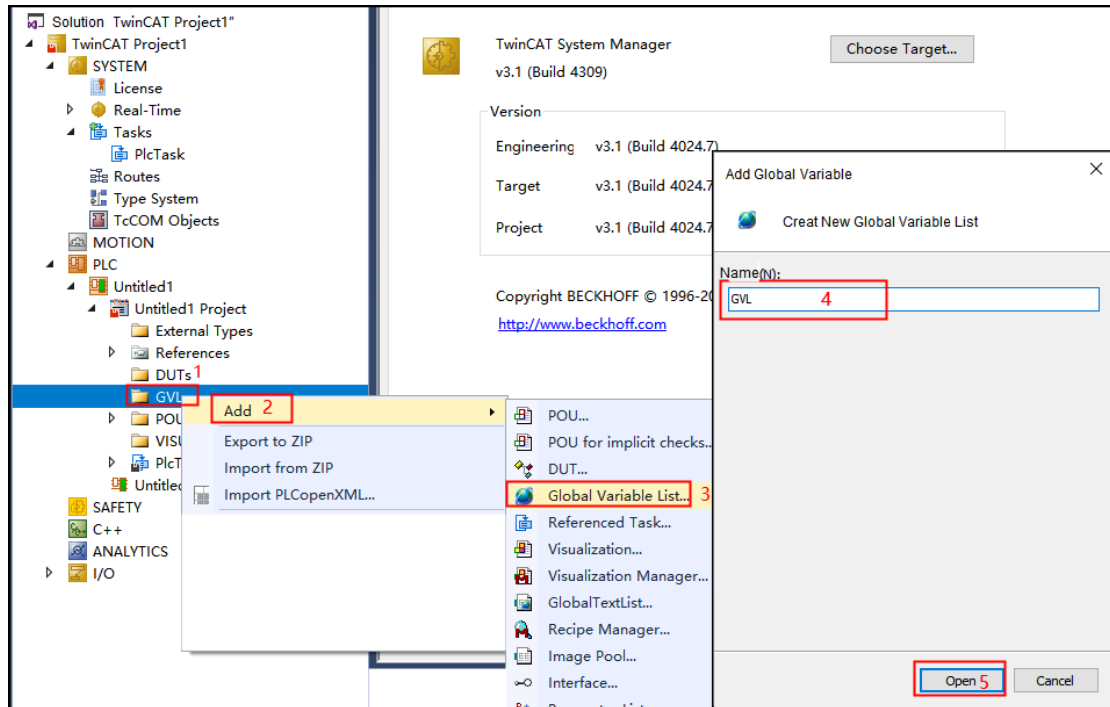


If you need to enter a user name and password, then user name: Administrator, password: 1



