EtherNet MPI Adapter
GT100-IE-MPI

User Manual

V 2.0

Rev E

SST Automation

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www.SSTAutomation.com

Important Information

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Table of Contents

1 Product Overview

1.1 Product Function

The GT100-IE-MPI is an adapter which is used for Ethernet communication of Siemens SIMATIC S7 series PLC (including S7-200, S7-300, S7-400), Siemens CNC (840D, 840DSL, etc). It supports data monitoring.

1.2 Product Features

- Supports multi-master communication, the expansion port can be connected to touch screen or other masters.
- Automatic baud rate detection.
- Automatically query the master station address and display the address list.
- It can be directly installed on the PPI/MPI/PROFIBUS communication port of PLC without external power supply.
- Supports Siemens S7 Ethernet communication drivers, including MicroWIN, STEP 7, WinCC, SIMATIC NET, KEPServerEX, etc.
- Supports connectivity to Node-Red.
- Supports up to 16 Ethernet TCP/IP connections, allowing 16 PCs to collect PLC data at the same time.

1.3 Technical Specifications

[1] DB9 communication port:

- Interface type: TIA/EIA RS-485 compatible, ESD: ±15KV, up to 32 nodes.
- Protocol supported: Siemens S7 bus multi-master protocol, supports PPI, MPI and PROFIBUS.
- Baud rate (bps): 9600, 19200, 45450, 93750, 187500, 500K, 1.5M.

[2] Ethernet port:

- Network port type: a 10M/100M adaptive network port.
- Protocols supported: S7TCP, 16 TCP/IP connections, Modbus TCP Server.

[3] Power: 24 VDC (11~30 VDC), 100mA(24VDC).

[4] Operating temperature: 32°F~140°F(0°C ~ 60°C). Humidity: 5%~90% (non-condensing).

[5] Dimensions (W*H*D): 0.67 in *2.56 in *1.29 in (17mm*65mm*33mm).

[6] Installation: Siemens S7 PLC DB9 communication port plug.

[7] Protection Level: IP20.

1.4 Related Products

The related products include: GT200-DP-RS, GT200-PN-RS and GT200-PN-3RS, etc.

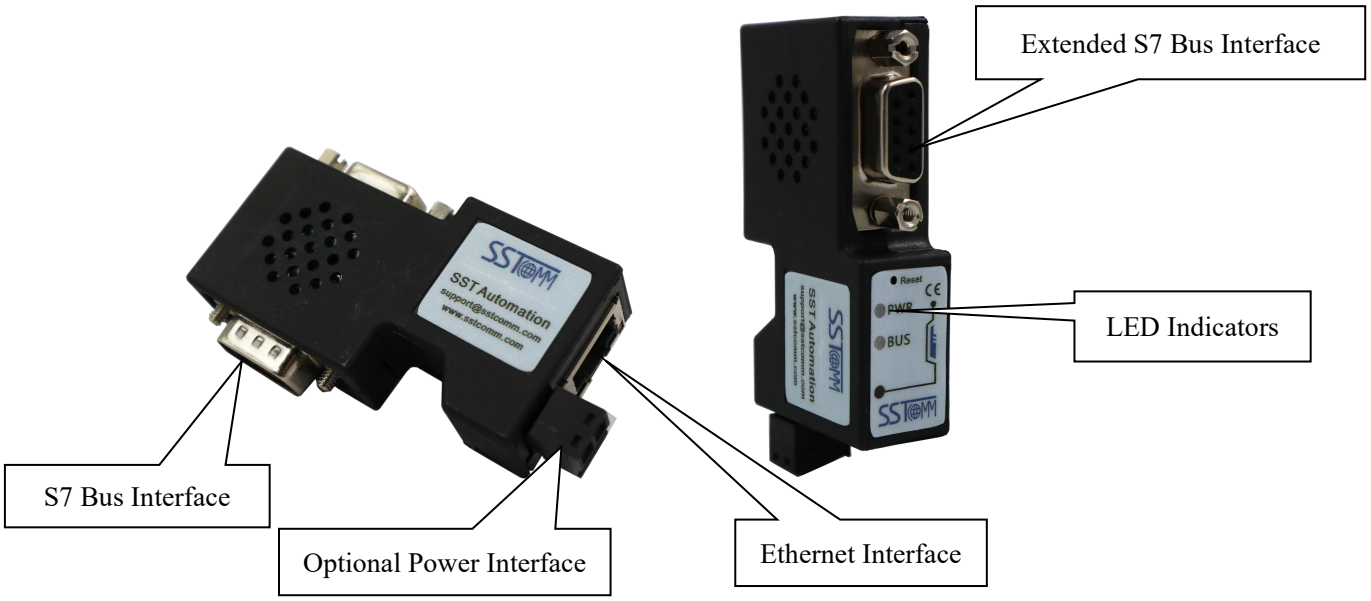
To get more information about related products, please visit SST Automation's website: www.sstautomation.com.

1.5 Revision History

Revision	Date	Chapter	Description
V2.0, Rev E	5/6/2024	Chapter 8	Added instructions for Modbus TCP communication
V2.0, Rev D	6/14/2023	Appendix B	Added instructions to connect Node-Red
V2.0, Rev C	6/9/2023	Appendix A	Added instructions to connect KEPServerEX
V2.0, Rev B	4/11/2023	Chapter 7	Added more details for STEP 7 modeling
V2.0, Rev A	4/3/2023	Chapter 7	Added STEP 7 modeling
V2.0	3/20/2021	ALL	New release

2 Hardware Description

2.1 Product Appearance



Note: This picture is for reference only. The product appearance is subject to the actual product.

2.2 LED Indicators

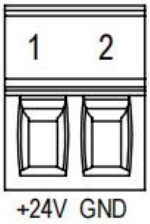
Indicator	State	State description	Troubleshooting
PWR	ON	Supply of power is normal	N/A
	OFF, Flashing	Supply of power is abnormal	Check the power supply
BUS	ON	The baud rate is correct and the gateway is functioning normally	N/A
	Flashing (for 1 second)	The same station address exists on the S7 bus	Modify the station address of the module through the web page
	Flashes twice at 1Hz after a few seconds interval	Baud rate is not detected	Check the PLC communication port
	OFF	Gateway or indicator failure	Contact technical support
	Flashing	Communication response frequency	N/A
Link	ON	Network is connected	N/A
	OFF	Gateway or network failure	Check local and remote network connections
Active	Flashing	Communication is normal with remote devices	N/A
	OFF	No communication	N/A
	ON, not flashing quickly	Ethernet failure	Contact technical support

2.3 Interface

2.3.1 Power Interface

The power interface is an optional interface. It's not recommended to use it. The gateway can get power when connecting PLC using S7 bus interface. If PLC itself cannot provide power, you can connect power interface to power it.

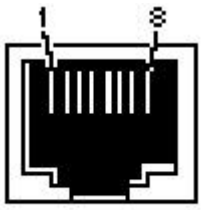
Pin	Function
1	+24V
2	GND



2.3.2 Ethernet Interface

The Ethernet interface uses an RJ-45 connector. Its pin (standard Ethernet signal) is defined as below:

Pin	Description
S1	TXD+, Transmit Data+
S2	TXD-, Transmit Data-
S3	RXD+, Receive Data+
S4	Bi-directional Data+
S5	Bi-directional Data-
S6	RXD-, Receive Data-
S7	Bi-directional Data+
S8	Bi-directional Data-



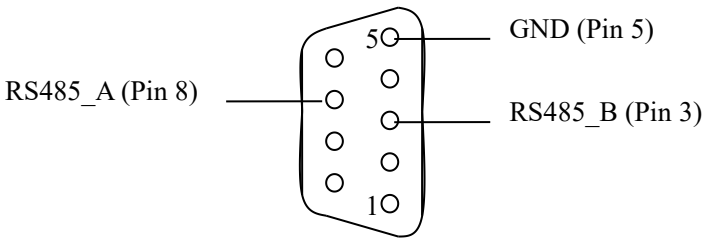
RJ-45 port

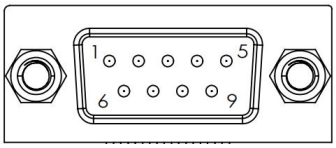
2.3.3 S7 Bus Interface

1) S7 bus interface X1

The X1 interface uses a DB9 male port, which can be directly inserted into the communication port (PPI port, MPI port or PROFIBUS port) of an S7 series PLC. The pin definition of the communication port is the same as that of the PLC, among which pin 3 is the B line of RS485, pin 8 is the A line of RS485, and pin 5 is the logic ground. Pin 7 is the positive of the 24VDC power supply of the PLC, and pin 2 is the ground of the 24VDC power supply. The 24VDC power supply of pin 2/7 is used as the default power supply input. The baud rates supported by the X1 interface include: 9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K and 1.5Mbps.

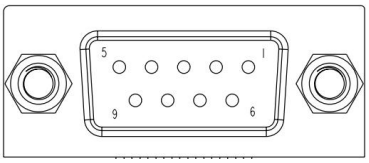
Pin	Function
2	GND of 24VDC
3	RS485, B
5	GND
7	24VDC
8	RS485, A





2) Extended S7 bus interface X2

The X2 interface uses a DB9 female port, which is used to connect Siemens communication equipment (such as Siemens touch screen, CP5611 communication card, etc.). The supported baud rates include 9.6K, 19.2K, and 187.5K.



2.3.4 Reset Button

The reset button is used to restore the gateway to factory settings. Long press the button for 5 seconds and release the button when the BUS indicator is solid green. The default IP is 192.168.1.188. Navigate to 192.168.1.188 in a web browser to configure the gateway.

3 Hardware Installation

3.1 Mechanical Dimensions

Size (width * height * depth):

0.67 in *2.56 in *1.29 in (17mm*65mm*33mm)

3.2 Installation Method

The GT100-IE-MPI is installed using a Siemens S7 PLC DB9 communication port plug.

4 Quick Start Guide

Basic steps when configuring G100-IE-MPI :

1. Wiring: See also Chapter2.3 Interface.

    1) Plug the S7 bus Ethernet interface to Siemens PLC PPI, MPI or PROFIBUS communication port.

    2) Connect the network port of the gateway to the PC with a network cable to download the configuration.

    3) Power on the PLC, and check whether the gateway powers on.

2. Build your configuration using web browser after connecting the gateway with network cable.

If the gateway cannot be discovered, please note:

- The factory network IP Address of the GT100-IE-MPI is 192.168.1.188. Please check whether the computer and gateway are in the same network segment.
- Please test the network connection first. Please refer to the note "How to Use the Ping Command" located on our Support page on the sstautomation.com website.
- If you press and hold the Reset button for 5 seconds, the gateway will restore the factory default configuration, and the IP address will be fixed to 192.168.1.188.

3. Navigate to 192.168.1.188 in your web browser to configure the gateway. For more details about configuring the GT100-IE-MPI, please refer to Chapter 5.

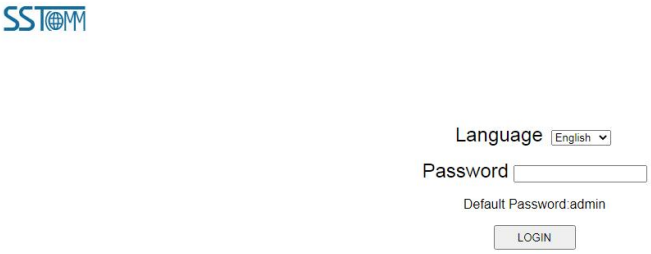
5 Configuration Instructions

5.1 Configuration Interface Description

After connecting the gateway using network cable, you can fill in http: //192.168.1.188/ to start configuration of GT100-IE-MPI.

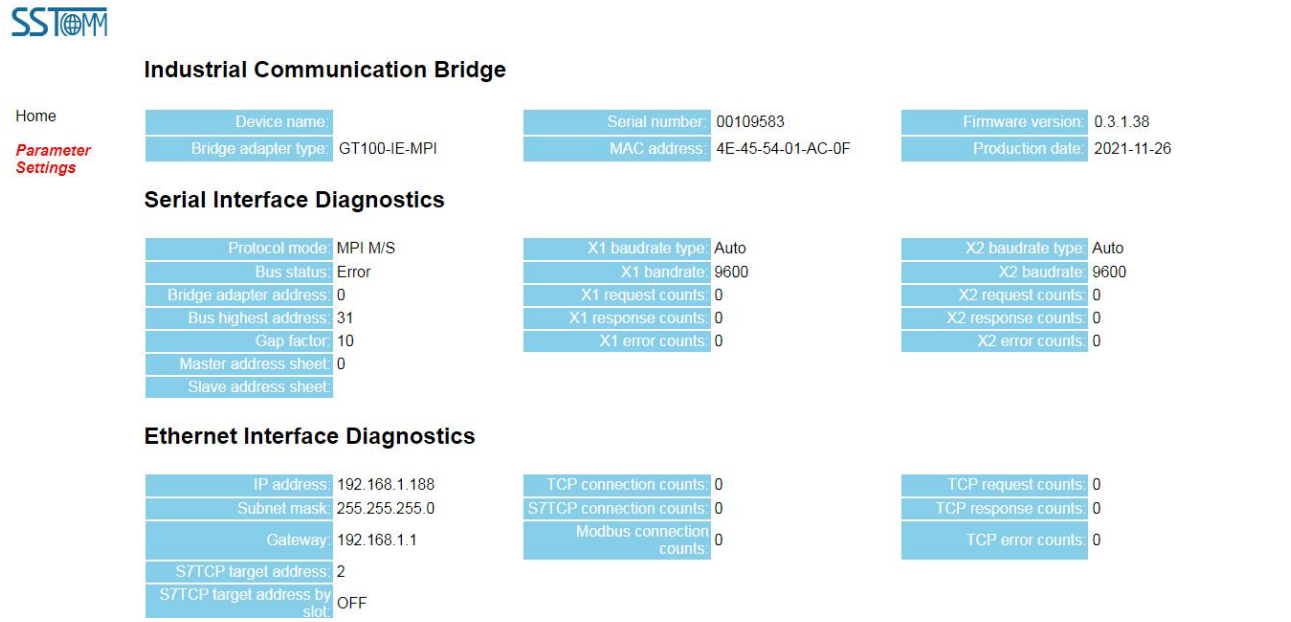
When you first visit the web configuration page, the interface is as below.

The default password is admin.



5.2 Home

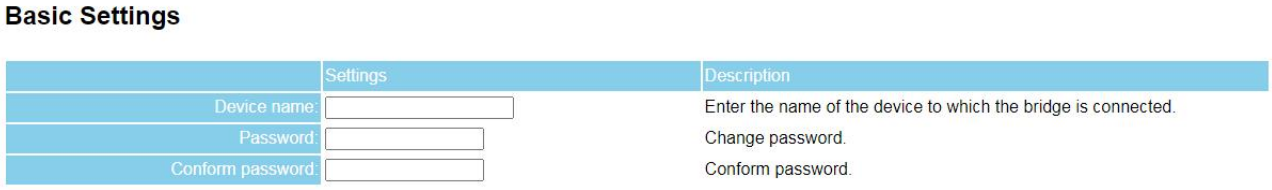
The Home screen of the configuration webpage will show the basic info and diagnostics for your reference.



5.3 Parameter Settings

5.3.1 Basic Settings

Click the "Parameter Settings" on the left and you will the configuration interface, as shown below:



Device name: Enter the name of the device to which the bridge is connected.

Password: Change the login password of the web configuration page.

Confirm password: Input the password again.

5.3.2 Serial Interface Settings

Serial Interface Settings

	Settings	Description
Protocol mode:	MPI M/S	Select the protocol mode of PLC.
Bridge adapter address:	0	The default is 0,which cannot conflict with other station address on the bus.
Bus highest address:	31	The default is 31.
Gap factor:	10	Range:1-100,the default is 10.
X1 baudrate:	AUTOMATIC	X1 port connects to PLC,the baudrate can be set to be automatic or fixed baudrate.
X2 baudrate:	AUTOMATIC	X2 port connects to HMI,the baudrate can be set to be automatic or fixed baudrate.

Protocol mode: Select the protocol mode of PLC. If you want to connect the PPI of S7-200 PLC, please select PPI. If the PLC is S7-300 or S7-400, please select MPI M/S. If you want to connect PROFIBUS port, please select PROFIBUS.

Bridge adapter address: The default is 0,which cannot conflict with other station address on the bus.

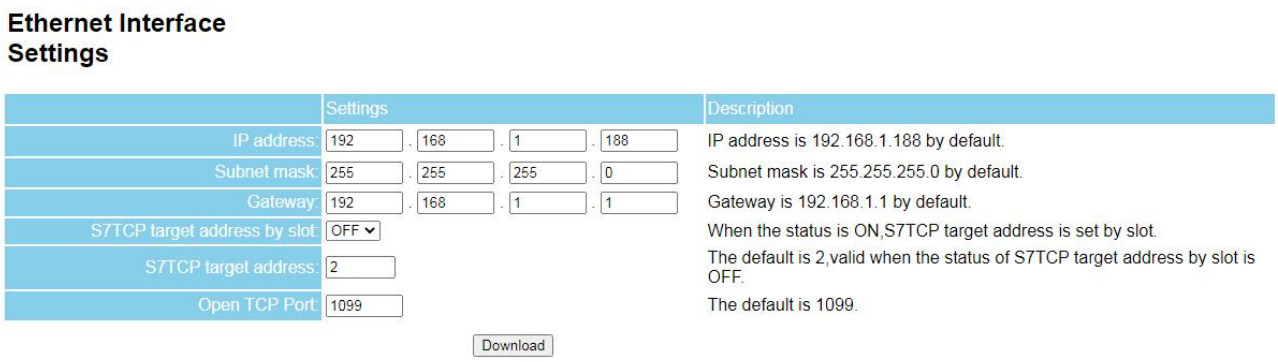
Bus highest address: The default is 31. No need to change.

Gap factor: The default is 10. No need to change.

X1 baudrate: Select the baudrate you want to use with PLC. X1 port connects to PLC,the baudrate can be set to be automatic or fixed baudrate.

X2 baudrate: Select the baudrate you want to use with PLC. X2 port connects to PLC,the baudrate can be set to be automatic or fixed baudrate.

5.3.3 Ethernet Interface Settings



IP Address: Set the IP address of the GT100-IE-MPI.

Subnet Mask: Subnet mask is 255.255.255.0 by default.

Gateway: The default address is 192.168.1.1.

S7TCP taget address by slot: When the status is ON,S7TCP target address is set by slot

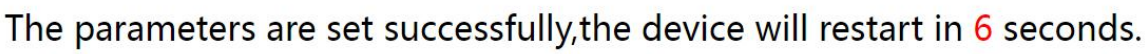
S7TCP taget address: The default is 2,valid when the status of S7TCP target address by slot is OFF.

Open TCP Port: The default is 1099.

5.4 Download

When parameter settings are done, please click Download button to download the configuration to the GT100-IE-MPI.

The web page will show the following hint when you click the Download button. Then the configuration will take effect.



6 TIA Portal Programming

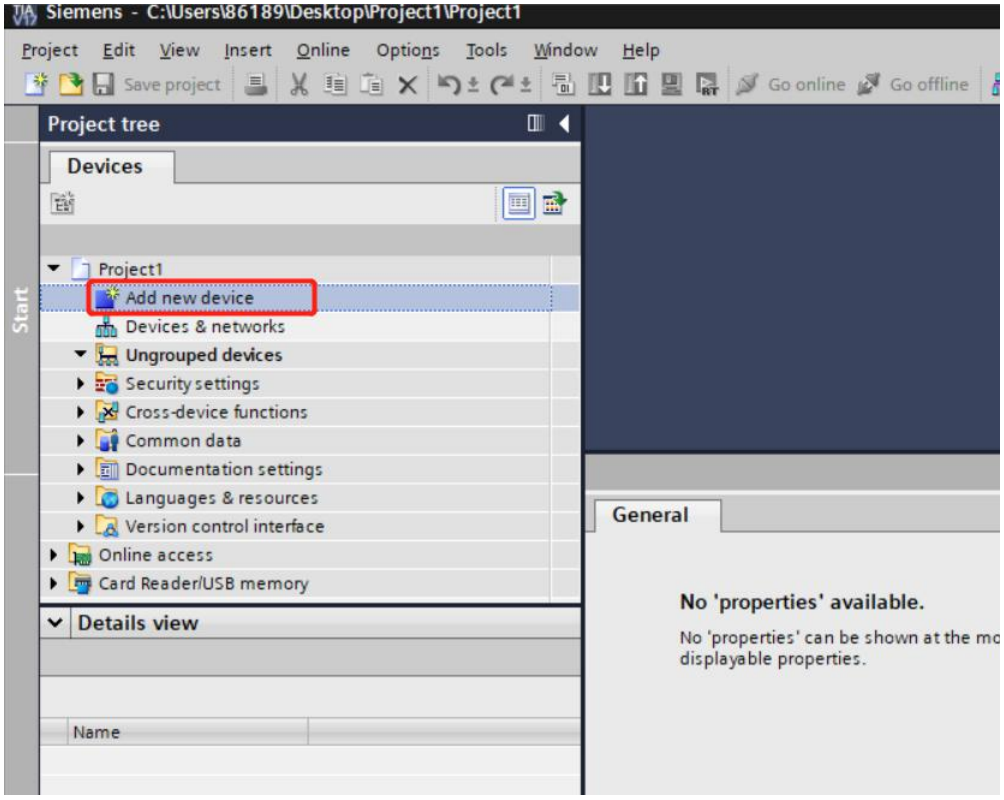
6.1 System Requirements

To program your PLC with TIA Portal using the GT100-IE-MPI, TIA Portal must first be installed on your system. Please refer to Siemens for instructions on how to install TIA Portal.

