3onedata



Industrial IoT Edge Computing Intelligent Gateway

User Manual

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Industrial Ethernet Communication Solution Expert **3onedata Co., Ltd.**

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Preface

Audience

This manual applies to the following engineers:

- Network administrators responsible for network configuration and maintenance
- On-site technical support and maintenance personnel
- Network engineer

Port Convention

The port number in this manual is only an example, and does not represent the actual port with this number on the device. In actual use, the port number existing on the device shall prevail.

Text Format Convention

Format	Description
" "	Words with “” represent the interface words. Such as: “Port No.”.
>	Multi-level path is separated by ">". Such as opening the local connection path description: Open "Control Panel> Network Connection> Local Area Connection".
Light blue font	It represents the words clicked to achieve hyperlink. The font color is as follows: ‘Light Blue’.
About this chapter	The section ‘about this chapter’ provides links to various sections of this chapter, as well as links to the Principles/Operations Section of this chapter.

Icon Convention

Format	Description

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Format	Description
Notice	Remind the announcements in the operation, improper operation may result in data loss or equipment damage.
Warning	Pay attention to the notes on the mark, improper operation may cause personal injury.
Note	Conduct necessary supplements and explanations for the description of operation content.
Key	Configuration, operation, or tips for device usage.
Tips	Pay attention to the operation or information to ensure success device configuration or normal working.

Button Operation Convention

Format	Description
Logout	There is a logout button in the upper right corner of the webpage. After clicking it, the webpage returns to the login page.
+ Add	Click the Add button to add a line of configuration. Note that repeated configuration may result in data overwrite.
	Click the Refresh button to refresh the information of current page.
	Click the Density button to adjust the spacing of entries on the current page.
	Click the Settings button to adjust the position order of interface element display columns, and to turn interface elements on or off.
	Check the row(s) you want to modify, then click the Edit button to enter the modification page.
	Check the line to be deleted, and then click the Delete button to delete the configuration.

Revision Record

Version No.	Revision Date	Revision Note
01	02/28/2025	Product release
02	11/20/2025	Software upgrade

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Version No.	Revision Date	Revision Note
03	01/20/2026	Software upgrade
04	05/27/2026	Software upgrade
05	06/12/2026	Software upgrade

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1 Login to the WEB Interface

1.1 System Requirements for WEB Browsing

Using this device, the system should meet the following conditions.

Hardware and Software	System Requirements
CPU	Above Pentium 586
Memory	Above 128MB
Resolution	Above 1024x768
Color	256 colors or above
Browser	Internet Explorer 9.0, Microsoft Edge, Google Chrome
Operating system	Windows 7/8/10/11

1.2 Set the IP Address of PC

The default management IP address of the device as follows:

IP Settings	Default Values
IP address 1 (LINK1)	192.168.1.250:8000
IP address 2 (LINK2)	192.168.8.250:8000
Subnet mask	255.255.255.0

Note

The network configuration of parts of double IP device supports single IP and double IP modes.

- In the single IP mode, the default IP address of Ethernet port LINK1/LINK2 is

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192.168.1.254.

- In dual IP mode, the default IP address of LINK1 is 192.168.1.250:8000, and that of LINK2 is 192.168.8.250:8000.

When configuring a device through the Web:

- Before conducting remote configuration, please confirm the route between computer and device is reachable.
- Before making a local configuration, make sure that the IP address of the computer and the device are on the same subnet; The computer's IP must not be identical to the device's IP—they should be set to different IP addresses within the same network segment.

Note:
While configuring the device for the first time, if it's the local configuration mode, first confirm the network segment of current PC is 1.

Eg: Assume that the IP address of the current PC is 192.168.5.60, change the network segment "5" of the IP address to "1".

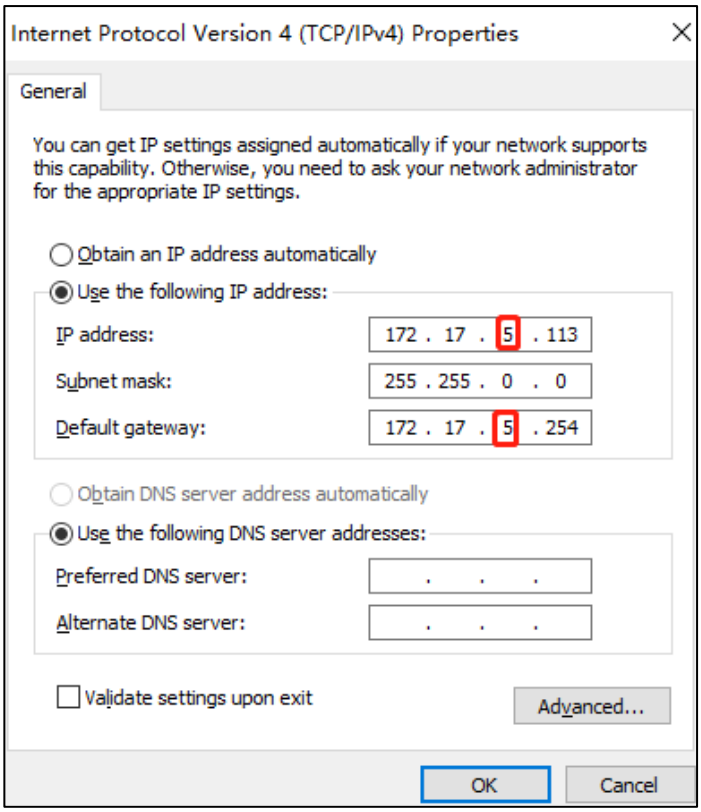
Operation Steps

Amendment steps are as follows:

Step 1 Open "Control Panel> Network Connection> Local Area Connection> Properties> Internet Protocol Version 4 (TCP / IPv4)> Properties".

Step 2 Change the "5" selected by the red frame in the figure to "1".

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Step 3 Click "OK", modification is successful.

Step 4 End.

1.3 Login to the WEB Configuration Interface

Operation Steps

Log in to the WEB configuration interface as follows:

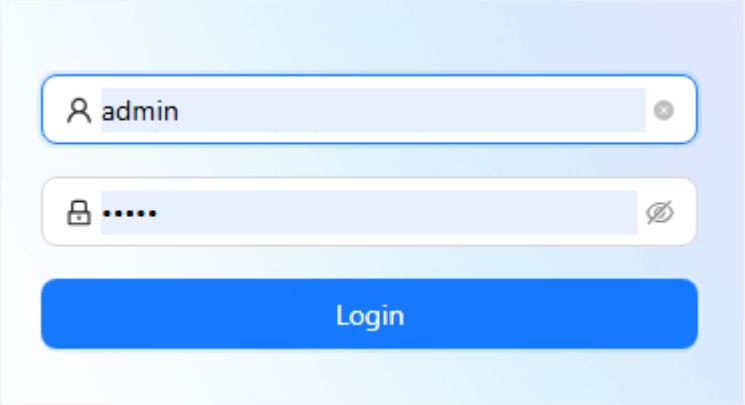
Step 1 Run the computer browser.

Step 2 Enter the address of the device "http://192.168.1.250:8000/" in the address bar of the browser.

Step 3 Click the “Enter” key.

Step 4 Pop-up dialog box as shown below, enter the user name and password in the login window.

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Note:

- The default username and password are “admin/admin”; please strictly distinguish capital and small letter while entering.
- Default user account has the administrator privileges.

Step 5 Click "Login".

After login successfully, user can configure relative parameters and information of WEB interface according to demands.

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2 Device Overview

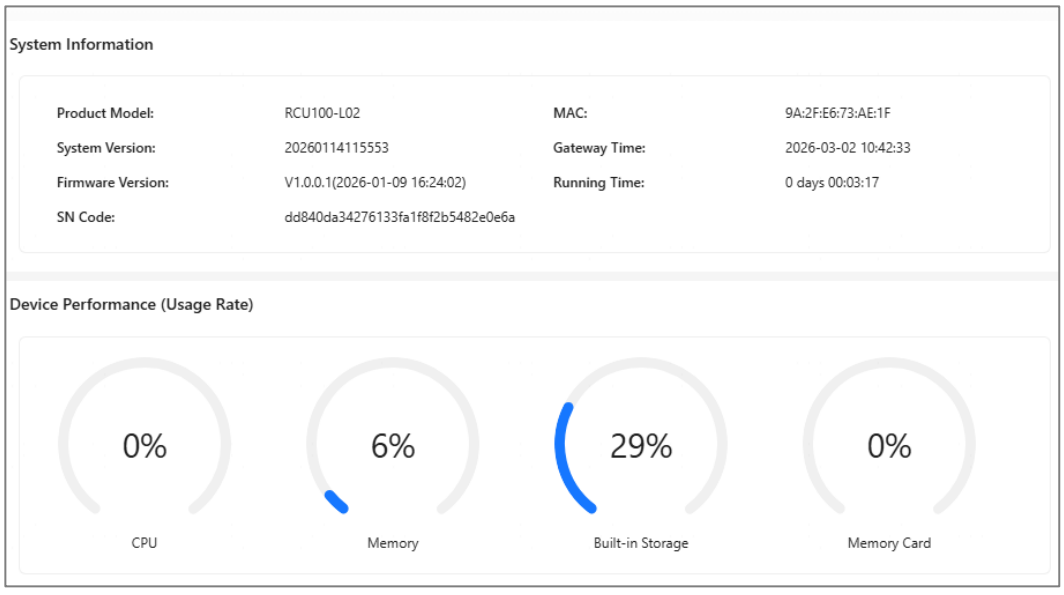
Function Description

View the device's system information, such as product model, system version, firmware version, MAC address, serial number (SN), etc.

Check device performance status.

Interface Description

The device overview interface is as follows:



The main element configuration description of device overview interface:

Interface Element	Description
System Information	Basic information of software, hardware and operation of the device. • Product Model

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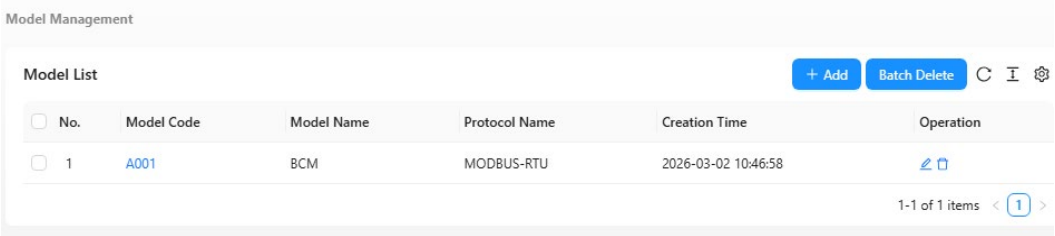
Interface Element	Description
	• System Version • Firmware Version • SN Code • MAC • Gateway Time • Running Time
Device Performance (Usage Rate)	Device performance status. • CPU (%) • Memory (%) • Built-in Storage • Memory Card

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3 Model Management

3.1 Model Management

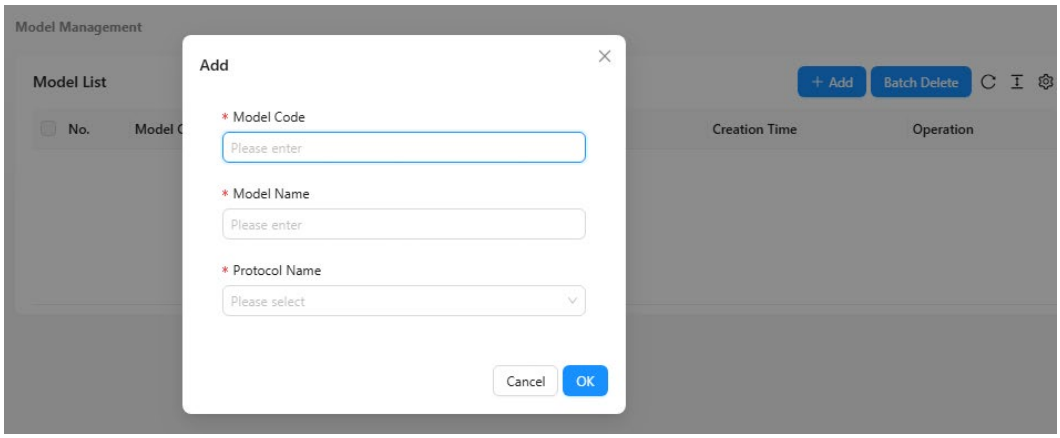
- The model management page includes dynamic creation, modification, deletion and batch deletion of specific models.



- Click the “Add” button to create a device model. A device model consists of model code, model name, and protocol name. Among them, the model code and model name are user-defined, while the protocol name is selected via a dropdown menu.

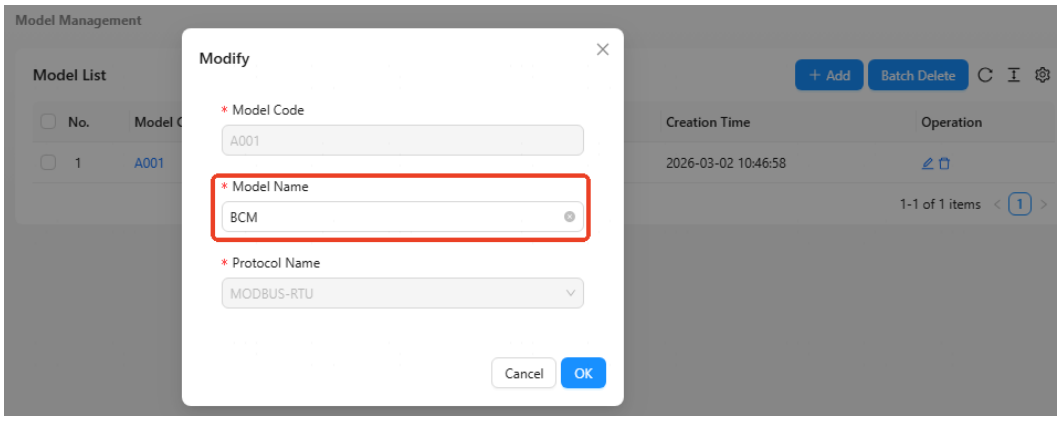
  Note:

  The naming convention for the model code is as follows: it must consist of letters, underscores, and numbers, with the first character prohibited from being a digit.

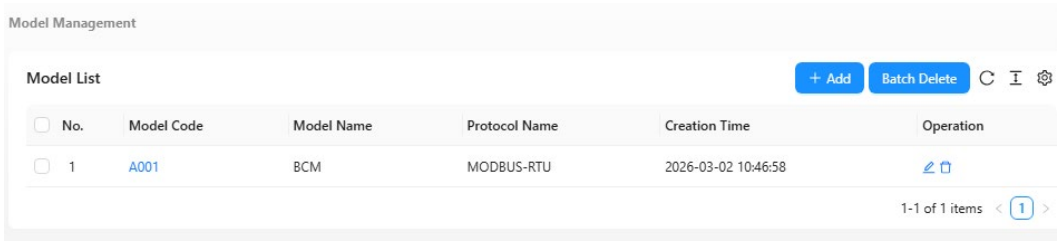


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- To modify a device model, only the model name and protocol name can be edited; the model code cannot be changed.

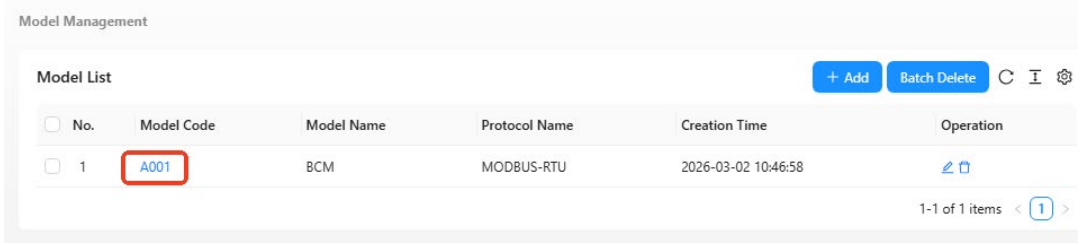


- If the model is created incorrectly or the created model is discarded, click the Delete button to delete the model or click Batch Delete after checking on the left.



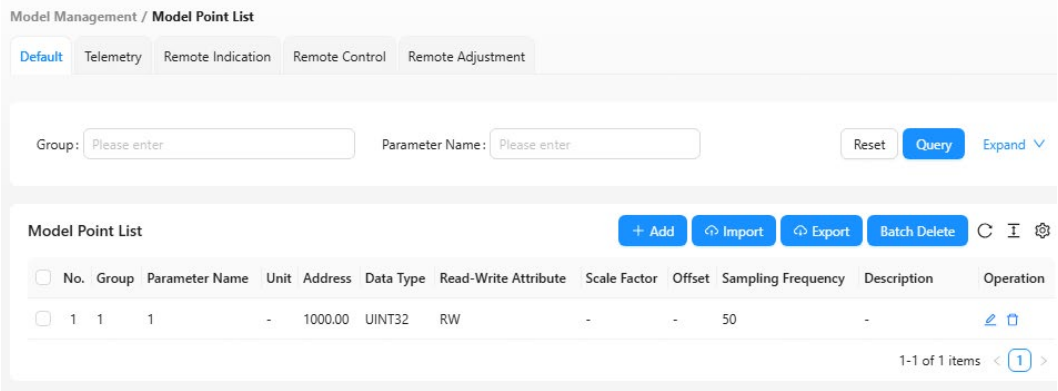
3.2 Configure Model Point List

- Each device model is associated with a Point List. Click the specific model code to configure its Point List.



- The model point list is divided into upper and lower sections: the upper section is for conditional queries, and the lower section displays specific points along with add, delete, modify, import, and export operations.

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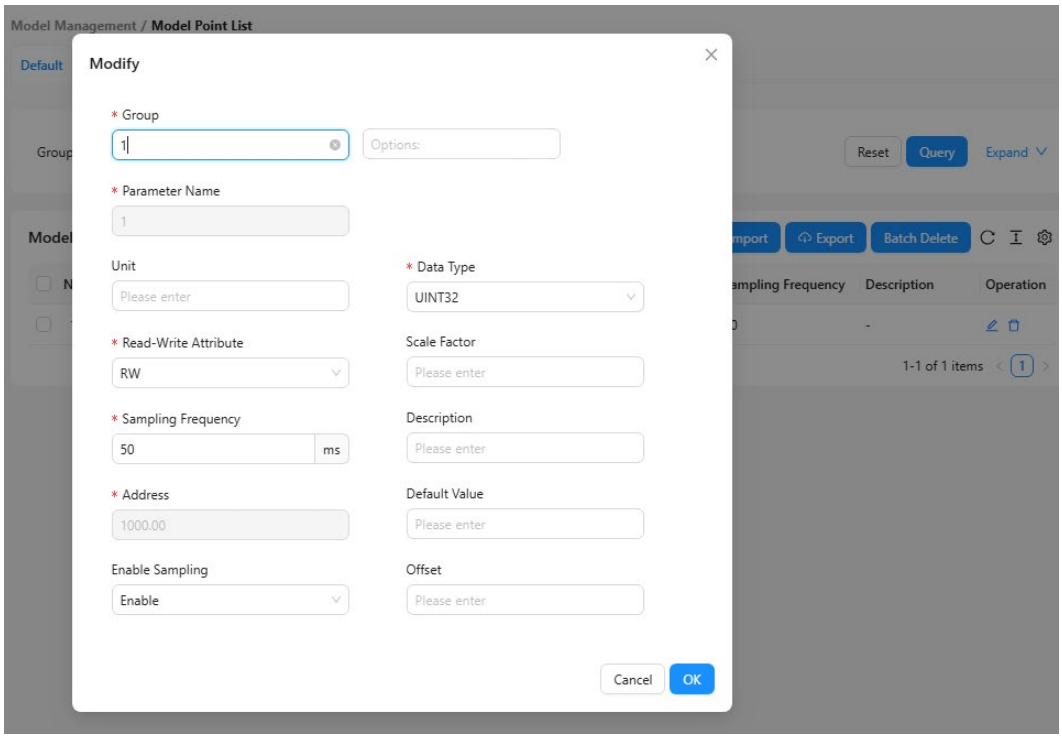


Interface Element	Description
No.	Number.
Group	The model list supports grouped display.
Parameter Name	The alias of the address must be a unique value within the same model.
Unit	Organization or enterprise name.
Address	A unique value within the same device model, used as an identifier for device communication. Format: Register name + address. Example: To access the first address of the holding register in Modbus RTU protocol, enter "40", where "4" is the identifier for holding registers and "0" is the address. Virtual point format @@ (parameter name 1+ parameter name 2) * parameter name 3 supports four arithmetic operations. For example: @@(device_type + user_data) * device_type + user_data Virtual points can only be associated with other points of the current device, not across devices
Data Type	Data type of the specified point
Read/Write Attribute	Read/write attribute options are as follows: • RO: read only; • RW: read and write; • WO: write only.
Scale Factor	The scaling factor. For example: If the data is 10 and the scaling factor is configured as 0.1, the data will be displayed as 1.0 (0.1*10).
Sampling	Sampling interval, unit: milliseconds.

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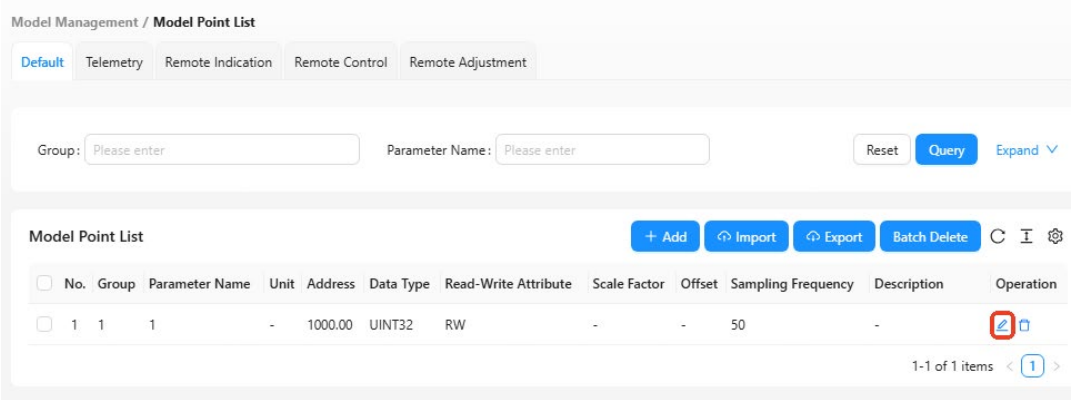
Interface Element	Description
Frequency	
Description	Description of the point.
Default	Display default value if acquisition fails
Enable acquisition	If closed, the point will not be collected
Offset	For example, assume that the data is 10, the offset is configured to 2, and the data is displayed as 12 (10+2). If the scaling offset is started at the same time, the scaling is 10 and the offset is 2, then it is 102 (10*10+2).

- Click to create a new point. The field information of the point is as shown in the "Model Points" table.

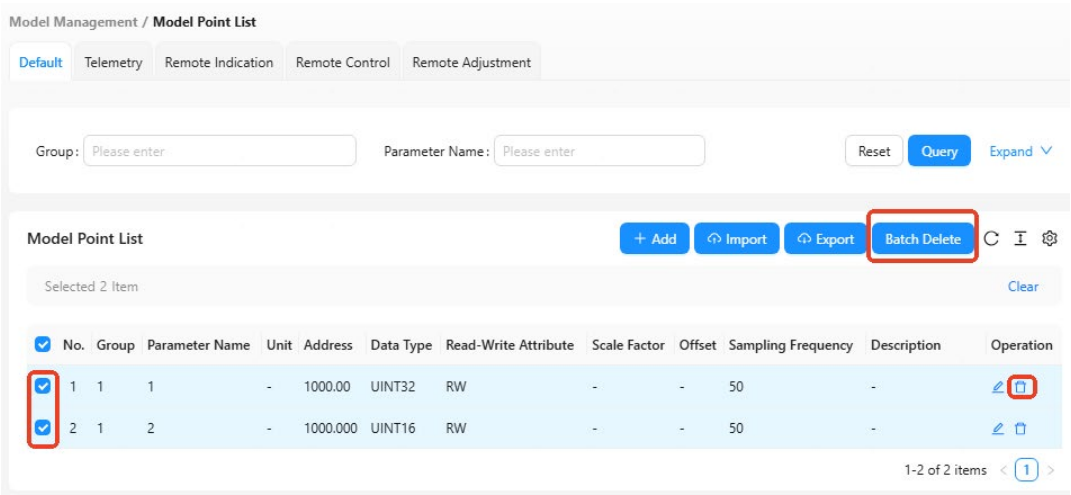


- Click the Edit button to modify the point. Note that the parameter name and address in the point cannot be modified.

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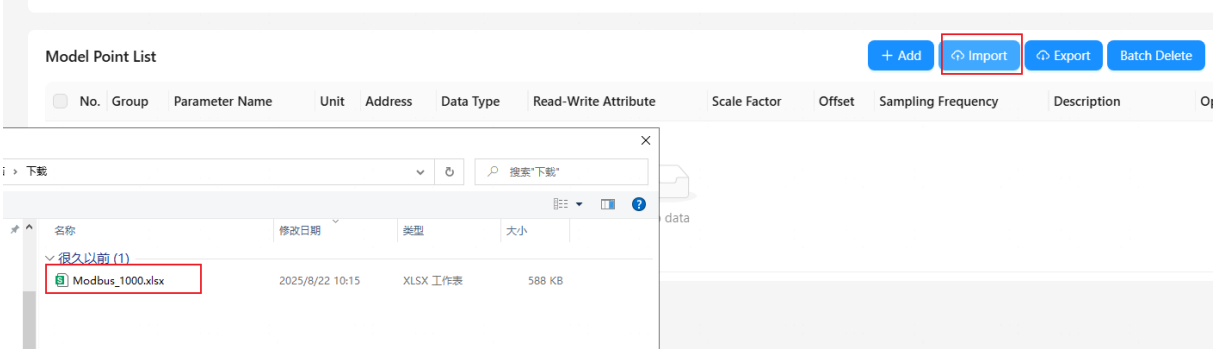


- Click the Delete button to delete points or select them in batch.

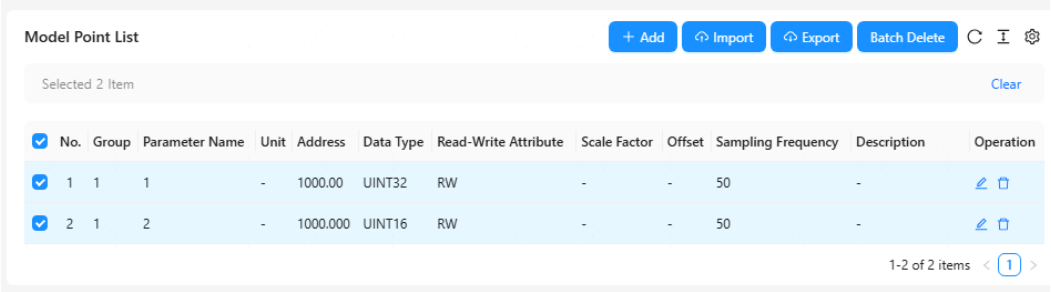


- Batch create points by generating an Excel template according to the rules, then import the file. Note: Importing the point table will clear all existing points and regenerate them according to the imported table. Users may first export a blank template file, populate it with the required data, and then import it. The format of the imported file is as follows:

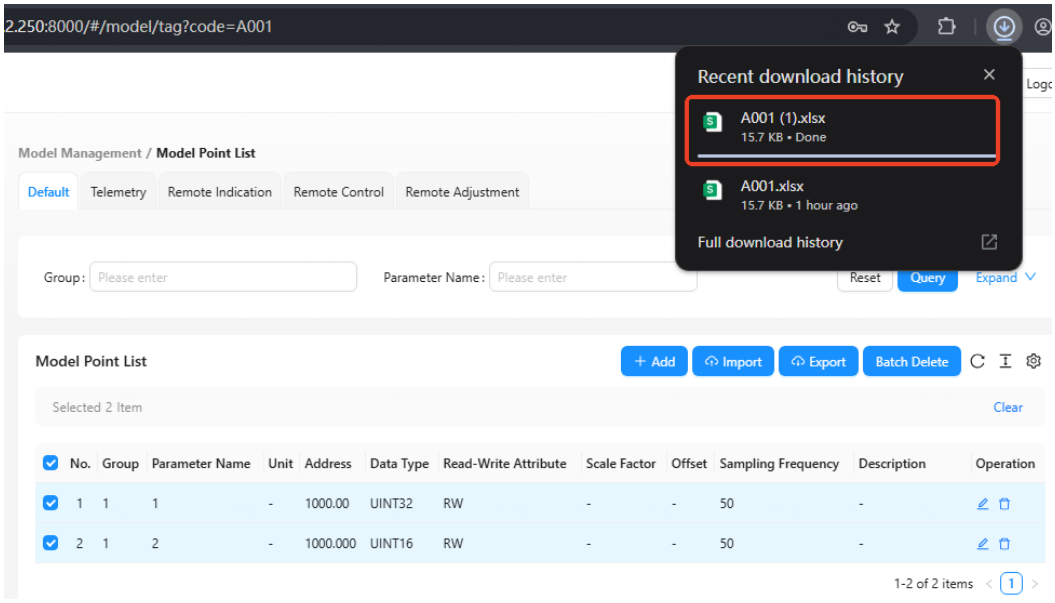
Group	Parameter	Unit	DataType	Access	ScanRate	Description	Address	Display	ValueString



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- Export point files for batch modification or import into other models.

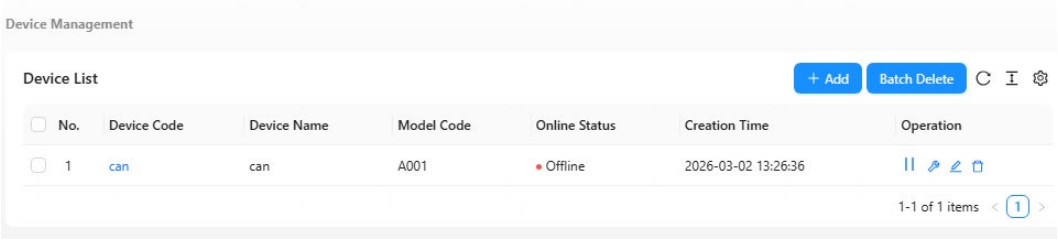


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4 Device Management

4.1 Configure Device

- The device configuration page also consists of two sections: the upper part for conditional queries, and the lower part for adding, deleting, modifying, and configuring specific protocol functions.

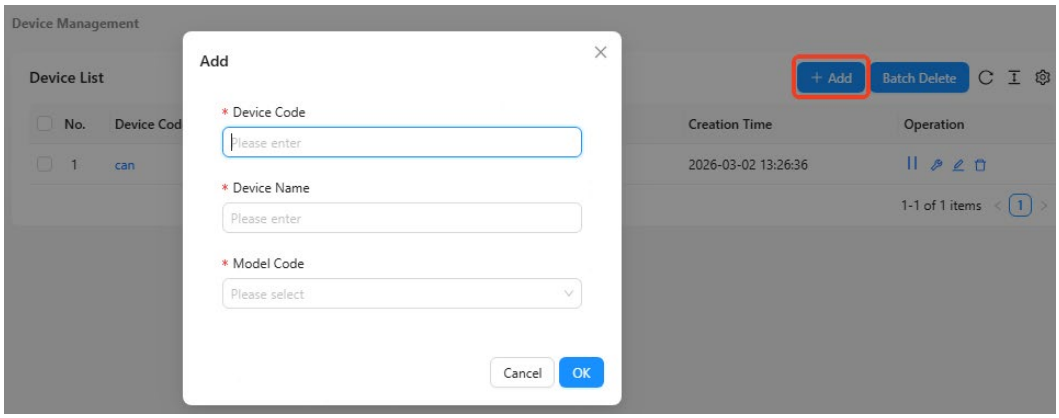


- Create a new device consisting of device code, device name, and model name. The device code is unique, and the model name will be automatically associated with the created model table. Select the corresponding model based on the specific device characteristics.

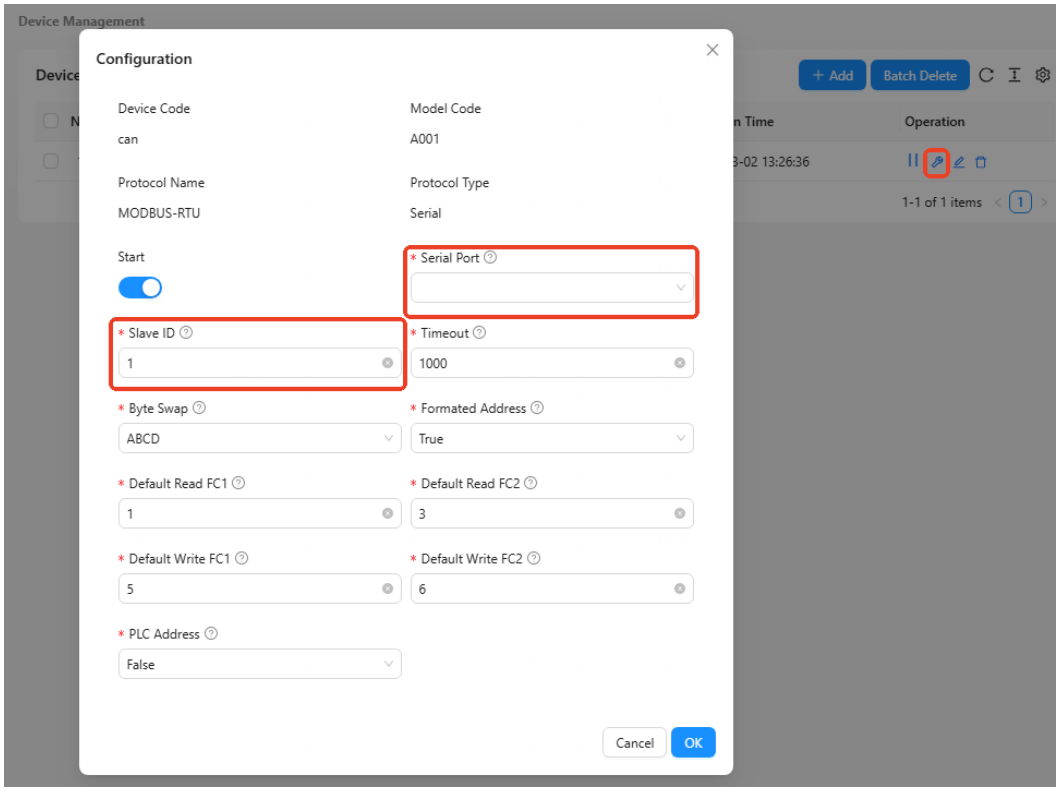
  Note:

  The naming convention for device code is as follows: it must consist of letters, underscores, and numbers, with the first character prohibited from being a digit.

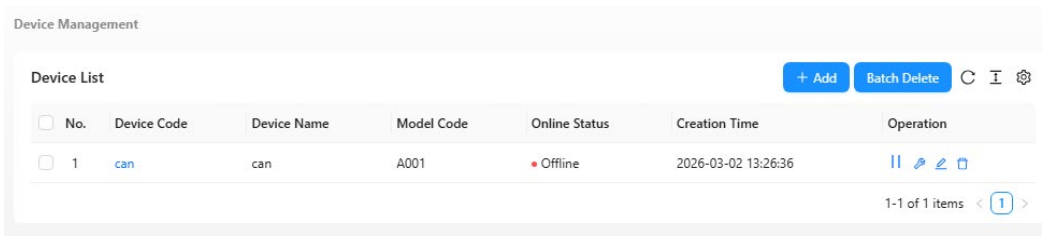
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- After creating a new device, you need to configure its specific parameters. This case uses a Modbus RTU device, so you need to configure the specific serial port and device station number.

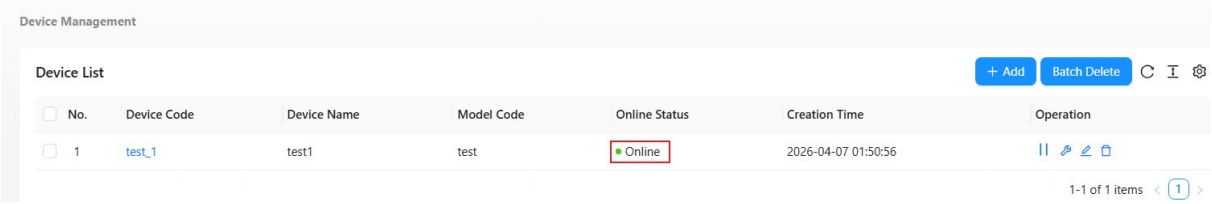


- After creating a device and configuring its specific parameters, the device's online status will be dynamically displayed. If the device is not connected or there is a communication exception, it will show as Offline.

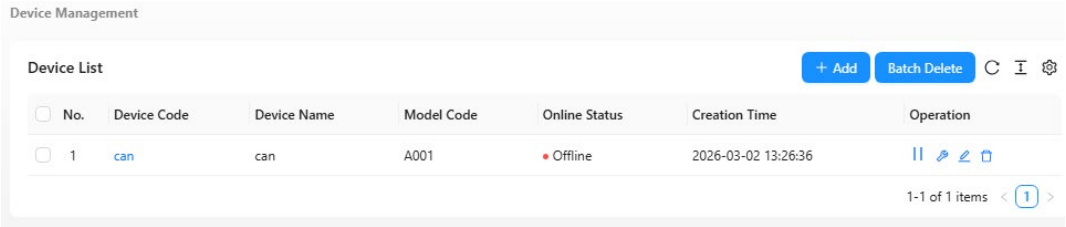


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- When the device is connected and communicates normally, it will show as Online. (same as above）

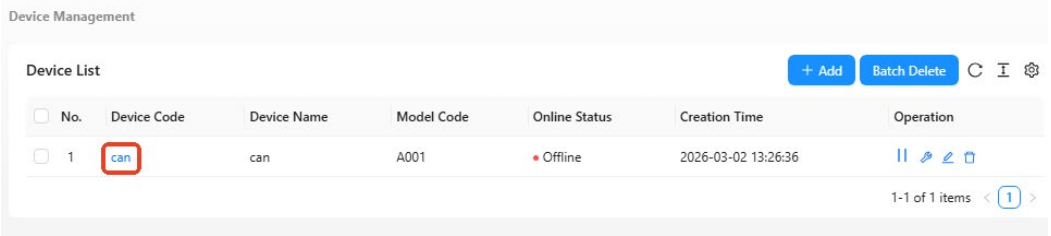


- The device configuration page also provides the functions of modification, deletion and batch deletion.

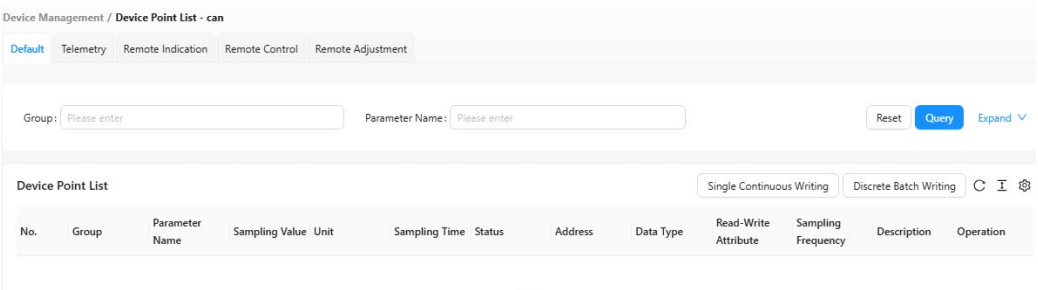


4.2 Configure Device Point Table

- Click on a specific device code to view real-time data in the device point table.