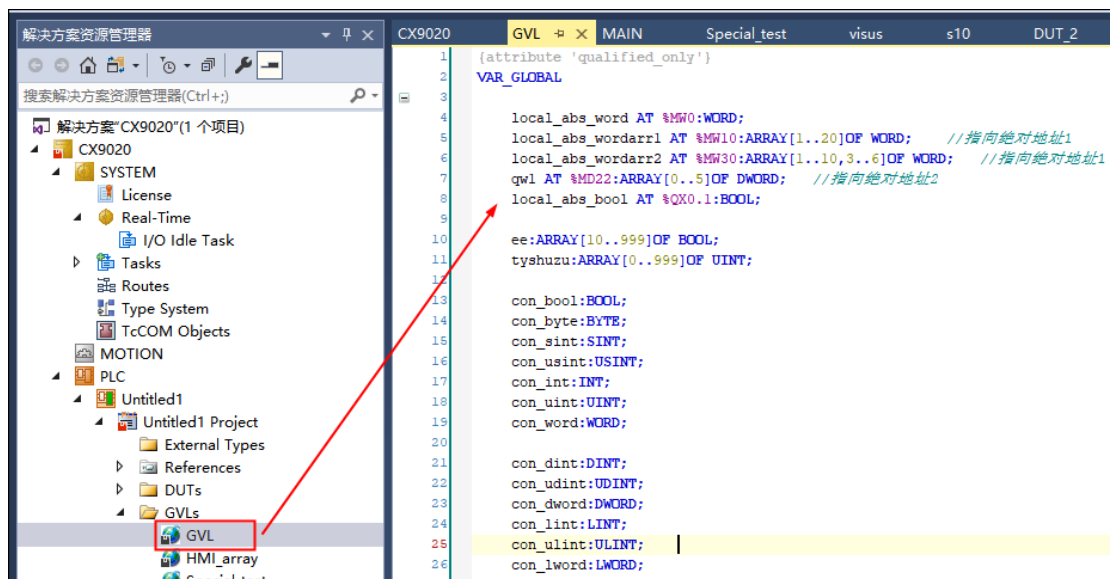
6. Create label variables

Global variables, DUT, PLC_PRG, etc. can be added. Here is an example of creating global variables (similar operation for local variables and other variables).



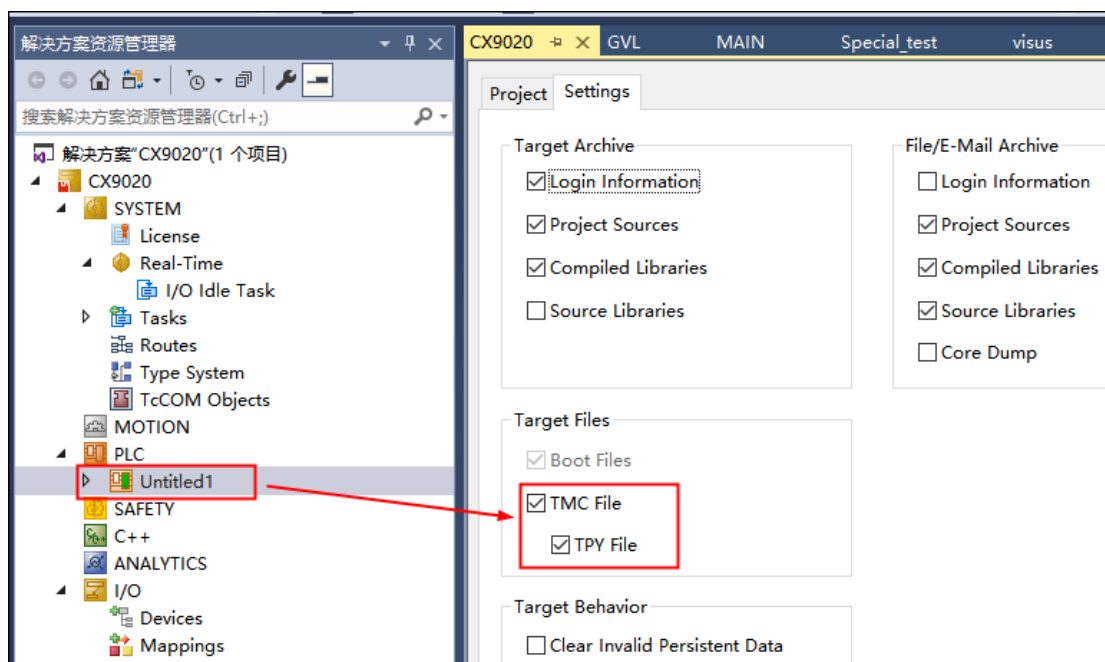
- (1) Right-click on "GVL";
- (2) Click on "Add";
- (3) Click on "Global Variable List" to create a global variable;
- (4) Edit the name of the list of global variables;
- (5) Click "Open" to finish creating the list of global variables.