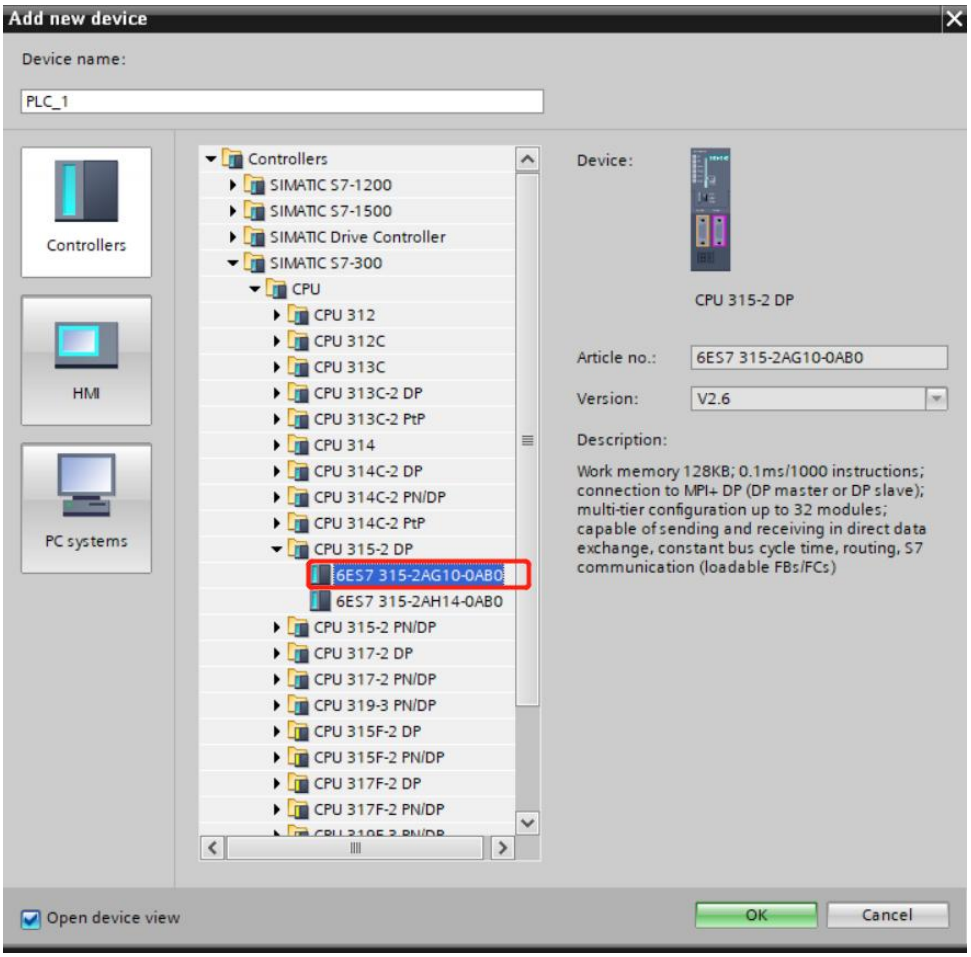
6.2 Programming

Refer to the following instructions to configure the GT100-IE-MPI in TIA Portal.

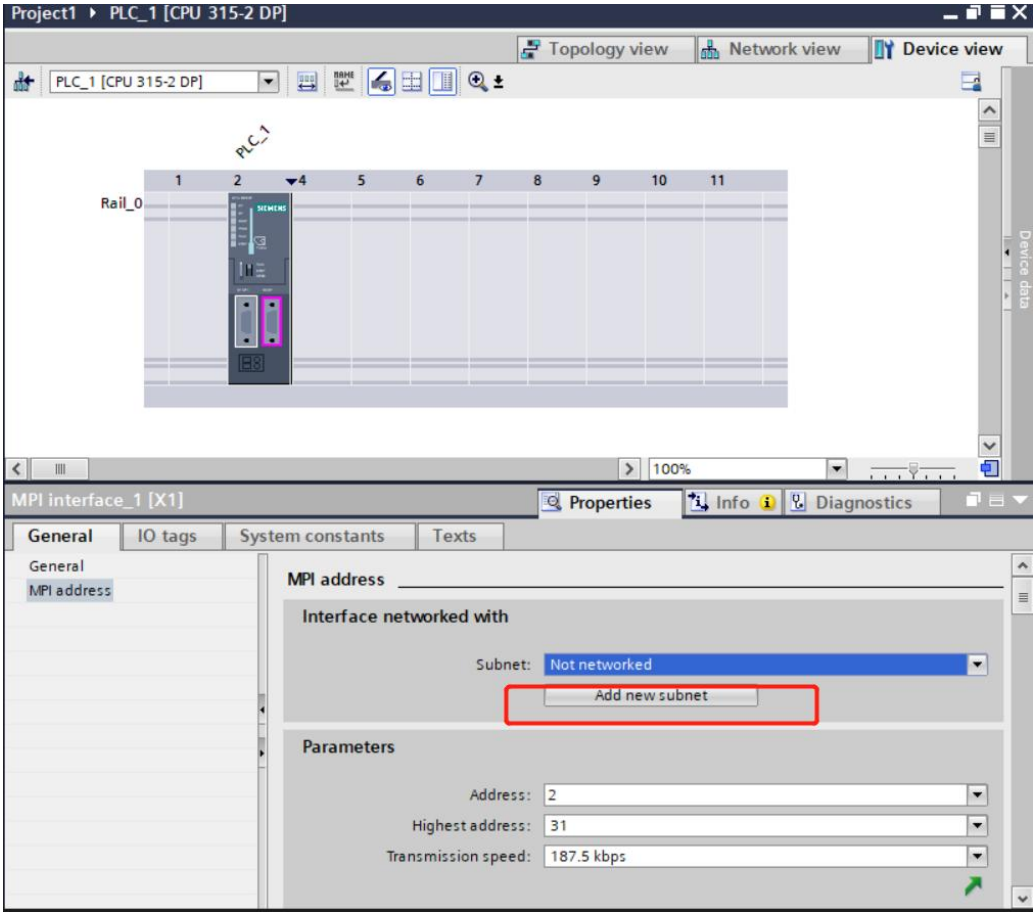
1. Open a new project.
2. Double click "Add new device".



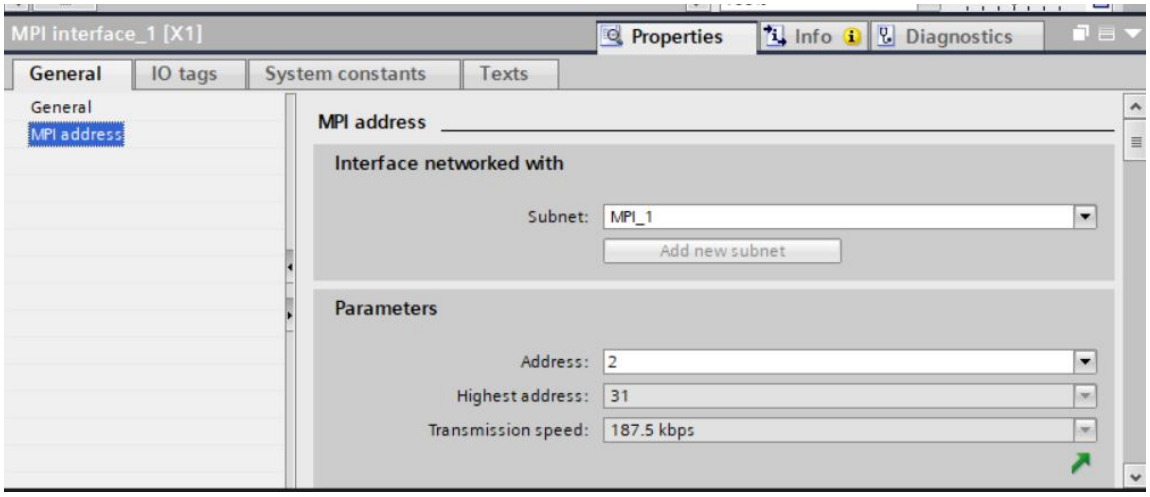
3. Expand the "Controllers" tree and expand the "CPU" folder under "SIMATIC S7 300", then select the actual PLC model you want to connect. Then click "OK".



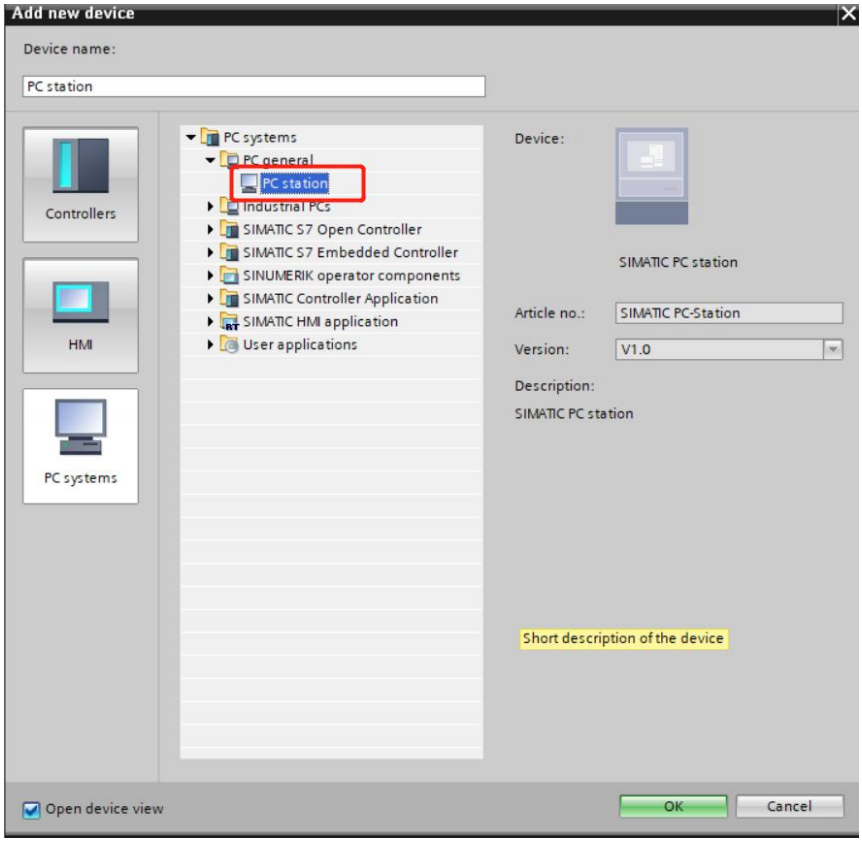
4. Double click "MPI address", configure it and click "Add new subnet".



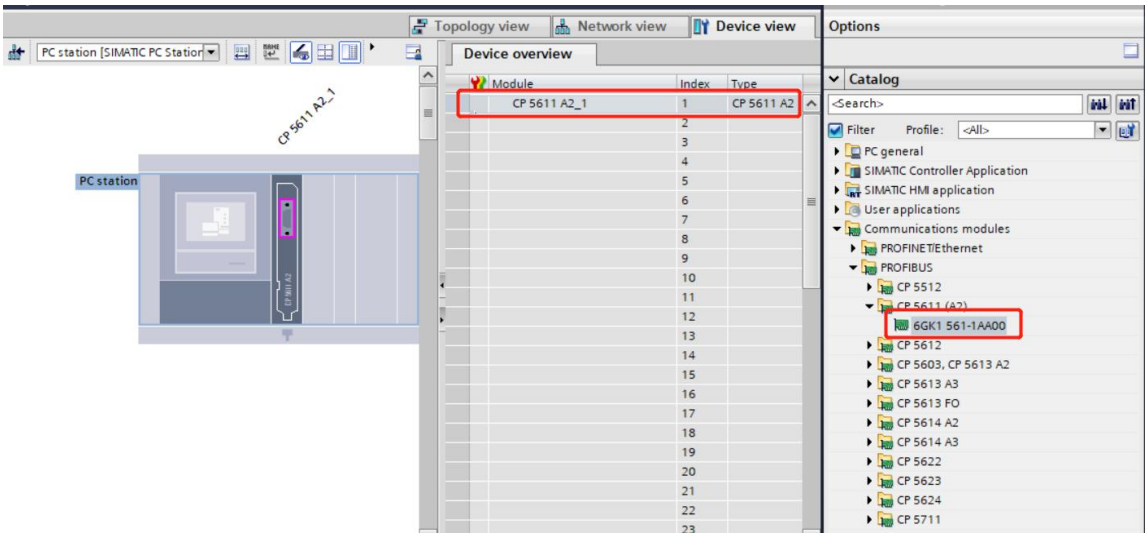
5. It will generate "MPI_1" network. The "Address" should match the MPI address of PLC. The default is 2.



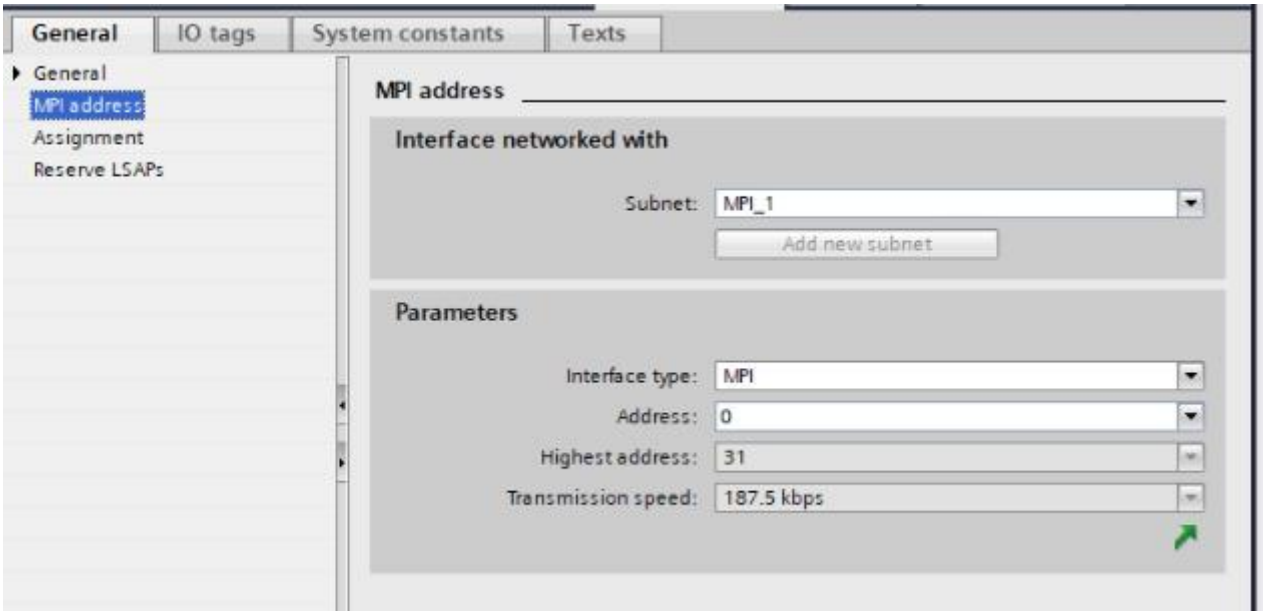
6. Then select "Add new device", select the "PC station" option under the "PC general" folder within the "PC systems" tree. Then click OK.



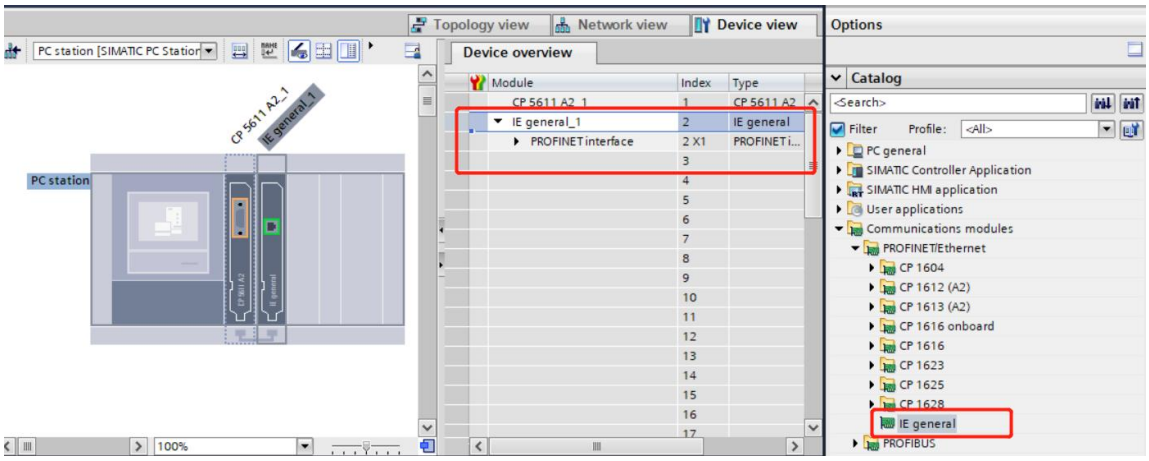
7. Select "Communications modules"->"PROFIBUS"->"CP5611(A2), and drag it to the No.1 slot of PC station.



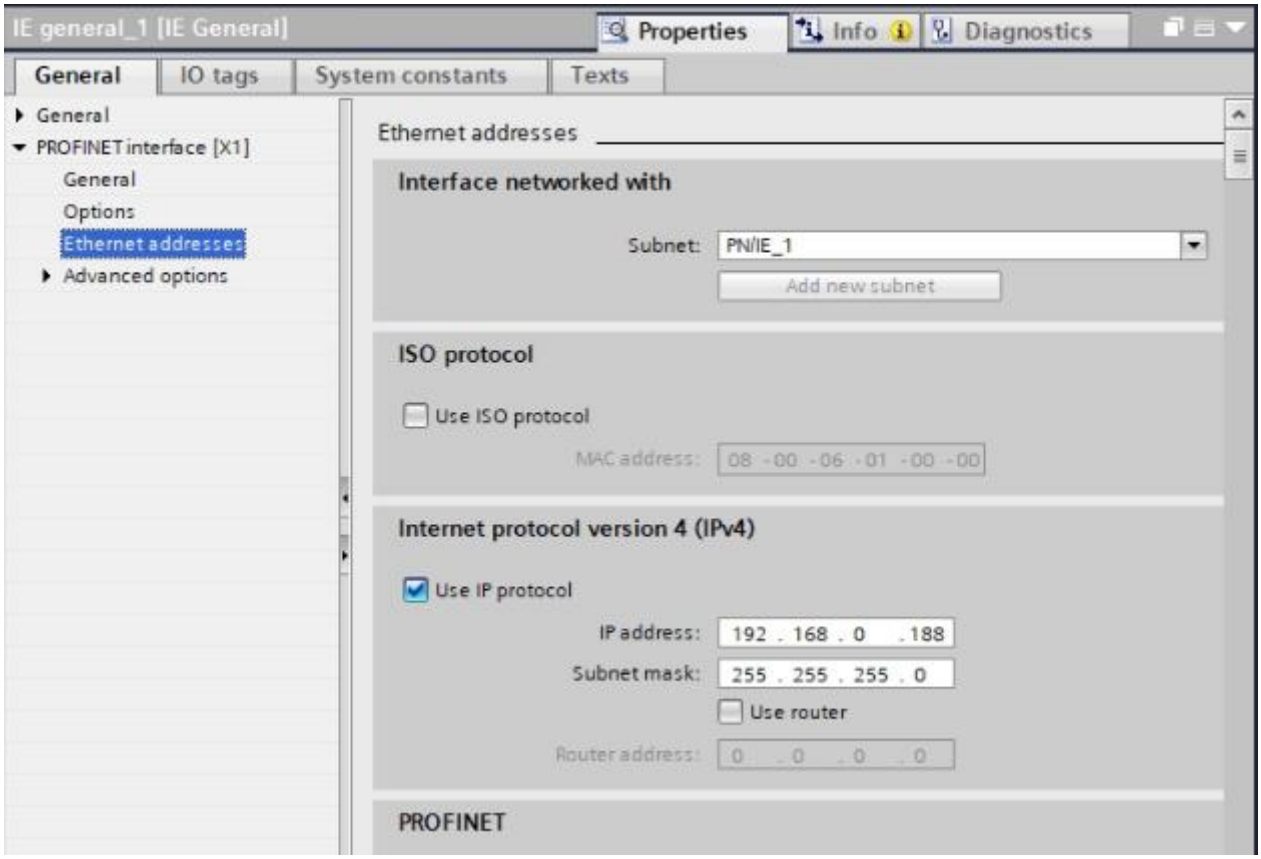
8. Double click "CP5611A2_A" to start configuring the serial interface parameters. Choose "MPI" for Interface type. Choose "MPI_1" for Subnet, then set the "Address" to the GT100-IE-MPI Module address (The default is 0, and it must not conflict with any other station address on the bus).



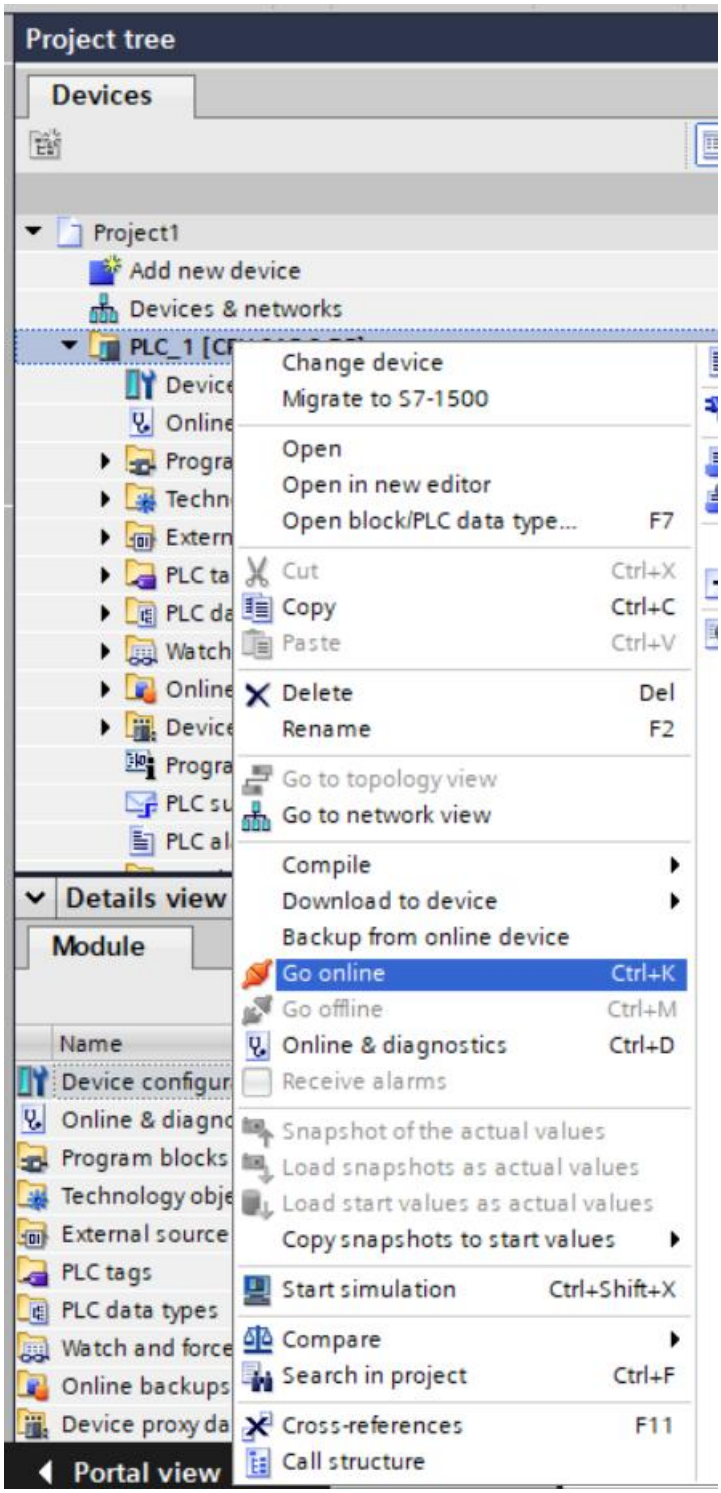
9. Select "Communications modules"->"PROFINET/Ethernet"->"IE general", drag it to the No.2 slot.