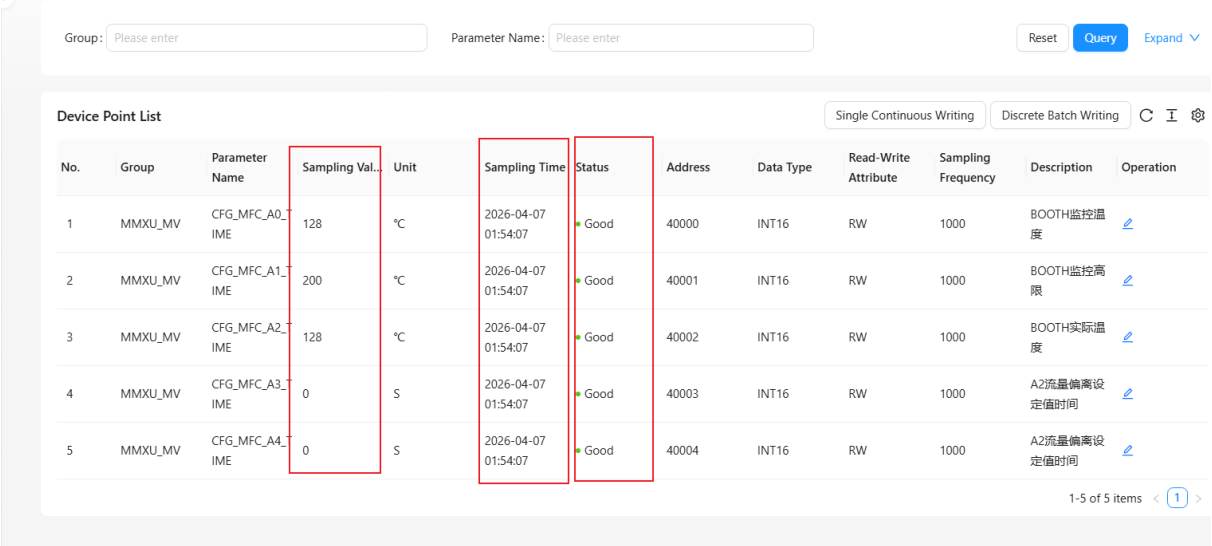


- The device point table does not require manual creation. When a device selects a specific model, it will automatically associate with the point table under that model. To modify or delete points, users must return to the Model Management section to perform these operations. The changes will automatically synchronize to the device point table.

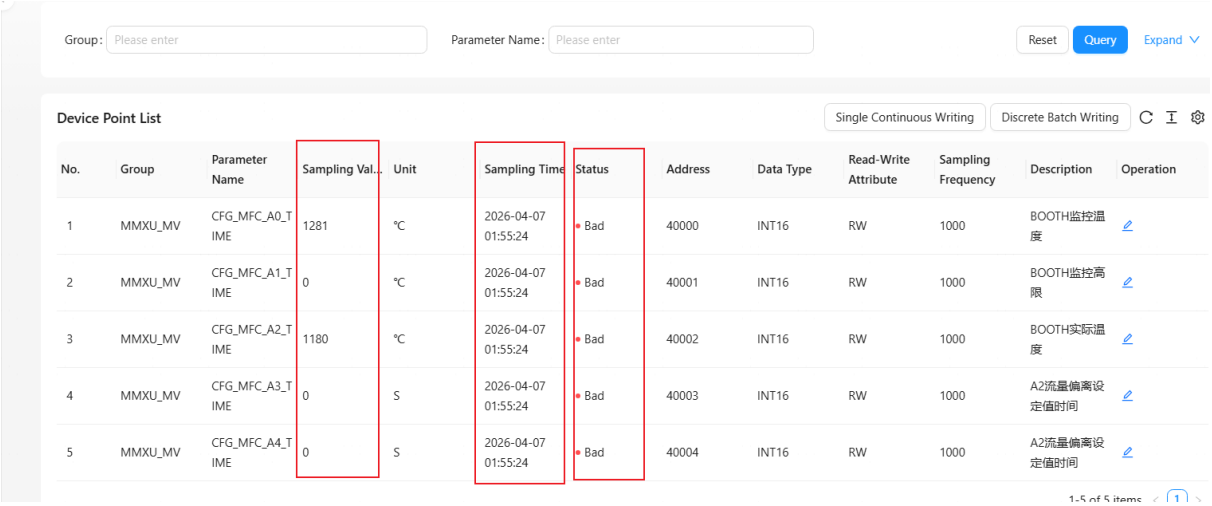


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- The difference between the device point table and the model point table is that the device point table is real-time and dynamic, with collection time, collection data, and collection point status.



- After communication abnormality, the status will change to "bad", and the collection time will stay at the most recent normal collection time, and the collected value will also stay at the most recent collected value.



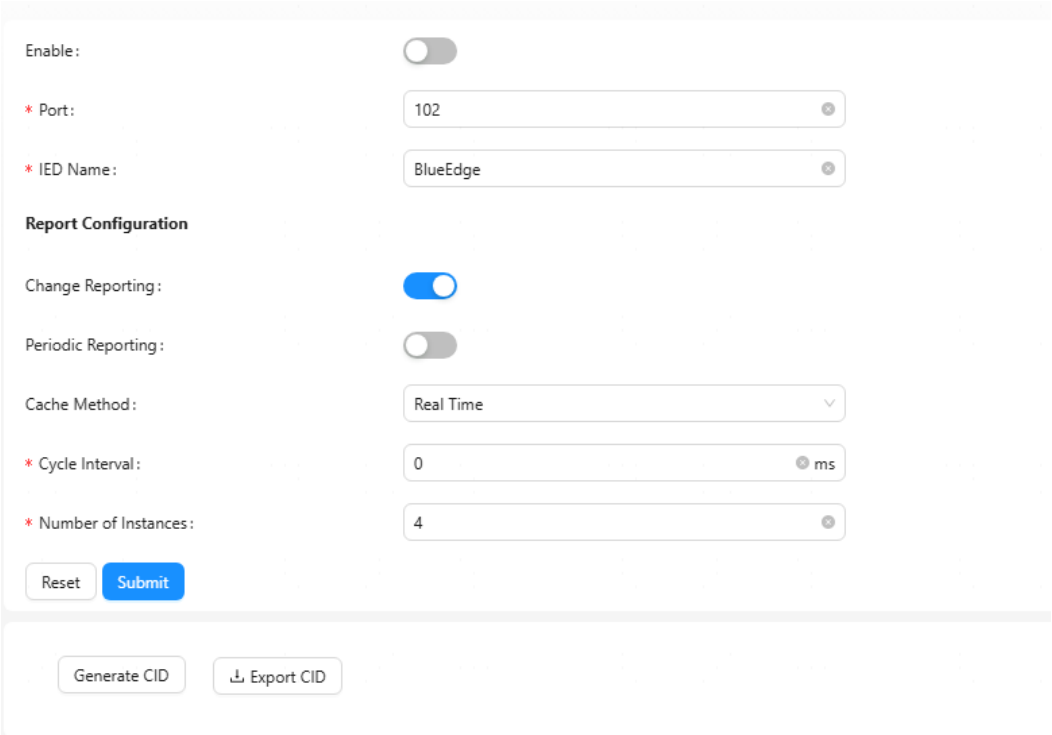
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5 Data Service

5.1 IEC61850 MMS Server

Support IEC 61850 MMS Server integration. The system can be connected by configuring the IEC 61850 MMS Server port and uploading relevant configuration files.

The Report Configuration option allows you to generate a default report configuration.



There are two ways to connect:

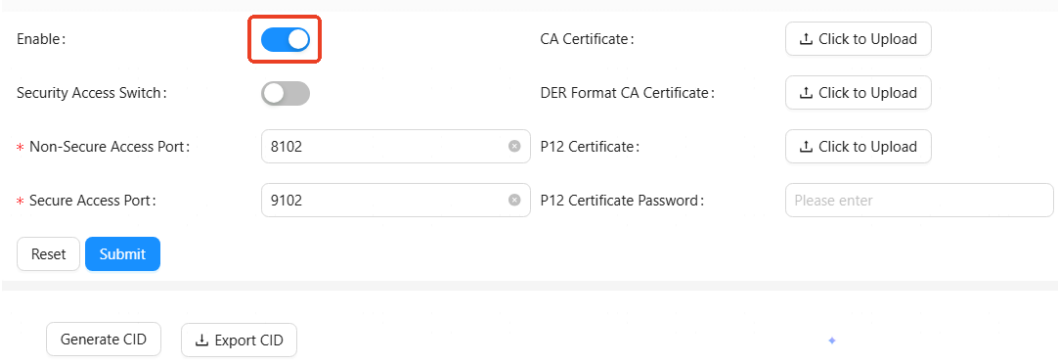
- IP address + port direct connection, this method is recommended to be used when there are few points; Exporting the CID file by parsing the CID file;

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- IP address + port number connection, which is used in most cases.

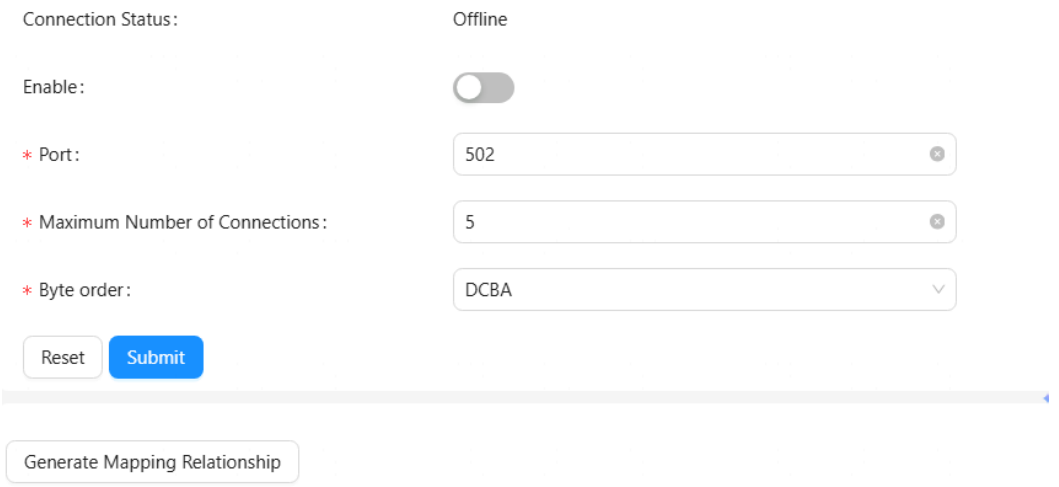
5.2 IEC61850 CMS Server

Support IEC 61850 CMS Server integration. The system can be connected by configuring the IEC 61850 CMS Server port and uploading relevant configuration files.



5.3 Modbus TCP Slave

Support ModBusTCP Slave system docking, which can be accessed by configuring ModBusTCP Slave port.

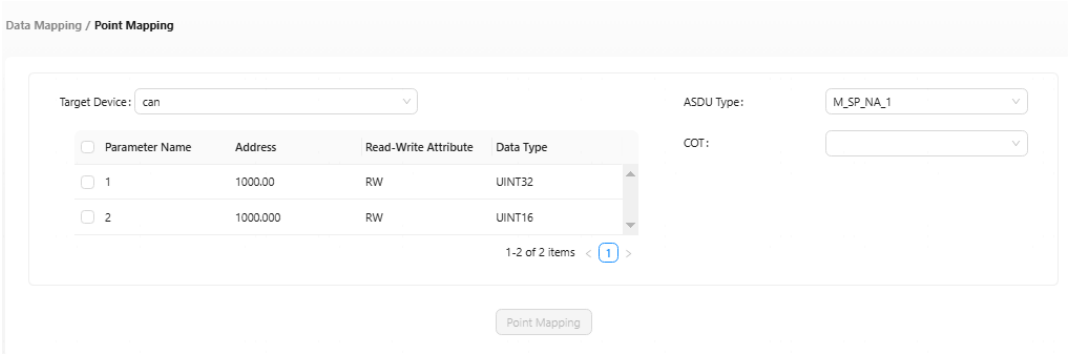


Idle time: If there is no connection request within the specified time, the connection will be automatically closed

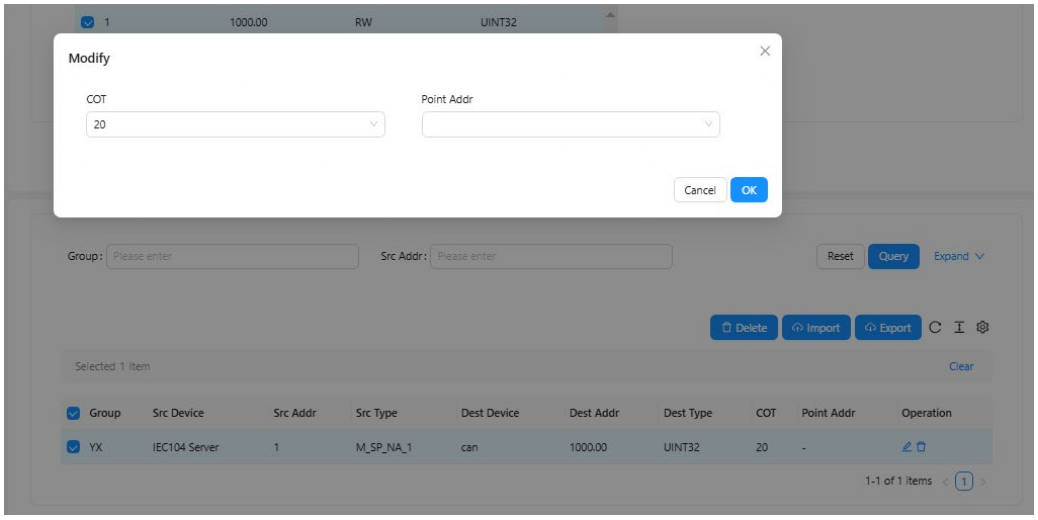
Maximum Connections: Limit the number of clients connecting to the server at the same time

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Generate mapping relationship: Select the points that can be collected by the service. The mapping relationship here can directly map multiple devices. The station number of the mapping relationship generated here is defaulted to 1



Data mapping: When mapping points manually, you can set grouping, source type, and station number. Settings are all non-required, and default data is generated when settings are not filled in.



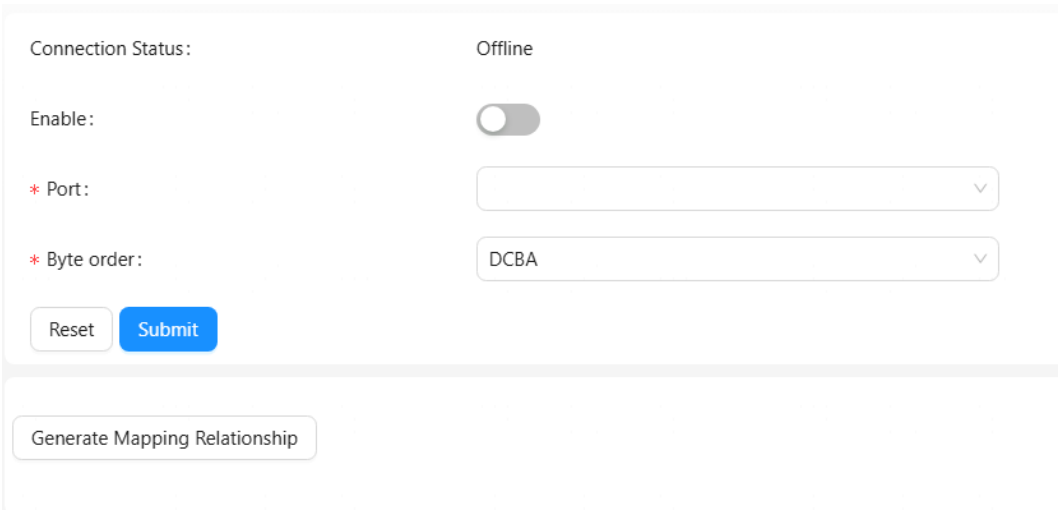
Composition of source address: station number + underscore + register address

Operation: When modifying the source address, if the station number is not modified, only the register address needs to be modified in the source address column; If you need to change the station number during modification, modify it in the station number column. At the same time, the station number before the source address also needs to be modified, and it is consistent with the modification in the station number column.

5.4 Modbus RTU Slave

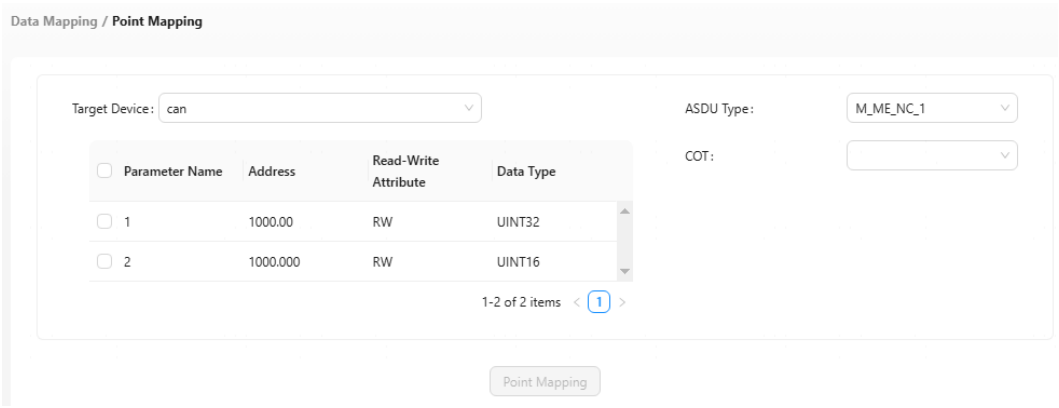
Support ModBusRTU Slave this system docking, by configuring ModBusRTU Slave port, can be accessed.

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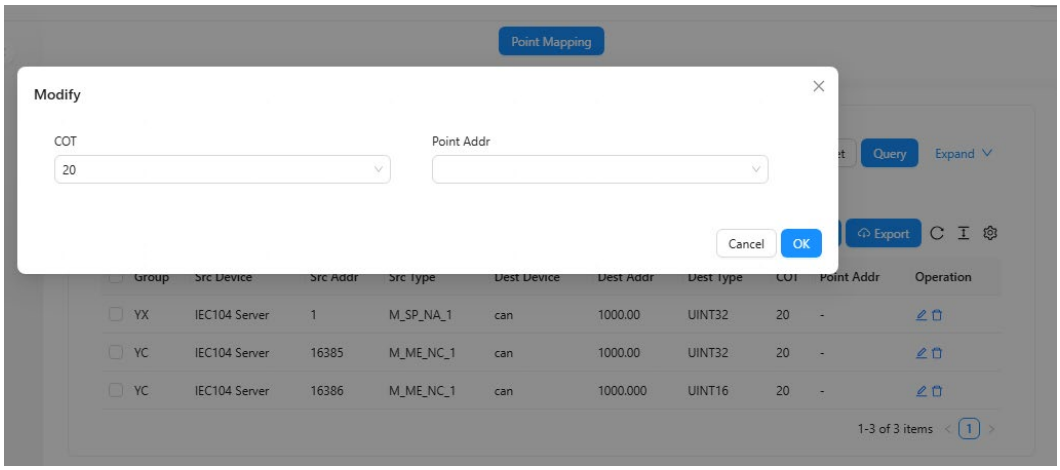
Connection Status: Displays whether the device is online normally

Generate mapping relationship: Select the points that can be collected by the service. The mapping relationship here can directly map multiple devices. The station number of the mapping relationship generated here is defaulted to 1



Data mapping: When mapping points manually, you can set grouping, source type, and station number. Settings are all non-required, and default data is generated when settings are not filled in.

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Composition of source address: station number + underscore + register address

Operation: When modifying the source address, if the station number is not modified, only the register address needs to be modified in the source address column; If you need to change the station number during modification, modify it in the station number column. At the same time, the station number before the source address also needs to be modified, and it should be consistent with the modification in the station number column

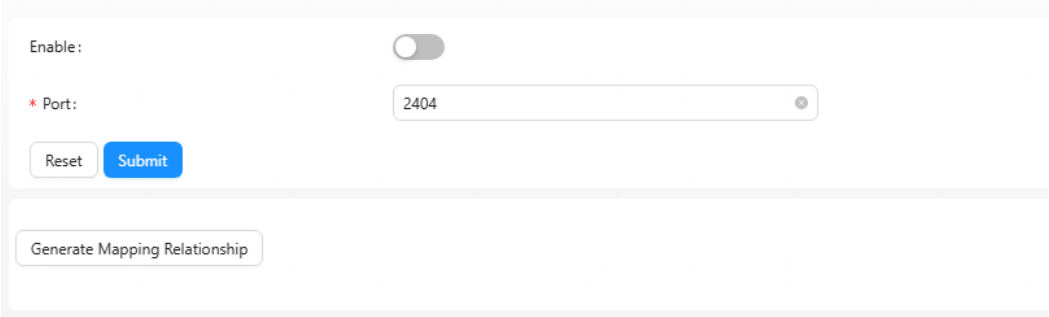
Note:

When importing, Modbus TCP and Modbus RTU cannot use the same Execl mapping table. You need to change the source device column in the table to the imported source protocol device.

5.5 IEC104 Server

Support IEC104 system docking, which can be accessed by configuring IEC104 Server port.

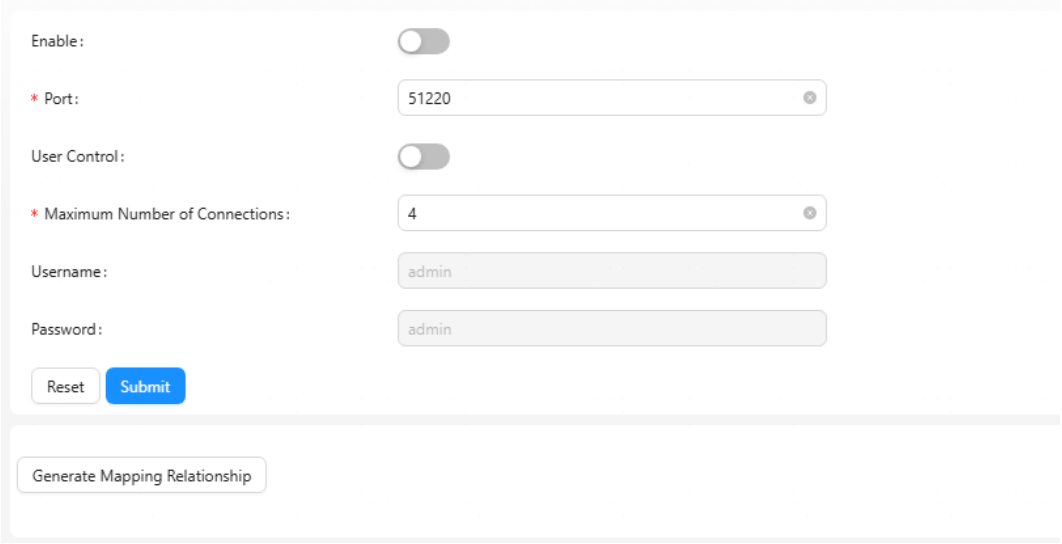
Copyright © 3onedata Co., Ltd.



Generate mapping relationship: Select the points that can be collected by the service. The mapping relationship here can directly map multiple devices

5.6 OPC UA Server

Support OPC UA Server system docking, which can be accessed by configuring OPC UA Server port

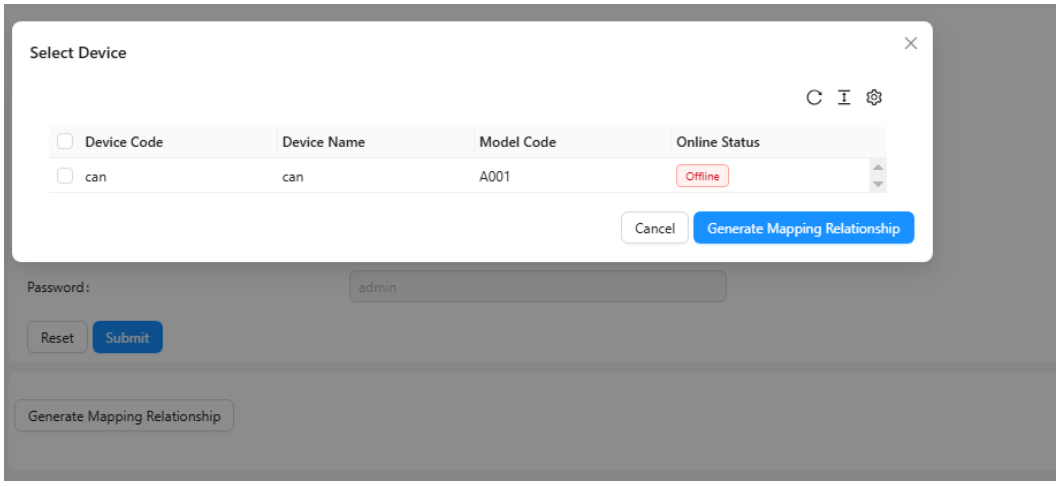


The maximum number of connections limits the number of clients connecting to the server at the same time

After initiating user control, the client connection requires a username and password

Generate a mapping relationship to select the points that the service can provide for acquisition. The mapping relationship here can directly map multiple devices

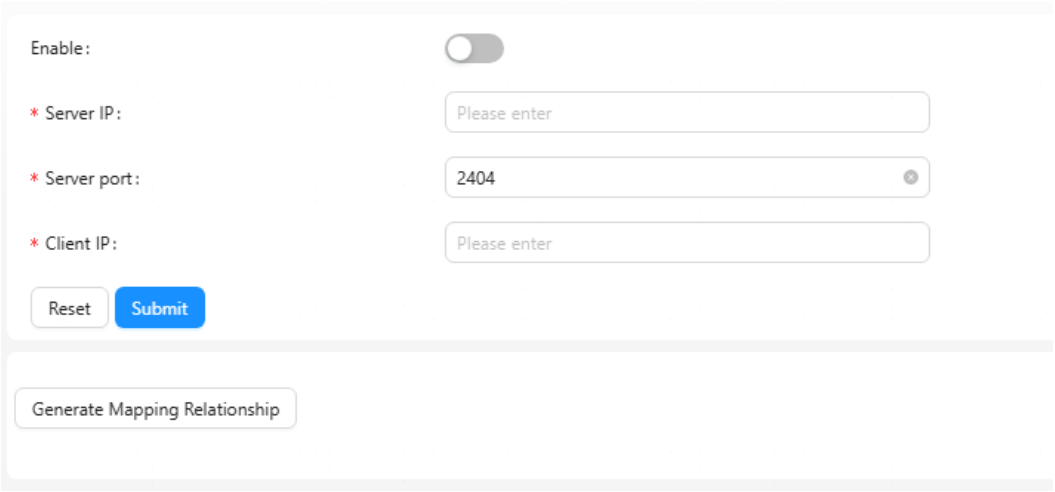
Copyright © 3onedata Co., Ltd.



Check device to directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship

5.7 IEC103 Server

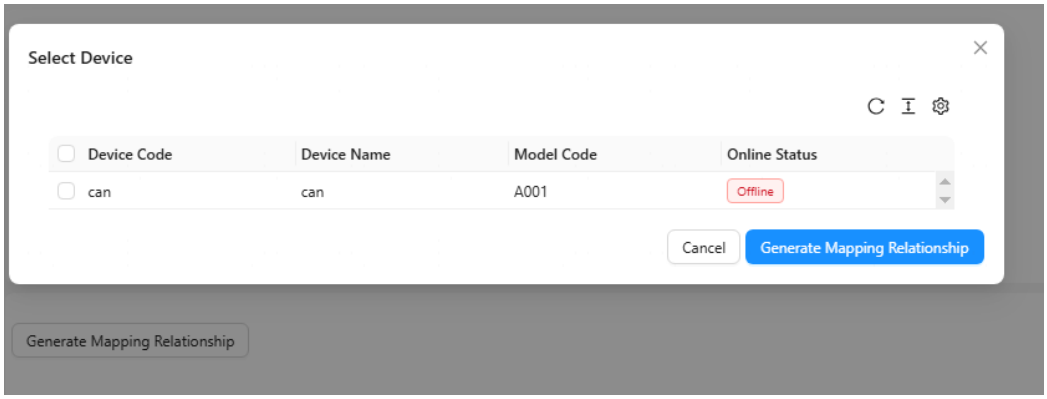
Support IEC103 Server TCP, IEC103 Server UDP, IEC103 Server COM system docking, by configuring IEC103 Server TCP/UDP/COM Port, which can be accessed.



After starting user control, you need to enter the server IP and port, and the client IP

Generate a mapping relationship to select the points that the service can provide for acquisition. The mapping relationship here can directly map multiple devices

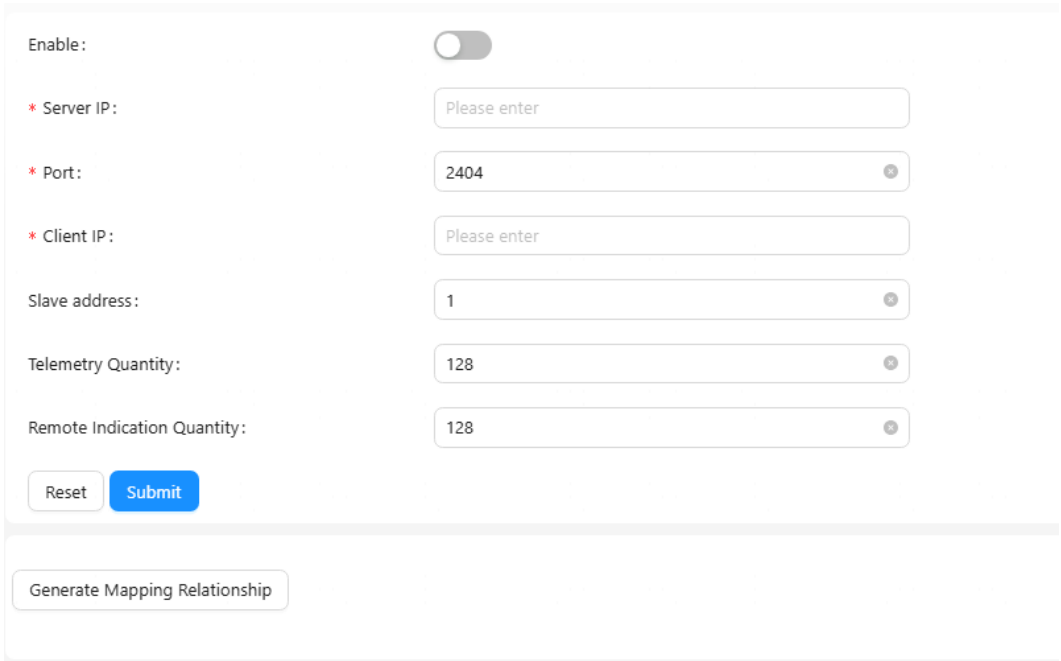
Copyright © 3onedata Co., Ltd.



Check device to directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship

5.8 DNP3 Server

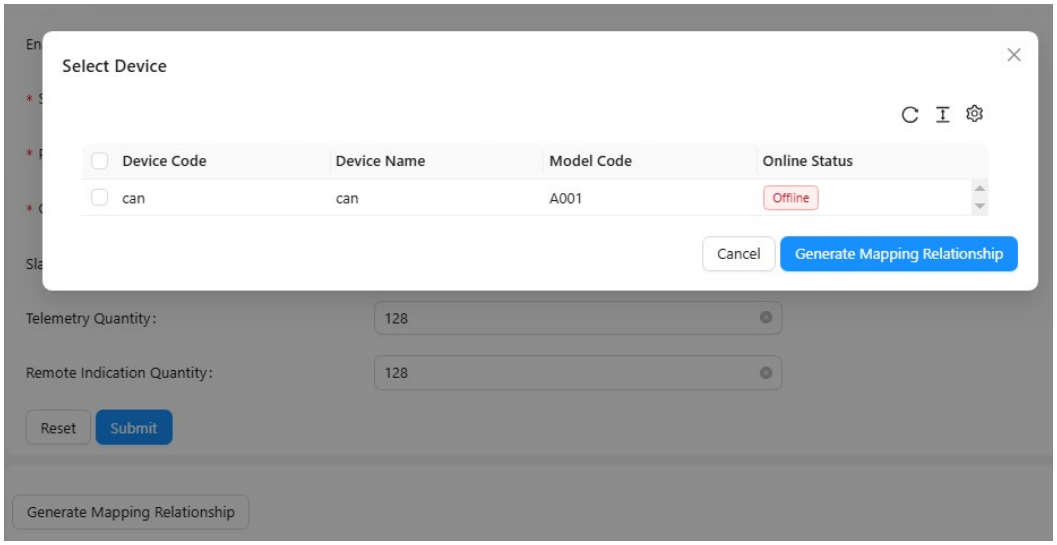
Support DNP3 Server TCP/COM system docking, which can be accessed by configuring DNP3 Server TCP/COM port.



After starting user control, you need to enter information such as server IP and port, client IP, etc.

Generate a mapping relationship to select the points that the service can provide for acquisition. The mapping relationship here can directly map multiple devices

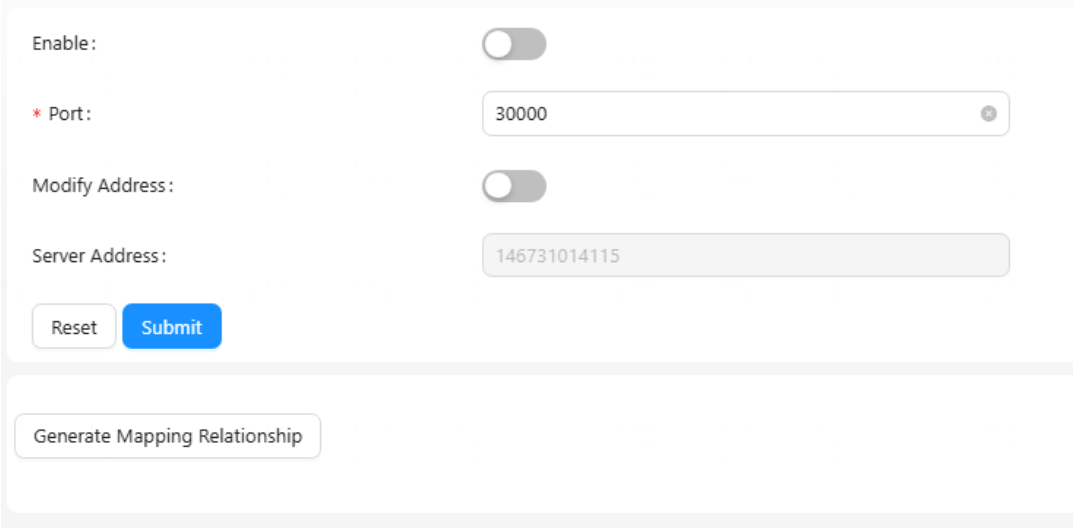
Copyright © 3onedata Co., Ltd.



Check device to directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship

5.9 DLT698 Server

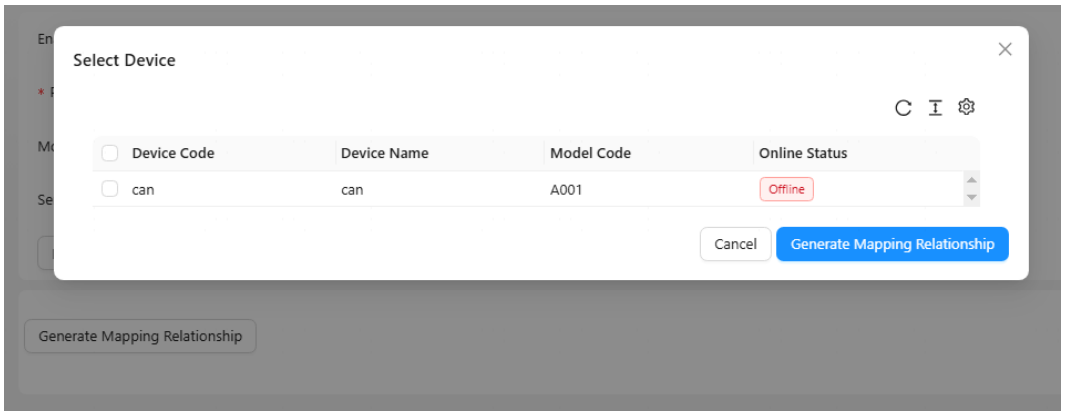
Support the DLT698 Server system docking, which can be accessed it by configuring the DLT698 Server port



After user control is initiated, client connections require port and server addresses to be entered.

Generating a mapping relationship can select the points that the service provides for acquisition, and the mapping relationship here can directly map multiple devices.

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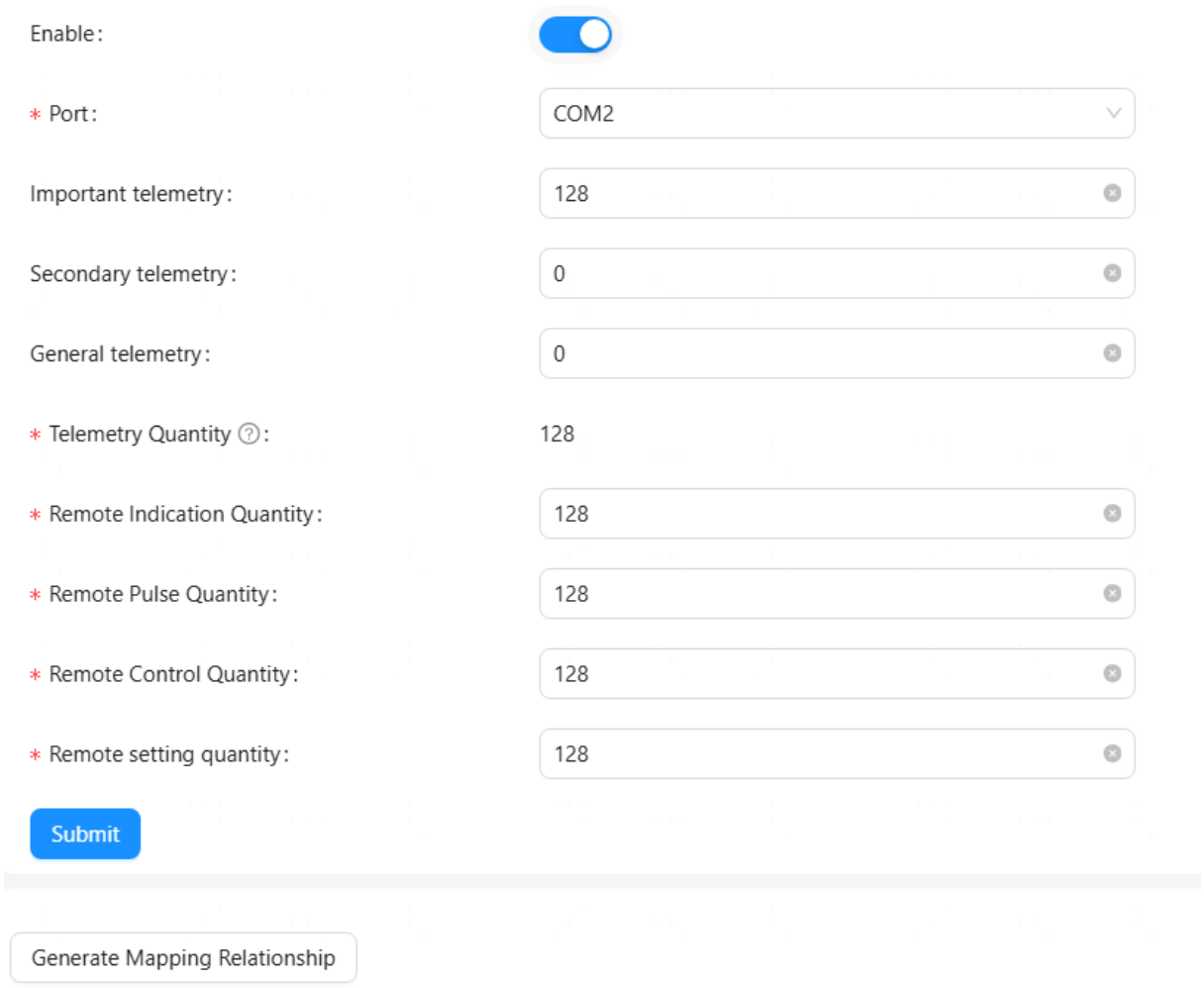


Check device to directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship

5.10 CDT Server

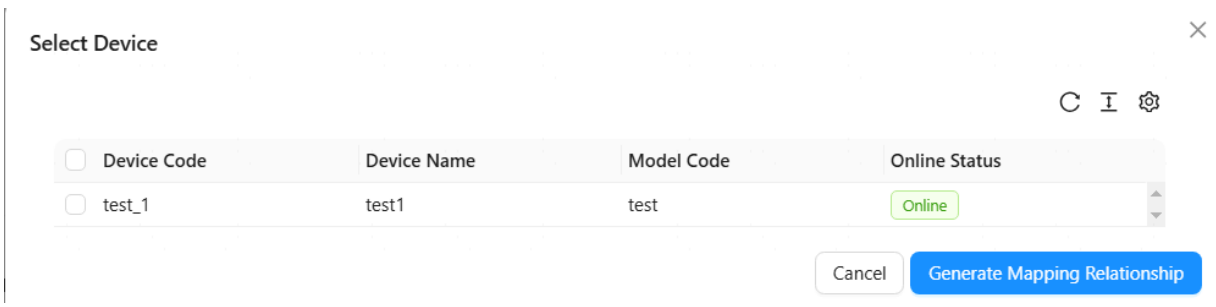
Support CDT Server system docking, which can be accessed by configuring CDT Server port.

