



User Manual 用户手册



APG Serie bus gateway

ETHERNET/IP Protocol transfer
MODBUS RTURS485 master station
Model number: APG1503

CATALOGUE

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1.Preface

1.1 Document Usage Instructions

This document describes the product's functional specifications, installation, operation, settings, as well as the content related to network protocols. This document is only applicable for trained electrical automation engineers.

(1) Disclaimer

The author has conducted necessary checks on the document, but as the product evolves and develops, the document may contain technical parameters or editing errors. We reserve the right to make adjustments and modifications without prior notice to users.

(2) Trademark

Industrial Ethernet Protocol (Ethernet/IP) was developed by ODVA and received strong support from Rockwell Automation.

(3) Patent Information

The designer of this product has applied for patent protection for the product's appearance and technical implementation methods. Any attempts to copy, imitate, or reverse engineer may violate the law.

(4) Copyright

Without the author's authorization, it is prohibited to copy, distribute, or use this document.

1.2 Safety matters

This product is a professional equipment for industrial use and can only be operated by personnel with electrical operation experience. Before use, please carefully read this manual and follow the instructions to operate it. Failure to do so may result in personal injury or product damage.

This product is designed with an IP20 protection level. When using it, it needs to be installed in a distribution cabinet with dust-proof and moisture-proof functions.

1.3 Document history

Version	Date	Description
V1.0	2021.12	First release

1.4 Reference document

《IEC11631-22007 Programmable controllers –Part 2:Equipment requirements and tests》；

《IEC/TR 61158 Industrial Communication Network - Fieldbus Specification》；

《IEC61784-1Industrial Communication Network - Industry Standards Part 1: Fieldbus Standards》；



2.Specification parameters

2.1 APG1503 Specification Parameter Table

ETHERNET/IP communication parameters		
Serial Number	Item	Specification
1	Agreement	ETHERNET/IP
2	Transmission rate	10/100 Mbaud, automatically detects transmission speed
3	Bus interface	Equipped with dual RJ45 switches, industrial Ethernet compliant with IEEE 802.xx standard, featuring auto negotiation and auto crossover functions
4	Communication address	The only globally unique MAC address
5	Transmission cable	CAT5e shielded cable
6	Port protection	Transformer isolation, 1500V DC (IEC61000-4-2)
Modbus communication format		
1	Transmission mode	Modbus_RTU
2	Physical interface	Open type connector with 5 pins (terminal resistor interface)
3	Baud rate (kbps)	2400,4800,9600,19200,38400,57600,115200
4	Function code	01H、02H、03H、04H、05H、06H、0FH、10H
Other specifications		
1	Dimensions of the shape	(L) 114 * (W) 30 * (H) 85mm
2	Installation method	35mm guide rail
3	Protection level	IP20
4	Environmental temperature	Transportation and storage: -40℃ to +70℃ Operating temperature: -20℃ to +55℃
5	Power supply voltage	24 VDC(±20%)
6	Rated current	110 mA (24 VDC)

Table 1 Parameter Specifications



3.Hardware description

3.1 Power interface

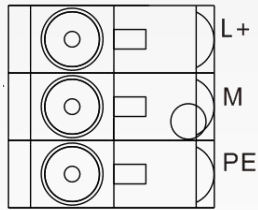


Figure 1 Power Interface

Table 2 Power Indicator

Pin	Logo	Description
1	L	24V, positive terminal of the DC power supply
2	M	negative terminal of the DC power supply
3	PE	ground connection

3.2 Communication interface

The module uses a physical interface with two RJ45 sockets for communication. The module itself has the function of a switch. They are respectively identified as X1P1 and X1P2. Each port has an independent MAC address that is adjacent to the identifier on the module.

3.3 LED indication

LED indications are divided into 3 types. These include power indication, Modbus status indication, and Ethernet/IP status indication. The definitions are as shown in Table 3.

Name	Colour	Explanation	
Power indicator			
PWR	Green	Power indicator light	
Modbus Indicator light			
ALM	yellow	Modbus	Communication failure. Data timeout or incorrect data reception.
RX	green	Modbus	Data is being sent.
TX	green	Modbus	Data is being received.
ETHERNET/IP Indicator light			
RY	Red light	The module enters the operating state and successfully establishes a connection with the main station.Data exchange in a loop occurs.	
MT	green	The LED indicates that there is a maintenance request for the module at present.	
SF	green	System failure - either a hardware or software failure of the module is indicated.	
ER	Red light	The ETHERNET/IP bus has not entered the correct mode: There are communication, operation errors, or communication timing monitors.	

Table 3 LED Indicator Definitions

3.4 Modbus Communication interface

The module uses its own wiring socket as the physical interface for Modbus communication, where two TRs are terminal resistance selection terminals. An internal terminal resistance of 120R is integrated within the module. When TR1 is short-circuited to DA and TR2 is short-circuited to DB, the terminal resistances are effective. The interface definition is shown in Table 4.

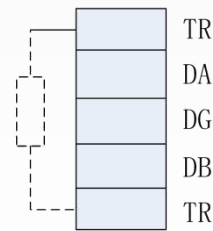


Figure 2 Modbus Interface

Table 4 Modbus Terminal Definitions

Pin	Signal	Description
1	TR1	Terminal resistor connection selection
2	DA	Receive/send data, line A (red)
3	DG	Data ground
4	DB	Receive/send data, line B (red)
5	TR2	Terminal resistor connection selection



4.Protocol conversion

4.1 Status register

"Status" refers to the status register of the gateway.