10. Double click "IE general_1" to start configuring the ethernet interface parameters. Click "Add new subnet" and it will automatically generate "PN/IE". Fill in the IP address and Subnet mask of the GT100-IE-MPI (The default, IP address is 192.168.1.188).



11. Right click "PLC", turn to "Go online". In the pop-up window, select "PN/IE" for "PG/PC" interface type, select local network card for "PG/PC Interface". Click searching, then the PLC will be found. Click "Go online".



12. Right click "Program blocks", select "Upload from device (software)", then start uploading and downloading the program of PLC.

7 STEP 7 Programming

7.1 System Requirements

To program your PLC with STEP 7 using the GT100-IE-MPI, STEP 7 must first be installed on your system. Please refer to Siemens for instructions on how to install STEP 7.

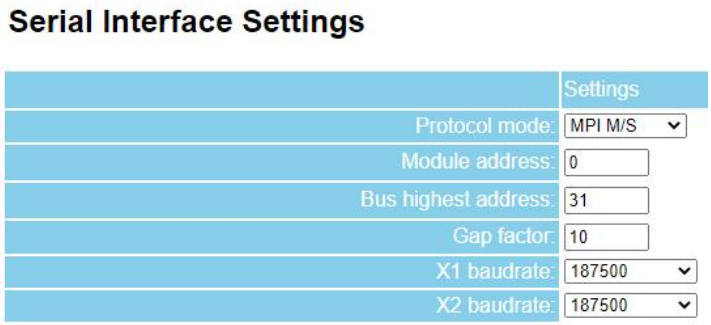
And, please install the STEP 7 driver (Run as administrator) which is available on GT100-IE-MPI product page.

7.2 Programming

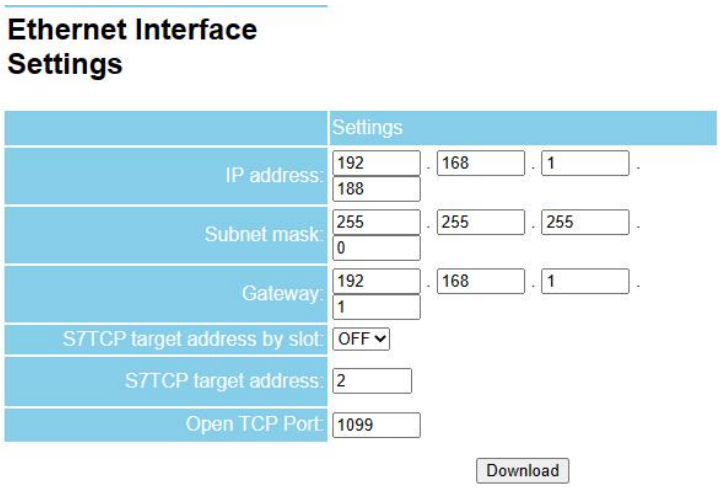
The following procedure will show you how to program your PLC using STEP 7.

1. Set PG/PC interface

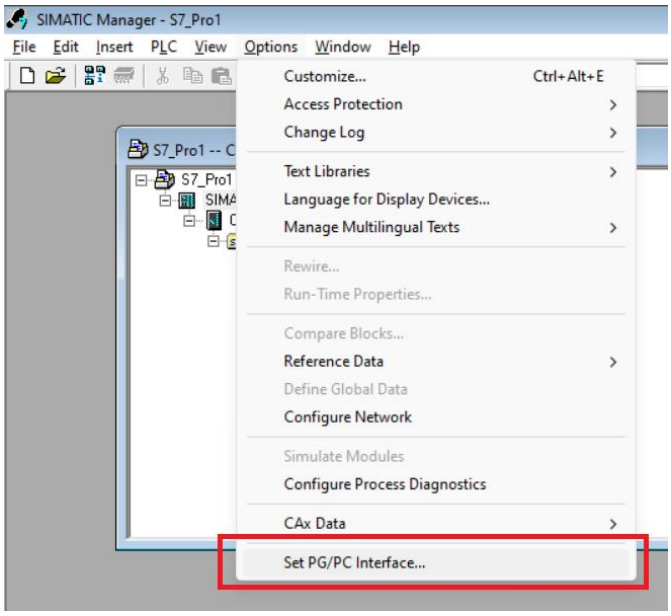
a. Using a web browser, go to the "S7 Bus Interface Parameters" page of the GT100-IE-MPI (See Chapter 5.1). Under 'Serial Interface Settings', set the 'Module address' to the desired MPI address for the GT100-IE-MPI (default is 0). This MPI address must be unique and cannot be the same as the PLC's MPI address.



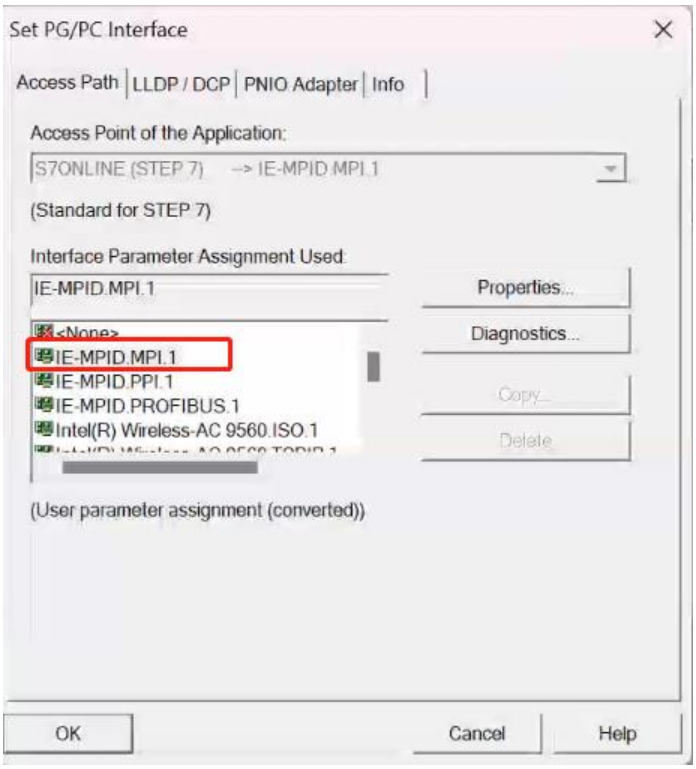
Under 'Ethernet Interface Settings', set the 'S7TCP target address' to the actual PLC's MPI address (default is 2), and click the "Download" button to save the changes.

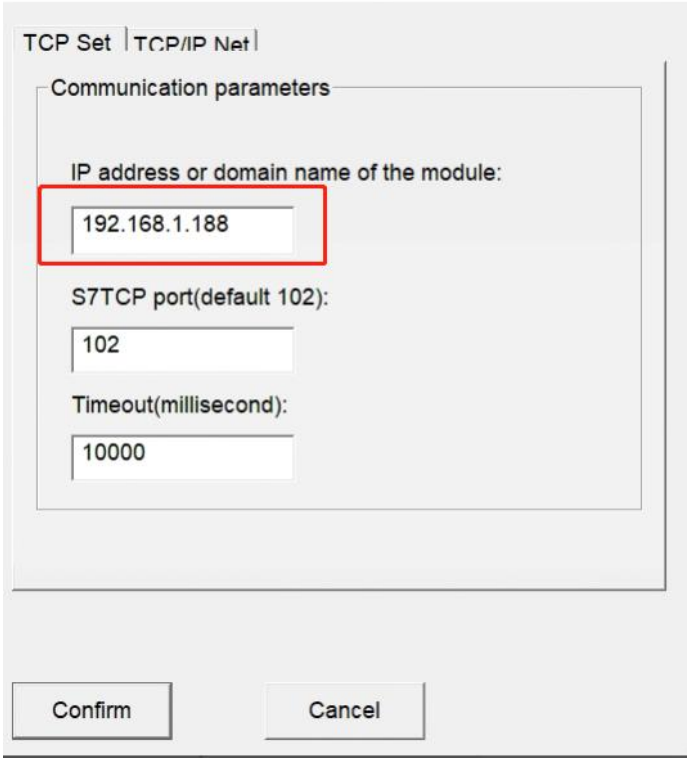


b. Open the STEP 7 programming software, select the menu "Options -> Set PG/PC Interface...".



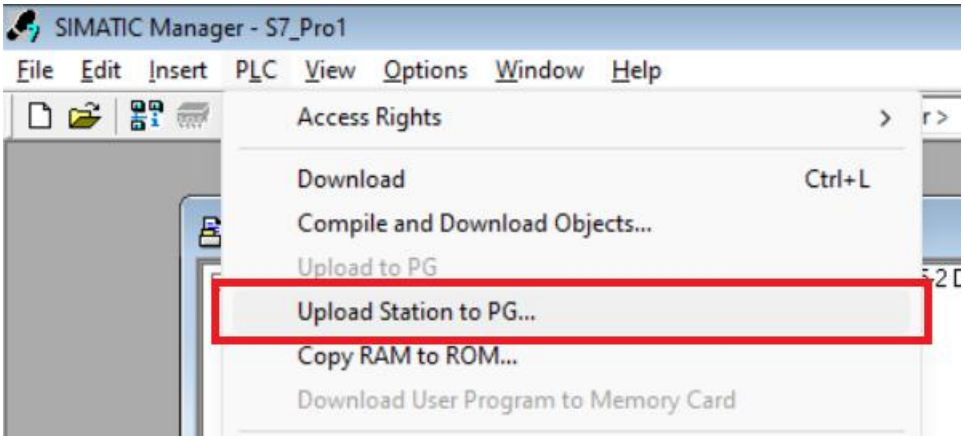
c. Select IE-MPID.MPI.1 in the pop-up dialog box, and then click on Properties to change its IP address so that it is in the same IP subnet as the PC.



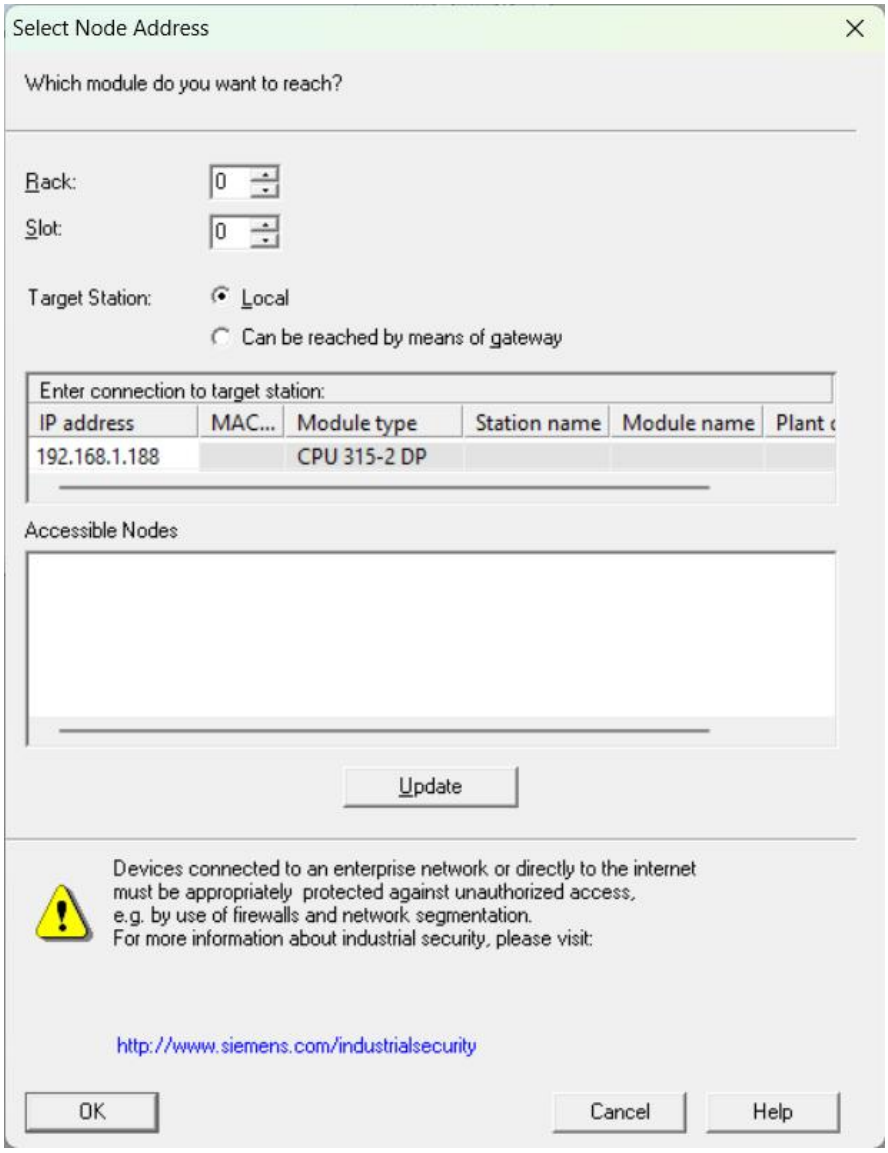


2. Upload Program

a. Select the menu "PLC -> Upload Station to PG..." in the main window of STEP 7 software.



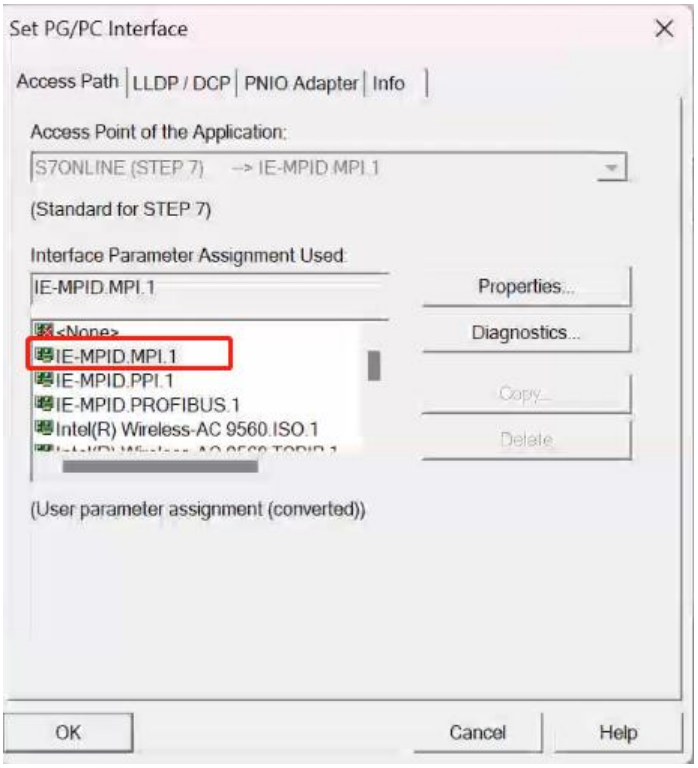
b. Click the "View" button to check the type of the PLC, and then click the "OK" button to upload the program from the PLC.

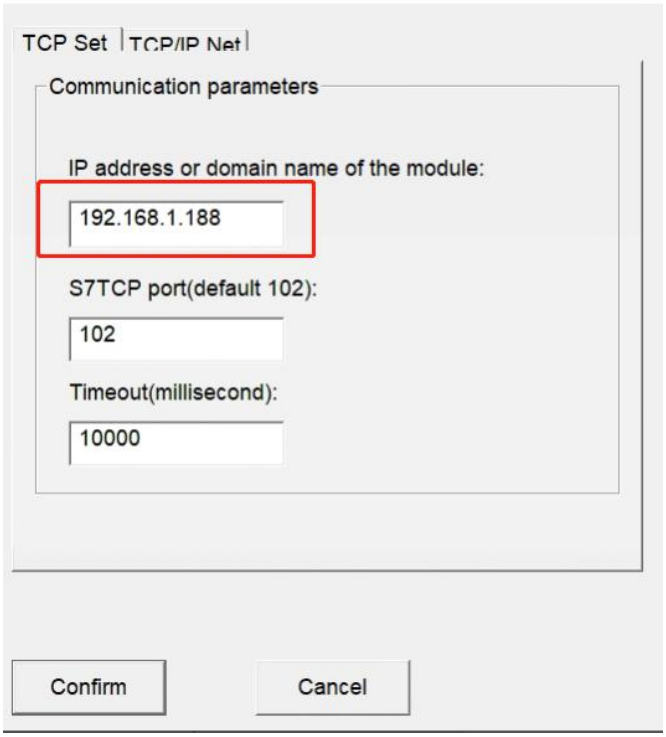


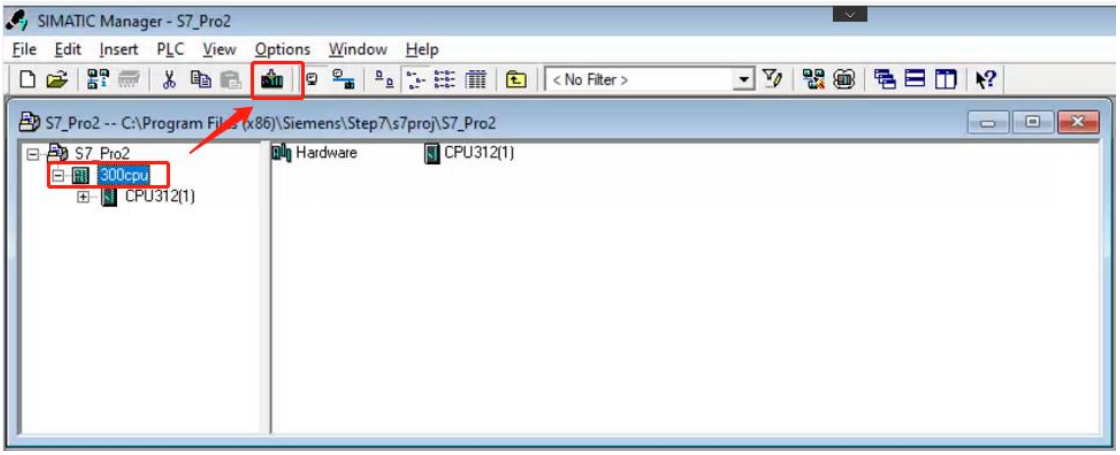
3. Download Program

STEP 7 software will automatically check whether there is an Ethernet connection in the hardware configuration of the current S7-300 Station when performing download and when monitoring the Network communication interface.

a. Since the GT100IE-MPI driver has already been installed and "IE-MPID.MPI.1" has been selected in the PG/PC settings, you only need to select the S7-300 Station project and click "Download".







b. After clicking on download, a download progress bar will be displayed to confirm that the GT100-IE-MPI connection is working properly.

4. Conclusion

After the S7-300 Station is established, you can start using GT100-IE-MPI to download and monitor program (Operate on the S7-300 Station of the STEP 7 project).

Note:

a. You should run as administrator to install the STEP 7 driver and run STEP 7 software.

b. The IP address of IE General in S7-300 Station rack should be the IP address of GT100-IE-MPI.

c. The address parameter of the STEP 7 programming station for GT100-IE-MPI should be pre-set to the MPI station address of the current PLC (the default is 2).

8 Modbus TCP Communication

The GT100-IE-MPI can be configured to function as a Modbus TCP Server, which can be enabled using the Exclink configuration software. This feature is supported on S7-200, S7-300 and S7-400 PLCs. The PLC's Q output area is mapped starting at 0x0001, the I input area is mapped starting at 1x0001, and the M memory area is mapped starting at 3x0001. On S7-300 and S7-400 PLCs, the DB memory area blocks are mapped starting at 4x0001. On S7-200 PLCs, the V memory area is mapped starting at 4x0001.

The mapping address table is listed as below.

Modbus Register Starting Address	S7 Series PLC Starting Address	Data Type	Calculation	Function Code
0x0001	Q0.0	Bit	Q***m.n*** = 0x0001 + ***m****8 + ***n***	FC1 (Read Coil Status) FC5 (Write Single Coil）
1x0001	I0.0	Bit	$\mathbf{I}\boldsymbol{m}.\boldsymbol{n} = 1x0001 + (\boldsymbol{m} * 8) + \boldsymbol{n}$	FC2 (Read Discrete Input)
3x0001	MW0	Word (2 bytes)	$\mathrm{MW}\boldsymbol{m} = 3x0001 + \boldsymbol{m}/2$ Where ***m*** is an even number.	FC4 (Read Input Registers)
4x0001	DBx.DBW0 (S7-300 and S7-400)	Word (2 bytes)	$\mathrm{DB}\boldsymbol{x}.\mathrm{DBW}\boldsymbol{m} = 4x0001 + \boldsymbol{m}/2$ Where ***m*** is an even number. (***x*** is set through the Exclink configuration software)	FC3 (Read Holding Registers) FC16 (Write Multiple Registers) FC6 (Write Single Register)
	VW0 (S7-200)		$\mathrm{VW}\boldsymbol{m} = 4x0001 + \boldsymbol{m}/2$ Where ***m*** is an even number (The V memory area in the Exclink configuration software is configured as DB1)	

Note: Modbus register addresses are expressed in Base-1 notation. If the Modbus TCP Client uses Base-0 notation, then the addresses will need to be offset by one.

Note: Please make sure your PC is configured within the same IP segment as the GT100-IE-MPI adapter. For example, if the adapter's IP address is 192.168.1.188, then your PC should be configured to 192.168.1.XXX.