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After starting the user control, you need to input information such as the port and the number of telemetry points.

Generating a mapping relationship can select the points that the service provides for acquisition, and the mapping relationship here can directly map multiple devices.

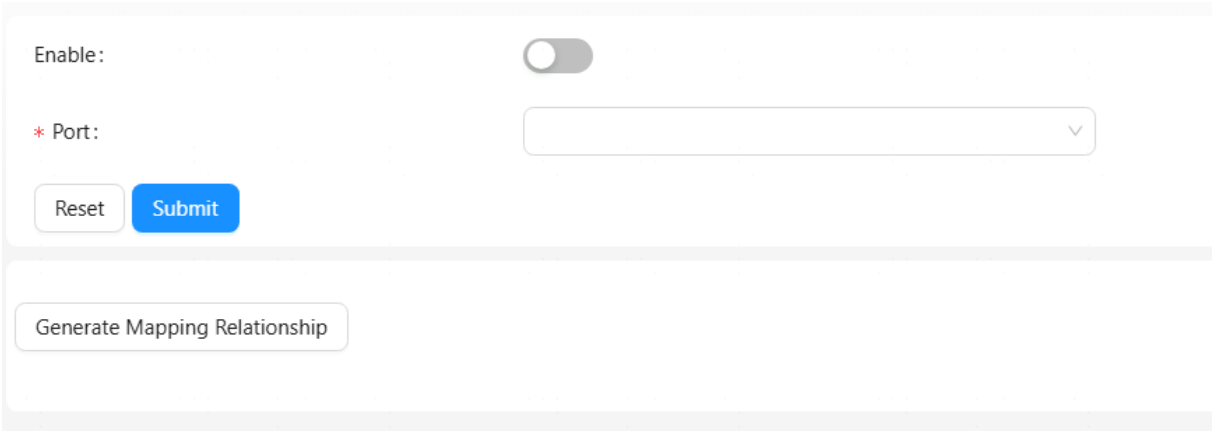


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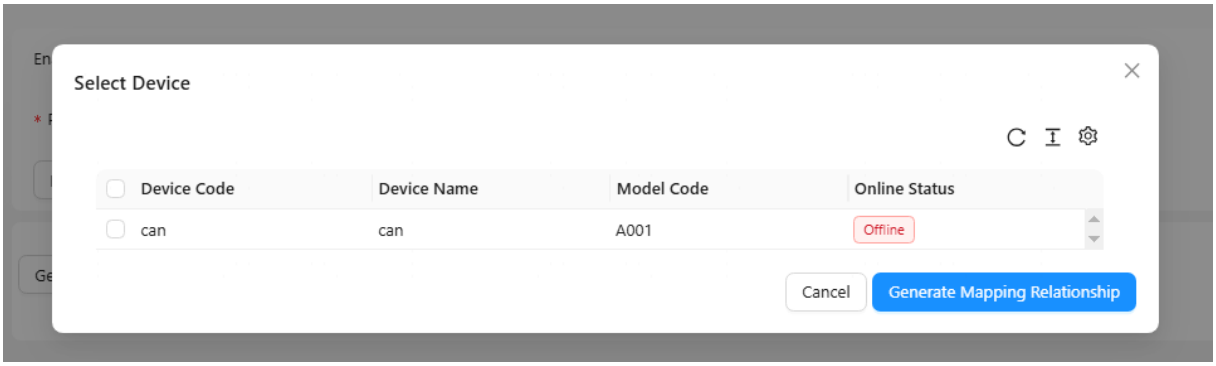
Check device directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship.

5.11 IEC102 Server_COM

Support IEC102 Server_COM system docking, which can be accessed by configuring IEC102 Server_COM port.



Generate a mapping relationship to select the points that the service can provide for acquisition. The mapping relationship here can directly map multiple devices



Check device to directly generate mapping relationship to clear the original mapping relationship and regenerate a new mapping relationship.

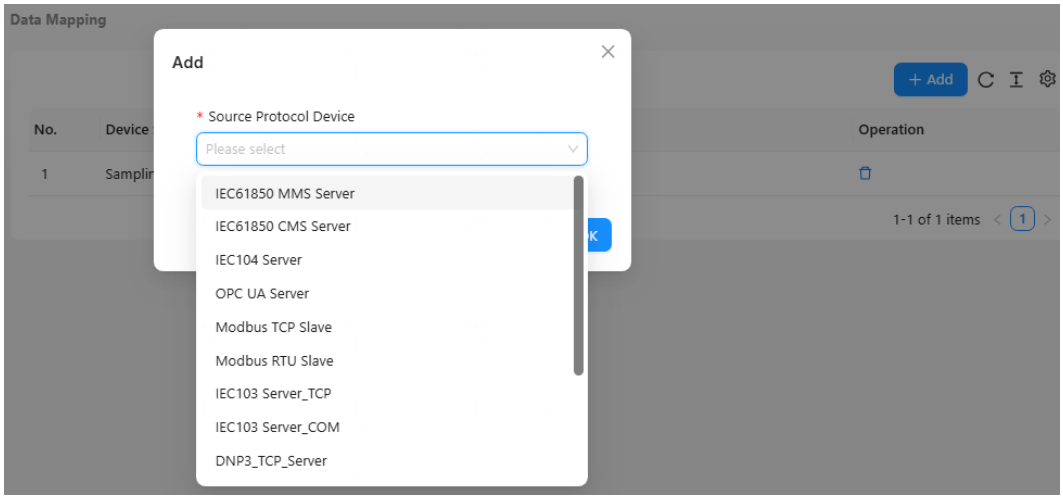
The mapping relationship of IEC102 can be divided into SP (single point information) and TI (electric energy information). The mapping table generated by default: the BIT type data corresponds to SP type, and the others correspond to TI type.

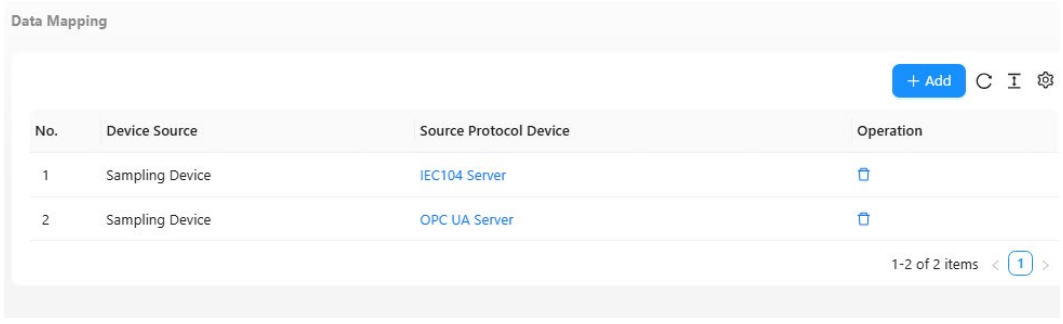
Copyright © 3onedata Co., Ltd.

6 Data Mapping

6.1 Data Service Mapping

Support adding, modifying, and deleting "Data Service" mappings.

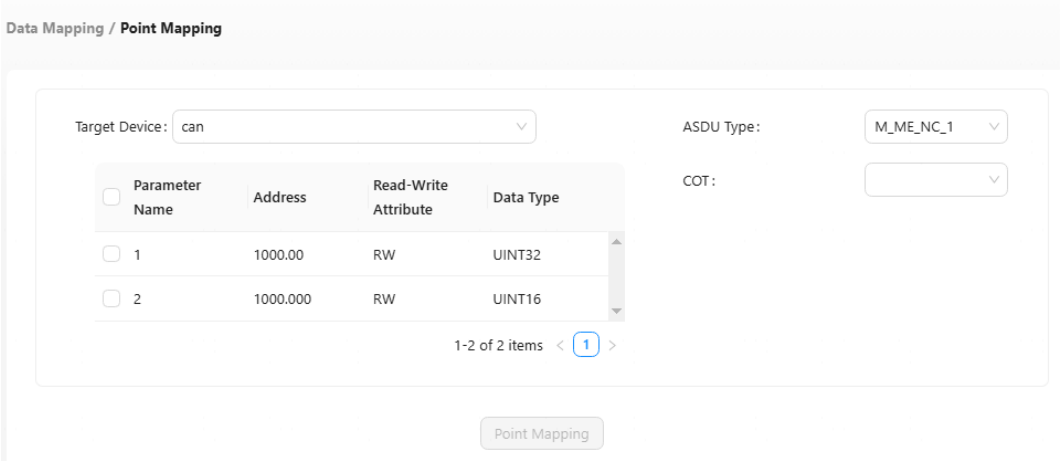




6.2 Acquisition Device Mapping

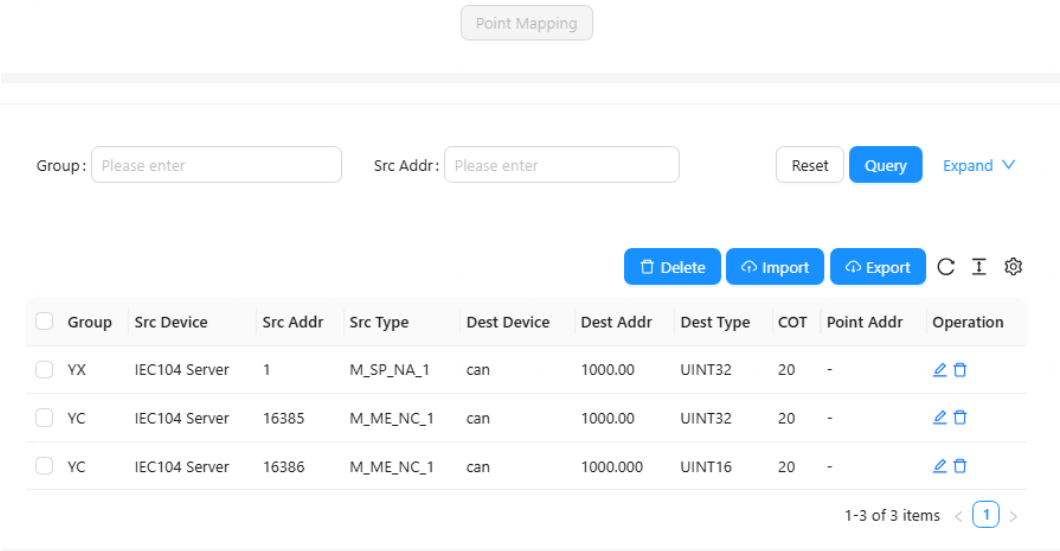
Supports batch adding, modifying, and batch deleting of the mapping of "acquisition device".

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After selecting the device, you can check the point, and the default value can be set on the right side. If not, the corresponding grouping and type will be automatically set according to the grouping and type of the southbound point. After checking, the point mapping will be successful

Support query import export and batch delete and modify mapping



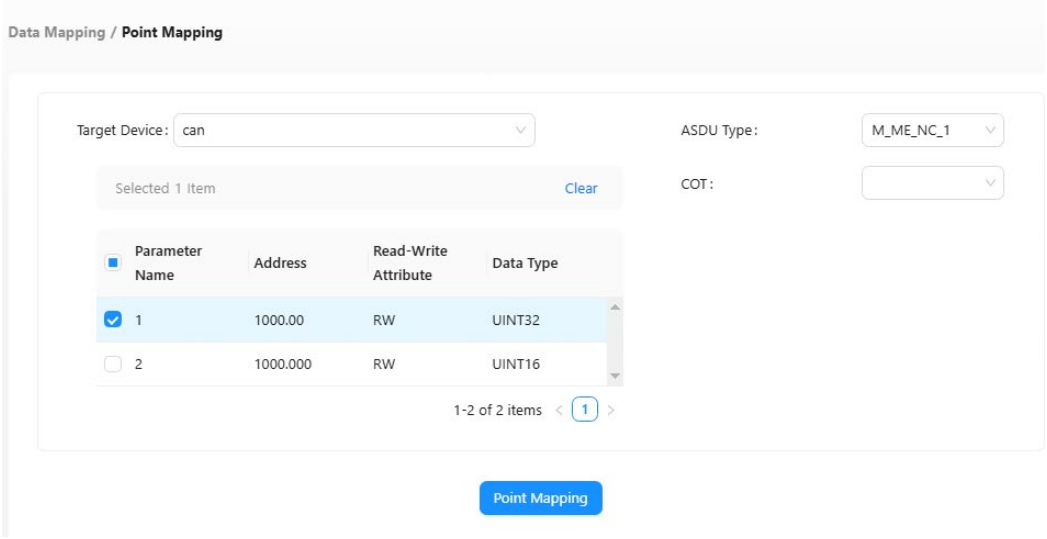
6.3 Data Mapping

Main IntroductionIEC103 Server_TCP/UDP/COM data mapping uses.

Grouping: SP(Single Point Remote Signaling), DP(Dual-Point Remote Signaling), YC(Telemetry), BHYX(Protect Remote Signaling), CHK(Self-Test Information), ALM(Alarm Information), INPUT(Input Information), YM(Tele-pulsing)

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Group number: mapping table generated by default in hexadecimal range (0x01-0xFF): BIT type data corresponds to SP type, and others correspond to YC type.



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7 Edge Computing

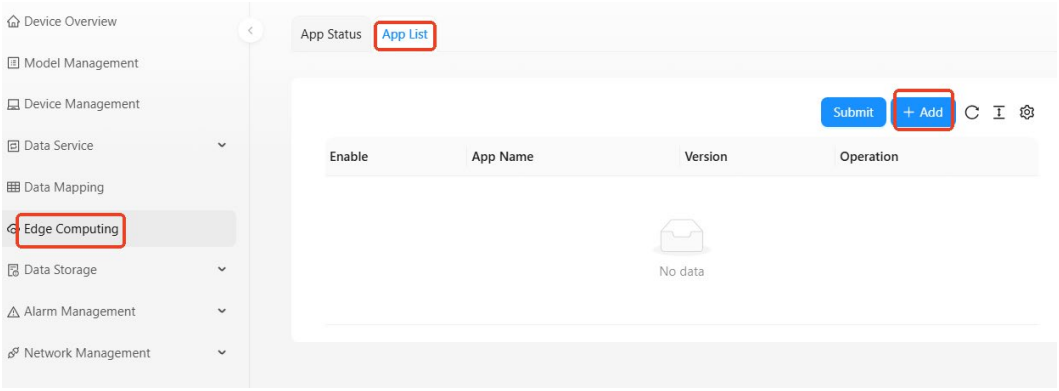
7.1 APP List

On the Edge computing, add files to the APP List. The file type needs to be "zip" or "tar.gz".

The Project file directory also has format requirements. The main files are: Project/src/main.py and Project/config.ini

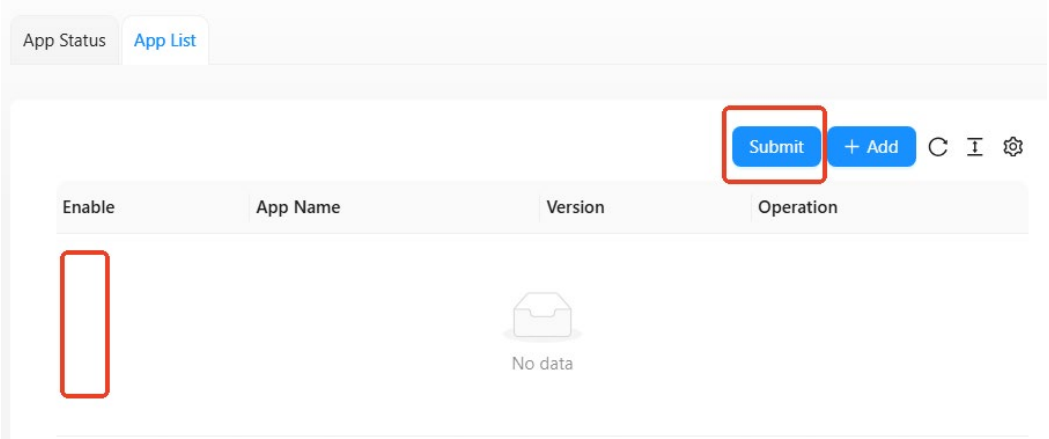
Project/src/main.py is a script start entry, and this file must be available;

Project/config.ini is a script configuration file, which must be available;



Start the script step: After adding the file, click "Enable" button under Enable, then click "Submit", and the script will be compiled in the background and run for the first time.

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7.2 APP Status

The script runs in three states: RUNNING, STOPPED, and STARTING.

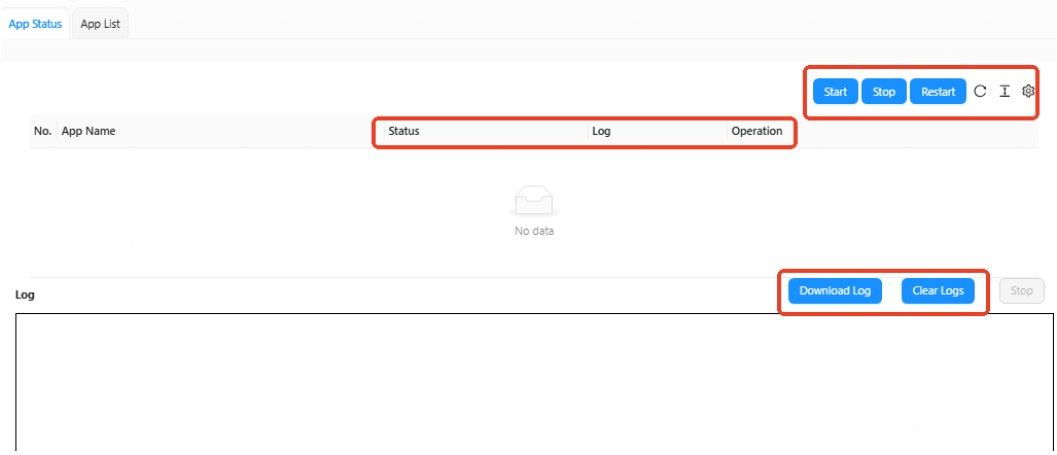
They respectively indicate that the script is running, the script has stopped, is not running, and the script is compiling and starting (there is a high probability that the startup fails and restarts repeatedly).

The three buttons in the upper right corner are global actions, and all scripts will execute the actions on the buttons.

The button under Log: Click to view the log. When the log is on the current page, it will always be read.

Buttons under Operation: You can stop, restart, and start a single script.

Button in the bottom right corner: You can clear and stop viewing the log.



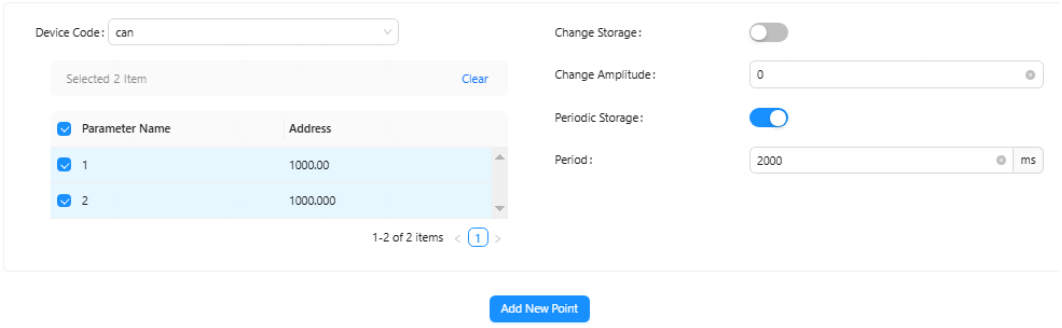
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8 Data Storage

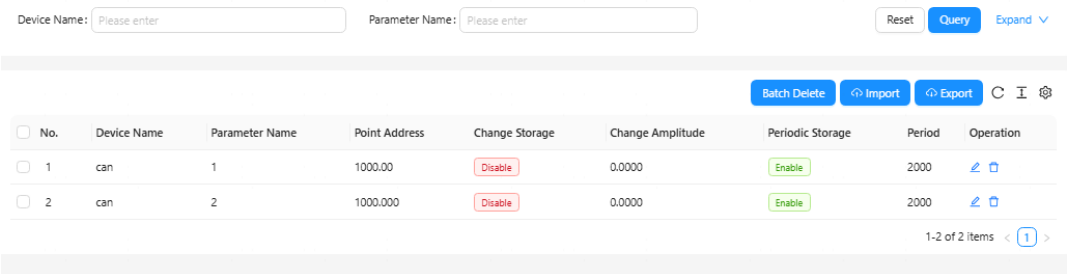
8.1 Point Configuration

Operation Steps

Step 1 Select the device code, which supports adding multiple points at a time, but cannot add existing points repeatedly



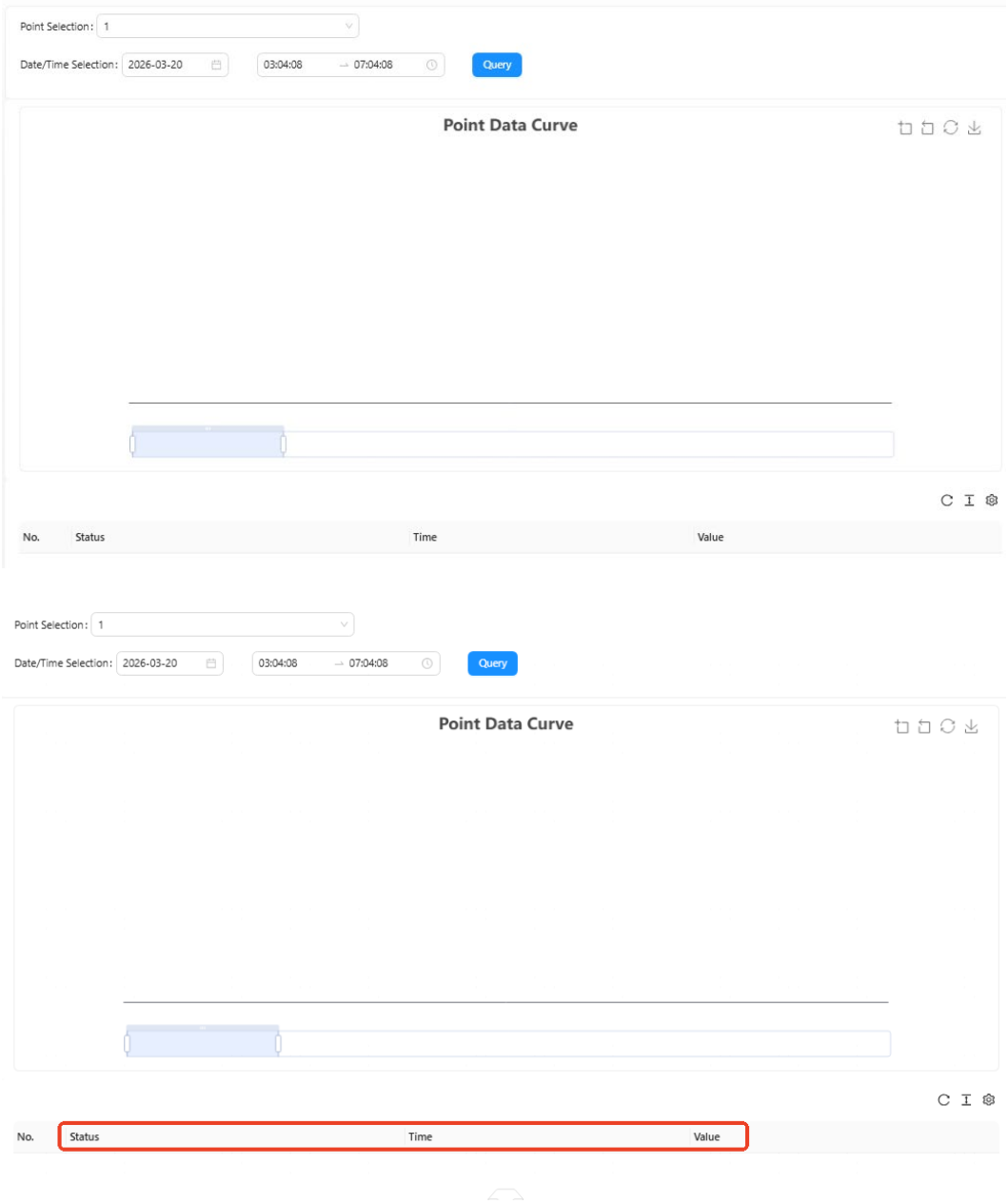
Step 2 Supports the editing of whether to enable change storage, the extent of change, whether to enable cyclic storage, and the cycle. The unit of the cycle is ms



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8.2 Data Query

Support querying point data for a specified date, with results displayed in both graphical and tabular formats.



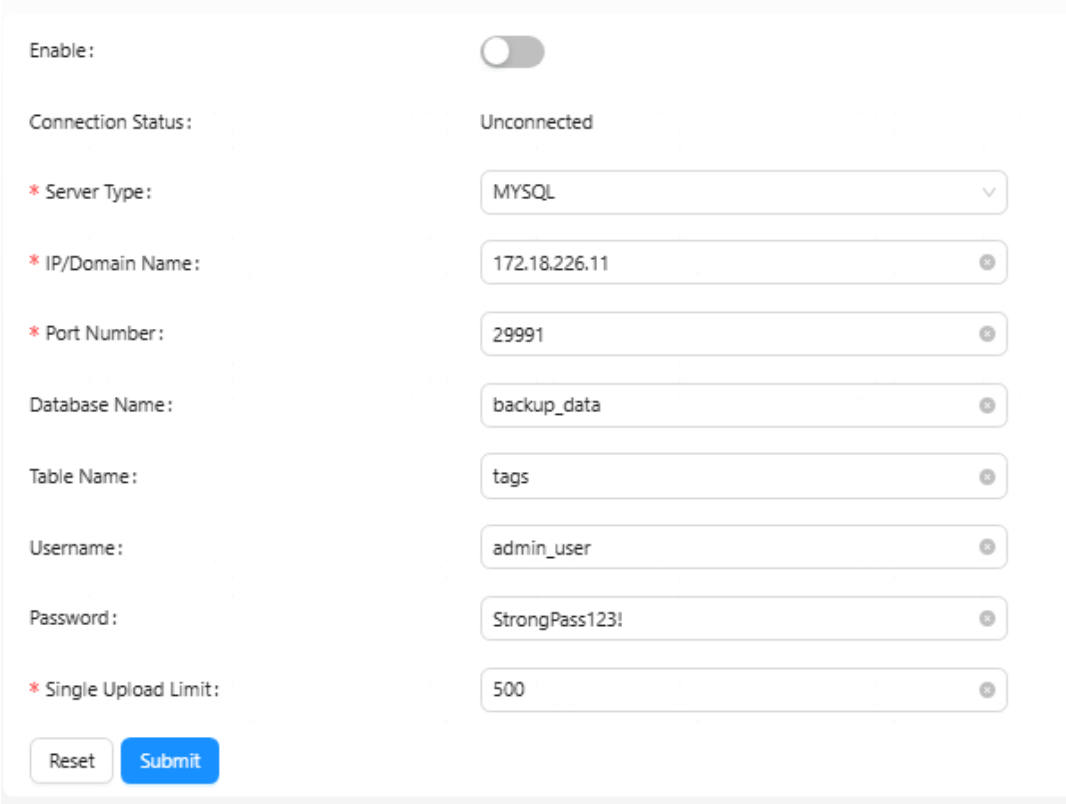
8.3 Data Backup

Support backup of data to cloud database. Connection status can be used to check whether the database has been connected to cloud database. You can select the

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database server type. The server supports IP or domain name. You can define the database name and surface. You need to enter the username and password that can access the database on the server. You can set the limit of the number of points in a single upload to avoid failure caused by too much data in a single upload.

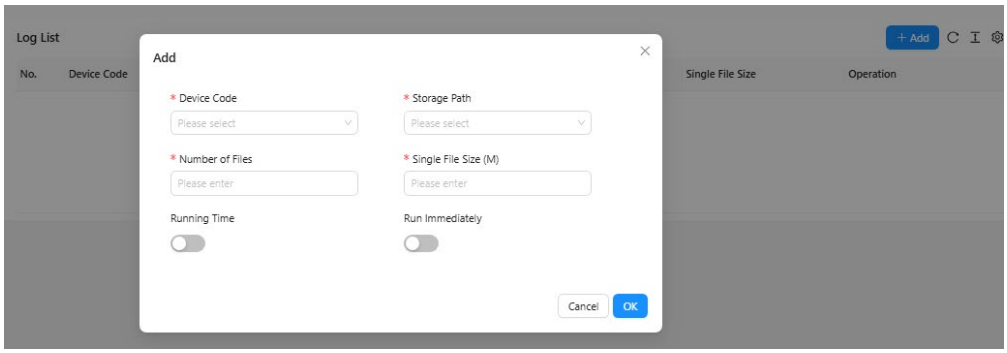
```
Note that MySQL server needs to modify MySQL user authentication
method
Executing on MySQL server:
ALTER USER 'admin_user'@'%' IDENTIFIED WITH mysql_native_password
BY 'StrongPass123!';
FLUSH PRIVILEGES;
```



8.4 Communication Message Recording

On the "Communication Message Recording" page, the original protocol message records sent and received by the device may be stored on the "internal storage" or "memory card" of the device.

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- Execute log storage



- Suspend log storage



- Download log

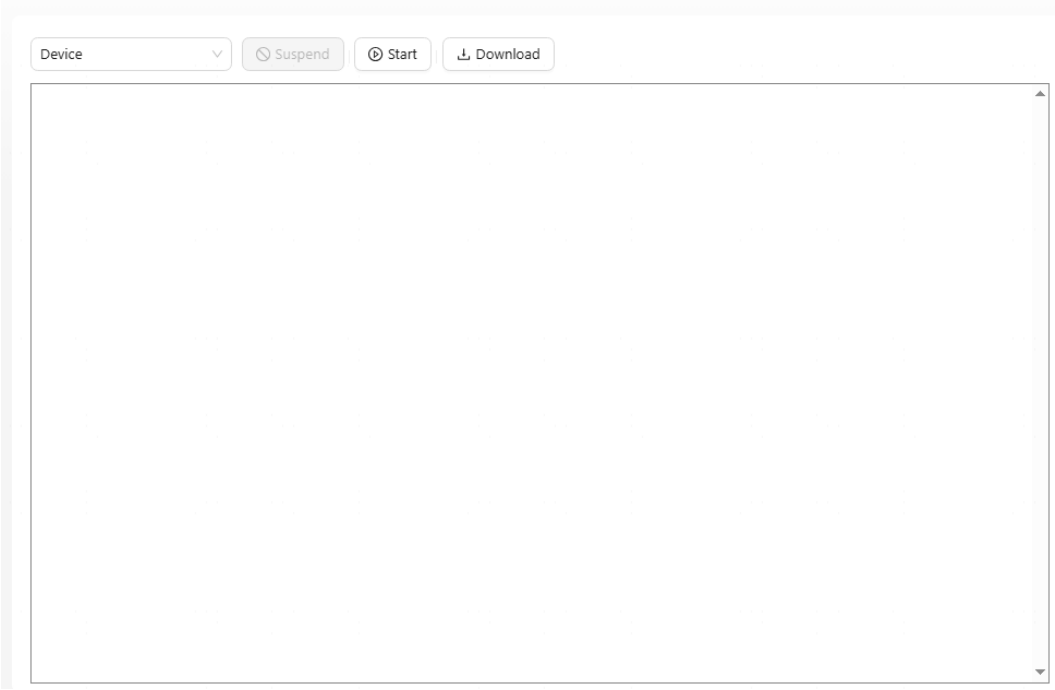


8.5 Communication Monitoring

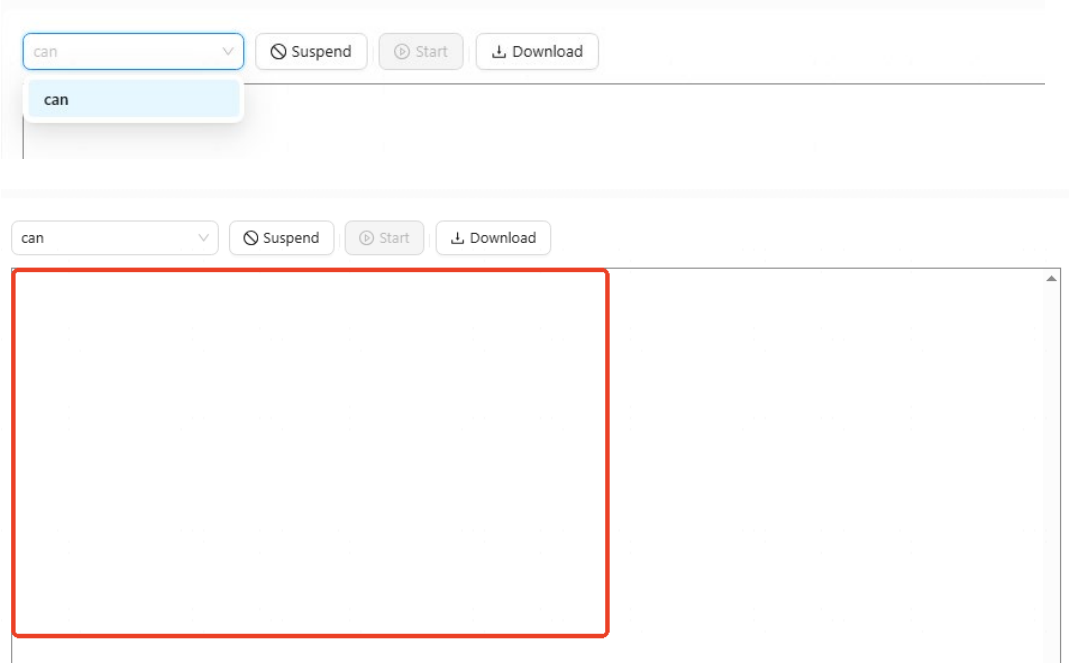
Operation Steps

Step 1 Enter the data store, select Communication Monitoring, you can view the device real-time communication log and support log download to local function.

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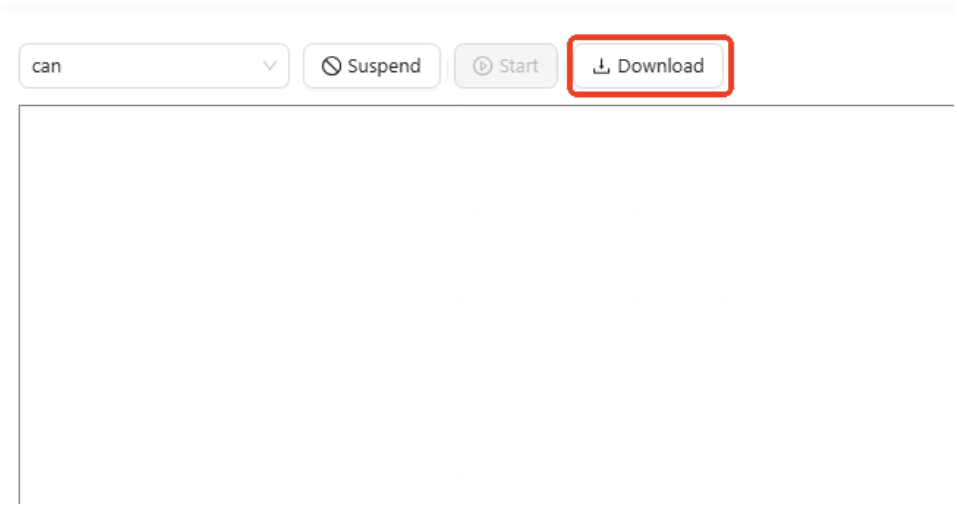


Step 2 Click "Device", select the target device to view, then click "Start" – the communication logs will be displayed in real-time within the log box. Each log entry consists of a timestamp, device name, transmission status, and raw data.



Step 3 Click "Download" to save the logs from the log box to a local file in TXT text format.

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8.6 Storage Configuration

Support switching local records and selecting storage location, and you can set storage logic. The number of saved days is the cycle of cyclic coverage. If set to 30, it means that only records of nearly 30 days will be kept, and the excess part will be deleted. If the space is insufficient, it will be automatically overwritten as insufficient memory to forcibly clear historical records. If set to 20, the data beyond 2 days will be deleted if the remaining 20M is left. If the remaining space is still less than 20M after clearing other files, the recording will be stopped.



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9 Alarm Management

9.1 Alarm Configuration

Supports adding, modifying, and deleting alarm configurations.

Communication Failure: Device point values are marked as ”bad", indicating either unreadable data collection or device offline alarm status.