The definition is as follows:

Bit: 7	Bit: 6	Bit: 5	Bit: 1...4	Bit: 0
Retention	Received Error	Timeout	Error Code	Running Status

4.2 Control Register

"Control" is the control register of the gateway.

It is defined as follows:

Bit: 3..7	Bit: 2	Bit: 1	Bit: 0
Keep	Reset Gateway	Error Clear	Start / Stop



5.Product Usage Instructions

5.1 LAEConfig Software Settings Module

The module configuration software is named "LAEConfig". LAEConfig is a software developed by our company with independent intellectual property rights. This software is developed by our company specifically for our controllers. This software can be used normally on systems prior to WIN10.

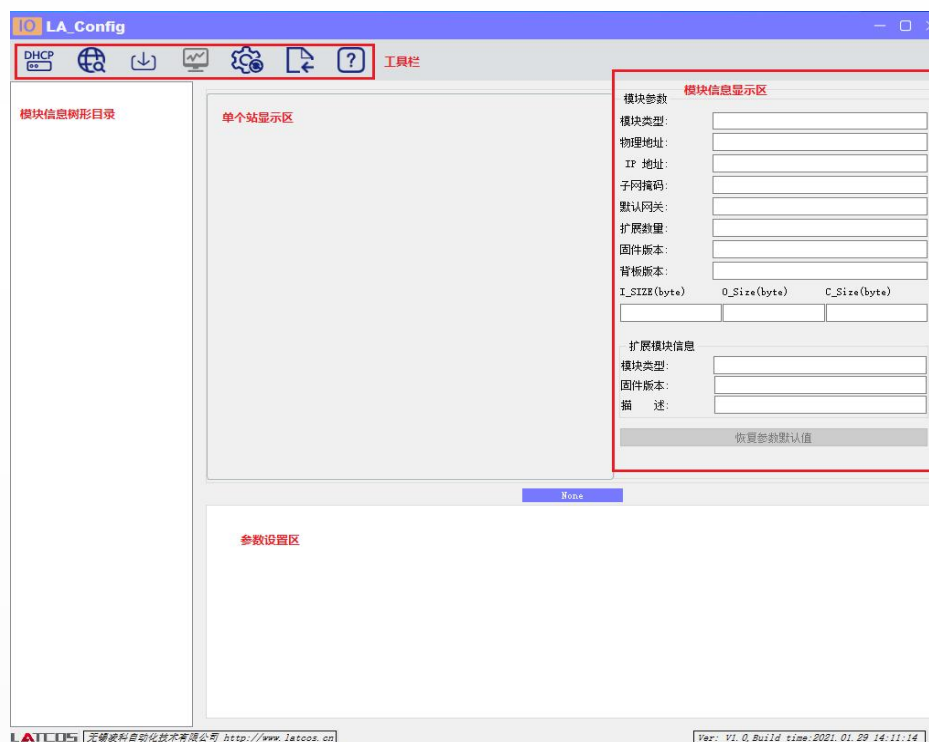


This is the installation file.



This is the desktop icon after the installation is completed.

5.2 Software Interface Introduction

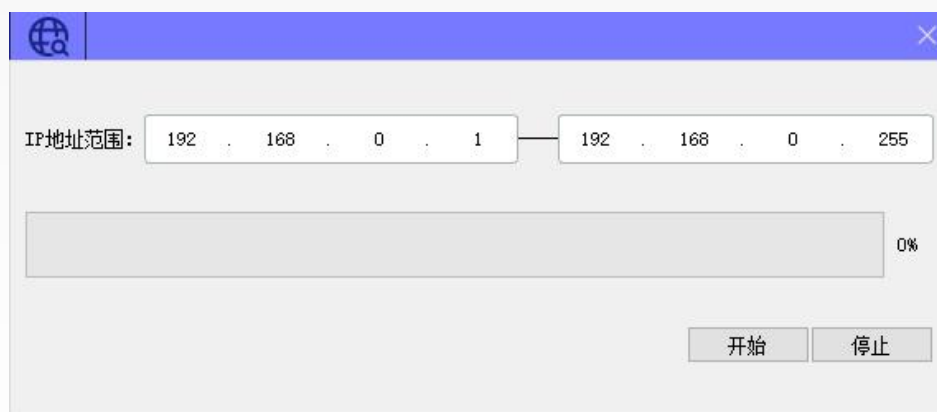


The interface of this software includes: toolbar, module information tree directory, parameter setting area, module information display area, and so on.