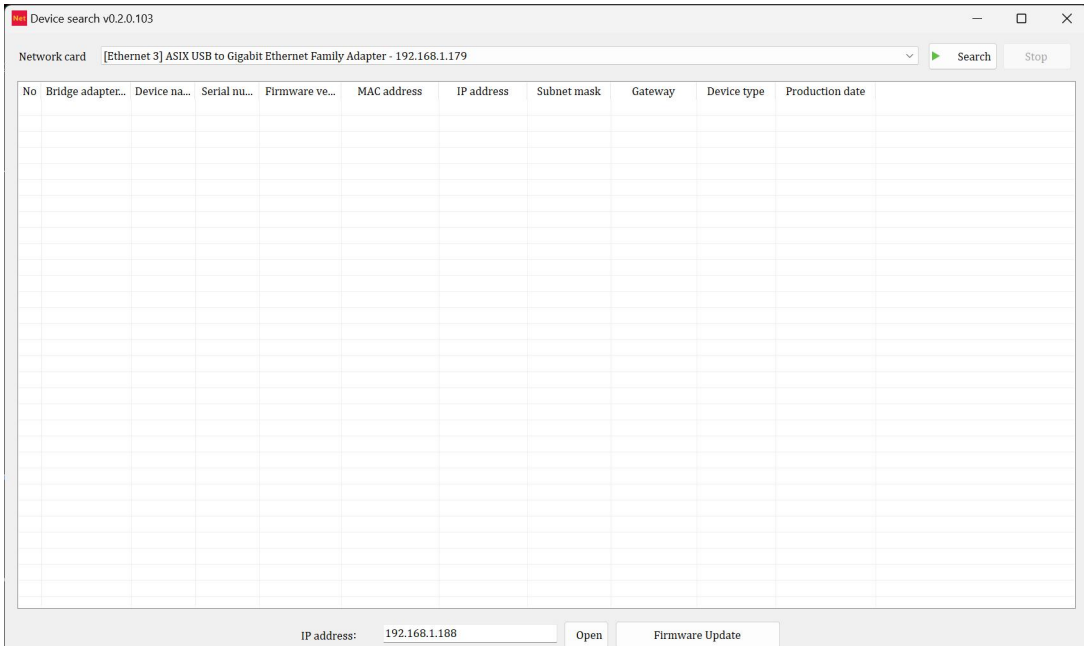
Modbus TCP IP Address: The same IP address as the GT100-IE-MPI
Default: 192.168.1.188

Modbus TCP Slave ID: The same as the station address of your PLC
Default: 2

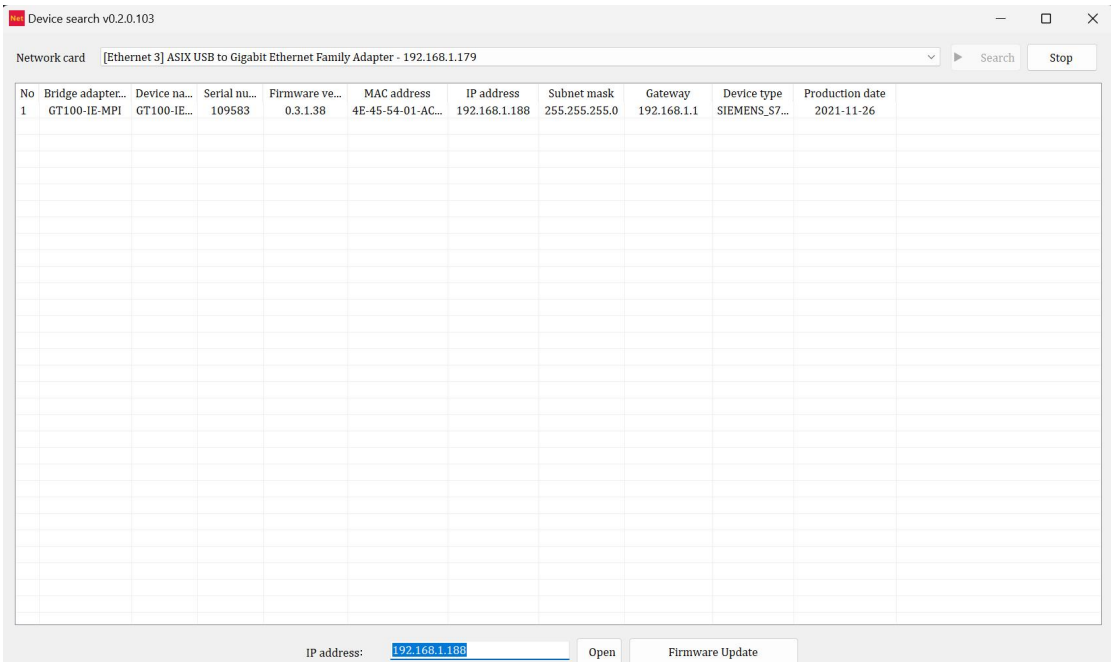
The following example will show how to access data from S7-300 PLC.

1. Open the Exclink software 

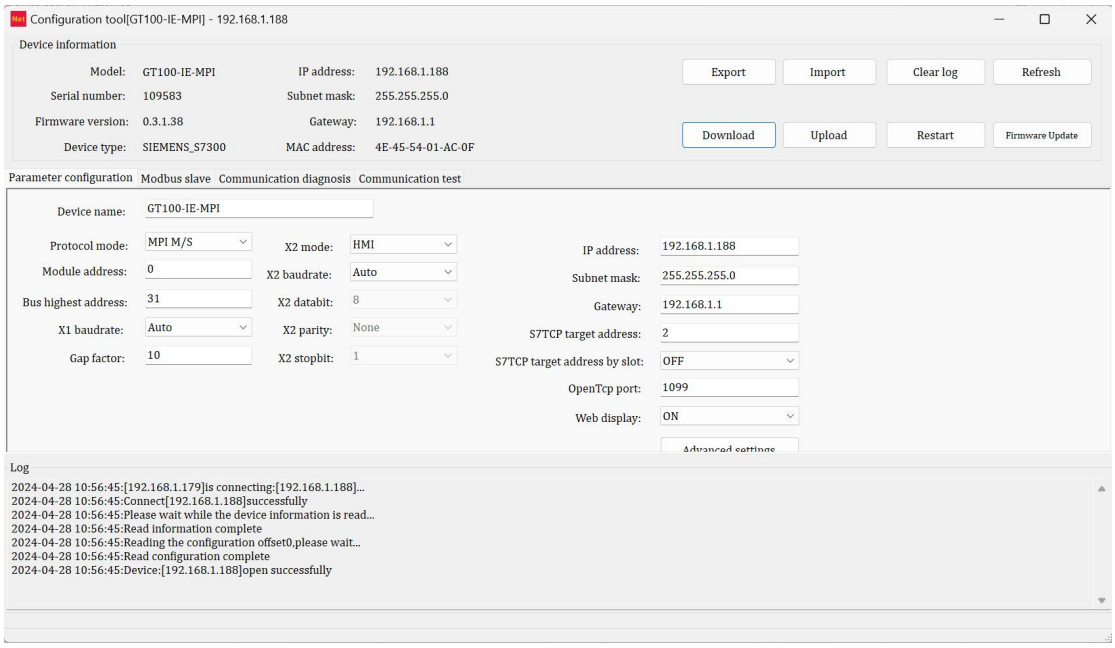
2. Click the "Search" button.



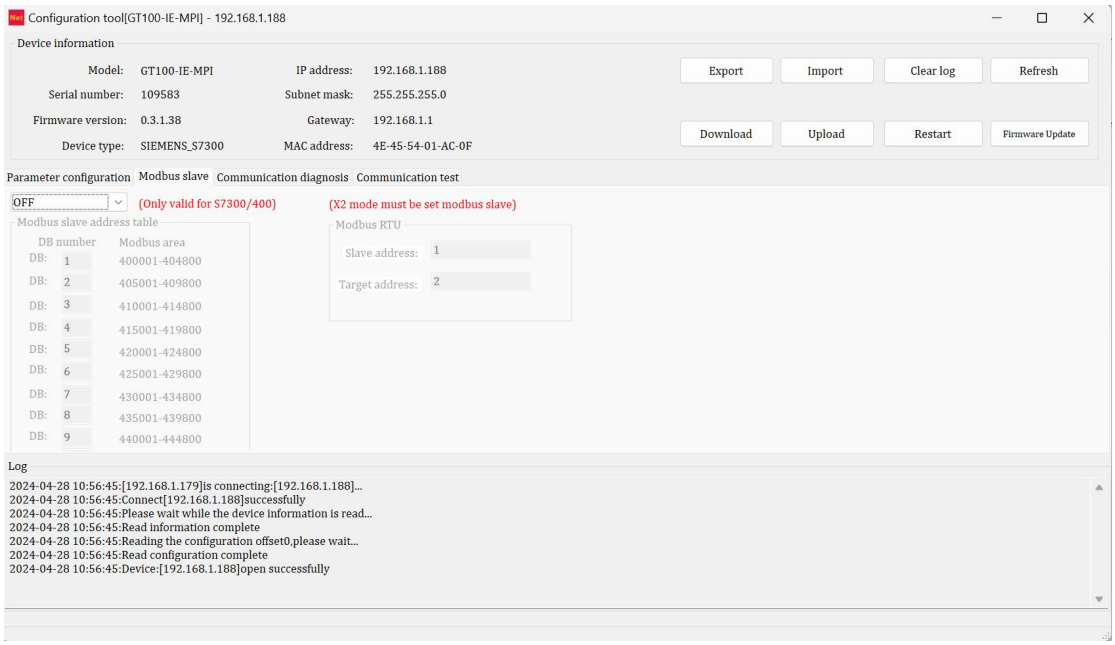
The GT100-IE-MPI is found.



3. Double click the GT100-IE-MPI to enter into the configuration interface.

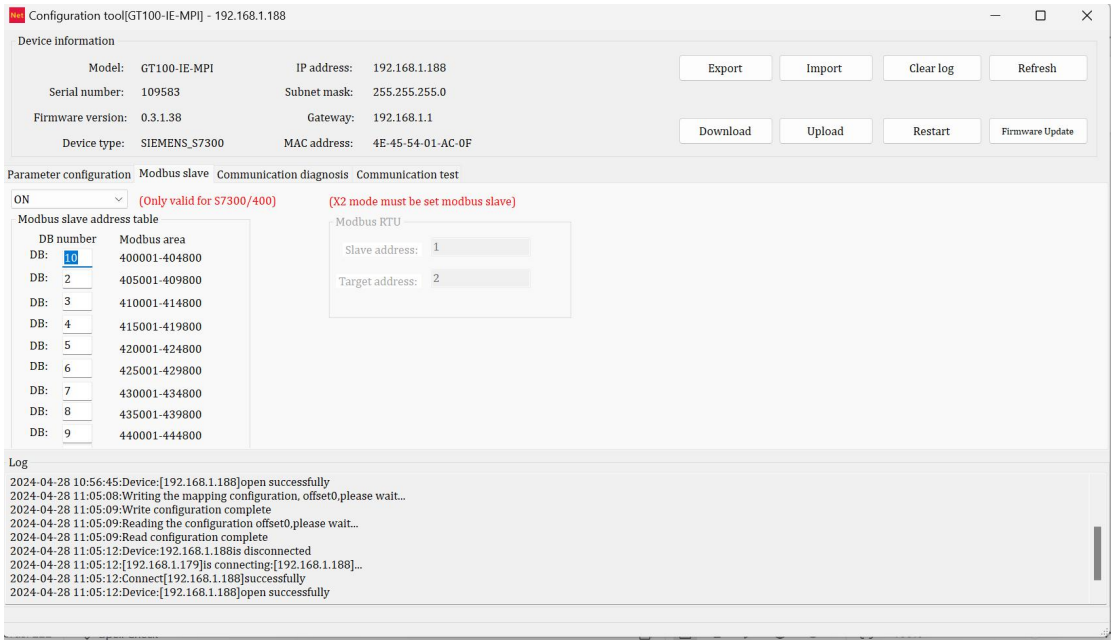


4. Click the Modbus slave Tab.

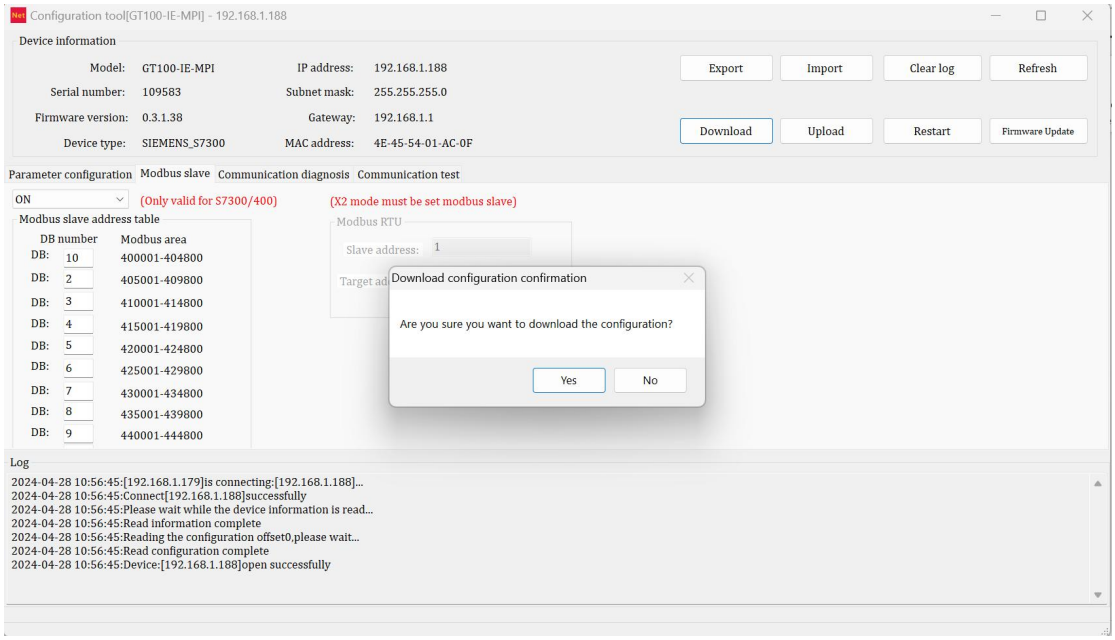


Set the drop-down option to "ON" to enable Modbus TCP, then configure the DB block numbers for the Modbus slave addresses to be mapped to the PLC. In this example, the DB10 block will be mapped to 400001-404800.

Note: Before enabling Modbus TCP, first add the data blocks, such as DB1 and DB2, to the S7 PLC program.

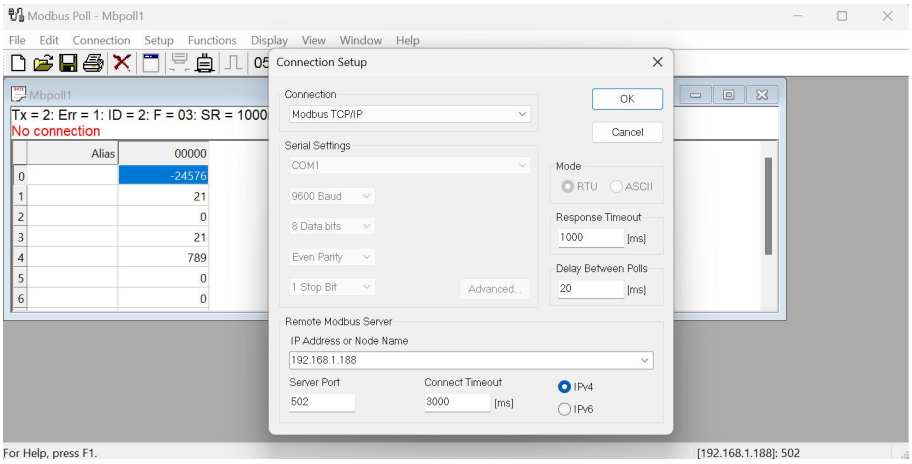


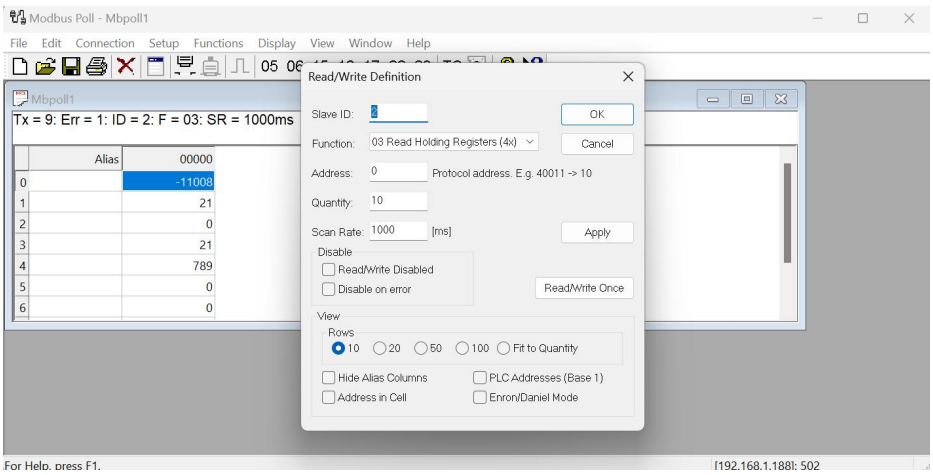
5. When the configuration is done, please click the "Download" button to download the configuration into the GT100-IE-MPI adapter.



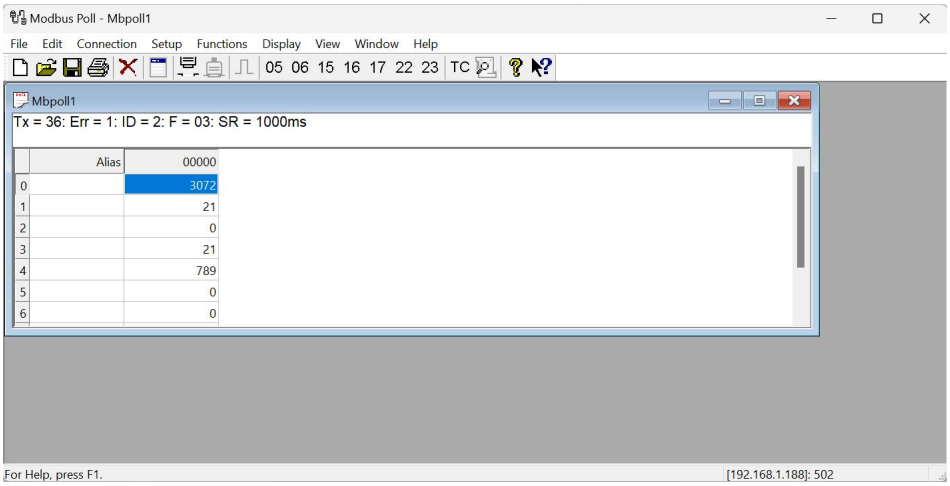
Cick "Yes" to execute. The log in the bottom will show the configuration is downloaded successfully.

6. Use a Modbus TCP Client to connect to the GT100-IE-MPI and read the data.
   In this example, the Modbus Poll acts as a Modbus TCP Client to read the data.
   Connect to IP address 192.168.1.188 and Slave ID 2.

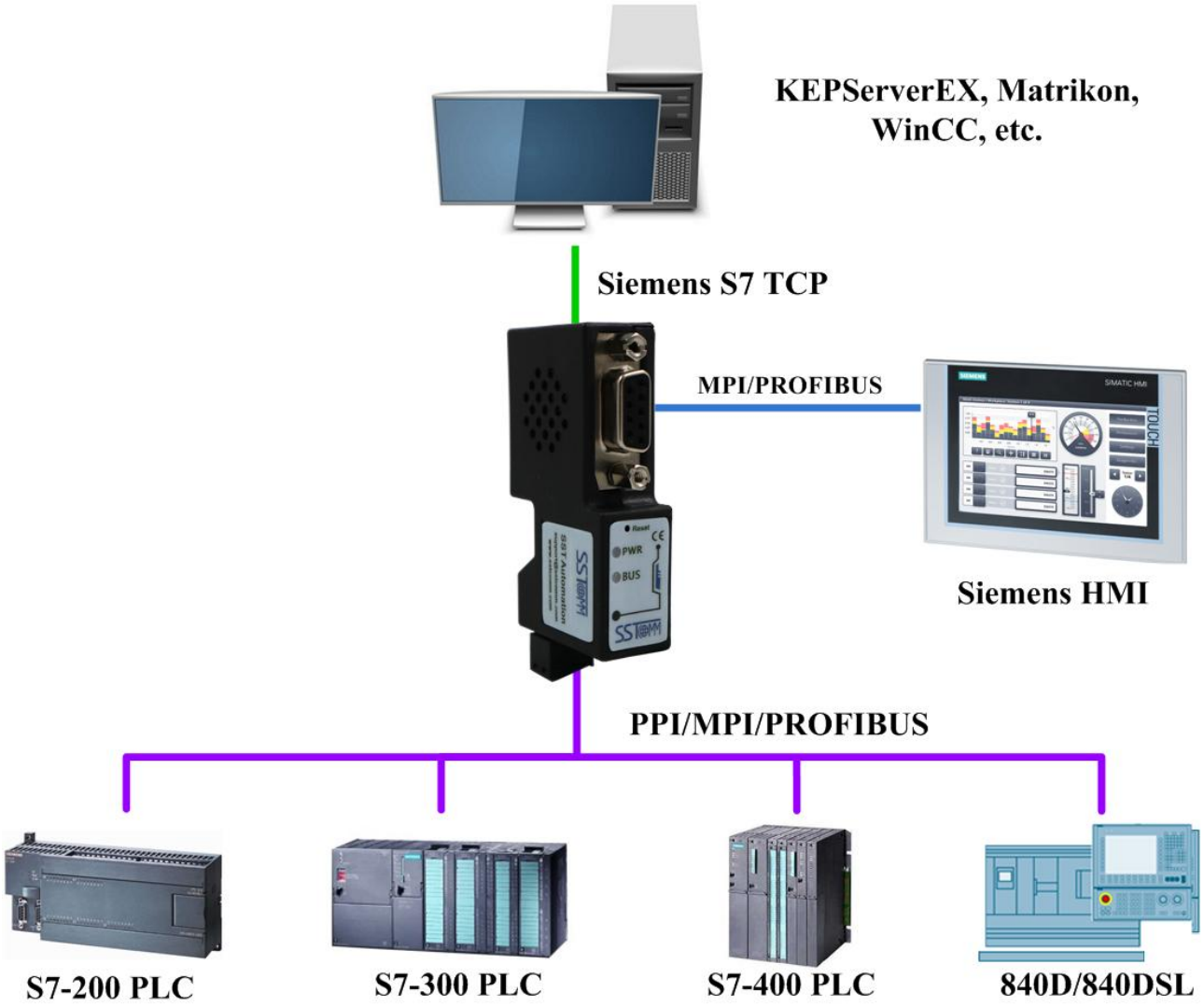




The data can now be read from the S7 PLC using Modbus TCP. Function codes FC6 or FC16 can also be used to write register values to the PLC.



