

**S7-TCP to MODBUS-TCP and MQTT Gateway  
MG-IOT03**

**User Manual**



**ODOT Automation System Co., Ltd.**

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**Version information**

The following changes have been made to the document:

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**Software download**

Please log on the official website: [www.odotautomation.com](http://www.odotautomation.com) and click on the corresponding product page to download.

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## 1. Product overview

### 1.1. Introduction

MG-IOT03 is an industrial-grade Ethernet gateway with protocol conversion functions; it carries with 5\*100Mbps ports, all of which support 10/100Mbps auto-negotiation and Auto-MDI /MDIX. The gateway could convert Siemens S7 Ethernet protocol to Modbus TCP and MQTT through ODOT software configuration.

### 1.2. Function Introduction

- ◆ It supports Siemens S7 Ethernet to MODBUS-TCP and MQTT protocols
- ◆ It supports Auto negotiation 10/100Mbps, half/full duplex, Auto MDI/MDIX
- Supports 200 collection points
- ◆ It supports equipment search, lighting test
- ◆ It supports data sort swap
- ◆ It supports data type conversion
- ◆ It supports data calculation
- ◆ It supports IAP download, update and upgrade the firmware program in the product through the network port
- ◆ It supports wide temperature work: working environment temperature -40 ~ 85 °C
- ◆ It supports one-key reset
- ◆ It supports 35mm standard guide rail installation
- ◆ It supports 9 ~ 36V DC wide voltage input and anti-back connection protection
- ◆ It supports broadcast storm protection

### 1.3. Technical parameters

| Environmental Parameters        |  |
|---------------------------------|--|
| Operating temperature           | -40~85°C   |
| Storage temperature             | -55~125°C  |
| Working humidity                | 5%~95% (no condensation))                              |
| Power Supply                    |  |
| Power ports no.                 | 1 port   |
| Input voltage                   | 9~36V DC   |
| Power consumption               | Max.200mA@24V  |
| Ethernet parameters             |  |
| Ethernet port number            | 5 RJ45, 10M, 100M adaptive rate, with gateway function |
| Network protocols               | ETHERNET、ARP、IP、TCP、ICMP、MQTT                          |
| PLC number collected            | Max. 4pcs  |
| Number of data points supported | 200  |

## 2. Hardware description

### 2.1. Product appearance



## 2.2. Indicator light description

| Identification | State                   | Definition                |
|----------------|-------------------------|---------------------------|
| PWR            | Normally on a red light | Power supply normal       |
|                | The red light out       | Abnormal power supply     |
| RUN            | Normally on             | System operating normally |
|                | Flashing                | Normal data exchange      |
|                | Put out                 | System failure            |

RUN Indicator status description:

Green LED always on: release and capture connected successfully.

Green LED flashes at 1HZ, PLC connects successfully, MQTT is not connected.

Green LED flashes at 2.5Hz, MQTT is connected successfully, and PLC is not fully connected.

Green LED flashing at 0.5Hz, unknown abnormal.

## 2.3. Terminal definition

| Interface number | Connection identifier | Wiring instructions   |
|------------------|-----------------------|-----------------------|
| 8                | PE                    | Protected land (land) |
| 9                | V-                    | Negative power input  |
| 10               | V+                    | Positive power input  |

## 2.4. A one-key reset

In order to facilitate the use of customers, the gateway has set the function of one-key reset, which is located in the round hole at the bottom of the gateway. The system reset can be achieved by pressing the button for about 0.5 seconds. After reset, the default gateway IP is 192.168.1.254



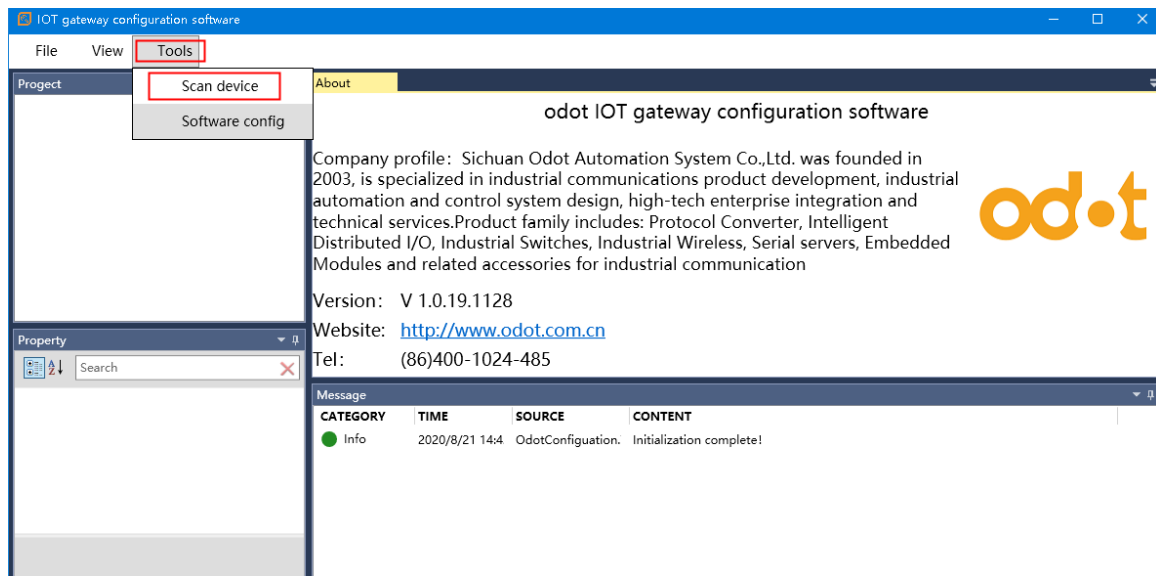
## 2.5. Installation dimensions



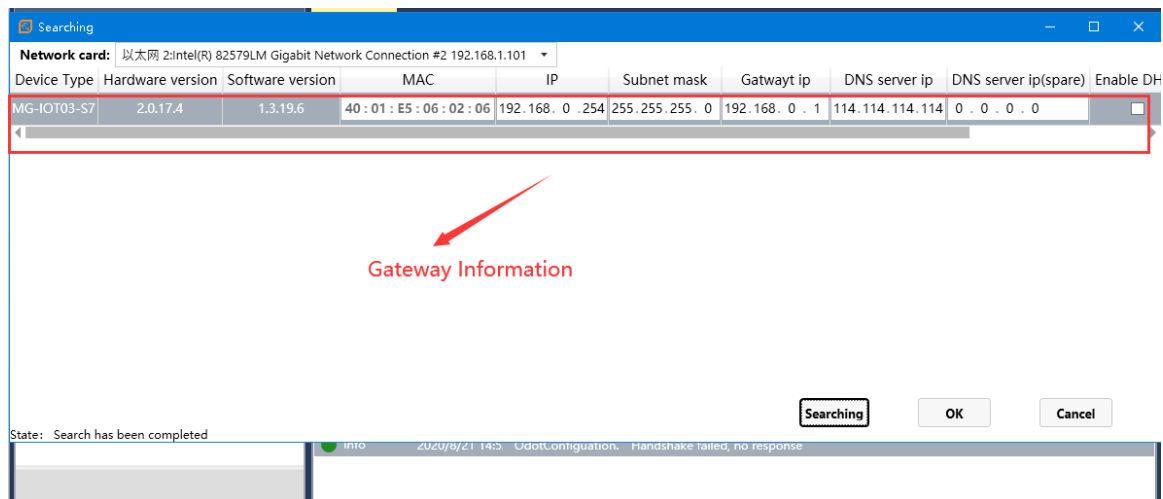
### 3. Siemens S7 Ethernet to Modbus-TCP and MQTT protocols