7. Create variables.

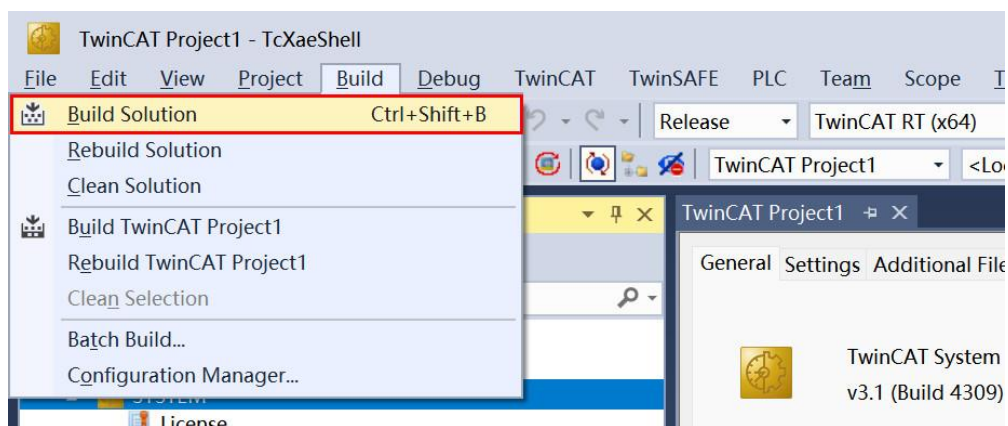


8. The Cat3 controller does not generate TPY files by default. If you need to generate TPY files, set

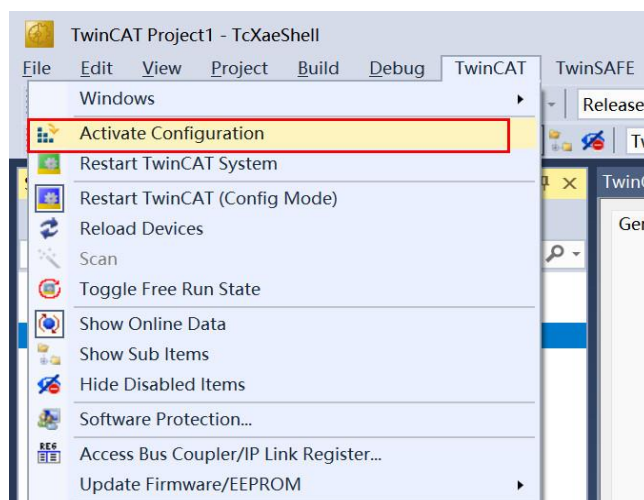
them according to the following chart.



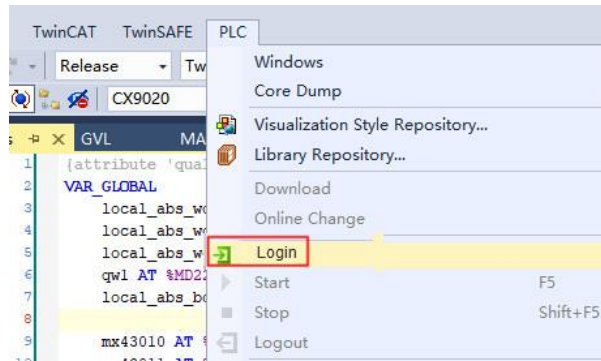
9. Generate solutions.



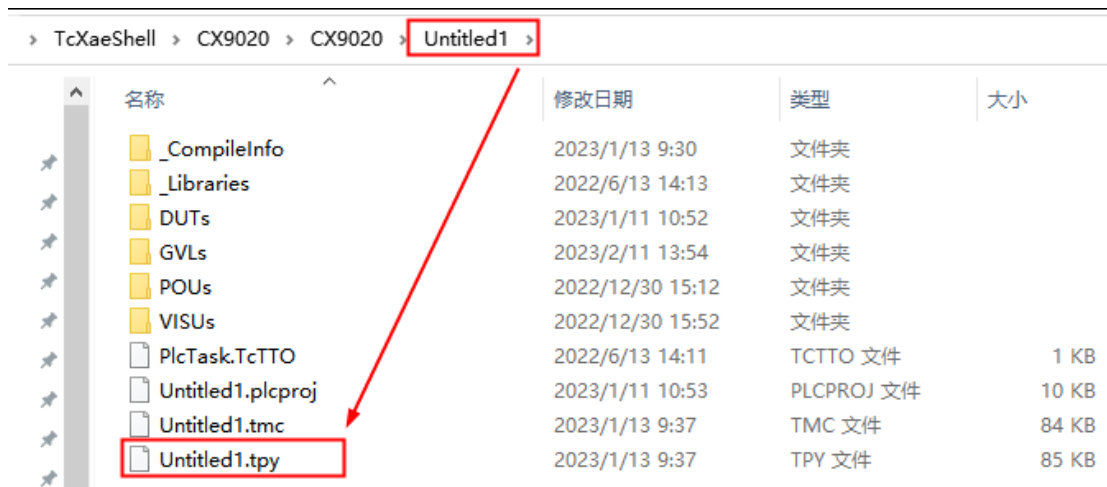
10. Activate the configuration.