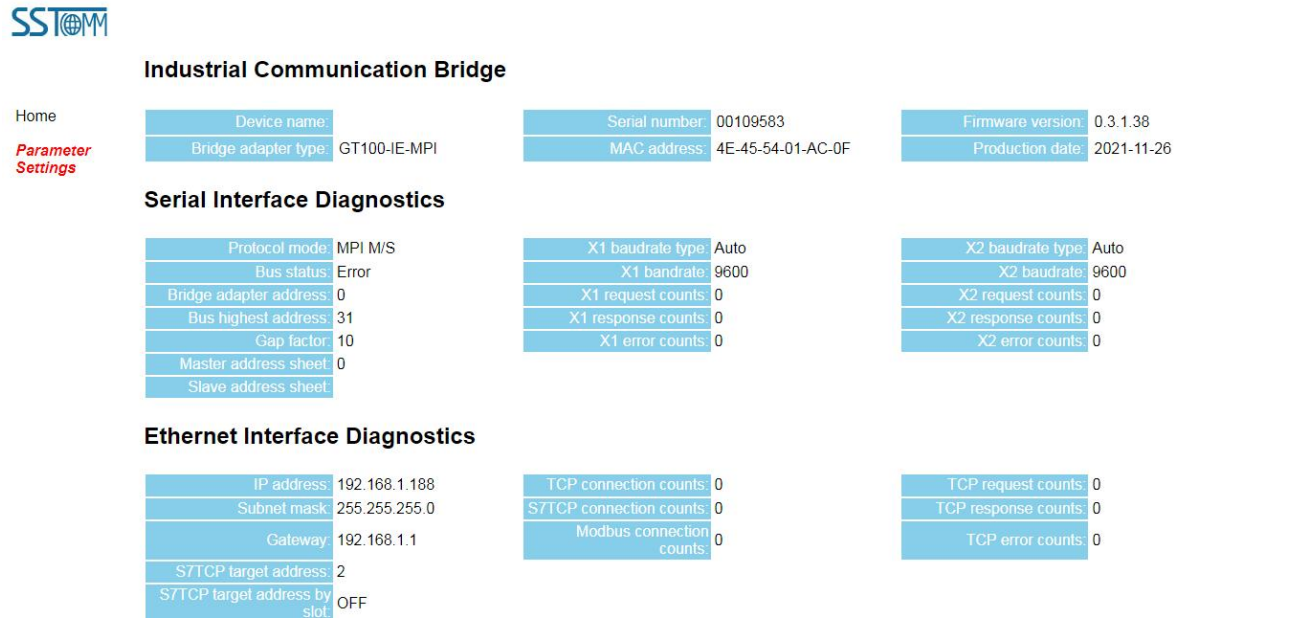
9 Use Case


KEPServerEX, Matrikon,
WinCC, etc.
Siemens S7 TCP
MPI/PROFIBUS
Siemens HMI
PPI/MPI/PROFIBUS
S7-200 PLC
S7-300 PLC
S7-400 PLC
840D/840DSL

Appendix

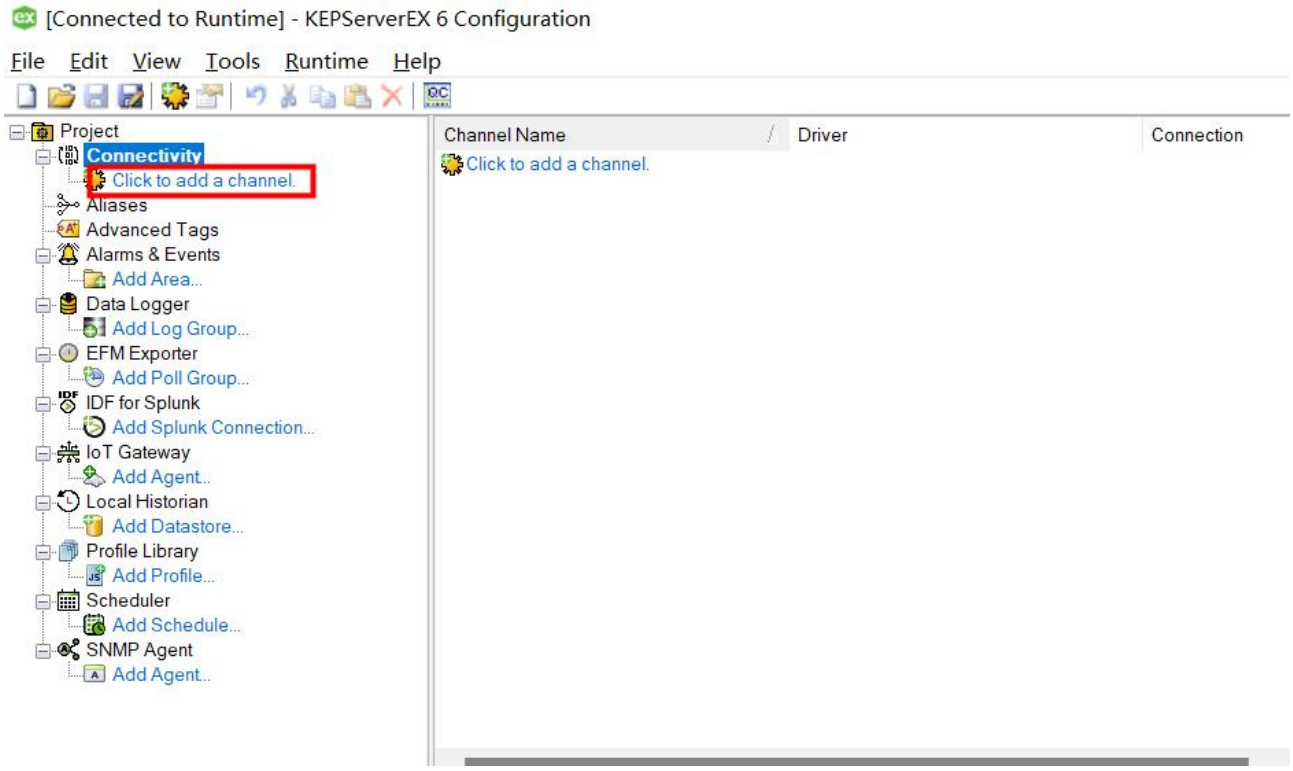
A. How to connect GT100-IE-MPI to KEPServerEX

Firstly, please set S7TCP target address as 2 or other number, and set the IP address the same IP segment with the PC installed with KEPServerEX. Keep other parameters as default.

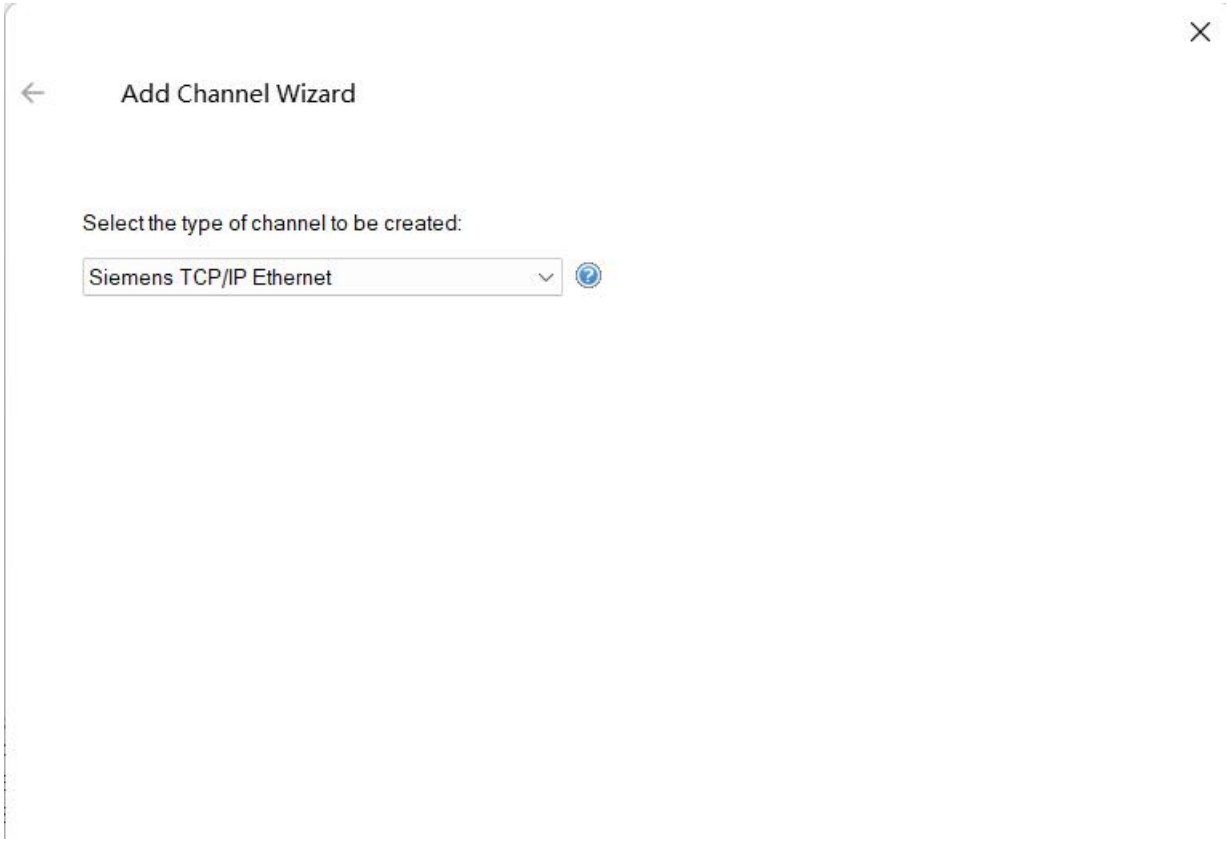


Then start configuring KEPServerEX.

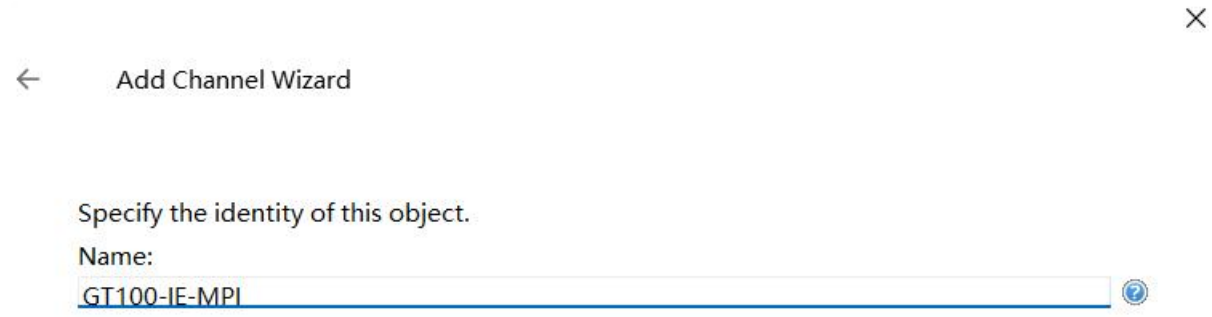
1. Create a new channel.



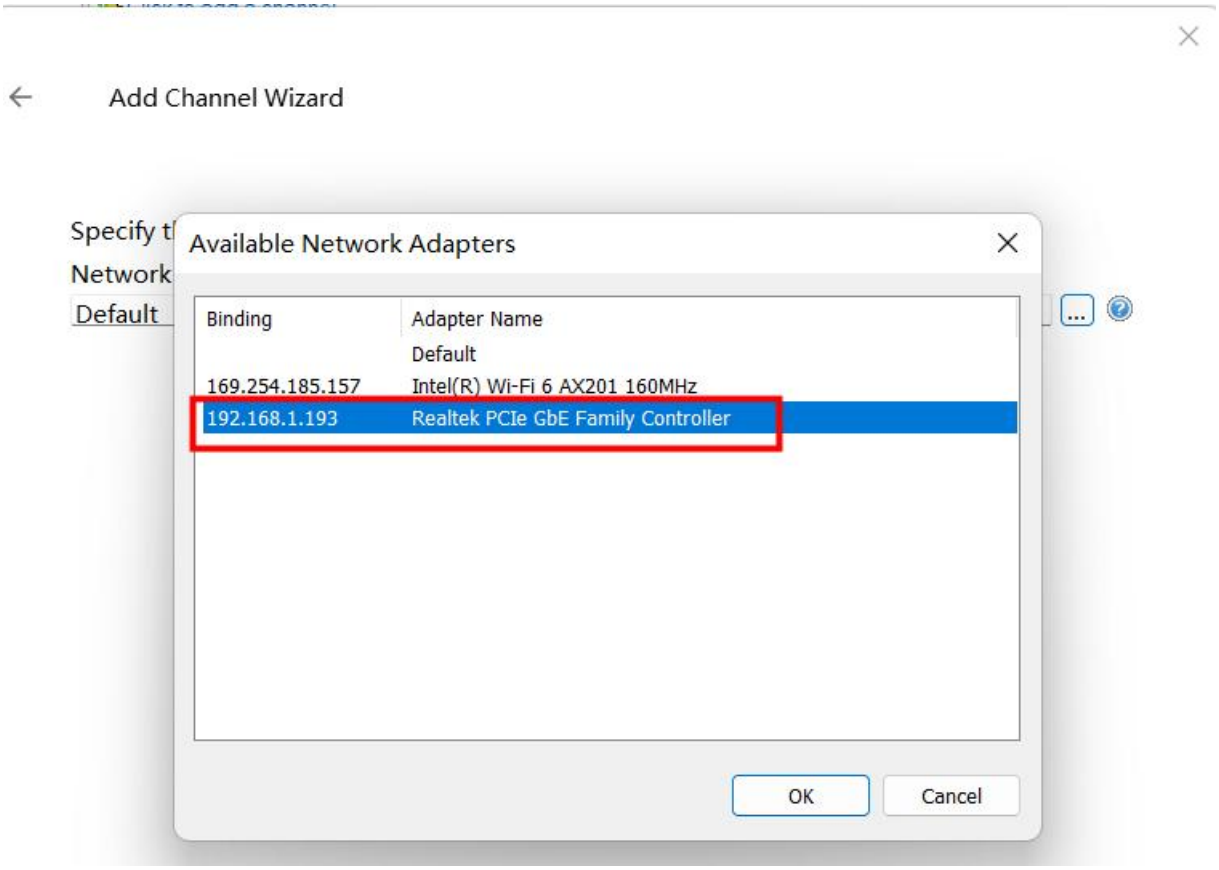
2. Select Siemens TCP/IP Ethernet driver.



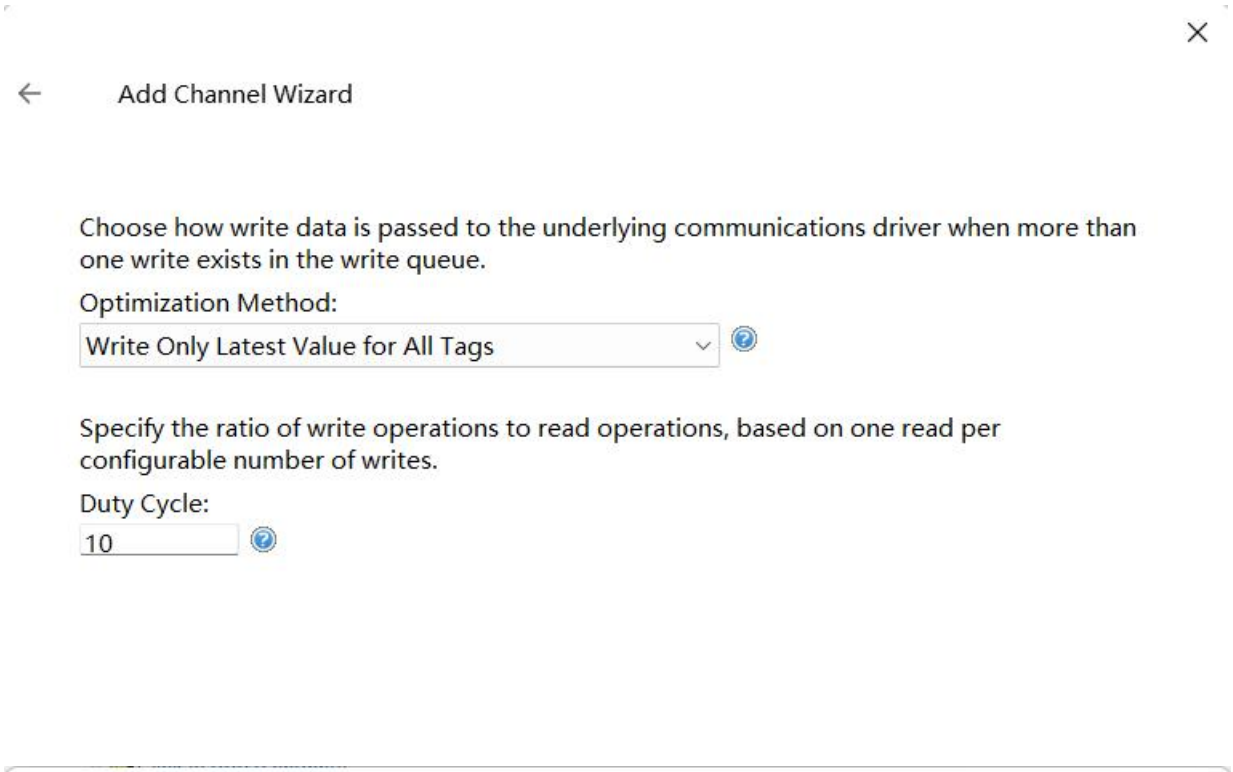
3. Fill the name of the Channel.

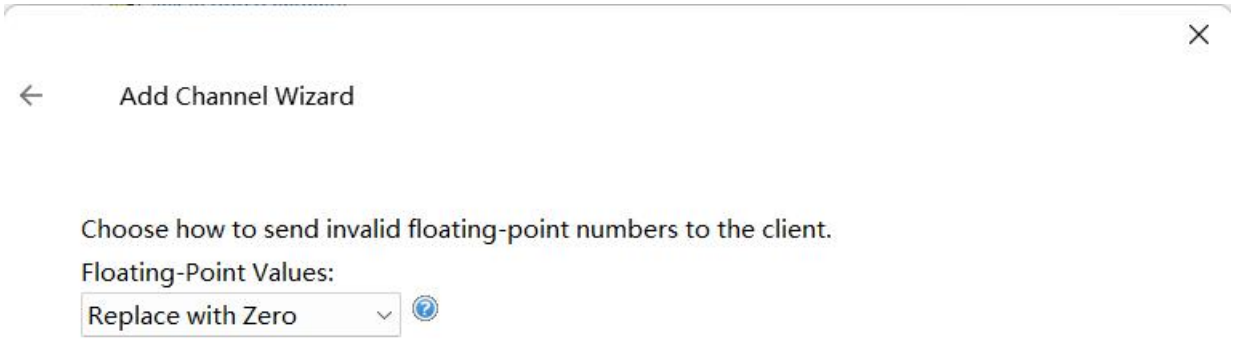


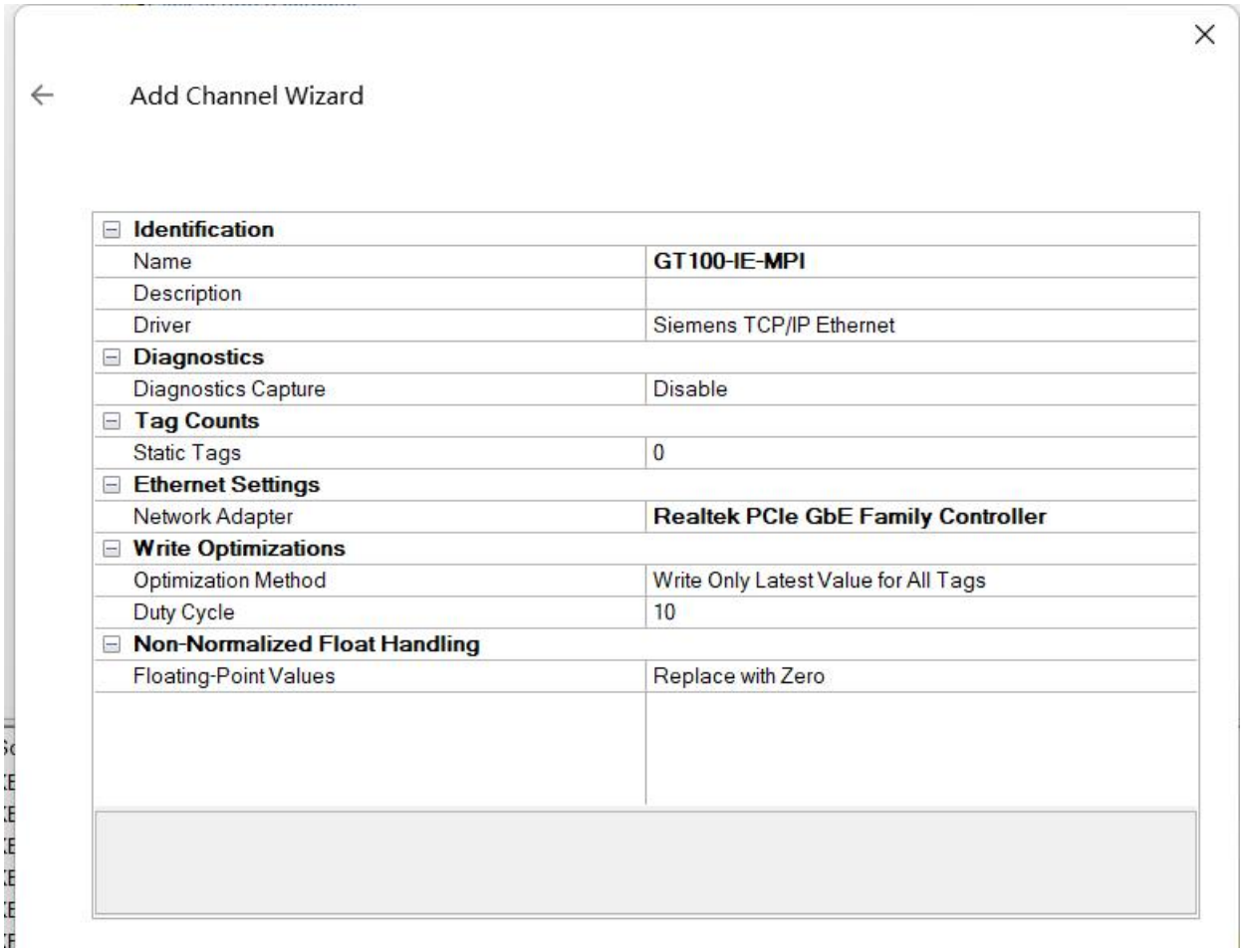
4. Select the network adapters communicting with GT100-IE-MPI.



Keep other parameters as default.