Range Alarm: Open interval (lower limit, upper limit), alarm outside the range. If the lower limit is set to 1 and the upper limit is set to 10, either 1 or 10 will sound an alarm, and there will be no alarm within 1-10

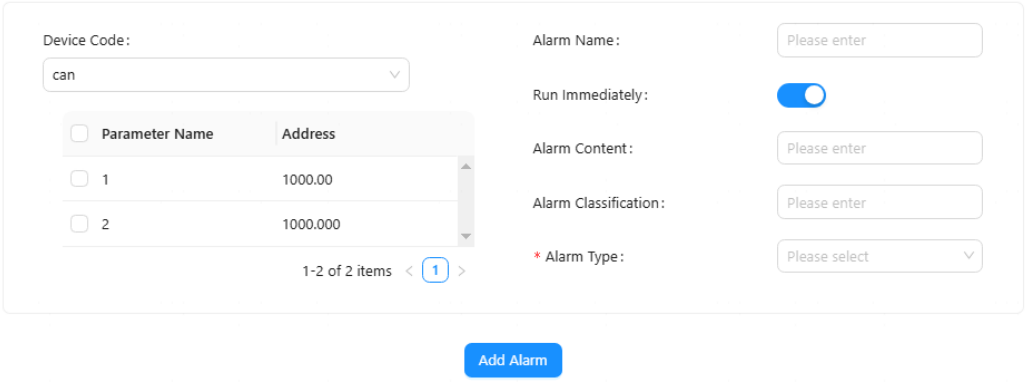
Upper limit alarm: no alarm for values below the upper limit, alarm for values greater than or equal to the upper limit. x>=upper limit, alarm

Lower limit alarm: no alarm above the lower limit, alarm below or equal to the lower limit. x<=lower limit, alarm

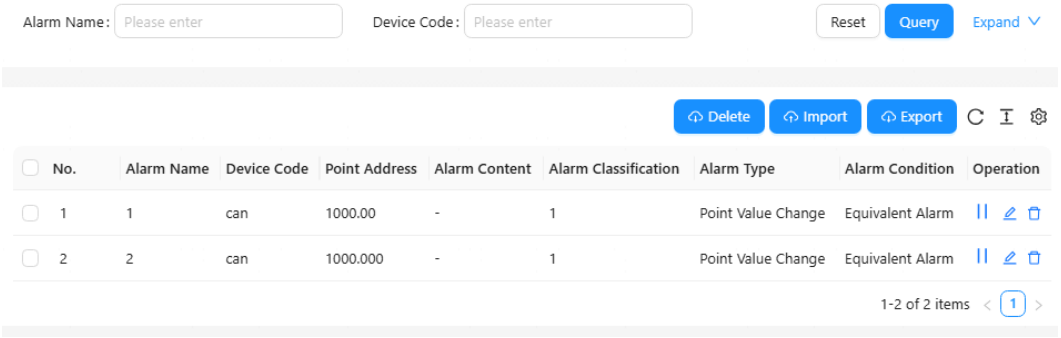
Equivalent alarm: Alarm when the collected value is equal to the set equivalent value, i.e. x==Equivalent alarm

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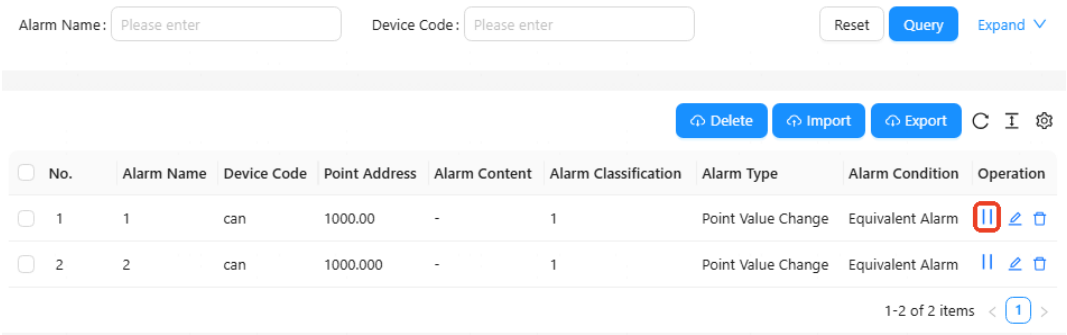
Add alarms in batches as follows. Select the device and select the point. Set the alarm logic and click Add alarm。



Support query, delete, batch delete, import alarm configuration everywhere.



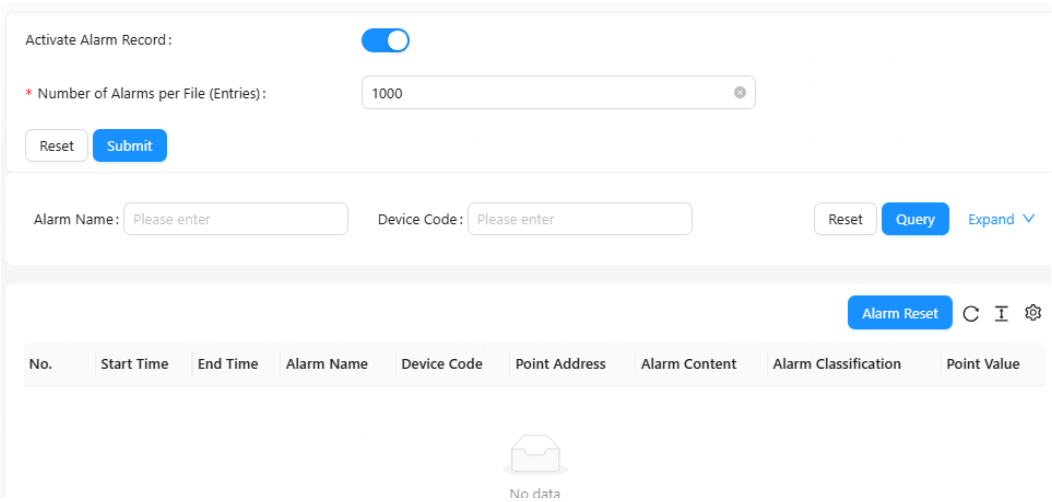
Run the alarm. Click the Run button in the action column to start and stop the alarm.



9.2 Alarm Record

Enabling alarm recording will save alarm information to the database. When the configured alarm count limit is reached, the database will cyclically overwrite older alarm data.

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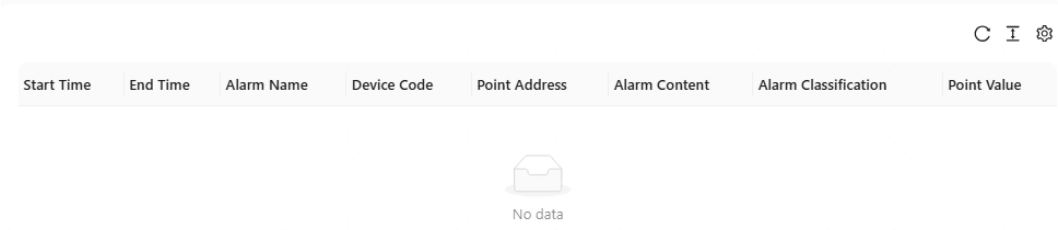


The alarm logging logic is

When an alarm occurs, the start time of the alarm will be recorded. If the end time is empty, it indicates that the alarm is still continuing. If the alarm is still triggered after the subsequent point value changes, it will not be recorded in the subsequent period, and it will be recorded again until the alarm is eliminated. The end time will be recorded in the record of the end alarm.

9.3 Alarm State

Support to view the current alarm status, the alarm status displays the current alarm, and the point value is real-time data

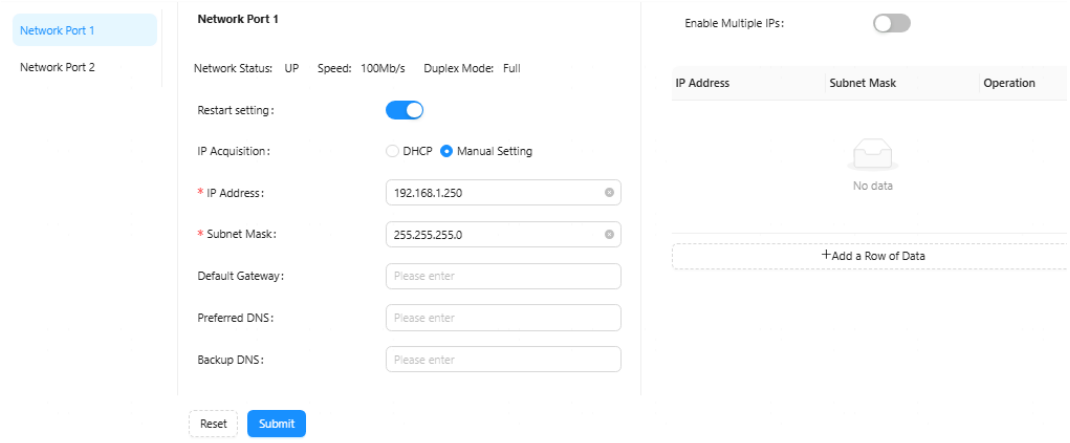


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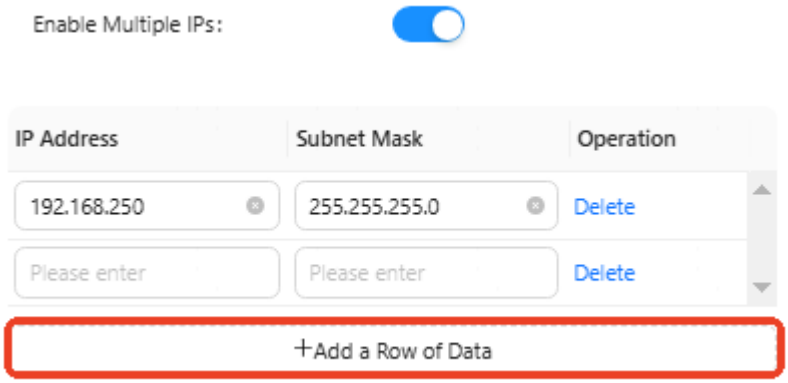
10 Network Management

10.1 Wired Network

- The wired network port supports IP acquisition mode (static and DHCP), IP address, subnet mask, default gateway, DNS.



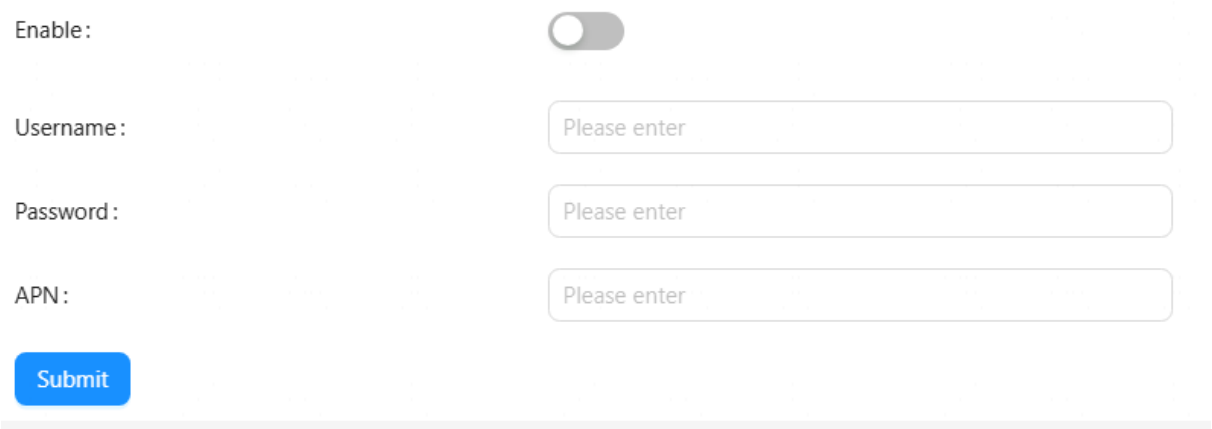
- If multiple IPs are configured simultaneously, manually add a data row and fill in the IP address and subnet mask.



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10.2 Cellular Network

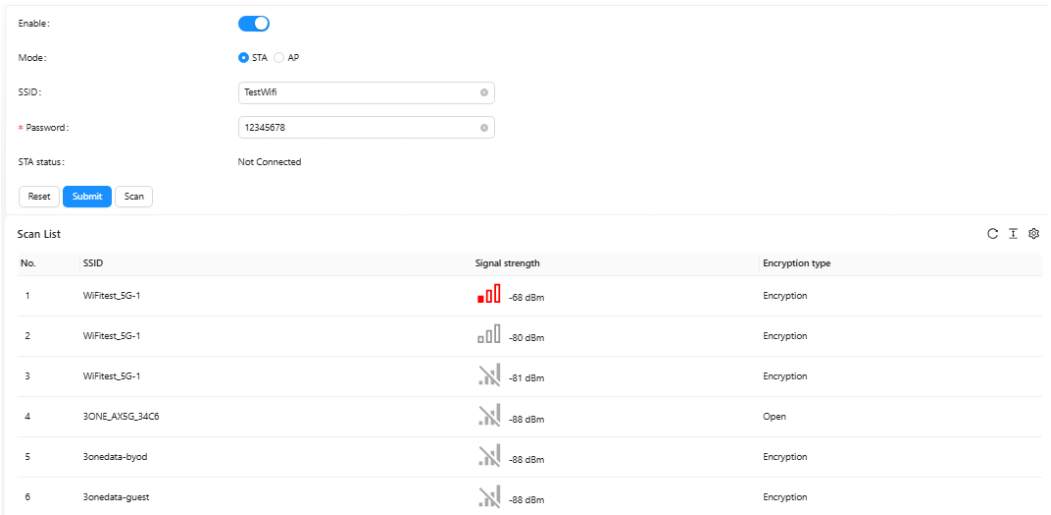
- Cellular network configuration consists of: enable/disable status, username, password, and APN. Users configure these parameters based on SIM card information.



If no SIM card is inserted, do not keep the "Enable" option checked.

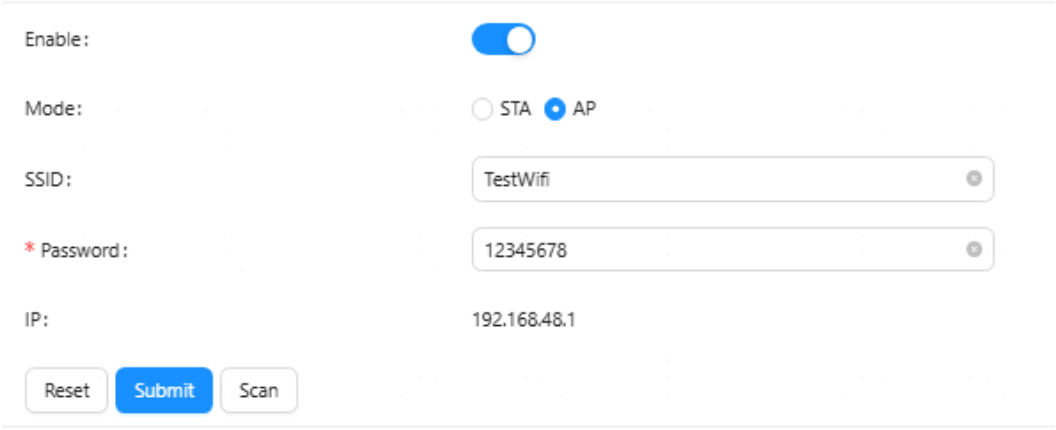
10.3 WIFI Mode Settings

wifi mode is divided into STA and AP mode, and STA can connect to other wifi. If the connected wifi can access the external network, the connected device also has the ability to access the external network. Scan can scan the searched wifi. If the wifi is not encrypted, the password can be set empty



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AP mode, that is, the device turns on the hotspot, and devices such as mobile phones or computers can be connected to the device to form a local area network



If you do not set a password, it is an open network, and the ip is fixed to 192.168.48.1. After connecting your mobile phone or computer, you can access 192.168.48.1:8000 to access the web

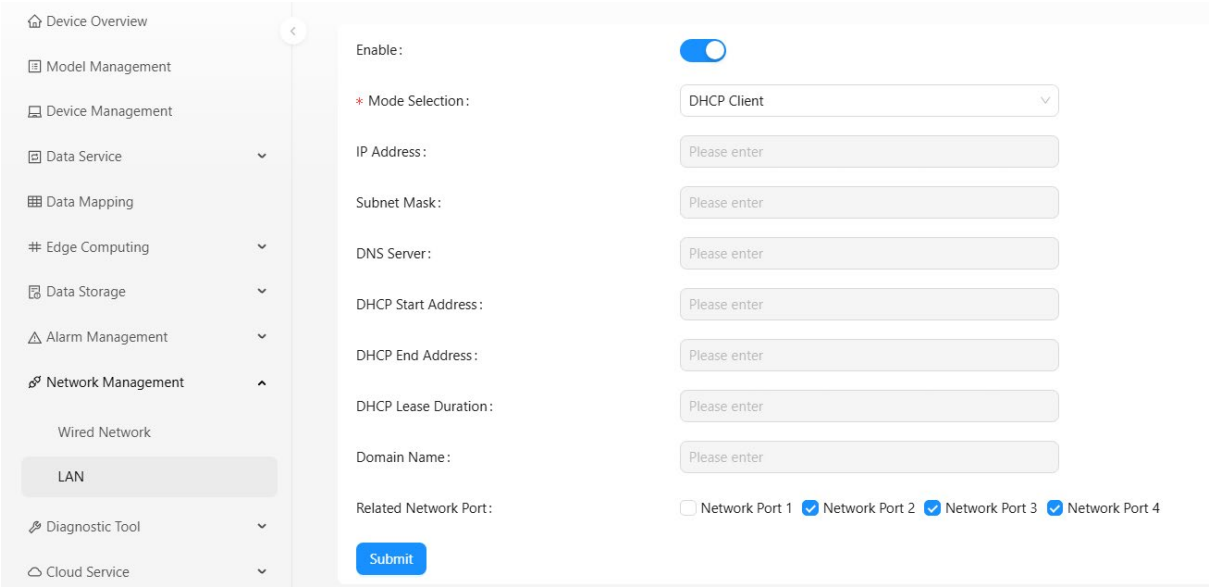
10.4 Local Area Network

When the device network ports are more than or equal to 4, the function is supported,

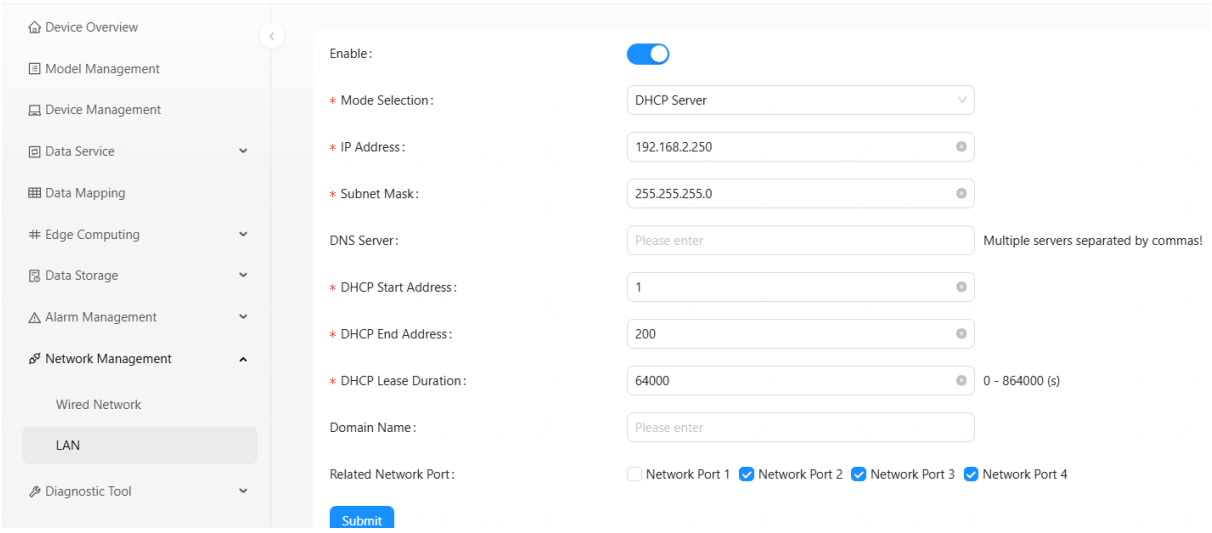
LAN supports mode selection (server/client), IP address, subnet mask, DNS server, DHCP start address, DHCP end address, DHCP lease time and domain name.

The default mode is DHCP Client, and the associated network port is selected to receive and allocate ip. This function is similar to that of a switch, and it does not allocate ip to access devices, but simply forwards data. Note: The set network port cannot be used to access the gateway. In order to avoid being unable to access the device web, the first network port is not allowed to be associated by default.

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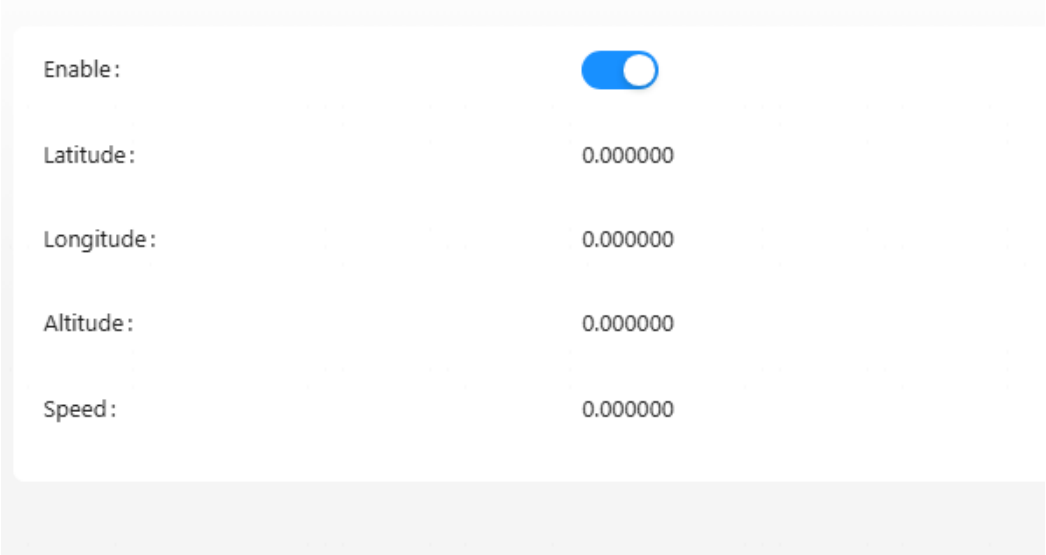
DHCP Server is selected as the mode. After the network configuration is entered, ip addresses will be automatically assigned to the devices connected to the associated network ports. At this time, the gateway is similar to a router, and other devices can also set static ip. When the network segment is the same as the gateway, you can access the configured IP address and add 8000 ports to access the device web.



10.5 GPS Positioning

Devices with 4G GPS module can enable this function. Note that this function needs to be connected to the antenna to receive GPS signals in an open place outdoors, and can display the latitude, longitude, altitude and current speed of the gateway device.

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11 Diagnostic Tools

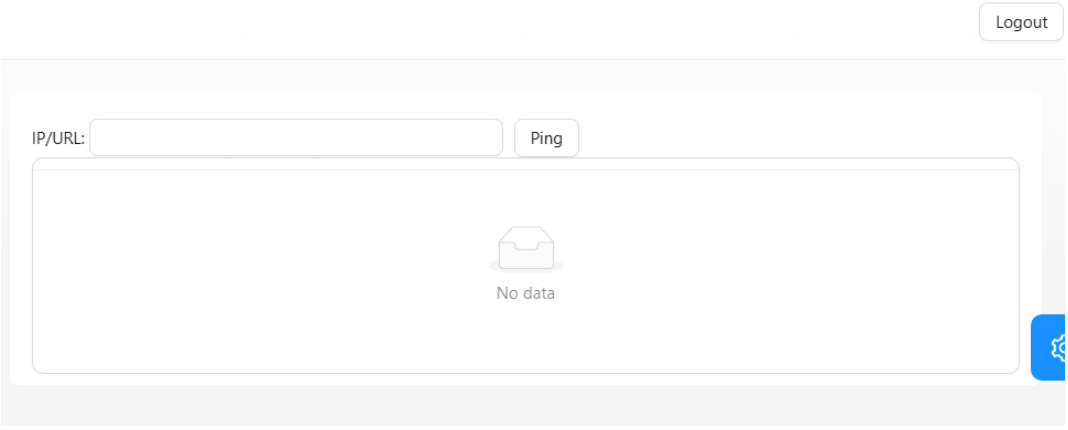
11.1 Ping Test

User can enter a URL or IP address to perform ping detection.

To ping external networks, the gateway must be configured for Internet access first. When network issues exist - such as routing (no corresponding route), network interfaces (invalid WAN, no cellular network), etc. - ping may fail with error code: 504.

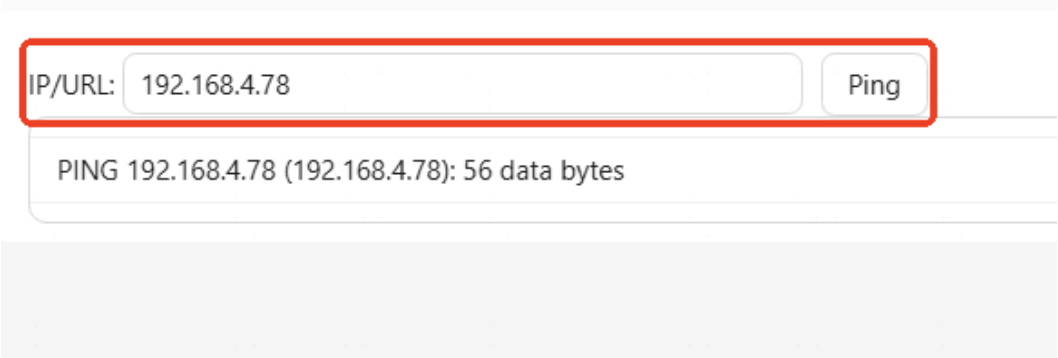
The ping detection may take a long time; please wait for a while.

No corresponding routing ping detection:

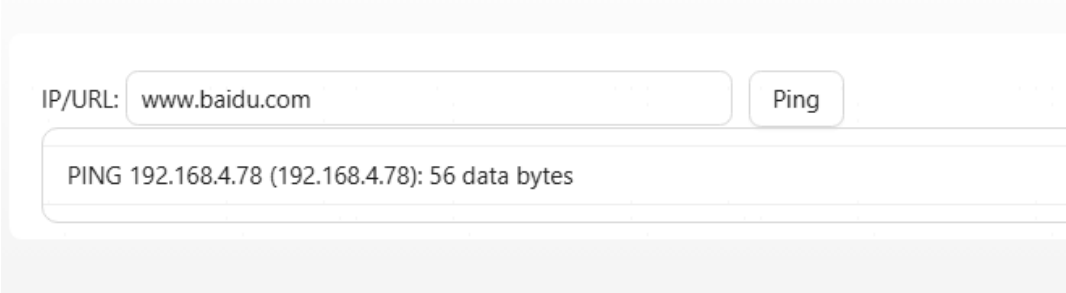


Ping detection within the same LAN:

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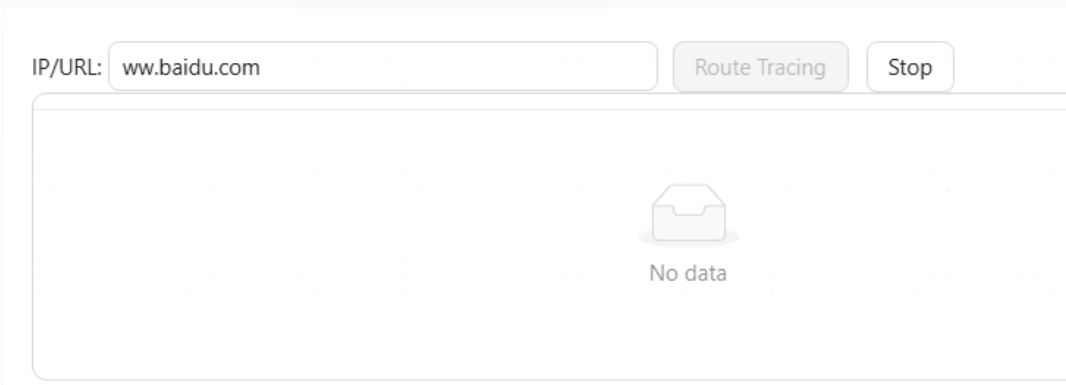
External network ping detection: Network fluctuations with packet loss observed.



11.2 Route Tracking

Route tracing can also be performed by entering a URL or IP address. A single route trace shows three hops, and it repeats every 2 seconds.

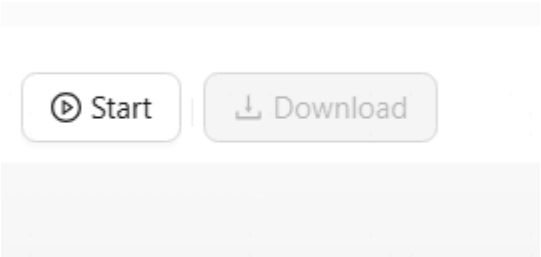
This feature also has network requirements, such as ping detection.



11.3 Packet Capture Diagnosis

Click the “Start” button, and the device will start capturing network packets.

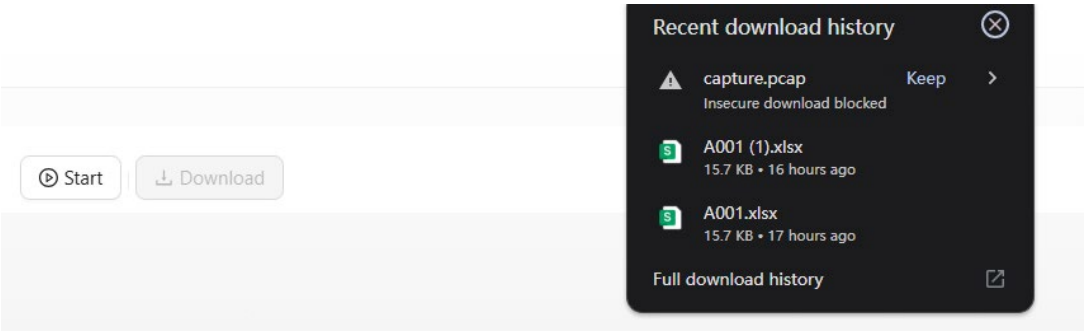
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Click the "End" button, the device stops capturing network packets, and saves the network packets captured during this period to the local client in ".pcap" format.

Note

Users can use Wireshark or other third-party software to open the captured packets.



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12 Cloud Service

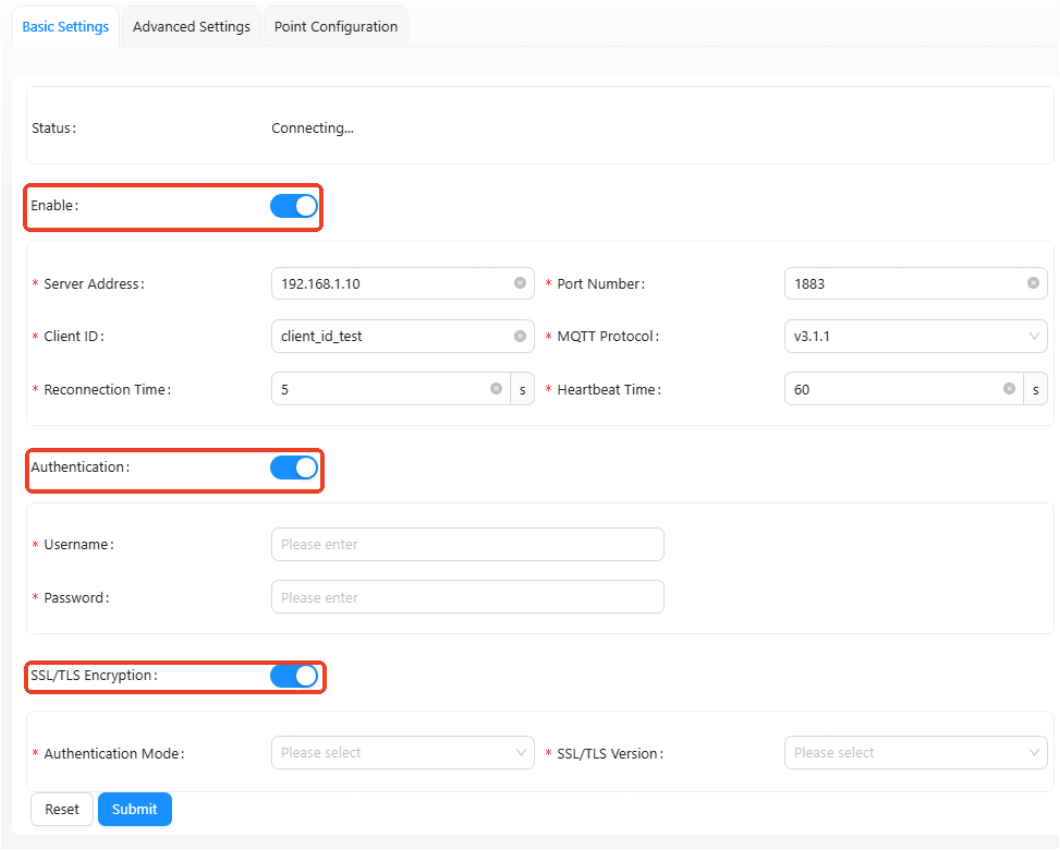
12.1 Universal MQTT Platform Integration

12.1.1 BlueLink Configuration

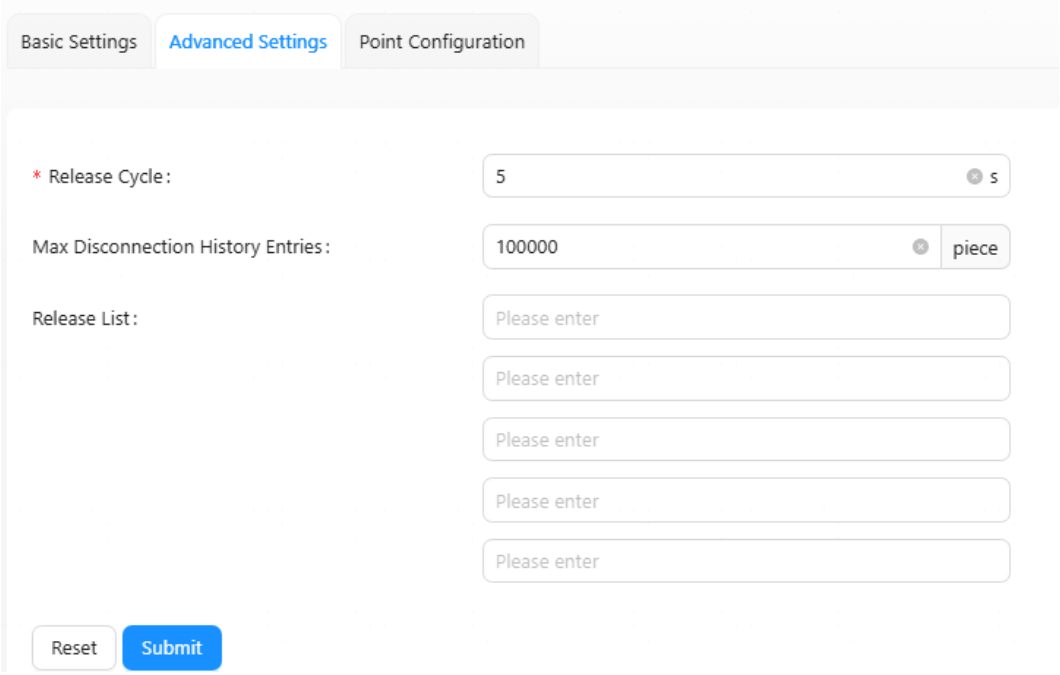
In the cloud service "BlueLink", information related to the MQTT platform can be configured, such as the server IP address, server port, client ID, etc. The MQTT protocol versions are v3.1 and v3.1.1.

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Basic Settings



Advanced Settings



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Cabinet-level EMS Format

- The standard primarily consists of three parts: the theme, envelope, and letter paper.
- Topic Format, Definition: Object + Allmsg;
- Cabinet-level EMS definition: The publishing topic for Ccs is /Ccs/Allmsg, and the topic for Rts is / Rts /Allmsg. The gateway is Ccs, and the platform is Rts.
- The envelope format is:

```
 'from': 'Ccs',//indicates the sender
 "target": "Rts", // Indicates the recipient
 Reason ":" ask ",//data reason
 "type": "rts_yaotiao", // Message type
 "factory": "Energy Storage Station", // Plant-site definition
 "device": "192.168.1.1", // Hardware design for the software system
 "quality": "now", // Transmission quality
 "time": "2022-06-14 09:11:05", // Timestamp of message publication
```

- The letter paper format is:

```
"Data": [
        {
            "No": 0, // Serial number; generally starts from 0 and must be consecutive;
            "Name": "BMS_SOC", // Name of the information
            "Data": 50.0, // Transmitted data
            "quality": "now" // Quality of data
        },
{
     "No": 1, // Serial number; generally starts from 0 and must be consecutive;
       "Name": "BMS_DA", // Name of the information
       "Data": 10.0, // Transmitted data
       "quality": "now" // Quality of data
 }
]
```

Integration Case

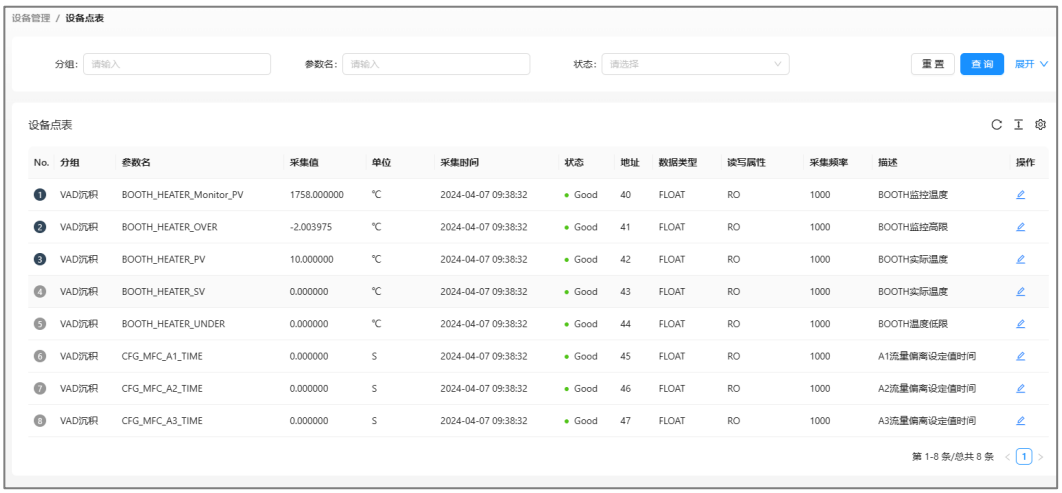
- Use the third-party client MQTTX to connect to the data acquisition gateway's MQTT Broker for testing.

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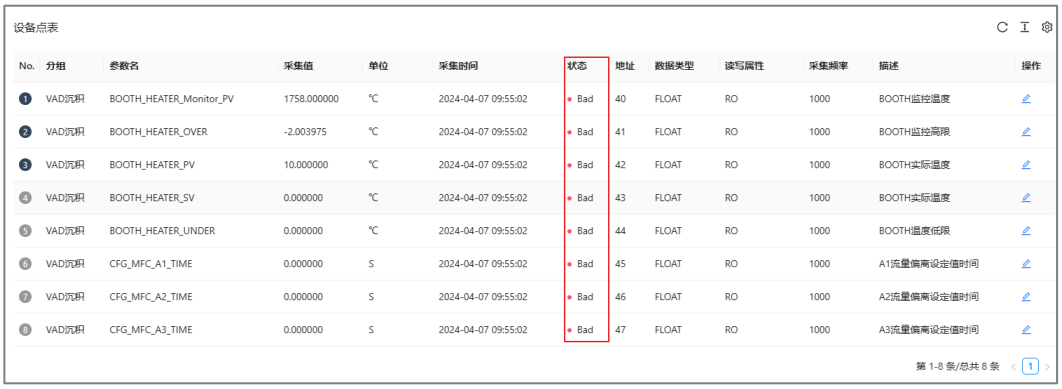
- Device Property Reporting

```
"from": "Ccs"
"target":"Rts"
"type":"/ChildDevice/Properties/Report"
"device":"TemperatureSensor_001"
```

- Messages pushed by the gateway can be subscribed to in MQTTX, and their values are kept in sync with the device.







