MG-IOT01
IOT Gateway

User's Manual

V1.2

2019.11.01

Sichuan Odot Automation System Co., Ltd.

2018-11

Version Information

Date	Version No.	Revised Content	Author/reviser
2018-11-20	V1.0	Initial version	SYC
2019-06-27	V1.1	New communication dialing method	YZJ
2019-11-14	V1.2	PLC application	CCL

Ownership Information

Disclaimer

This User's Manual is only for the purpose to assist the user in the use of the product, and the company is not responsible for any loss or error caused by the use of the information in this document. The products and texts described in this document are constantly being developed and refined. Sichuan Odot Automation System Co., Ltd. has the right to modify this document without notifying the user.

Software Download

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Content

1 Product Overview

1.1 Product Function

Developed by Sichuan Odot Automation System Co., Ltd and based on market demand and years of project experience, MG-IOT01 is a protocol converter supporting to convert a variety of PLC protocols to MODBUS TCP and MQTT protocol.

Any device with RS485/RS422/RS232 interface and supporting Siemens (PPI), Omron (HOSTLINK), Mitsubishi (FX series), and Delta (MODBUS) can connect to MODBUS TCP network through this gateway, and through MQTT to cloud platform, so as to connect low-speed serial devices to high-speed Ethernet and cloud servers for industrial data collection. The gateway has two different working modes: “General mode” and “Bridge mode”. Gateway in “General” mode is directly connected to PLC for data collection, and “Relay” mode can be used for data collection when it is compatible with the original PLC communication to HMI without adding more communication interfaces.

1.2 Features

- DC 9-36V wide voltage input, anti-reverse protection.
- Communication terminal isolation processing, 1500V isolation voltage.
- 2 Ethernet ports, with switch function, support cascade.
- 2KV network port isolation protection, 10M/100Mbps rate adaption, Auto-MDI/MDIX.
- Supports for connection to Siemens 200 PLC, Omron HOSTLINK protocol PLC, Mitsubishi FX protocol PLC, Delta MODBUS protocol PLC.
- Supports simultaneous connection of 5 MODBUS TCP clients.
- Supports 200 collection points.
- Supports MQTT connection to the cloud.
- Supports data sorting and exchange.
- Supports data type conversion.

- Supports data calculation.
- 4 serial ports real time refresh, short scanning period, strong loading capacity.
- Supports Bridge mode, collecting PLC data without affecting PLC and HMI communication.
- With watchdog function, and the watchdog time can be set.
- Support IAP download, update and upgrade the firmware program in the product through the network port.
- External termination resistor and bias circuit for high stability.
- Packet transmission interval can be adjusted freely and is more flexible to use.
- Supports one-button reset function to restore factory settings.
- 35mm standard rail installation.
- EMC complies with the international standards EN 55022:2010 & EN55024:2010.

1.3 Technical Parameters

The technical parameters related to this product are shown in Table 1. Please use this product within the parameters of this product for better performance.

Table 1. Technical parameters

Environmental parameters	
Working Temperature	-40 – 85℃
Storage Temperature	-55 – 125℃
Working Humidity	5% – 95% (No condensation)
Power parameter	
Power Port No.	1

Input Voltage	9 – 36V DC
Power Consumption	Max.200mA@24V
Ethernet Parameters	
Gateway Working Mode	Transparent transmission mode, address mapping mode optional, Modbus TCP protocol
Ethernet Ports No.	2 RJ45, 10M, 100M adaptive rate with switch function
Network Protocol	ETHERNET, ARP, IP, TCP, ICMP, MQTT
Number of TCP	Up to 5
Serial Port Parameter	
Serial Ports No.	4 channel RS485/RS232 or 2channel RS422
Communication	4 PLC protocols optional
Baud Rate	2400 – 115200 bps
Verification Mode	No parity, odd parity, even parity
Supported Slaves	124 maximum (without repeater)
Supported Data Points	200

2 Hardware Description

2.1 Product Appearance

2.2 Indicator Description

The device has a total of 6 LED status indicators, and its symbol definition and status description are shown in Table 2.

Table 2. Description of the indicators

Symbol	Definition	Status	Description
PWR	Power indicator	ON	Power ON
		OFF	No power
ETH	Network failure indication	ON	TCP gateway communication error
		OFF	TCP gateway communication normal
CO1	COM1 status indication	Blink	Data exchanging
		OFF	No data exchange
CO2	COM2 status indication	Blink	Data exchanging
		OFF	No data exchange
CO3	COM3 status indication	Blink	Data exchanging
		OFF	No data exchange
CO4	COM4 status indication	Blink	Data exchanging
		OFF	No data exchange

Note: * Green color —— The status of the MG-IOT01 gateway indicator during normal communication

2.3 Terminal Definition

The device wiring adopts 16Pin 3.81mm pitch plug-in terminal block, and the terminal definition of RS485/RS232/RS422 interface is as shown in “Table 3”.

Table 3. Terminal definitions

No.	RS485		RS232	RS422	
	Symbol	Definition	Definition	Definition	
1	1R/S-	COM 1 RS485-	COM 1 RS232_RX	RS422 Channel 1	RS422 Send Negative
2	1T/S+	COM 1 RS485+	COM 1 RS232_TX		RS422 Send Positive
3	GND	Shielding Layer	Ground		Shielding Layer
4	2 R/S-	COM 2 RS485-	COM 2 RS232_RX		RS422 Receive Negative

5	2 T/S+	COM 2 RS485+	COM 2 RS232_TX		RS422 Receive Positive
6	GND	Shielding Layer	Ground		Shielding Layer
7	3R/S-	COM 3 RS485-	COM 3 RS232_RX	RS422Channel 2	Shielding Layer
8	3T/S+	COM 3 RS485+	COM 3 RS232_TX		RS422 Send Positive
9	GND	Shielding Layer	Ground		Shielding Layer
10	4R/S-	COM 4 RS485-	COM 4 RS232_RX		RS422 Receive Negative
11	4T/S+	COM 4 RS485+	COM 4 RS232_TX		RS422 Receive Positive
12	GND	Shielding Layer	Ground		Shielding Layer
13	PE	Ground Terminal			
14	PE	Ground Terminal			
15	V-	Power Input Negative			
16	V+	Power Input Positive			

Note:

When using the RS422 channel, RS422 channel 1 on the configuration software needs to be configured to COM 1, the indicator light is the indicator light of COM 1; RS422 channel 2 needs to be configured to COM 3, and the indicator light is the indicator light of COM 3.

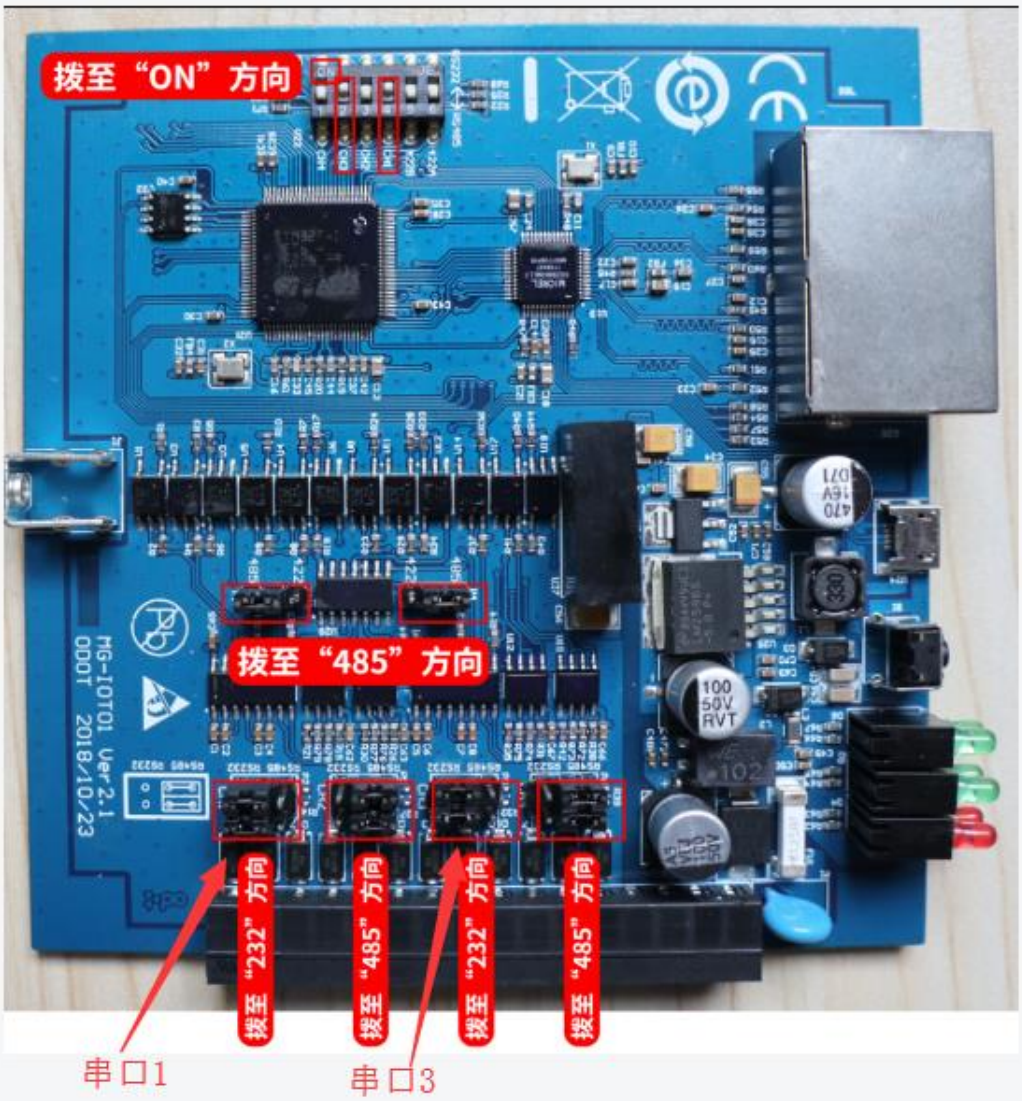
2.4 RS232/RS422 Dial Setting

1. If the 4 serial ports needs to use RS485 communication, there is no need to adjust the gateway dialing code. The factory default is RS485 communication mode.

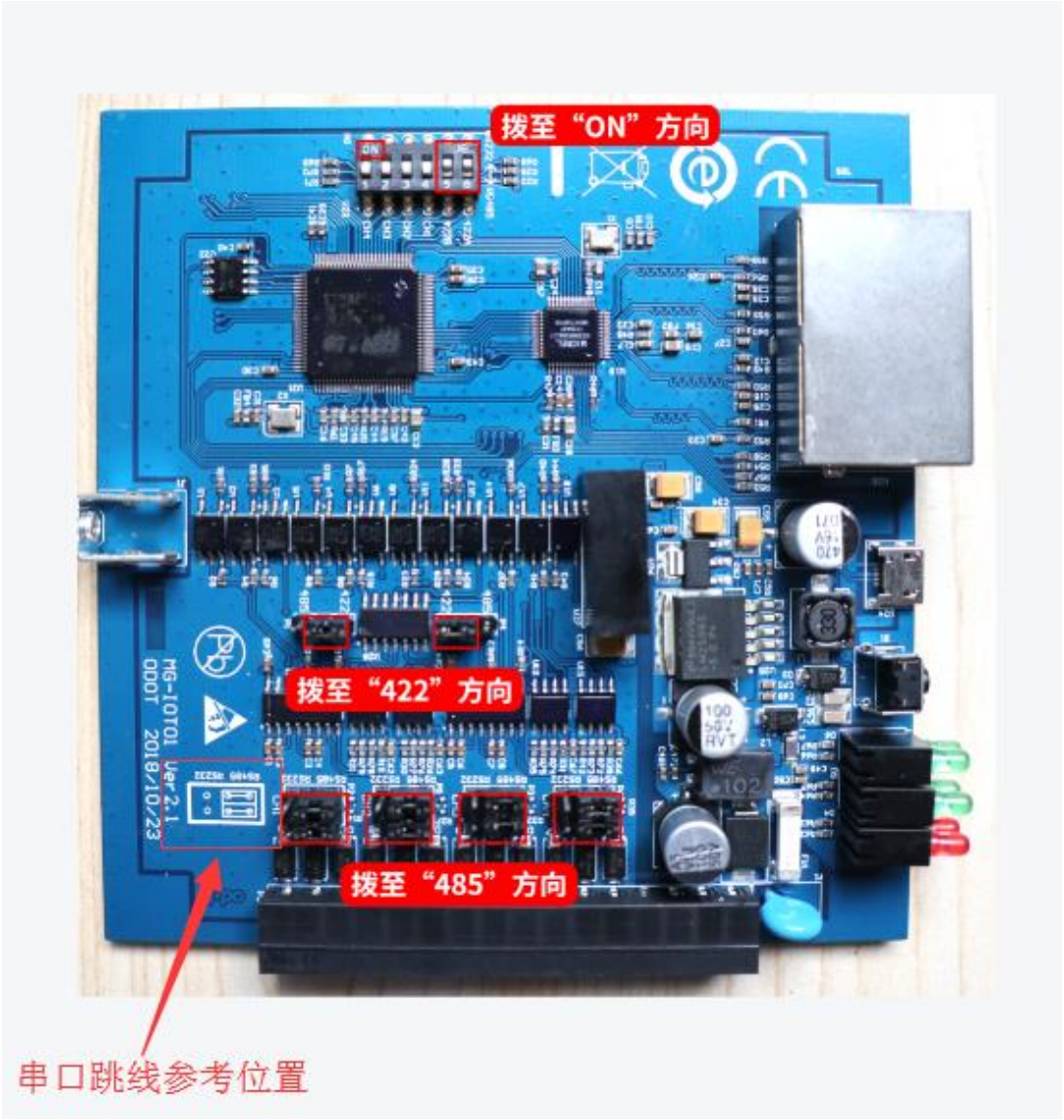
2. When the gateway device adopts the RS232 communication interface, the hardware dialing code is as follows: loosen the bolt at the arrow and remove

the gateway cover.

Turn the gateway CH1 and CH3 DIP switches to the ON position, and the serial port 1 and 3 to the RS232 mode.


拨至“ON”方向
拨至“485”方向
MG-IOT01 Ver2.1
ODOT 2018/10/23
拨至“232”方向
拨至“485”方向
拨至“232”方向
拨至“485”方向
串口1
串口3

3. When the gateway device adopts the RS422 communication interface, the hardware dialing code is as follows:



2.5 System Reset

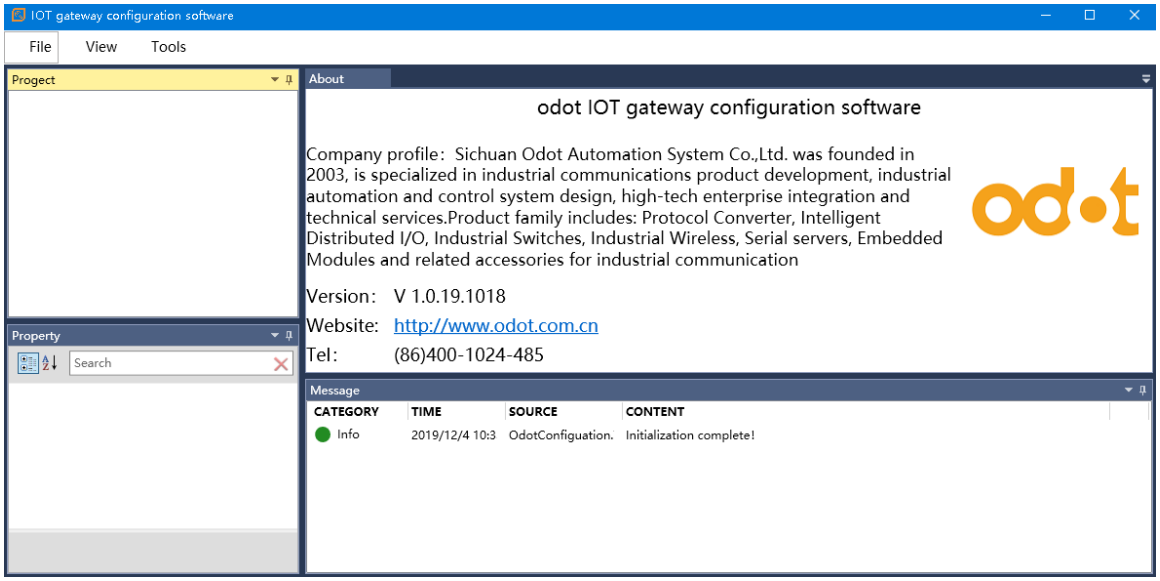
The device has a system reset button RESET. When the user forgets the IP address of the device and port number and cannot connect to the gateway, the reset button can be triggered. The system parameters will be restored to the factory settings and the device will be restarted. The reset button can be clicked with a paper clip. All the indicators flash once to indicate that the reset was successful. The technical parameters of the gateway are as follows:

Parameter Name		Default Value
ETHERNET	Protocol Converter IP	192.168.1.254
	Subnet Mask	255.255.255.0
	LAN Gateway IP	192.168.1.1
	Configuration Port	1024
	DHCP Enable	Not Enable
	DNS server address	114.114.114.114
SRIALPORT	Serial Port Collection Mode	Straight
	Serial Port Type	RS485
	Serial Port Baud Rate	9600bps
	Parity Bit	No check
	Data bit	8 bit
	Stop bit	1 bit
	Receive Character Interval	3.5t
	Slave Response Timeout	100ms
	Timeout Processing Mode	Data-hold
	Data collection time	100ms

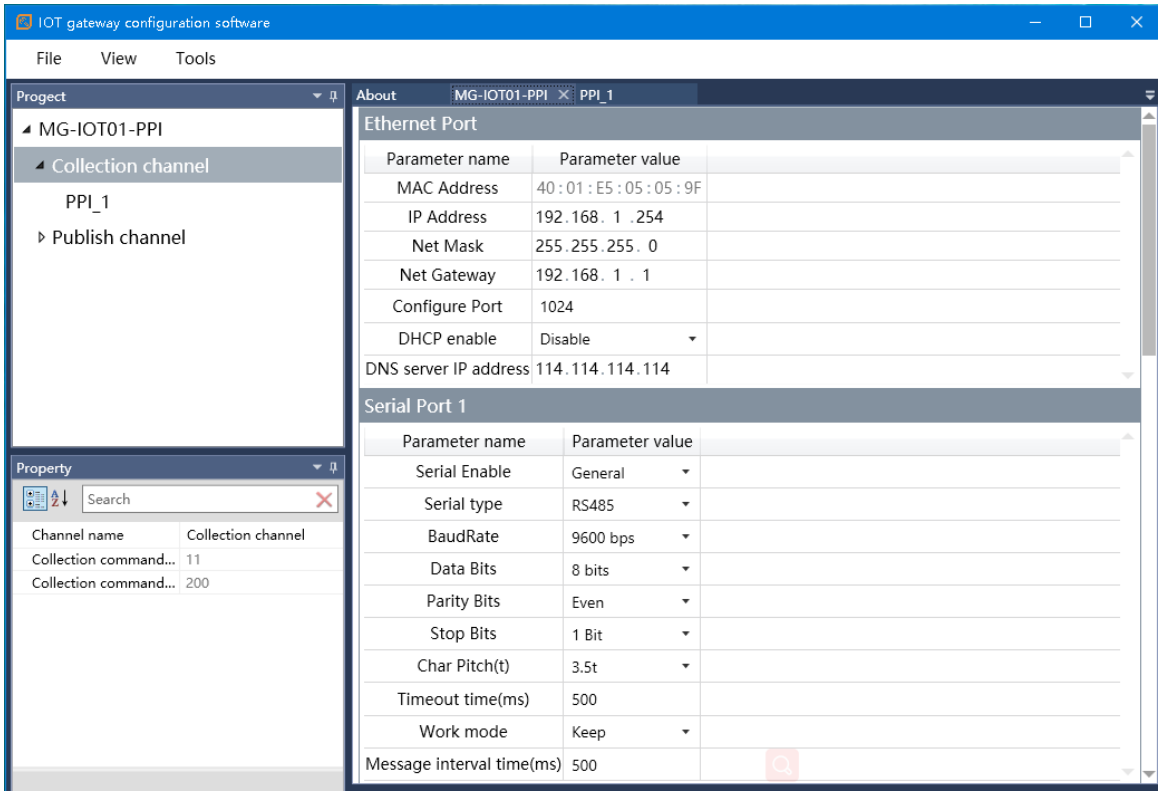
2.6 Installation Dimensions

2.7 Software Interface

1 Open the software and the main interface as follow:



2. It consists of a Project bar, a Property bar, an Output bar, and a Configuration Information bar. Create a Project and select Configuration Information in the Project bar and configure it in the Configuration Information bar.

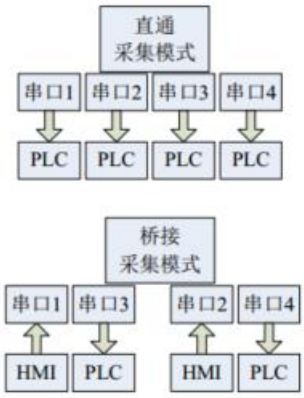


3 How to Use the Gateway

3.1 Serial Port Side Collection Channel

Each serial port of the gateway has two working modes: General mode and Bridge mode.

In the General mode, the gateway serial port is directly connected to the PLC for data collection.



In Bridge mode, PLC data is collected without affecting HMI and PLC communication. The connection method is HMI and PLC respectively connected to the two serial ports of the gateway (serial port 1 and serial port 3 are one group, serial port 2 and serial port 4 are One group, serial port 1, 2 to HMI, serial port 3, 4 to PLC). The HMI data enters the gateway through the serial ports 1, 2, and enters the PLC from the serial ports of the gateways 3 and 4.

3.2 Ethernet Port Side Publish Channel

There are two modes for the network port side publish channel, Modbus TCP publish channel and MQTT publish channel.

1. Modbus TCP publish channel

The data area has 4K (bit) DO (Coil), DI (Discrete Input) area, and 1K

(Uint16_t) AO (Hold Register), and the AI (Input Register) area is used to store the acquired data. The user can associate the collection point with the corresponding Modbus data area and address through the configuration software. After the Modbus publish channel is configured, the gateway will set up the Modbus server and publish the collection point data to the corresponding Modbus data area. Users can access the Modbus server for data exchange. The Modbus server supports 5 client accesses simultaneously.

2 MQTT publish channel

MQTT is an IoT transport protocol designed for lightweight publish /subscribe message transmission and is used to provide reliable network services for IoT devices in low bandwidth and unstable network environments. The gateway is based on the standard MQTT3.1.1 protocol for secondary development, supporting Alibaba Cloud, Baidu Cloud, Tencent Cloud, Onenet and other cloud platforms and private cloud connections and provides data collection. The device supports subscription and publish of 10 themes at the same time, and can install up to 50 data points under each theme. It supports triggering and configurable periodic data distribution, and supports the publish of messages in binary pass-through and JOSN format.

Json data format: plain text

Data Format(publish/Subscribe)

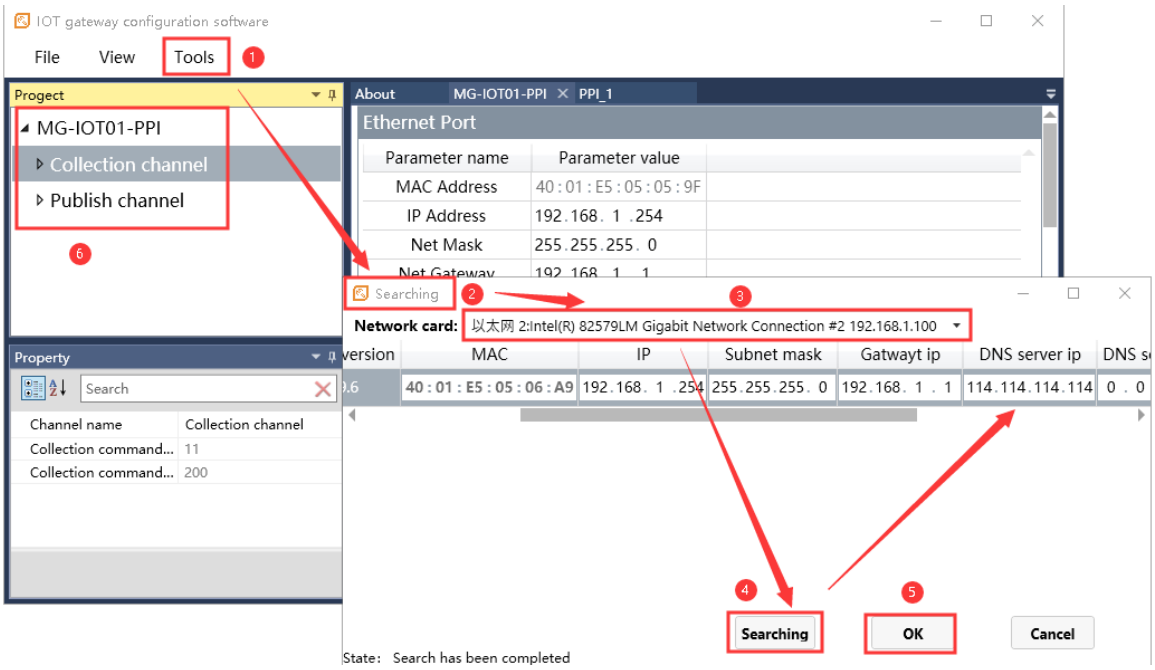
```
{
    "version" :   "1.0",
     "params" : {
          "name" : data,
          "name" : data,
          "name" : data,
     },
     "id" : 31359,
     "method" :   "thing.event.property.post"
```

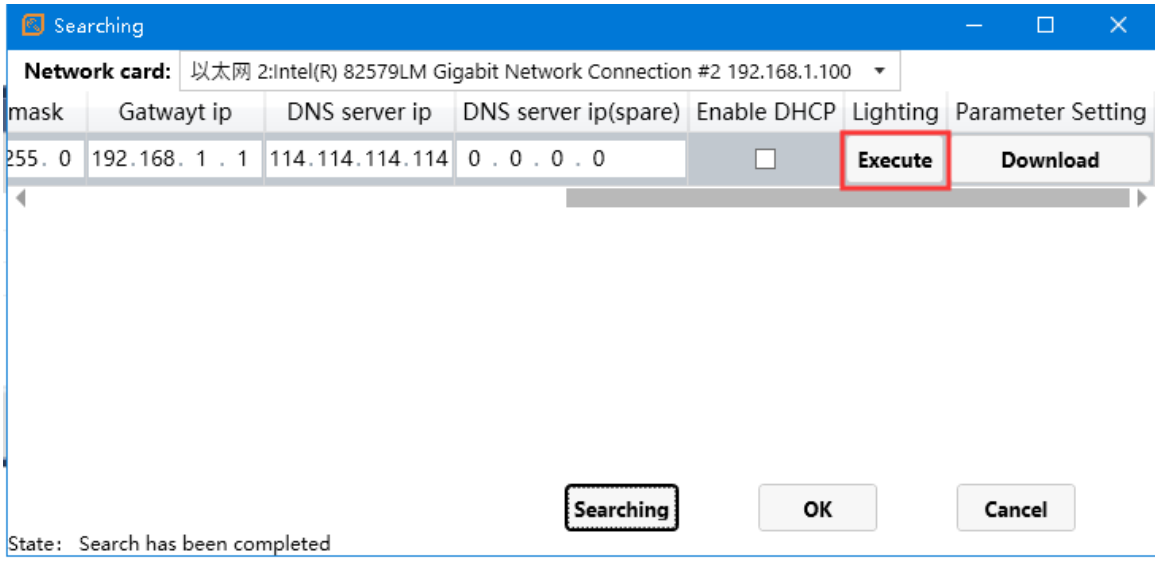
```
}
```

Field	Description	Type
version	Version number, fixed at 1.0	String
name	Collection point name	String
Data	Collecting point data	
Id	ID number, fixed at 31359	Int32
method	Attributes,"thing.event.property.post"	String

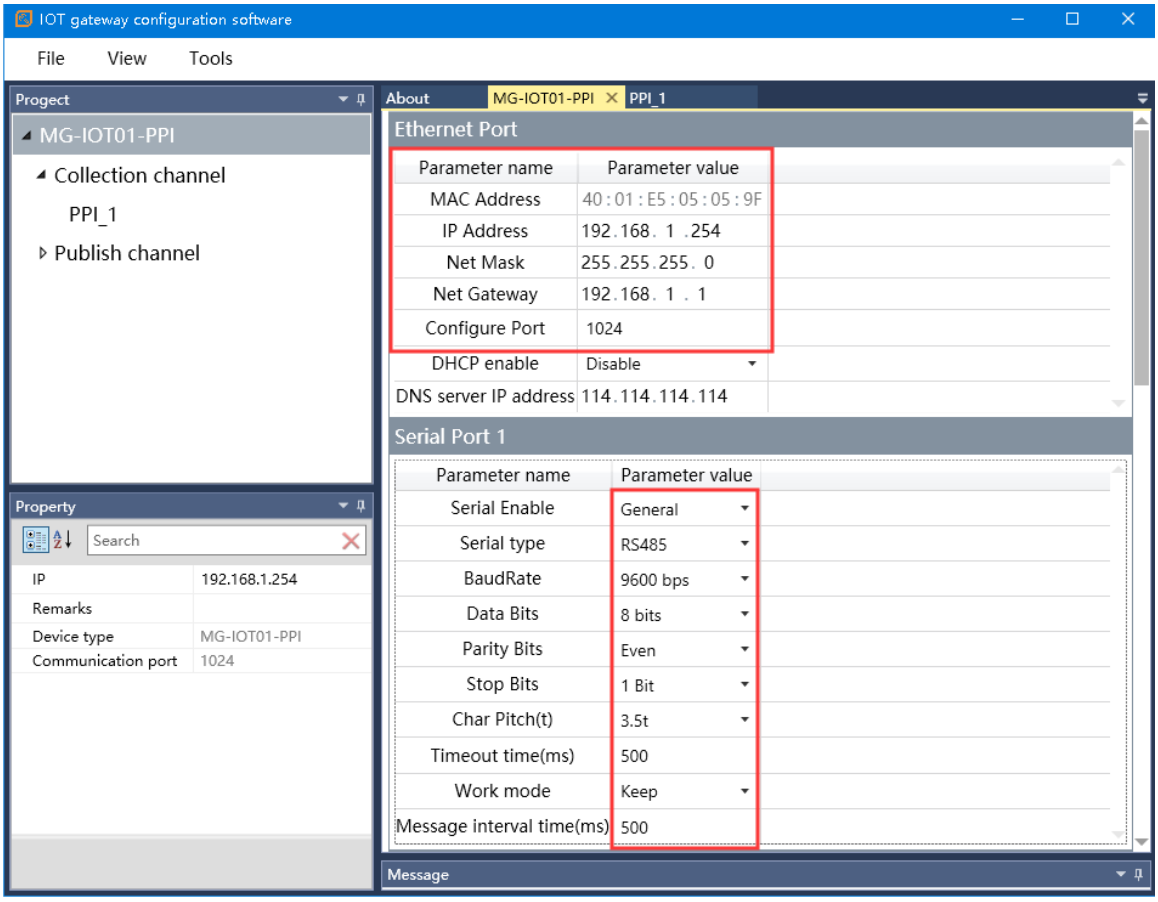
3.3 Configuring Software Usage

1. Open the configuration software "Odot Configuration Software", click Tools - Searching, select the local network card, click Searching, it will scan the IOT gateway on the same network segment, click OK to generate the IOT project on the left side. If there are multiple IOT gateways on the same network segment, you can click the light button, and the corresponding ETH light of the IOT gateway will flash five times to distinguish multiple MG-IOT01 modules on the same network. This document is demonstrated using the PPI protocol of the S7-200. Other protocols use the same method.





2. Double-click "MG-IOT01-PPI" in the project bar and configure the network port and serial port parameters in "Ethernet Port" and "Serial Port" window on the right.