11. Login to PLC



12. View the tag file. The generated tag file is in the project root directory, and the file type is TPV file. As shown in the following figure:



❖ 4 Supported Register Types

	Data Type	Data Format	Note
BOOL	Single	Bit	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
BYTE SINT USINT	Single	8-bit	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
WORD INT UINT	Single	16-bit	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
DWORD DINT	Single	32-bit	
	One-dimensional arrays		

UDINT	Two-dimensional arrays		
	Three-dimensional arrays		
LWORD LINT ULINT	Single	64-bit	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
REAL	Single	32-bit floating point	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
LREAL	Single	64-bit floating point	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
STRING	Single	ASCLL string	Character Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
WSTRING	Single	UTF-16LE wide string	Character Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
DATE	Single	Date	Time Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
TOD TIME_OF_DAY	Single	Time of day	Time Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
TIME LTIME	Single	Time Long Time	Time Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
DT DATE_AND_TIME	Single	Date and time	Time Elements
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
STRUCT	Single	Struct	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
UNION	Single	Consortium	

	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		
ENUM	Single	Enumeration	
	One-dimensional arrays		
	Two-dimensional arrays		
	Three-dimensional arrays		

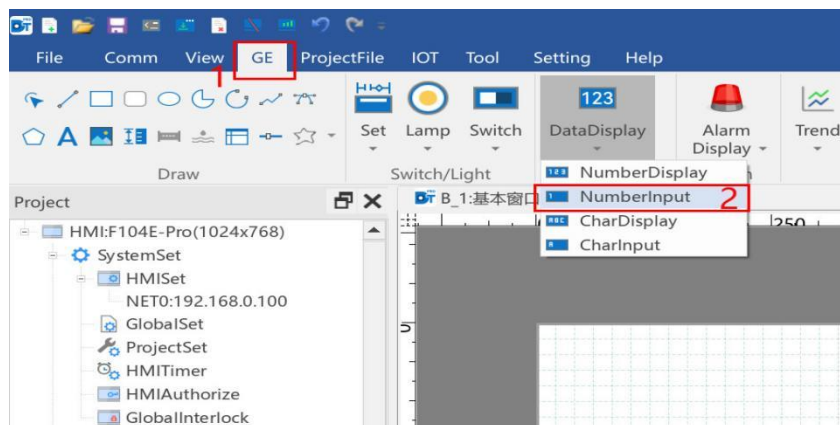
❖ 5 Advanced parameters and error messages

Reference Manual - Communication Advanced Parameters and Error Information Table.

❖ 6 Software configuration

The following steps use the global label variable as an example:

1. Create a new numeric input element.



2. The numeric input element is associated with a global label variable.

- (1) Click on the Read/Write input box;
- (2) Enter the corresponding variable name directly or check the external variable "NET0" in the variable selection box;
- (3) Select the global variable, with "GVL" as the global variable and "con_int" as the variable name;
- (4) Click "OK" to complete the operation of the selected variable, or double-click the variable to achieve the effect of "OK".
- (5) Click "OK" on the component property page to complete the operation steps of the associated variable of the numeric input component.

Partial data type using component description

Data Type	Component
TIME	Time Component
TIME_OF_DAY	Time Component
LTIME	Time Component
DATE	Time Component
DATE_AND_TIME	Time Component
STRING	Character component
WSTRING	Character component