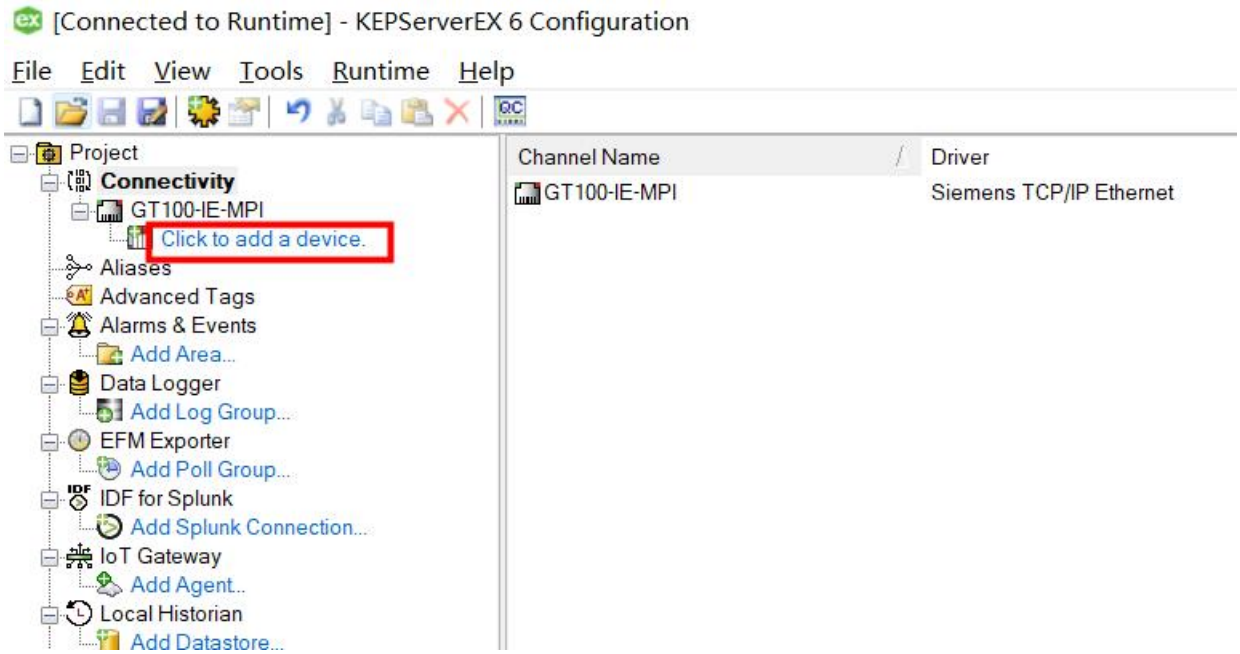




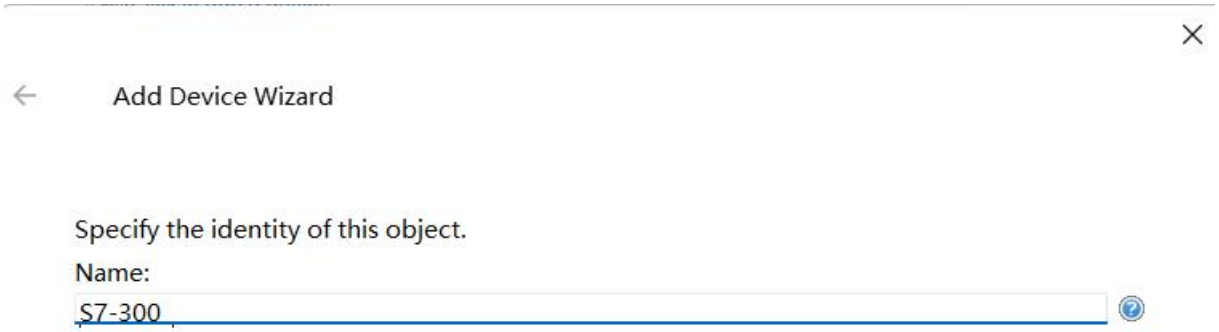
The channel is created successfully.

Then you need to add a device.

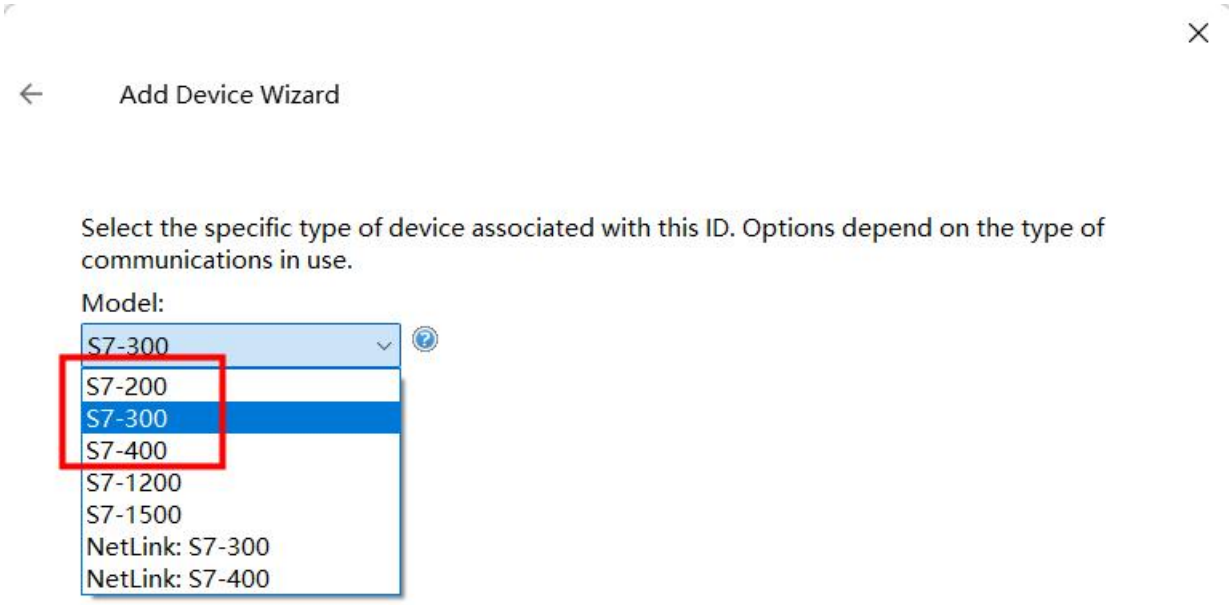
5. Click to add a device.



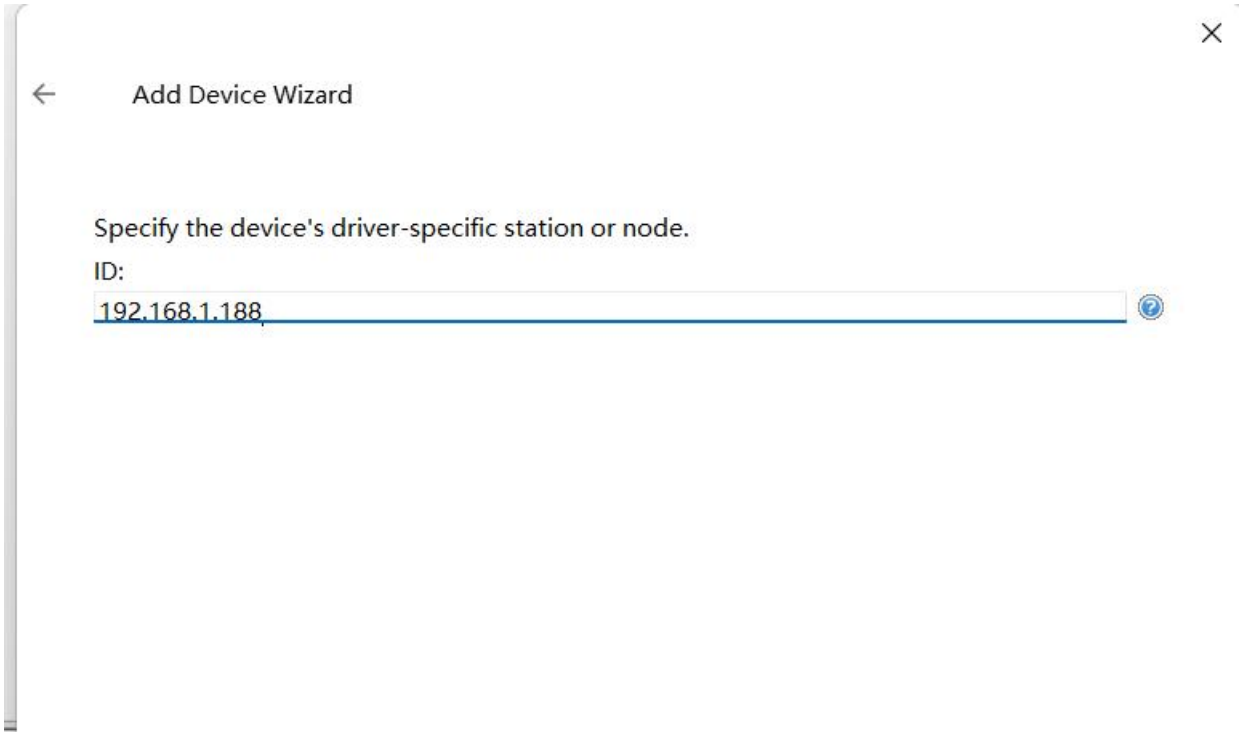
6. Fill in the device name.



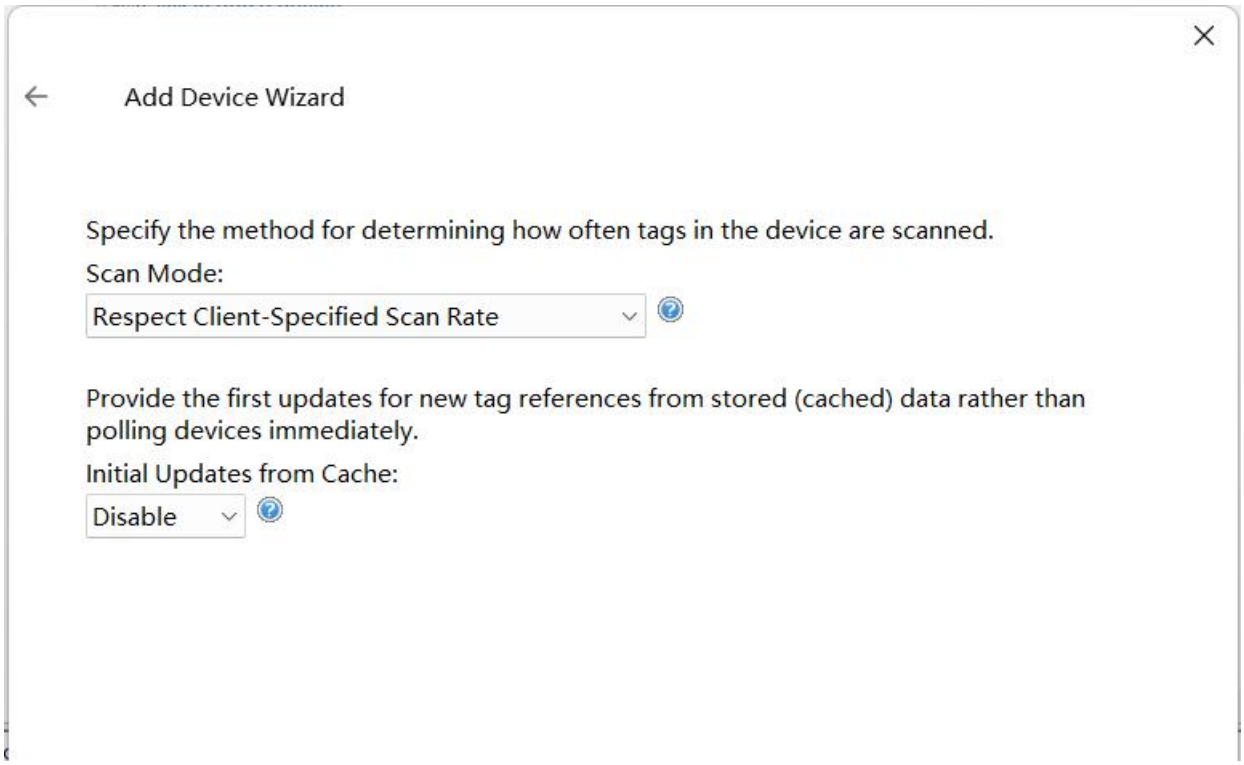
7. Select the actual S7 PLC model. GT100-IE-MPI only supports connecting S7-200, S7-300 and S7-400.

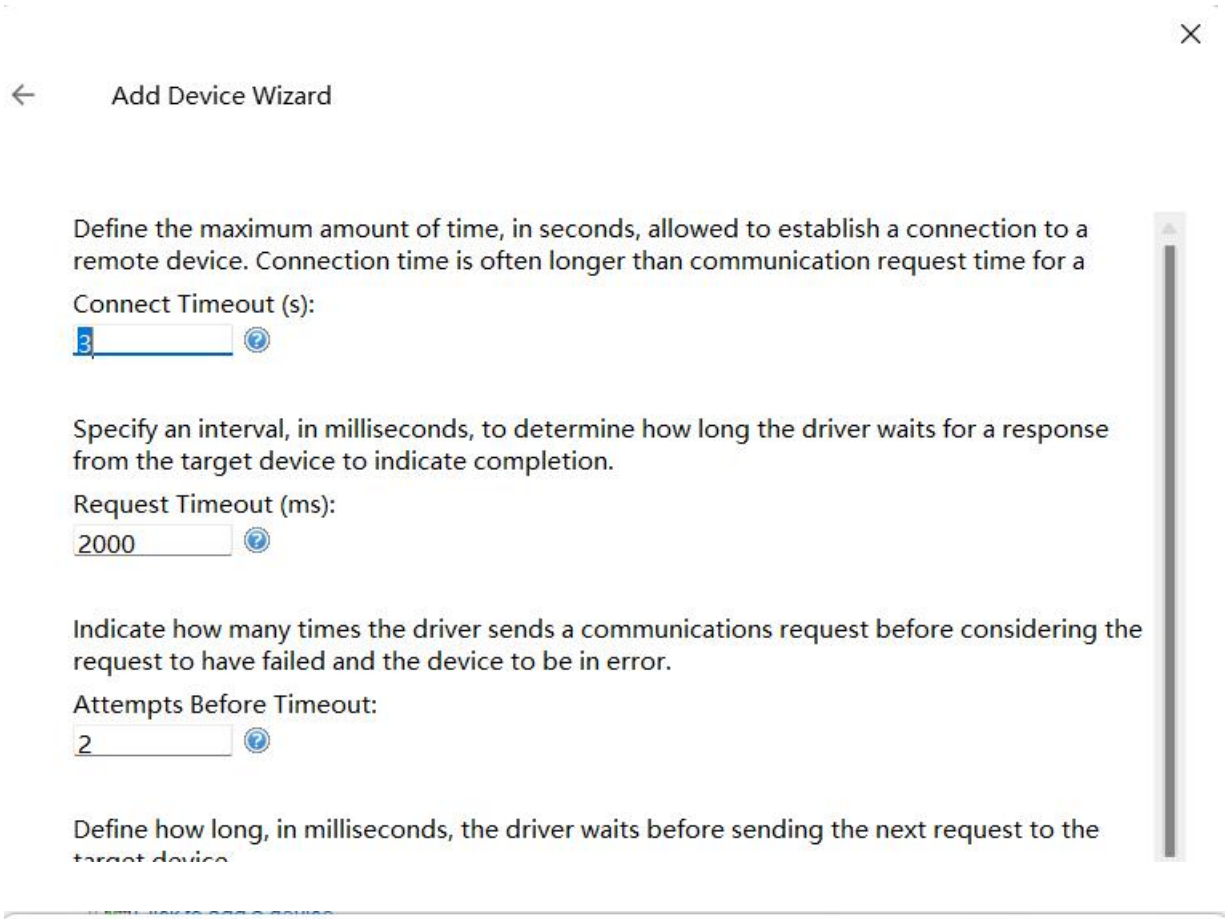


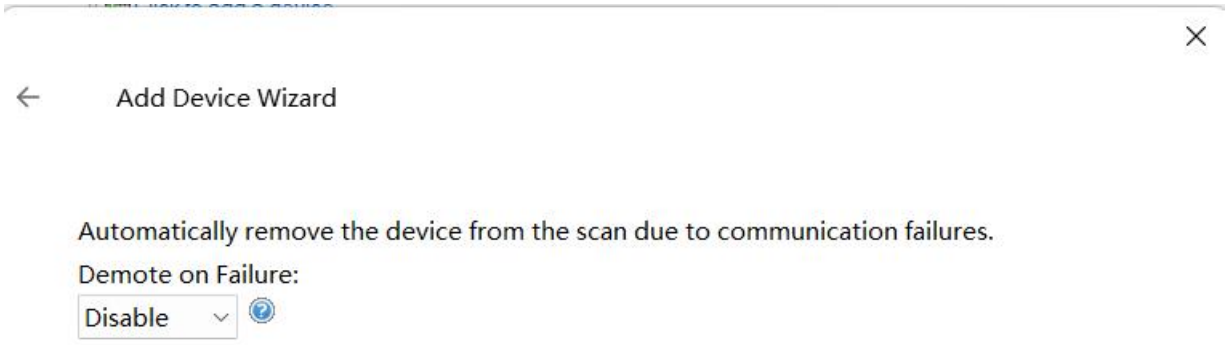
8. Fill in the IP address of GT100-IE-MPI.

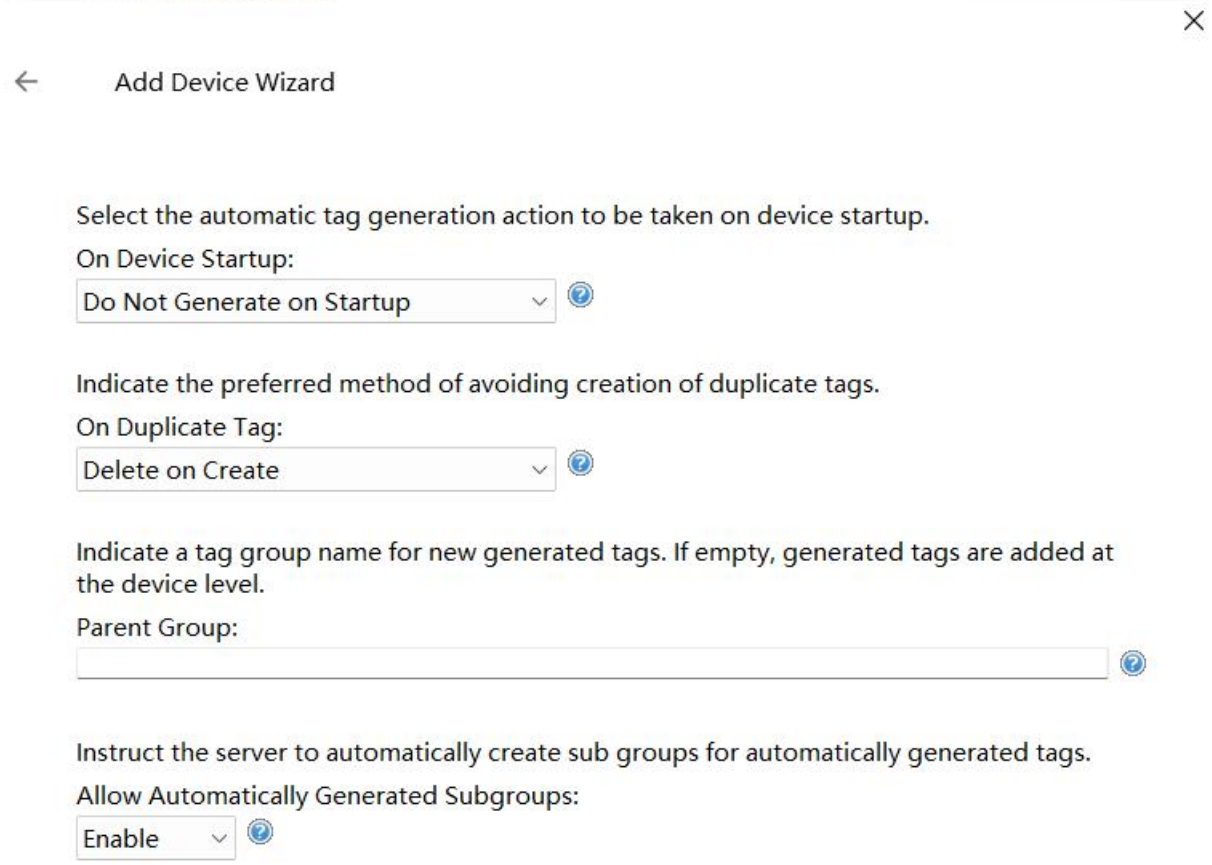


Keep other parameters as default.