The main parameters have the following meanings:

IP address:

Gateway IP, the gateway creates the Modbus TCP server IP, the user accesses this IP, port 502, and logs in to the Modbus TCP server.

Serial port working mode:

Used to set the collection mode of the serial port of the gateway.

Disable:

Do not use this serial port.

“General mode”:

Directly connected to the PLC for data collection.

“Bridge mode”:

In this mode, two serial ports are a group, (1, 3 serial ports are a group or 2, 4 serial ports are a group). One serial port is connected to the HMI, and one serial port is connected to the PLC. In this mode, data collection can be performed using intermittent time without affecting the HMI to PLC

Baud rate:

Serial port baud rate, the range is 2400 – 115200bps, the default is 9600bps. Please set this parameter to be the same as the device connected to the serial port.

Check Digit:

No Parity, Odd Parity, Even Parity optional. No parity by default. Please set this parameter to be the same as the device connected to the serial port.

Stop bit:

1 and 2 stop bits are optional. The default is 1 stop bit. Please set this parameter to be consistent with the device connected to this serial port.

Char Pitch (t):

The time from after confirming the end of the received message and before the new serial port data received is considered that one frame of the message ends. 1.5t – 200t optional, default 3.5t (t is the time for single character transmission, related to baud rate). In general, you do not need to change this parameter.

Overtime time:

After the gateway sends a frame of the message, it waits for the reply message. If the message is not received at this time, the communication is timed out. This communication fails. Do not set the time to be too short, especially in three-way mode, otherwise communication may fail.

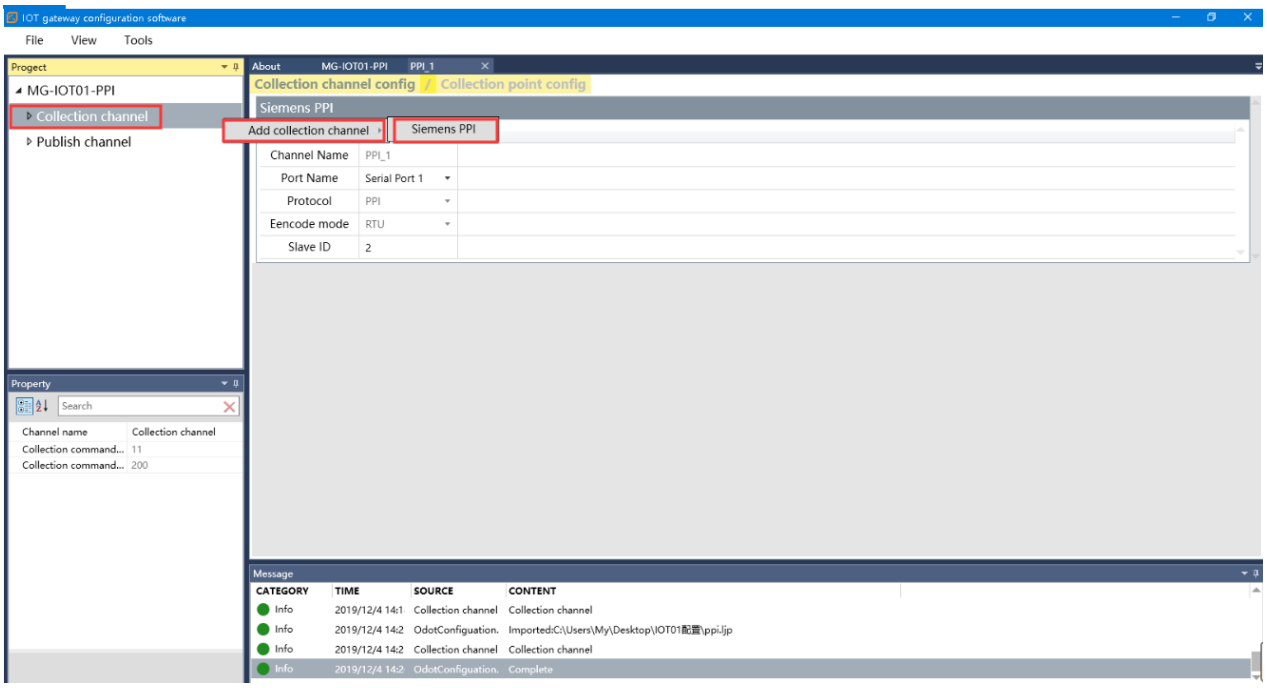
Message Interval Time (ms):

The cycle time of gateway collecting from the PLC, after one communication, the interval time (the delay of receiving the slave response message to the next command), 0ms-65535ms optional, the default is 100ms, it is recommended to set 100ms to prevent communication failure because of slow response of the connected device. In the three-way mode (bridge mode), it can be lengthened appropriately, and if too short it will affect the response of the HMI.

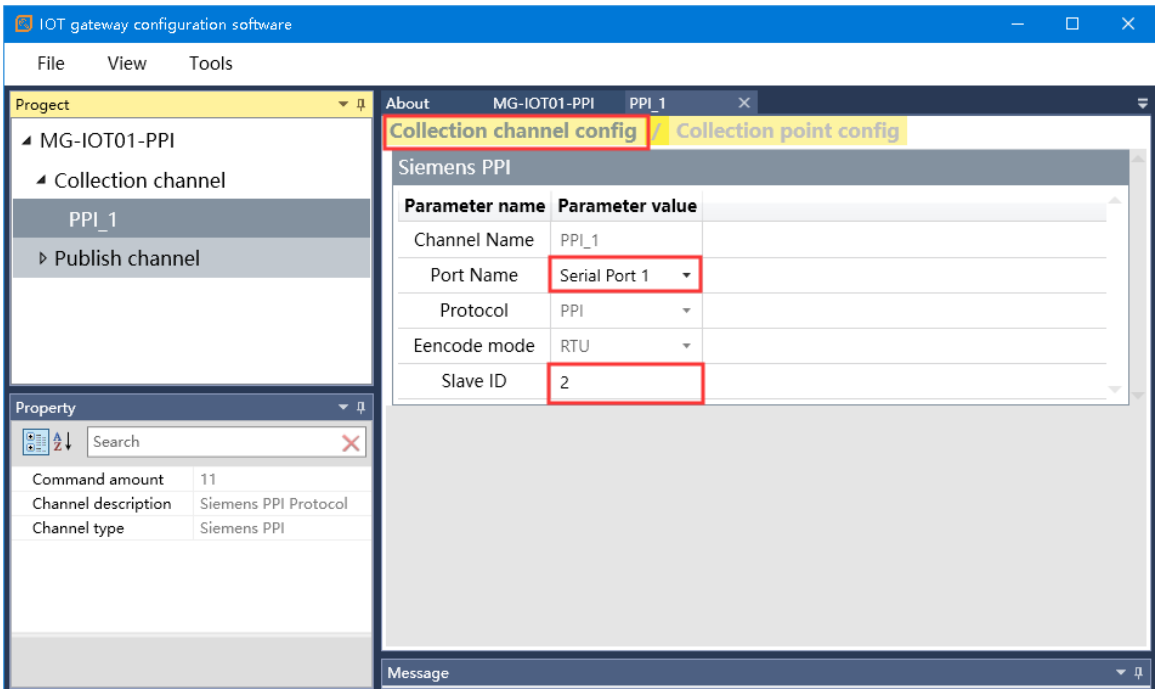
Work Mode:

If the slave responds over time when read data from PLC, the timeout data processing mode can select "data clear" or "data hold". The default is "data hold" mode. This parameter is only valid for the Modbus read command. Please set this value according to actual needs.

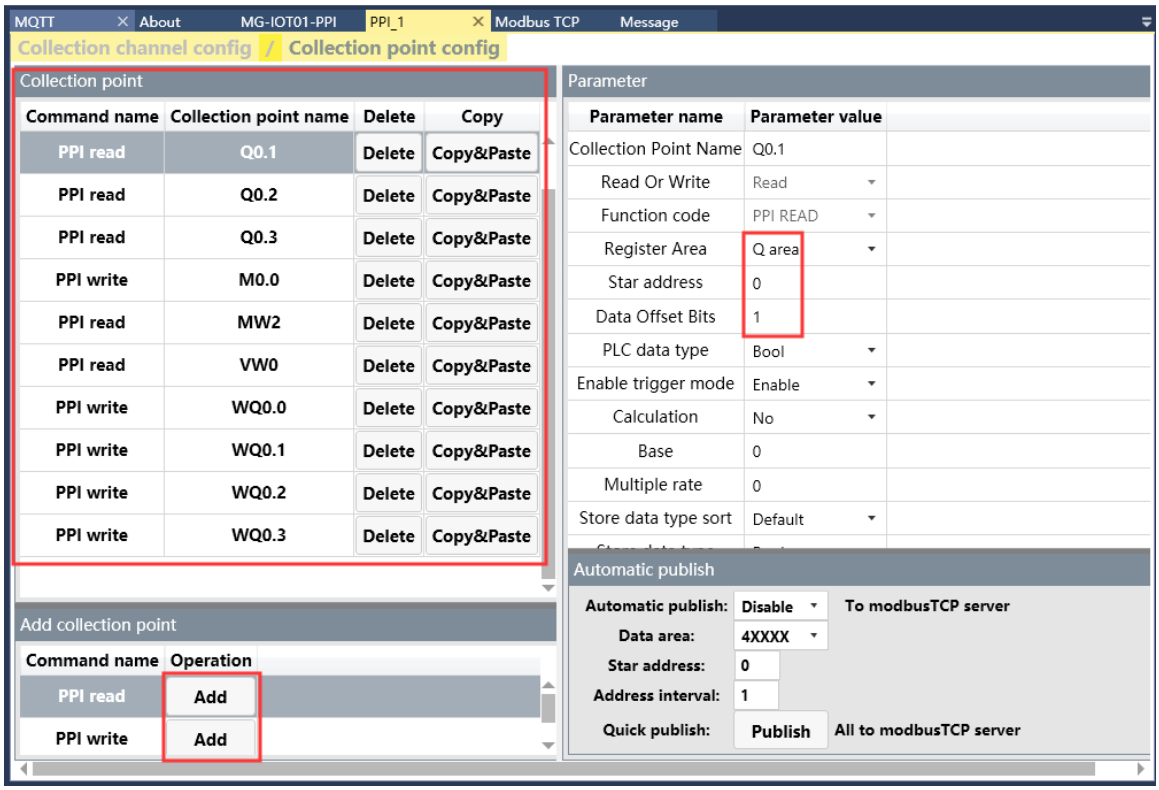
3. Right click on the “Collection Channel” in the project bar and select Add Siemens 200 (PPI) protocol. There will be an extra "PPI_1" below the Collection channel.



Double-click PPI_1, and the Collection channel config window pops up on the right. In the Collection channel config window, set the serial port to confirm which serial port to collect and the Slave ID.



Click “Collection Points Config” and add: read or write commands in the "Add Collection Points" column. Then configure the collection point information in the parameter bar, such as: Register Area, Start address, PLC data type, etc.



The main parameters are as follows:

Register Area: Which area the data point belongs to, such as Q, M, V, etc. of PPI

Start Address: The offset address of the area where the data point is located.

Data Offset Bits: If in the selected register it is 1 address stores 1 word data (16 bits) and the PLC data type is Bool type. This parameter, together with the Start address, can determine which bit to be read in the 1 word data. If the register 1 address stores 1 bit, this parameter does not need to be configured, the default is 0.

PLC Data Type: Determine the data type and length of a data point read from PLC.

Enable trigger mode:

Enable: send a command to the PLC when data changes

Disable: Write command send to PLC in loop.

Data change mode：

Enable: Write command sends a command to PLC when data is changed.

Disabled: Write commands send a command to PLC cyclically.

Calculation processing:

None: no operation; multiplication/division: calculated value = cardinality + magnification (*, /) collection value

Base: Same as above

Multiple rate: Same as above

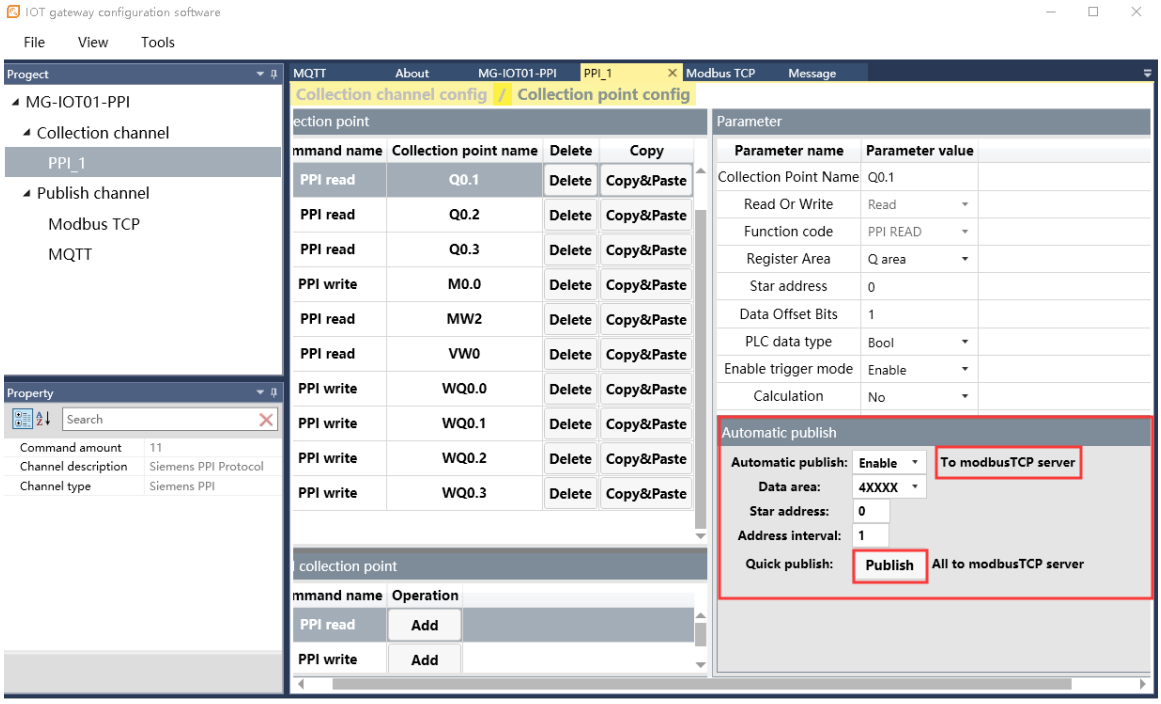
Store data type sort: Default little endian, and other types are optional.

Storage type: The data type of the collected data storage. For example, if the PLC data type is int and the storage type float, the data will be type converted.

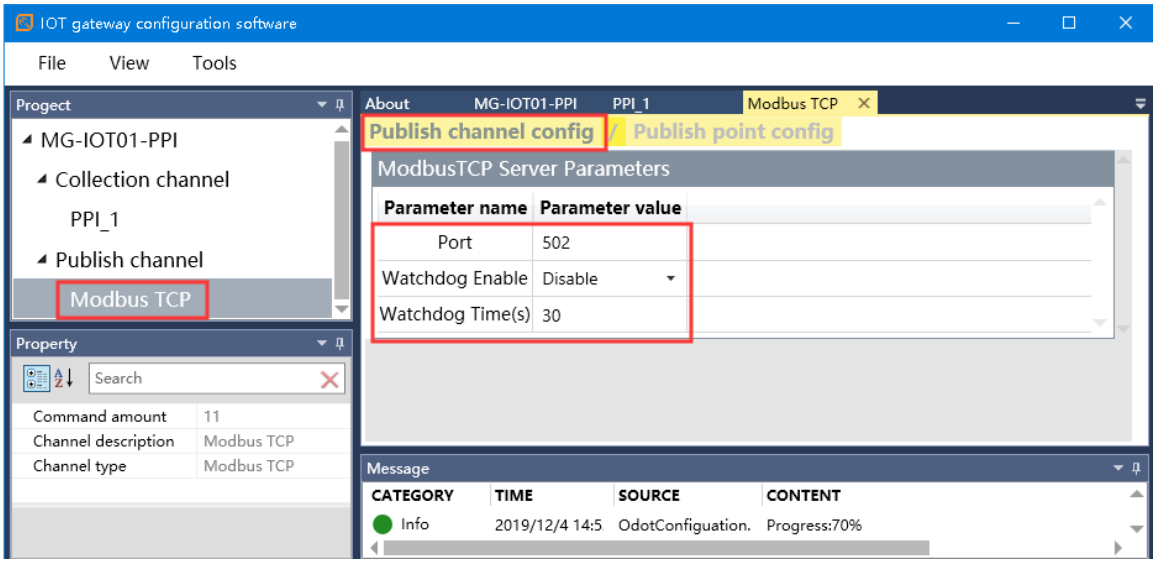
4. In the “Project” on the left, right-click the publish channel and select the publish channel to be added. There are 2 options, Modbus TCP channel and MQTT channel.

(1) Modbus TCP channel configuration

When you choose to publish to the MODBUS TCP channel, you can click on Automatic Publish to publish the collection point to an address area of Modbus. If the user wants to publish to different data areas, you can manually configure the publish point.

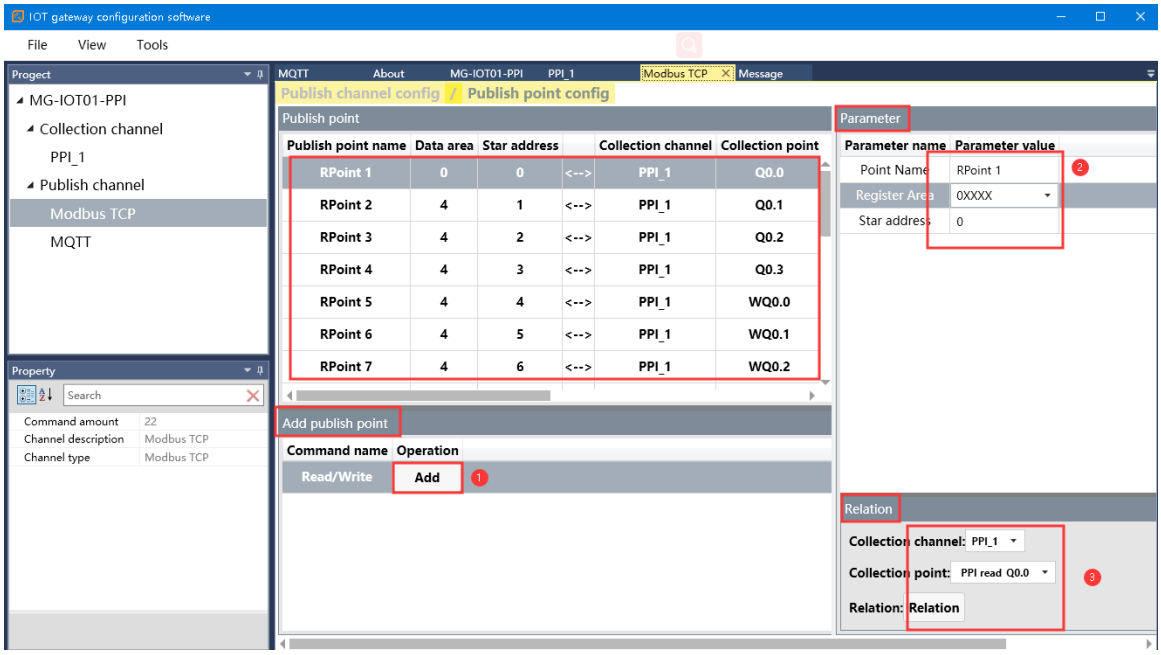


Selects the Modbus TCP channel as publish channel manually. Double-click on the right side to configure the publish channel parameters, such as Modbus port, Watchdog and other parameters.



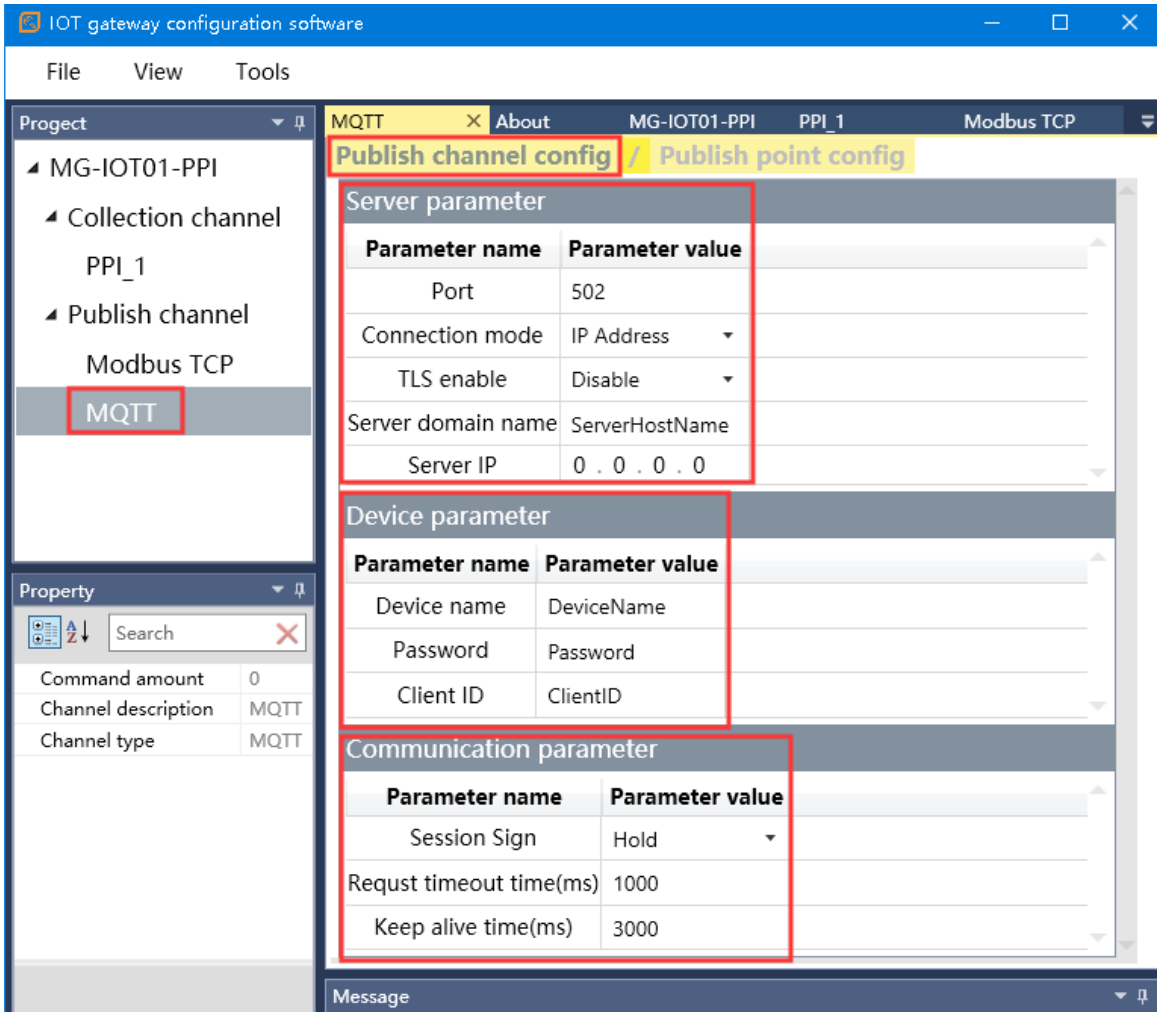
Click " Publish Point config" and select Add in the "Add publish point" column. Configure the Point Name, Register Area, and Start address in the

"Parameter" column. Then select the Collection channel in the relation column, Collect point, click the associated point, and complete the relation of the published data. As shown below:



(2) MQTT channel configuration

Select MQTT channel as publish channel, and configure publish channel parameters on the right side, including Server parameter, Device parameter, and Communication parameter.



MQTT sever parameter

Parameter Name	Parameter Description
Port	Server remote port
Connection Mode	Connection method (IP address: IP address connection / domain name: domain name connection)
TLS enable	Encryption enable (currently encryption is not supported)
Server Domain Name	Server domain name (Connection by IP, can be ignored)
Server IP	Server IP (connected via domain name, can be ignored)

Device Parameter

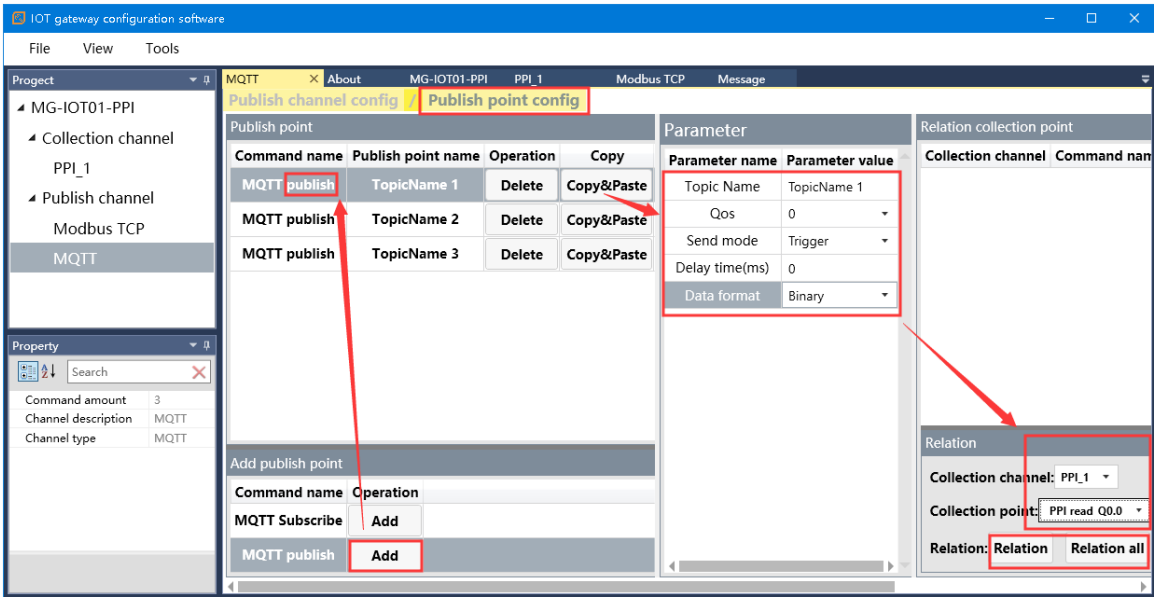
Parameter Name	Parameter Description
Device name	Corresponding to the user name in the MQTT, the name of the connected user is used for authentication. The username must be less than 128 characters.
Password	Corresponding to the password in the MQTT, the password of the connected user can be used for authentication. The password must be less than 128 characters.
Client ID	Corresponding to the client identifier (Client ID) in the MQTT, the unique identifier of the client to the server. It must be unique in the search for a client connected to a server and is the key in handling the message IDs for QoS level 1 and 2.

Communication Parameter

Parameter Name	Parameter Description
Session sign	Corresponding to Clean Session in MQTT. **Hold**: Maintains the previous session. After the network is disconnected, the previous session information is restored. The client and server need to have a related session persistence mechanism. **Clear**: Clears the previous session. Each time it is a new session. The session only lasts as long as the network connection.
Request timeout time	**MQTT request timeout (ms)**
Keep-alive time	MQTT Keep-alive Time(ms)

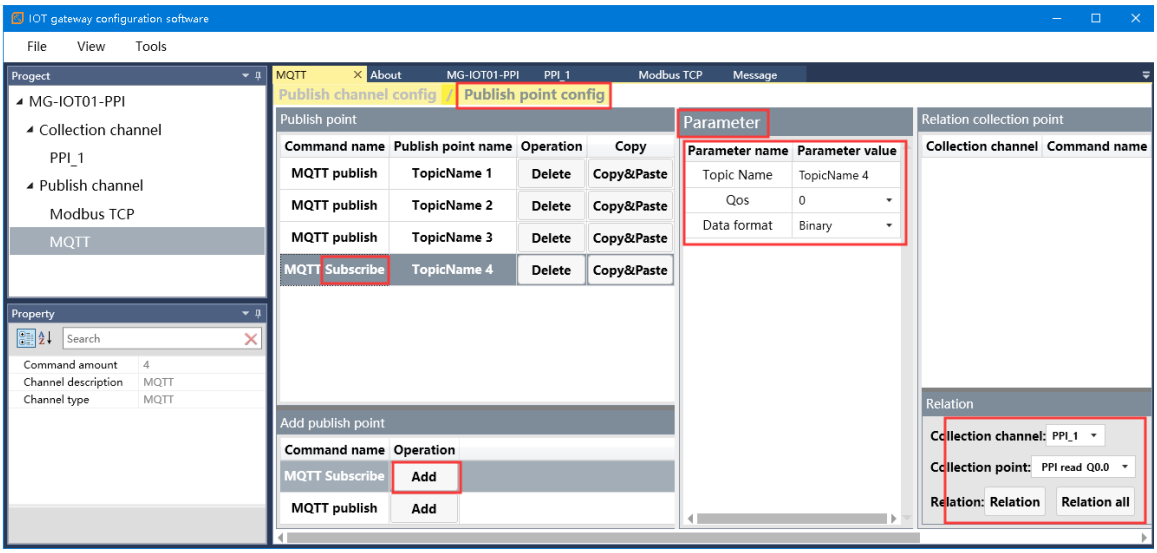
Click Publish point config, and select the command to add (MQTT subscribe, MQTT publish) in the "Add publish point" column. Configure the publishing point Topic Name, QoS level, Send mode, Delay time, and data

format in the Parameter column. Then select the collection channel in the relation column, Collection point, click “Relation” or “Relation all” to complete the relation of the publish data.