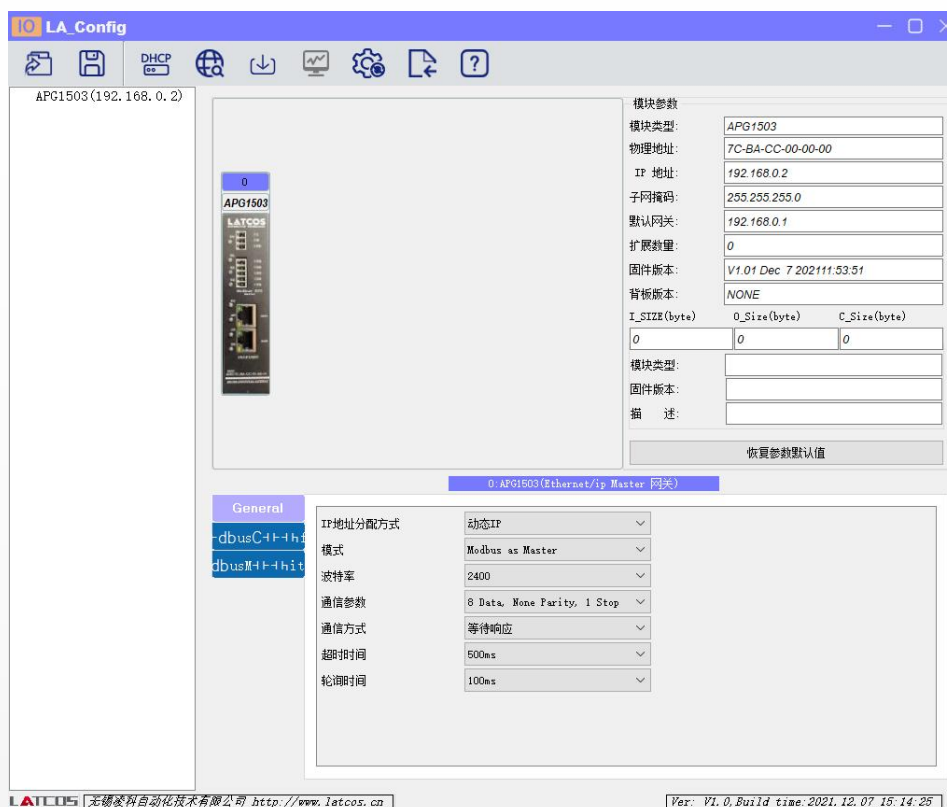
5.3 Scan the gateway module in the network

Click the scan  module button.



Set the IP address range to be scanned (in the display area), and ensure that the network IP parameters of the computer are in the same network segment as the set ones. Click "Start" to enter the scanning stage. Modules that are scanned will be displayed within the set IP range.

Note: The IP address of the module must be in the same network segment as the local network card address. (The factory default network segment for the module is 192.168.0.*)



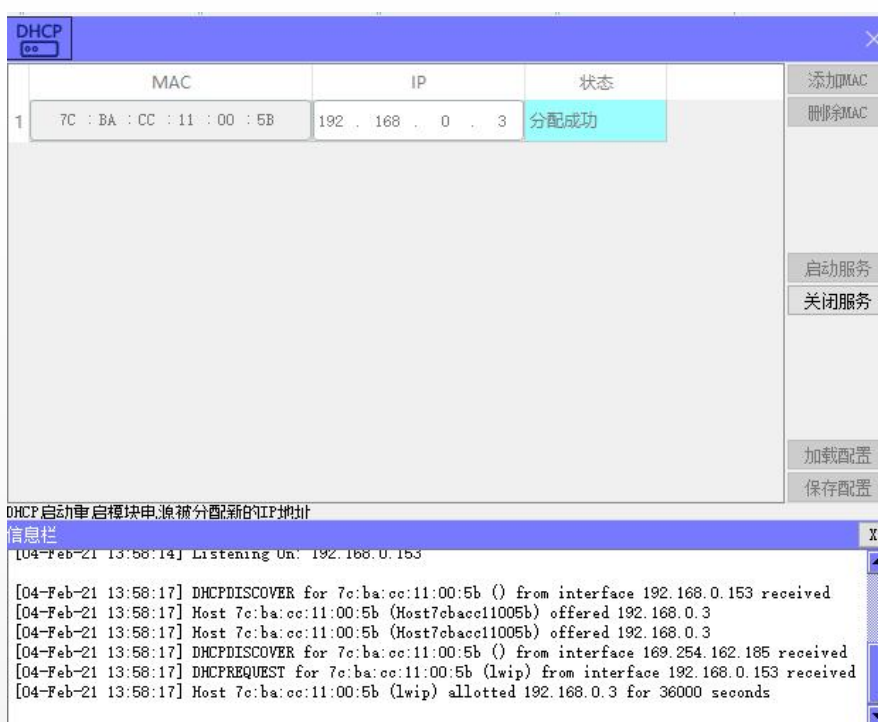
5.4 Modify the IP address of the module

5.4.1 Method 1 (This method is only applicable when "IP Address Allocation Method: Dynamic IP" is selected)



Click the button  on the toolbar to activate the DHCPService function. Click the "Add MAC" and "Delete MAC" buttons to add the MAC codes of the modules that need to be assigned, and fill in the corresponding IP addresses. After adding, click "Start Service" (as shown in the figure below)

During the process of allocating IP addresses, whether the allocation is successful can be shown in the status column later (as shown in the following figure)



After all the assignments are completed successfully, click "Stop Service".

5.4.2 Method 2 (fully available)

Click the button  on the toolbar and the following interface will appear.



Click on the global scan option to scan all the modules within the entire local network.