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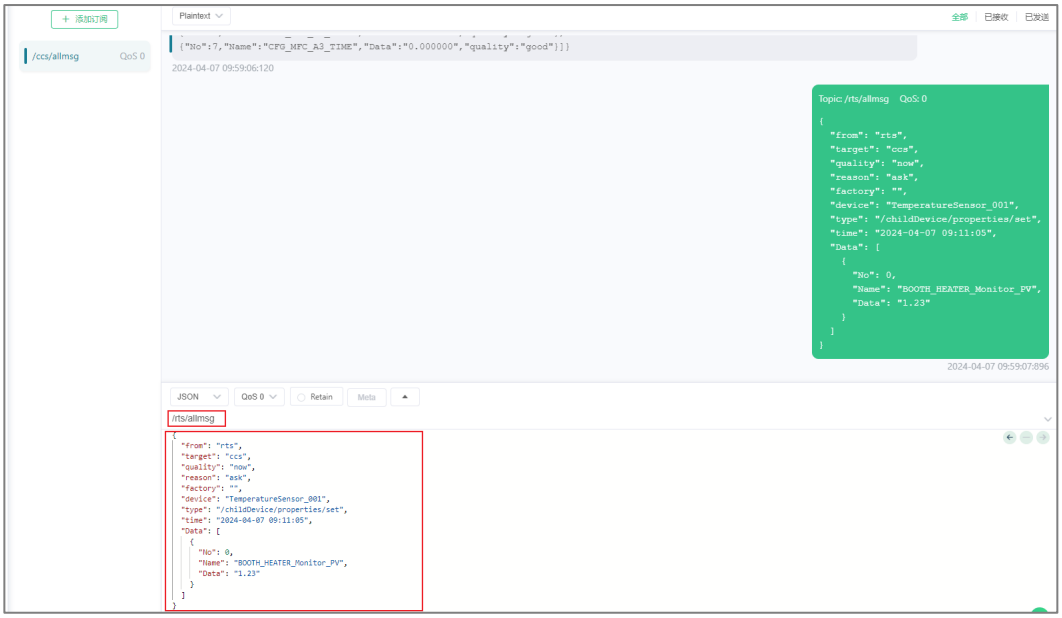
Topic: /ccs/allmsg QoS: 0

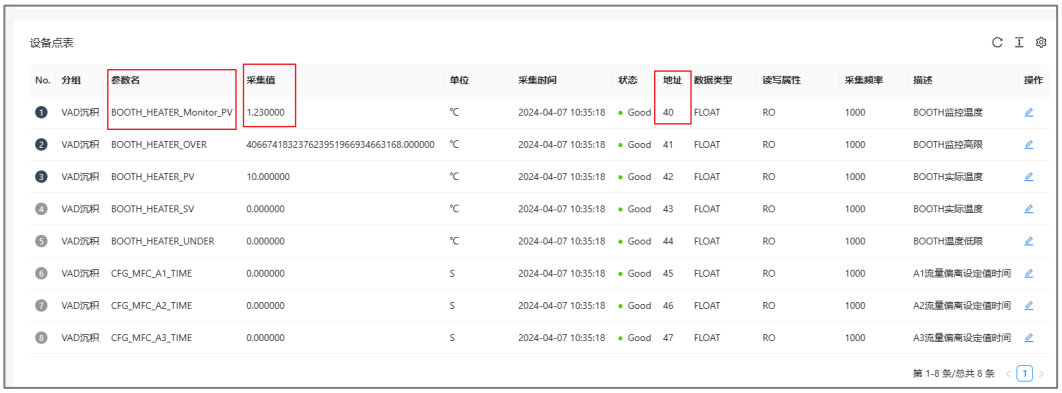
{"from":"ccs","target":"rts","quality":"now","reason":"ask","factory":"3oneData","device":"TemperatureSensor_001","type":"/childDevice/properties/report","time":"2024-04-07 09:55:17","Data":
[{"No":0,"Name":"BOOTH_HEATER_Monitor_PV","Data":"1758.000000","quality":"bad"},
{"No":1,"Name":"BOOTH_HEATER_OVER","Data":"-2.003975","quality":"bad"},
{"No":2,"Name":"BOOTH_HEATER_PV","Data":"10.000000","quality":"bad"},
{"No":3,"Name":"BOOTH_HEATER_SV","Data":"0.000000","quality":"bad"},
{"No":4,"Name":"BOOTH_HEATER_UNDER","Data":"0.000000","quality":"bad"},
{"No":5,"Name":"CFG_MFC_A1_TIME","Data":"0.000000","quality":"bad"},
{"No":6,"Name":"CFG_MFC_A2_TIME","Data":"0.000000","quality":"bad"},
{"No":7,"Name":"CFG_MFC_A3_TIME","Data":"0.000000","quality":"bad"}]}

Device Property Setting

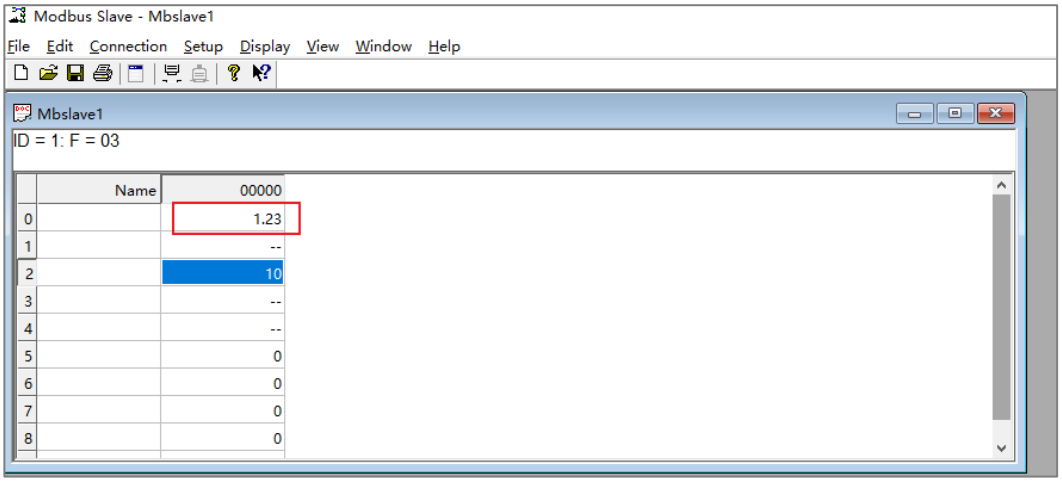
```
"from": "Rts"
"target":"Ccs"
"type":"/ChildDevice/Properties/Set"
"device":"TemperatureSensor_001"
```

In MQTTX, publish a message for device property configuration, and the gateway will write the received data to the device.





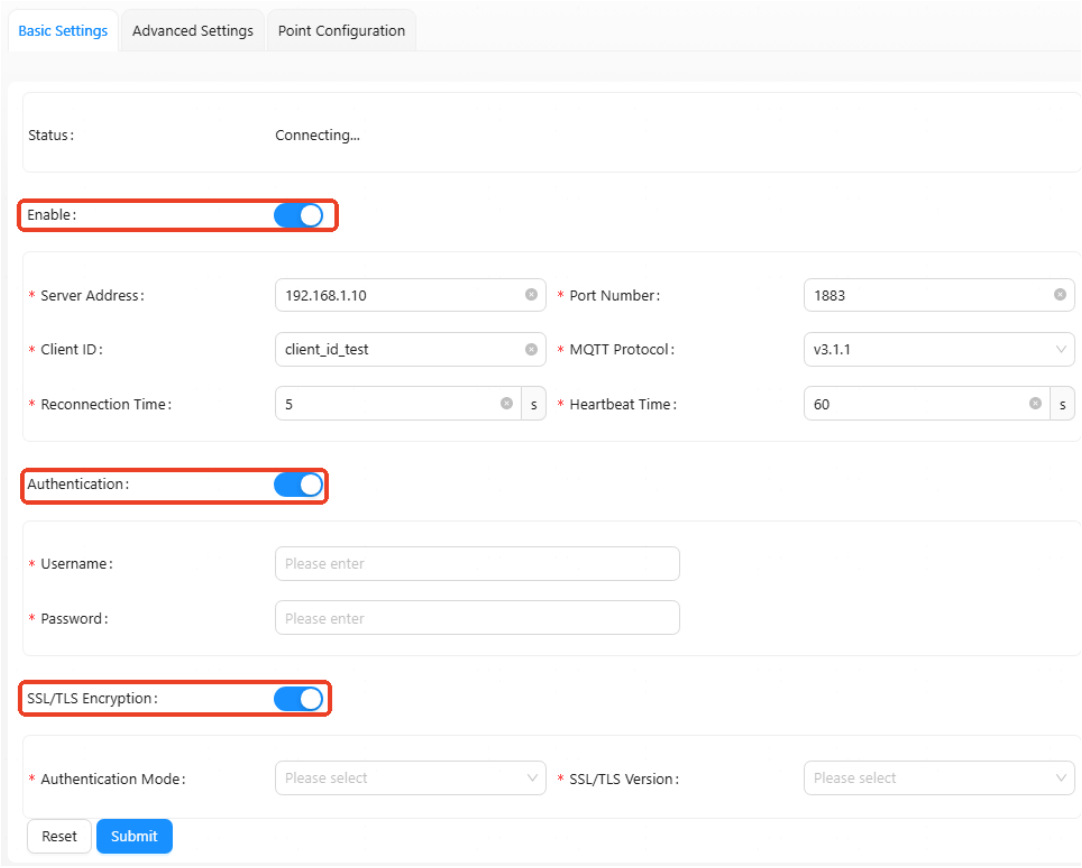
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12.1.2 Hynar Configuration

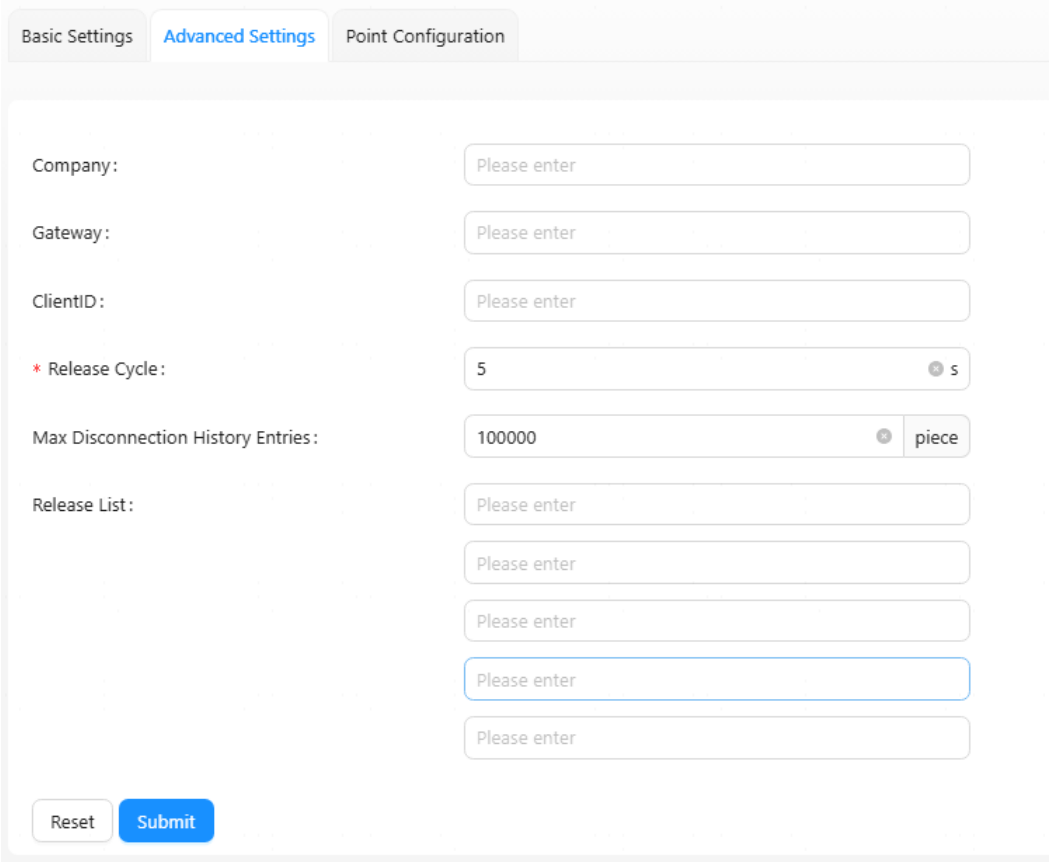
In the cloud service "Hynar", information related to the MQTT platform can be configured, such as the server IP address, server port, client ID, etc. The MQTT protocol versions are v3.1 and v3.1.1.

Basic Settings



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Advanced Settings

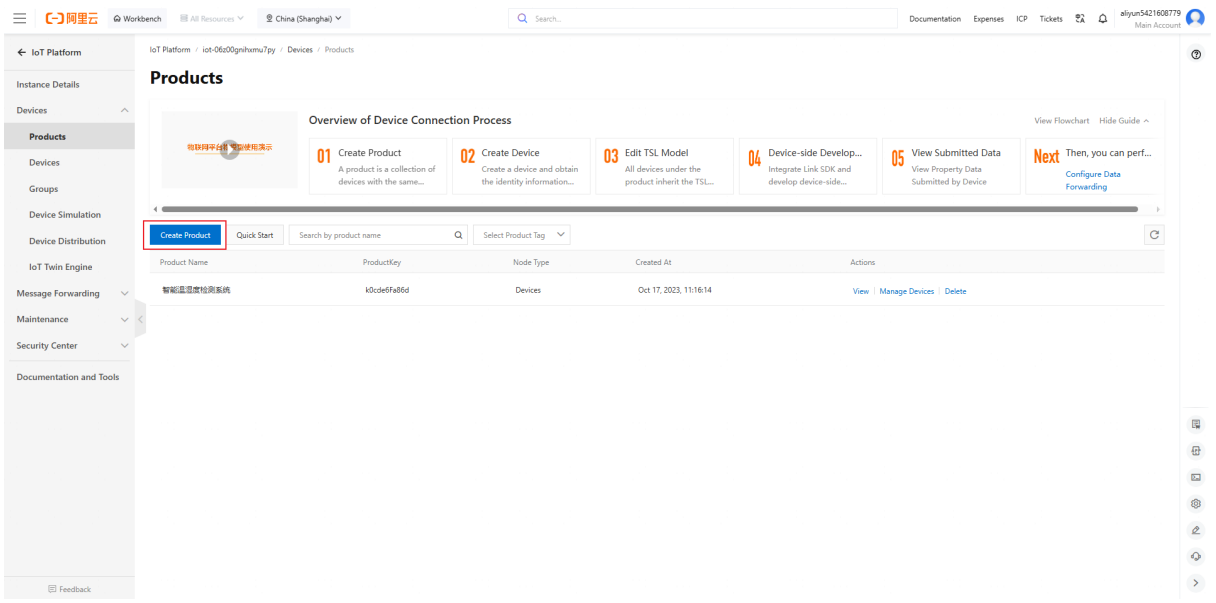


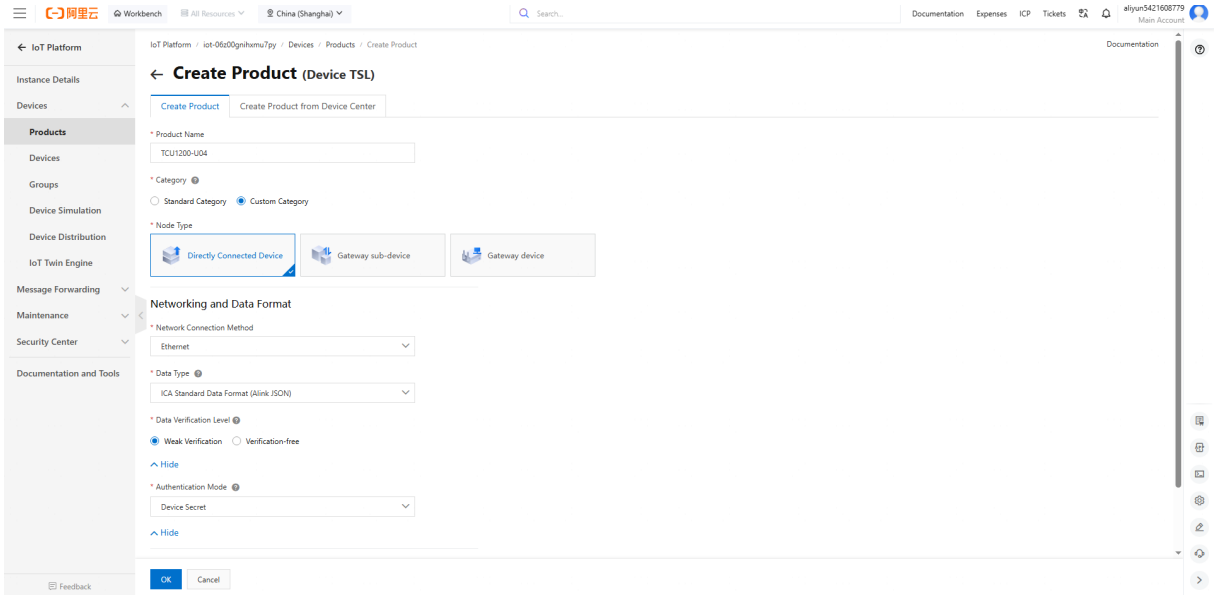
12.1.3 Aliyun Configuration

In the cloud service "Aliyun", information related to the MQTT platform can be configured, such as the server IP address, server port, client ID, etc. The MQTT protocol versions are v3.1 and v3.1.1.

1. Create products on Alibaba Cloud IoT platform

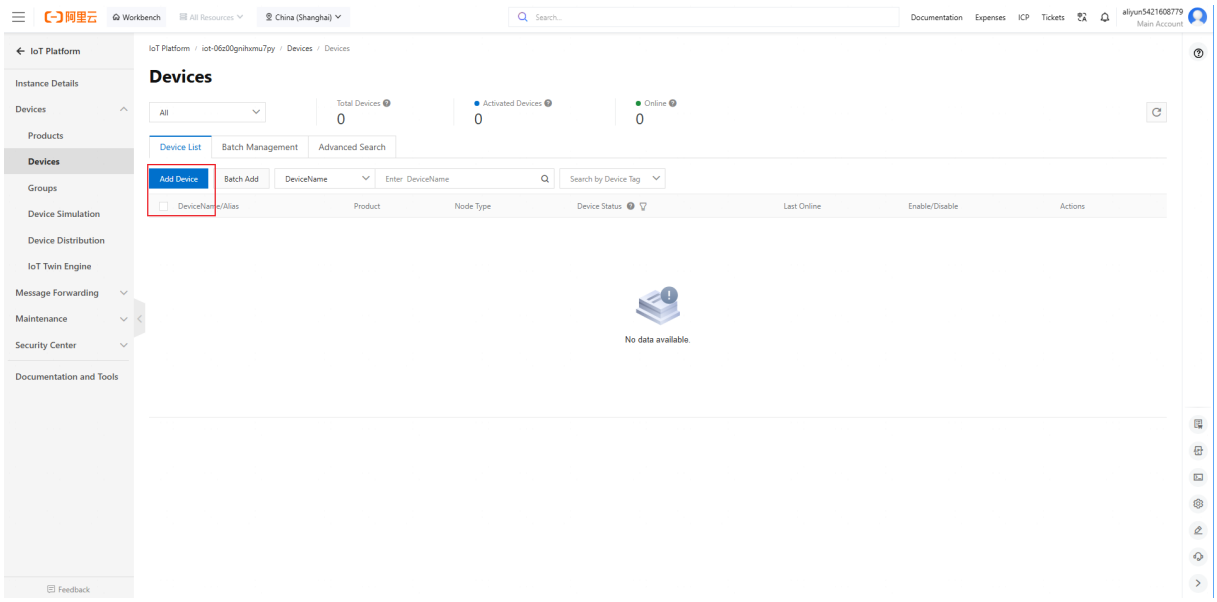
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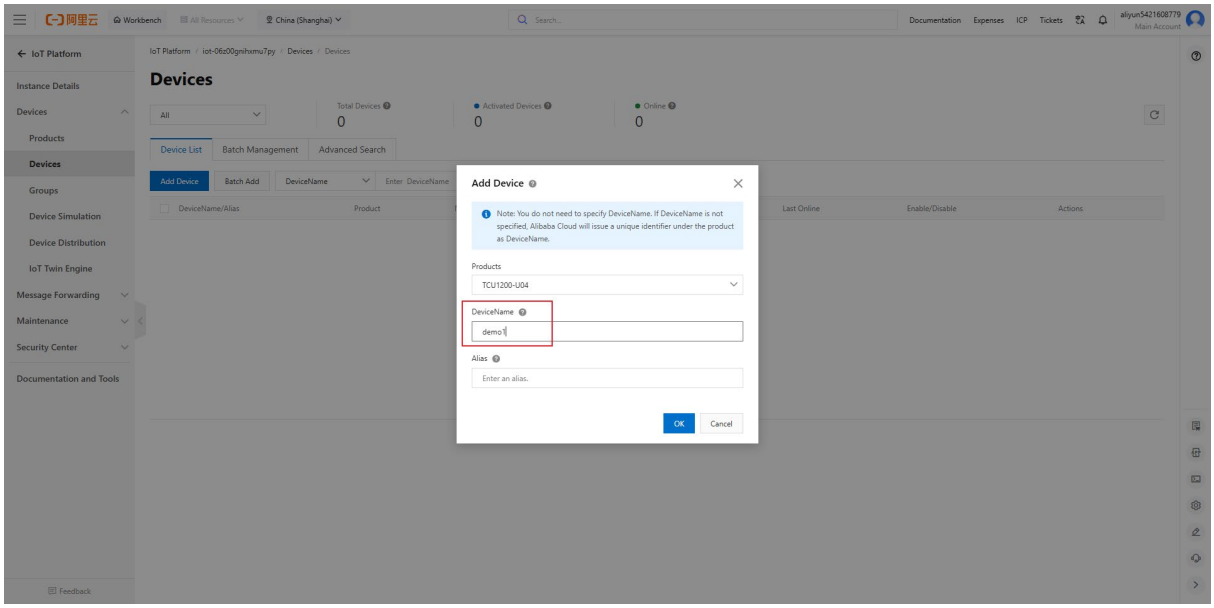


2. After creating a product, create a device under the product

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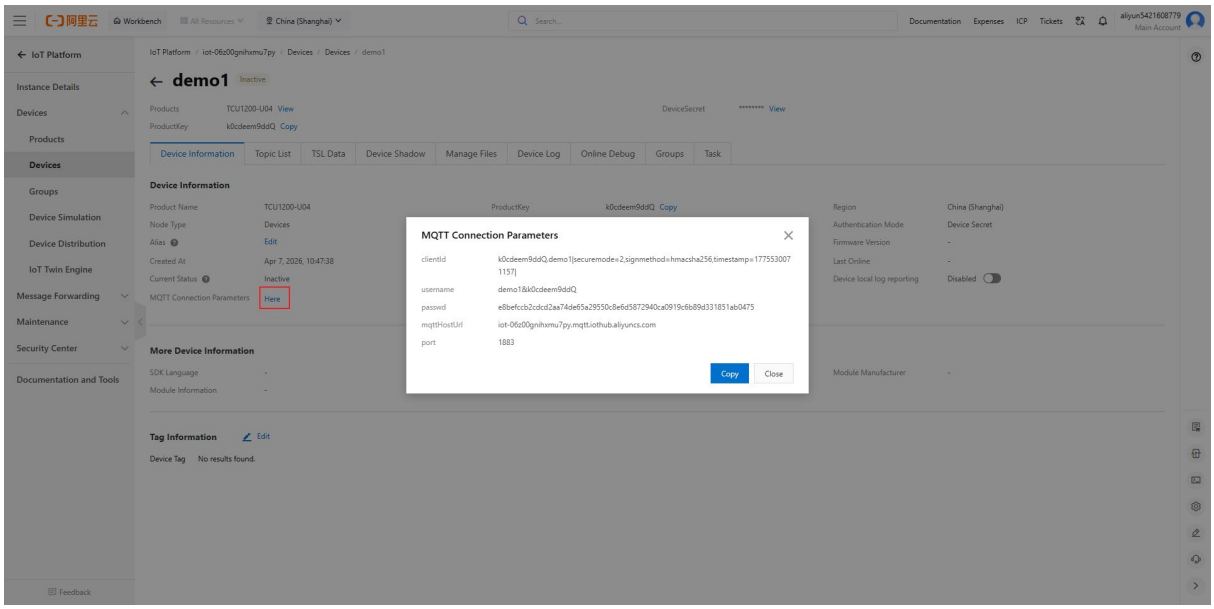


Fill in the device name, click Confirm, and the addition is successful



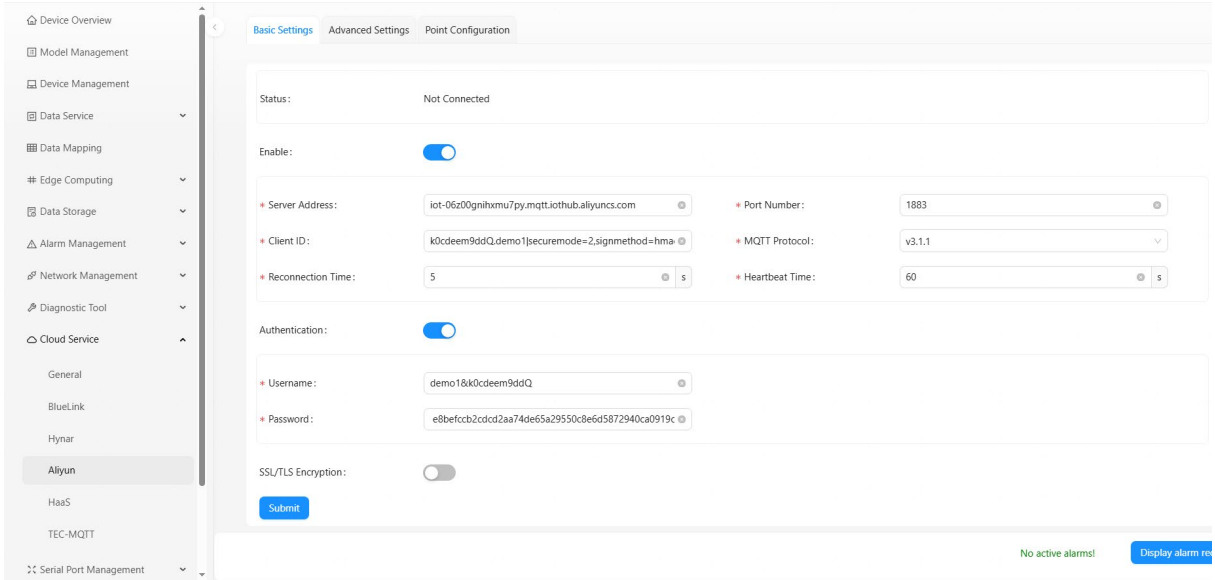
3. View device connection parameters

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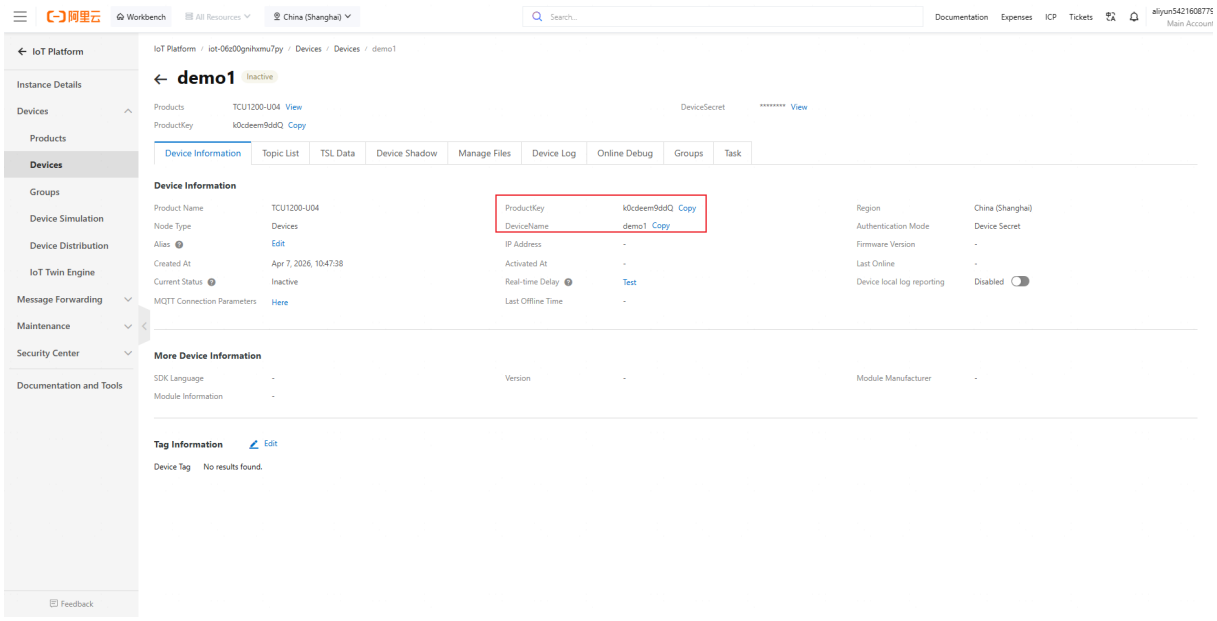
Fill the settings into the Basic Settings of the Gateway Cloud Service web page

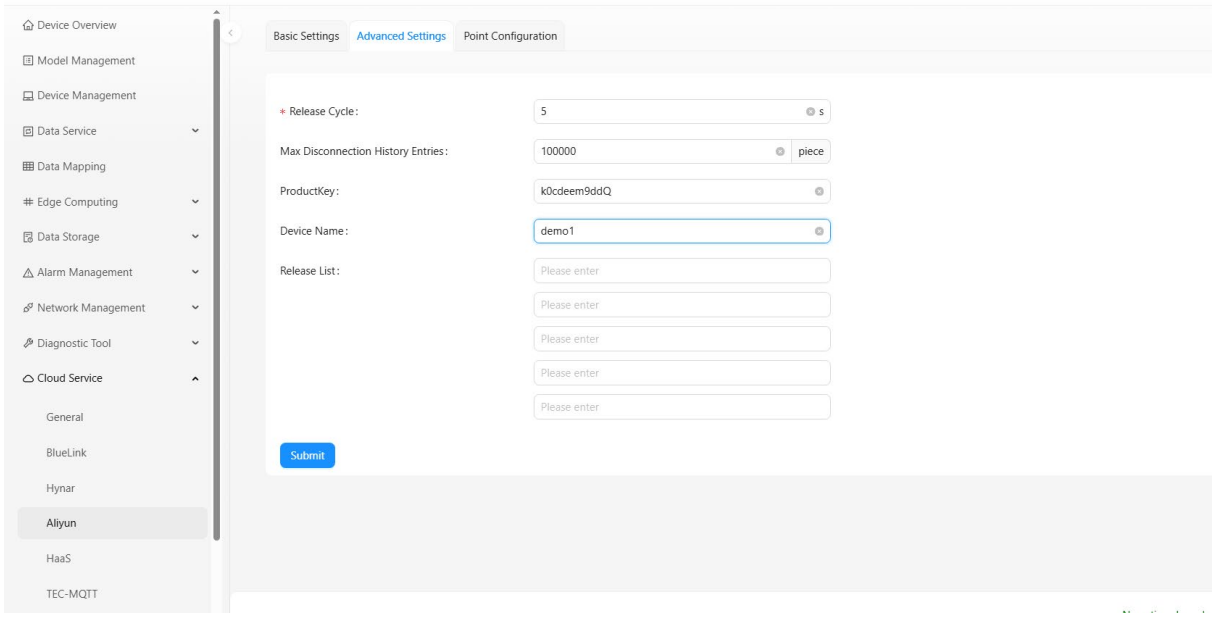
Basic Settings



Fill in the ProduceKey and device name in the advanced settings, and click Submit

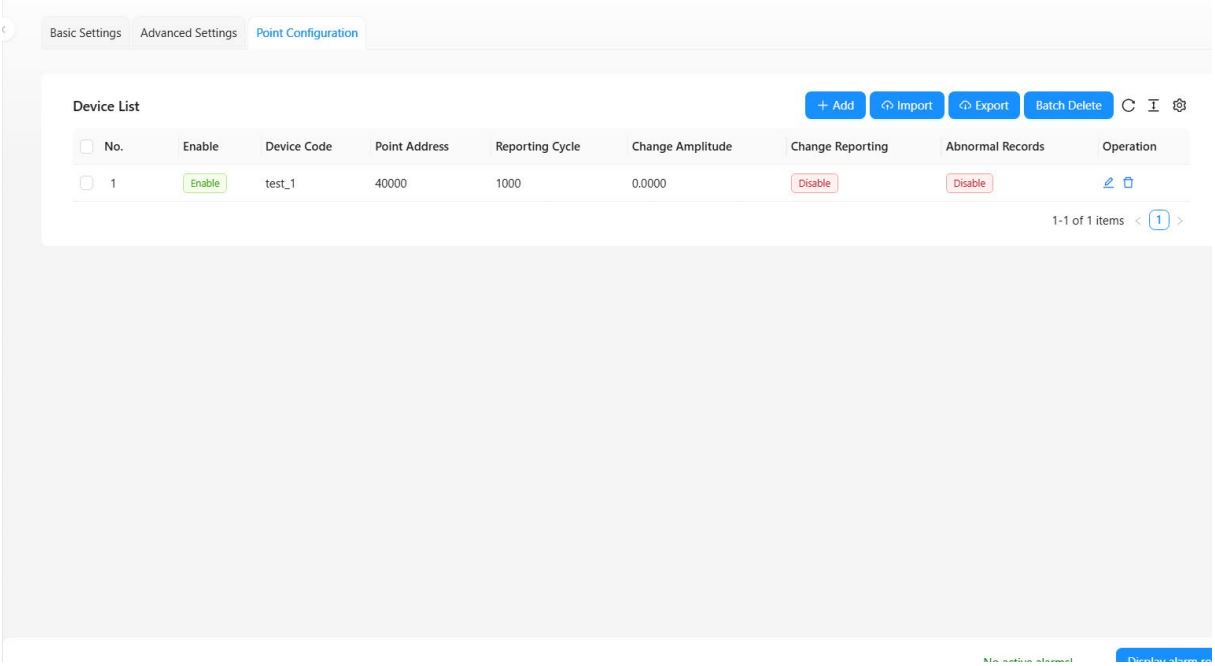
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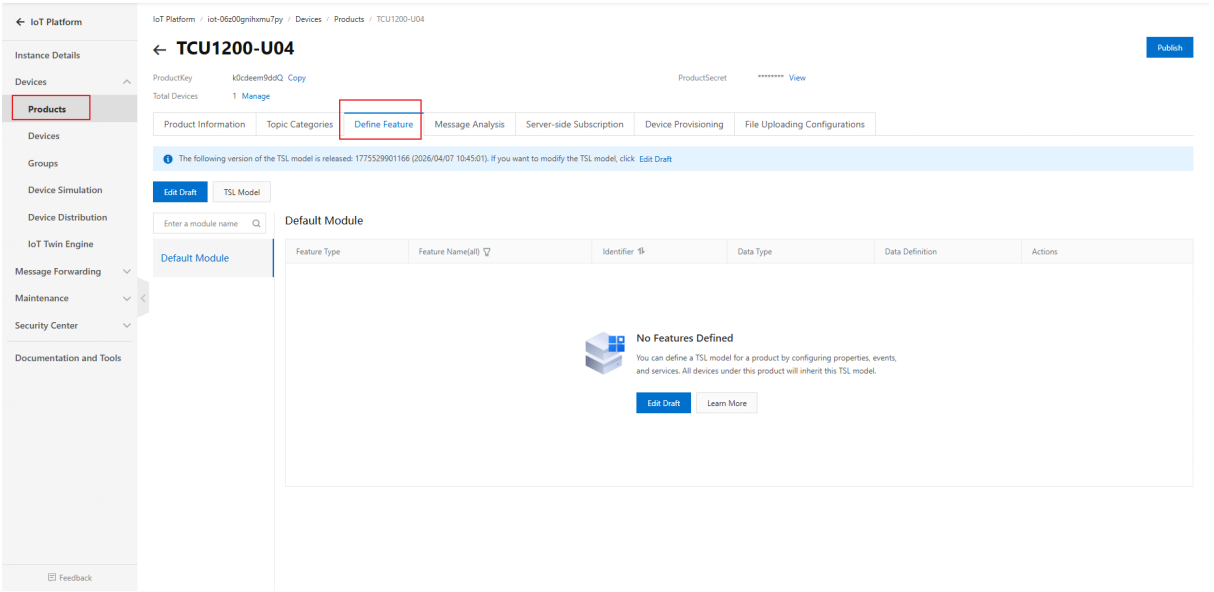


Configure the points to be reported

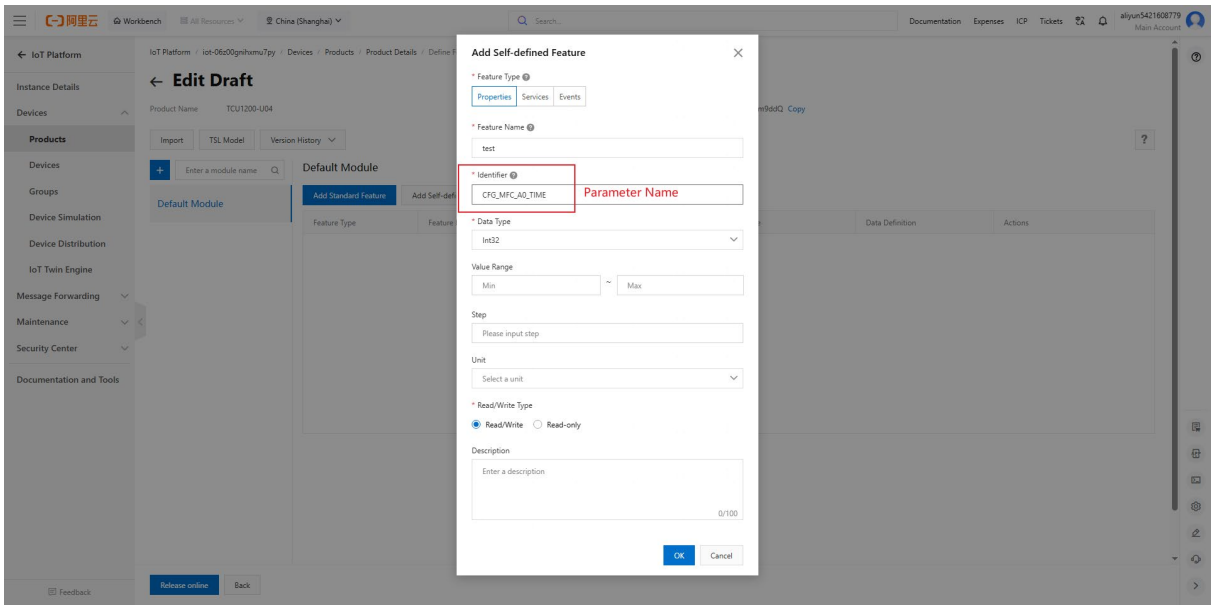
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Select a function definition in Alibaba Cloud IoT platform products