#### 3.1 Create a configuration acquisition channel

Please open "Odot Configuration Software" and select Tool → Scan Device

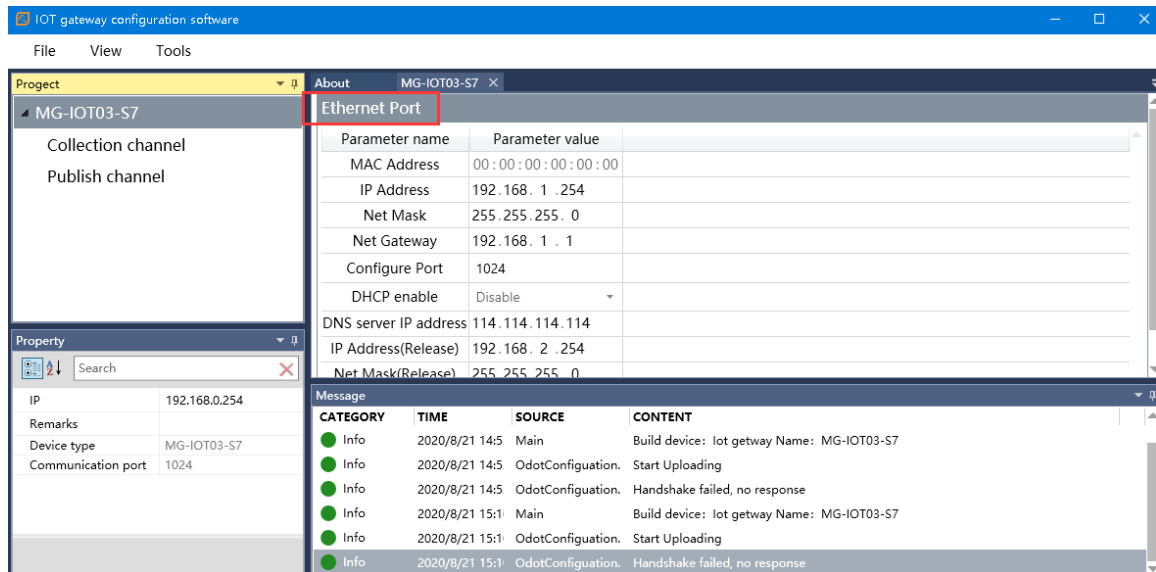


Click Scan device in the device Search dialog box, and click OK when finished. Lighting tests could be performed on modules; this could distinguish multiple MG-IOT03 modules in the same network.



Double-click "MG-IOT03-S7" in the project bar, and the "Network Port" window and parameters of the gateway pop up on the right side.

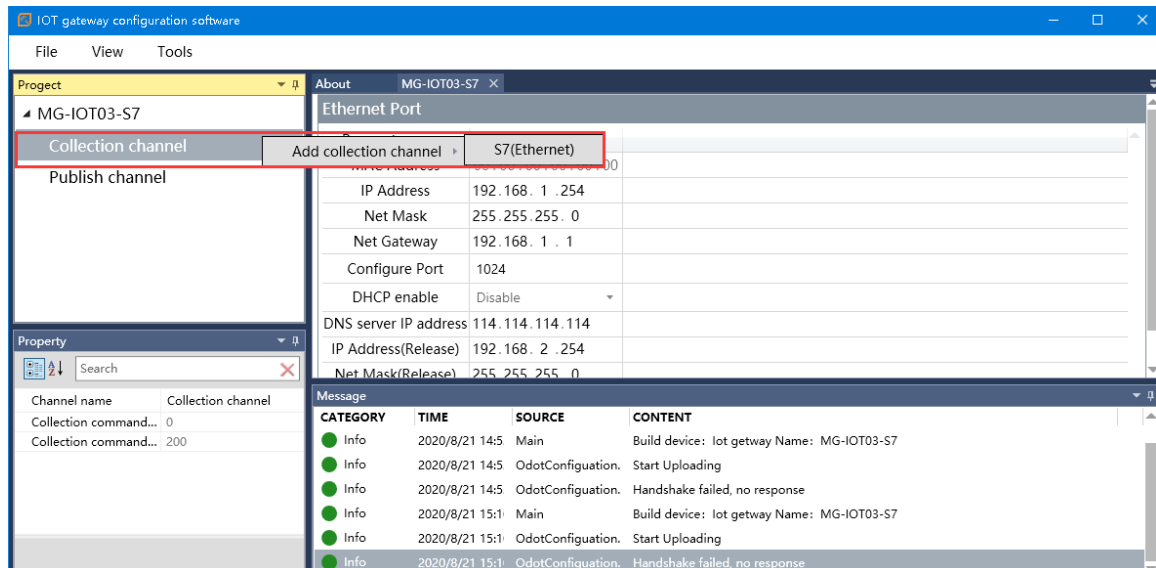




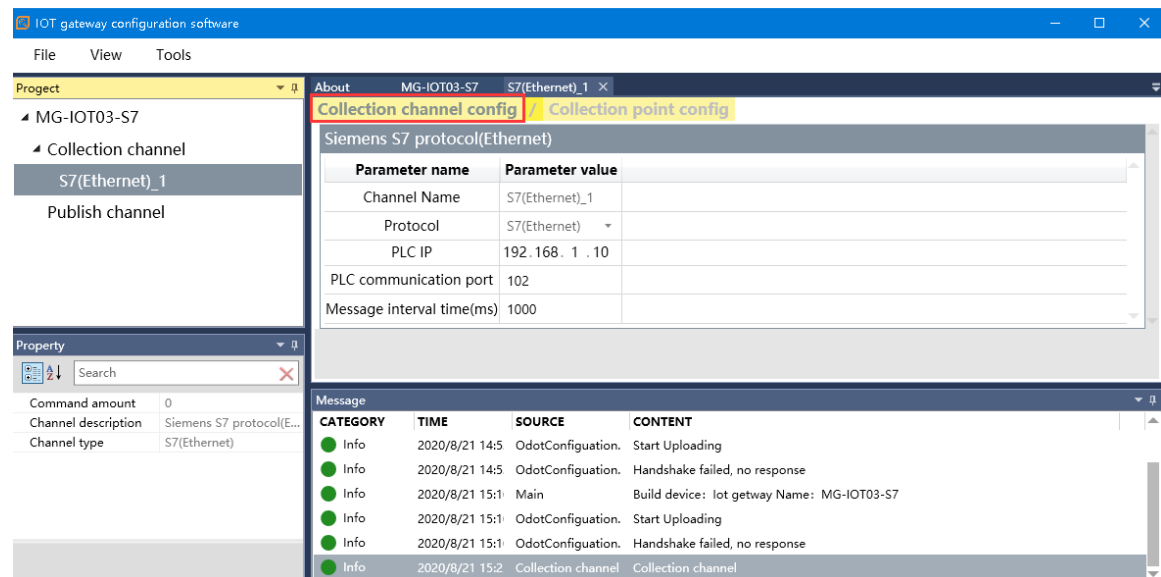
The main parameters have the following meanings:

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

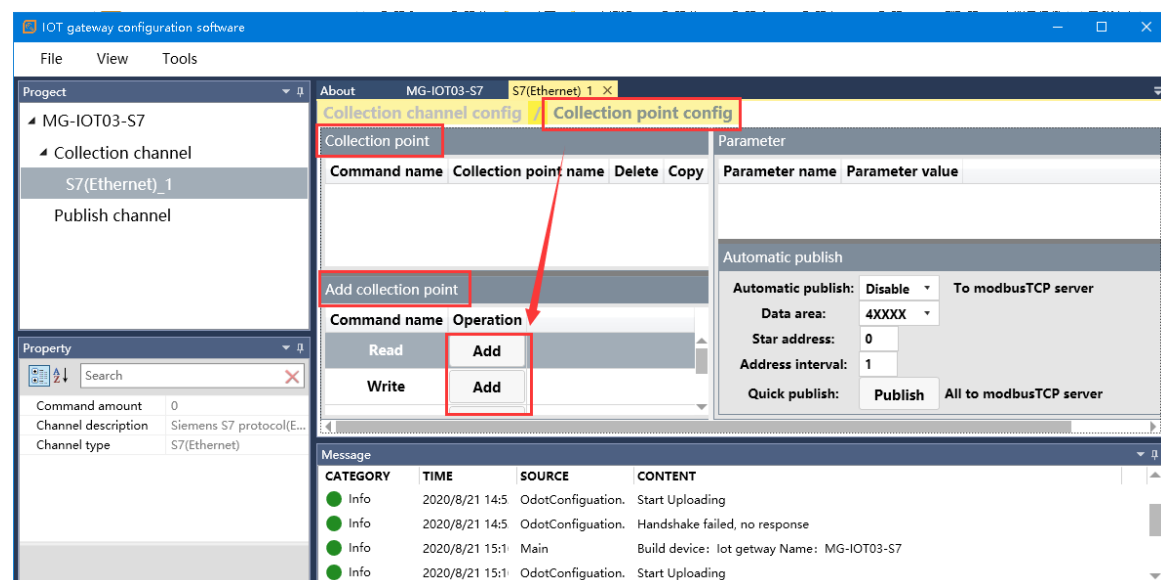
Right-click "Collection channel" in the project bar and select Add S7(Ethernet) protocol. Under the drop-down menu, appear "S7(Ethernet)\_1."