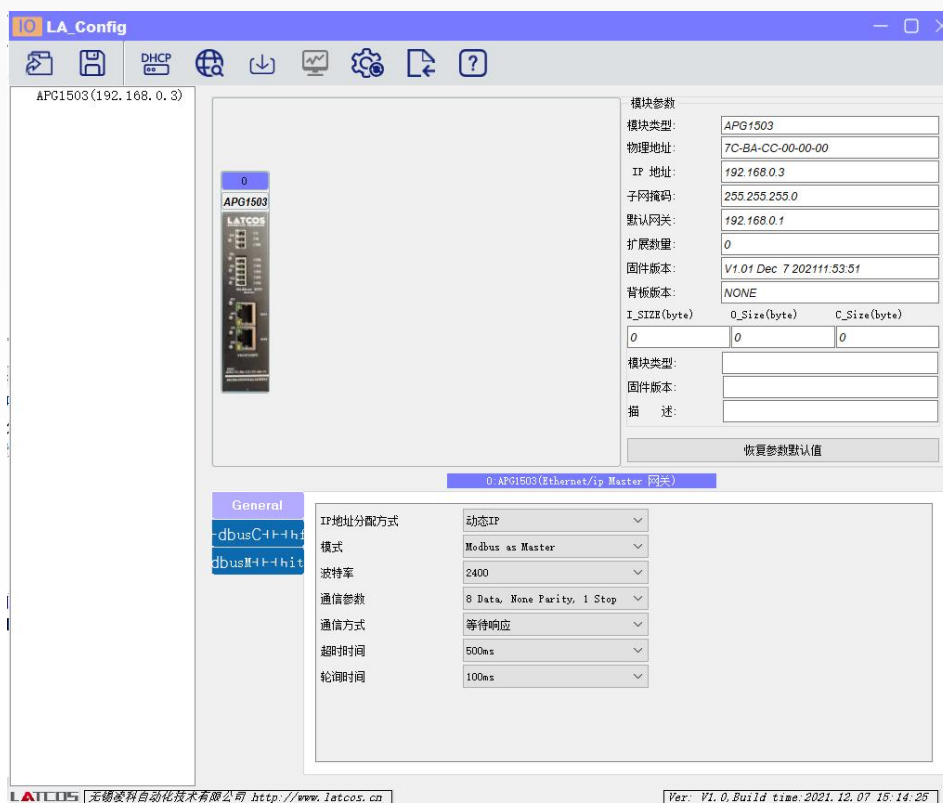


Modify the IP address in the table. After the modification is completed, click "Modify IP" to download the modified IP into the module. Check the status bar at the end to see if the allocation is successful.

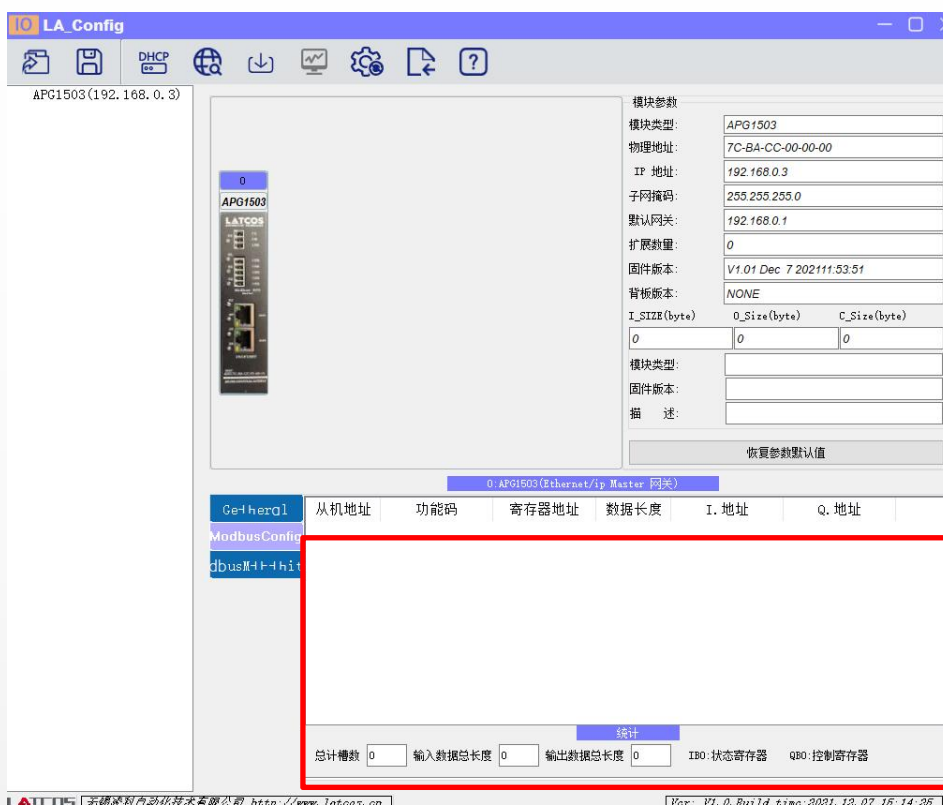
5.5 Modify the MODBUS parameters of the module

First, scan the module into the display area (as shown in the following figure)

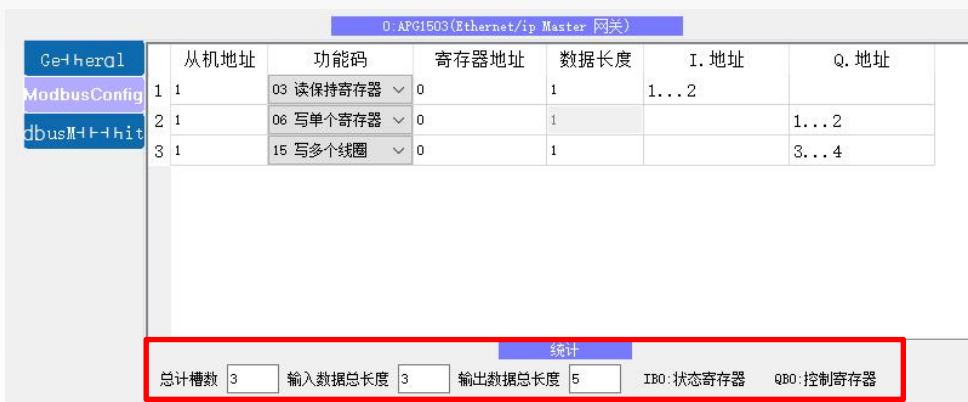
1. Match the Modbus master communication parameters with the corresponding Modbus parameters of the communication target.