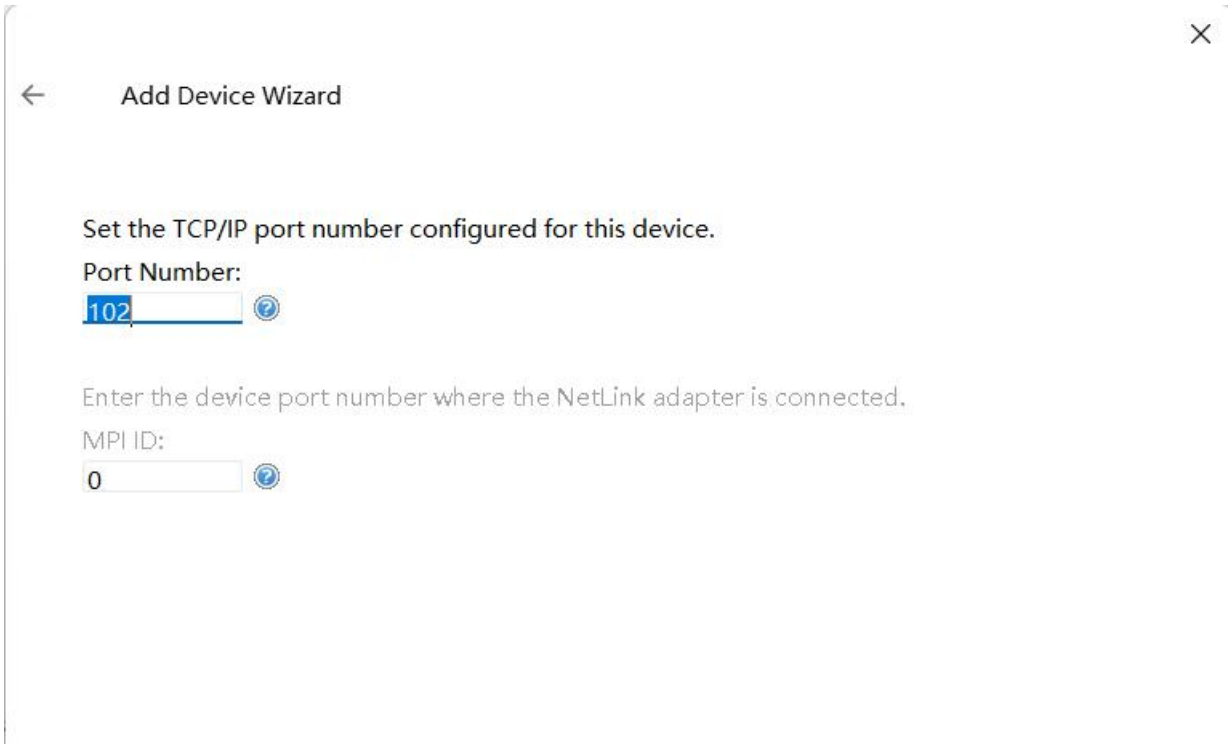



Add Device Wizard
Define the maximum amount of time, in seconds, allowed to establish a connection to a remote device. Connection time is often longer than communication request time for a
Connect Timeout (s):
3
Specify an interval, in milliseconds, to determine how long the driver waits for a response from the target device to indicate completion.
Request Timeout (ms):
2000
Indicate how many times the driver sends a communications request before considering the request to have failed and the device to be in error.
Attempts Before Timeout:
2
Define how long, in milliseconds, the driver waits before sending the next request to the

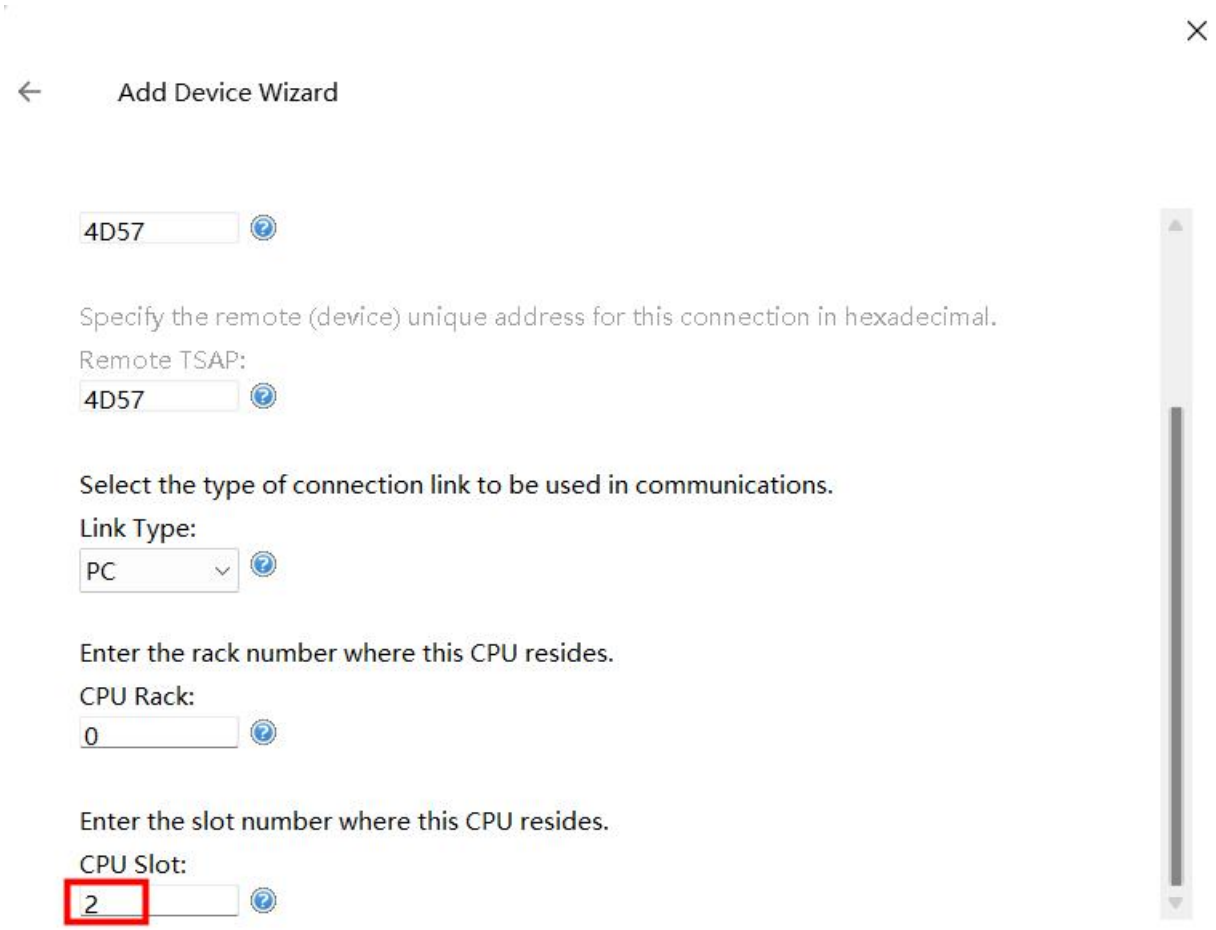

Add Device Wizard
Automatically remove the device from the scan due to communication failures.
Demote on Failure:
Disable


Add Device Wizard
Select the automatic tag generation action to be taken on device startup.
On Device Startup:
Do Not Generate on Startup
Indicate the preferred method of avoiding creation of duplicate tags.
On Duplicate Tag:
Delete on Create
Indicate a tag group name for new generated tags. If empty, generated tags are added at the device level.
Parent Group:
Instruct the server to automatically create sub groups for automatically generated tags.
Allow Automatically Generated Subgroups:
Enable

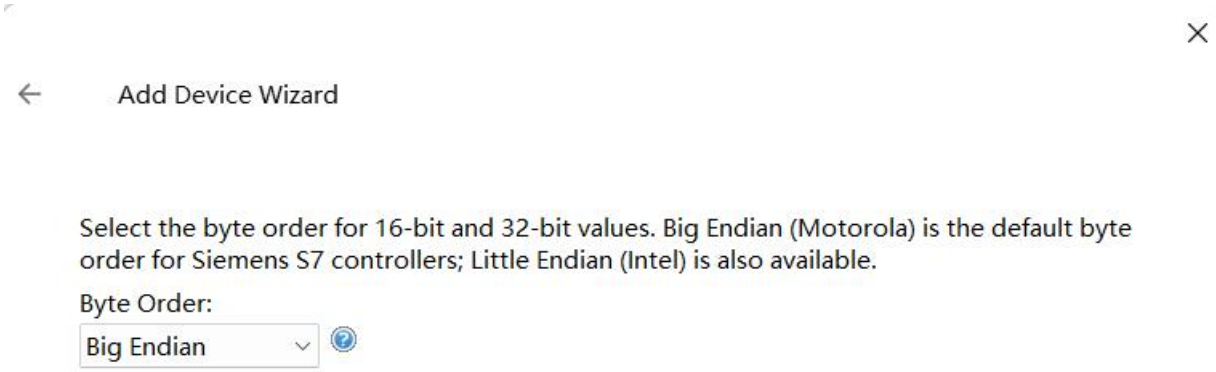
9. Keep the default port as 102. Since it is fixed in S7 communication port in the S7-200/S7-300/S7-400 PLC.



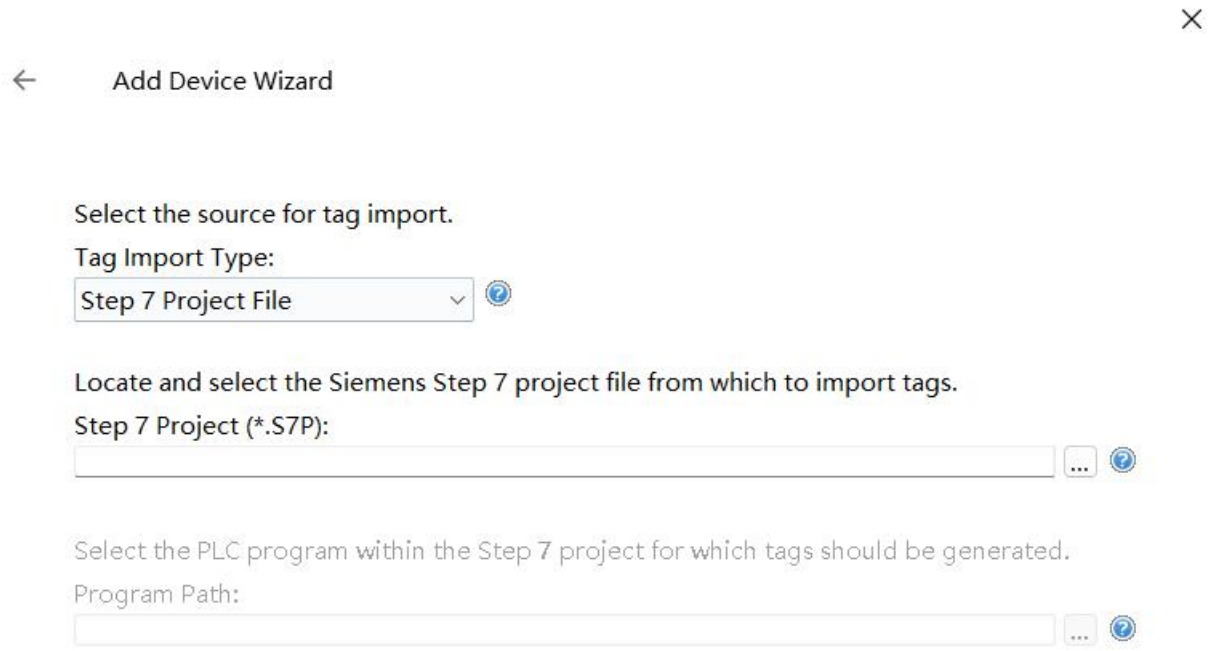
10. Fill in the same address as configured in the S7TCP target address in GT100-IE-MPI. Here is 2.



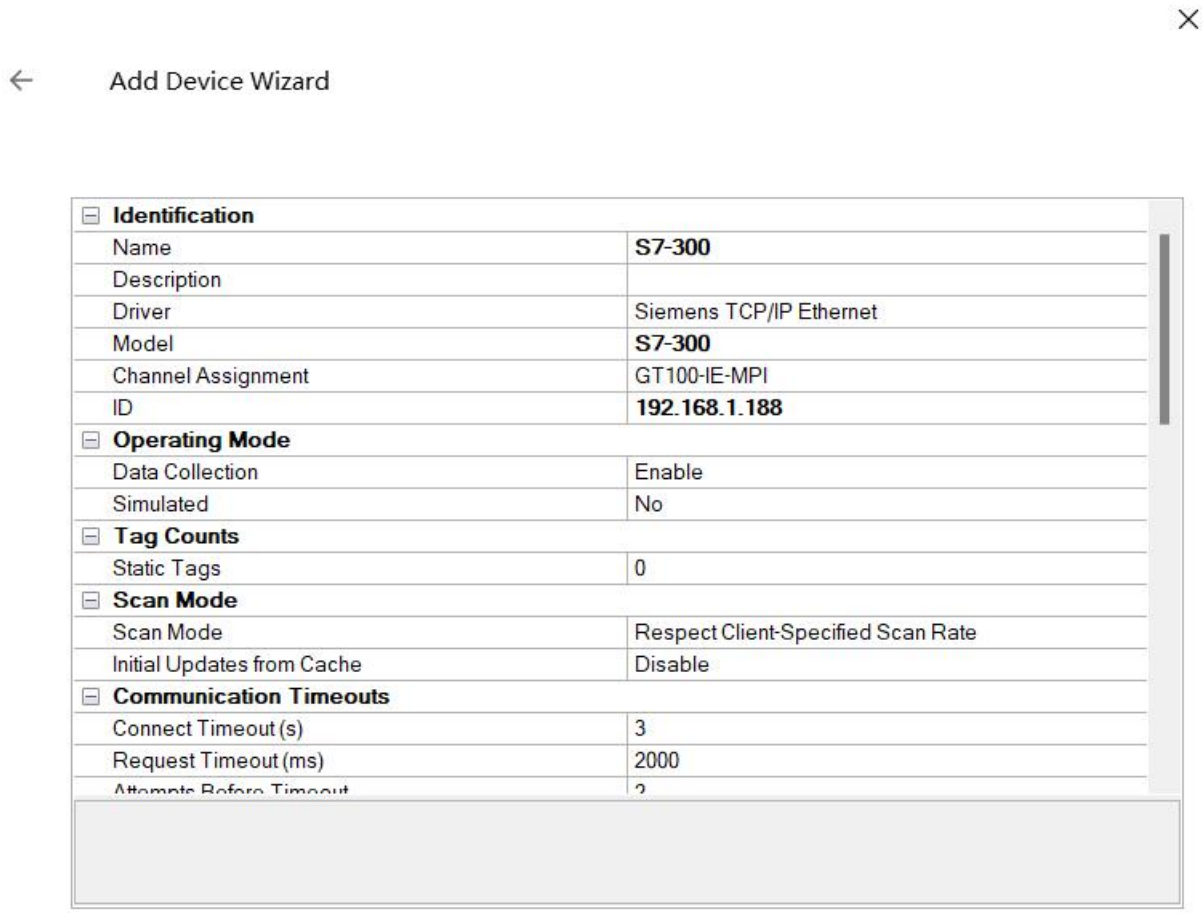
Keep other parameters as default.



11. You can import Step 7 project to generate the tags or do not import and manually create the tag later.

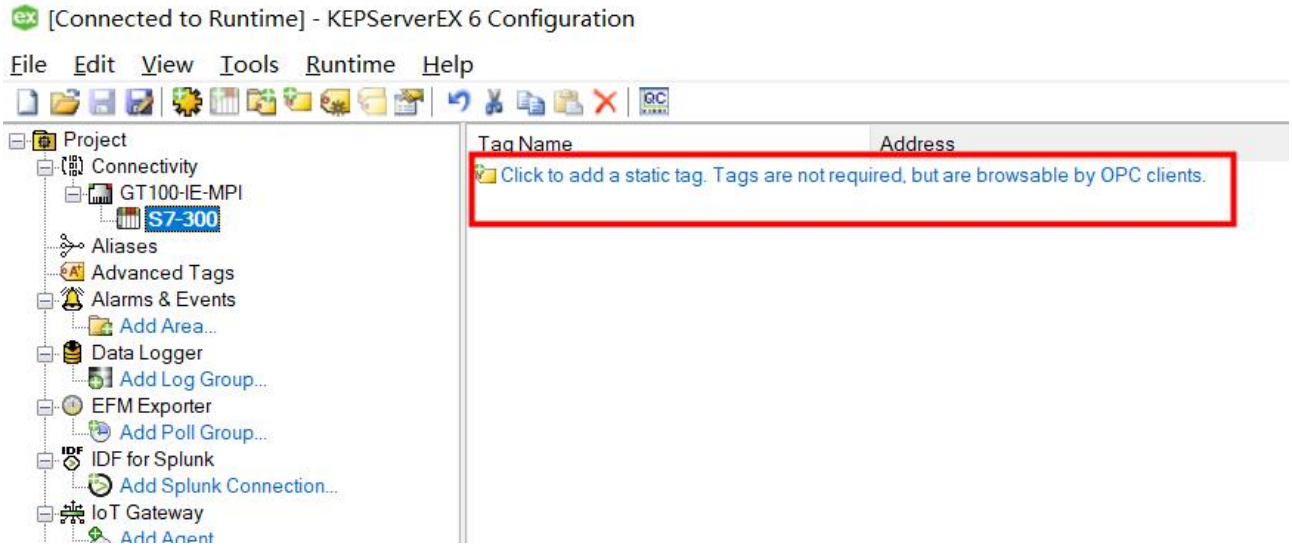


12. Then the device is created successfully. Click ok to close.

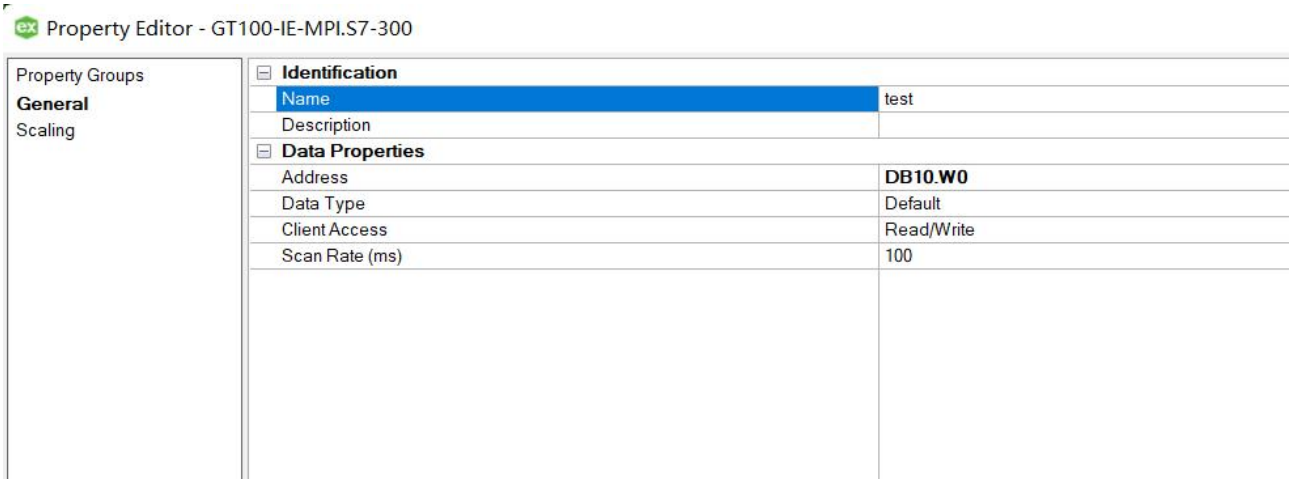


Then you should create the tags or auto generate the tags.

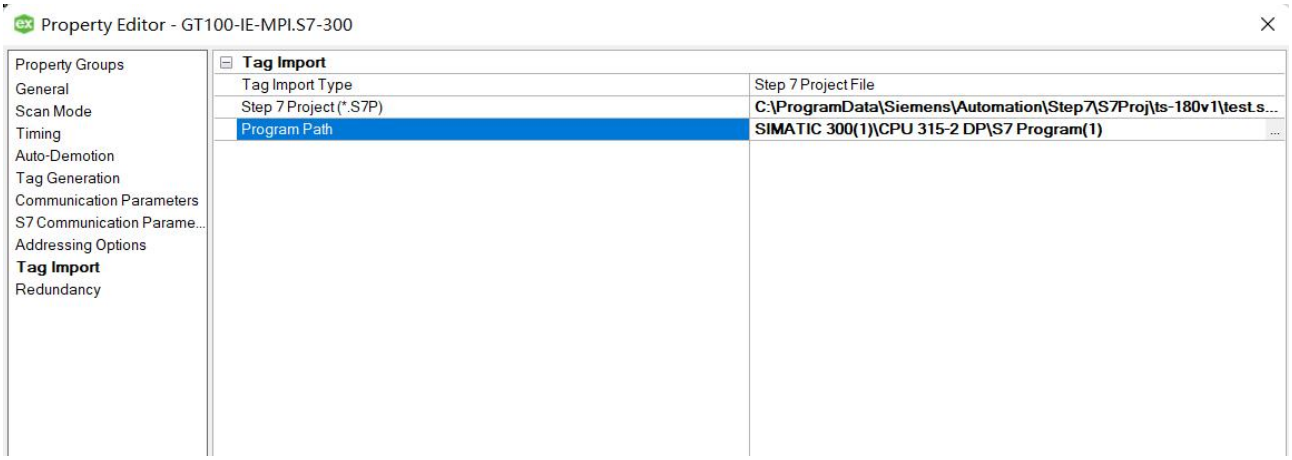
Manually click to add a tag.

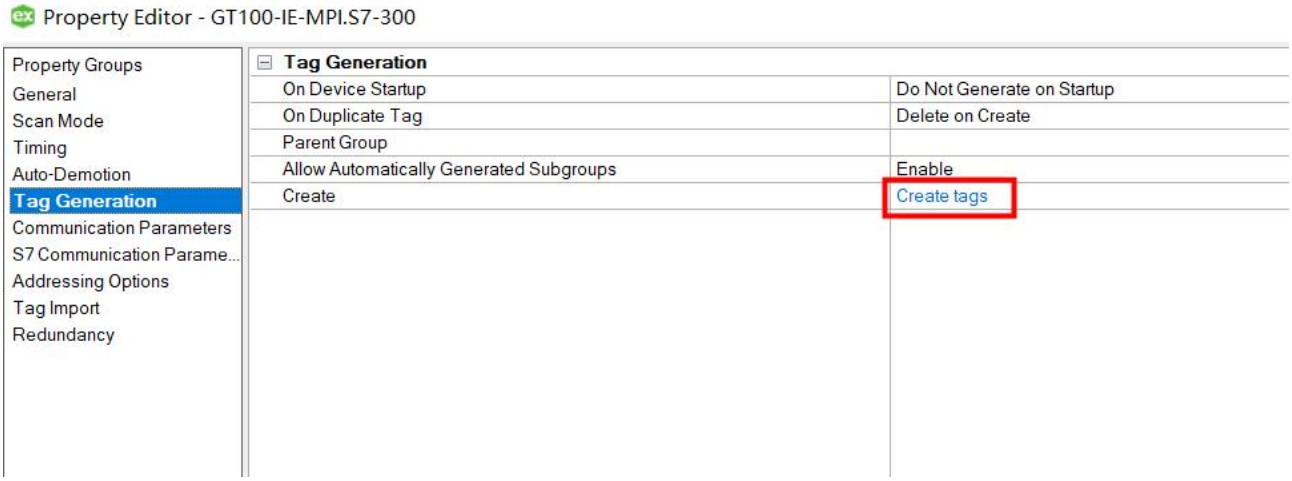


The address should be in the Step 7 project.

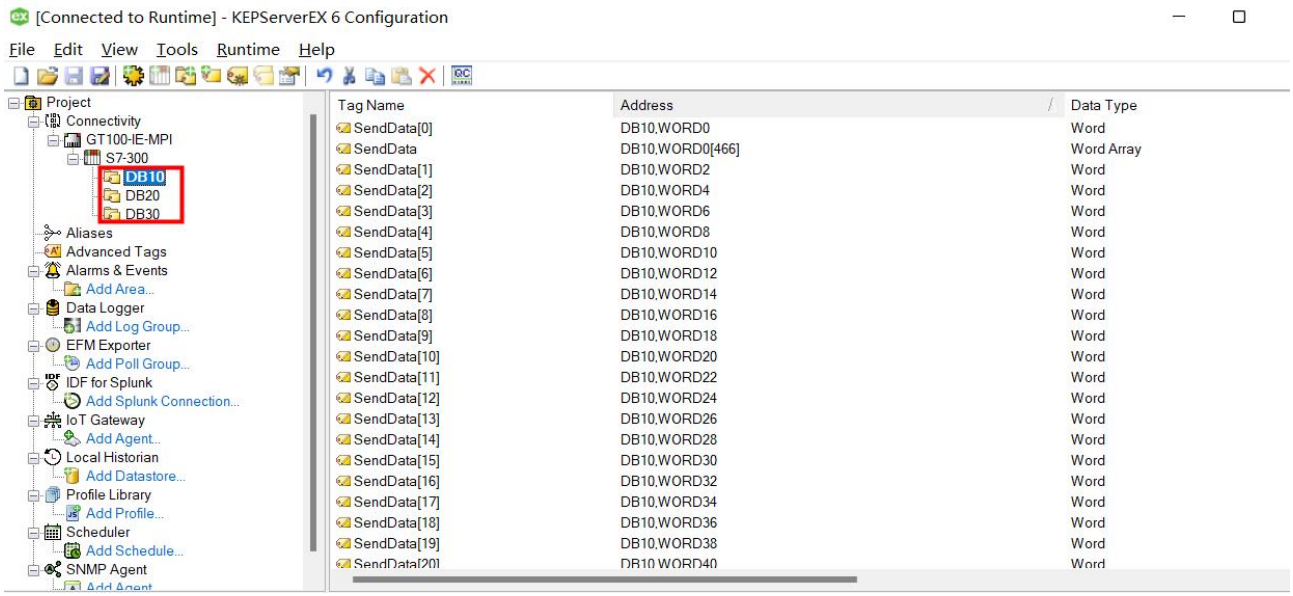


Or, you can select a Step 7 Project file. And move to "Tag Generation" to auto create the tags.