Click "S7(Ethernet)\_1" and the configuration channel parameters and configuration collection point window will pop up on the right. In the configuration channel parameters window, PLC IP is the IP address of the actual PLC, and the port number is fixed as 102.

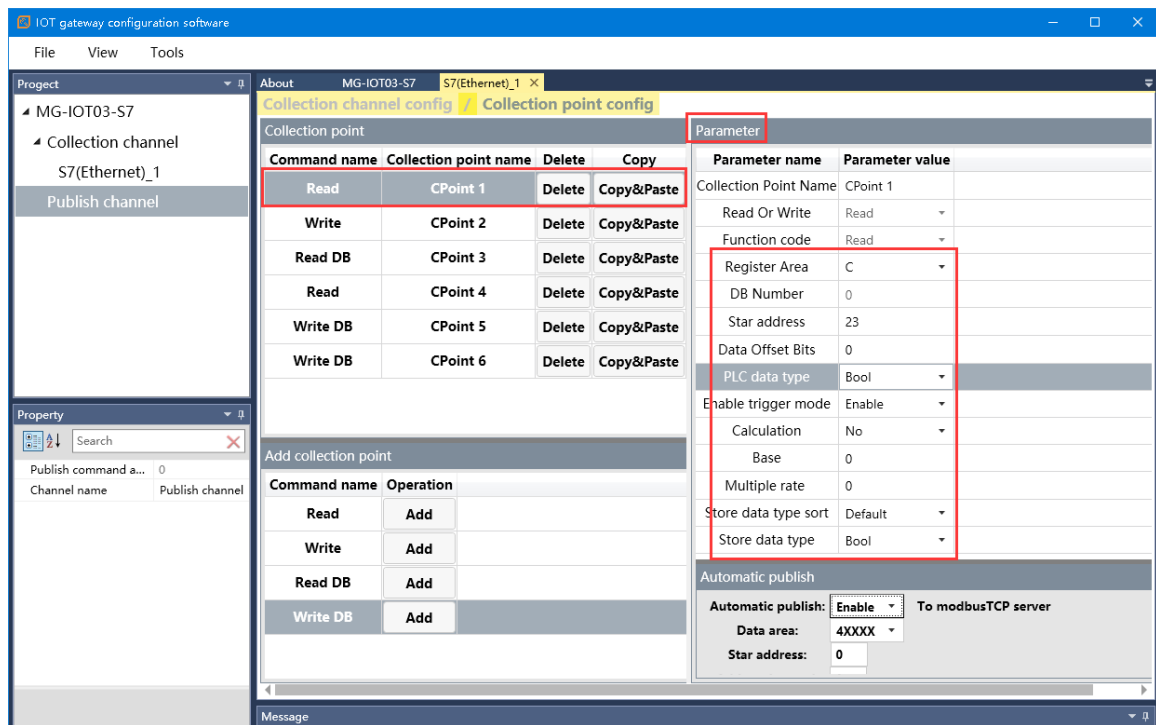


Click "Configure collection point" and add read or write commands in the "Add Collection Point" column.



When the command is added, it will be displayed in the collection point column. All collection point information could be configured in the parameter

column. For example, the collection point CPoint 1 reads the command, could set to read the PLC internal data register area, starting address, data offset bit, data type, Enable trigger mode, calculation and other parameters.



The main parameters have the following meanings:

Register: where the data point belongs to the PLC, such as I, Q, M, DB of s7-300PLC

DB number: The number of DB data area in PLC

Starting address: byte, word, double word, etc.

For example: db1.dbx2.5 starting address is "2", data offset bit is "5"

DB1.DBW10 starting address is "10"

Data offset Bits: The Bit of a data area's data address. For example, DB1.DBX2.5 data offset bit is "5".

PLC data type: The type and length of data read and written from the PLC.

Enable trigger mode:

enable: To send a command to the PLC when there is a data change.

Disable: Write command loop sent to PLC.

Calculation: no operation

(Multiplication/Division: Calculated value = base + multiplier (\* or /)  
collected value)

Base: Same as above

Multiple rate: Same as above

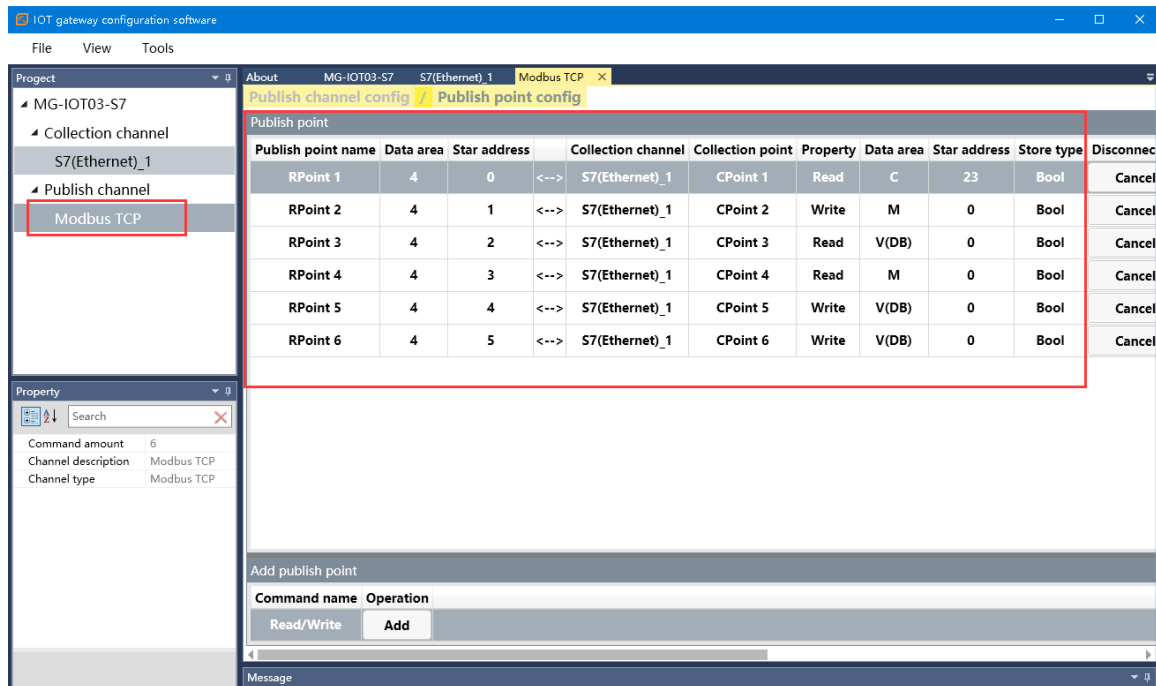
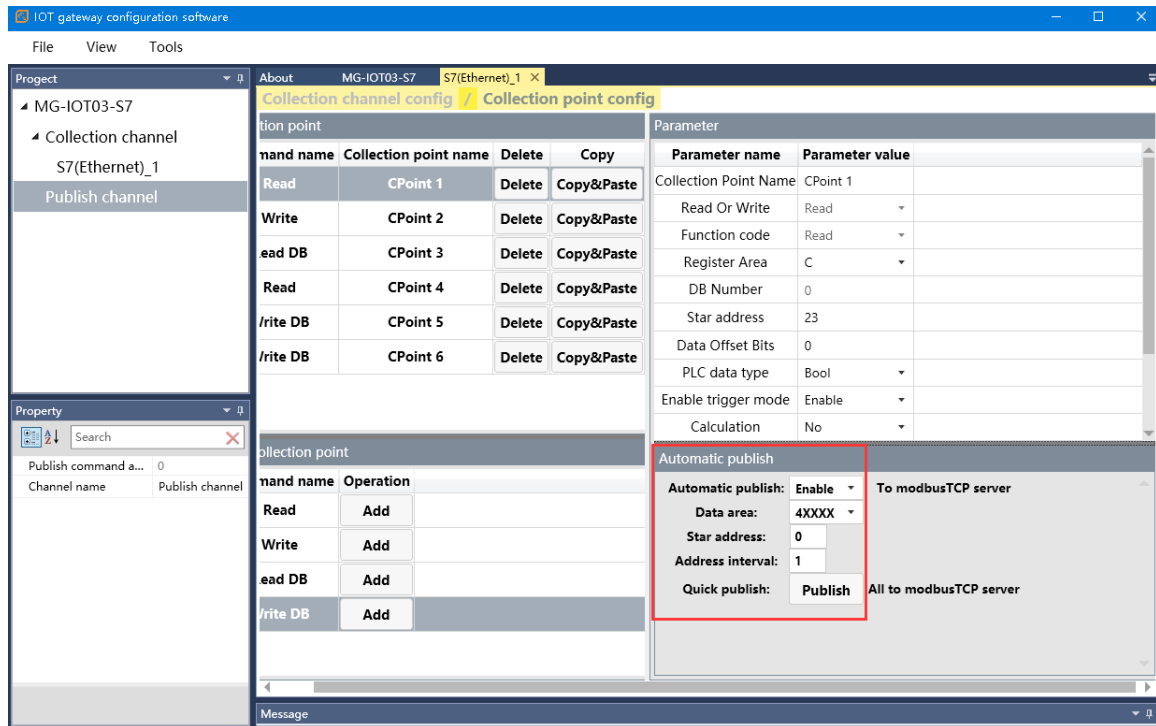
Store data type sort: The default is Little-endian in front; there are other data word, double word, floating point sort type optional.