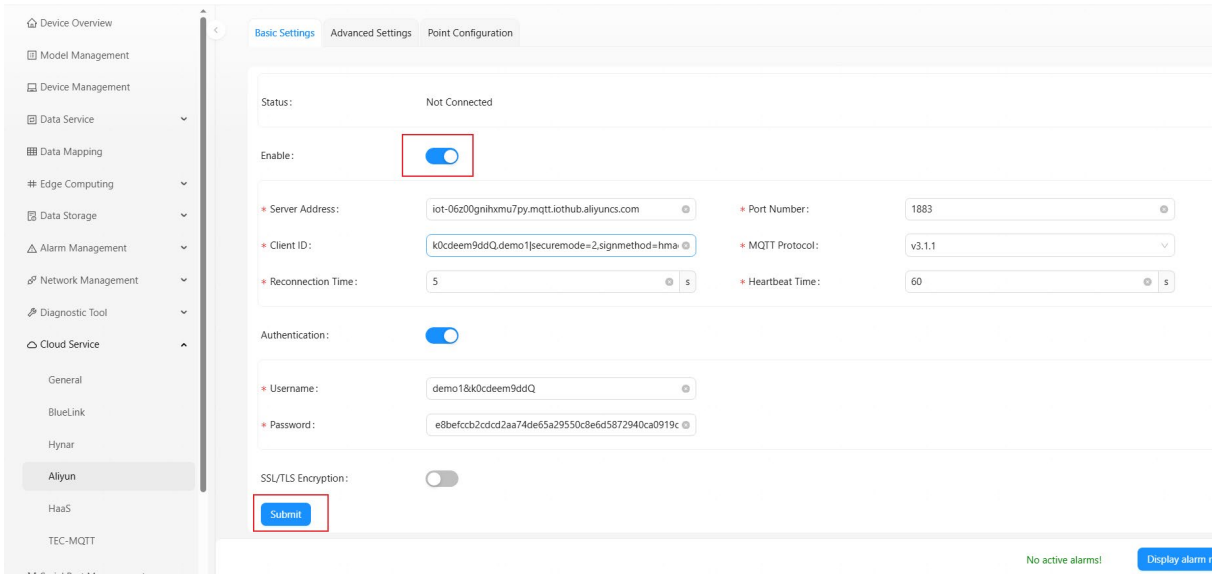


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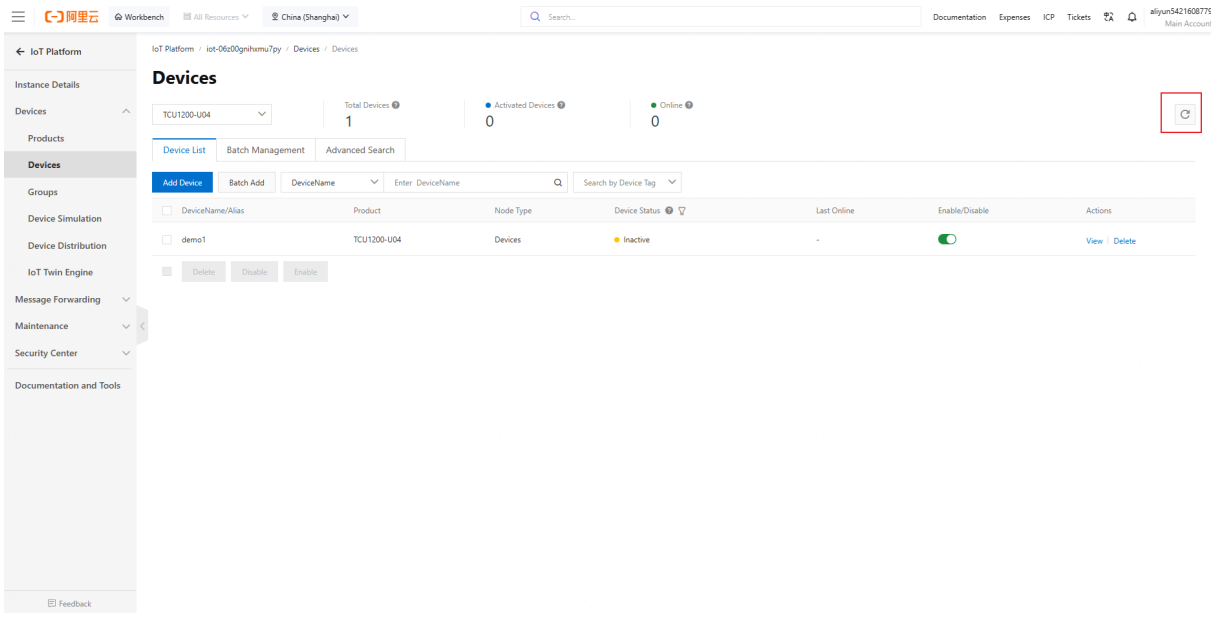
After filling in, click Publish Online in the lower left corner

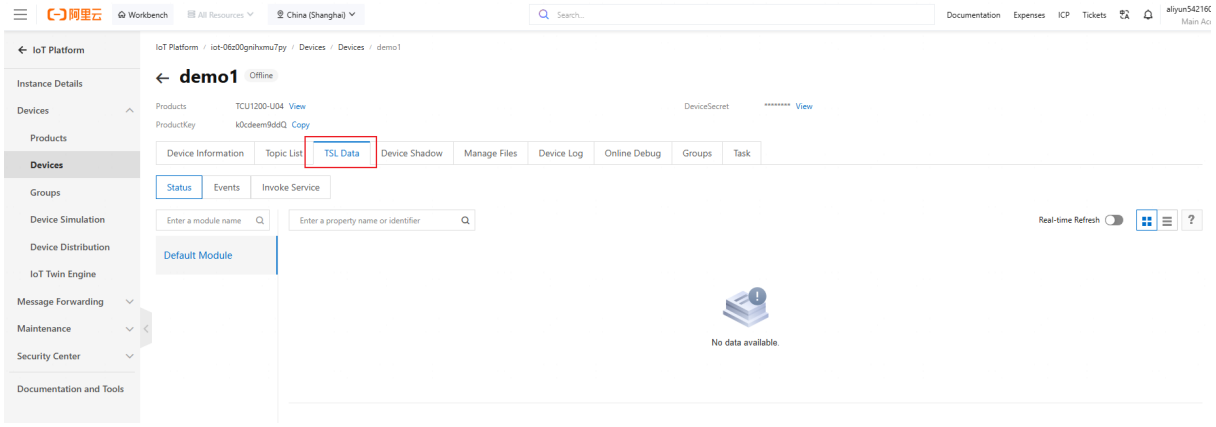
Enable cloud service



Click Refresh to see that the device status becomes online

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The following topics are supported:

Topic: /${productKey}/${deviceName}/thing/event/property/post

Get the attribute information reported by the device through this Topic.

Data format:

```
{
        "id":"1",
        "method":"thing.event.property.post",
        "params":{
            "CFG_MFC_A5_TIME":4654,
            "param1":65536
            },
        "version":"1.0"
}
```


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Topic: /${productKey}/${deviceName}/thing/service/property/set

Set the property information of the device through this Topic.

Data format:

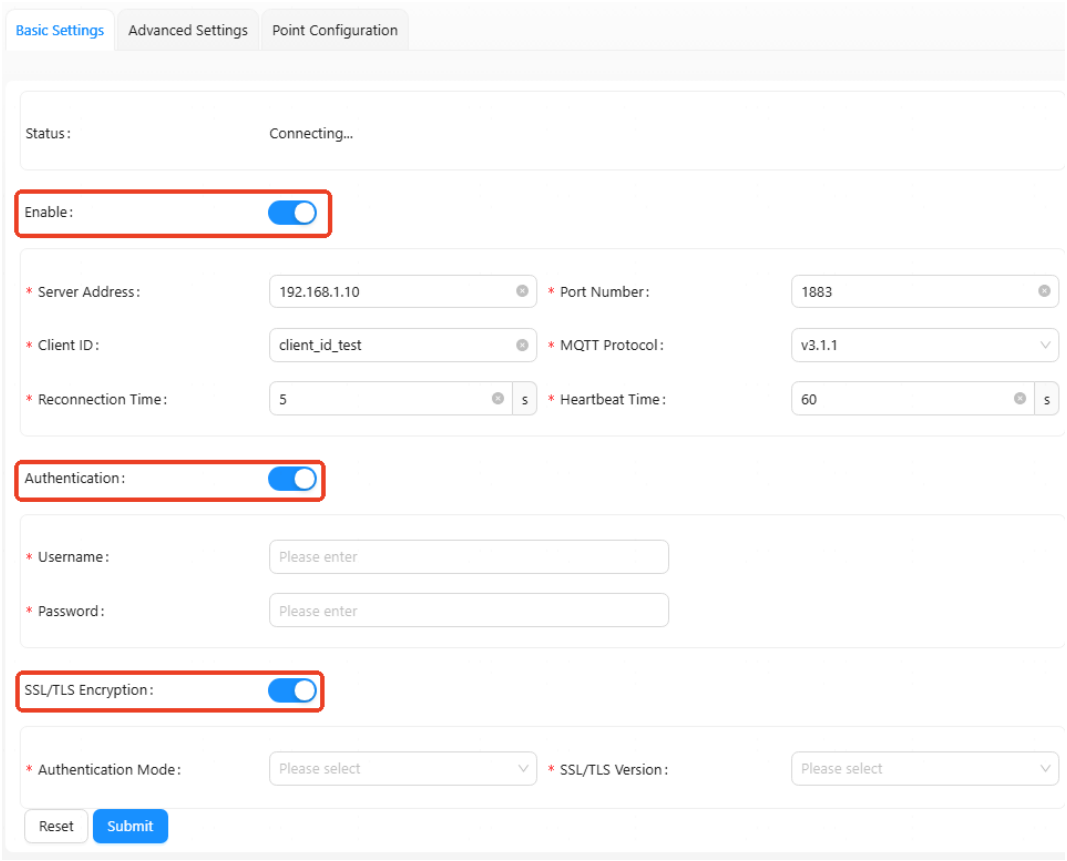
```
{
    "id":"8",
    "method":"thing.service.property.set",
    "params":
    {
        "param1":1,
        "param2":66
    },
    "version":"1.0"
}
```

12.1.4 HaaS Configuration

In the cloud service "Haas", information related to the MQTT platform can be configured, such as the server IP address, server port, client ID, etc. The MQTT protocol versions are v3.1 and v3.1.1.

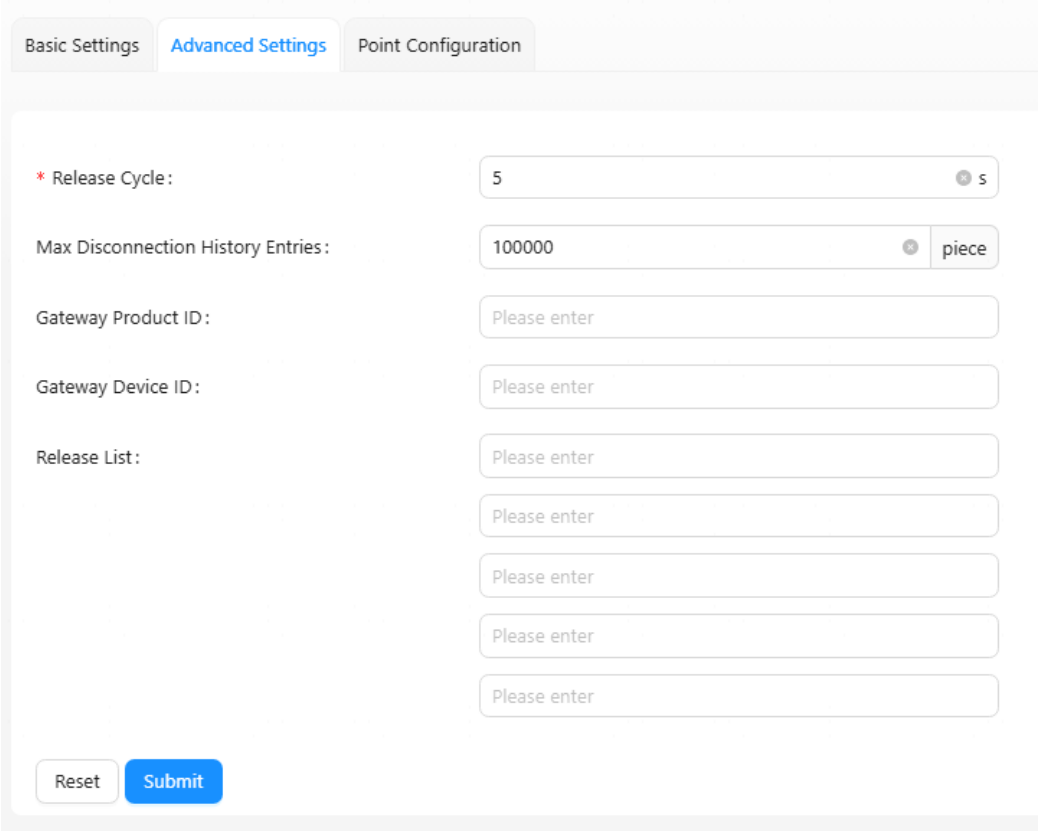
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Basic Settings



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Advanced Settings

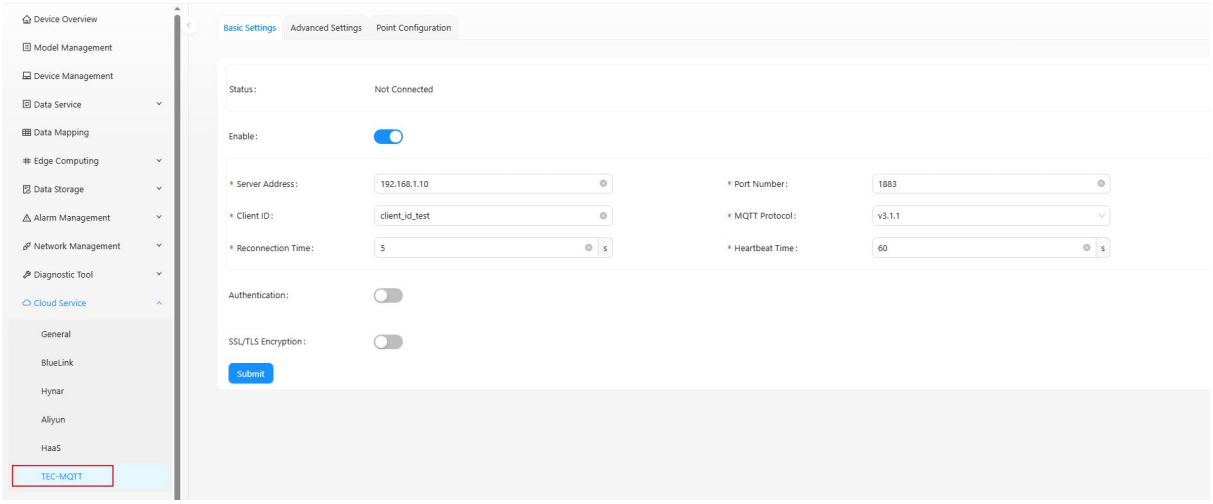


12.1.5 TEC-MQTT Configuration

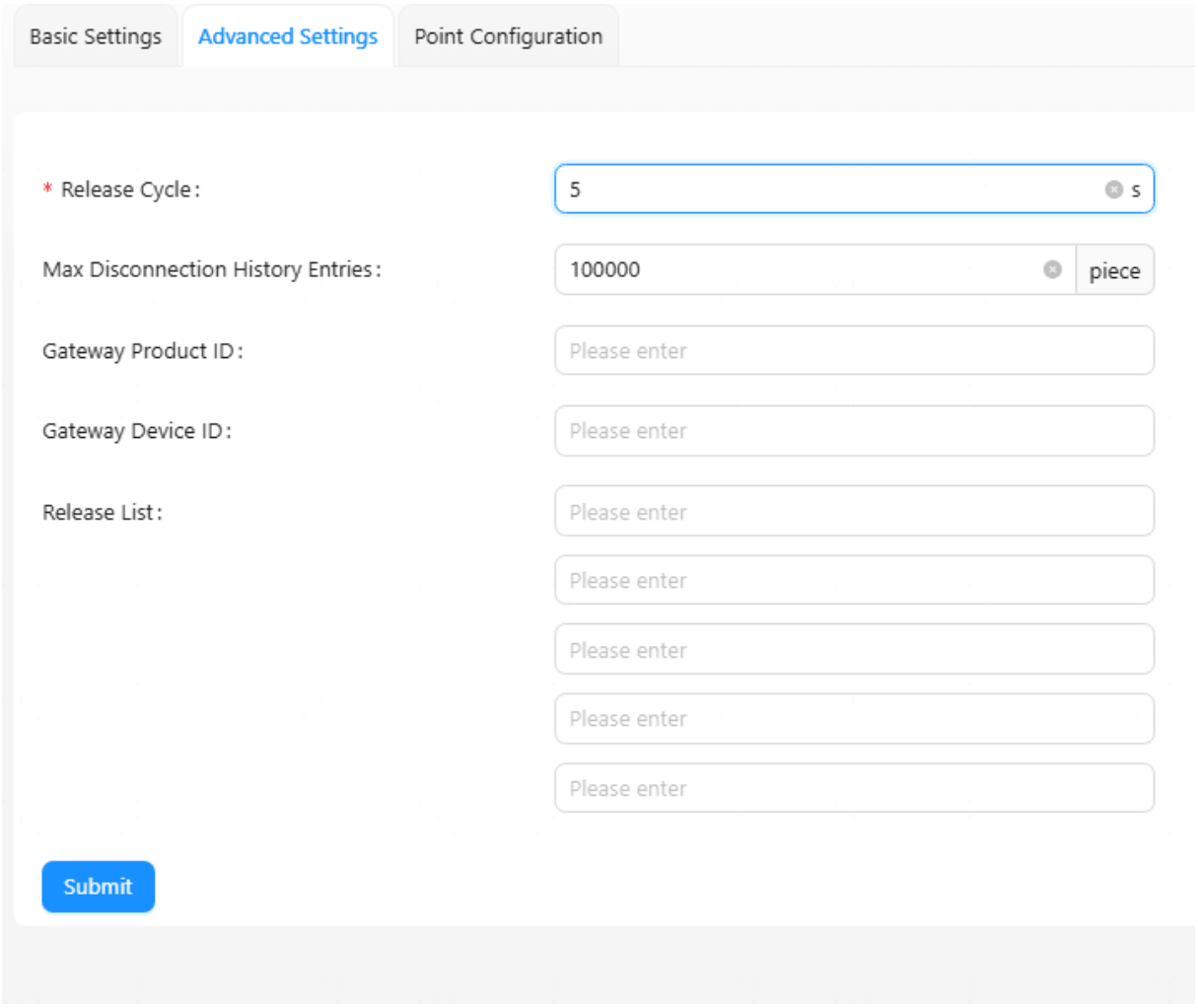
In the cloud service "Haas", information related to the MQTT platform can be configured, such as the server IP address, server port, client ID, etc. The MQTT protocol versions are v3.1 and v3.1.1.

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Basic Settings



Advanced Settings



The following topics are supported:

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Topic：Topic/${Company}/${Gateway}/${ClientID}/system/WriteData

Set the point value of the device through this Topic.

Data format:

```
{
    "time":"20251212",
    "Data":
    {
        "data": "tag1", / /parameter name
        "value": "100"/ /value
    }
}
```

Topic/${Company}/${Gateway}${ClientID}/system/Mul_WriteData

The point value of the device is continuously written through this Topic.

```
{
    "start_addr": "40",
    "quantity": "3",
    "data_type": "UINT16",
    "data": [
    "9",
    "0",
    "0"
    ],
    "device_id": "b"
}
```

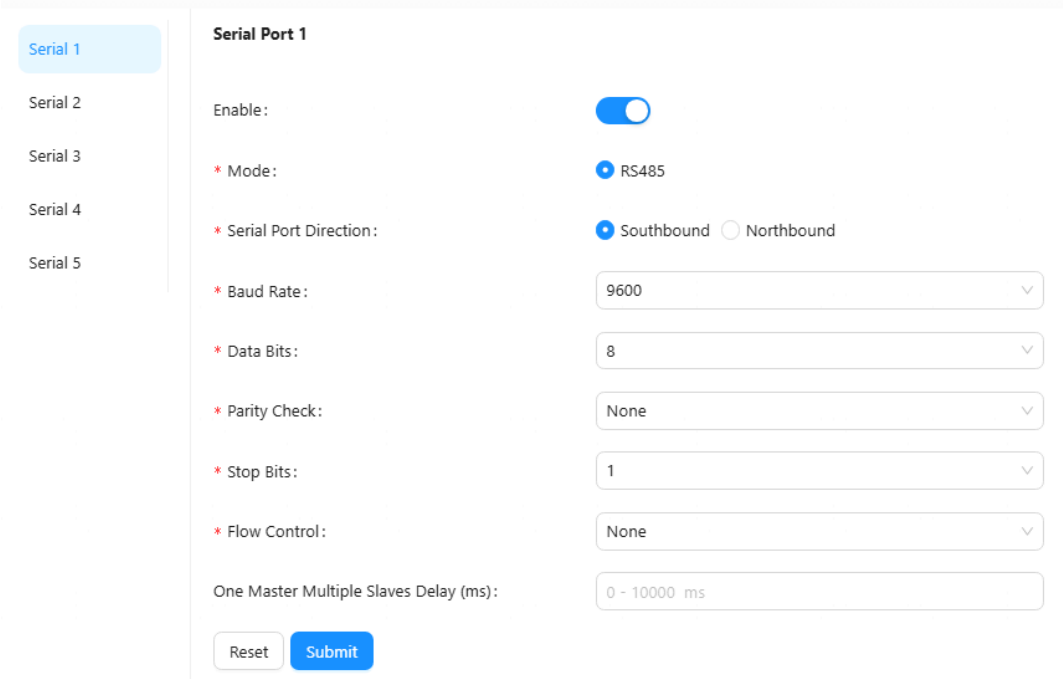

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13 Serial Port Management

The device has integrated instant networking function for serial device, the serial server can convert serial signal into Ethernet wired or wireless signal to achieve signal transmission of serial port on Ethernet.

13.1 COM Settings

On the “Serial Settings” page, users can configure serial server mode, serial service direction and specify basic parameter information such as baud rate, data bit, stop bit and check bit for the corresponding serial port number.



The main element configuration description of COM Settings interface:

Parameters	Description

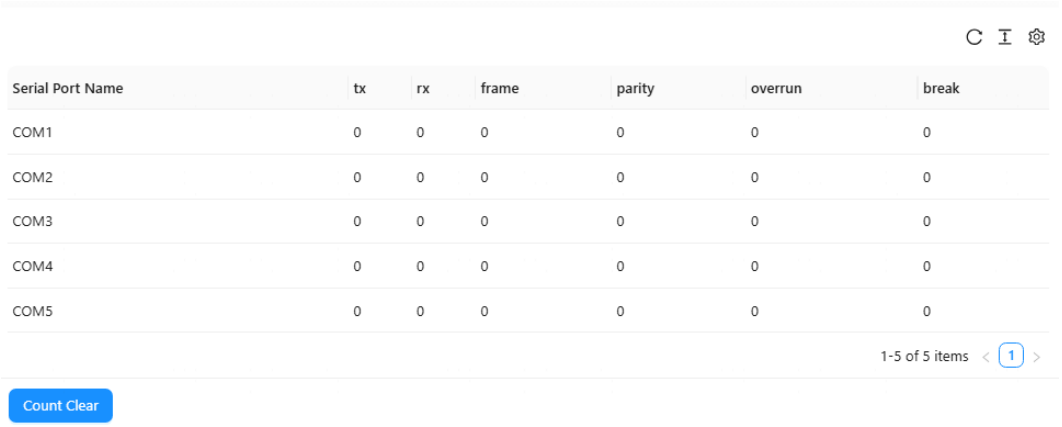
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Parameters	Description
Serial No.	The corresponding serial port number of device's serial port.
Serial Port	Display the serial port name of the device.
Enable	Check to enable serial port server
Mode	Display the interface mode of the device's serial port: RS485 RS232
Serial Port Direction	Display the service direction of the device serial port: Southbound: Device serial port collects data from the server • Northbound: Device serial port sends data to client
Baud Rate	Choose baud rate of corresponding serial port. Unit: bps. Options: 9600/19200/38400/57600/115200。
Data Bits	Display the data bits of the device's serial port. Unit: bit. • 5 • 6 • 7 • 8
Pairty Check	Select parity bits of corresponding serial number. Options: • None • Odd • Even • Space • Mark
Stop Bits	Choose stop bit of corresponding serial port. Options: • 1 • 1.5 • 2
Flow Control	Display the flow control function of the device's serial port. • None • RTS/CTS • DTR/DST • XON/XOFF

13.2 Serial Port Status

View the statistics of the number of bytes received and sent during the conversion between each serial port and the network.

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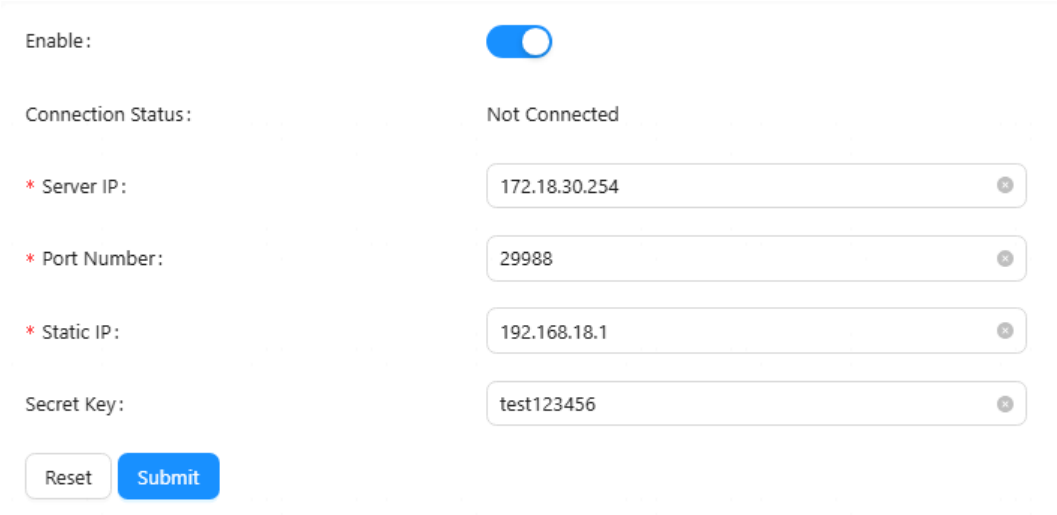
Serial Port Name	tx	rx	frame	parity	overrun	break
COM1	0	0	0	0	0	0
COM2	0	0	0	0	0	0
COM3	0	0	0	0	0	0
COM4	0	0	0	0	0	0
COM5	0	0	0	0	0	0

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14 VPN

14.1 N2N Network Penetration

The system supports N2N network penetration, which uses UDP hole punching through NAT to enable interconnection between intranet devices. Establish a P2P-encrypted Layer 2 direct connection between clients, with data transmission bypassing third-party servers.



Configure the static IP based on actual requirements. It must be in the 192, 172, or 10 range (e.g., 192.168.50.2), and the IP must be unique within the same LAN. Remote devices will use this static IP for communication.

The secret key functions similarly to a password (also referred to as a passphrase). It is user-defined and must be at least 8 characters long.

After connecting to the server, you can use the easyN2N tool on your local computer to access remote devices. The tool can be downloaded online, but your computer may

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flag it as a virus. If the antivirus blocks the download, temporarily disable real-time and scheduled scanning in "Virus & Threat Protection".

The group name in the tool serves as the web access key and must remain consistent. The static IP must be on the same LAN, similar to a private network setup.

Once the computer connects to the device, they form a local area network (LAN), allowing the computer to access the device's backend system or web interface.

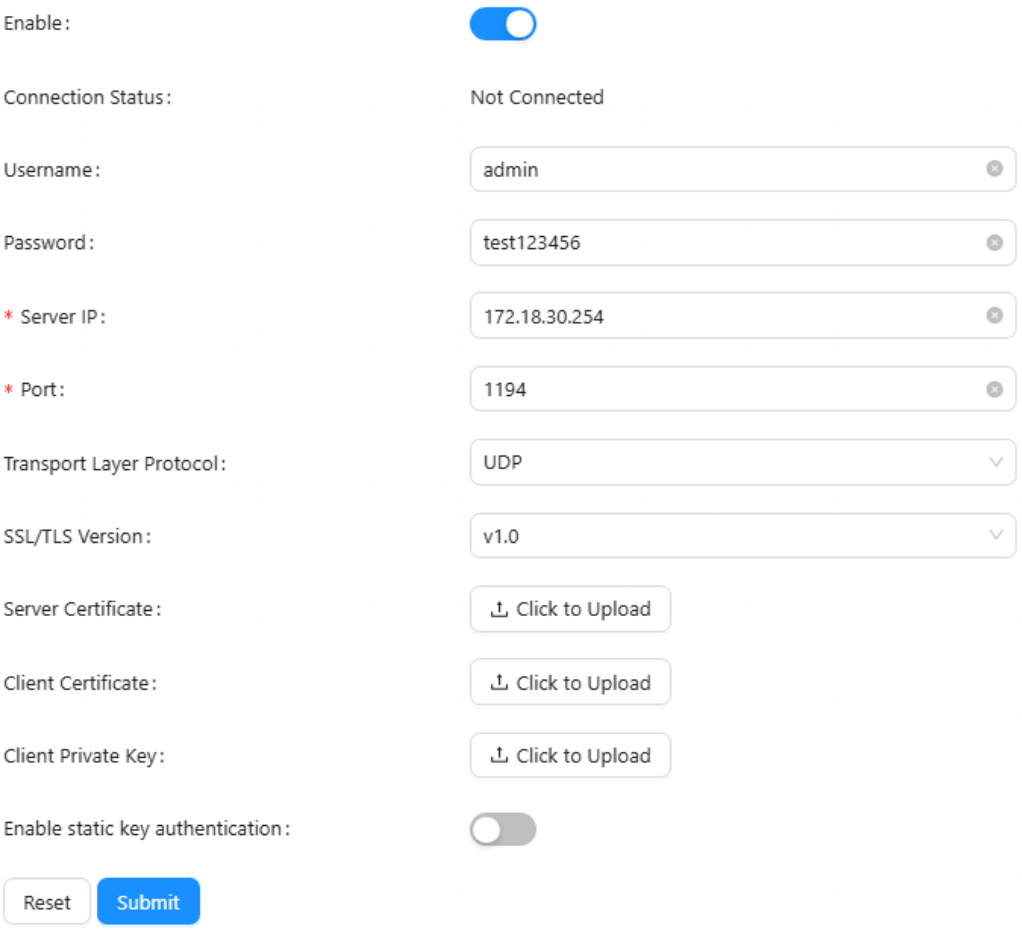
Note:

After successful access to the network, it will always be displayed as connected, even if the network is disconnected; After the connection is successful, you can access the device. Enter the static IP configured by the device and add 8000 to access the web.

14.2 Open VPN

OpenVPN is an open source encrypted tunnel construction tool. Based on the SSL/TLS protocol of OpenSSL, it can realize point-to-point SSL VPN secure connection in the Internet.

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15 Firewall

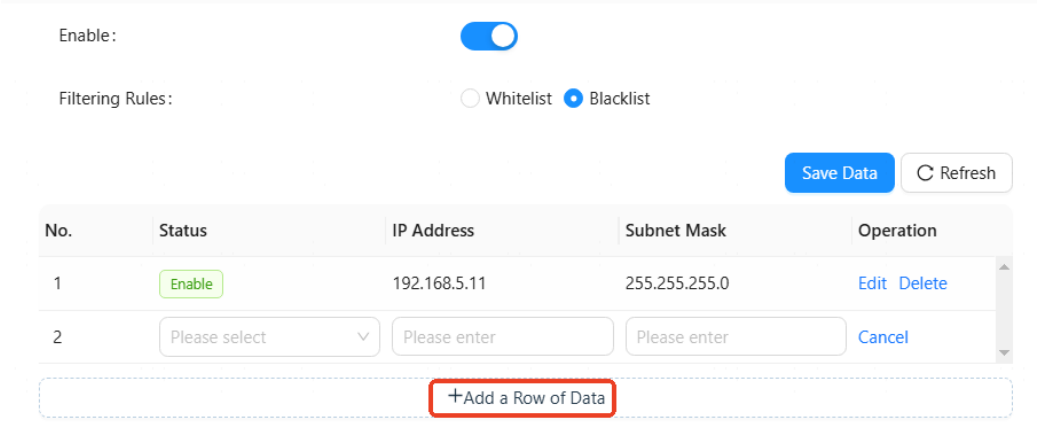
15.1 IP Address Filtering

IP address filtering supports enabling and disabling, blacklisting and whitelist switching, as well as adding, deleting and modifying IP addresses and subnet masks. The enable box marked as "checked" indicates that ip address filtering is enabled, while an empty box indicates that it is disabled.

Checkboxes can switch between the whitelist and the blacklist

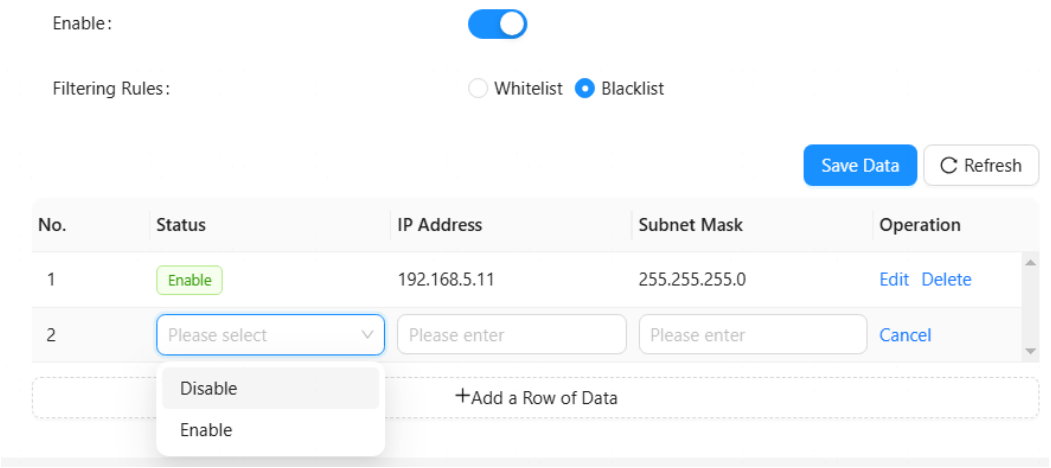
Note:

Remember to configure the IP address of the local PC when setting up the whitelist, and do not configure the IP address of the local PC when setting up the blacklist. Only one of the blacklist and whitelist can be chosen. It is not possible for several IP addresses to be on the blacklist and several addresses to be on the whitelist.



Click on “Add a row of data”, select “Enable” or “Disable”, add IP address and subnet mask

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Click "Edit" to modify the IP address, subnet mask and status of a certain line.

Click “Delete” to delete a certain row of data.

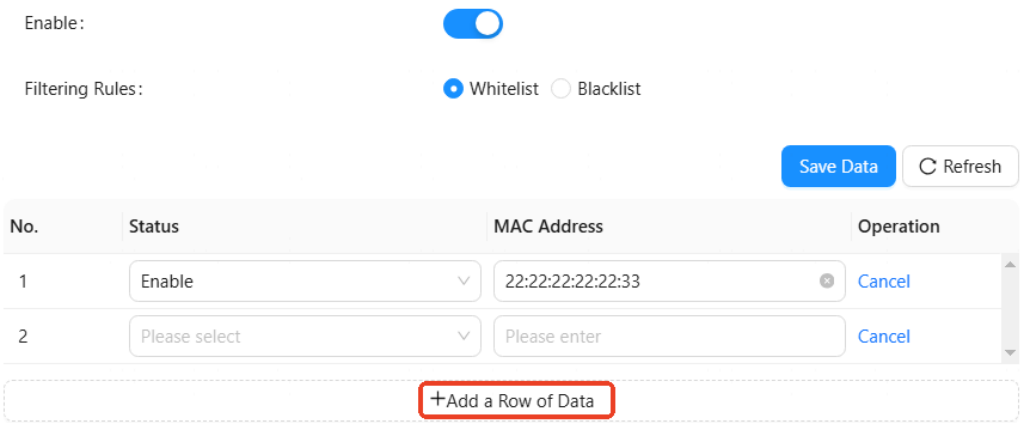
After making the modifications, click "Save Data" to make the configuration effective.

15.2 MAC Filtering

MAC address filtering supports enabling and disabling, blacklisting and whitelist switching, as well as adding, deleting and modifying MAC addresses.

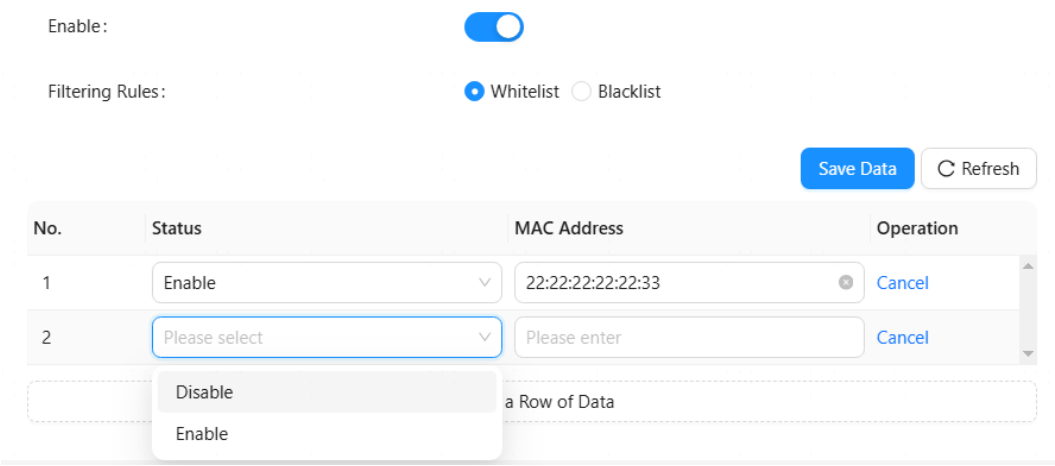
The enable box marked as "checked" indicates that ip address filtering is enabled, while an empty box indicates that it is disabled.

Checkboxes can switch between the whitelist and the blacklist (!!! Remember to configure the MAC address of the local PC when setting up the whitelist, and do not configure the MAC address of the local PC when setting up the blacklist. Only one of the blacklist and whitelist can be chosen. It is not possible for several MAC addresses to be on the blacklist and several addresses to be on the whitelist）.



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Click on “Add a row of data”, select enable or disable, and add MAC address and subnet mask.