MQTT publish parameters

Parameter Name	Parameter Description
Topic Name	The name that needs to be published to the topic
Qos level	MQTT message level, currently only supports 0,1
Send mode	Message push method, Trigger: Triggered release Cycle: Periodic release
Delay time	The cycle time of publish, this can be ignored if the Send mode is Trigger
Data format	Published message format, Binary: binary, JSON



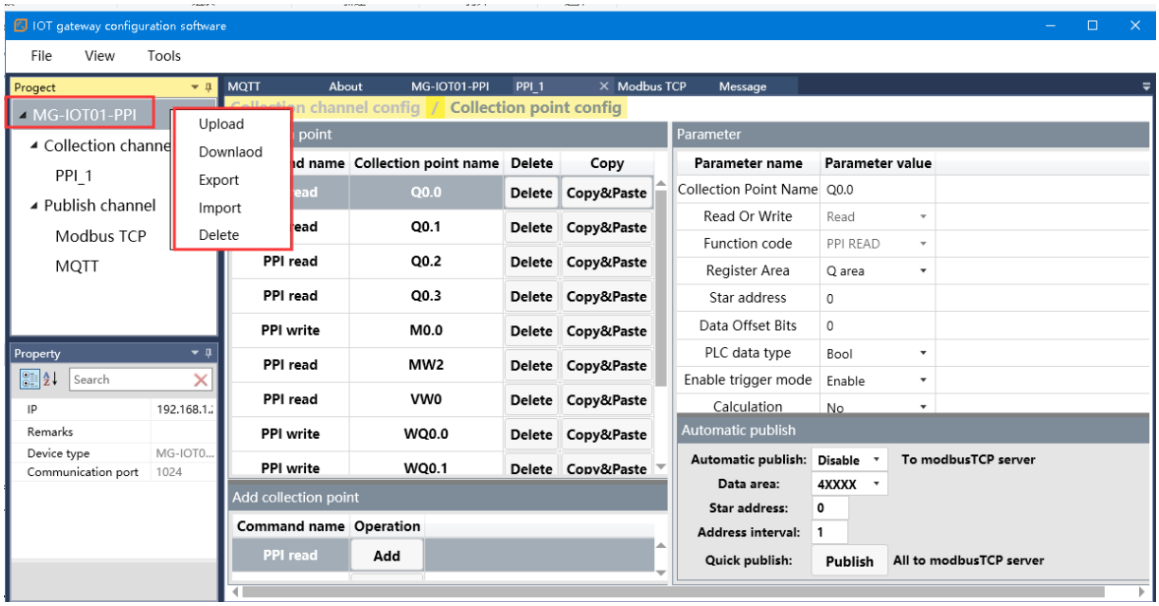
MQTT Subscribe Parameters:

Parameter Name	Parameter Description
Topic Name	The name that needs to be published to the topic
Qos level	MQTT message level, currently only supports 0,1
Data format	Published message format, Binary: binary, JSON

5. Download, Upload, Import, Export Configuration

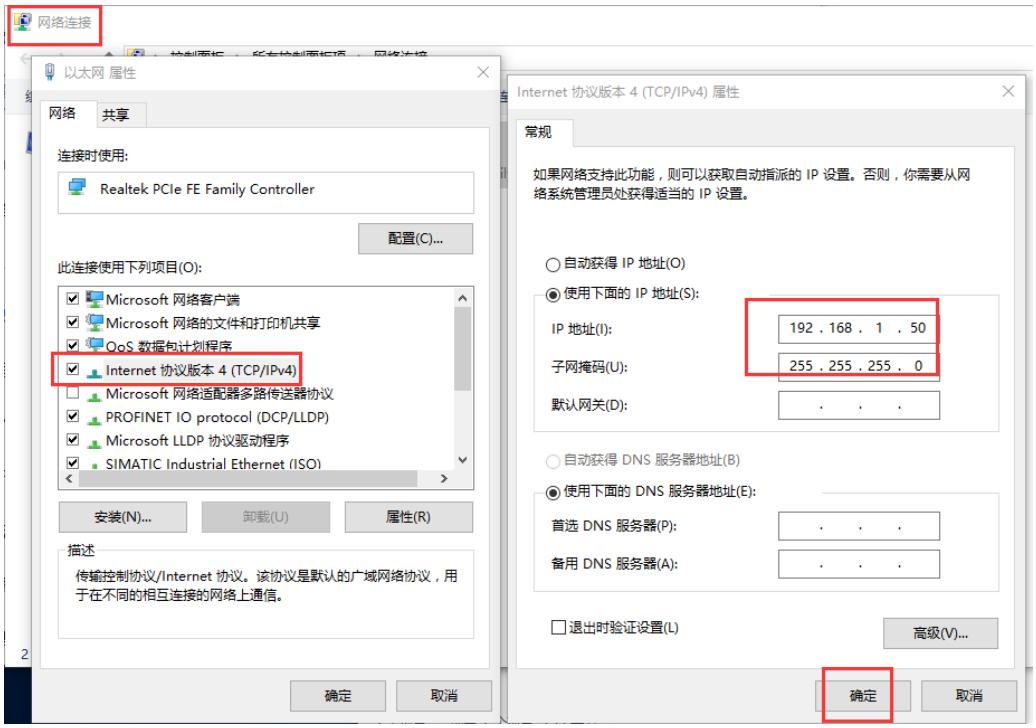
After all the collection points and publishing points are configured, right-click MG-IOT01-PPI, and you can choose to download and configure to the gateway. You can also choose to upload, import, and export configurations. When uploading and importing a configuration, you need to create an MG-IOT project first. If the download fails, please check if the computer IP address and the gateway IP address are on the same network segment, and check if the gateway IP address is set correctly. If you forget the gateway IP address, you can reset the gateway by reset button to the factory default IP address.

Note: When downloading and uploading, make sure that the computer and the gateway are on the same network segment.

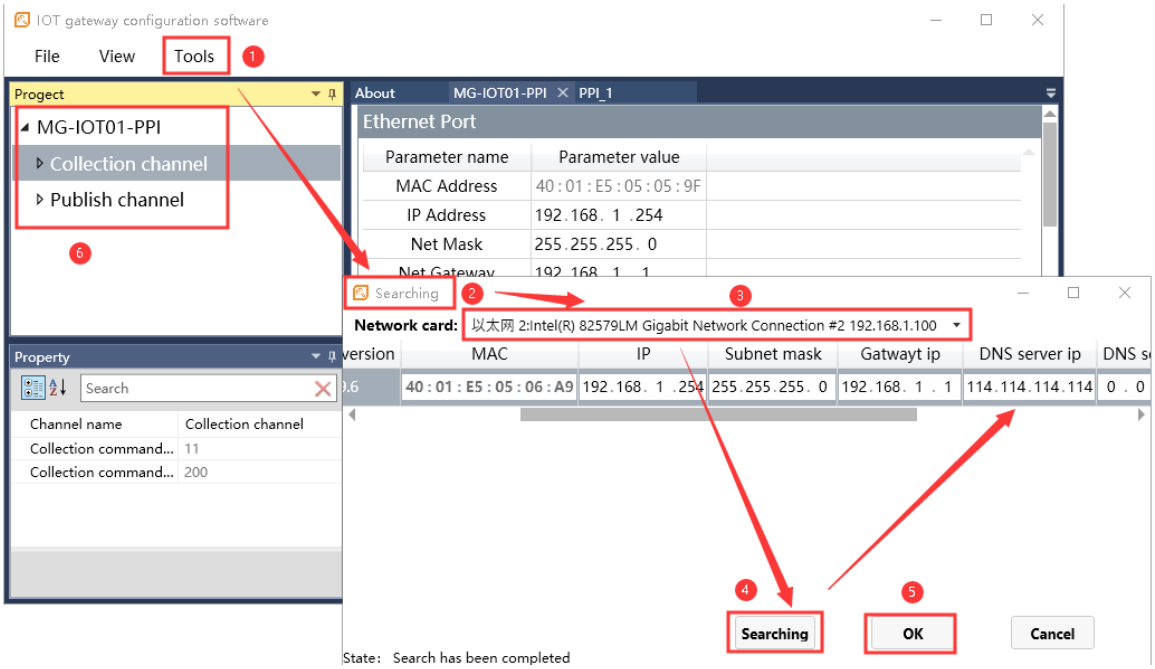


3.4 IP Address Modification

First, power the gateway 24VDC, connect the network cable to the gateway and the computer, and change the IP address of the computer's local network card to the 192.168.1.* network segment.

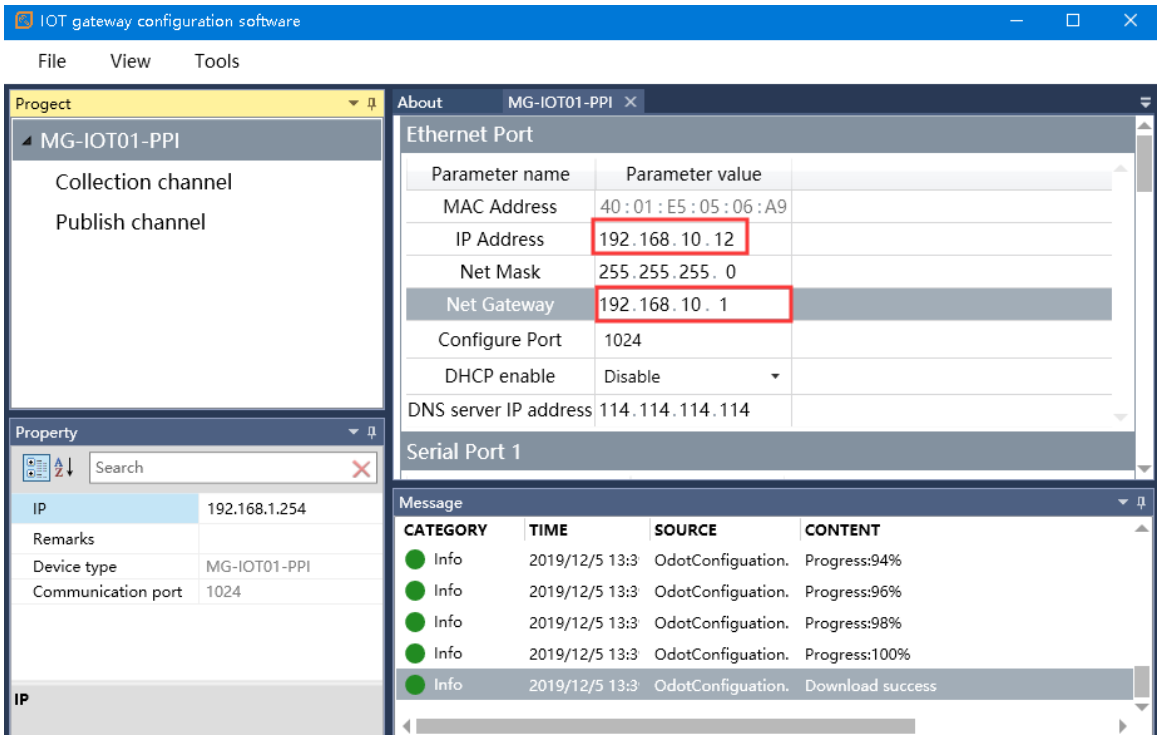


Then open the configuration software, click Tools-Searching for devices, select the local network card, click Searching, it will scan to the IOT gateway of the same network segment, click OK to create an IOT project on the left.

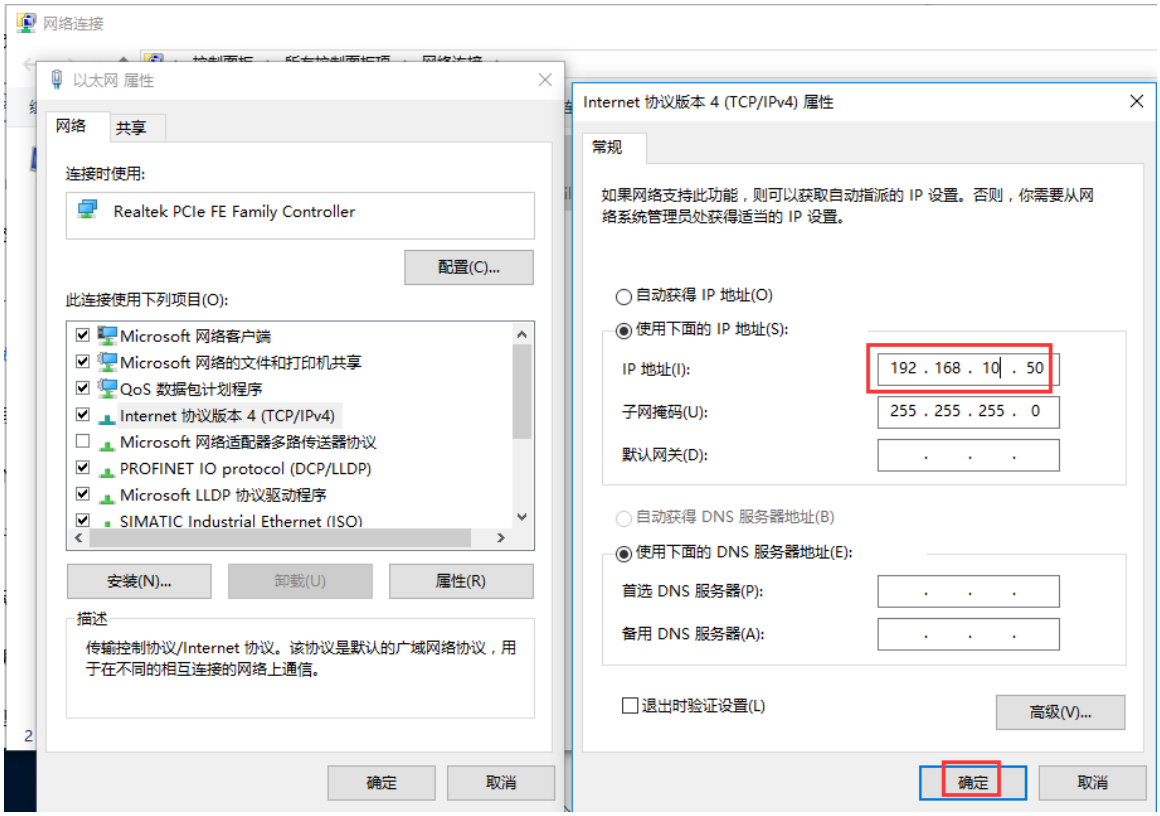


Modify the gateway IP address as: 192.168.10.12 (cross-segment), and change the LAN gateway IP to: 192.168.10.1. After the modification is

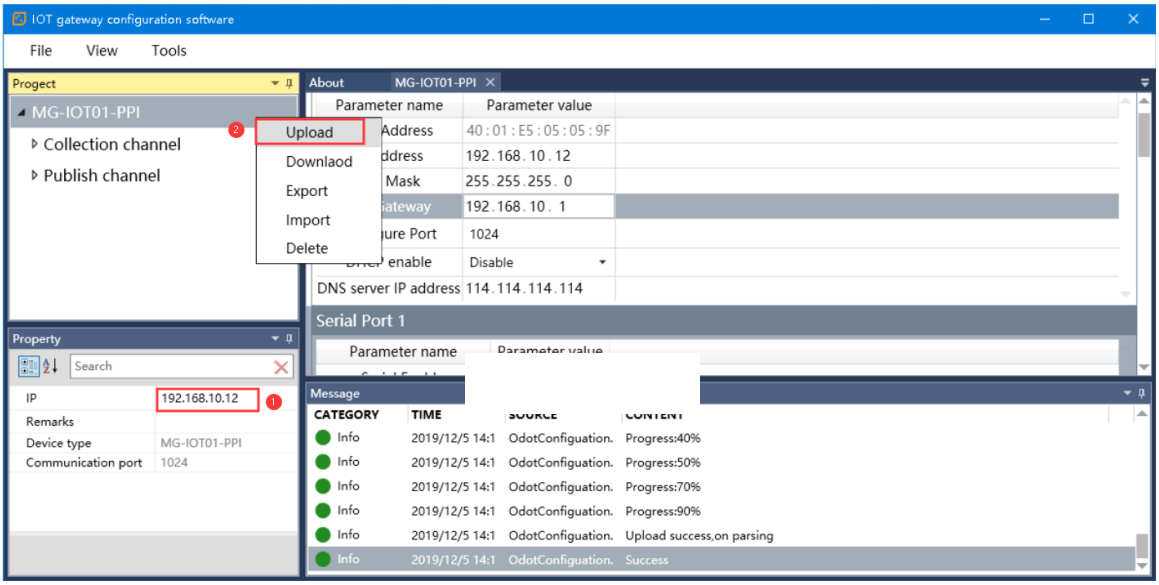
completed, right-click MG-IOT01-PPI and click the download parameter directly. You will see Download success in the lower right corner.



After the IP address is successfully changed, you need to change the local computer's IP address to: 192.168.10. * Network segment.



On the configuration software, change the IP address of the configuration parameters: 192.168.10.12, right-click MG-IOT01-PPI and click Upload. After the upload is successful, you can see that the upload is successful in the right lower corner. Complete the modification of the gateway IP address.



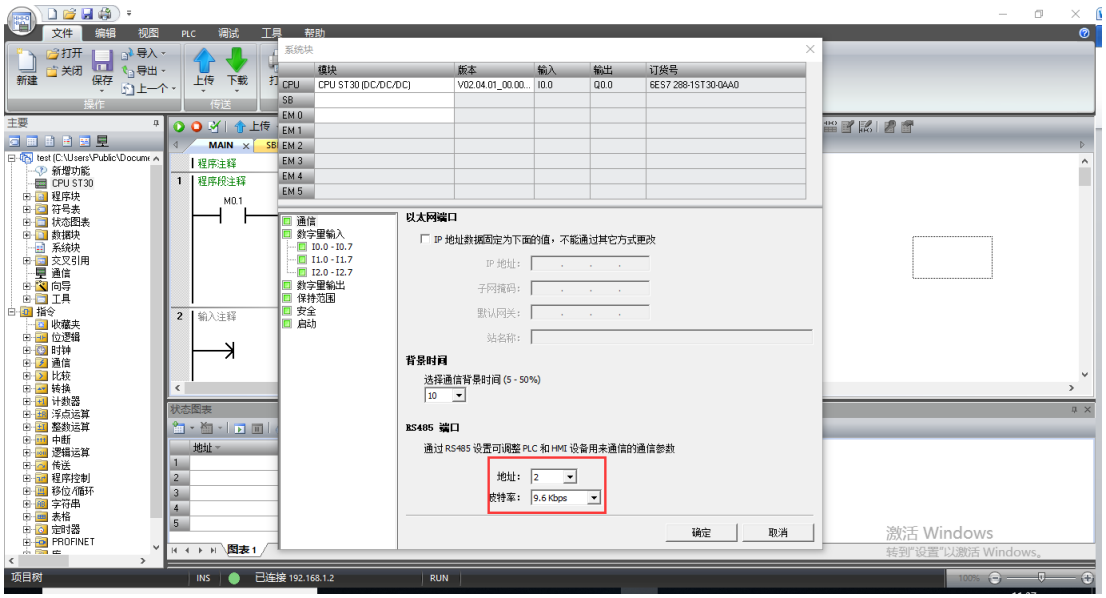
4 Test Application for Collecting SIEMENS S7-200/200 Smart PLC Data

4.1 Implementing PPI Protocol to Modbus TCP Data Exchange

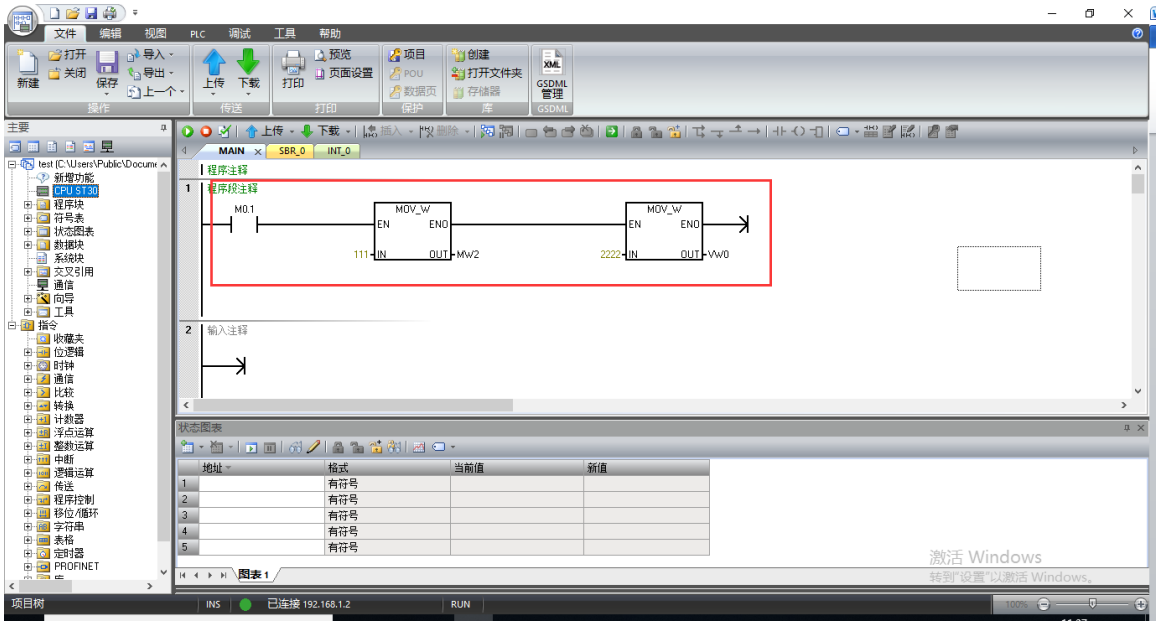
4.1.1 Smart 200 PLC Configuration

Power on the Smart 200 PLC, connect pin 3 of the RS485 serial port to the gateway serial port 1T/S+, and pin 8 to the gateway serial port 1R/S-. Serial

port parameters: ID = 2, 9600, E81.



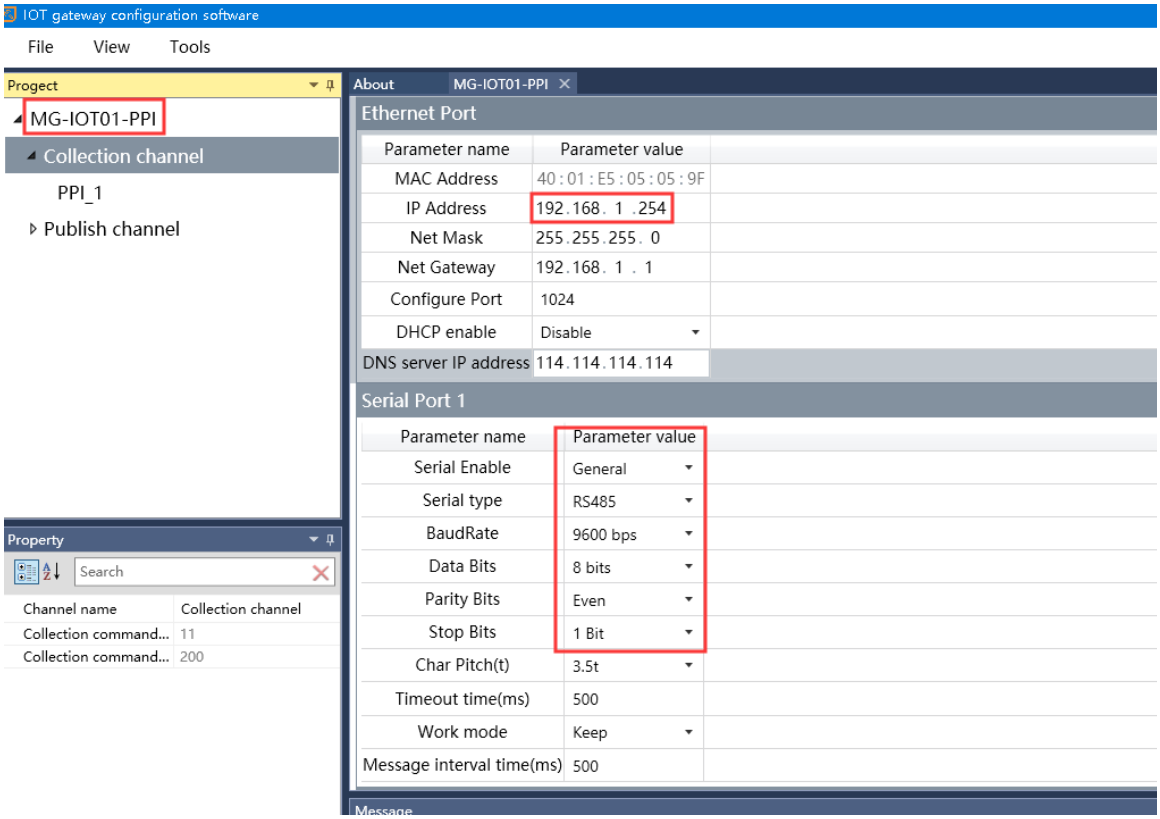
The test programming interface is as follows: After editing, save and download. Put the PLC in RUN.



4.1.2 MG-IOT01 Configuration

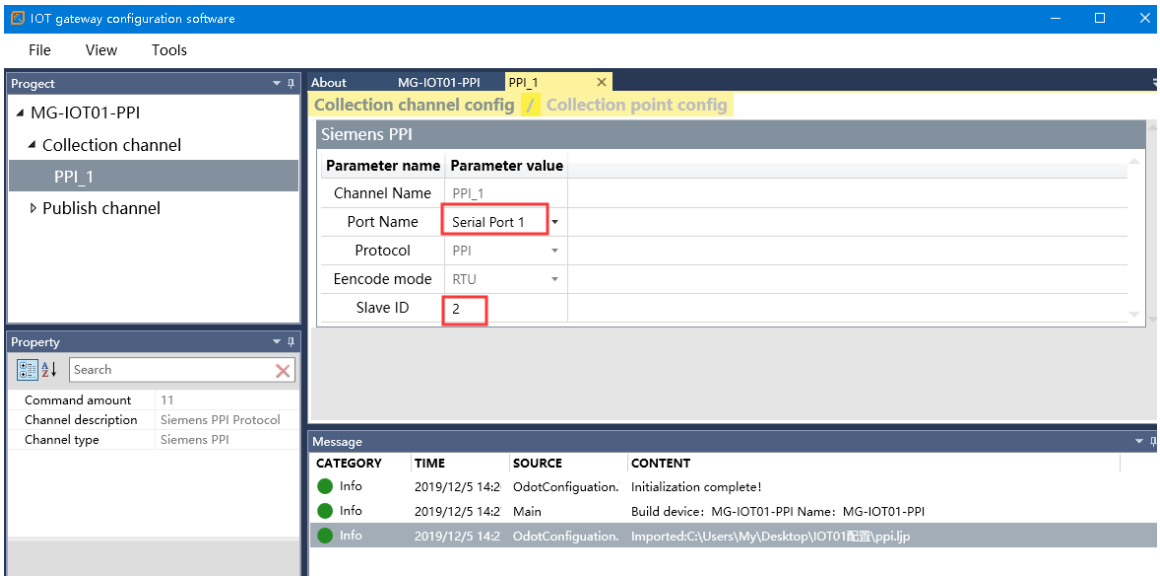
Open the configuration software, click Tools-Searching for devices, select the local network card, click Searching for devices, it will scan to the IOT gateway of the same network segment, click OK to create an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is

connected to serial port 1. Set the parameters of serial port 1 to General, RS485 / 9600, even / 8/1, and other parameters default.

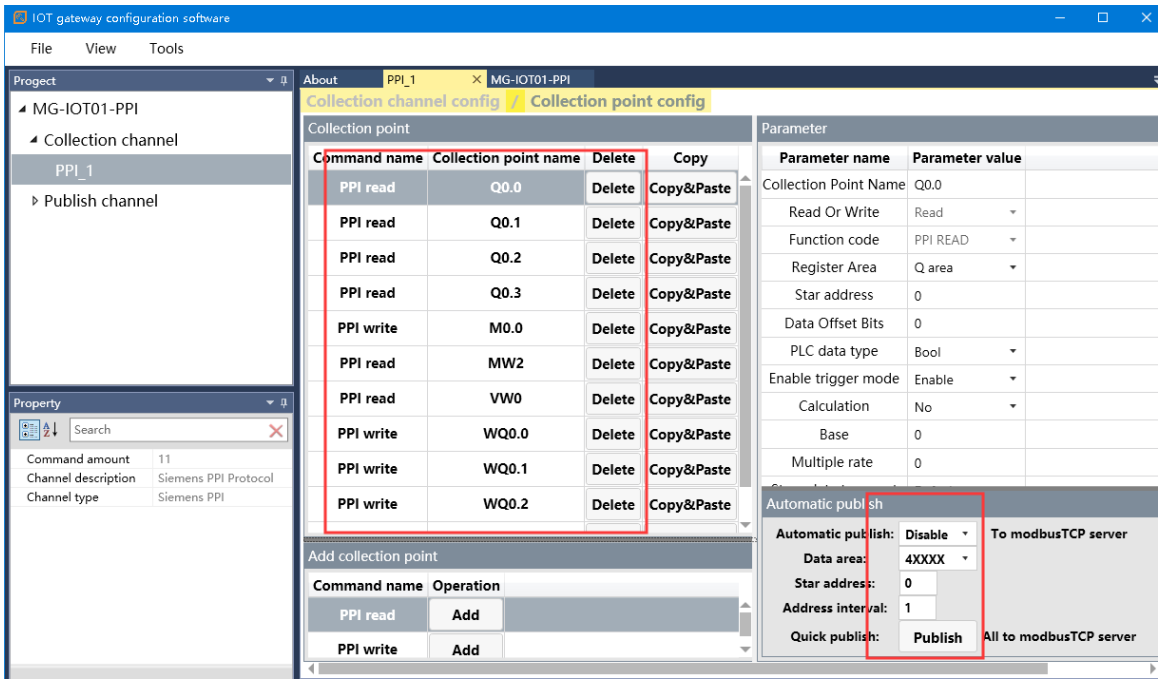


Configure the collection channel parameters as shown below:

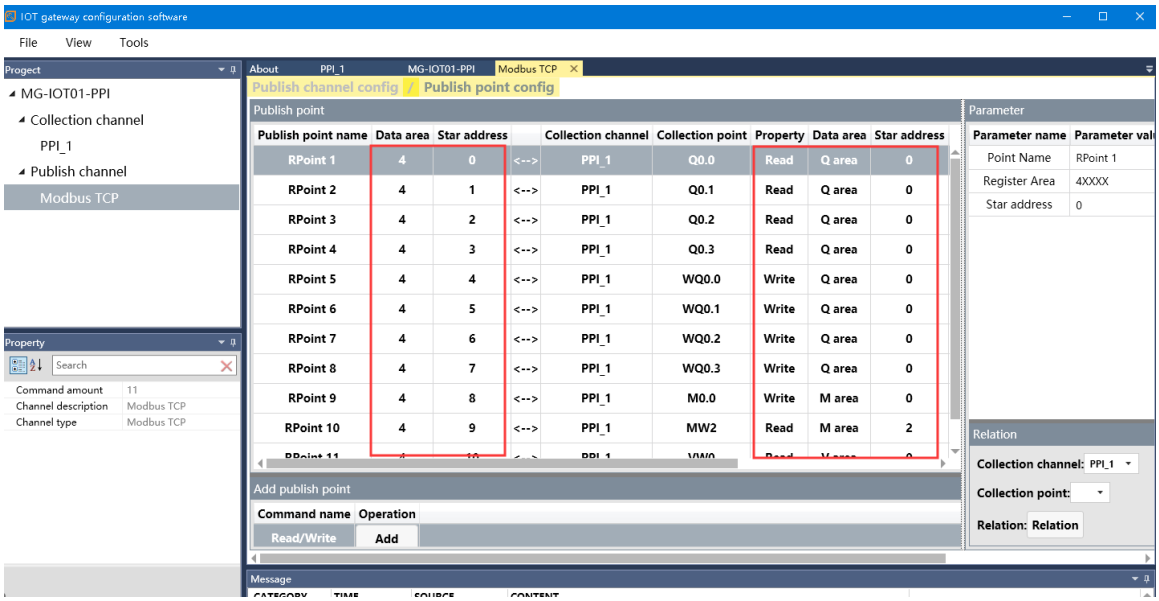
Select Serial Port 1 for the collection channel serial port and fill in 2 for the slave ID.



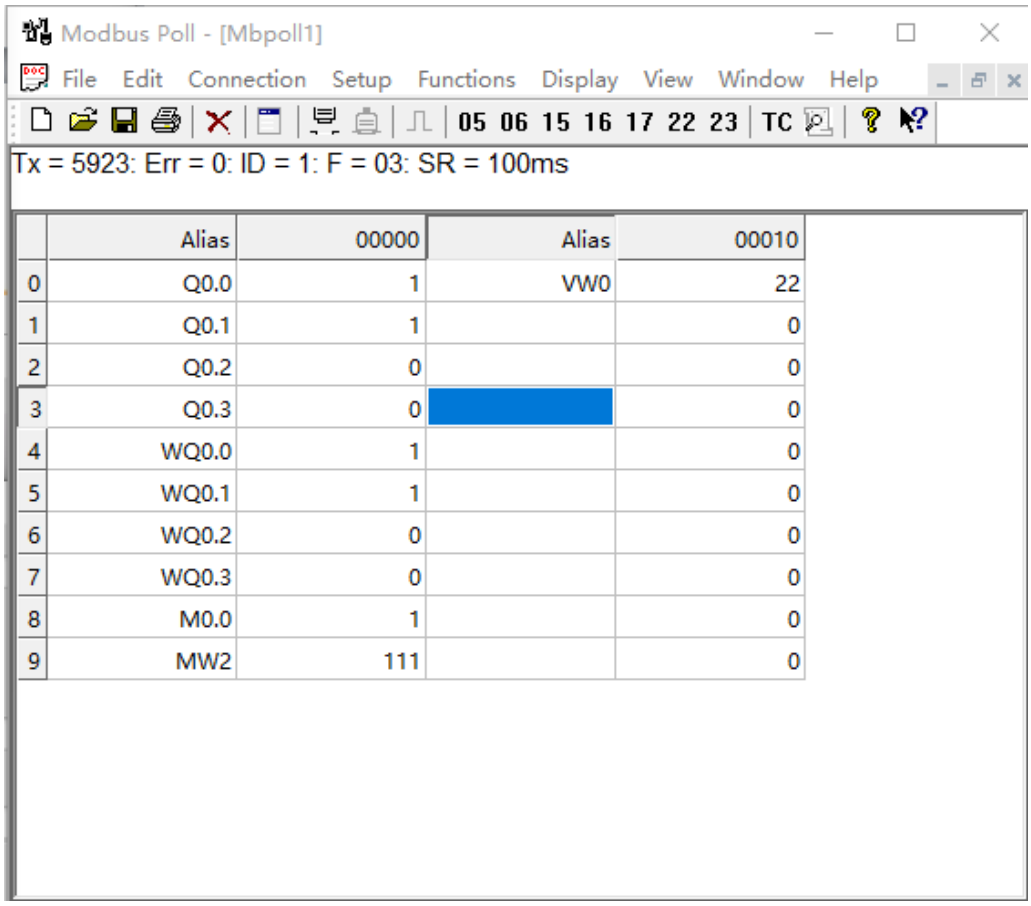
Configure the collection point and click Publish to area 4.