2. Set the communication message, click "Modbus Config", as shown in the following figure



3. Right-click within the red box, a menu  will appear. Click "Add" (to add Modbus messages), and then click "Delete" (to delete Modbus messages).



从机地址	功能码	寄存器地址	数据长度	I. 地址	Q. 地址
1	03 读保持寄存器	0	1	1...2	
2	06 写单个寄存器	0	1		1...2
3	15 写多个线圈	0	1		3...4

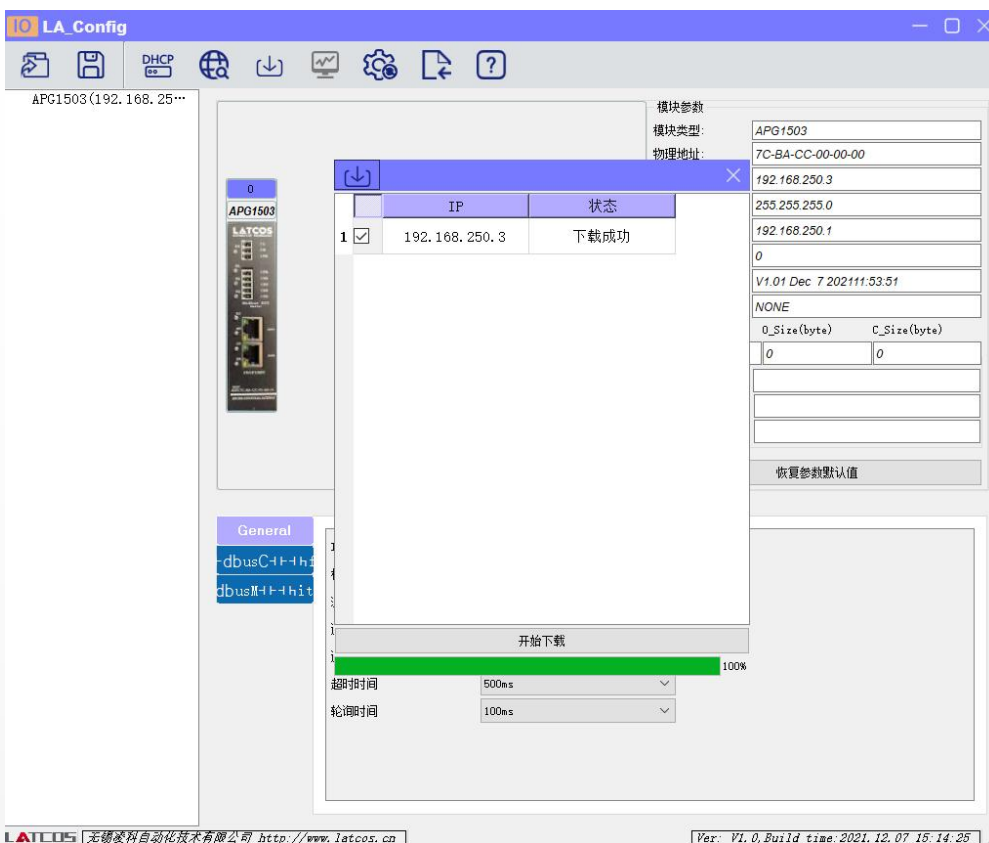
统计

总计槽数: 3 输入数据总长度: 3 输出数据总长度: 5 IBO: 状态寄存器 QBO: 控制寄存器

Messages can be added or deleted as needed. The Modbus message contains the slave station address, function code, register address (starting address), data length and status information. These details need to be filled in according to the parameters of the actual communication object.

The data in the red box is calculated based on the filled-in message. The input data length and output data length are required when configuring the PLC communication.

4. After the configuration is completed, the parameters will be downloaded to the module.



LA Config

APG1503 (192.168.250.3)

模块参数

模块类型: APG1503

物理地址: 7C-BA-CC-00-00-00

192.168.250.3

255.255.255.0

192.168.250.1

0

V1.01 Dec 7 2021 11:53:51

NONE

O_Size(byte) C_Size(byte)