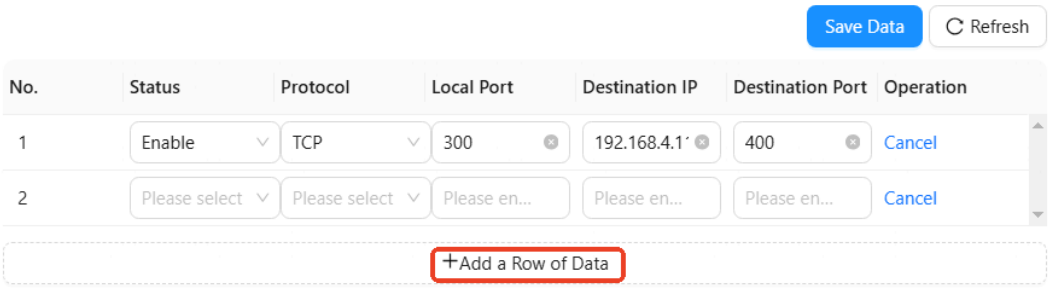
Click "Edit" to modify the MAC address, and status of a certain line.

Click “Delete” to delete a certain row of data.

After making the modifications, click "Save Data" to make the configuration effective.

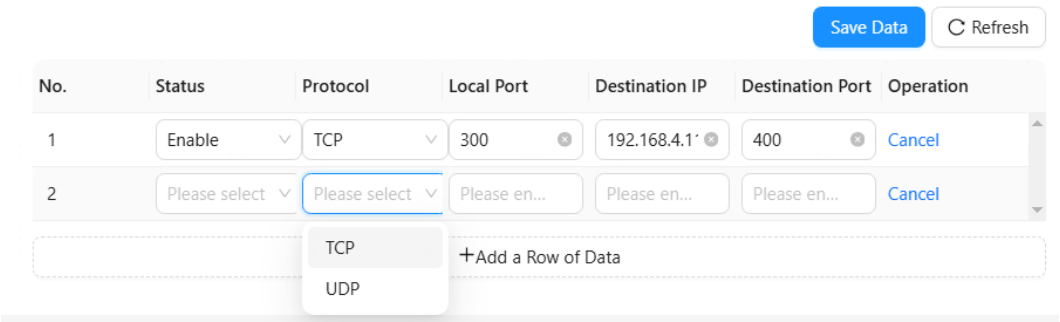
15.3 Port Forwarding

Port forwarding supports port forwarding protocols, local ports, target IP, and the addition, deletion, and modification of target ports.



Click on 'Add a row of data', select enable or disable, choose TCP or UDP protocol, add local port, destination IP address, and destination port.

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Click "Edit" to modify the protocol, local port, target IP address, target port and status of a certain line.

Click “Delete” to delete a certain row of data.

After making the modifications, click "Save Data" to make the configuration effective.

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16 System Management

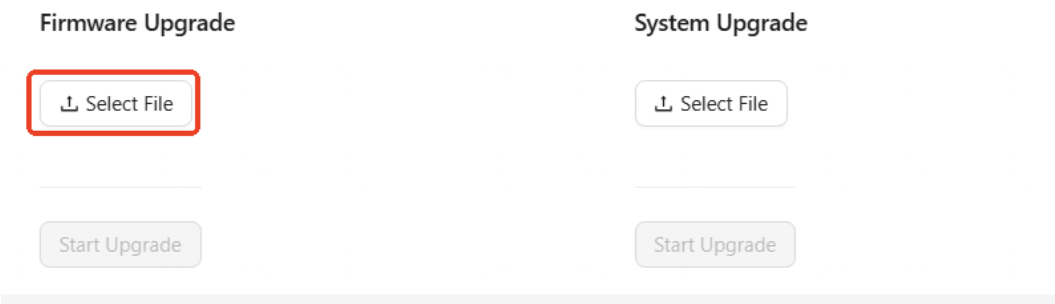
16.1 OTA Upgrade

On the "OTA Update" page, you can update the device's system program and perform system upgrades using an upgrade file.

16.1.1 Firmware Upgrade

Operation Steps

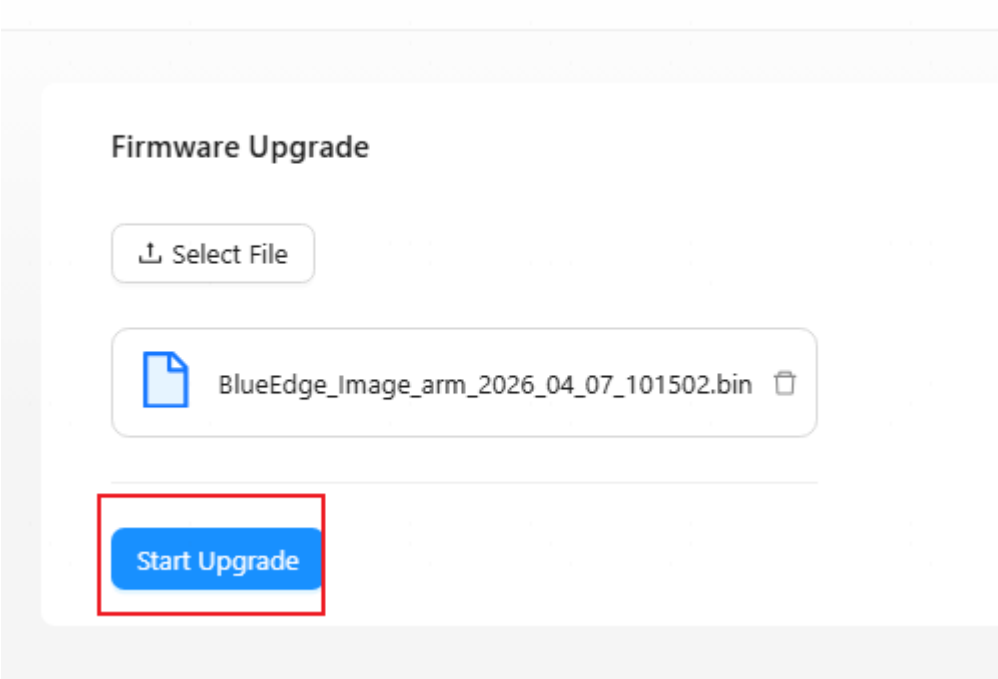
Step 1 Go to "System Management > OTA Update", then click "Select File" under "Firmware Upgrade".



Step 2 Select "Upgrade File", and click "Open"

Step 3 Click “Update”.

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After the upgrade is complete, the system will return to the initial login interface.

16.1.2 System Upgrade

Operation Steps

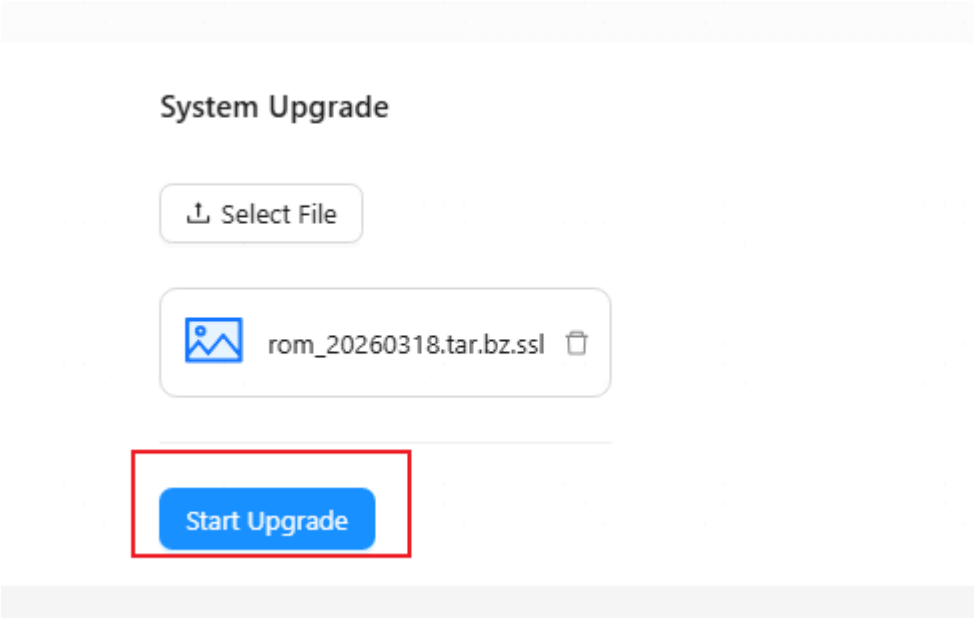
Step 1 Go to "System Management > OTA Update", then click "Select File" under "System Upgrade".



Step 2 Select the upgrade file, click Open. The system firmware extensions are as follows. System upgrades include patch upgrade, kernel upgrade, and filesystem upgrade. The device may restart during upgrade. If it is a filesystem upgrade, the upgrade time will be longer, please wait patiently.

Step 3 Click “Update”.

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After the upgrade is complete, the system will return to the initial login interface.

16.2 Time Settings

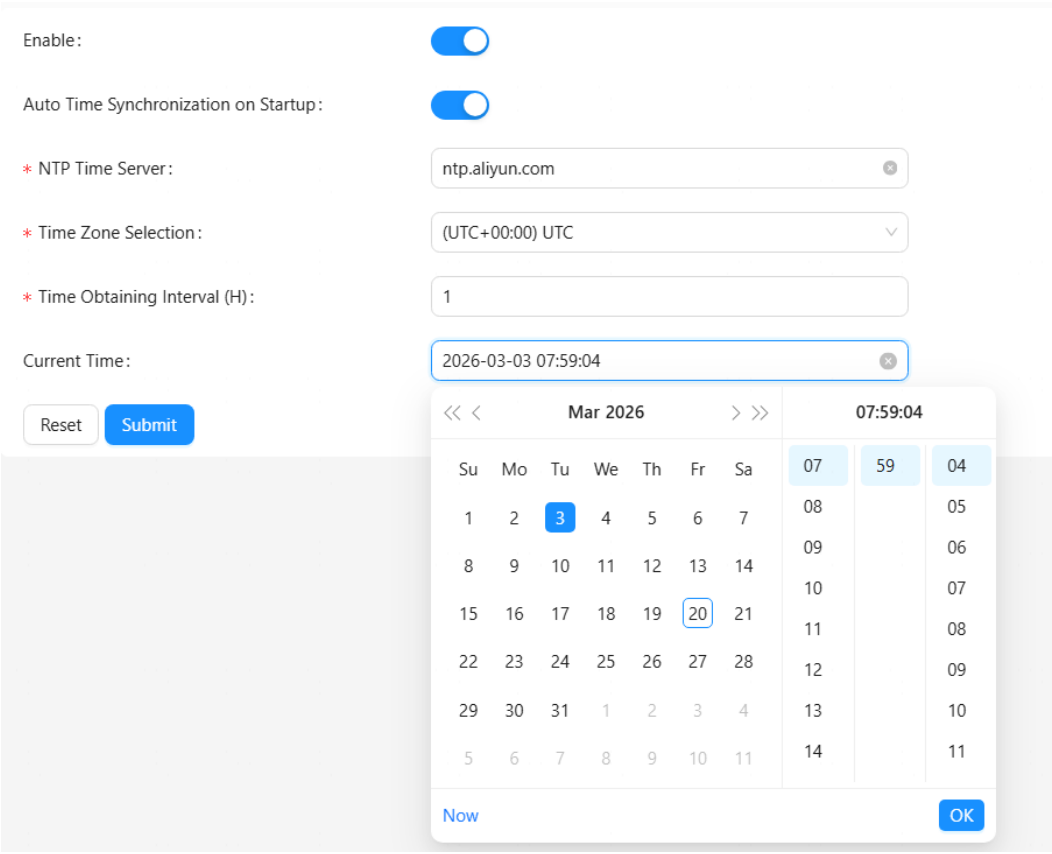
Automatic Timing:

On the "Time Settings" page, the device time can be synchronized with network time or other devices' time. To synchronize with network time, the device needs network connection. To synchronize with other devices' time, they must be on the same local area network. Check Enable or Auto Sync at Startup, then enter the NTP server address and set the time synchronization interval. Time zone selection is available.

Manual Timing:

When enable is not checked, you can manually get the current page time and set the time.

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16.3 Backup and Restore

On the "OTA Update" page, you can restore or back up the database by importing/exporting files.

16.3.1 Backup

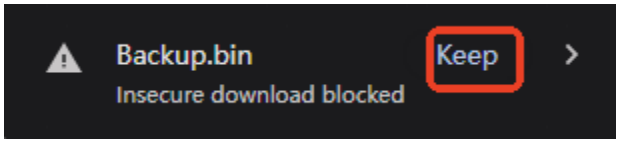
Operation Steps

Step 1 Go to "System Management > Backup and Restore", then click “Export File" under “Backup".

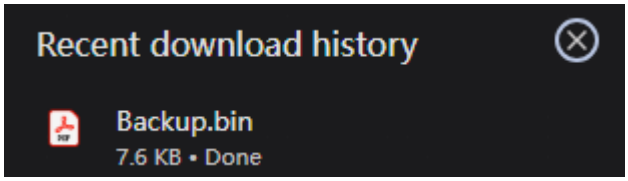
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Step 2 A pop-up window will appear in the upper-right corner – click "Keep" to confirm.



Step 3 The pop-up window will then change to "Completed", indicating the backup file was successfully exported.



16.3.2 Restore

Operation Steps

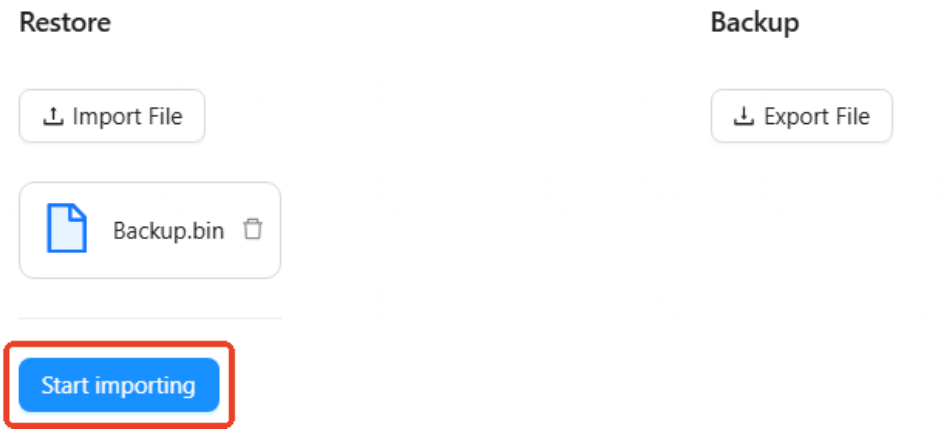
Step 1 Go to "System Management > Restore", then click “Import File" under “Restore".



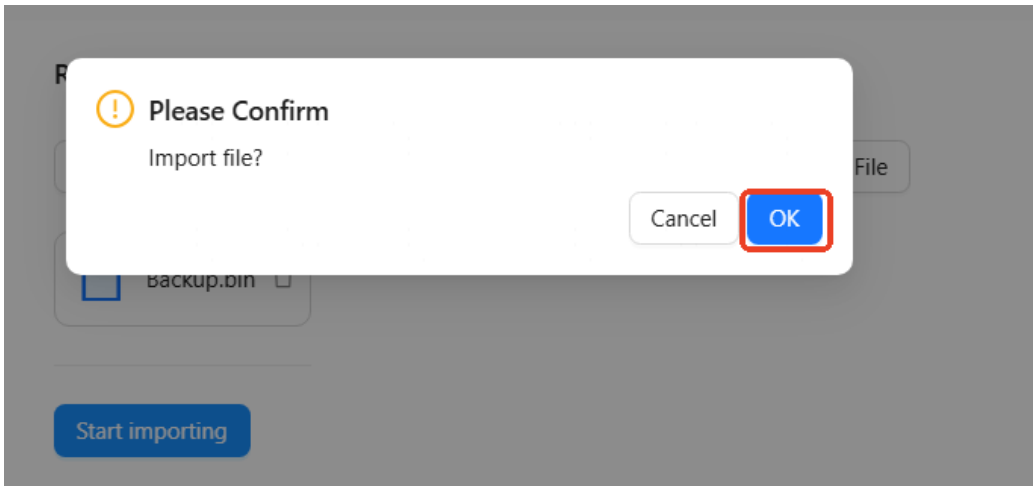
Step 2 Select "Upgrade File", and click "Open”

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Step 3 Click “Start importing”.



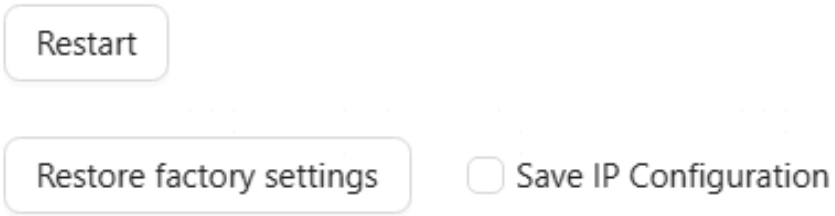
Step 4 Click "OK".



After the upgrade is complete, the system will return to the initial login interface.

16.4 System Control

On the "System Control" page, users can perform device restart and factory reset.

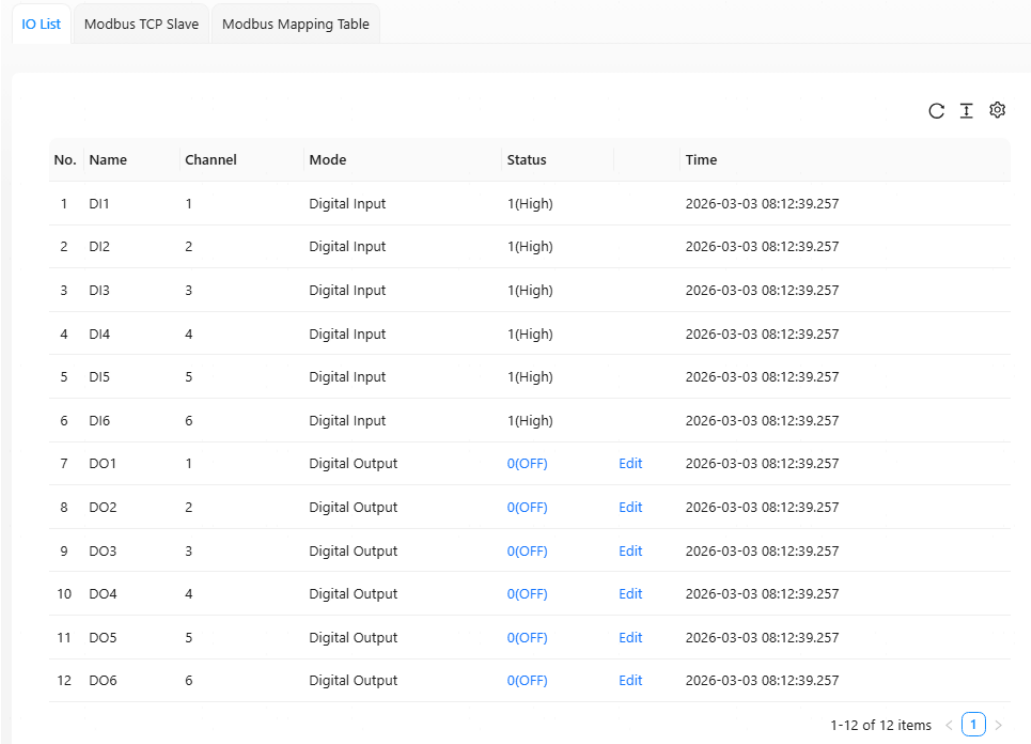


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17 IO server

17.1 IO Server DIDO

DI is a digital input and DO is a digital output



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18 Acquisition Protocol Example

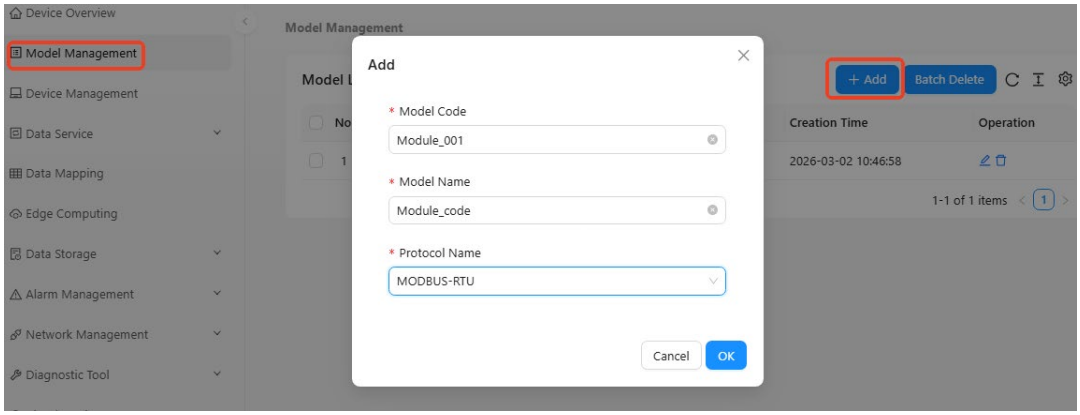
18.1 Modbus Protocol

18.1.1 Modbus RTU Protocol

Operation Steps

Step 1 Add model.

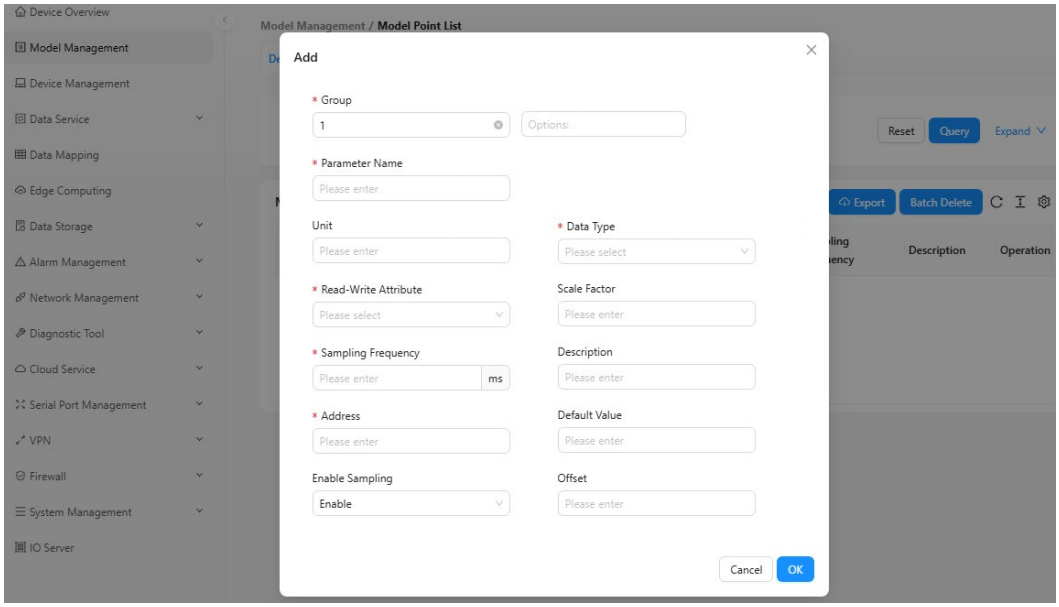
On the Device Model Management page, click "New" to create a Modbus RTU device model. Customize the Model Code and Model Name, then select “MODBUS-RTU” from the Protocol dropdown menu.



Step 2 Configure Model Point Table.

On the Device Model Management page, click the Modbus RTU model code to enter the model point list. Click "New" to configure point parameters.

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Modbus RTU Address format: Register/Coil + Address

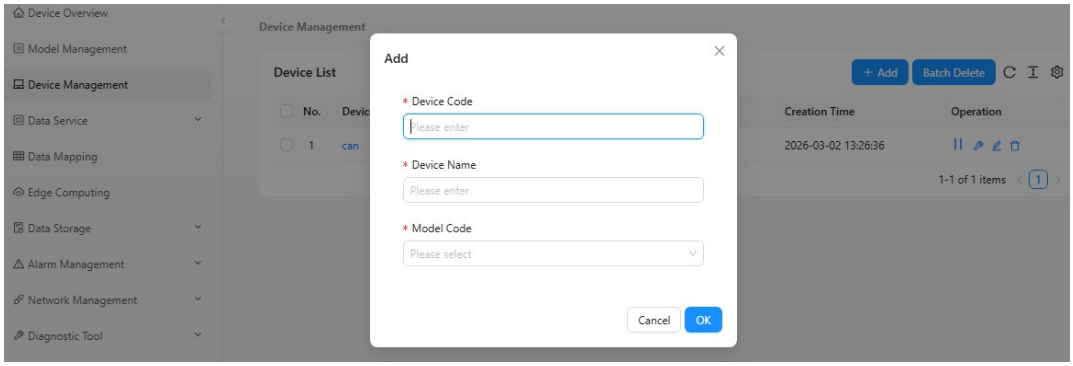
Register: Hold register 4; Input Register 3

Coil: Coil 0; Input coil 1

Address: 0 ~ 65535

Step 3 Add device.

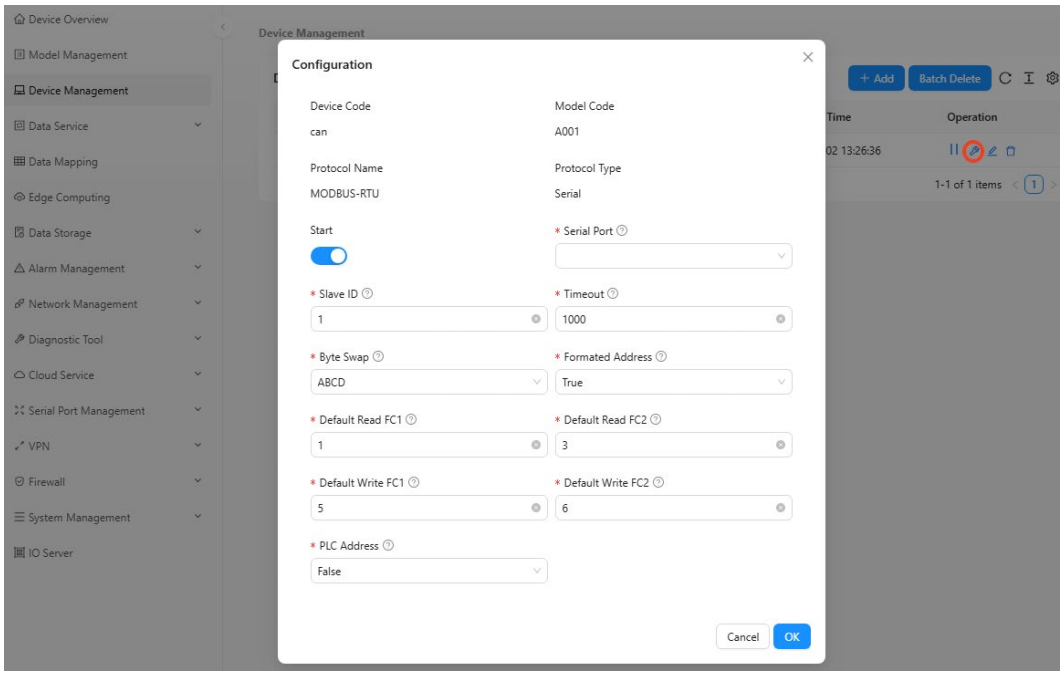
On the Device Management page, click "New" to create Modbus RTU Device. Customize the Device Code and Device Name, then select a pre-configured Model Code.



Step 4 Configure Device Parameter

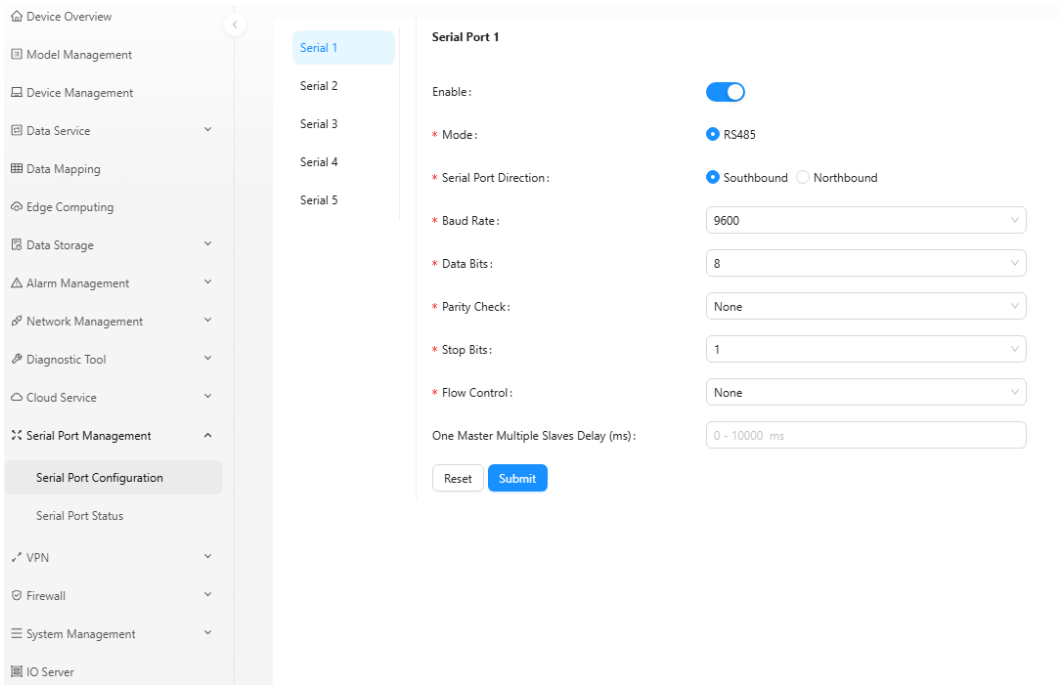
After adding the device, click the 'Configure' button in the Operation column to set up the newly created device.

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- Serial Port
- Slave ID: Modbus Slave ID.

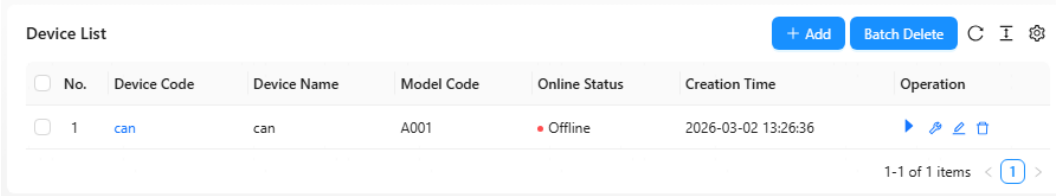
Step 5 On the Serial Port Configuration page under Interface Management, configure parameters for Serial Port 1 and click 'Submit'.



Step 6 Device status

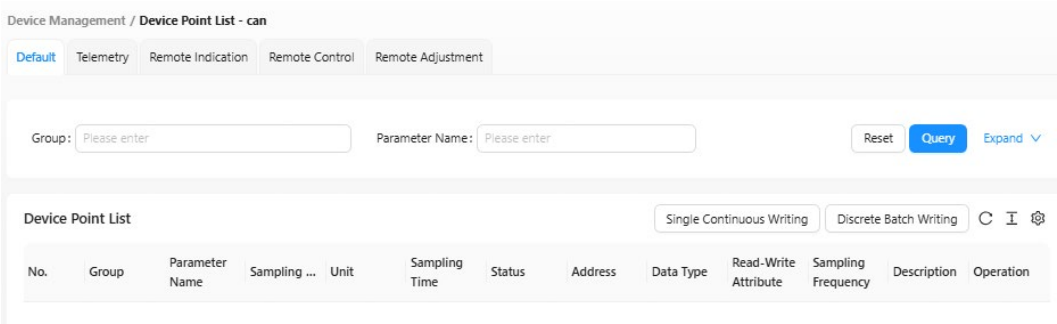
After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.

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Step 7 Device Point Table

In the Device Management interface, click the device code to access its Point Table, where you can view detailed status of all data points.



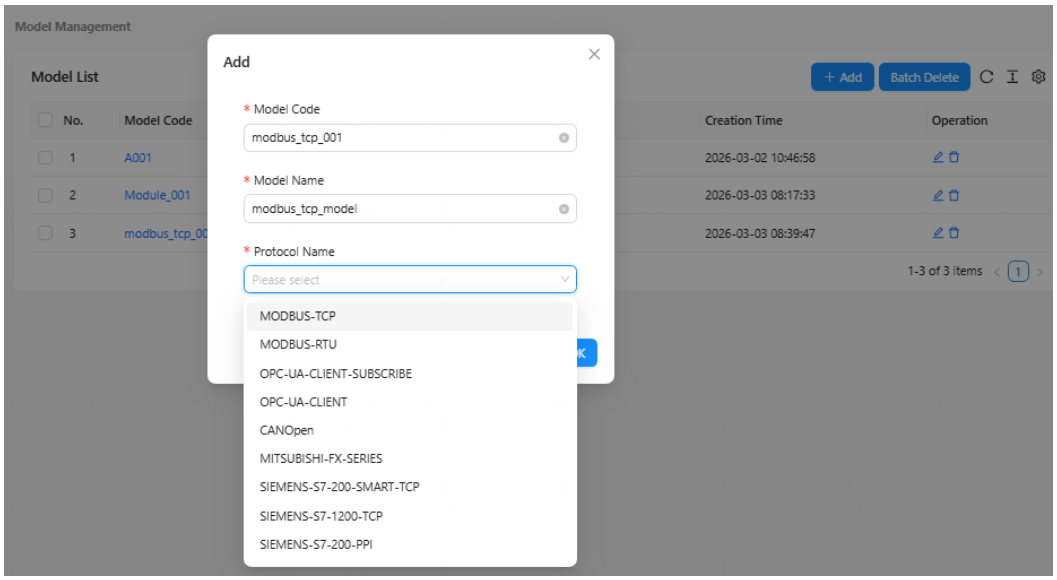
18.1.2 Modbus TCP Protocol

Operation Steps

Step 1 Add model

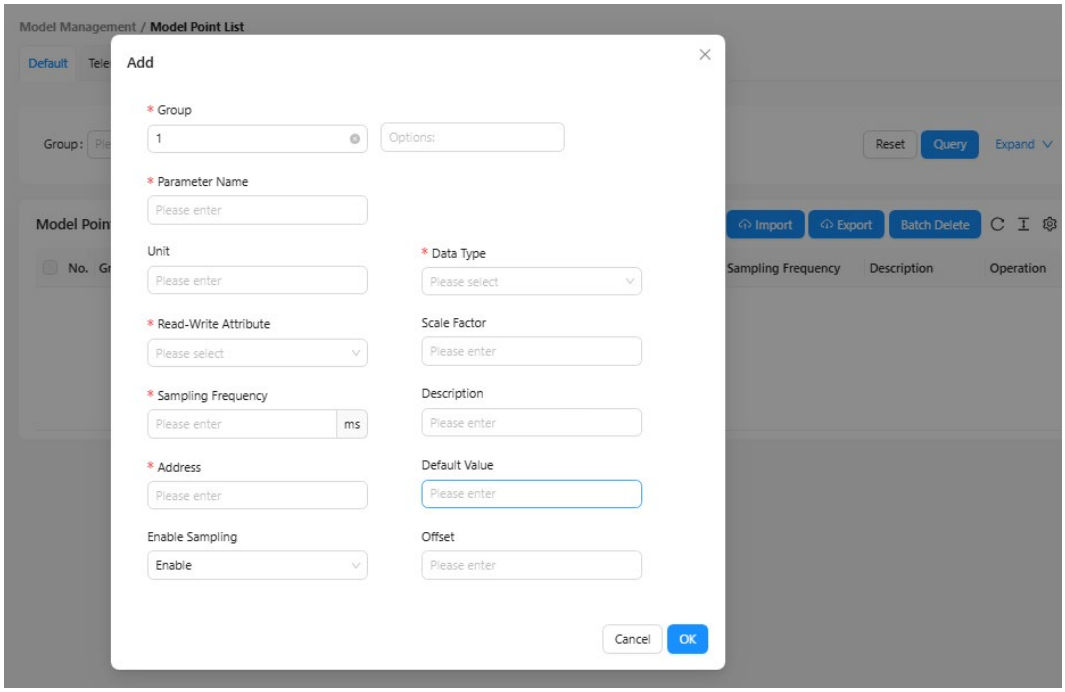
On the Device Model Management page, click "Add" to create a Modbus TCP device model. Customize the Model Code and Model Name, then select “MODBUS-TCP” from the Protocol dropdown menu.

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Step 2 Configure Model Point Table

On the Device Model Management page, click the Modbus TCP model code to enter the model point list. Click "Add" to configure point parameters.



Modbus TCP Address format: Register/Coil + Address

Register: Hold register 4; Input Register 3

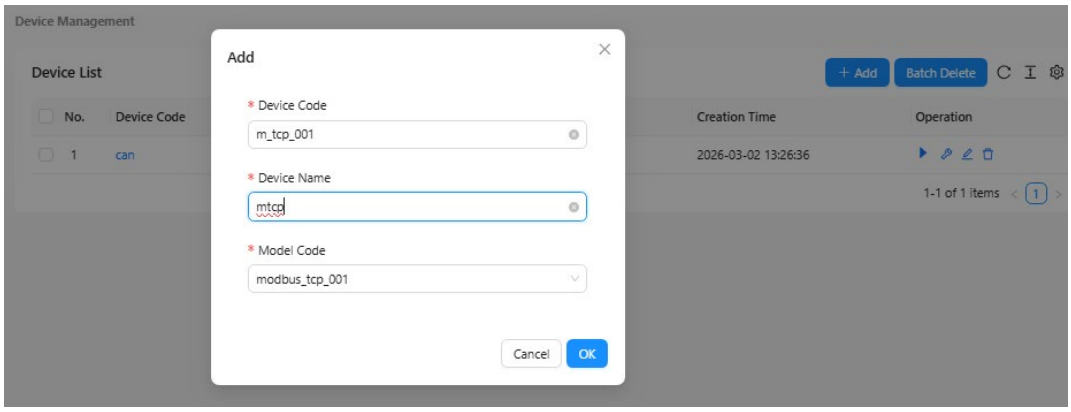
Coil: Coil 0; Input coil 1

Address: 0 ~ 65535

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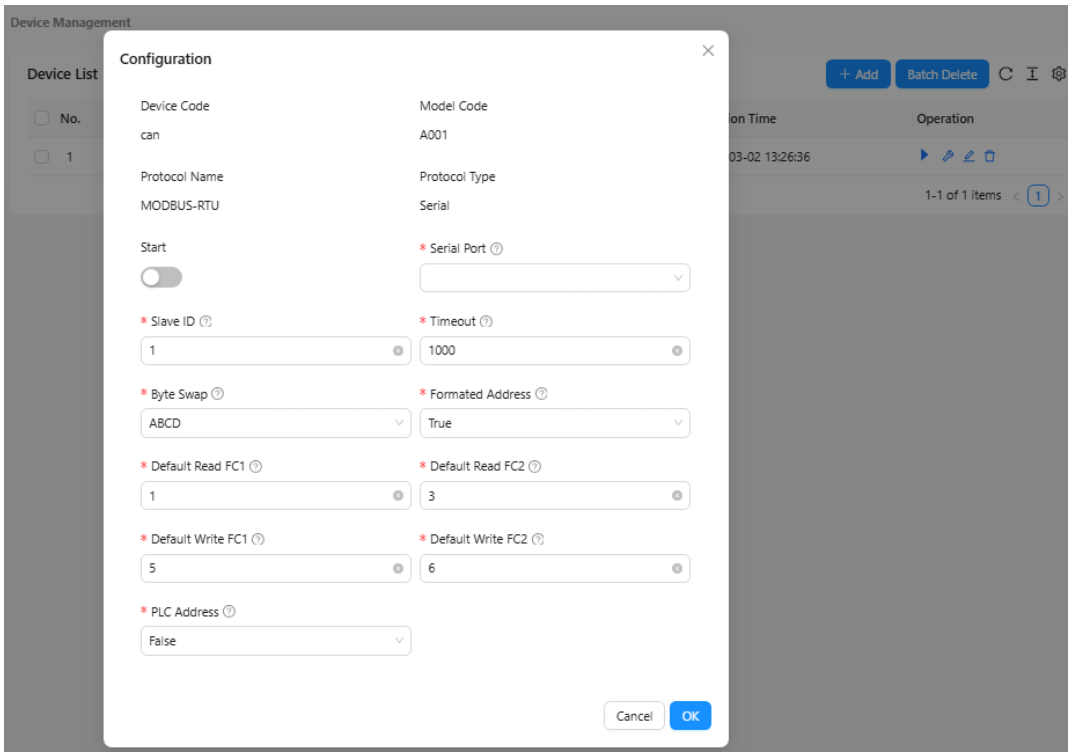
Step 3 Add device

On the Device Management page, click "Add" to create Modbus TCP Device. Customize the Device Code and Device Name, then select a pre-configured Model Code.