Store data type: The data type of the data store, such as PLC data type is INT, store data type float, and the data will have type conversion.

## **3.2. Creating a publish channel**

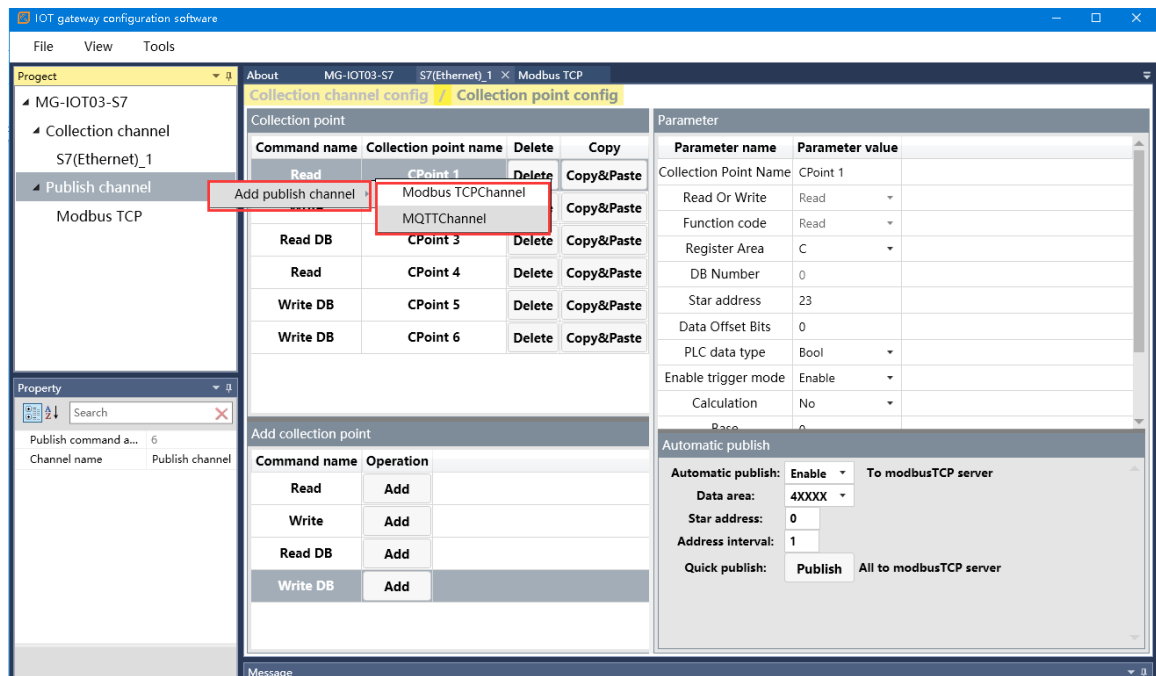
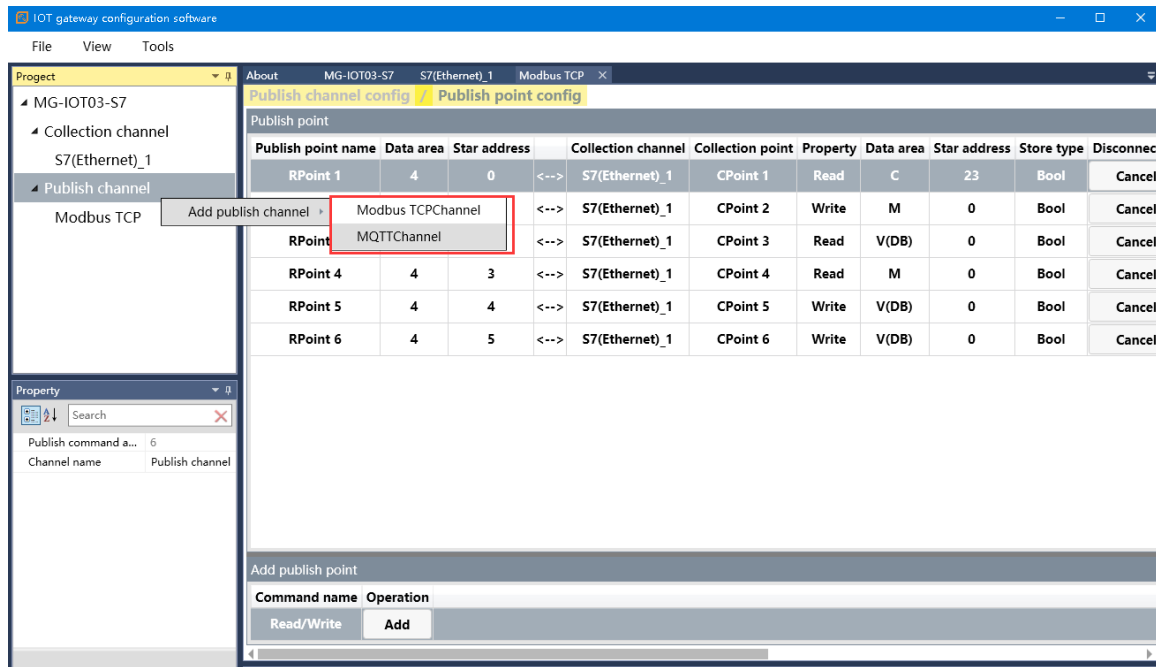
### **3.2.1 Collection points are automatically published to Modbus TCP server**

After all collection points are configured, select the function of enabling automatic publication in the automatic publication column, set the data publication area, starting address and address interval parameters, and click publish to publish all collection points to Modbus TCP server. Modbus TCP can be automatically generated in the release channel drop-down menu in the project bar.