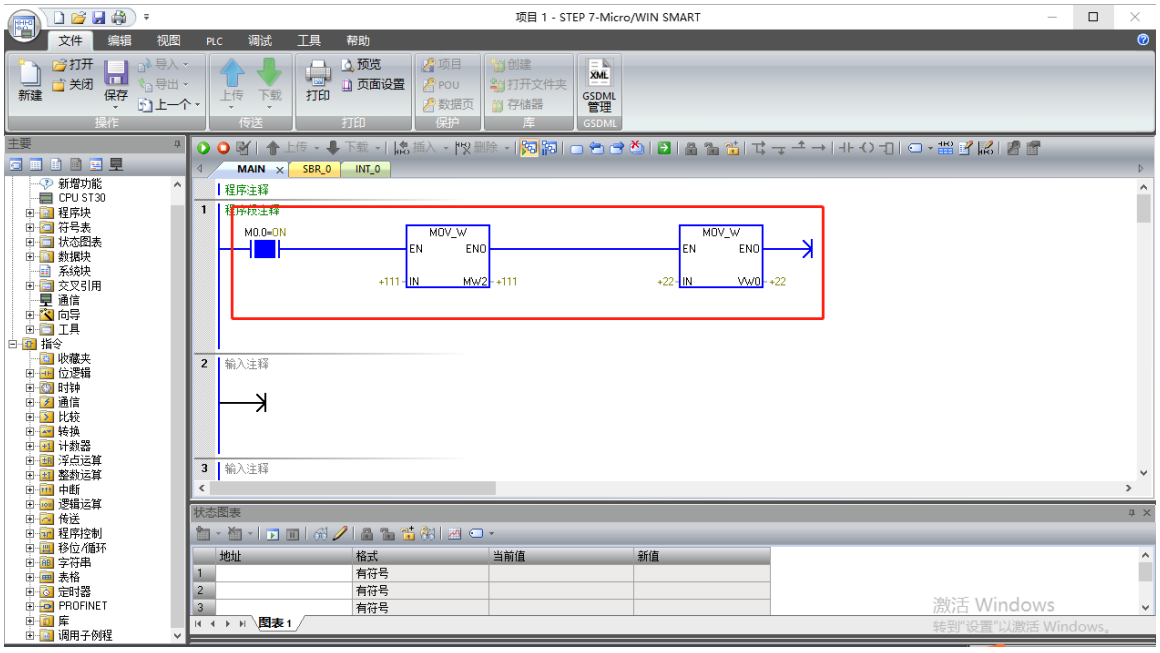
Click the Publish channel and click MODBUS TCP to view the correspondence relationship of the data publish address. After configuring all collection points and publish points, right-click MG-IOT01-PPI and select Download Configuration to Gateway.



After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the gateway through the gateway IP address 192.168.1.254 and Modbus data communication port 502 to access the collected data. This document uses Modbus Poll to simulate Modbus TCP client to collect data.



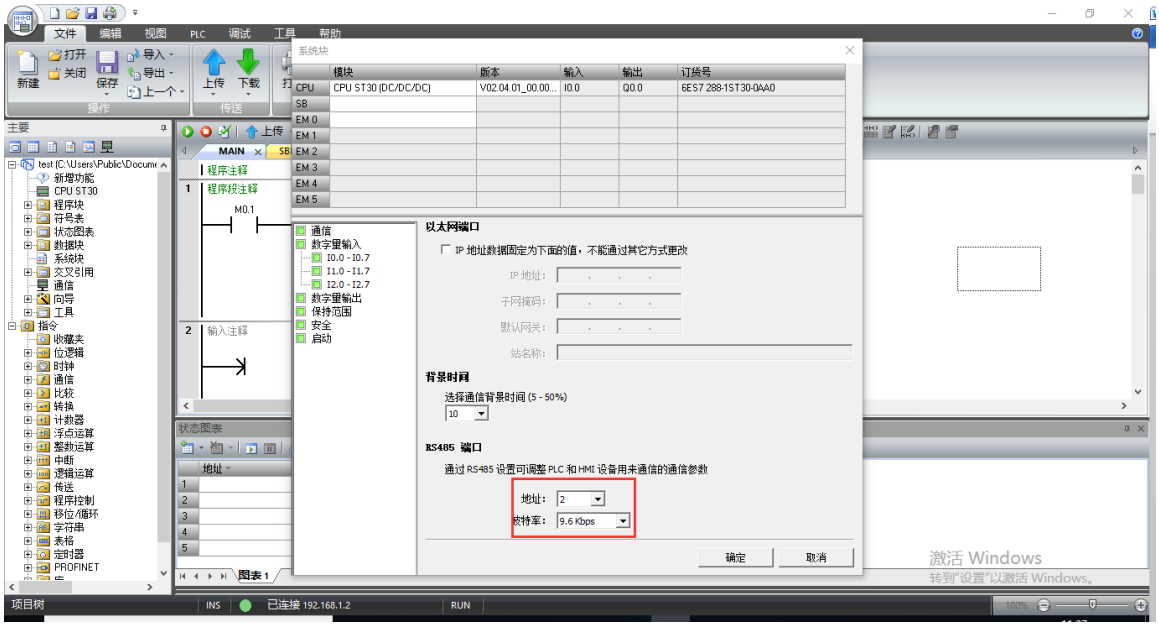
	Alias	00000	Alias	00010
0	Q0.0	1	VW0	22
1	Q0.1	1		0
2	Q0.2	0		0
3	Q0.3	0		0
4	WQ0.0	1		0
5	WQ0.1	1		0
6	WQ0.2	0		0
7	WQ0.3	0		0
8	M0.0	1		0
9	MW2	111		0



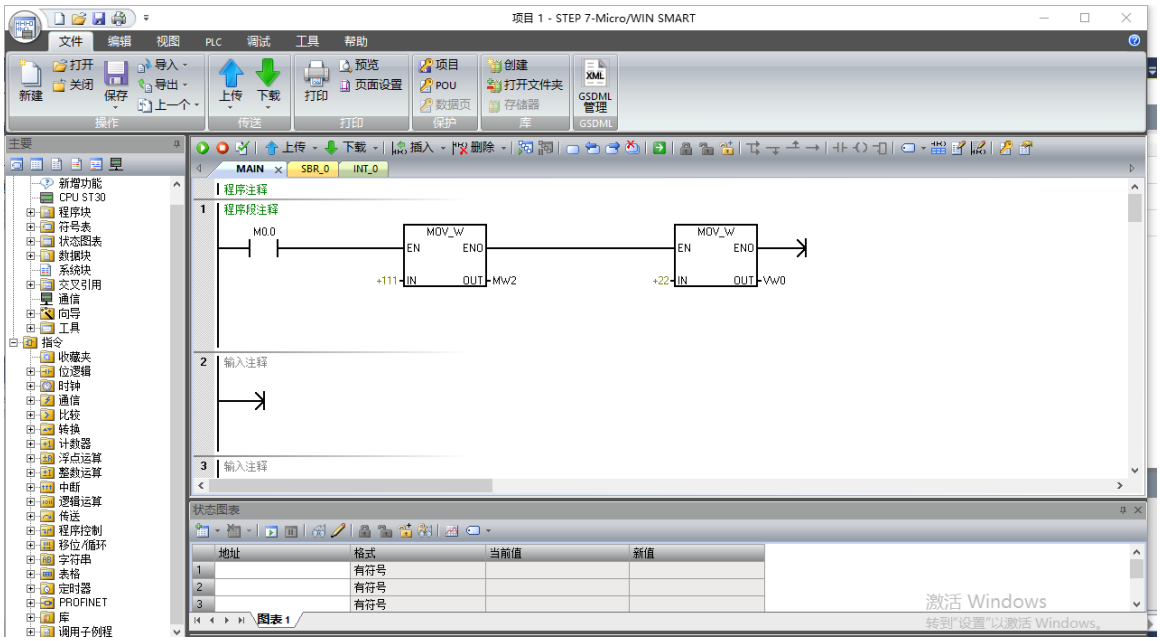
4.2 Implementing PPI Protocol to MQTT Data Exchange

4.2.1 Smart 200 PLC Configuration

Power on the Smart 200 PLC, connect pin 3 of the RS485 serial port to the gateway serial port 1T/S+, and pin 8 to the gateway serial port 1R/S-. Serial port parameters: ID = 2, 9600, E81.

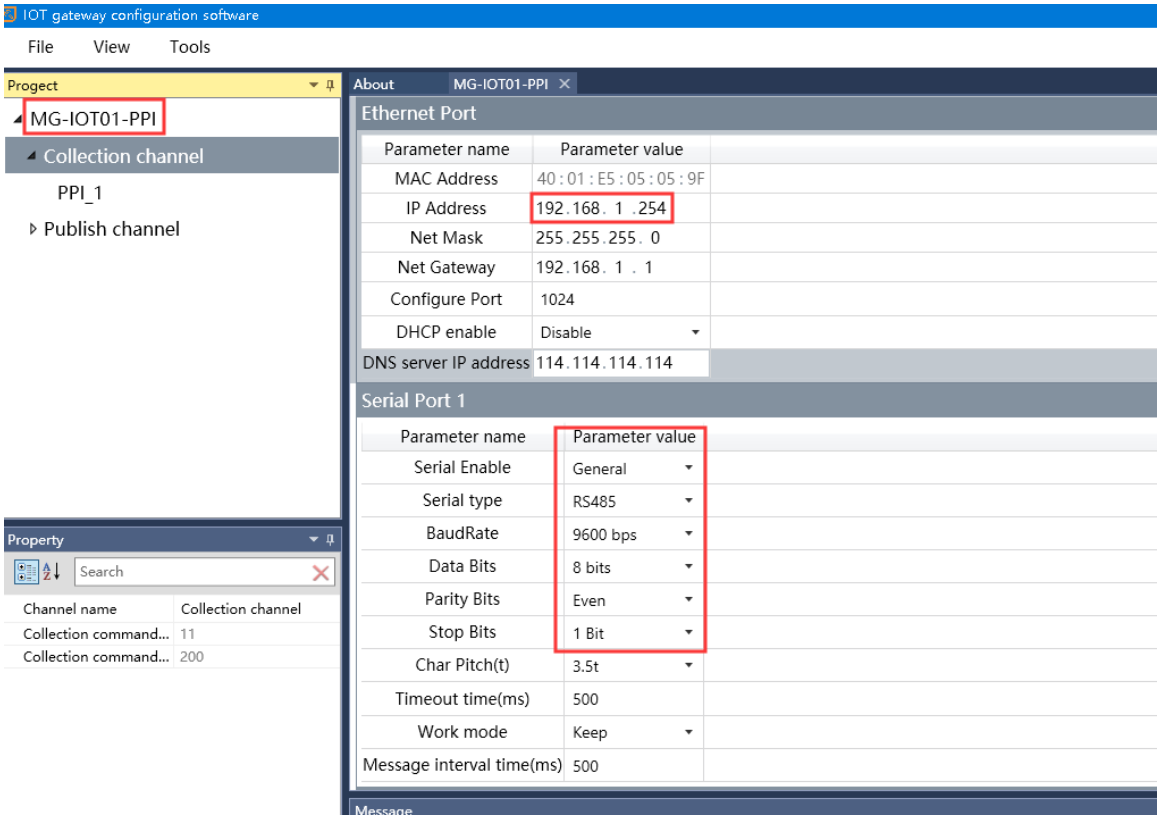


The test programming interface is as follows: After editing, save and download. Put the PLC in RUN.



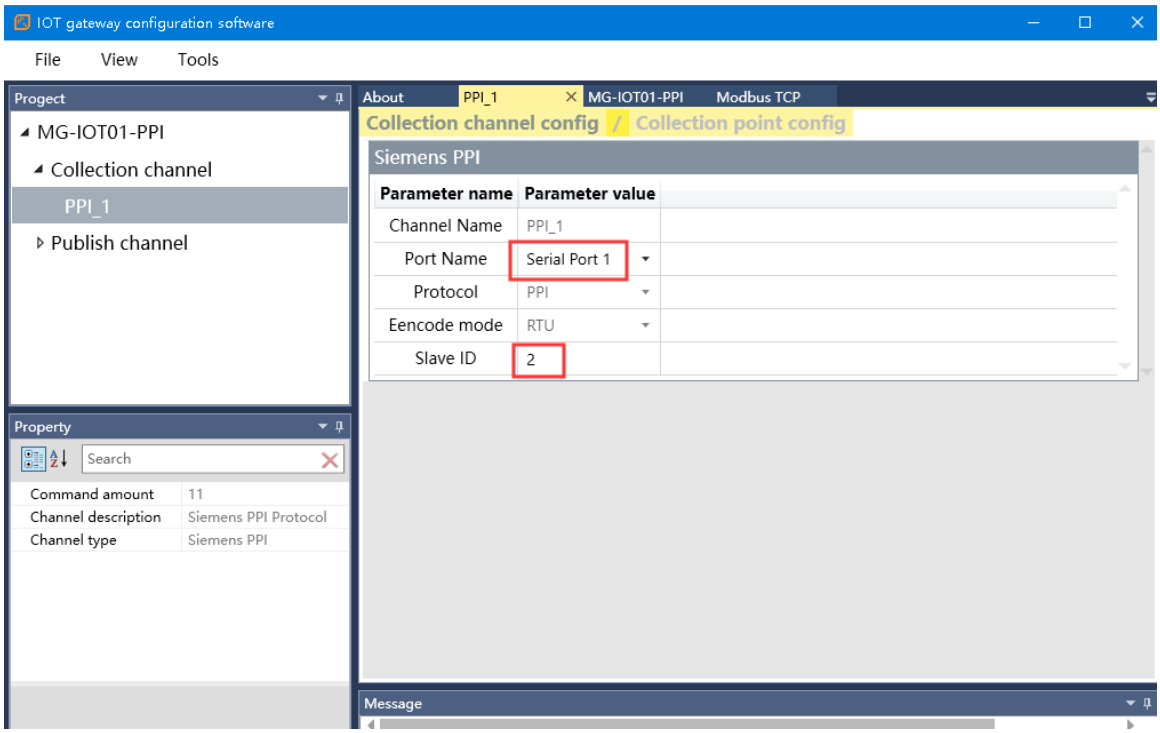
4.2.2 MG-IOT01 Configuration

Open the configuration software, click Tools-Searching for devices, select the local network card, click Searching for devices, it will scan to the IOT gateway of the same network segment, click OK to create an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS485 / 9600, even / 8/1, and other parameters default.

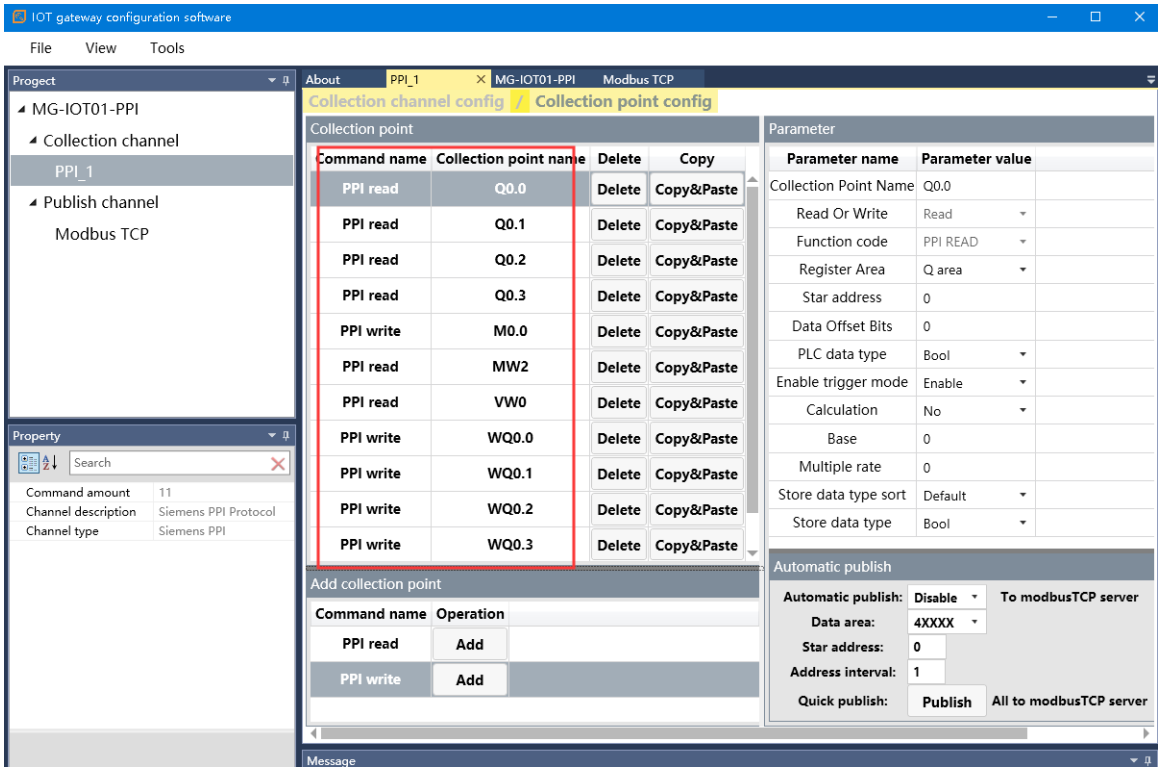


Configure the collection channel parameters as shown below:

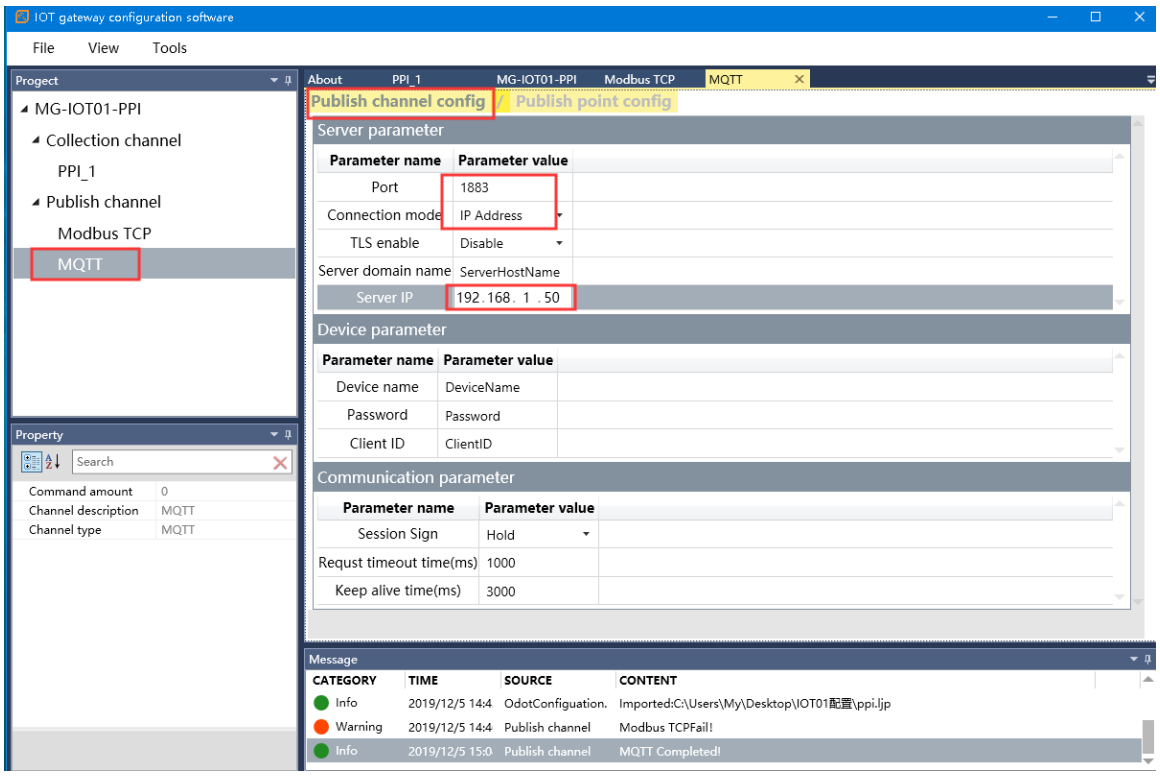
Select Serial Port 1 for the collection channel serial port and fill in 2 for the slave ID.



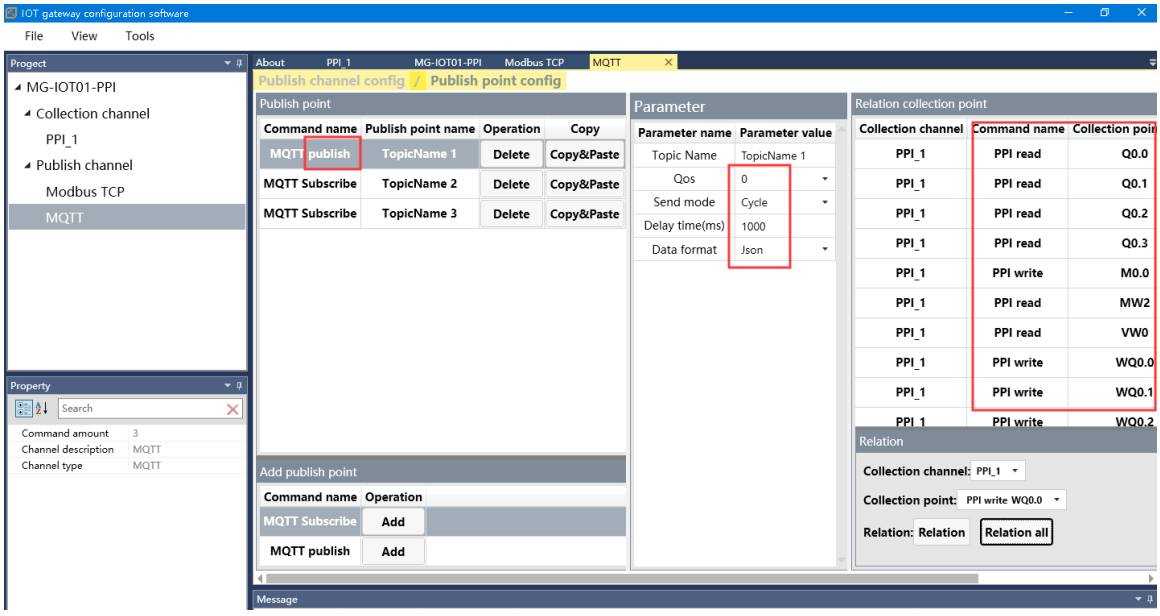
Configure the collection point as shown in the following:

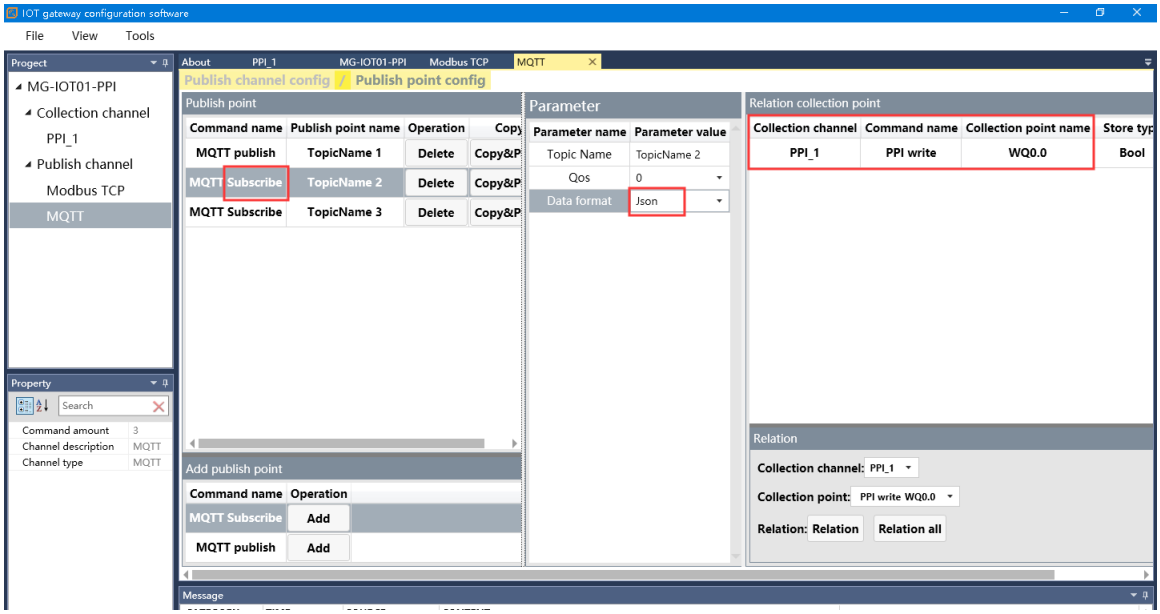


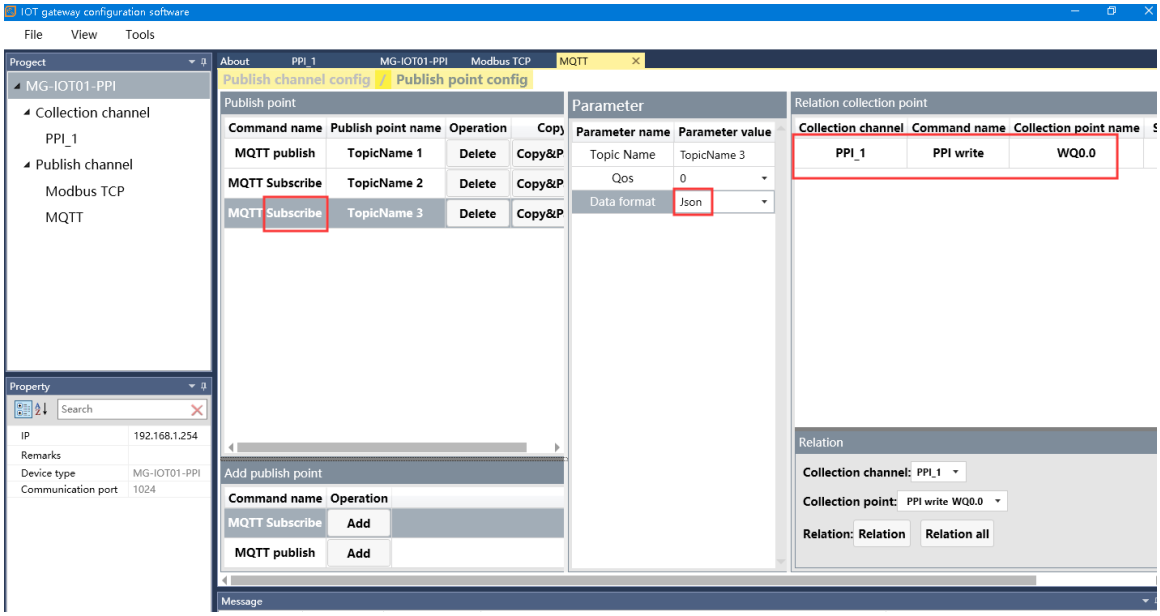
Right-click the Publish channel config to manually add the MQTT channel and set the configuration parameters manually. Port number: 1883, Connection mode: IP address, MQTT server IP: 192.168.1.50 (local machine's network card IP address, the machine simulates an MQTT server).



Click the Publish point config.

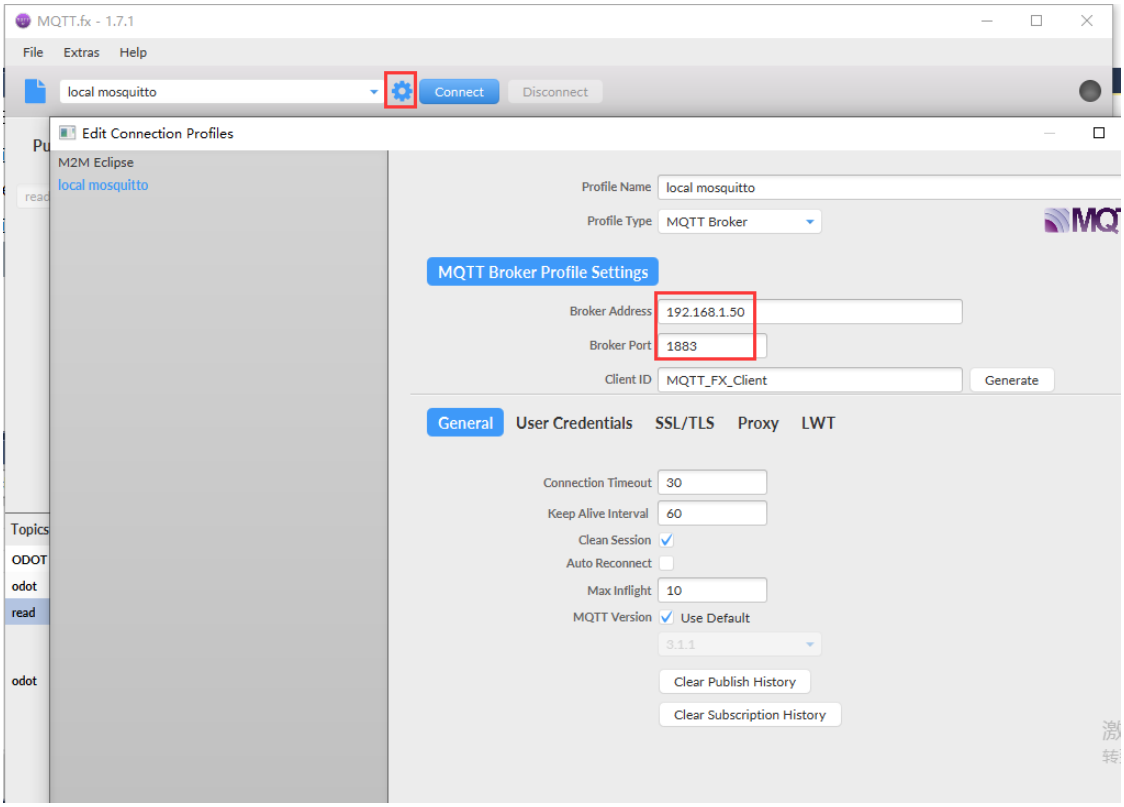


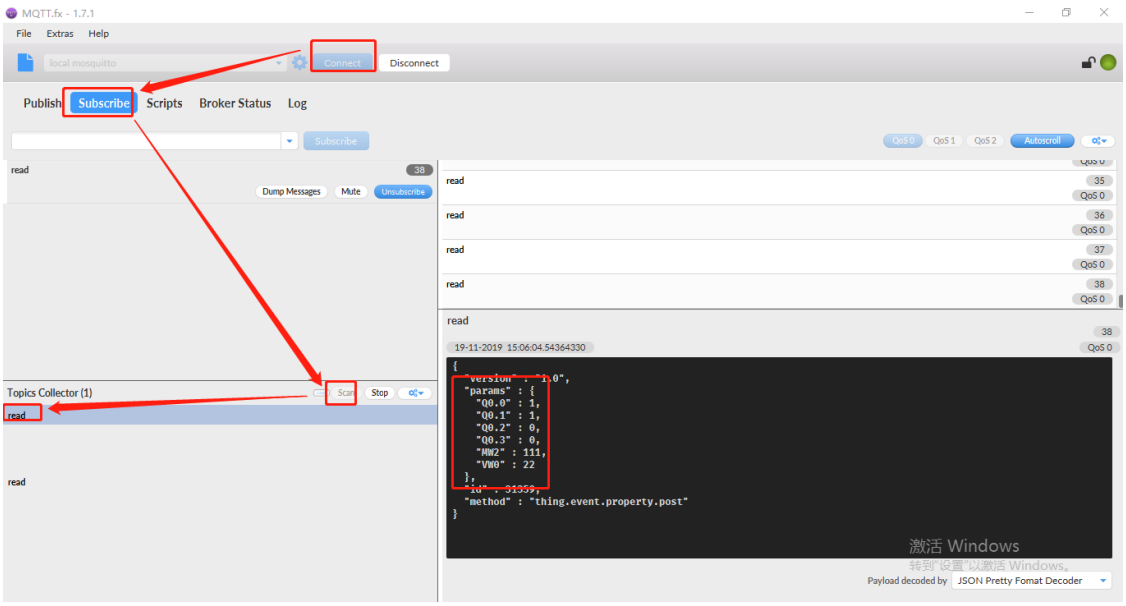

IOT gateway configuration software
File View Tools
Progect
MG-IOT01-PPI
Collection channel
PPI_1
Publish channel
Modbus TCP
MQTT
About PPI_1 MG-IOT01-PPI Modbus TCP MQTT
Publish channel config Publish point config
Publish point
Command name Publish point name Operation Copy
MQTT publish TopicName 1 Delete Copy&P
MQTT Subscribe TopicName 2 Delete Copy&P
MQTT Subscribe TopicName 3 Delete Copy&P
Parameter
Parameter name Parameter value
Topic Name TopicName 2
Qos 0
Data format Json
Relation collection point
Collection channel Command name Collection point name Store typ
PPI_1 PPI write WQ0.0 Bool
Property
Search
Command amount 3
Channel description MQTT
Channel type MQTT
Add publish point
Command name Operation
MQTT Subscribe Add
MQTT publish Add
Relation
Collection channel: PPI_1
Collection point: PPI write WQ0.0
Relation: Relation Relation all
Message


IOT gateway configuration software
File View Tools
Progect
MG-IOT01-PPI
Collection channel
PPI_1
Publish channel
Modbus TCP
MQTT
About PPI_1 MG-IOT01-PPI Modbus TCP MQTT
Publish channel config Publish point config
Publish point
Command name Publish point name Operation Copy
MQTT publish TopicName 1 Delete Copy&P
MQTT Subscribe TopicName 2 Delete Copy&P
MQTT Subscribe TopicName 3 Delete Copy&P
Parameter
Parameter name Parameter value
Topic Name TopicName 3
Qos 0
Data format Json
Relation collection point
Collection channel Command name Collection point name
PPI_1 PPI write WQ0.0
Property
Search
IP 192.168.1.254
Remarks
Device type MG-IOT01-PPI
Communication port 1024
Add publish point
Command name Operation
MQTT Subscribe Add
MQTT publish Add
Relation
Collection channel: PPI_1
Collection point: PPI write WQ0.0
Relation: Relation Relation all
Message

After all the collection points and publish points are configured, right-click MG-IOT01-PPI, and you can choose to download the configuration to the gateway. After successful download, complete the data MQTT publish.