0 0

恢复参数默认值

开始下载

100%

超时时间: 500ms

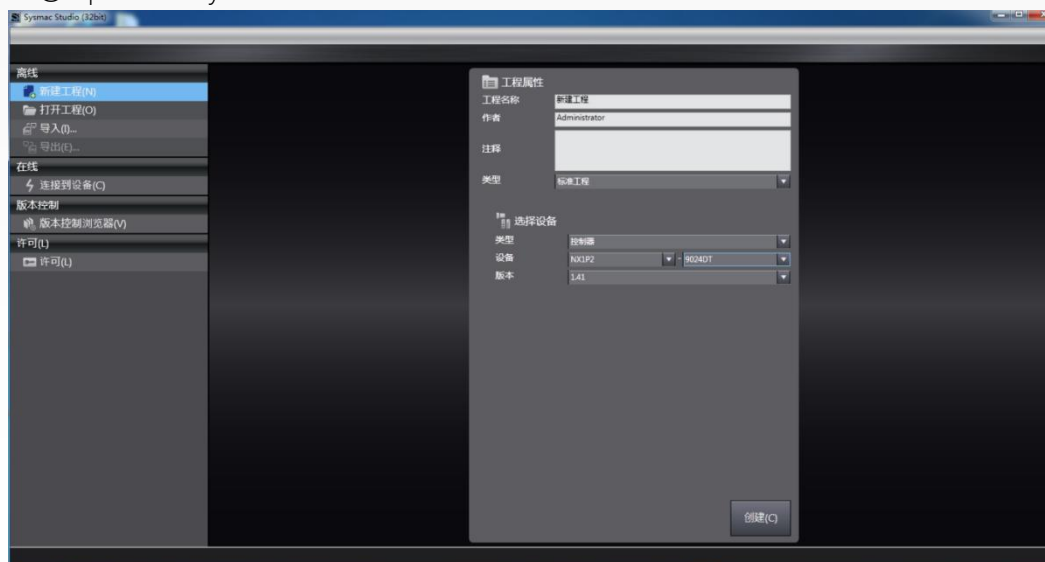
轮询时间: 100ms

Ver: V1.0, Build time: 2021.12.07 15:14:25

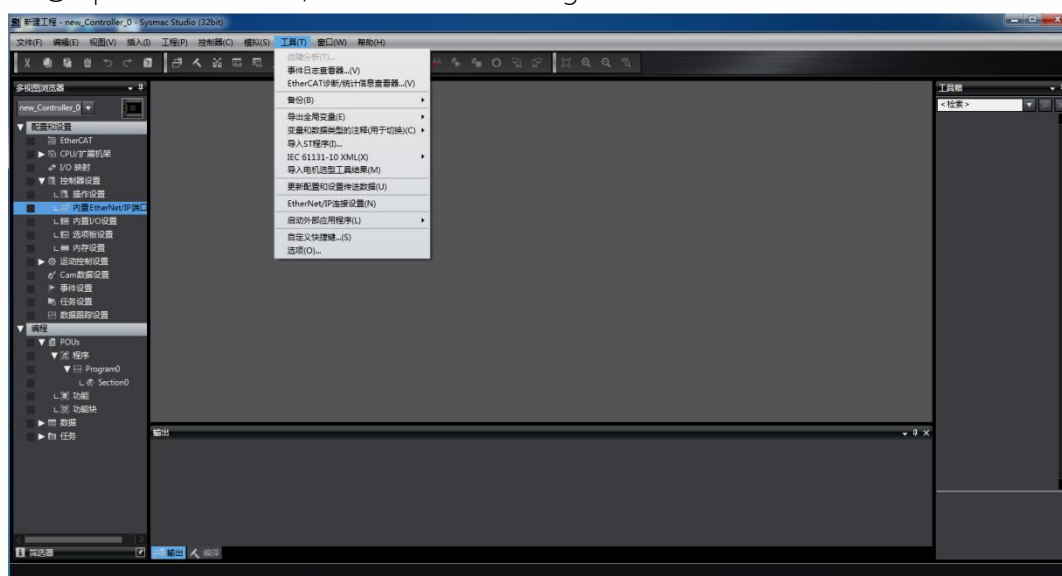
Click  to download the parameters to the module.

The following is an explanation of the configuration parameters for the modules based on the NX series PLC of OMRON Company.

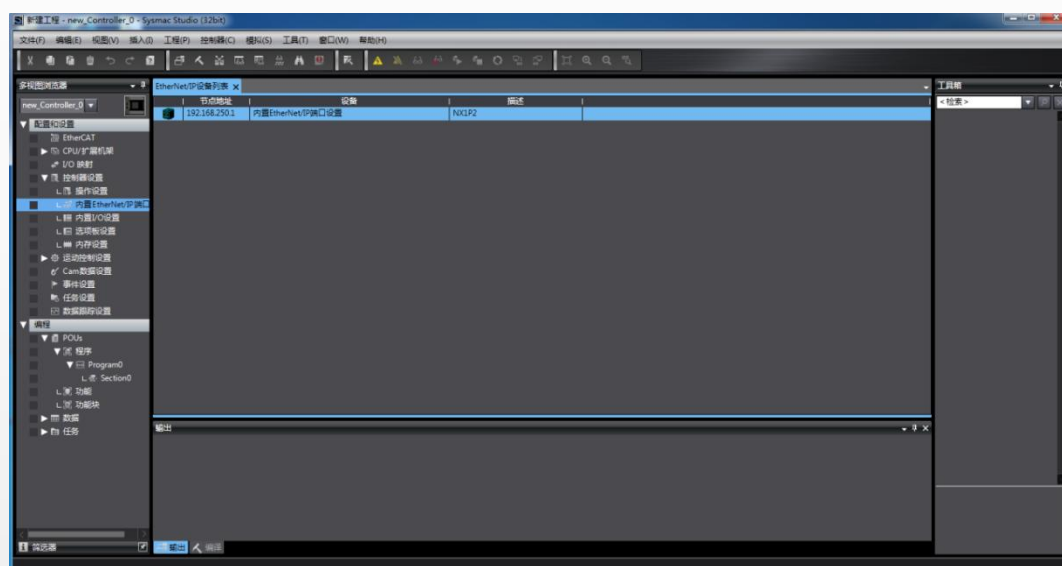
①Open the Sysmac Studio software and select the PLC.