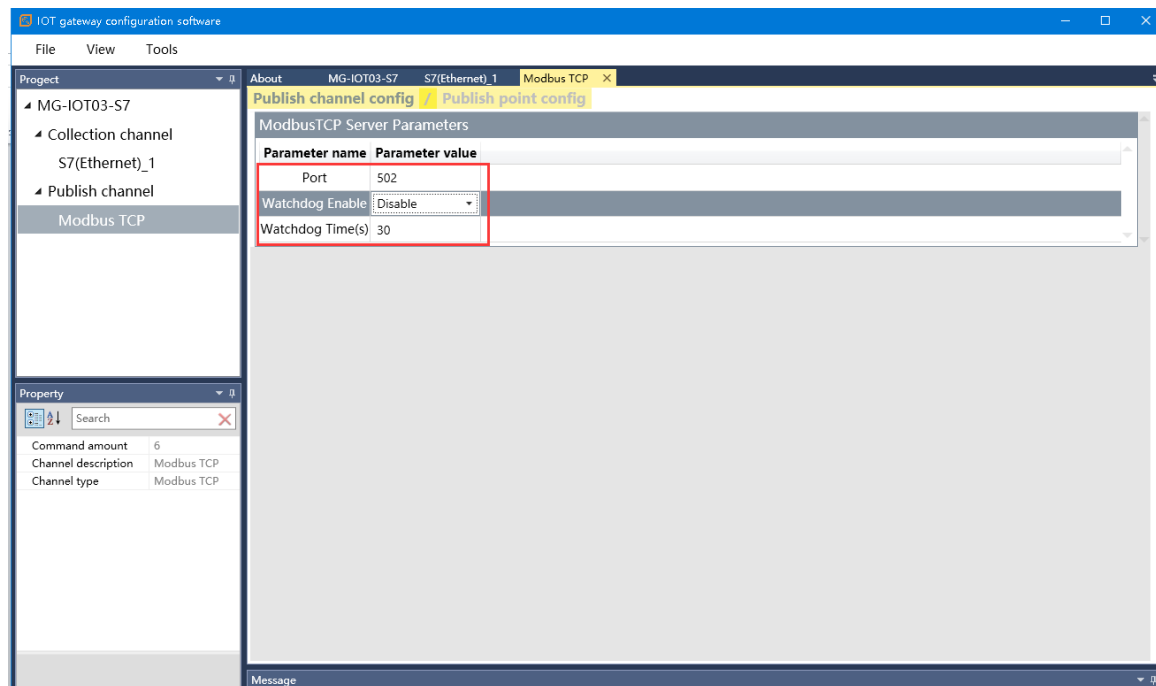
### 3.2.2 Manual release of collection points

Right-click the publishing channel in the left "Project bar" and select the publishing channel to be added. There are two options, Modbus TCP channel and MQTT channel.

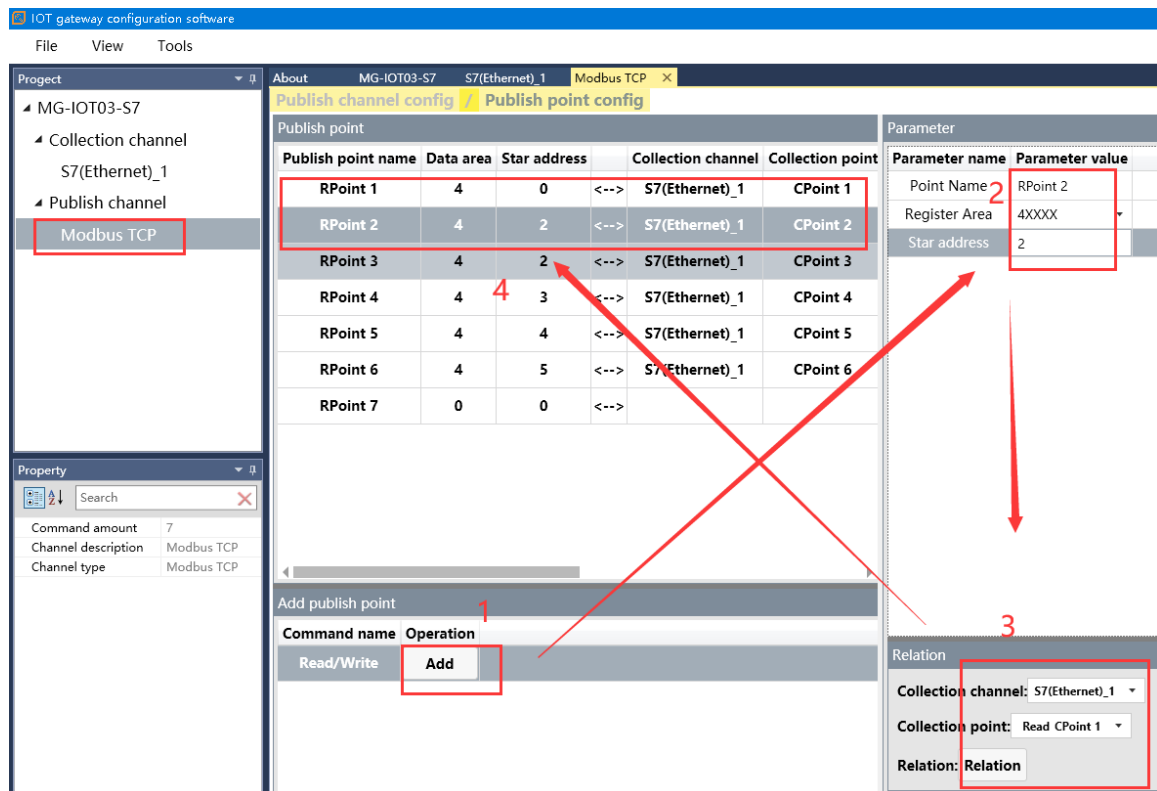


### 3.2.2.1 Manual Modbus TCP channel configuration

Click Modbus TCP channel, Modbus TCP server parameters can be configured, port number default 502, watchdog enable or disable, and watchdog time.



Click "Configure Publish Point" and select "Add read and write command" in the "Add Publish point" bar. Configuring the publishing point name, Modbus register area, and starting address in the Parameters column. Then select the associated collection channel, the collection point, and click the associated point. Figure: Add a read command, release point name is RPoint 1, publish to 40001 address, collect CPoint 1 data from PLC.