After completing the above settings, the MQTT client can use the MQTT.fx test software to access the gateway and access the collected data.





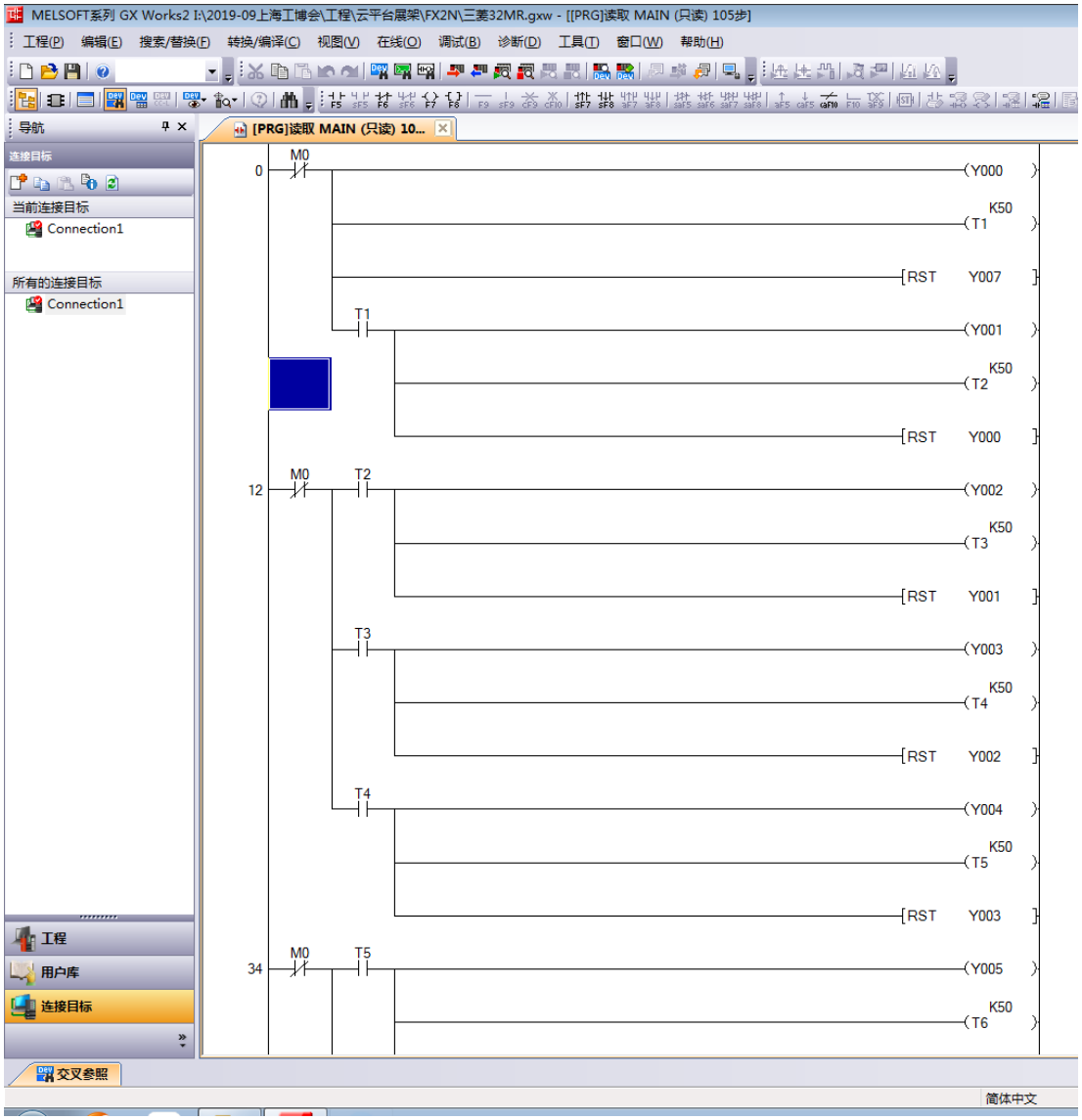
5 Testing Applications for Collecting Mitsubishi FX Series PLC Data

5.1 Implementing FX Serial Port Protocol to Modbus TCP Data Exchange

5.1.1 MITSUBISHI PLC Configuration

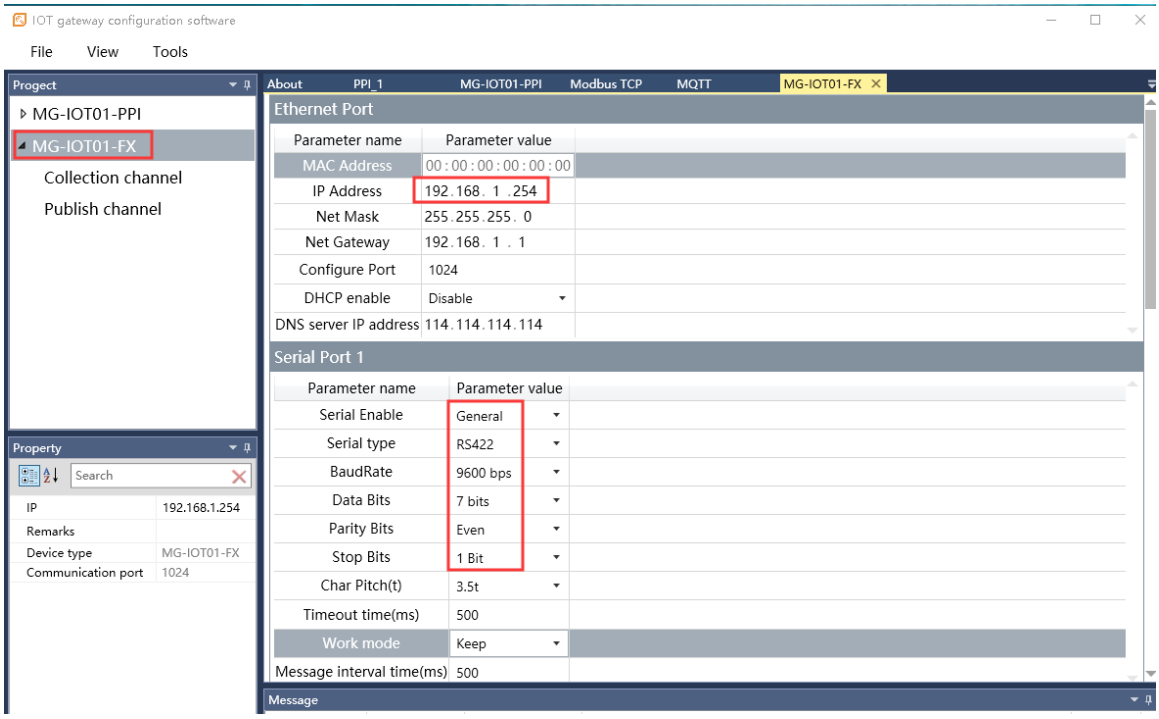
Power on Mitsubishi PLC, connect 1 of RS422 serial port pin to gateway serial port 1T/S-, pin 2 to gateway serial port 1T/S+, pin 4 to gateway serial port 2R/S-, and pin 7 to Gateway serial port 2R/S+. Serial port parameters: ID = 2,9600, E71.

The test programming interface is as follows: After editing, save and download. Put PLC in RUN.



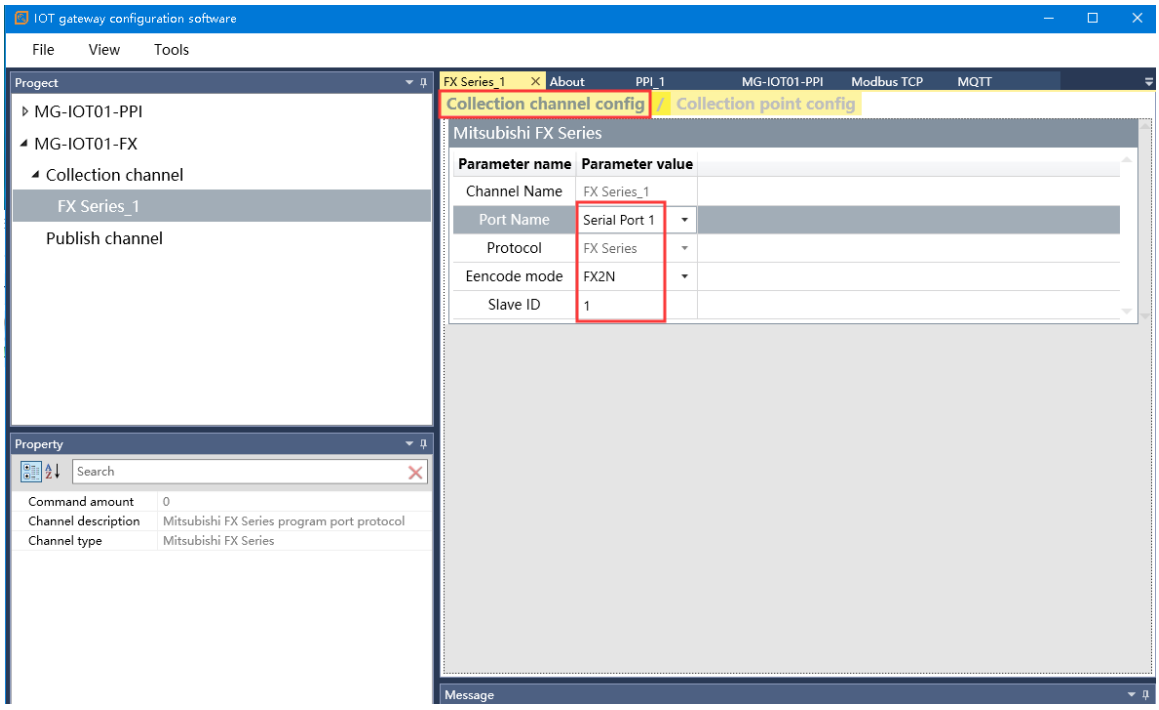
5.1.2 MG-IOT01 Configuration

Open the configuration software, click Tools-Searching for devices, select the local network card, click Searching for devices, it will scan to the IOT gateway of the same network segment, click OK to create an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS422 / 9600, even / 7/1, and other parameters default.

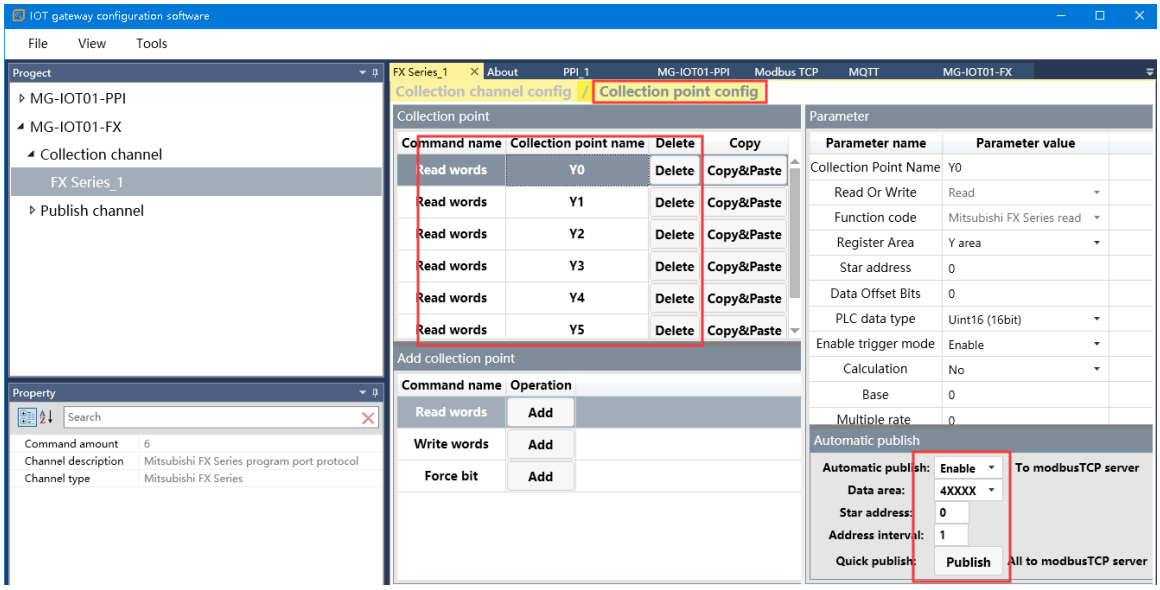


Configure the collection channel parameters as shown below:

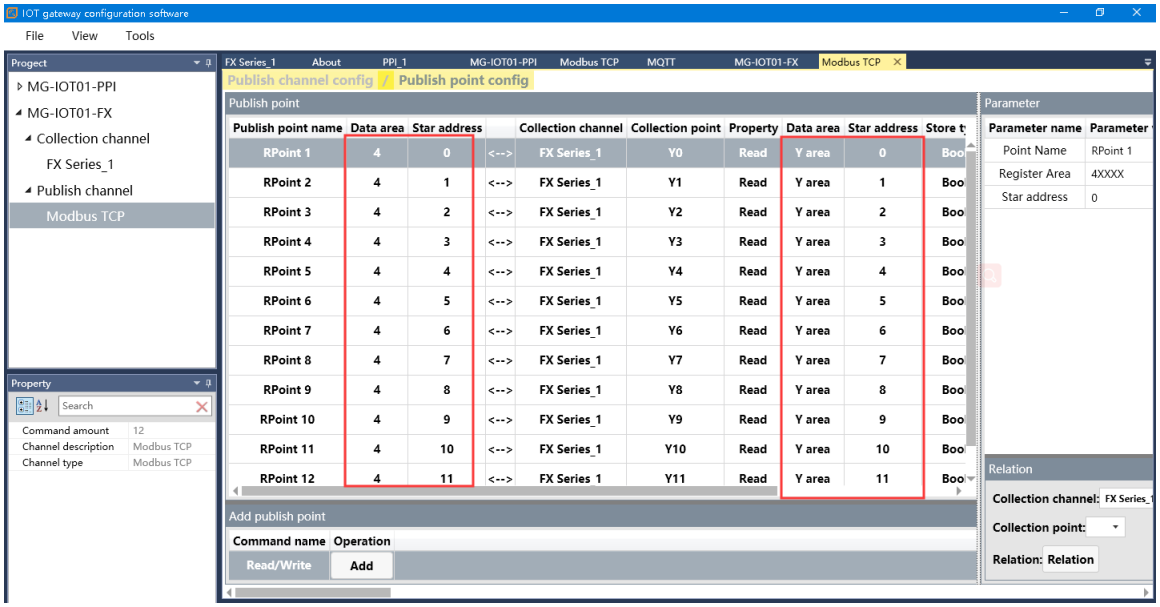
Select Serial Port 1 for the collection channel serial port and fill in 1 for the slave ID.



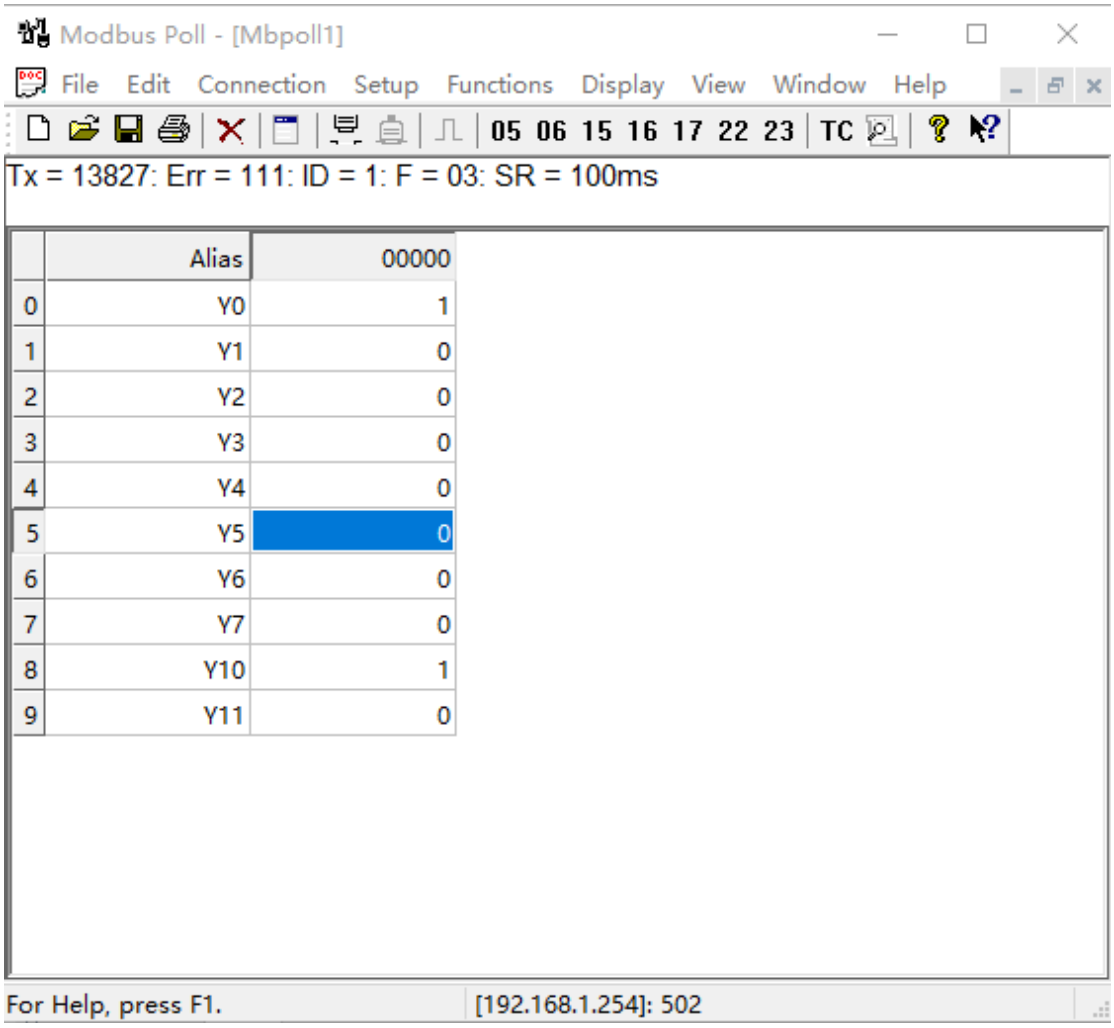
Configure the collection point and click Publish to area 4.



Click the Publish channel and click MODBUS TCP to view the correspondence relationship of the data publish address. After configuring all collection points and publish points, right-click MG-IOT01-FX and select Download Configuration to Gateway.



After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the gateway through the gateway IP address 192.168.1.254 and Modbus data communication port 502 to access the collected data. This document uses Modbus Poll to simulate Modbus TCP client to collect data.



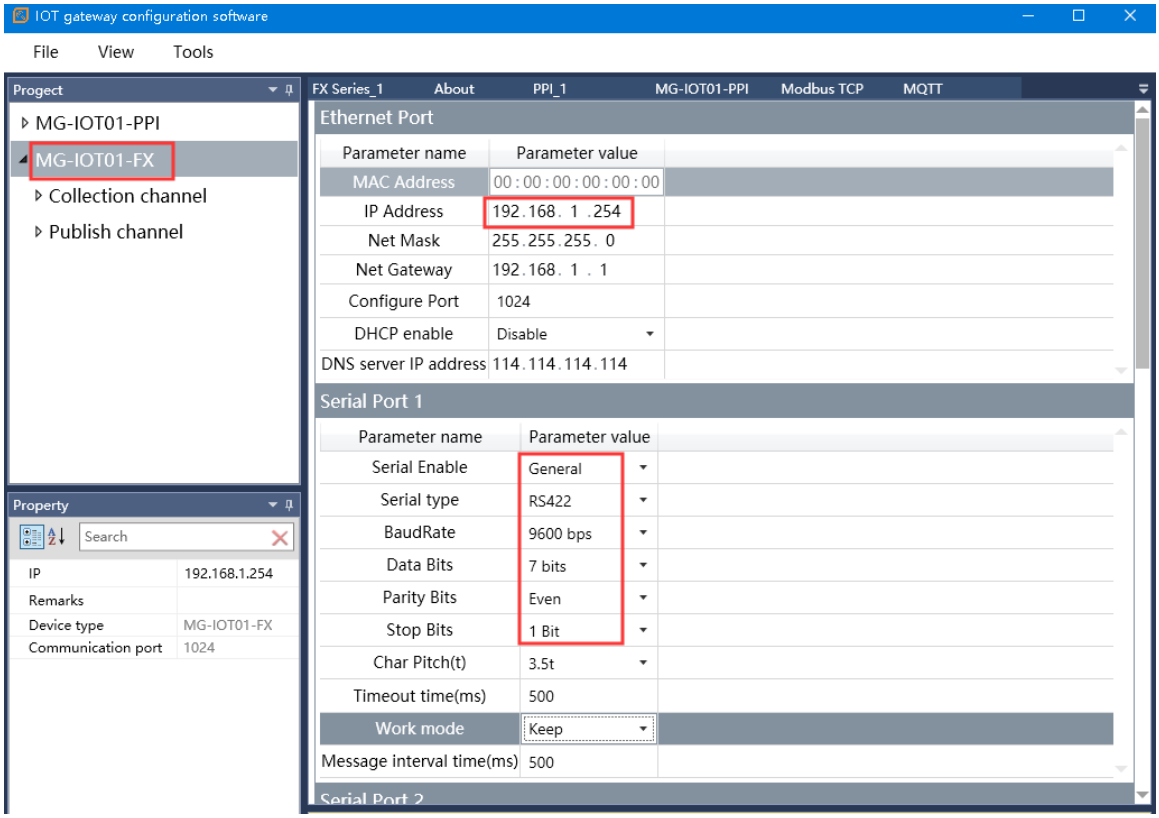
5.2 Implementing FX Serial Port Protocol to MQTT Data Exchange

5.2.1 Same as 5.1.1

5.2.2 MG-IOT01 Configuration

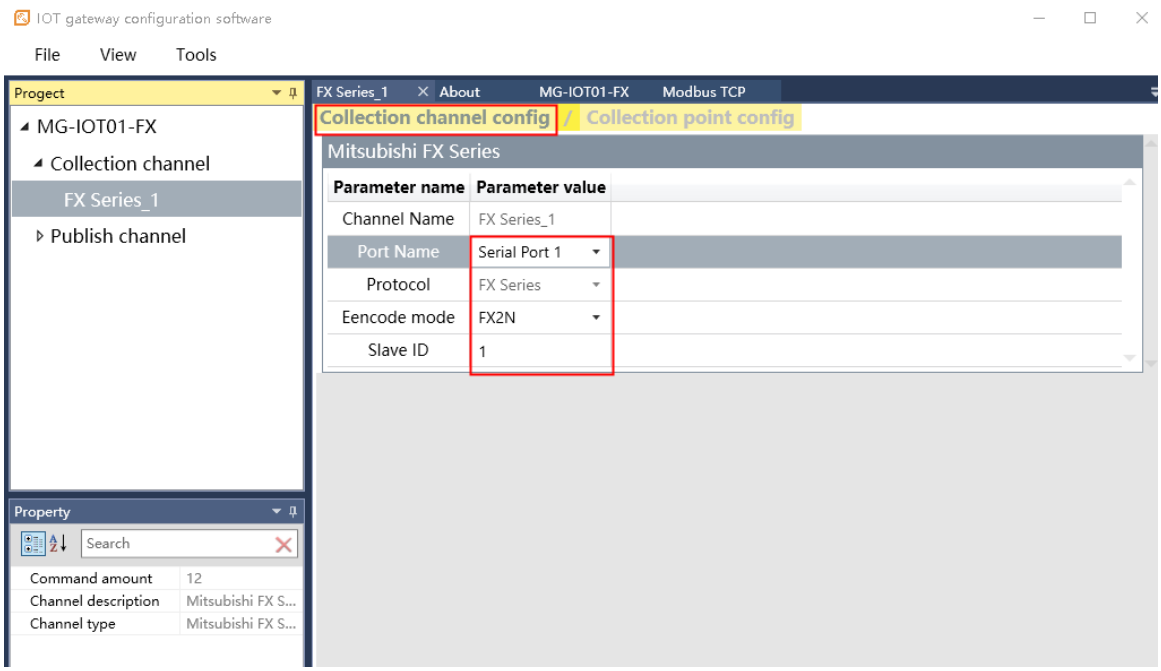
Open the configuration software, click Tools-Searching for devices, select the

local network card, click Searching for devices, it will scan to the IOT gateway of the same network segment, click OK to create an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS422 / 9600, even / 7/1, and other parameters default.

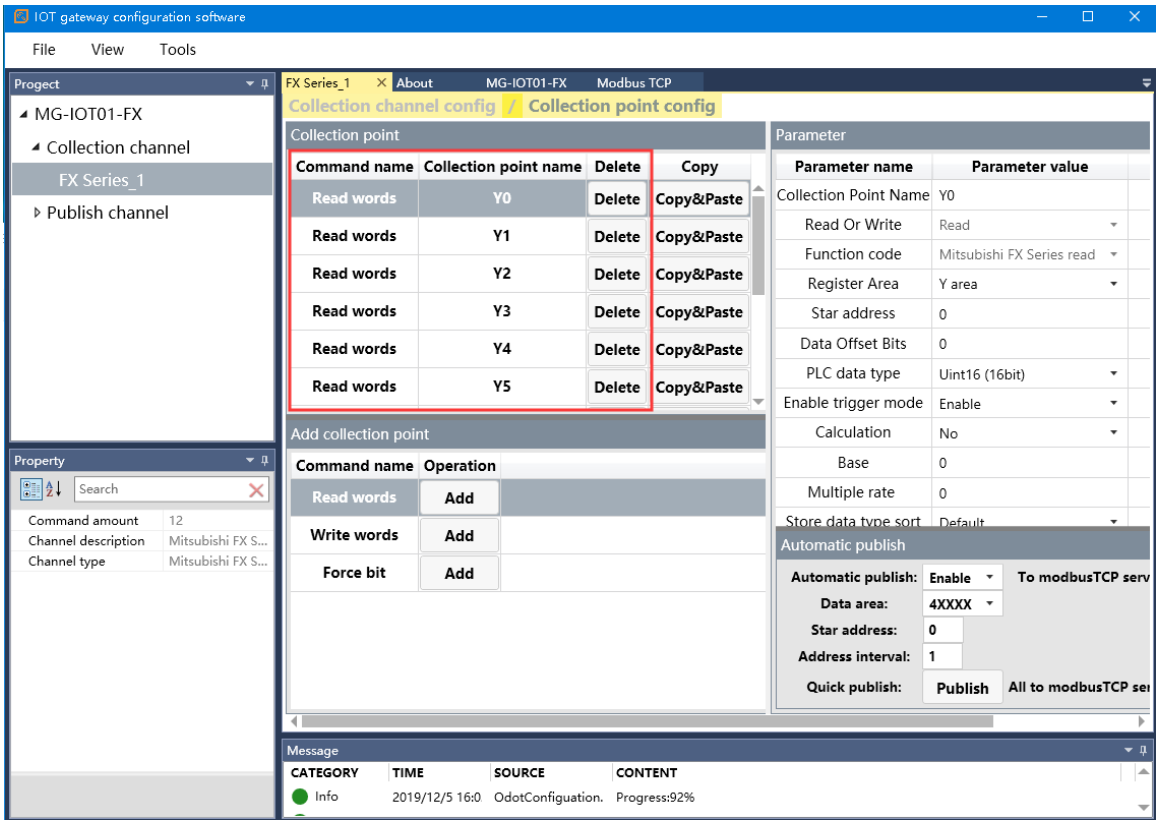


Configure the collection channel parameters as shown below:

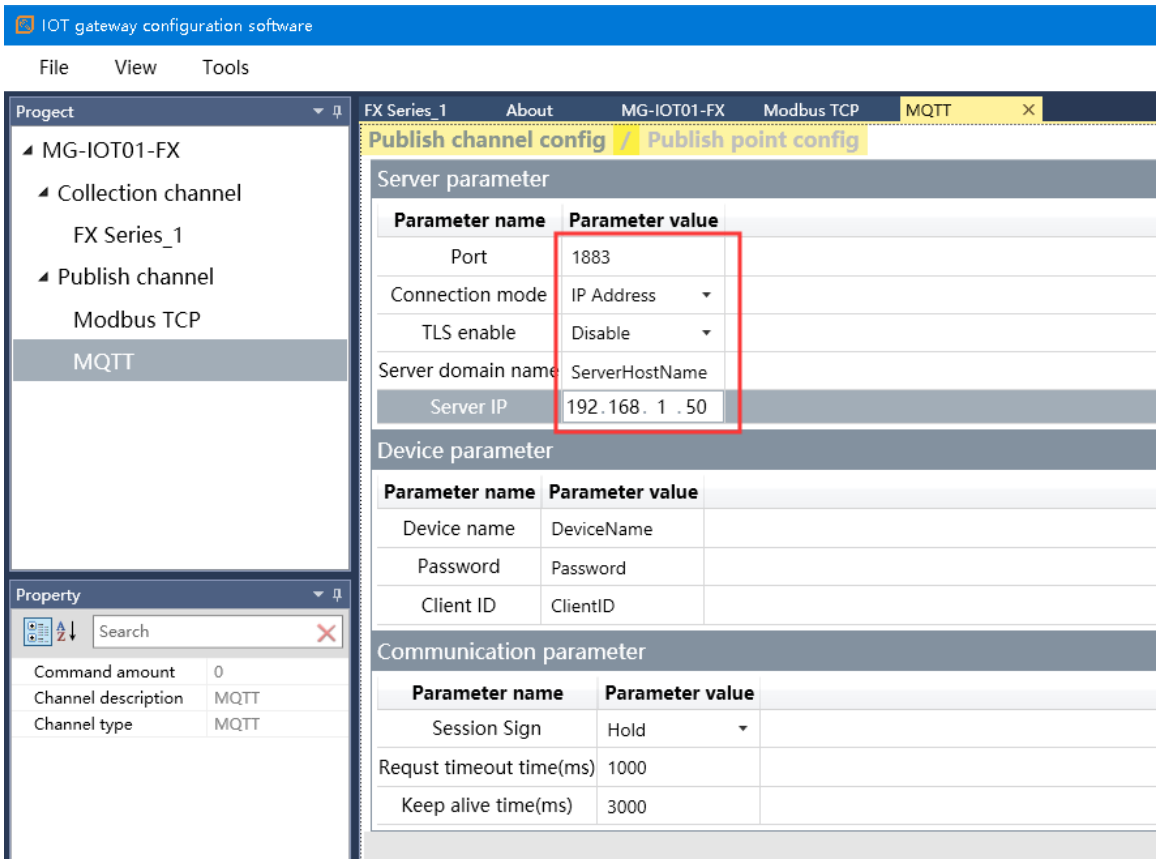
Select serial port 1 for the collection channel serial port, select FX2N for the Encode method, and set 1 for the slave ID.