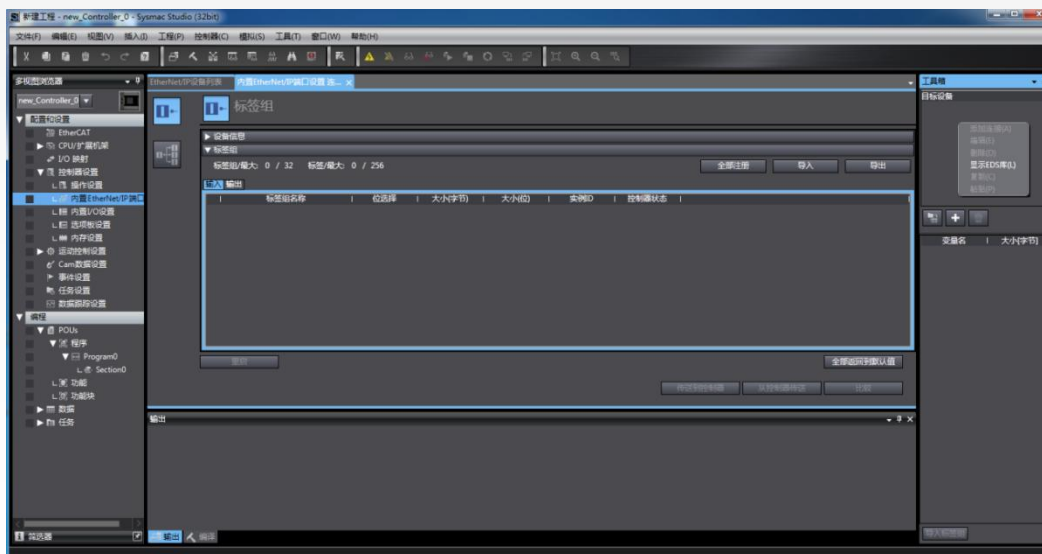
②Open the Ethernet/IP connection settings



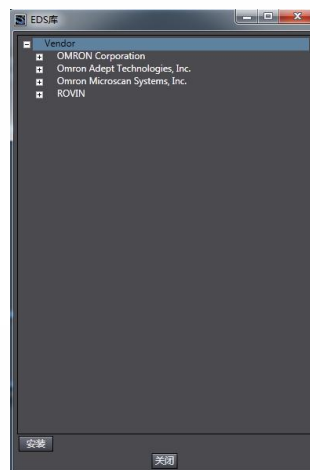
③Double-click the node



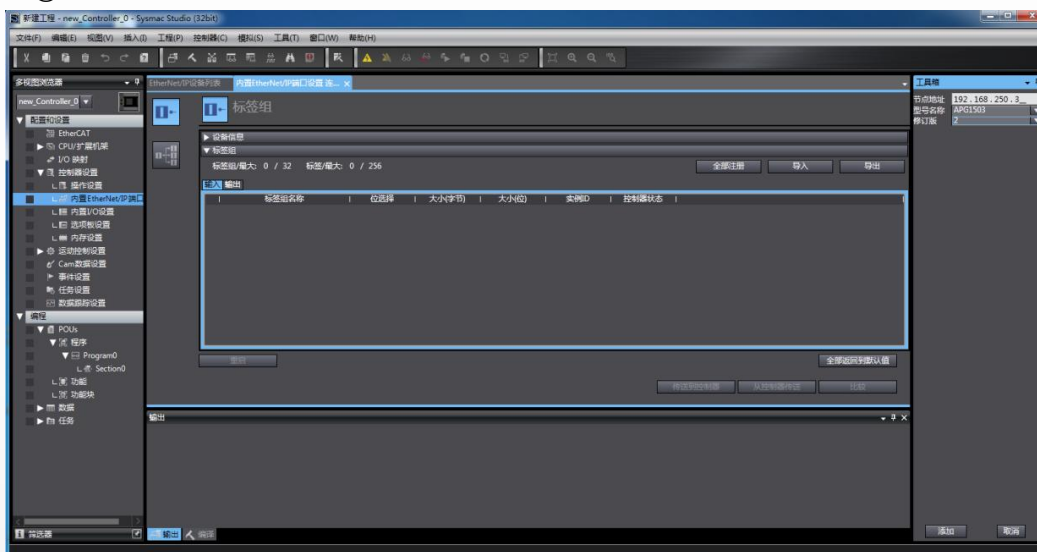
④Right-click the drop-down menu in the toolbox - Display ESI Library