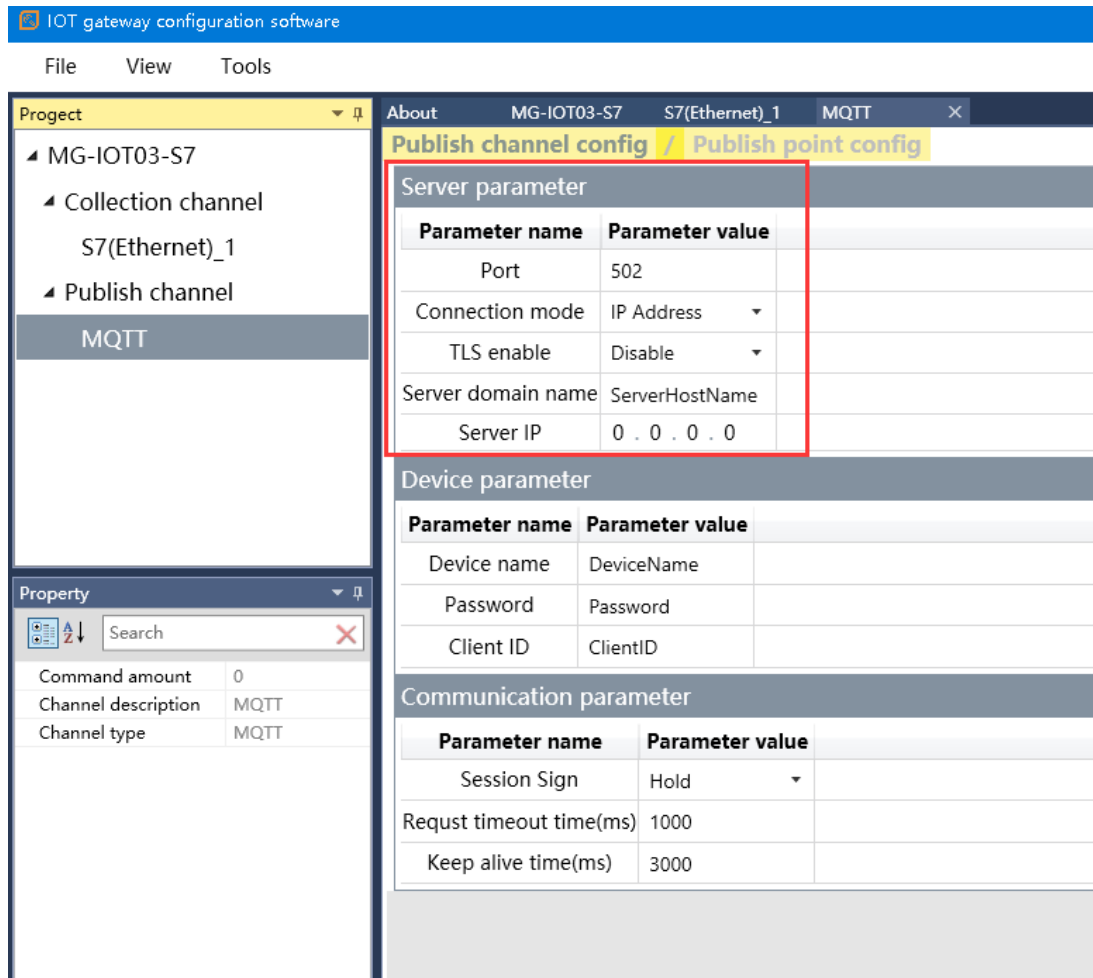


### 3.2.2.2 MQTT channel configuration

Click the MQTT channel, and MQTT can be configured to publish channel parameters, including MQTT Sever parameter, Device parameter, and Communication parameter.

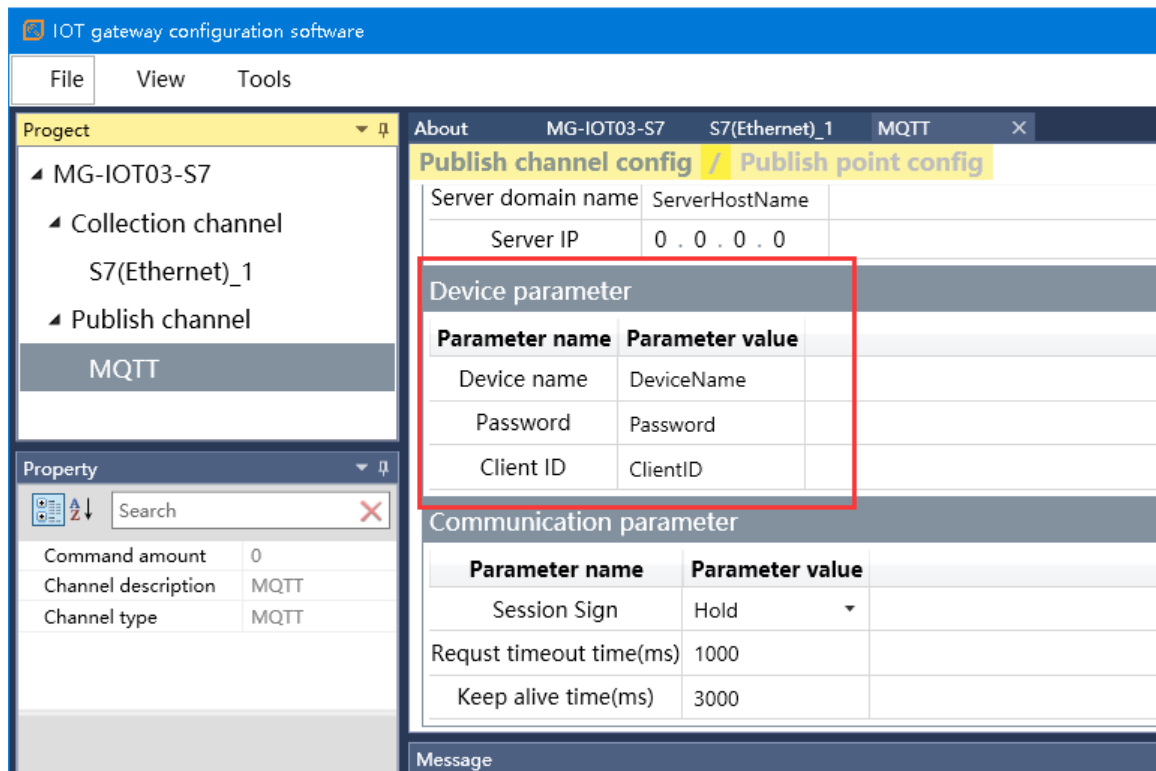
#### 1. MQTT Sever Parameter





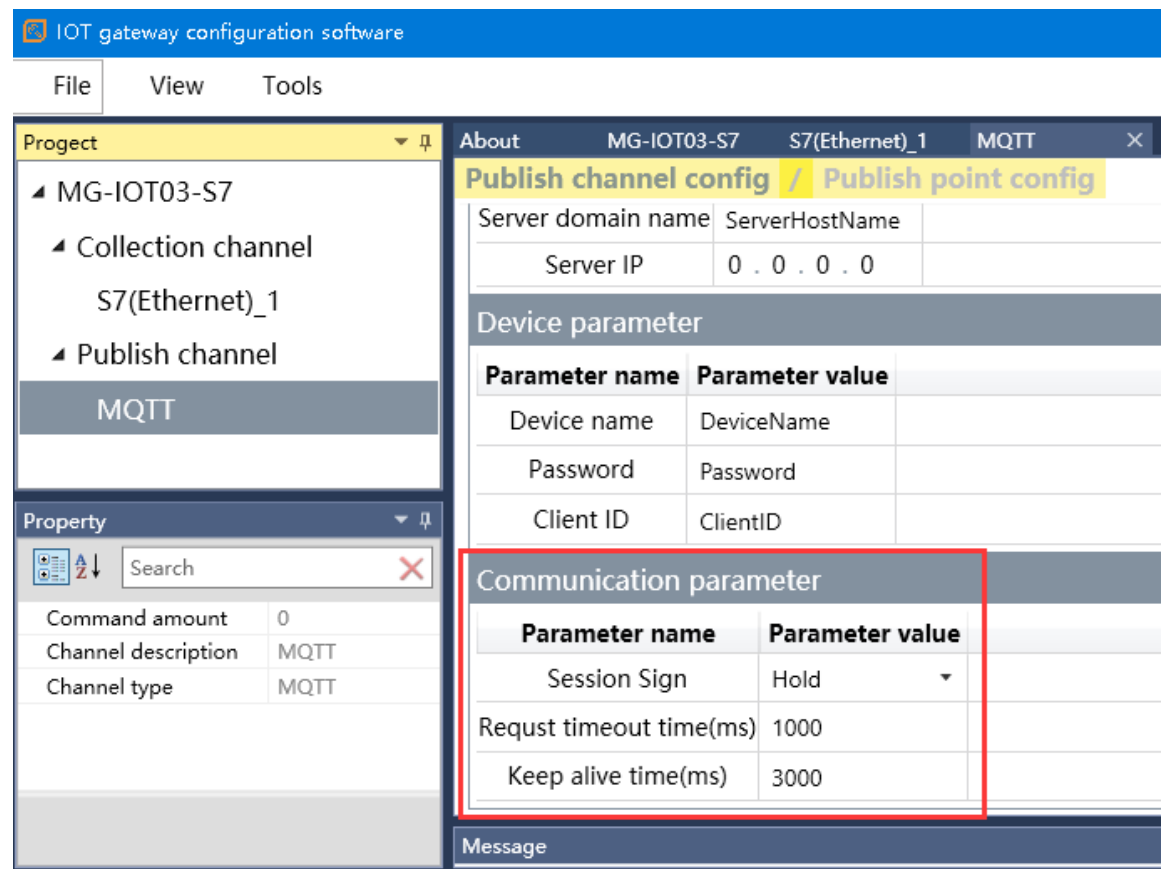
| The parameter           | Parameter description  |
|-------------------------|--|
| Port                    | Remote port of the server.<br>The default is 502                 |
| Connection mode         | Connection way<br>(IP address connection or domain name)         |
| TLS enable              | Encryption enablement<br>(encryption is not currently supported) |
| MQTT server domain name | Server domain name<br>(ignored if connected via IP)              |
| MQTT server IP          | Server IP (ignored if connected via domain)                      |