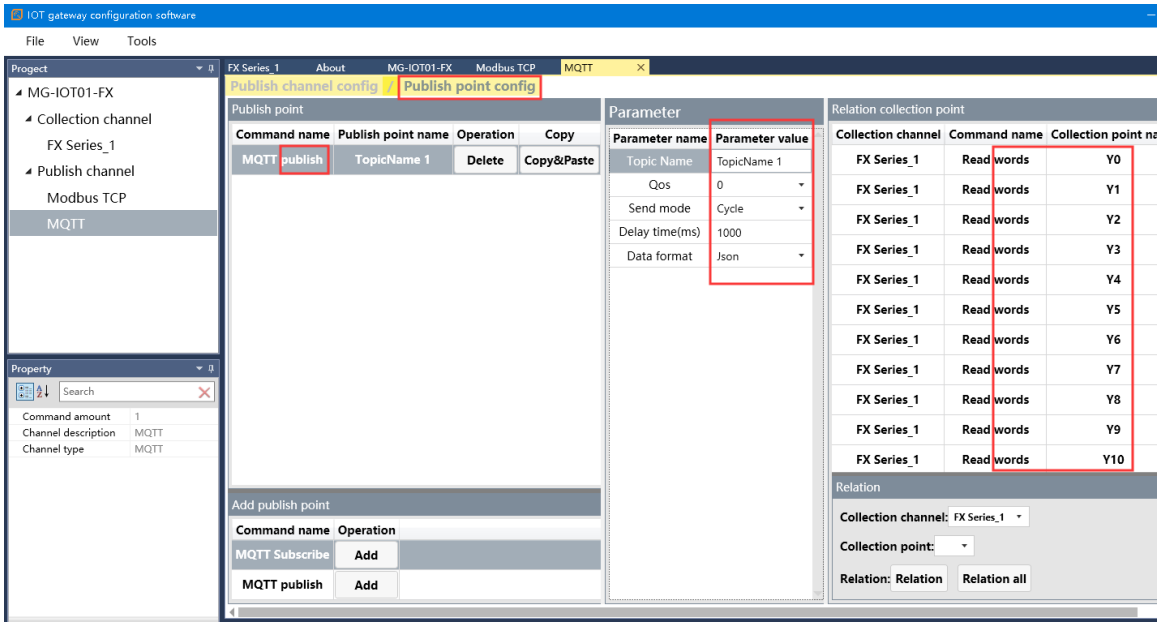
Configure the collection point as shown in the following figure:



Right-click the PUBLISH channel to manually add the MQTT channel and set the configuration parameters manually. Port number: 1883, connection mode: IP address, MQTT server IP: 192.168.1.50 (local computer network card IP address, the computer simulates MQTT server).

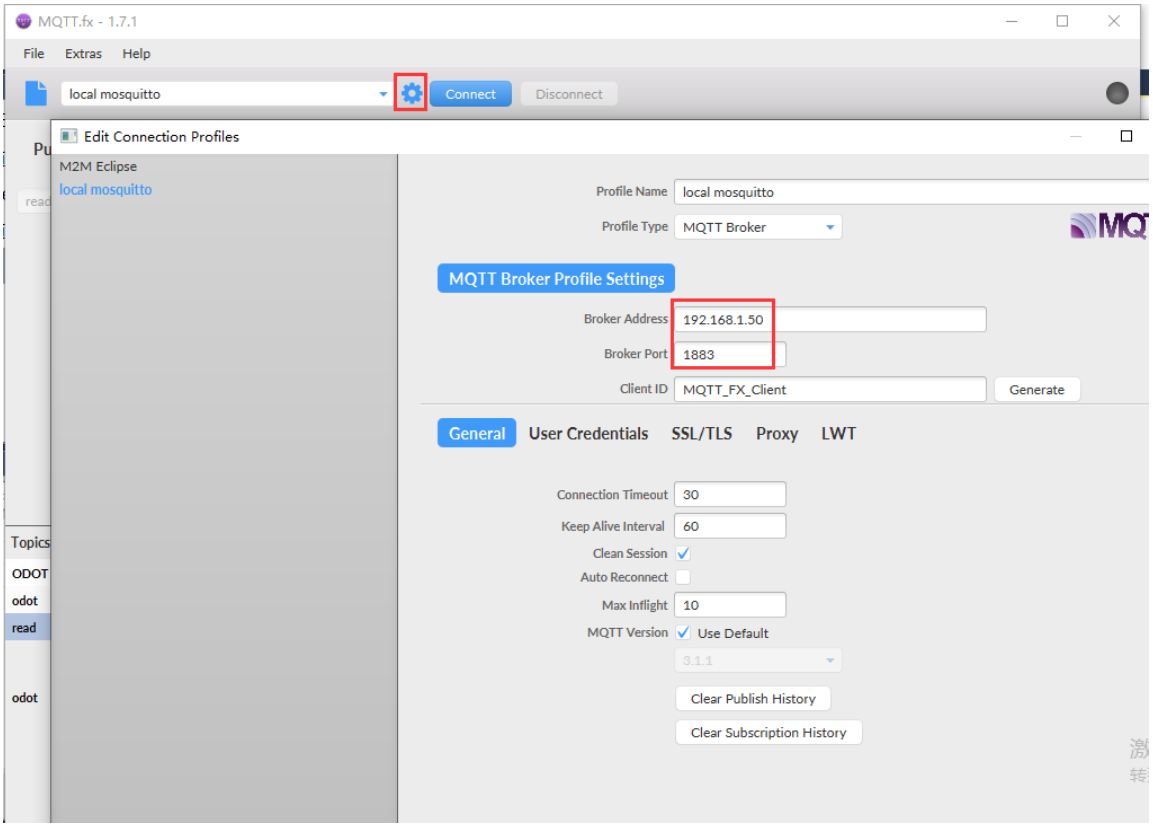


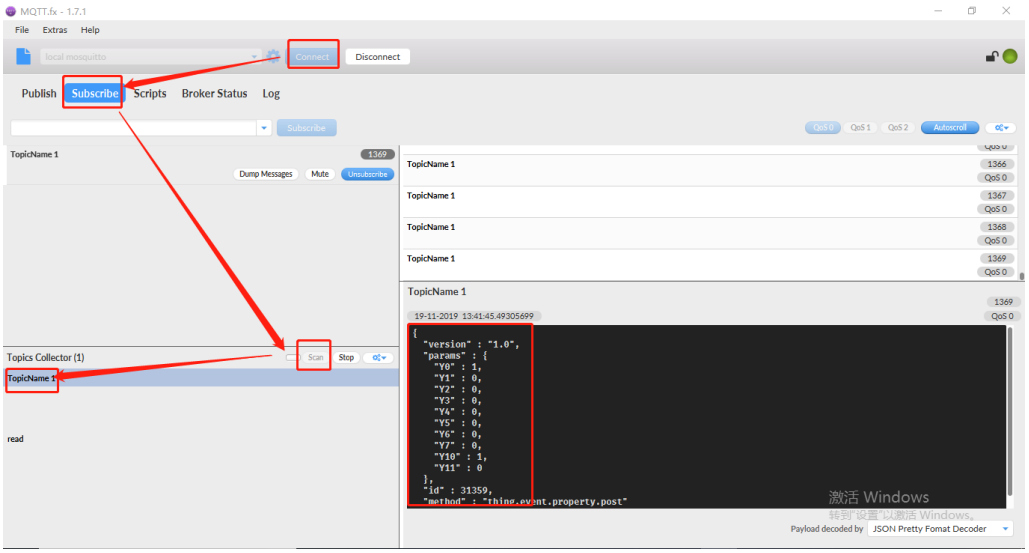
Click Publishing Point config.



After all the collection points and publishing points are configured, right-click MG-IOT01-FX and choose to download and configure to the gateway. After successful download, complete the data MQTT publish.

After completing the above settings, the MQTT client can use the MQTT.fx test software to access the gateway and access the collected data.



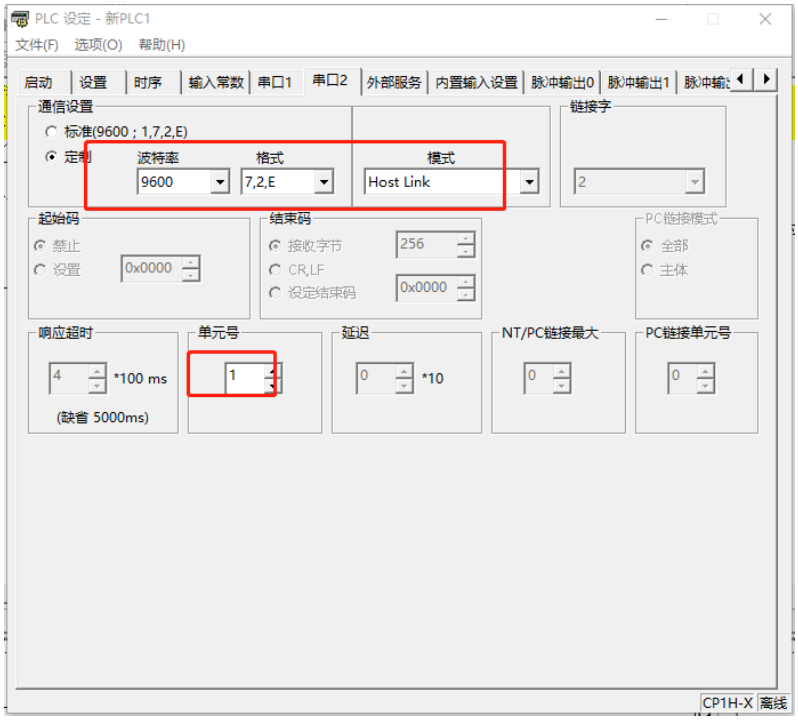


6 Test Application for Collecting Omron PLC Data

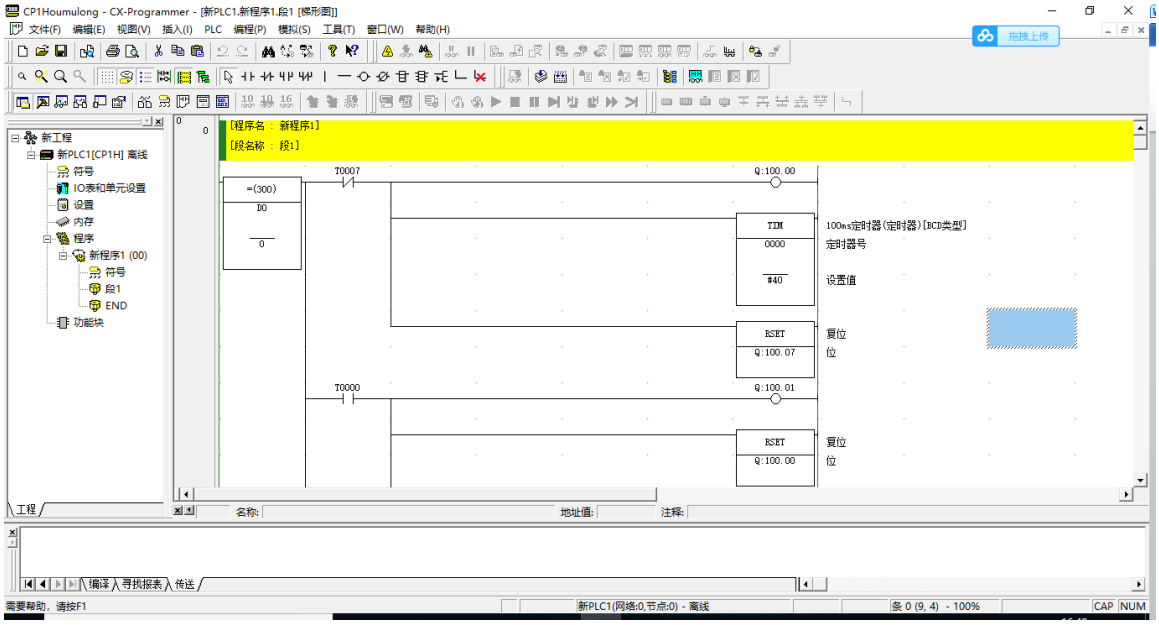
6.1 Implementing the Hostlink Protocol to Modbus TCP Data Exchange

6.1.1 Omron PLC Configuration

Power on the Omron PLC, and add a CP1W-CIF11 (485 communication module). This communication module has a DIP switch to set the communication mode. It is necessary to turn 2, 3 to ON (RS485 mode). Connect the second terminal interface RDB + on the front to the gateway serial port 1T/S+, and the first terminal interface RDA- on the front to the gateway serial port 1R/S-. Set serial port parameters: unit number 1, 9600, 7/E/2, Hostlink mode.

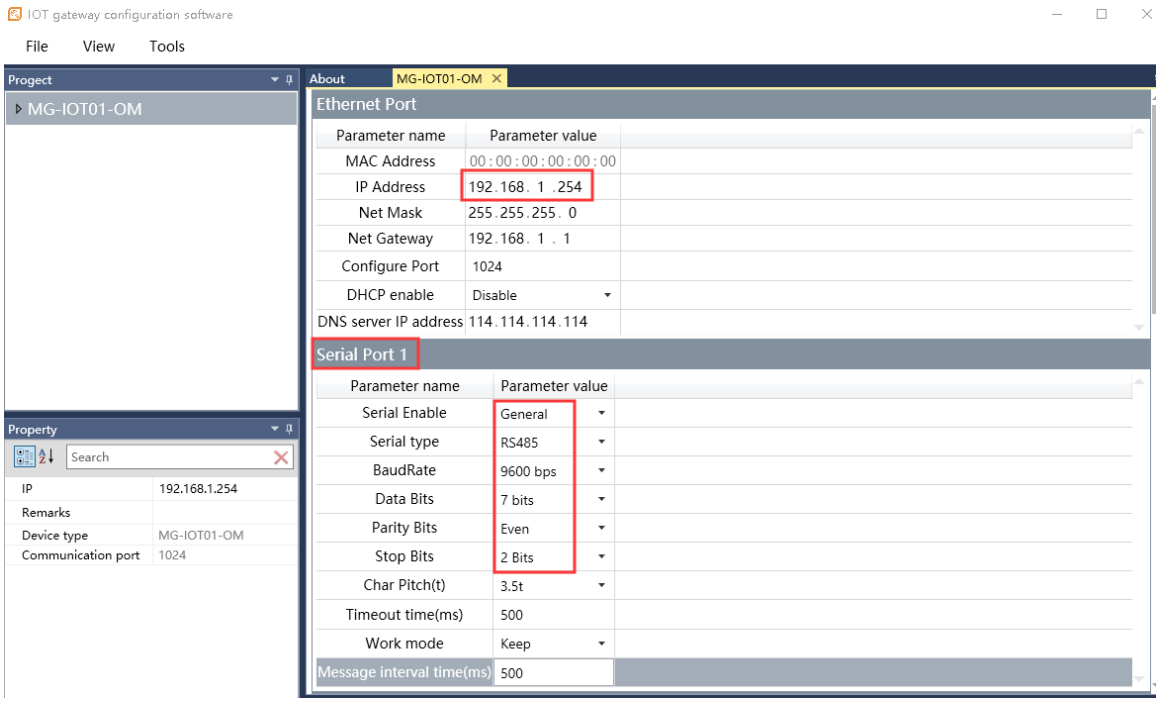


The test programming interface is as follows: After editing, save and download. Put PLC in RUN.



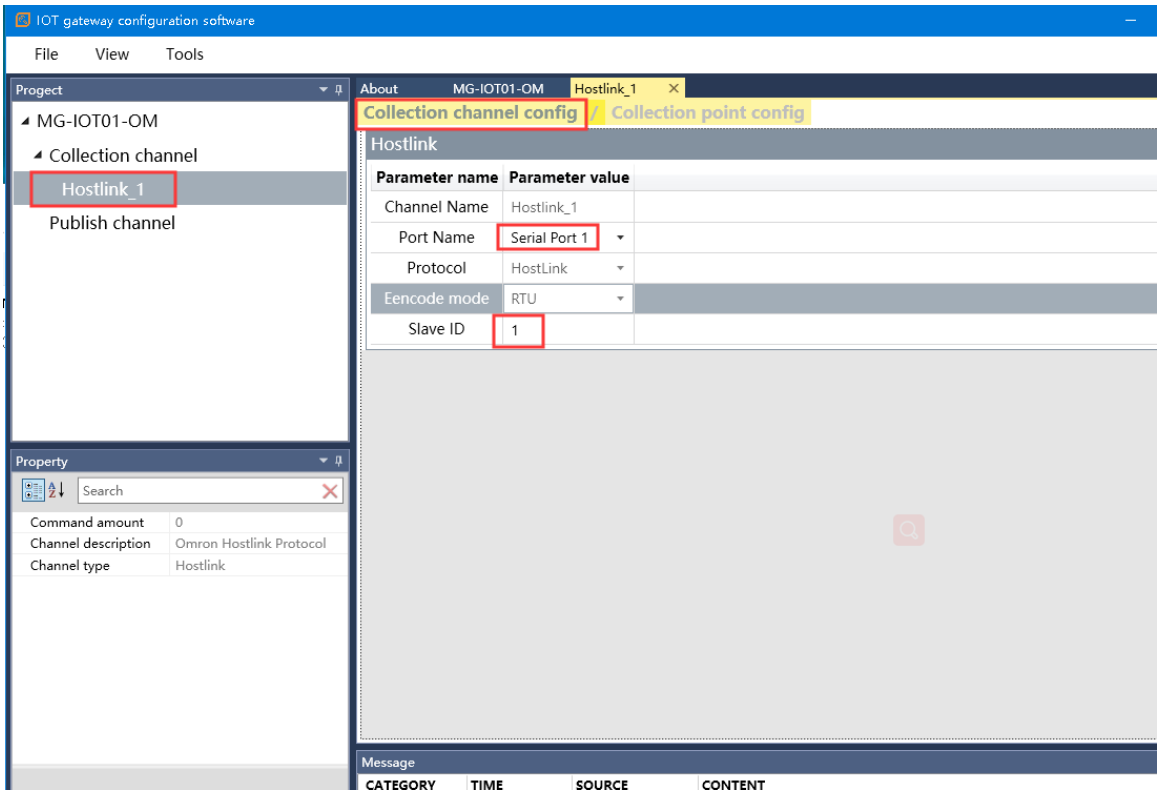
6.1.2, MG-IOT01 Configuration

Open the configuration software "Odot Configuration Software", click Tools-Search for devices, select the local network card, click Search for devices, and the IOT gateway on the same network segment will be scanned. Click OK to generate an IOT project. : 192.168.1.254. PLC serial port 1, set the parameters of serial port 1 to pass-through, RS485 / 9600, even / 7/2, and other parameter settings.

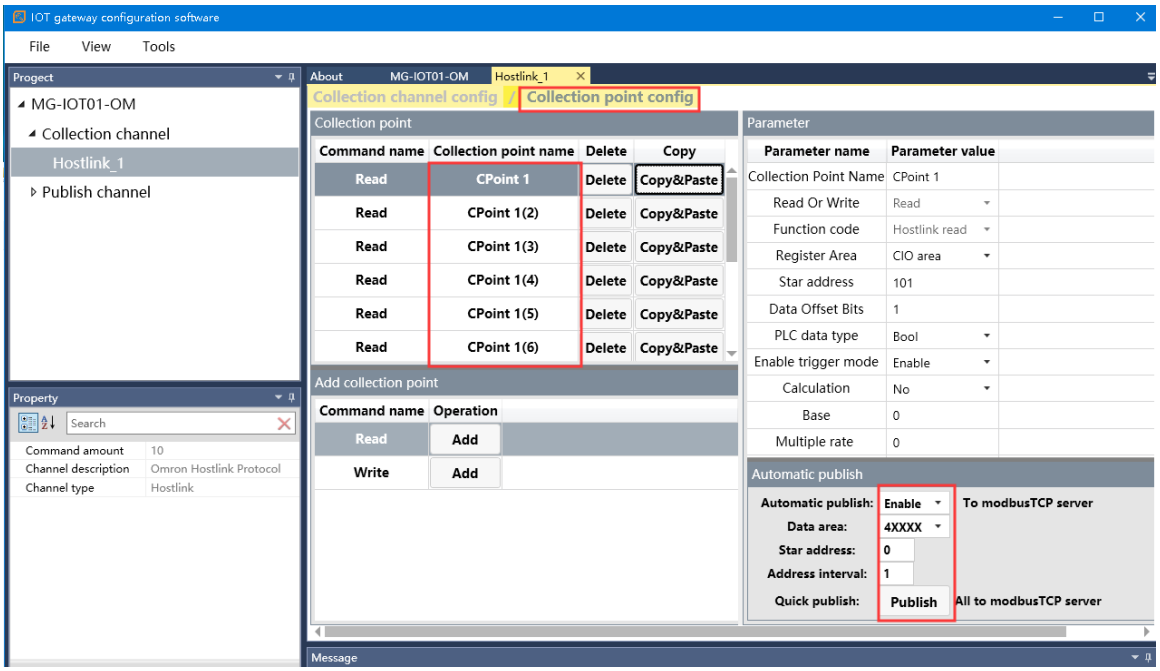


Configure the Collection channel parameters as shown below:

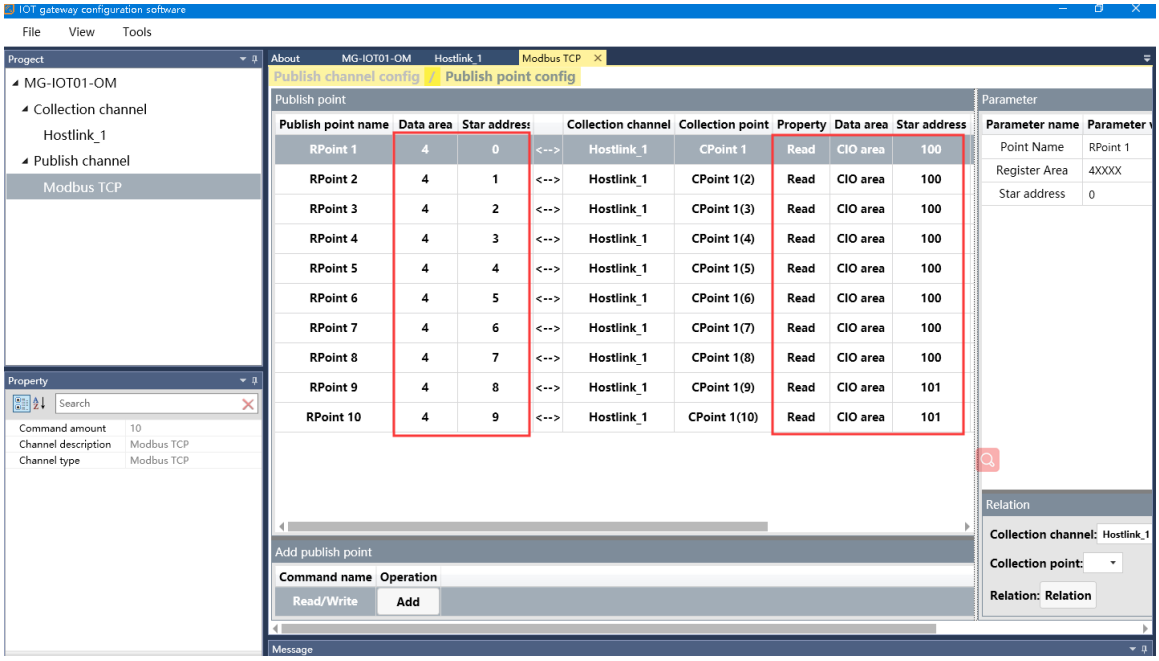
Select serial port 1 for the collection channel serial port and fill in 1 for the slave ID.



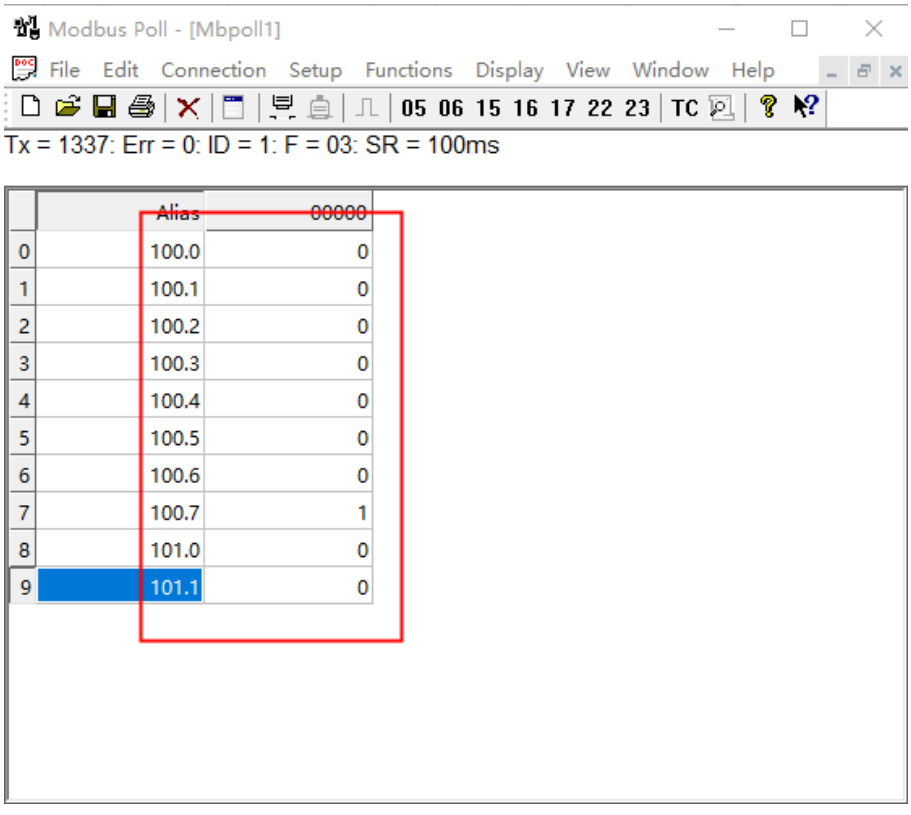
Configure the collection point and click Publish to area 4.



Click the Publish channel and click MODBUS TCP to view the correspondence relationship of the data publish address. After configuring all collection points and publish points, right-click MG-IOT01-OM and select Download Configuration to Gateway.



After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the gateway through the gateway IP address 192.168.1.254 and Modbus data communication port 502 to access the collected data. This document uses Modbus Poll to simulate Modbus TCP client to collect data.

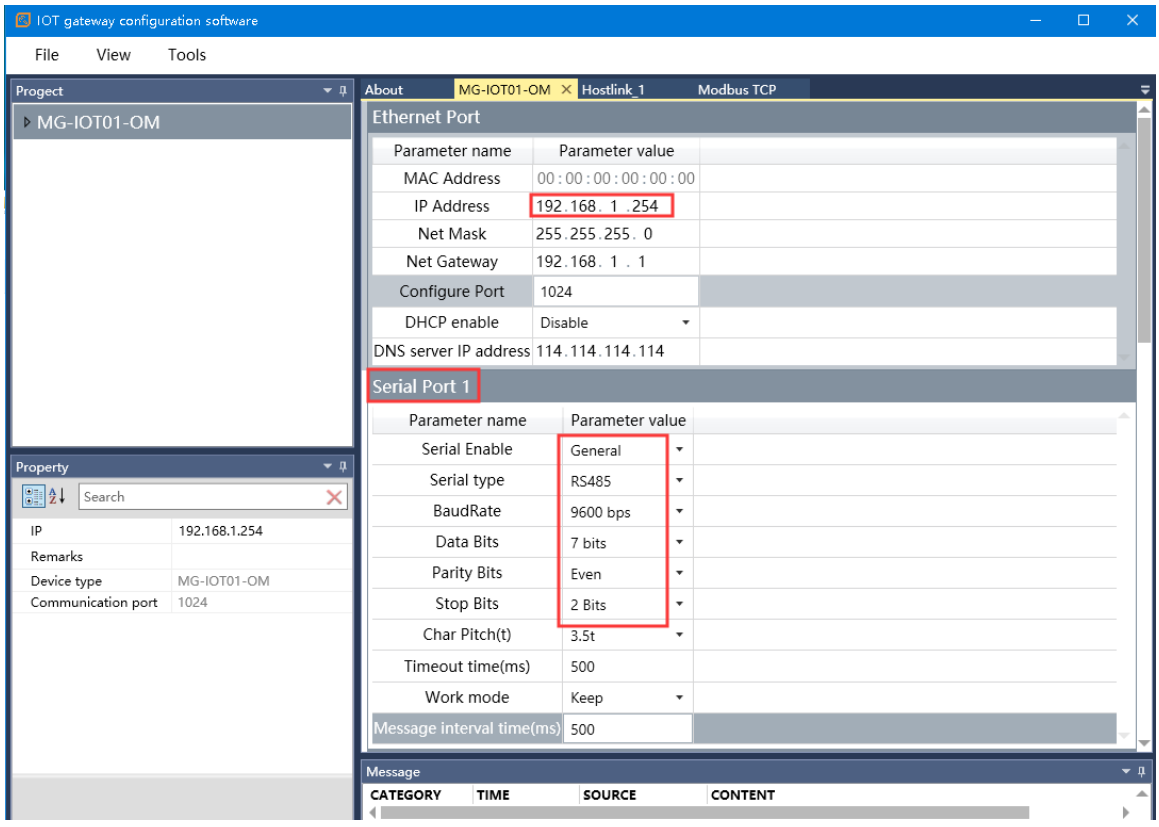


6.2 Implementing the Hostlink Protocol to MQTT Data Exchange

6.2.1 Same as 6.1.1

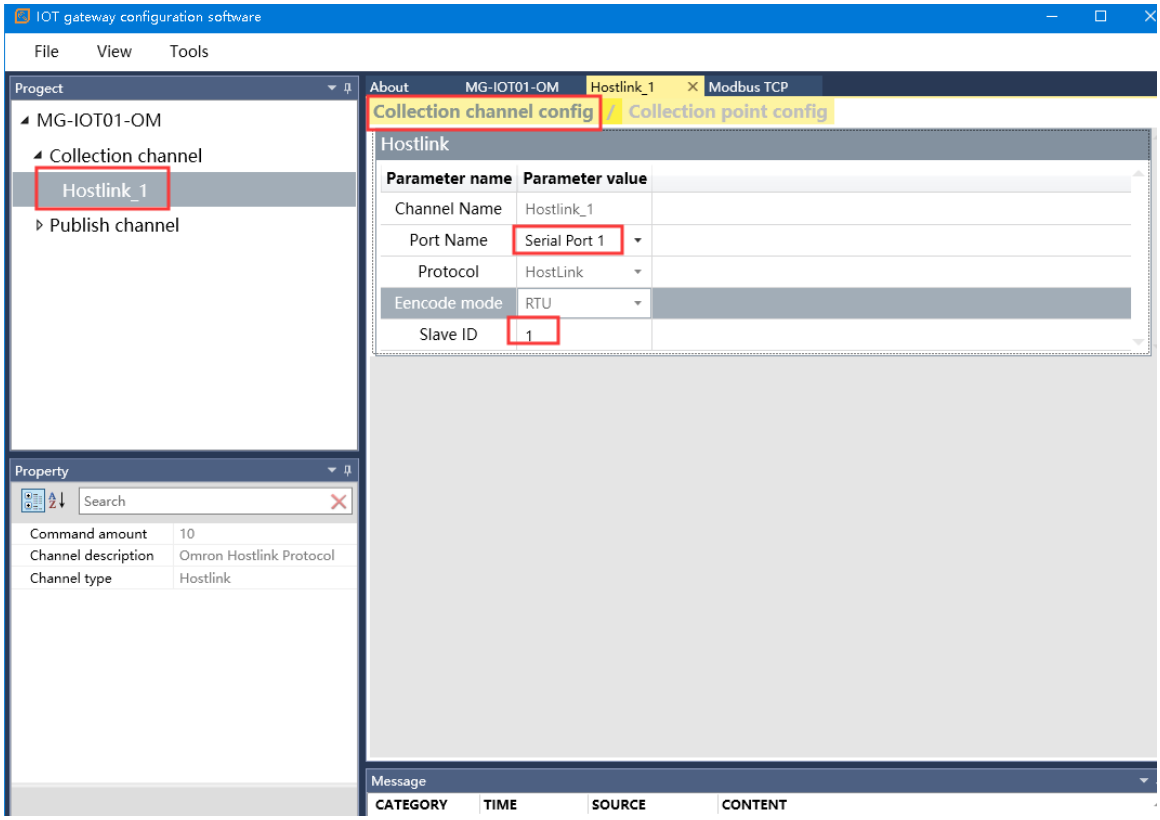
6.2.2 MG-IOT01 Configuration

Open the configuration software "Odot Configuration Software", click Tools-Search for devices, select the local network card, click Search for devices, it will scan to the IOT gateway of the same network segment, click OK to generate an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS485 / 9600, even / 7/2, and other parameters are default.