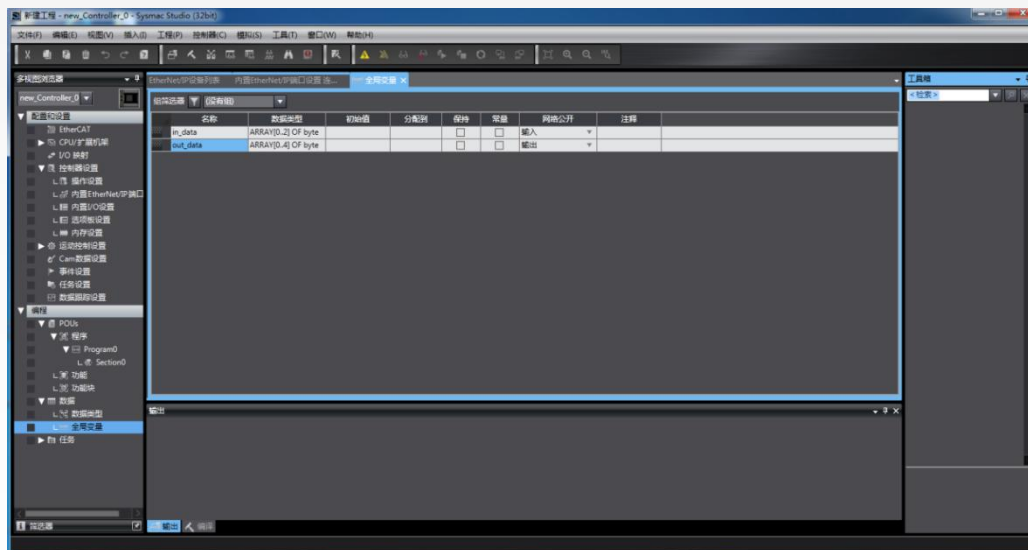
⑤Install EDS file - Install EDS file



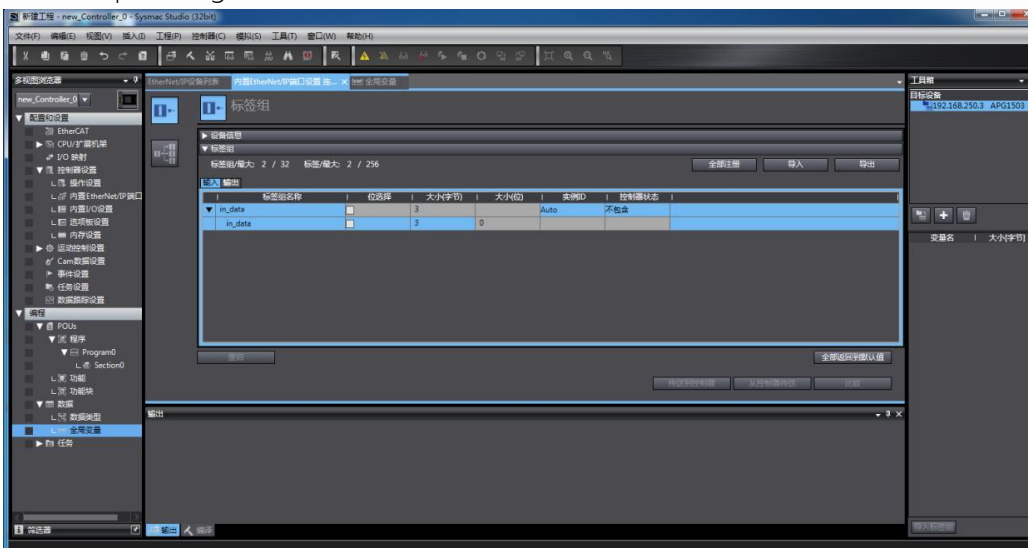
⑥Add nodes to the toolbox



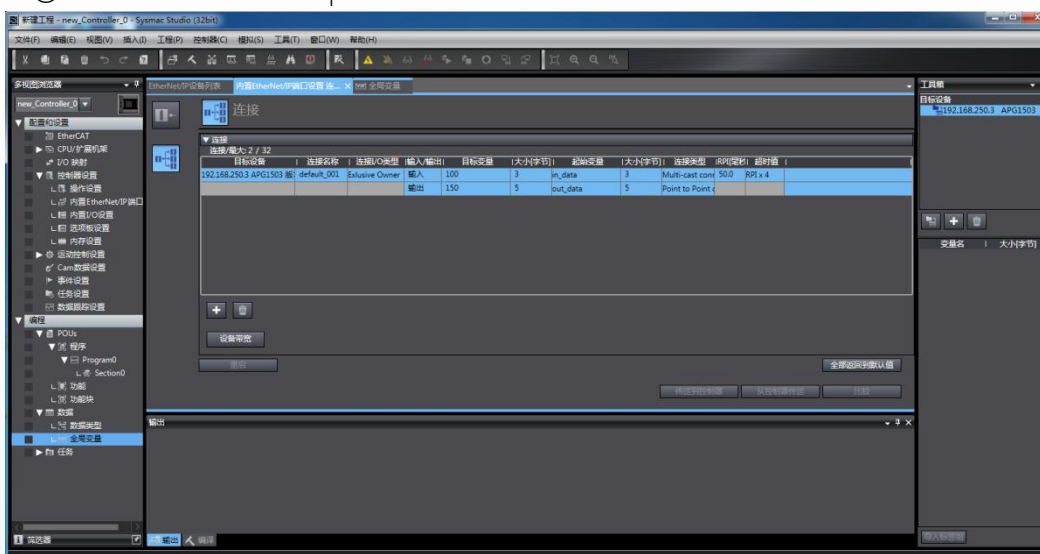
⑦Add variables



⑧Complete registration



⑨Fill in the connection parameters



At this point, all parameters have been fully configured.

Data table

in_data(0)	Status word	
in_data(1)	Read data 1	
in_data(2)	Control word	
out_data(0)	Write data 1	
out_data(1)	Write data 2	
out_data(2)	Status word	
out_data(3)	Read data 1	
out_data(4)		

Official website



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