## 2. Device parameter



| The parameter name | Parameter description  |
|--------------------|--|
| Device name        | Corresponds to the user name in MQTT, the name of the user identifying the connection, the user name that could be used for authentication needs to be less than 128 characters.                               |
| Password           | The Password corresponding to the Password in MQTT identifies the connected user, the password that can be used for authentication needs to be less than 128 characters.                                       |
| Client ID          | Corresponding to the Client identifier in MQTT, the unique identity of the Client to the server. It must be unique for all clients to connect to a server and is key in handling Qos level 1 and 2 message ID. |

### 3. Communication parameter

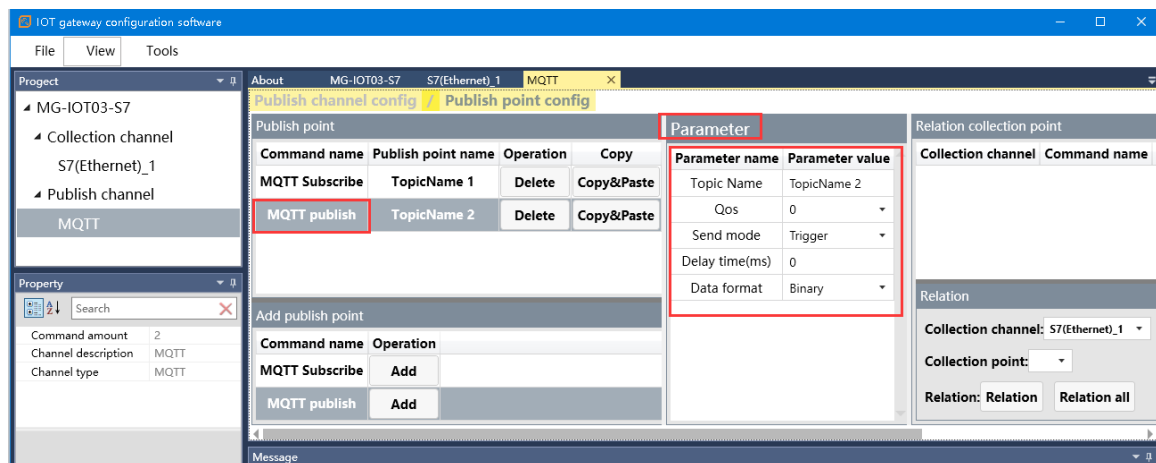


| Parameter name       | Parameter description  |
|----------------------|--|
| Session sign         | Corresponding To the Clean Session in MQTT<br>Hold; To keep the session truncated and recover the previous session information after the cluster is disconnected and reconnected, the client and server need to have relevant session persistence mechanism<br>Clear: Clear the previous Session. Each connect is a new Session,<br>The session lasts only as long as the network connection |
| Request timeout time | MQTT request timeout time (ms)   |
| Keep alive time      | MOTT survival time (ms)  |

Click "Publish Point Config" and select the command in the "Add publish Point" bar to add. The type of command added is optional: MQTT Subscribe /MQTT Publish.

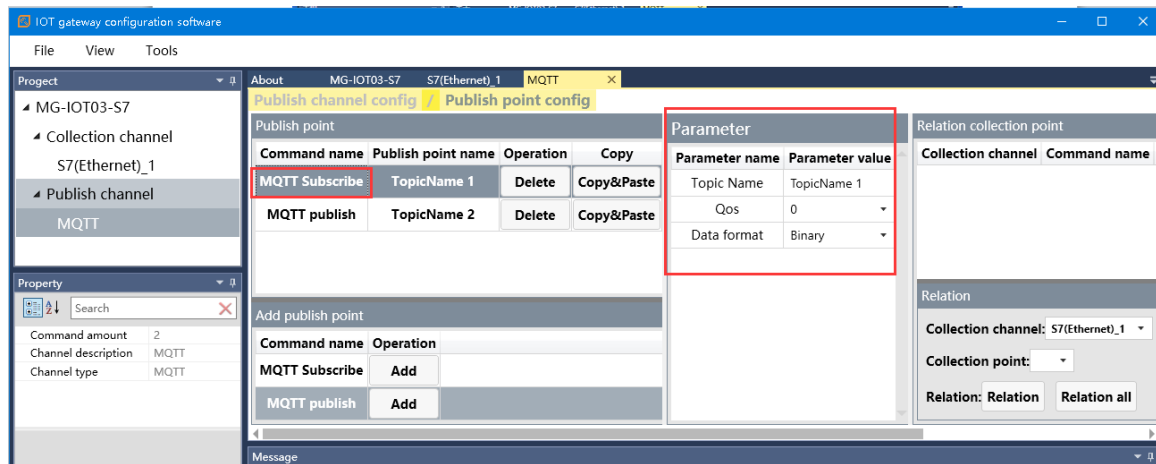
## 1. MQTT Publish parameter configuration

Configure the published parameters in the parameter list



| The parameter name | Parameter description                               |
|--------------------|---|
| Topic name         | A name that needs to be published to the topic.     |
| Qos level          | MQTT message level, currently only supported at 0,1 |
| Send mode          | Ways to push messages: trigger, loop                |
| Delay time (ms)    | The release cycle time, triggers can be ignored     |
| Data format        | The message format for publishing: binary, JSON     |

## 2. MQTT subscription parameter configuration



| Parameter name | Parameter description                                |
|----------------|--|
| Topic name     | Need to subscribe to the name of the topic           |
| Qos level      | MQTT message level, currently only supported at 0,1  |
| Data format    | The message format of the subscription: binary, JSON |

After the MQTT publish and subscribe parameter is set, it can be independently associated with collection, or all collection points can be associated with one click.

### 3.3 configuration file

After you have configured all the collection and distribution points, right-click MG-IOT03 and choose to download the configuration to the gateway.