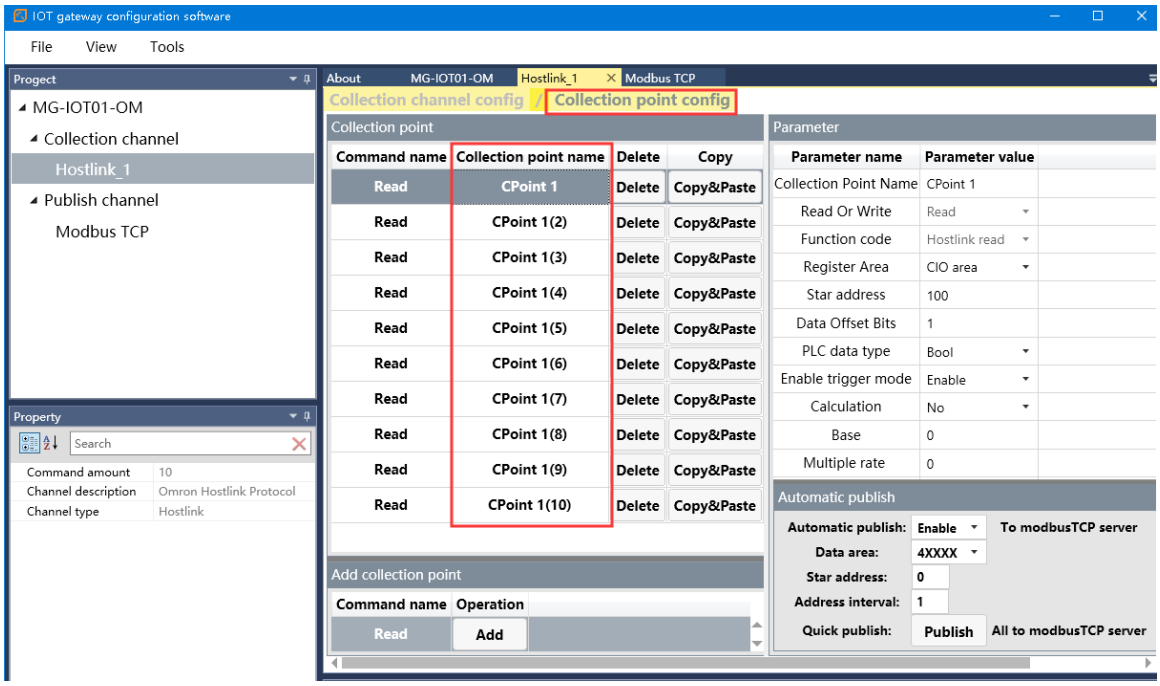


Configure the collection channel parameters as shown below:

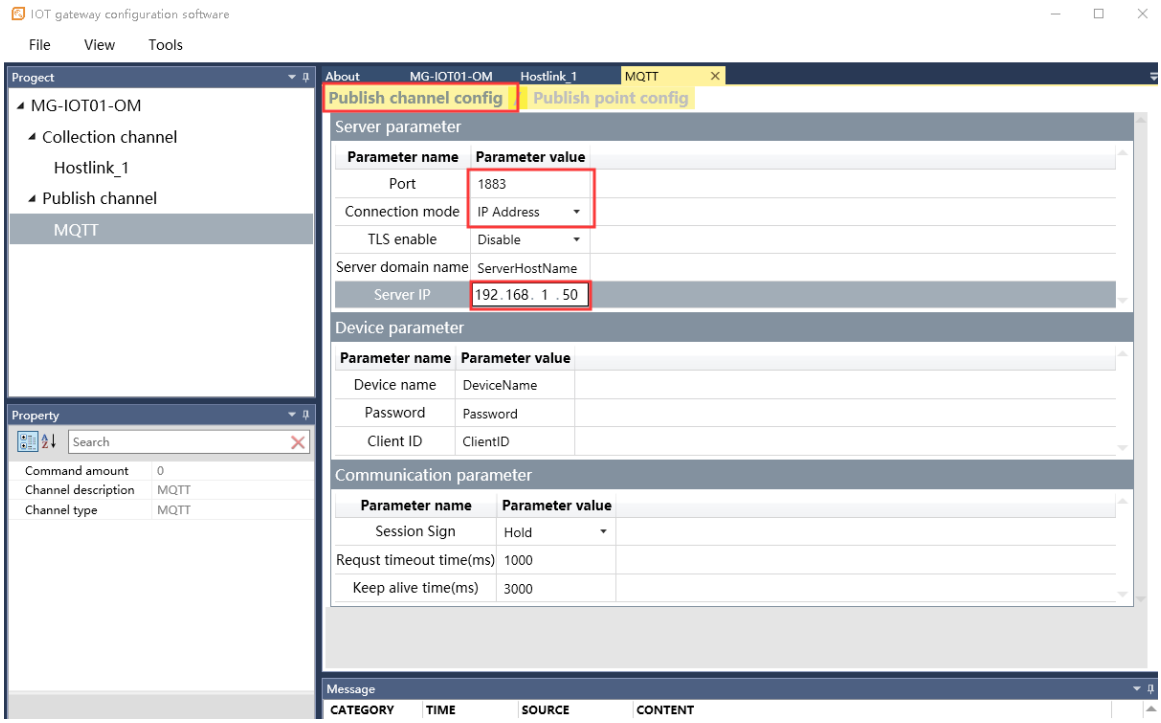
Select serial port 1 for the collection channel serial port, and fill 1 in the slave ID.



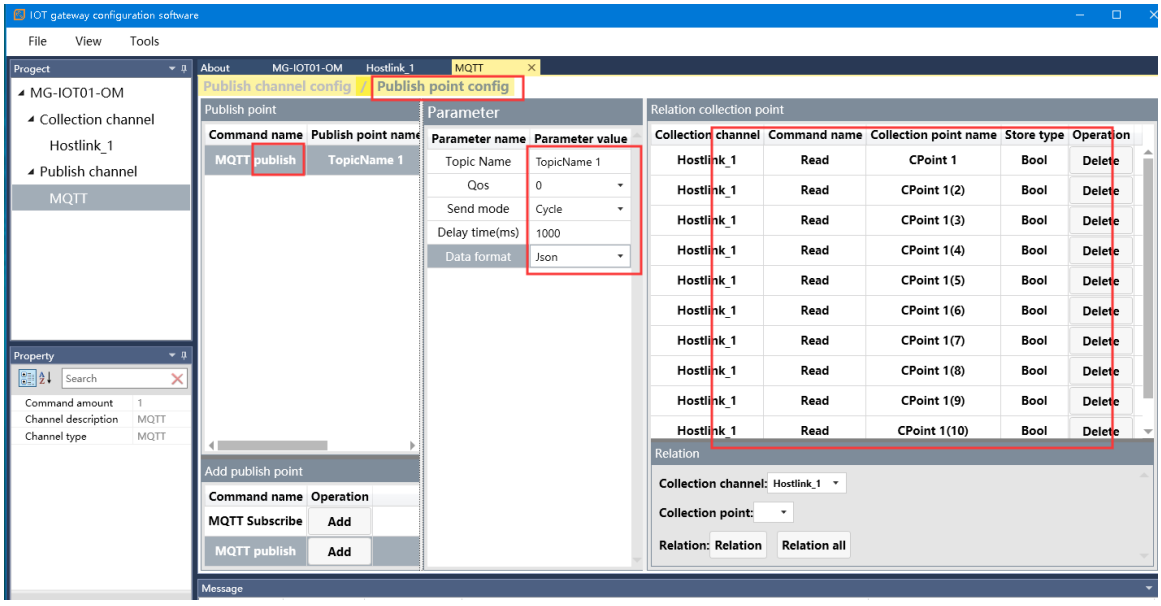
Configure the collection point as shown in the following figure:



Right-click the publishing channel to manually add the MQTT channel and set the configuration parameters manually. Port number: 1883, connection mode: IP address, MQTT server IP: 192.168.1.50 (local machine network card IP address, the machine simulates the MQTT server).

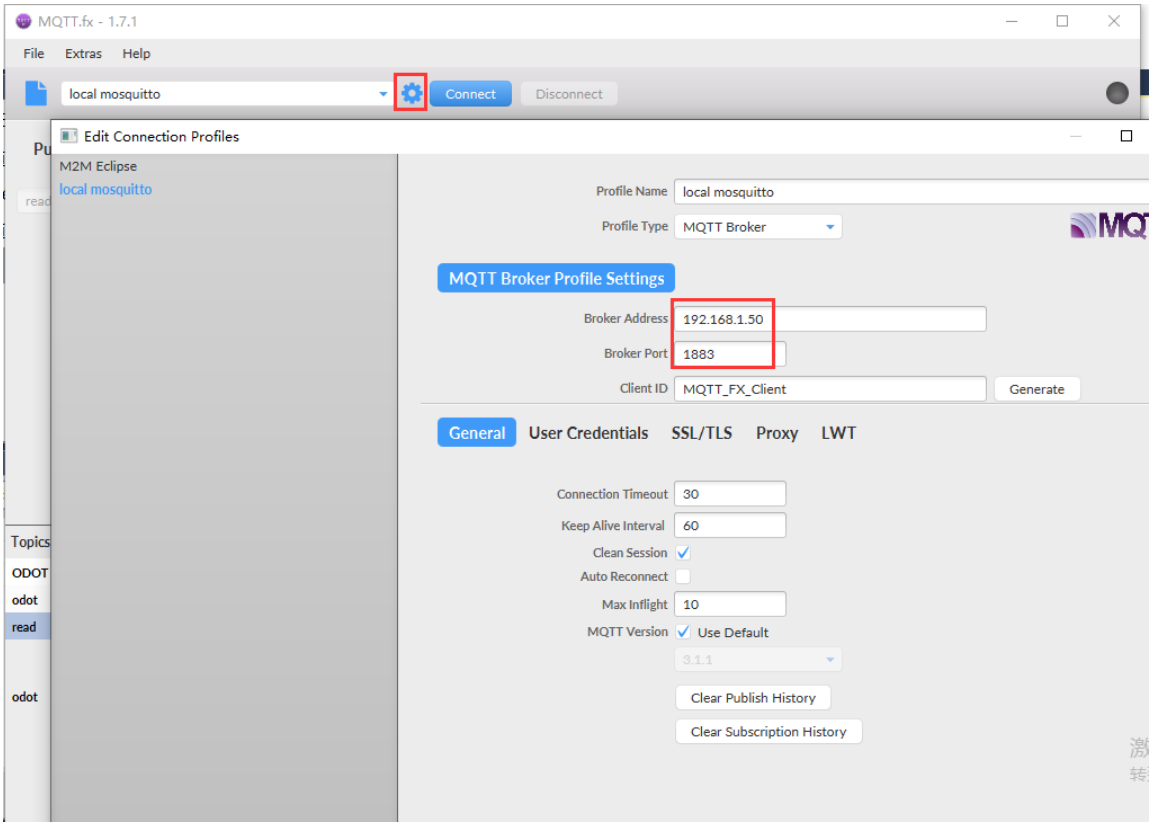


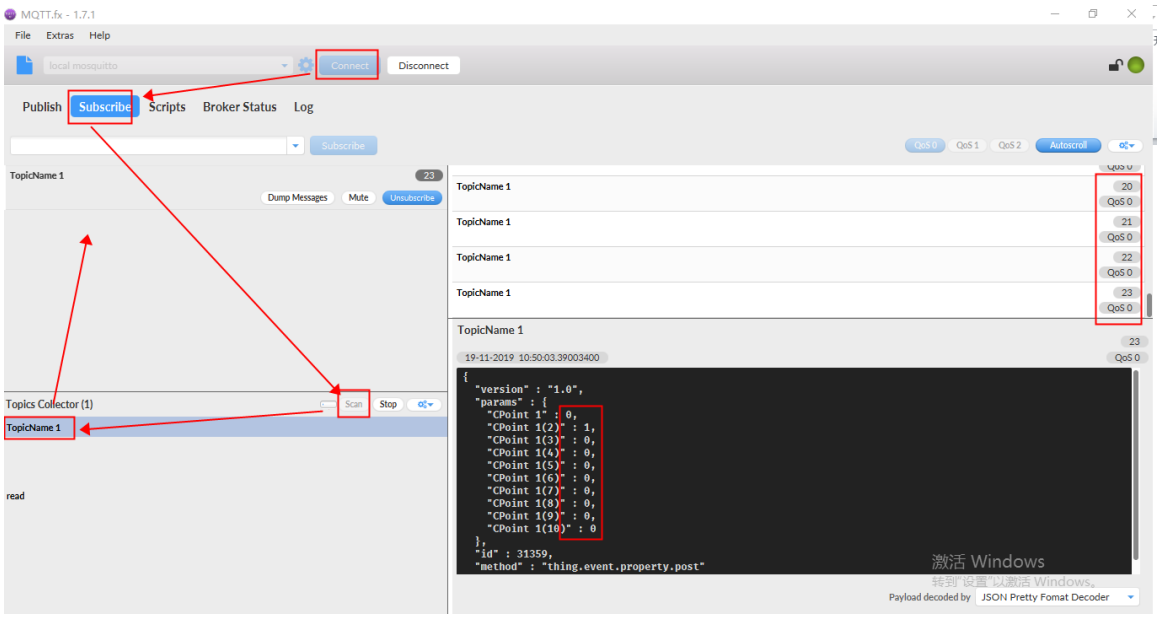
Click Publishing Point config.



After configuring all collection points and publishing points, right-click MG-IOT01-OM and choose to download and configure to the gateway. After successful download, complete the data MQTT publish.

After completing the above settings, the MQTT client can use the MQTT.fx test software to access the gateway and access the collected data.



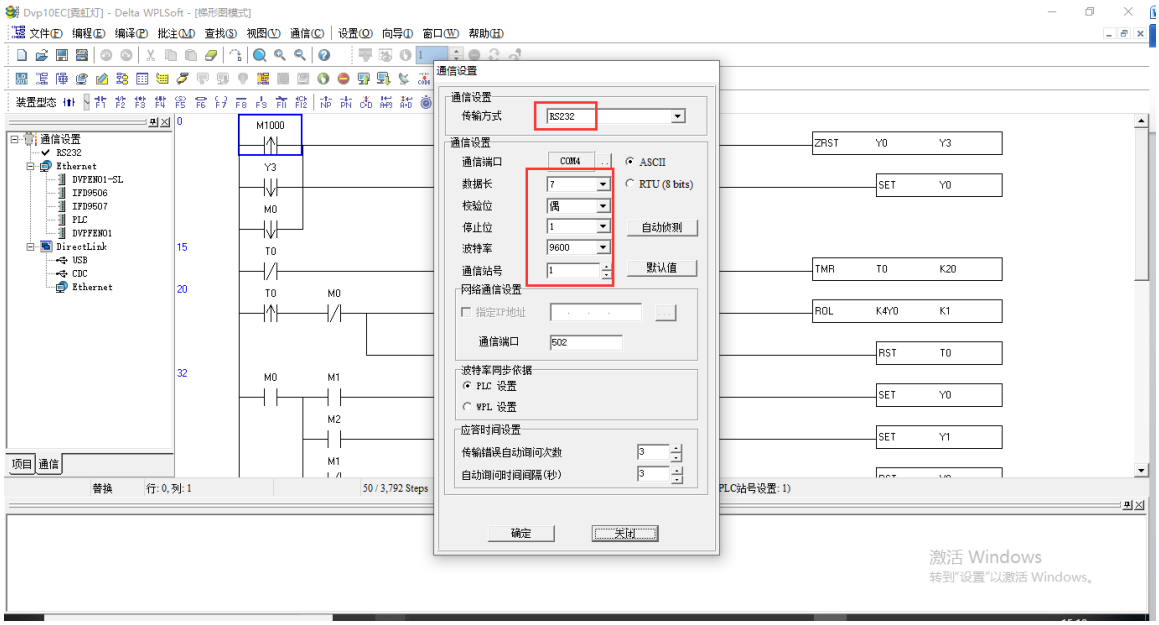


7 Collection of Test Data for Delta PLC Data

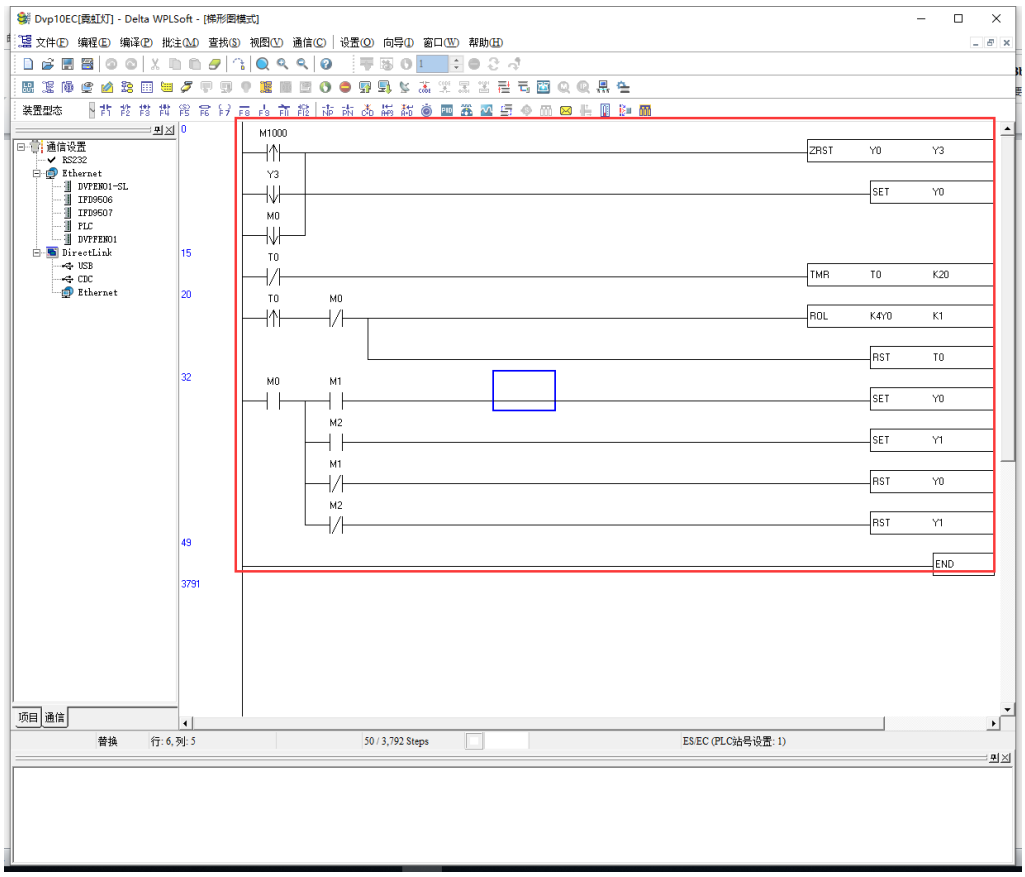
7.1 Implementing Modbus RTU Protocol to Modbus TCP Data Exchange

7.1.1 DELTA PLC Configuration

Power on the Delta PLC, connect 4 RXD of the RS232 serial port pin to the gateway serial port 1T / S +, pin 5 TXD to the gateway serial port 1R / S-, and pin 8 to the gateway serial port GND. Serial port parameters: ID = 1, RS232, 9600, 7E1.

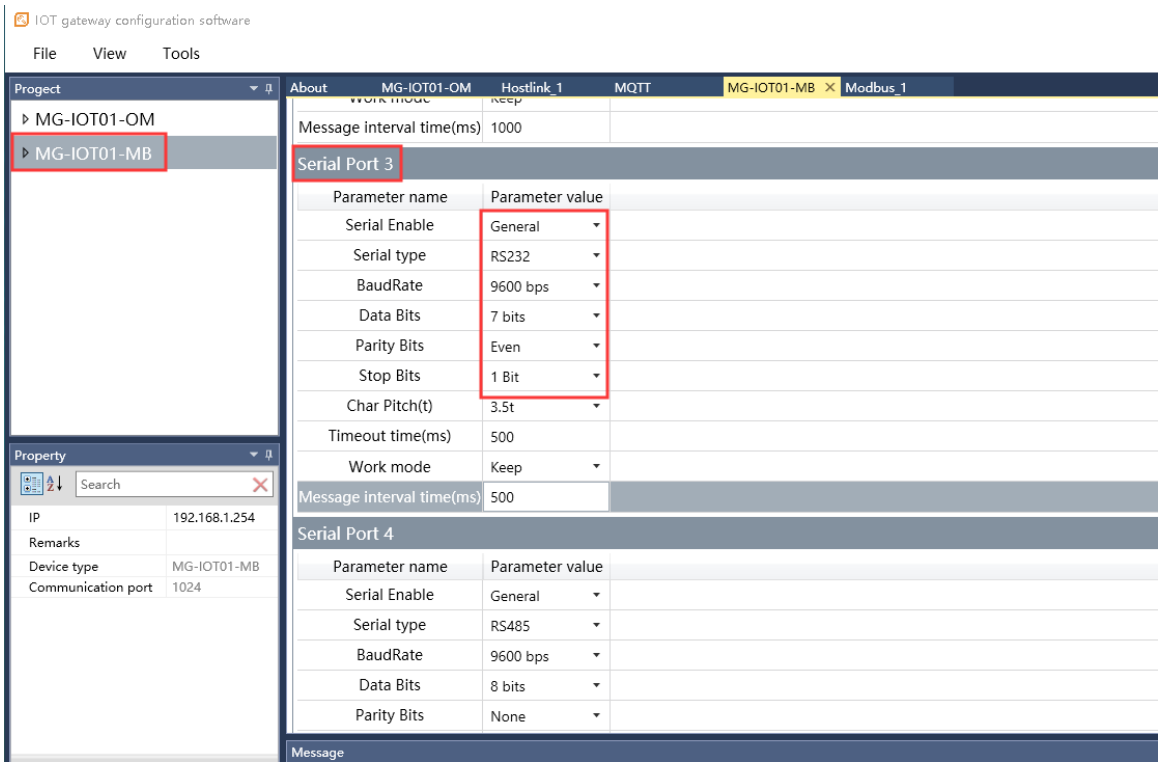


The test programming interface is as follows: After editing, save and download. Put PLC in RUN.



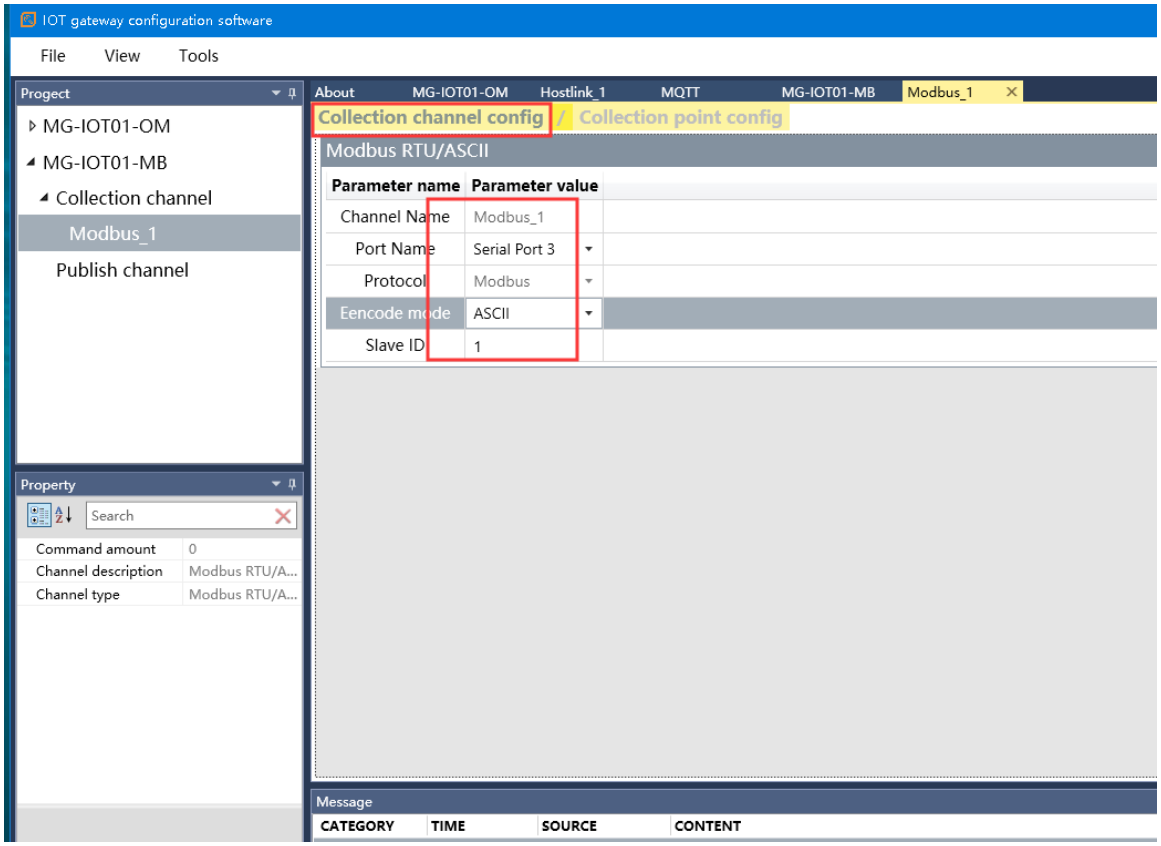
7.1.2 MG-IOT01 Configuration

Open the configuration software "Odot Configuration Software", click Tools-Search for devices, select the local network card, click Search for devices, it will scan to the IOT gateway of the same network segment, click OK to generate an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS232 / 9600, 7 / even / 1, and other parameters are default.



Configure the collection channel parameters as shown below:

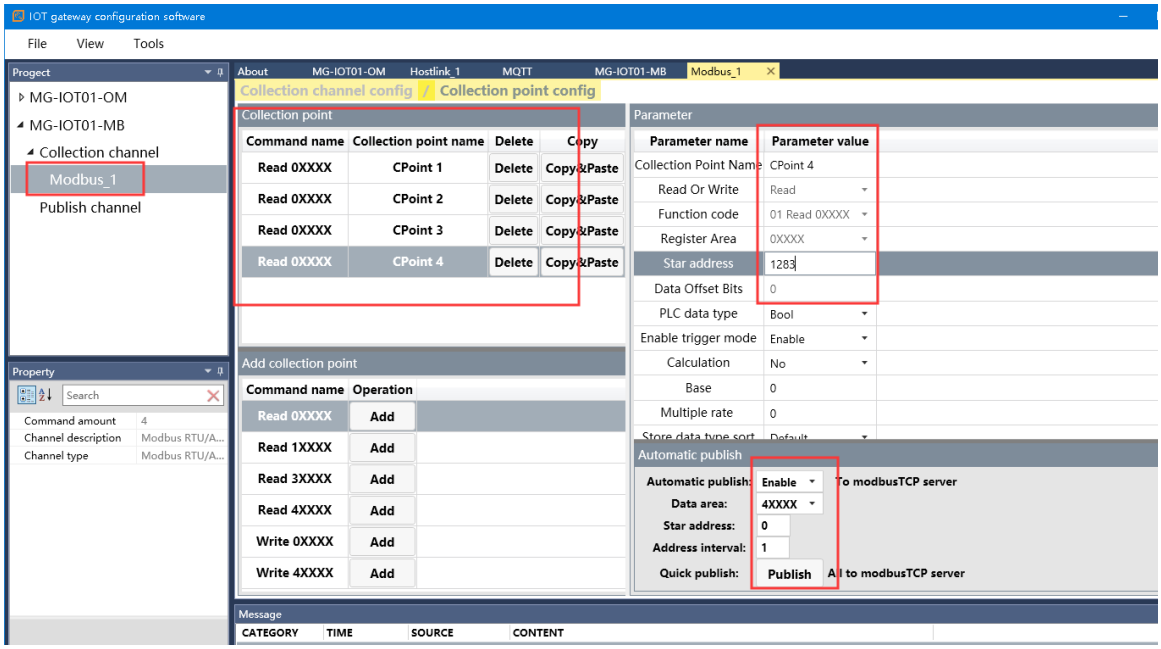
The serial port of the collection channel is selected as serial port 3, the encoding method is ASCII, and the slave ID is 1.