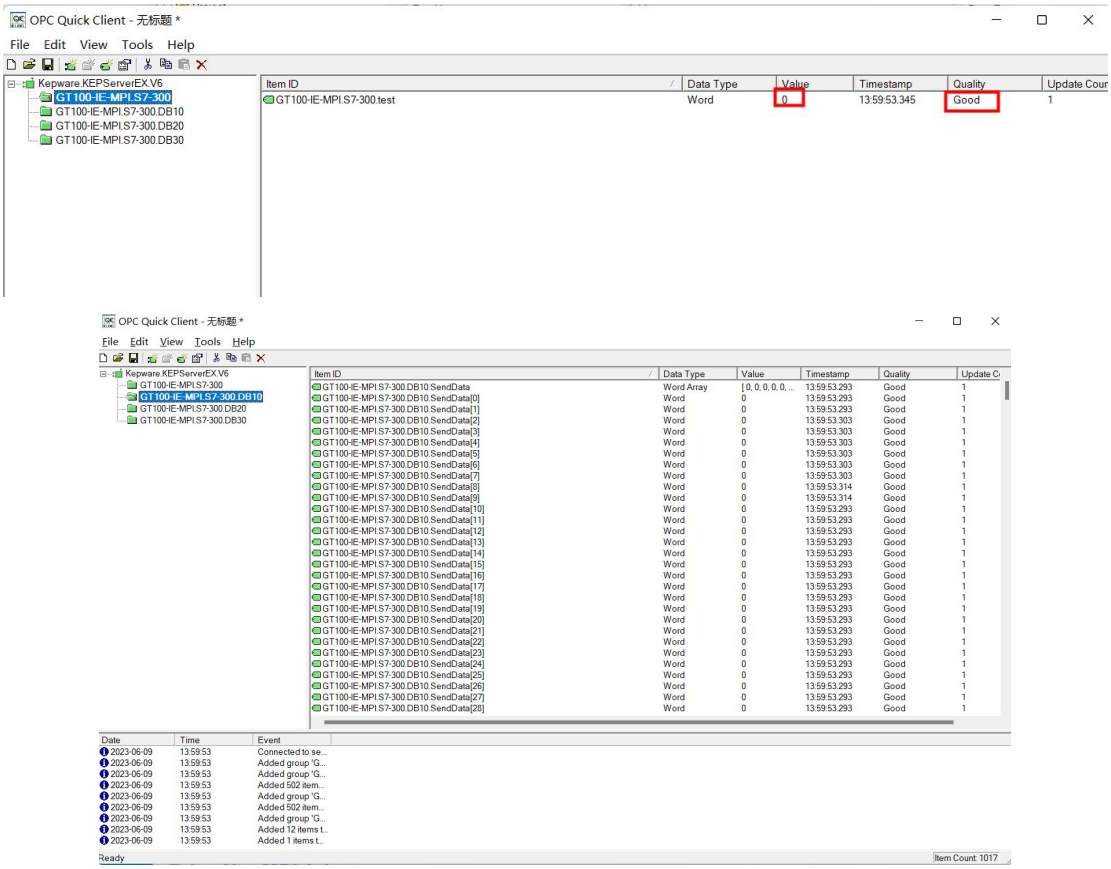




Then, the tags will be created under device S7-300.



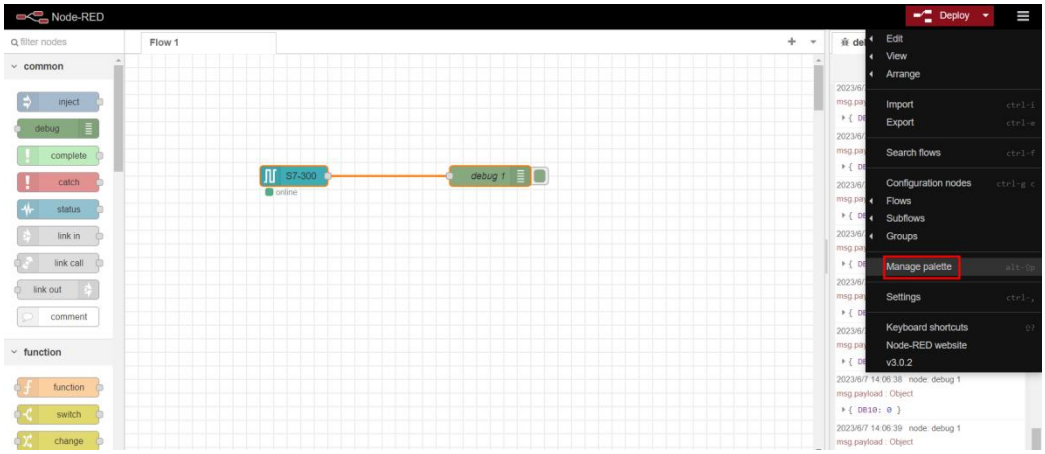
13. Click "QC" Quick Client in the tool bar to review the data.



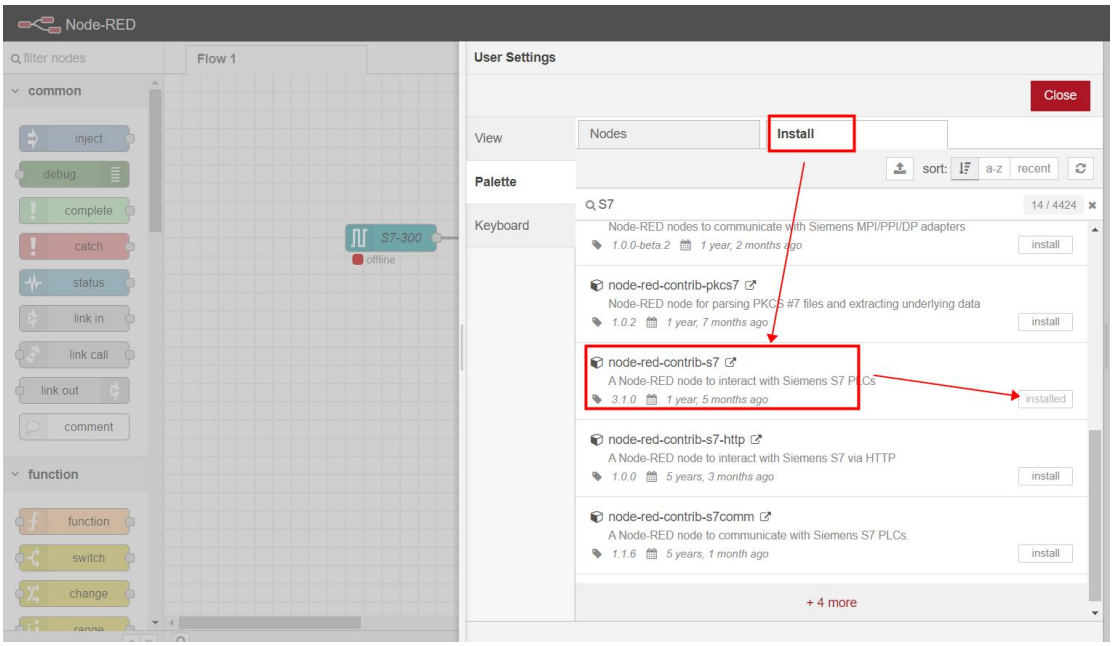
You can see the data value is 0 and Quality is Good. That means the connection is normal.

B. How to connect GT100-IE-MPI to Node-Red

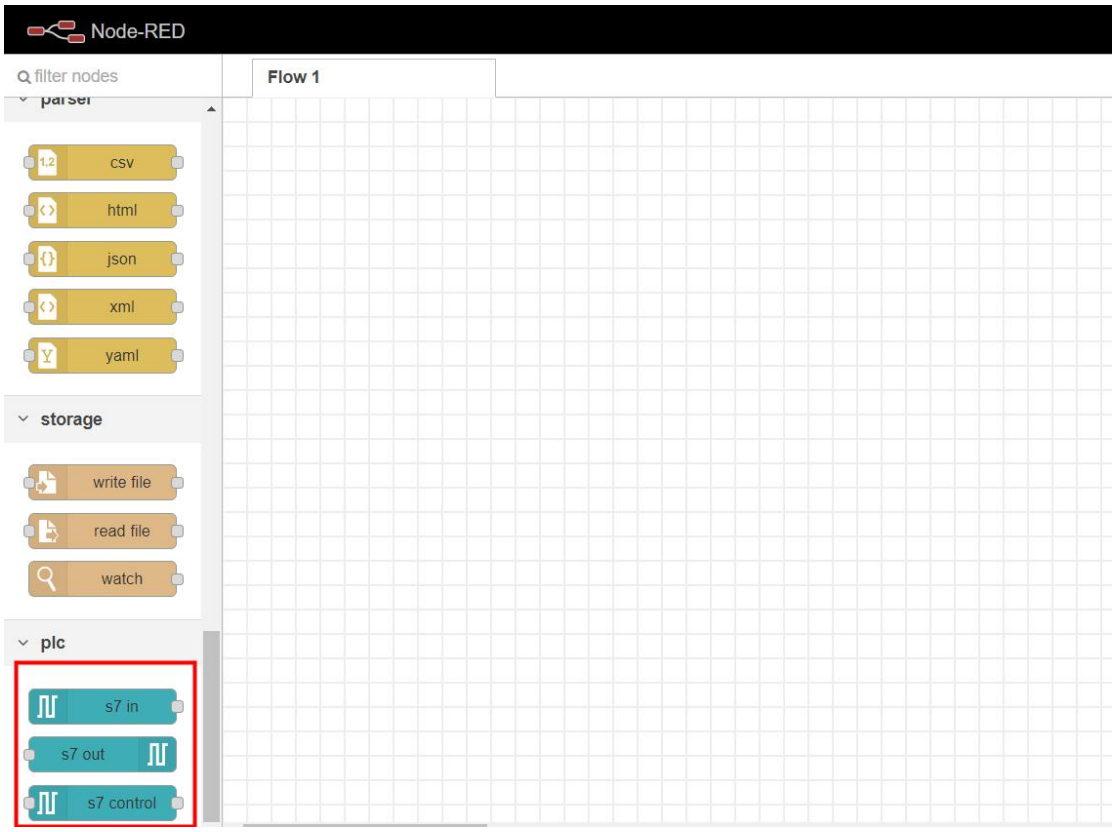
Install the contrib-S7 module. Click the "Manage palette".



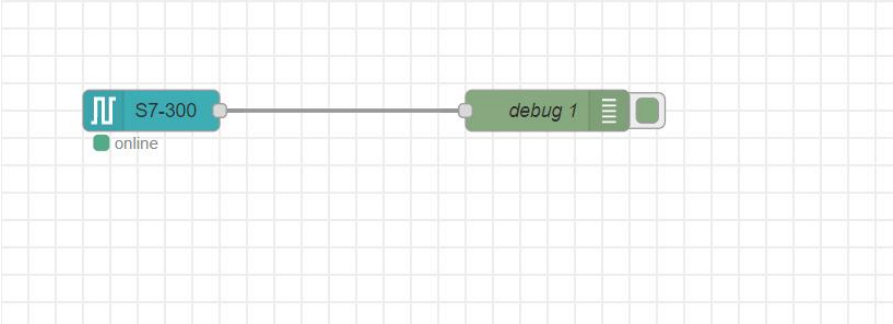
Search S7 in the "Install" area and install node-red-contrib-s7 module.

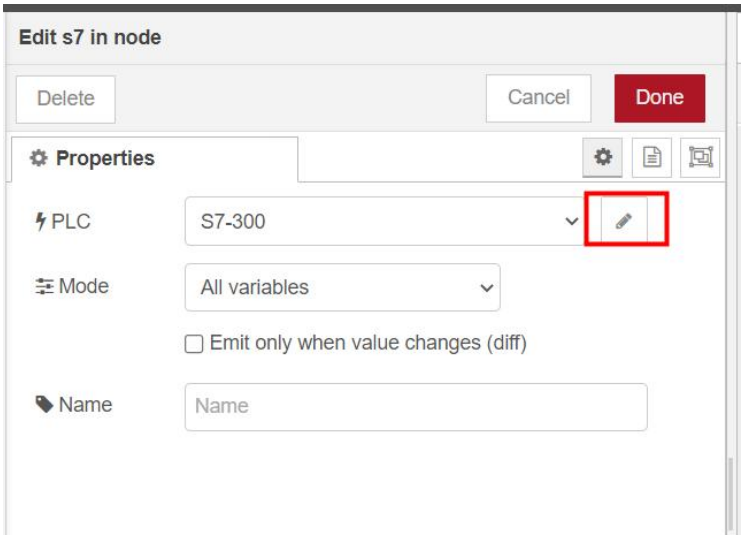


After installation, you will see the new node.



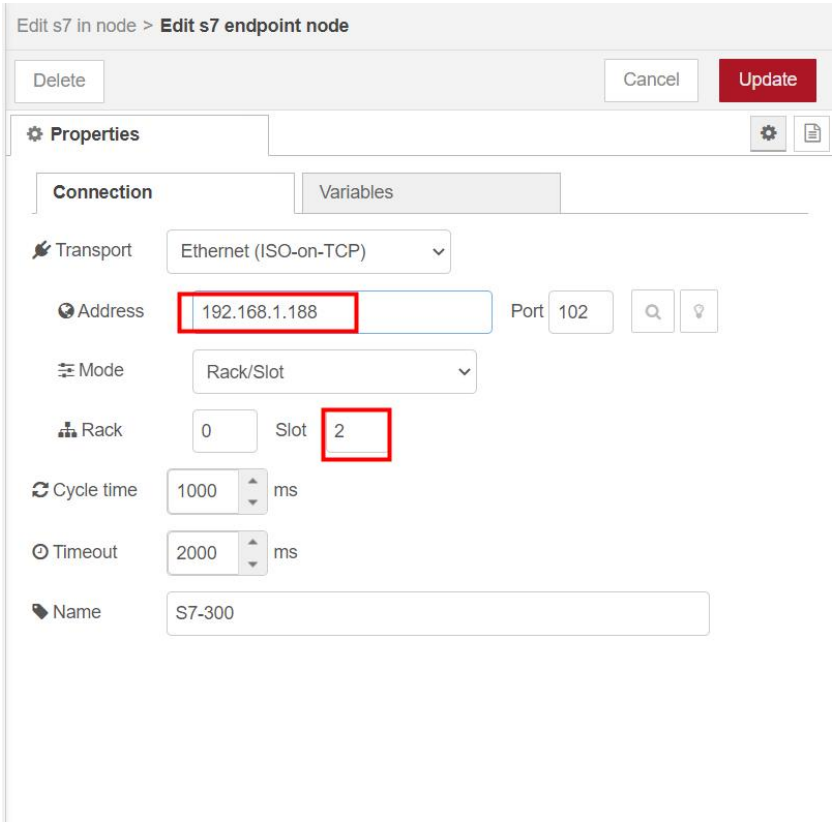
Drag S7-In and debug module to the panel and do the wiring between them.

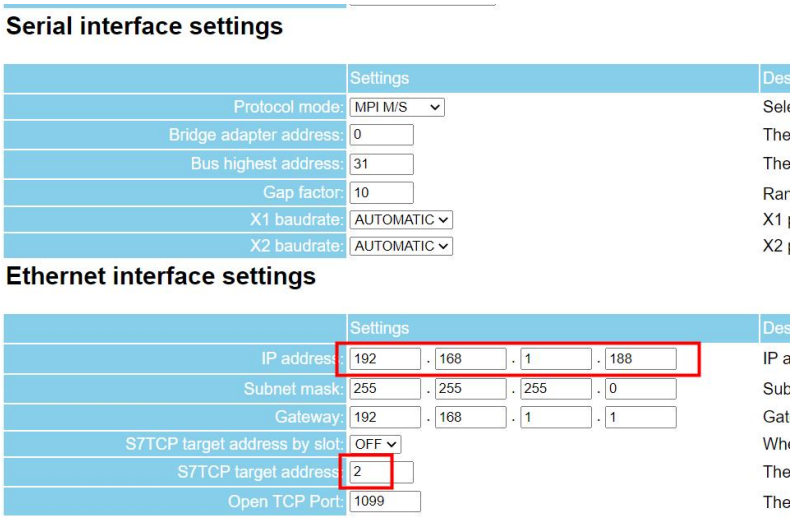




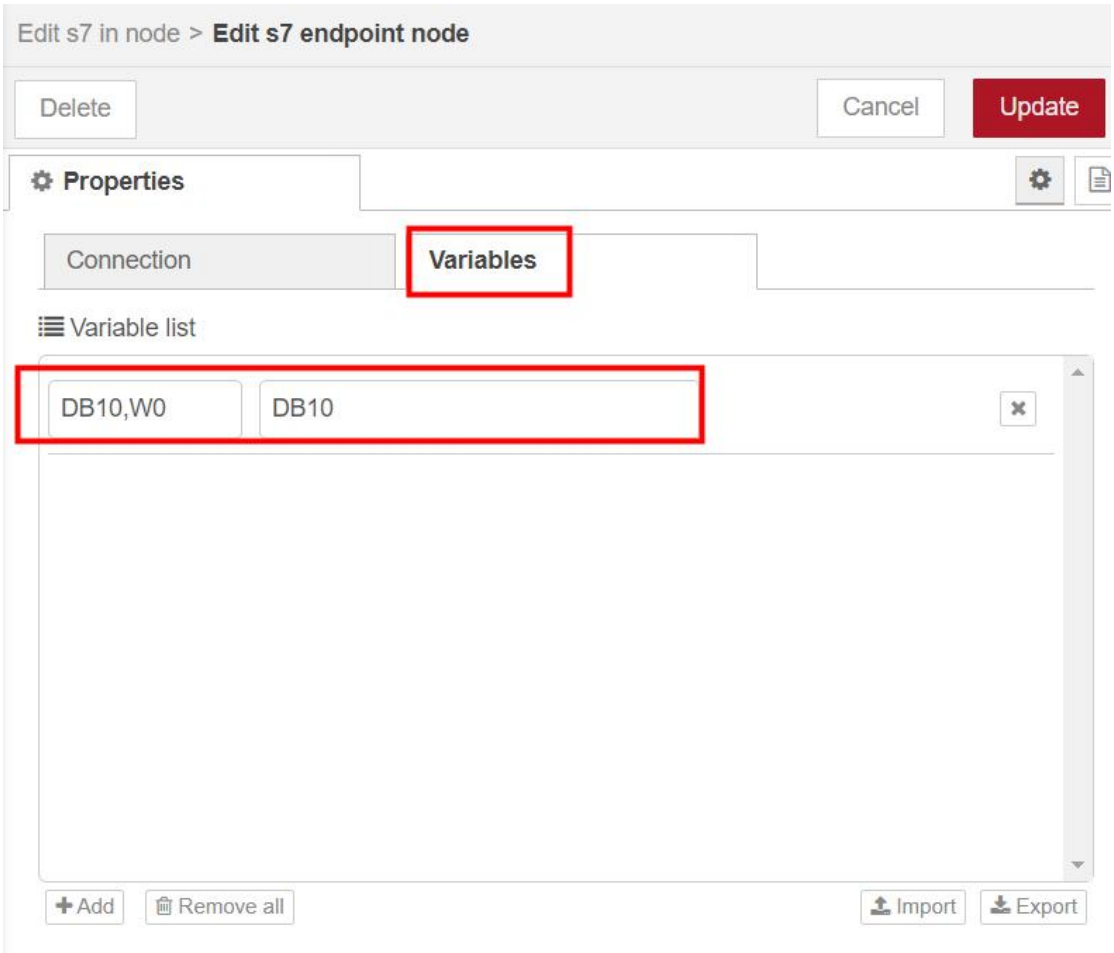
Click the pen to create the new connection. Fill the same IP address and S7TCP target address (Slot 2 as defualt) as GT100-IE-MPI configuration web page.

Please make sure the S7TCP target address is the same with the actual MPI address with Siemens PLC.



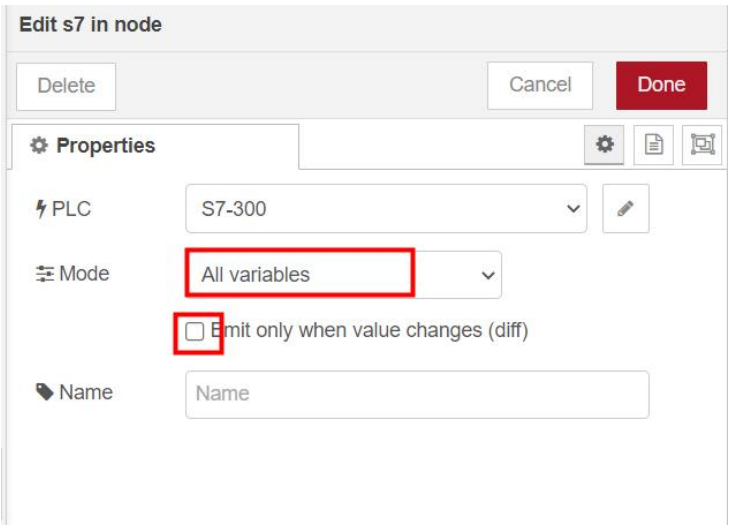


Click Variables, fill in the correct DB address.

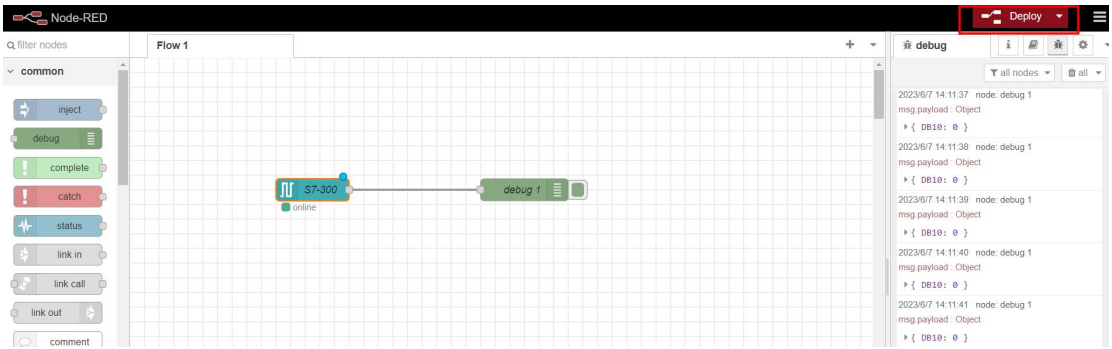


Uncheck the "Emit only when value changes" box to receive the data in cycle or check the box to receive the data when value changes.

Select All variables to read all the variables.



Finally, click deploy, the node-red will receive the data in cycle.



Click the debug button, you will see the data.