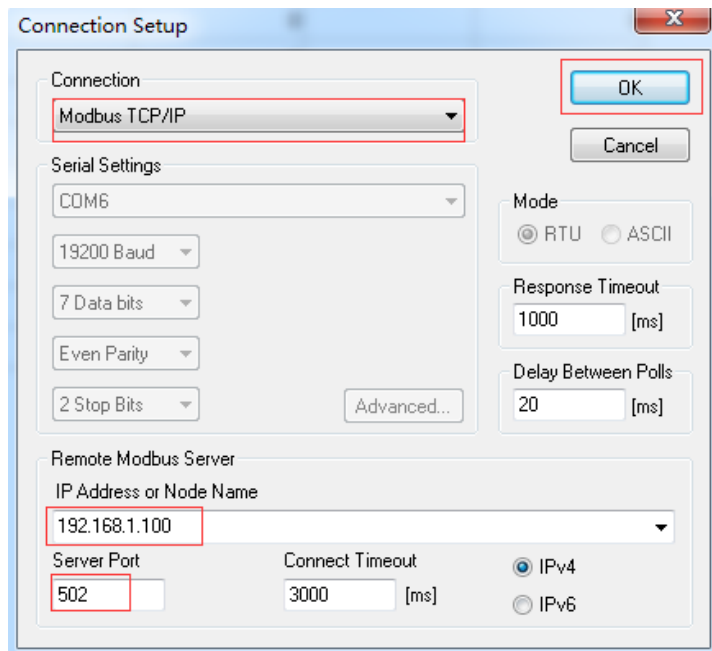
You can also choose to upload, import, and export configurations. When uploading and importing the configuration, you need to first create an MG-IOT03 project. If the download fails, please check whether the COMPUTER IP address and the gateway IP address are in the same network segment, and check whether the gateway IP address is set correctly. If you forget the

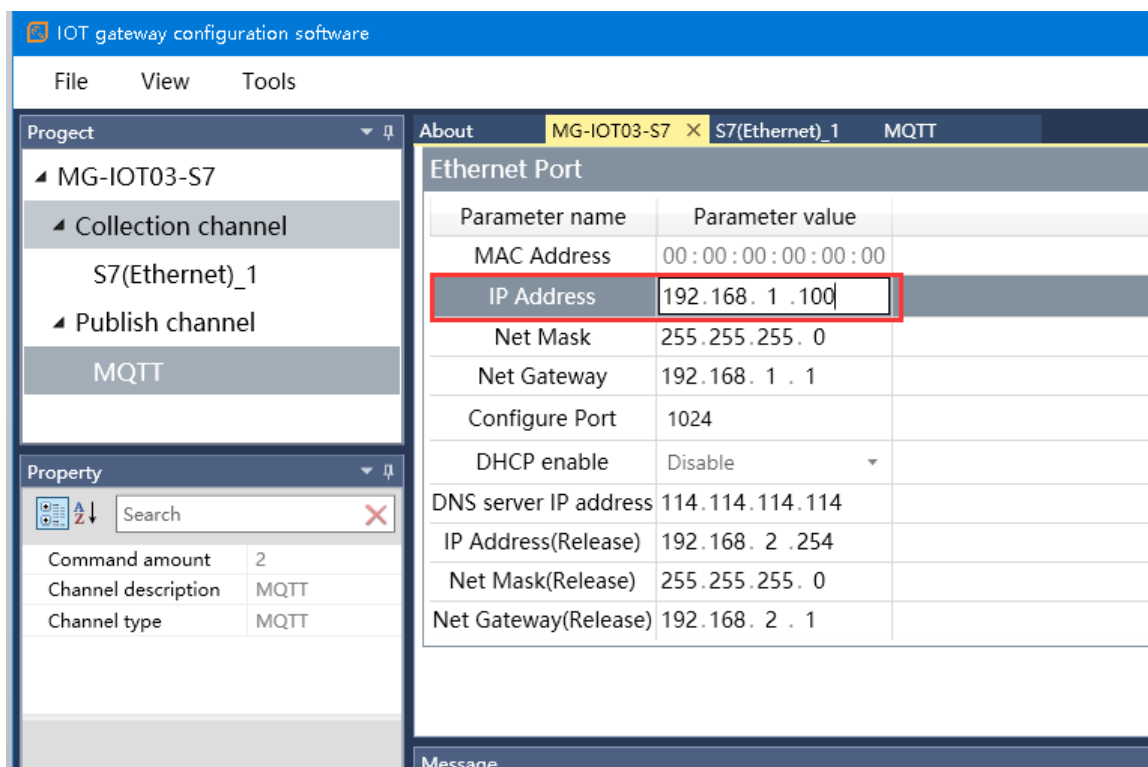
gateway IP address, you can reset the gateway by using the reset key. After reset, the gateway IP address is the default factory IP address.

Note: Make sure that the computer and gateway are in the same network segment when downloading and uploading.

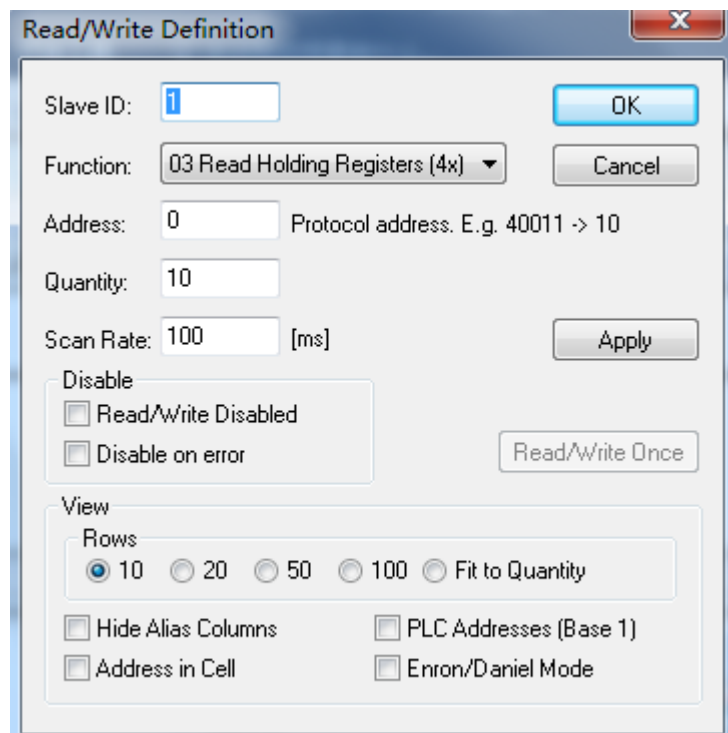
### 3.4 Modbus Poll software testing

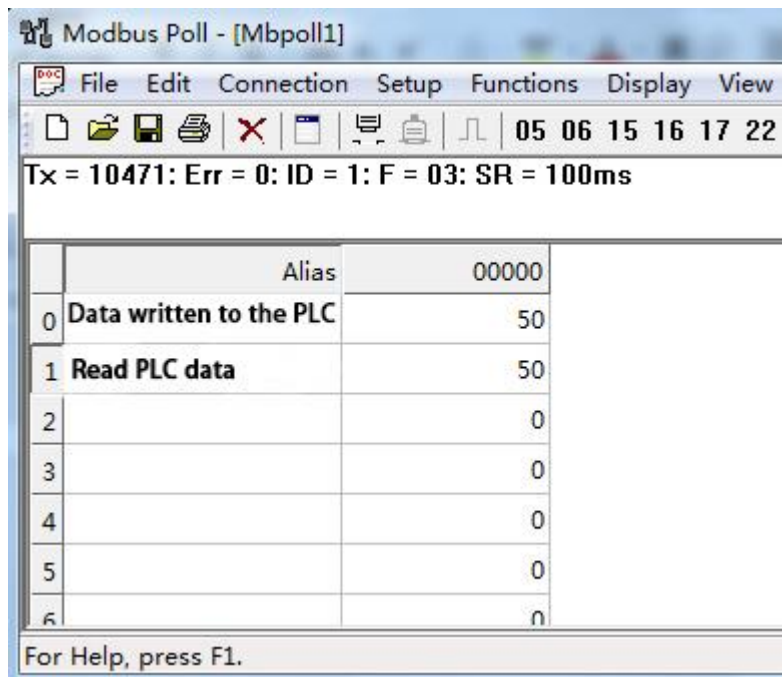
Please open the MODBUS POLL software, select the Connection/Connect menu, and select Modbus TCP/IP input gateway IP address 192.168.1.100, Server Port For 502, click the OK button.





Select Step/Read/Write Definition, select function code 03, and click OK.





## Odot Automation System Co., Ltd.

Add: No.6 Hongsheng Road, Hi-Tech District, Mianyang, Sichuan, China.



Tel: +86-0816-2538289

Zip Code: 621000

Email: sales@odotautomation.com

Web: www.odotautomation.com