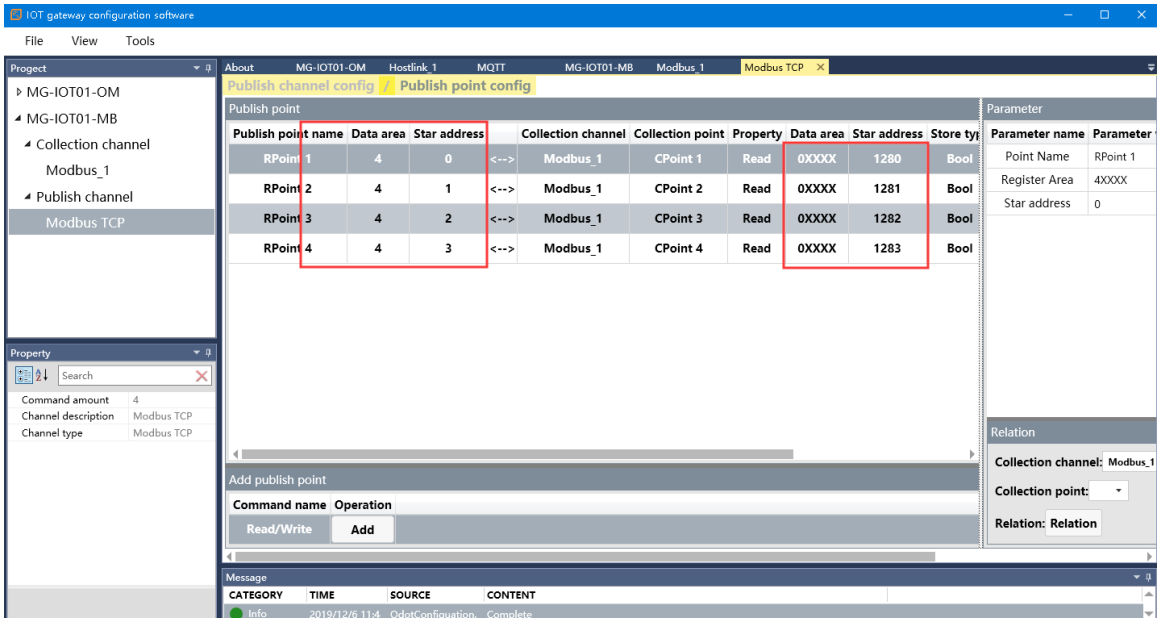
The corresponding Modbus address of Delta's PLC output coil Y is shown in the table below. Configure the collection points according to the point table. After the configuration is complete, click to publish to Zone 4.

2.12 DVP 系列 PLC 装置通讯地址

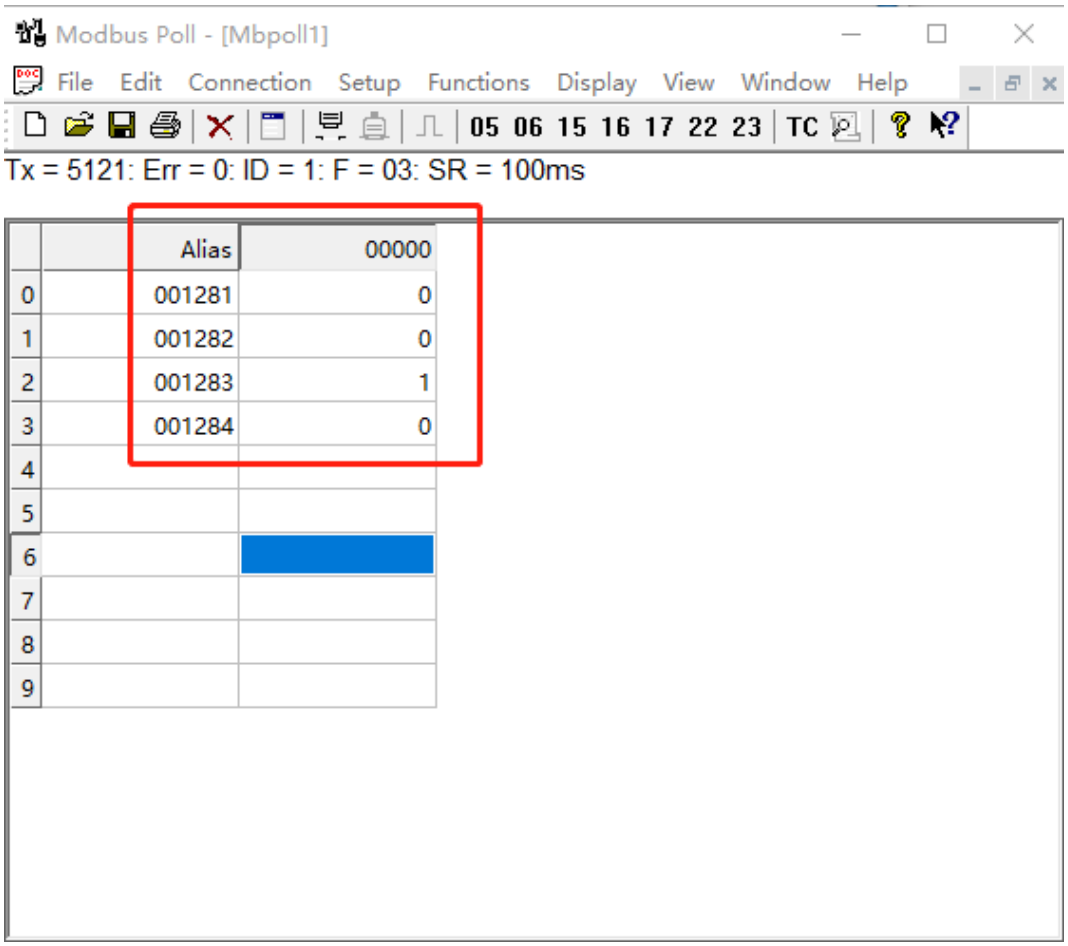
装置	範　圍	類　別	DVP 通訊位址 (Hex)	Modbus 通訊位址 (Dec)
S	000~255	Bit	0000~00FF	000001~000256
S	246~511	Bit	0100~01FF	000247~000512
S	512~767	Bit	0200~02FF	000513~000768
S	768~1023	Bit	0300~03FF	000769~001024
X	000~377 (Octal)	Bit	0400~04FF	101025~101280
Y	000~377 (Octal)	Bit	0500~05FF	001281~001536
T	000~255	Bit	0600~06FF	001537~001792
		Word	0600~06FF	401537~401792
M	000~255	Bit	0800~08FF	002049~002304
M	256~511	Bit	0900~09FF	002305~002560



Click the publish channel and click MODBUS TCP to view the correspondence relationship of the data address. After configuring all collection points and publishing points, right-click MG-IOT01-MB and select Download Configuration to Gateway.



After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the gateway through the gateway IP address 192.168.1.254, Modbus data communication port 502, and access the collected data. This document uses Modbus Poll to simulate Modbus TCP client to collect data.

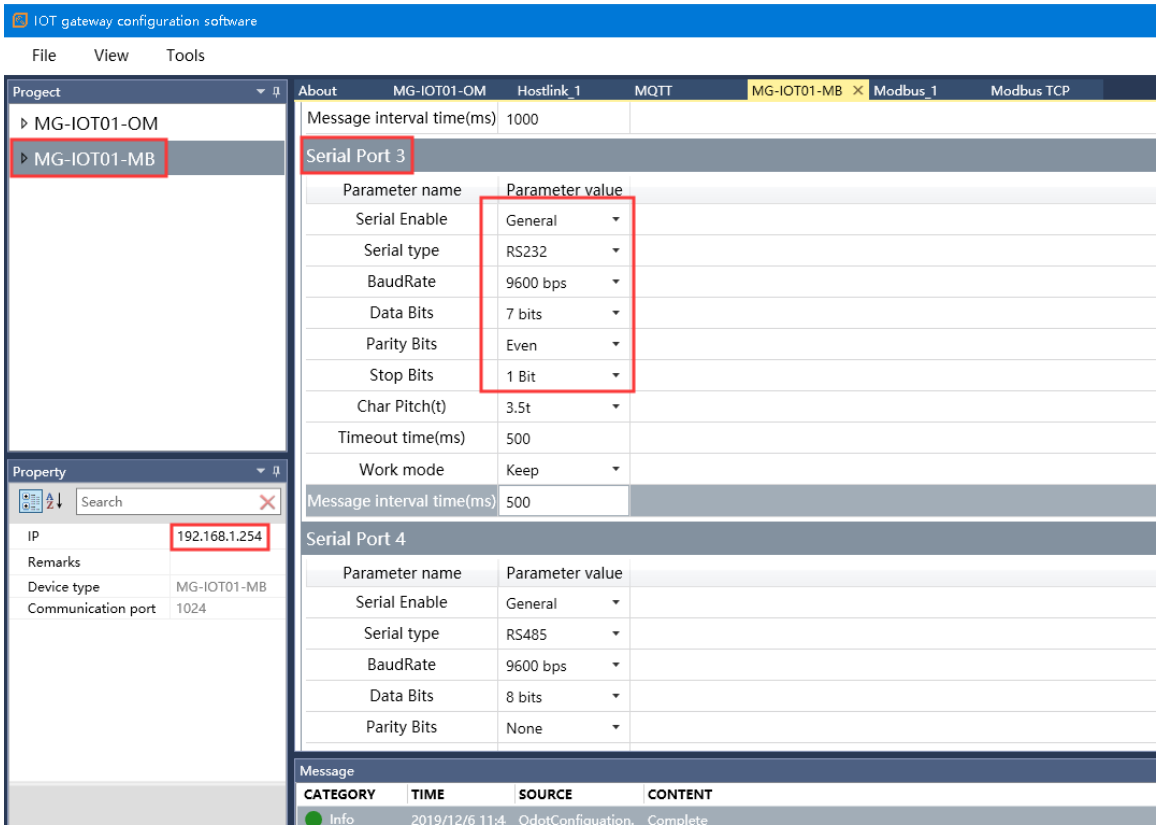


7.2 Implementing Modbus RTU Protocol to MQTT Data Exchange

7.2.1 Same as 7.1.1

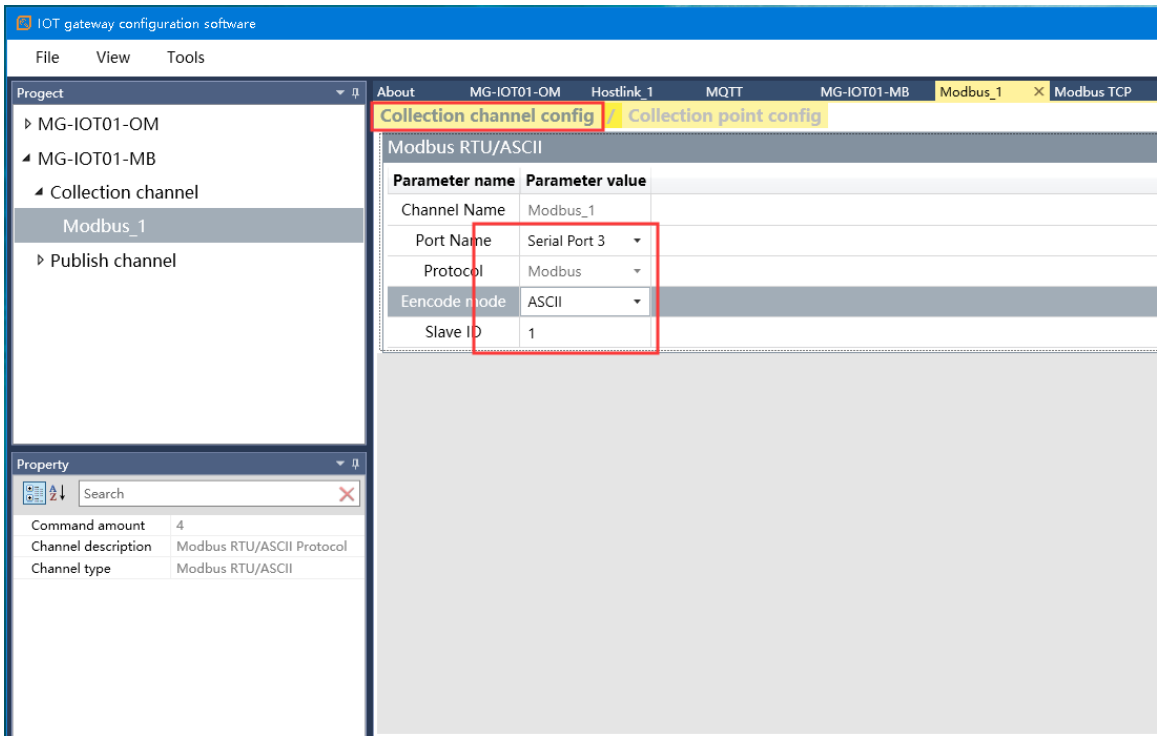
7.2.2 MG-IOT01 Configuration

Open the configuration software "Odot Configuration Software", click Tools-Search for devices, select the local network card, click Search for devices, it will scan to the IOT gateway of the same network segment, click OK to generate an IOT project on the left. The IP address uses the default IP address: 192.168.1.254. The PLC is connected to serial port 1. Set the parameters of serial port 1 to General, RS232 / 9600, even / 7/1, and other parameters are default.



Configure the collection channel parameters as shown below:

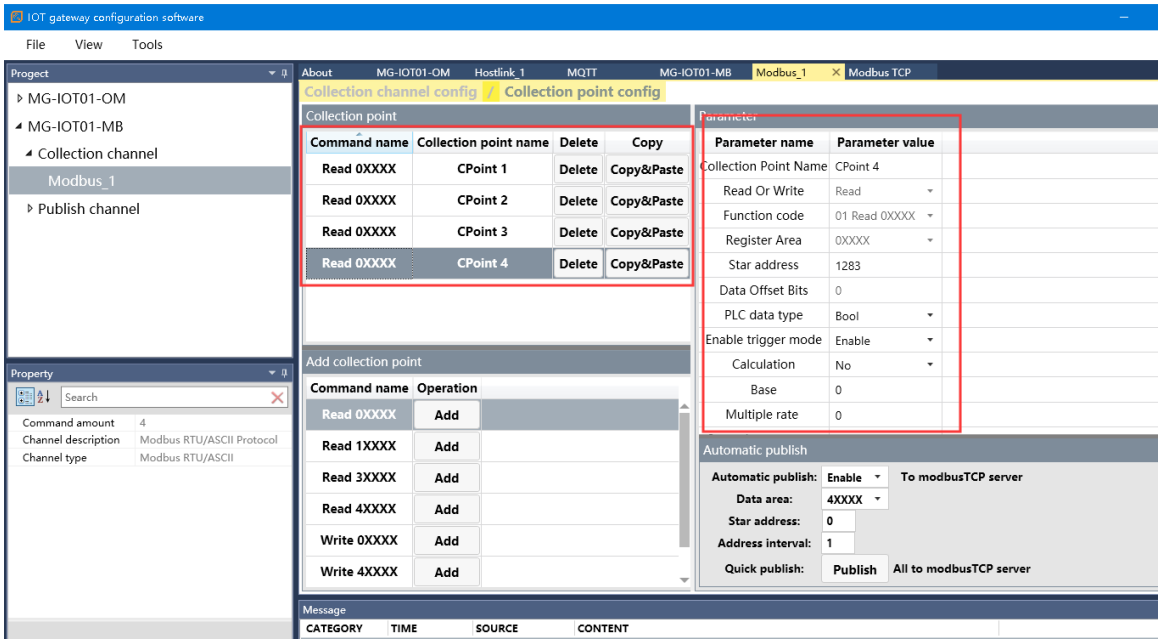
Select serial port 1 for the collection channel serial port, the encoding method is ASCII, and the slave ID is 1.



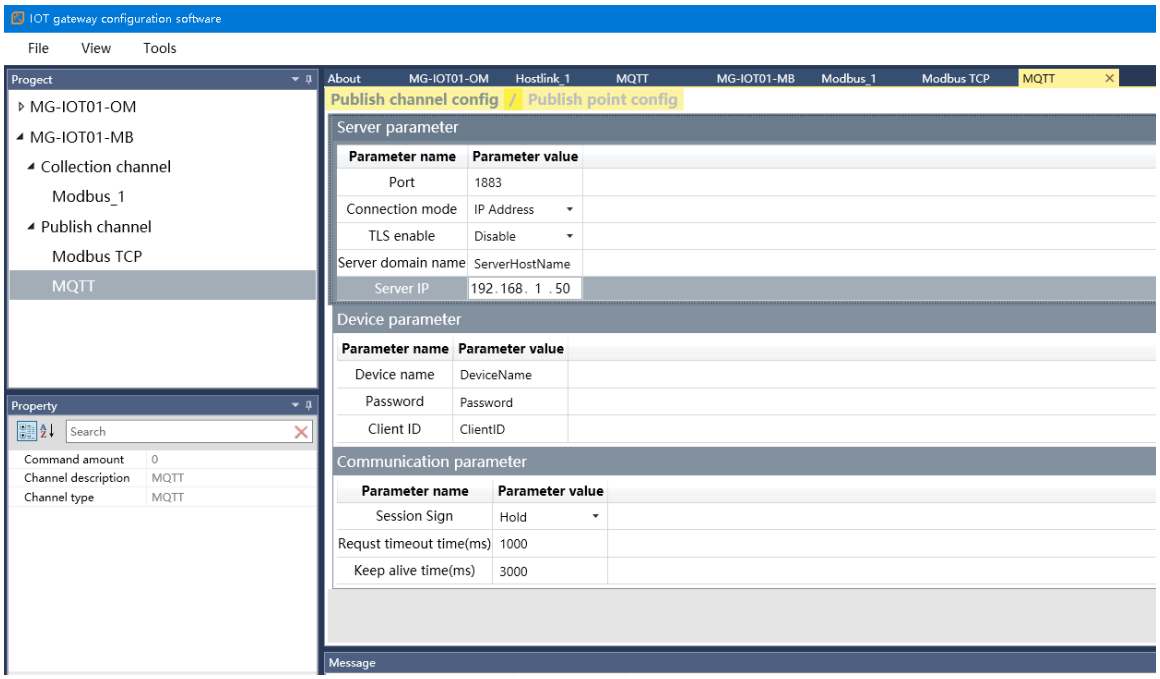
The corresponding Modbus address of Delta PLC output coil Y is shown in the table below, and the collection points are configured according to the point table.

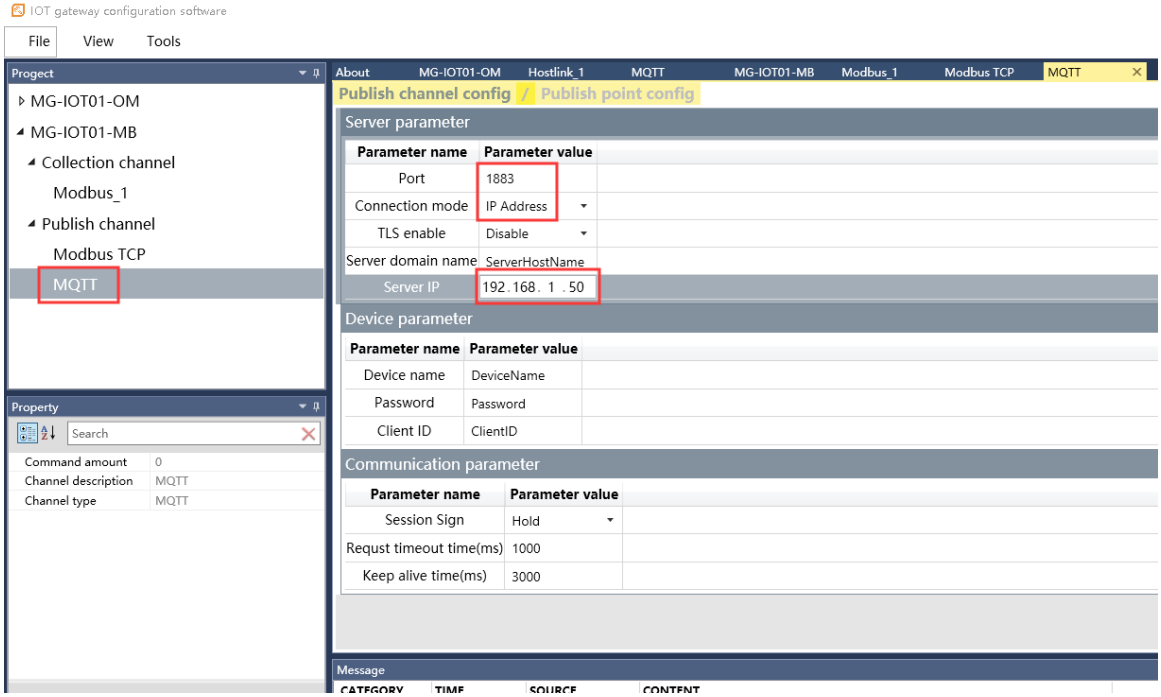
2.12 DVP 系列 PLC 装置通讯地址

装置	範　圍	類　別	DVP 通訊位址 (Hex)	Modbus 通訊位址 (Dec)
S	000~255	Bit	0000~00FF	000001~000256
S	246~511	Bit	0100~01FF	000247~000512
S	512~767	Bit	0200~02FF	000513~000768
S	768~1023	Bit	0300~03FF	000769~001024
X	000~377 (Octal)	Bit	0400~04FF	101025~101280
Y	000~377 (Octal)	Bit	0500~05FF	001281~001536
T	000~255	Bit	0600~06FF	001537~001792
		Word	0600~06FF	401537~401792
M	000~255	Bit	0800~08FF	002049~002304
M	256~511	Bit	0900~09FF	002305~002560

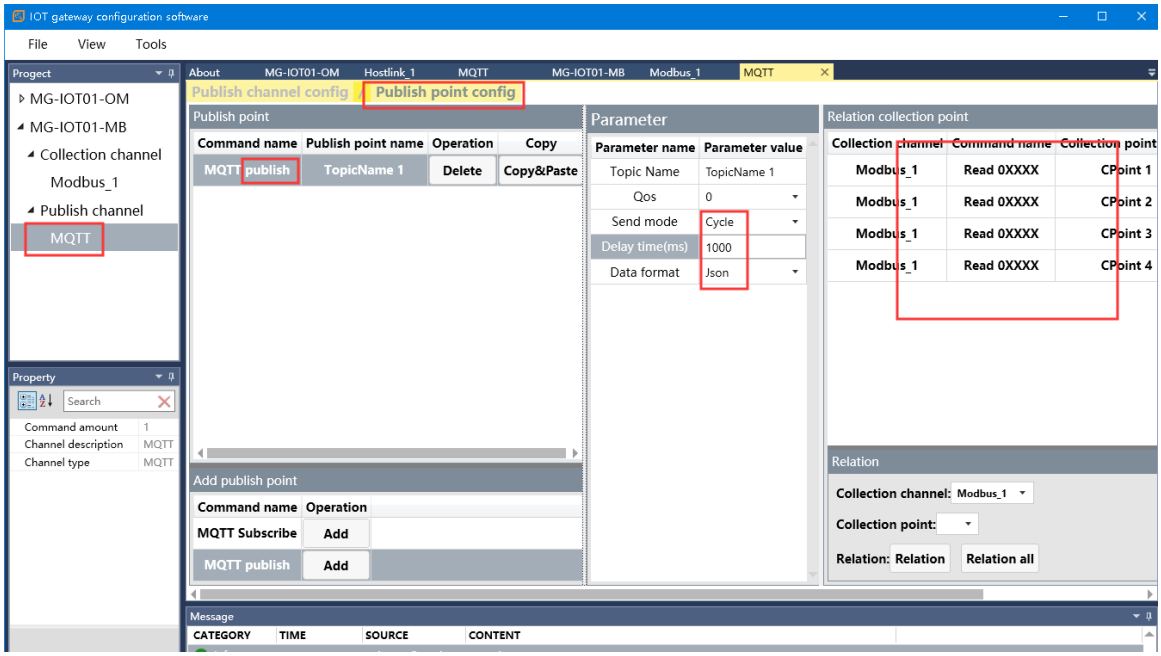


Right-click the publish channel to manually add the MQTT channel and set the configuration parameters manually. Port number: 1883, connection mode: IP address, MQTT server IP: 192.168.1.50 (local machine network card IP address, the machine simulates the MQTT server).



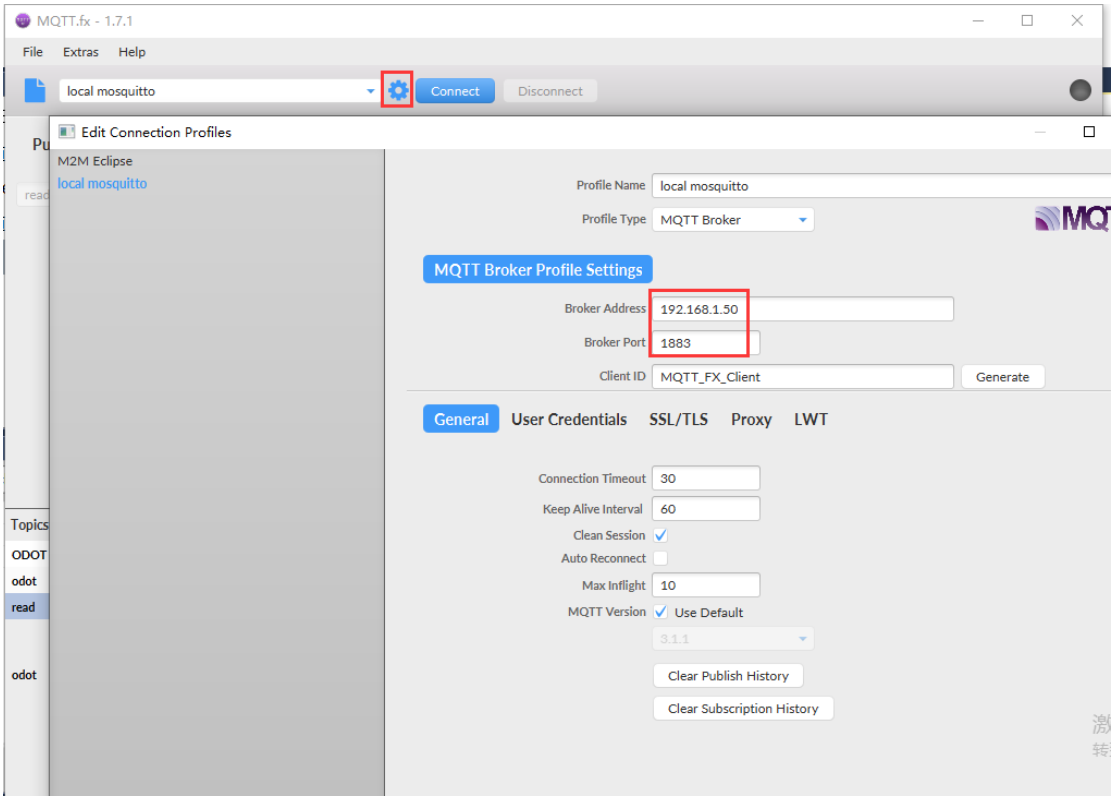


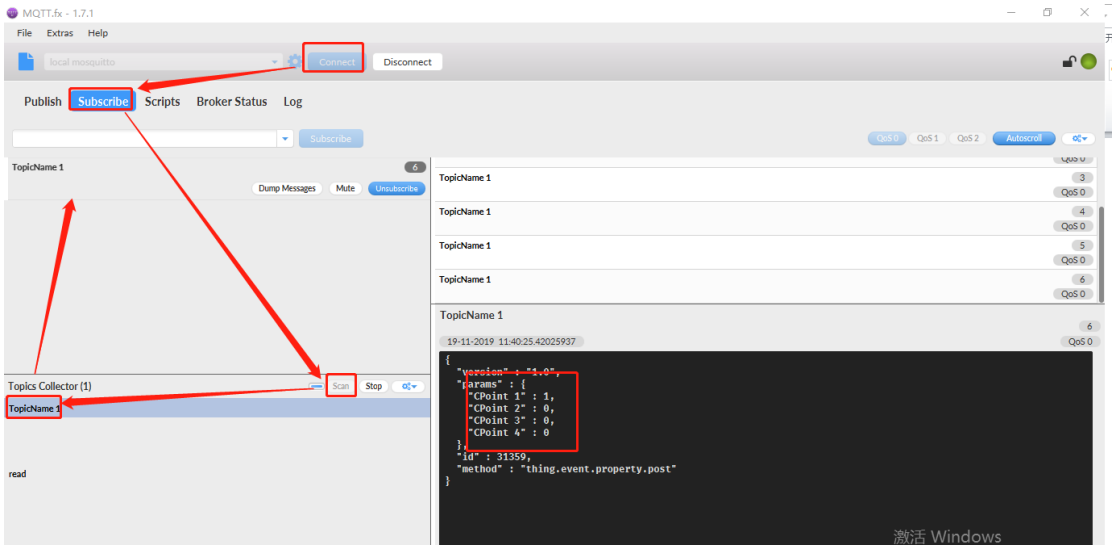
Click Publishing Point config.



After configuring all collection points and publishing points, right-click MG-IOT01-OM and choose to download and configure to the gateway. After successful download, complete the data MQTT publish.

After completing the above settings, the MQTT client can use the MQTT.fx test software to access the gateway and access the collected data.



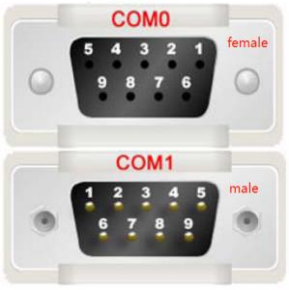

MQTT.fx - 1.7.1
File
Extras
Help
local mosquitto
Connect
Disconnect
Publish
Subscribe
Scripts
Broker Status
Log
Subscribe
QoS 0
QoS 1
QoS 2
Autoscroll
TopicName 1
6
Dump Messages
Mute
Unsubscribe
TopicName 1
3
QoS 0
TopicName 1
4
QoS 0
TopicName 1
5
QoS 0
TopicName 1
6
QoS 0
TopicName 1
6
19-11-2019 11:40:25.42025937
QoS 0
{
"version" : "1.0",
"params" : {
"CPoint 1" : 1,
"CPoint 2" : 0,
"CPoint 3" : 0,
"CPoint 4" : 0
},
"id" : 31359,
"method" : "thing.event.property.post"
}
Topics Collector (1)
Scan
Stop
TopicName 1
read
激活 Windows

8 Appendix

8.1 Siemens S7-200/200 SMART PLC Serial Wiring

PLC serial port supports RS485 interface.

PLC DB9 (female)

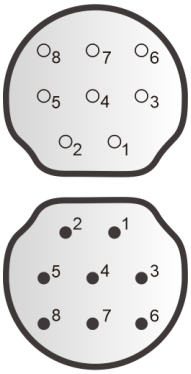


9pin DB9		Terminal No.	MG-IOT Gateway terminal definition
8 D-	———	1/4/7/10	R/S-
3 D+	———	2/5/8/11	T/S+
5 GND	———	3/6/9/12	GND

8.2 Mitsubishi FX series PLC Serial Port Wiring

Mitsubishi PLC serial communication is RS422, so you need to open the shell of the gateway before testing, and change the position of the jumper wire as described in 2.4.

PLC MD8 interface is female. The figure below is the pin number of the male.

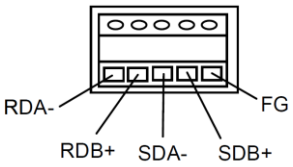


8 MD8		Terminal No.	MG-IOT Gateway terminal definition
4 TX-	———	4/10	R/S-
7 TX+	———	5/11	T/S+
3 GND	———	3/9	GND
1 RX-	———	1/7	R/S-
2 RX+	———	2/8	T/S+

8.3 Omron series PLC serial port wiring

Need to install a CP1W-CIF11 (485 communication module) in the PLC, this communication module has a DIP switch to set the communication method,

you need to dial 2, 3 to ON (RS485 method).

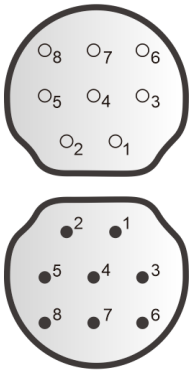


5 terminals		Terminal No.	MG-IOT Gateway terminal definition
1 RDA-	———	1/4/7/10	R/S-
2 RDB+	———	2/5/8/11	T/S+

8.4 Delta DVP series PLC serial port wiring

Delta's DVP PLC serial communication is RS232, so before testing, you need to open the shell of the gateway and change the position of the jumper wire as described in 2.4.

The PLC MD8 interface is the female header, the figure below is the pin number of the male header.



8 pin MD8		Terminal No.	MG-IOT Gateway terminal definition
4 RXD	———	2/5/8/11	T/S+
5 TXD	———	1/4/7/10	R/S-
8 GND	———	3/6/9/12	GND

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Web: www.odotautomation.com