Step 4 Configure Device Parameter

After adding the device, click the 'Configure' button in the Operation column to set up the newly created device.



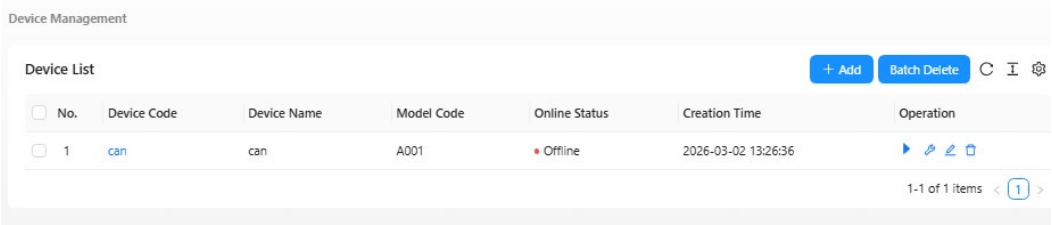
- IP: IP Address

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- Port: port number.
- Slave ID：Modbus Slave ID。

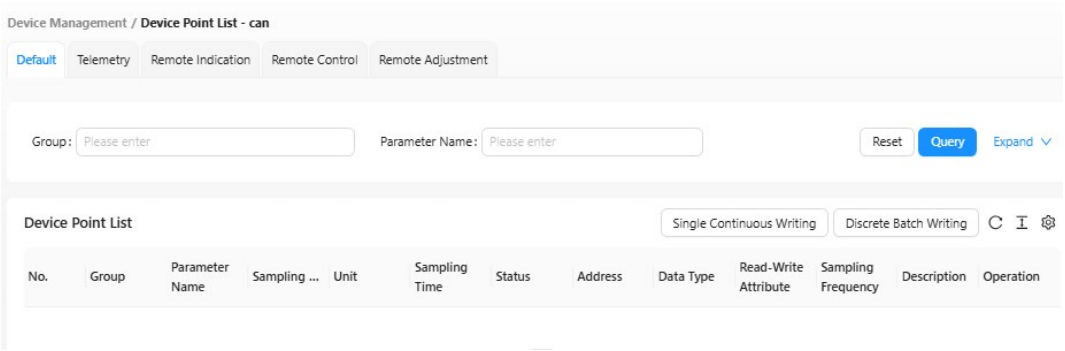
Step 5 Device status

After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.



Step 6 Device Point Table

In the Device Management interface, click the device code to access its Point Table, where you can view detailed status of all data points.



18.2 Electricity Meter Protocol

18.2.1 IEC60870-5-101 Protocol

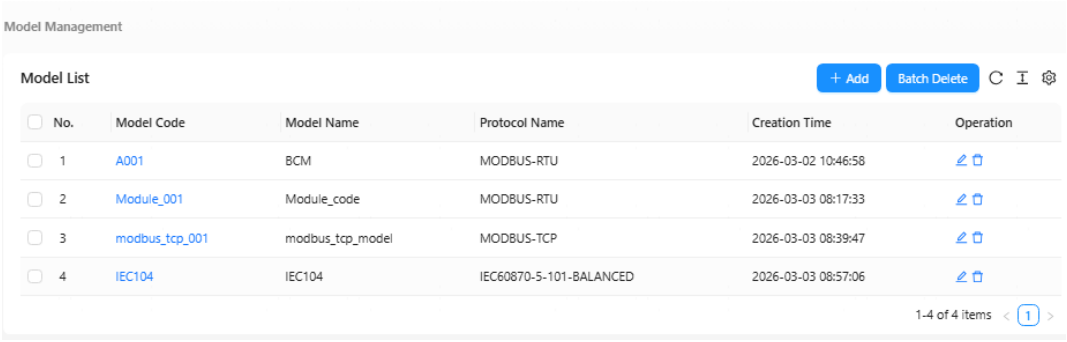
IEC 60870-5-101 is a widely used communication protocol in power automation systems. It transmits data via serial ports, supporting both balanced and unbalanced transmission modes, though currently only balanced transmission is implemented.

Operation Steps

Step 1 Add model.

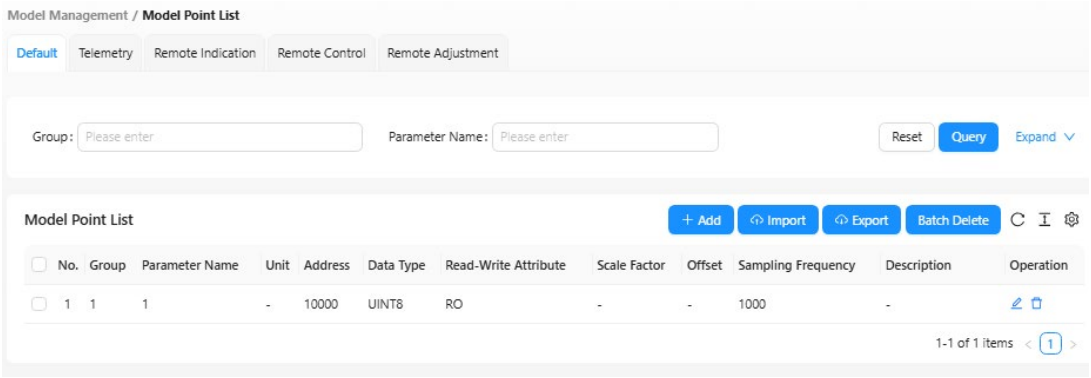
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In the model management interface, click "Add" to create a new device model. Enter the model code and model name, and select IEC60870-5-101 as the protocol name.



Step 2 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.



The format of each point address is "Type Identification + Information Object Address (IOA)". The following type identifications are supported:

- M_SP_NA_1
- M_SP_TA_1
- M_DP_NA_1
- M_DP_TA_1
- M_ME_NC_1
- M_ME_TF_1
- M_ME_NA_1
- M_IT_NA_1
- M_ME_TD_1
- M_ME_ND_1
- M_ME_NB_1
- M_ME_TE_1

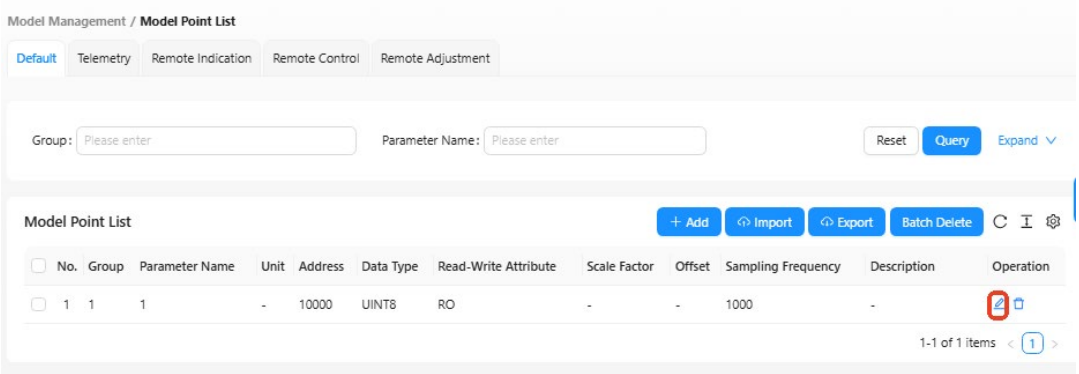
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- C_SC_NA_1
- C_SC_TA_1
- C_DC_NA_1
- C_DC_TA_1
- C_SE_NC_1
- C_SE_TC_1
- C_SE_NA_1
- C_SE_TA_1
- C_SE_NB_1
- C_SE_TB_1

In the IEC60870-5-101 protocol, an IOA (Information Object Address) belongs to only one type, and the IOAs for readable points (such as telemetry) differ from those for control points (such as remote commands). For example, if the IOA of a telemetry point is 100, the corresponding remote command point will not have the same IOA (100) but will instead be mapped to a different IOA.

Step 3 Add device

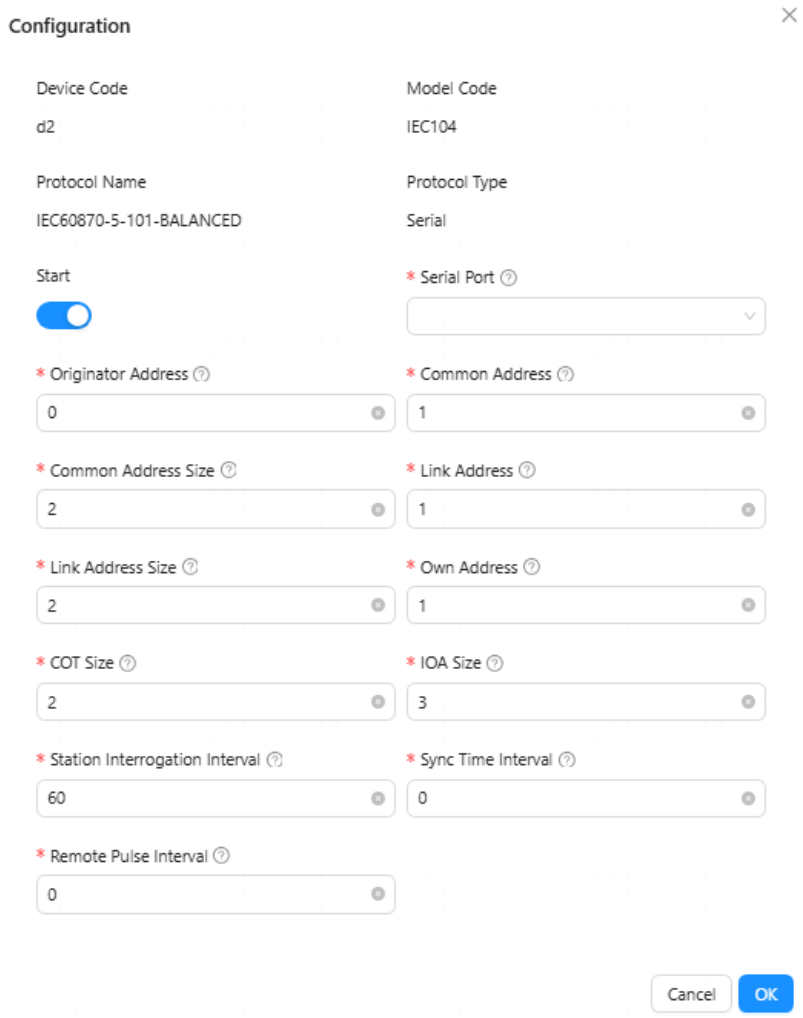
In the management interface, click "Add" to create a new model. Enter the device code and device name, then select the IEC60870-5-101 related model code.



Step 4 Configure Device Parameter

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

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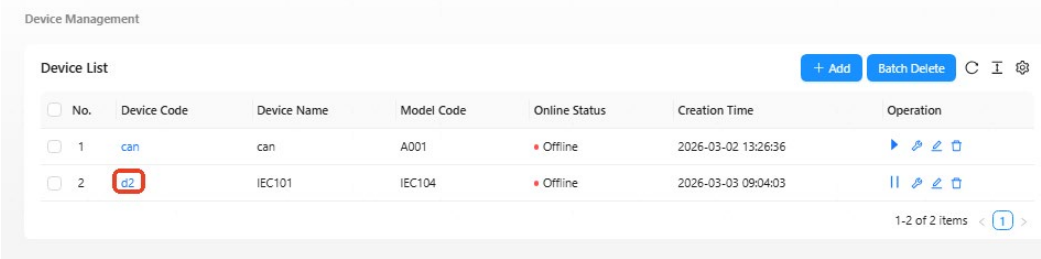
Parameters	Description
Serial Port	Port of serial port
Common Address	Public address that uniquely identifies the data object
Common Address Size	Size of public address
Link Address	Link layer address of slave station
Link Address Size	The size of the link layer address of the slave station
Own Address	Own link layer address
Originator Address	Original Address
COT Size	Size of transmission reason
IOA Size	Size of information object address
Station Interrogation Interval	Interval between sending total call commands
Sync Time Interval	Interval for sending clock synchronization instructions

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Remote Pulse Interval	Interval between sending counting call commands

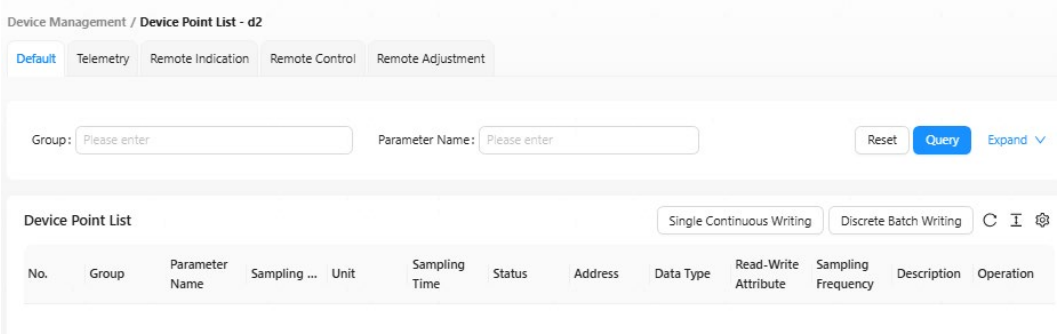
Step 5 Device status

After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.



Step 6 Device Point Table

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



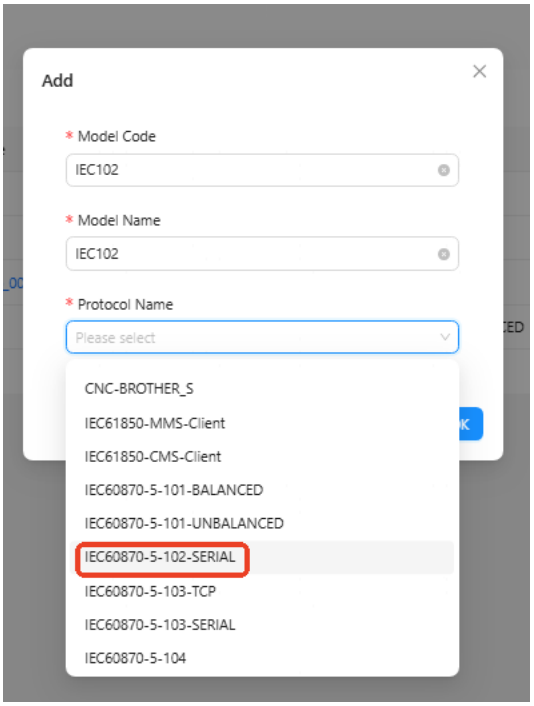
18.2.2 IEC61850-5-102 Protocol

Operation Steps

Step 1 Add model

In the model management interface, click New to create a new model, enter the model code and model name, and select the agreement name IEC60870-5-102-SERIAL

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Step 1 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.

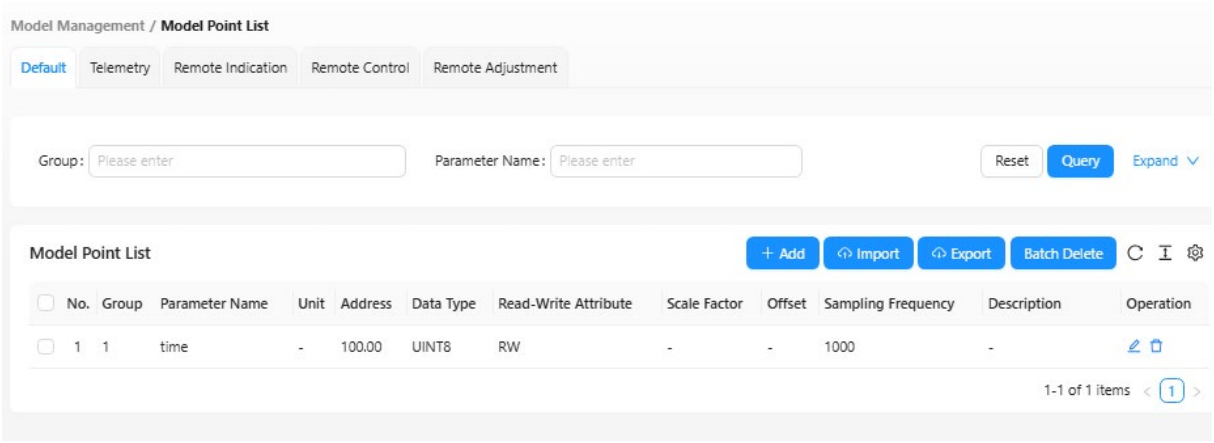
The address format is divided into single point information, power information, terminal equipment system time and specified write:

Single point information address format: type_id (single point information is 102 or 101).SPA (decimal, range: 1-256).SPQ (decimal, range: 1-128), for example: 102.2.1, which means reading single point information with information body address of 2 and single point information qualifier of 1 within the selected time range;

The address format of electric energy information: type_id.info_id (decimal: 1-256), for example: 104.5, indicating the earliest electric energy when the address of information body is 5;

The system time address format of the terminal equipment: type_id.0, for example: 103.0, that is, type_id = 103, which means reading the current system time of the terminal equipment;

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Instruction writing address format: There are only four writing instructions in IEC102: time synchronization instruction, link inquiry instruction, link reset instruction and level 1 data inquiry instruction. The address format is type_id/fun_id.0, for example, 128.0, that is, type_id = 128, which means sending time synchronization instructions; 9.0, that is, fun_id = 9, which means sending a link query instruction; 0.0, that is, fun_id = 0, which means sending a link reset command; 10.0, that is, fun_id = 10, means to send an instruction to ask for level 1 data. Note: IEC102 has no instruction to write data. The above-mentioned write commands are all sending instruction messages, and it is not necessary to specify how much data to send.

Step 2 Add Device In the device management interface, click New to create a new model, enter the device code and device name, and selectIEC60870-5-102Relevant model code.

Step 3 Configure Device Parameter

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

serial port: Serial port number

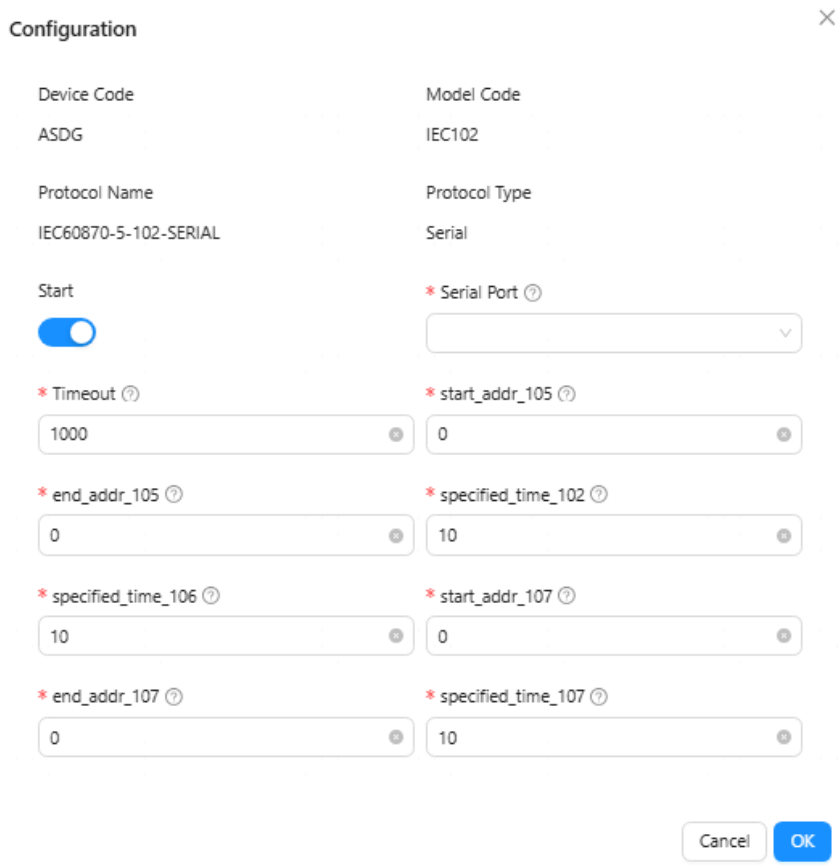
Timeout:Read-write timeout, unitms

start_addr: Read the start address of the power accumulation at the specified address

end_addr: Read the end address of the power accumulation amount of the specified address

Specified_time: a time period for reading the single point information of the pointing time period (Specificed_time =10, refers to the time before the current time10All single-point messages within minutes)

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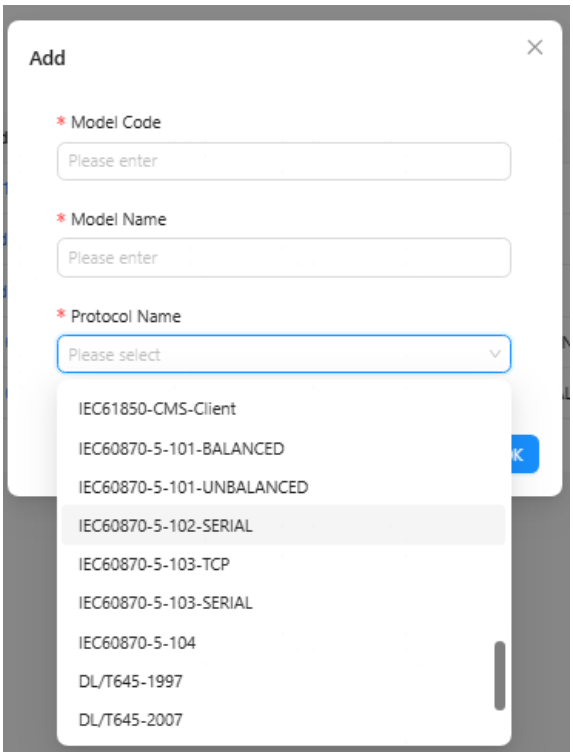
18.2.3 IEC61850-5-103 Protocol

Operation Steps

Step 1 Add model

In the model management interface, click New to create a new model, enter the model code and model name, and select IEC60870-5-103-TCP/UDP/SERIAL as the protocol name

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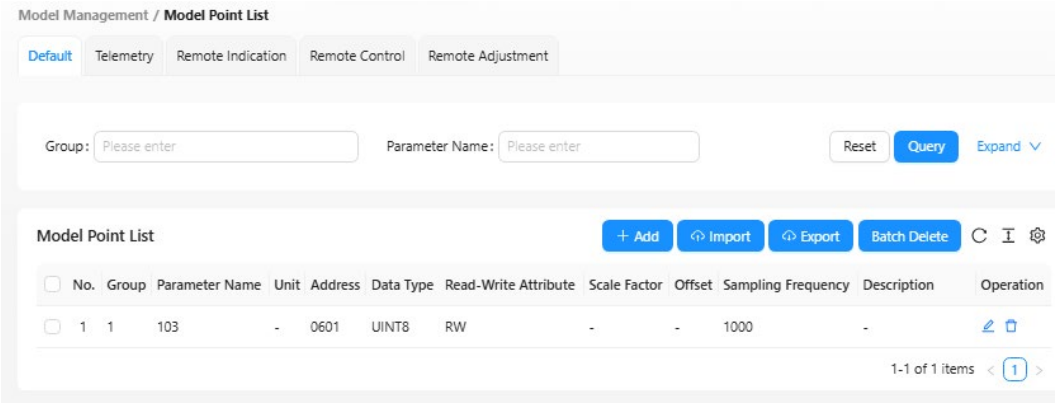


Step 2 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.

Address format: fun (hexadecimal, range: 0x01-0xFF) + inf (hexadecimal, range: 0x01-0xff)

Example: 0101,06ab



Step 3 To add a device in the device management interface, click "New" to create a new device model. Enter the device code and device name, then select the IEC60870-5-103 related model code.

Step 4 Configure Device Parameter

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After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

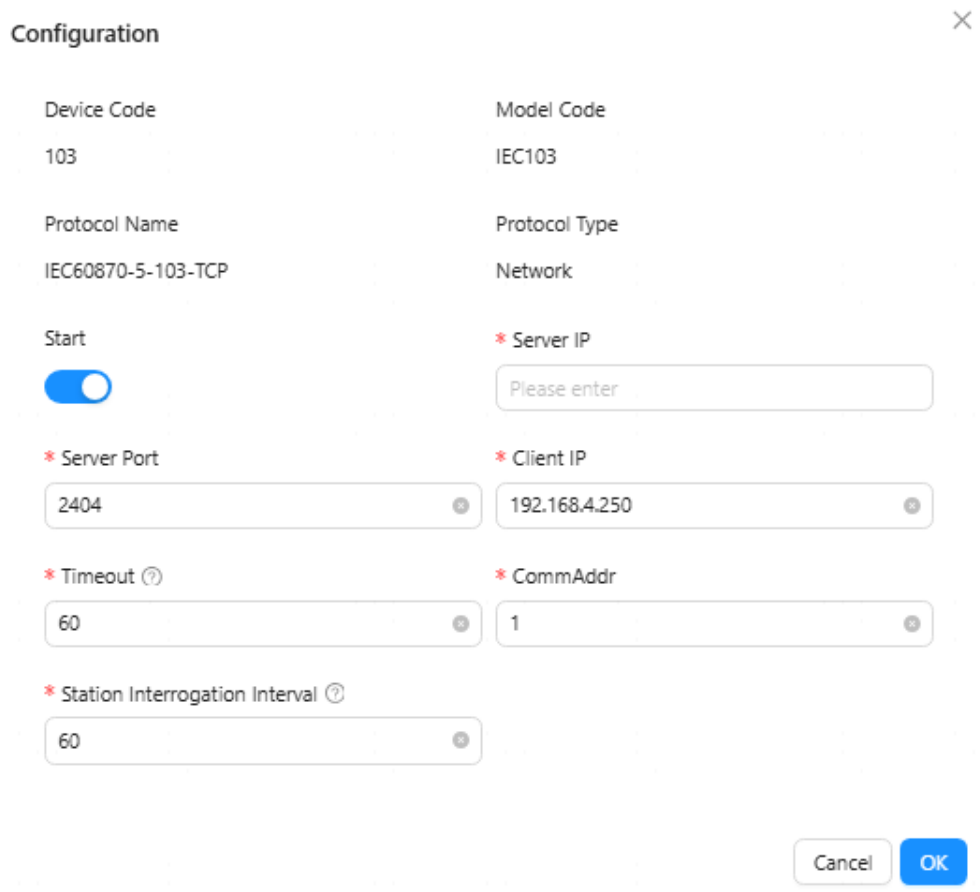
tcp and udp modes:

Server IP: Server address

Server Port: Server Port number

Client IP: Local IP address

Station Interrogation Interval: Total Interrogation Interval, unit s

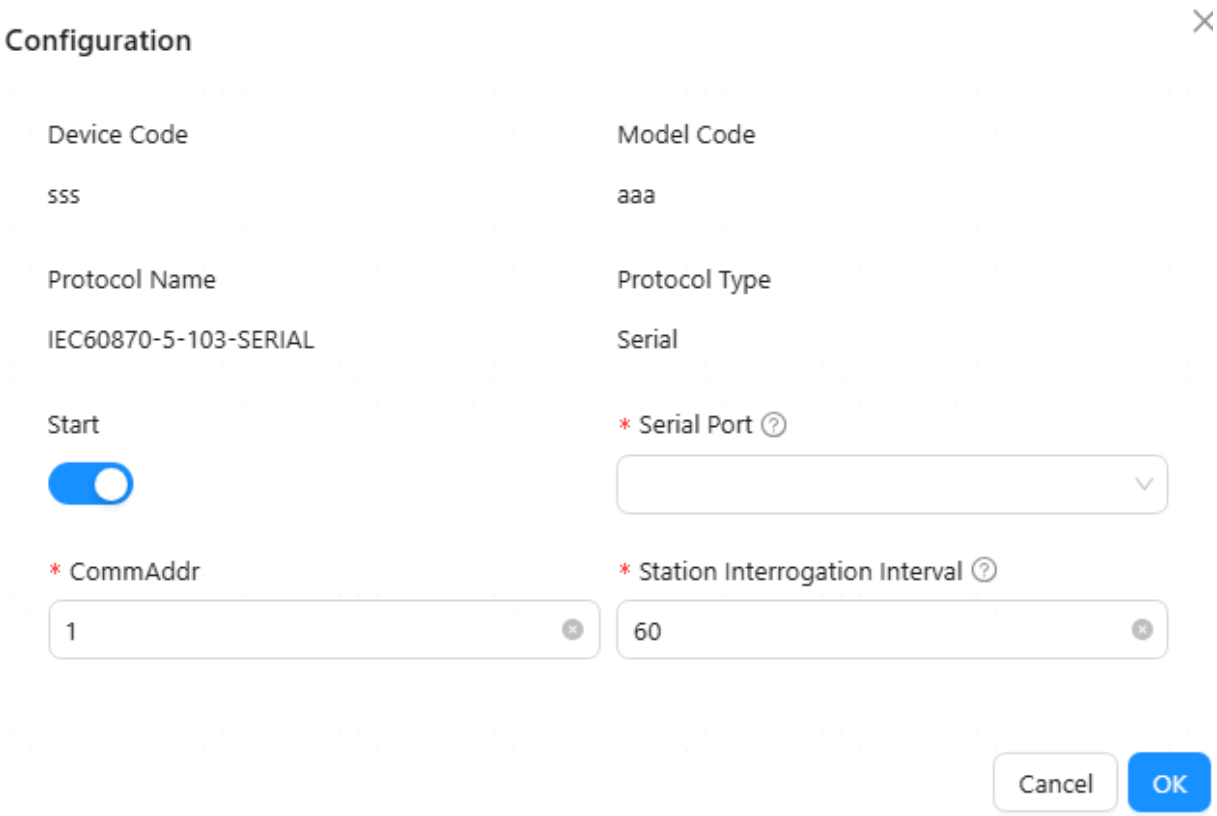


Serial Port Mode:

serial port: Serial port number

Station Interrogation Interval: Total Interrogation Interval, unit s

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18.2.4 IEC60870-5-104 Protocol

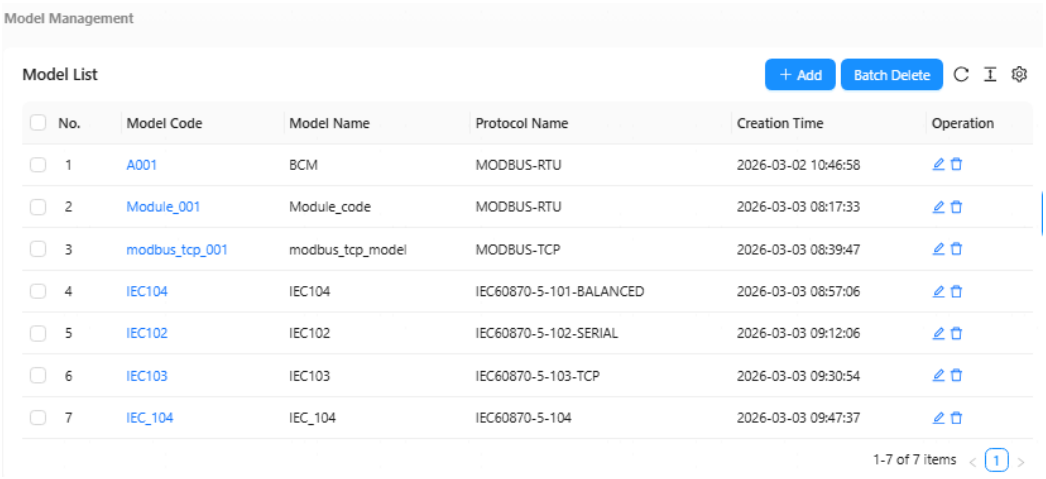
IEC 60870-5-104 is a widely used communication protocol in power automation systems. It employs TCP/IP as its underlying transport protocol for monitoring and controlling various devices in power systems, such as substations, generators, circuit breakers, and other grid equipment.

Operation Steps

Step 1 Add model

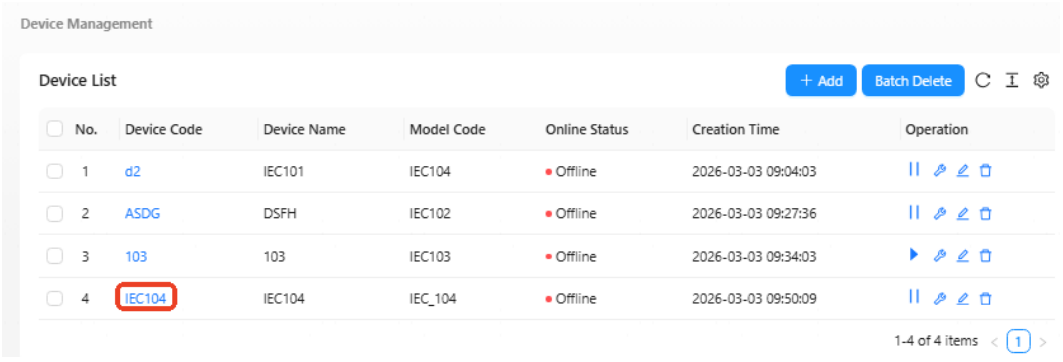
In the model management interface, click "Add" to create a new device model. Enter the model code and model name, and select "IEC60870-5-104" as the protocol name.

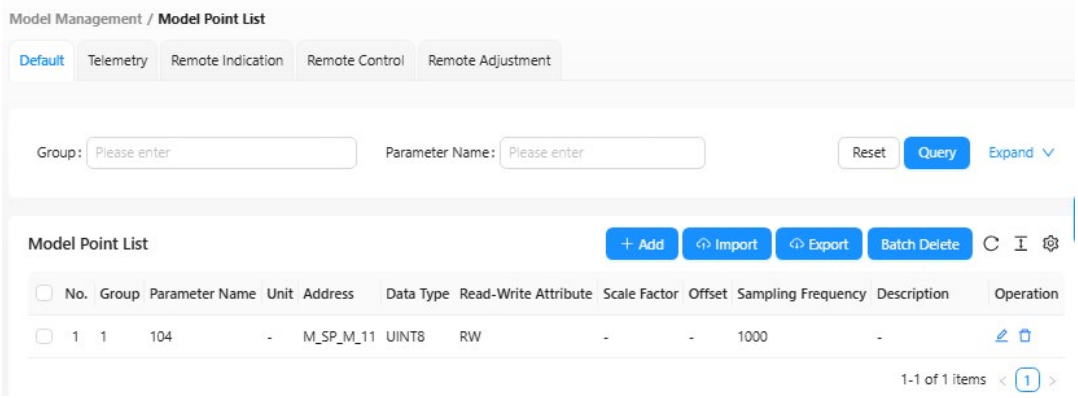
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Step 2 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.





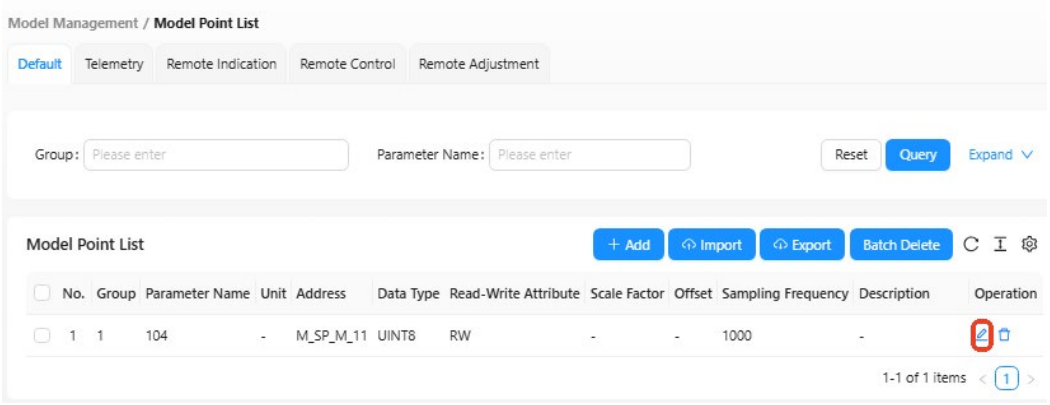
Note:

For the format of each point address, please refer to the IEC 60870-5-101 protocol.

Step 3 To add a device in the device management interface, click "New" to create a new device

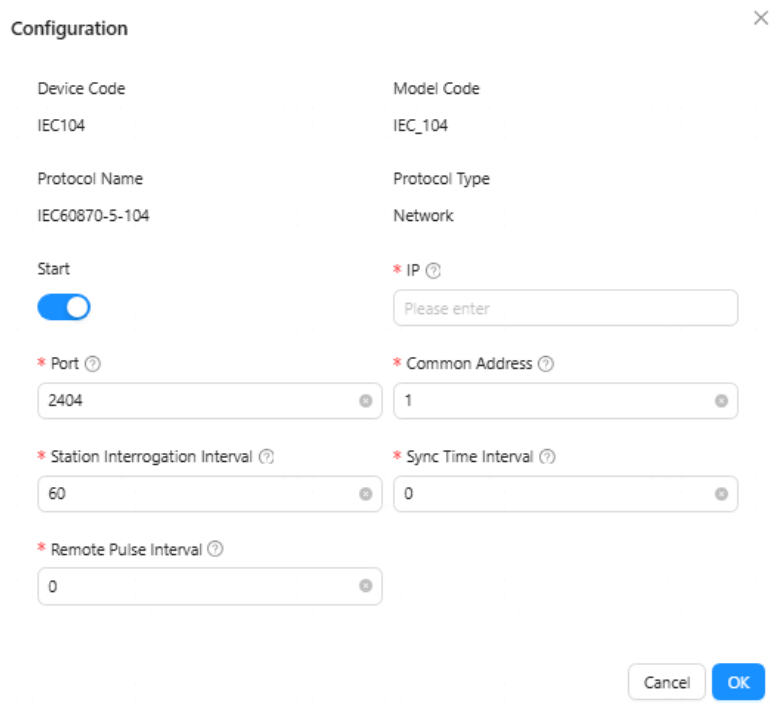
Copyright © 3onedata Co., Ltd.

model. Enter the device code and device name, then select the IEC60870-5-104 related model code.



Step 4 Configure Device Parameter

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.



- IP: The IPv4 address of the slave station
- Port: The port number of the slave station
- Common Address: A unique identifier for data objects.
- Station Interrogation Interval: The time interval between sending general interrogation commands
- Sync Time Interval: The time interval between sending clock synchronization

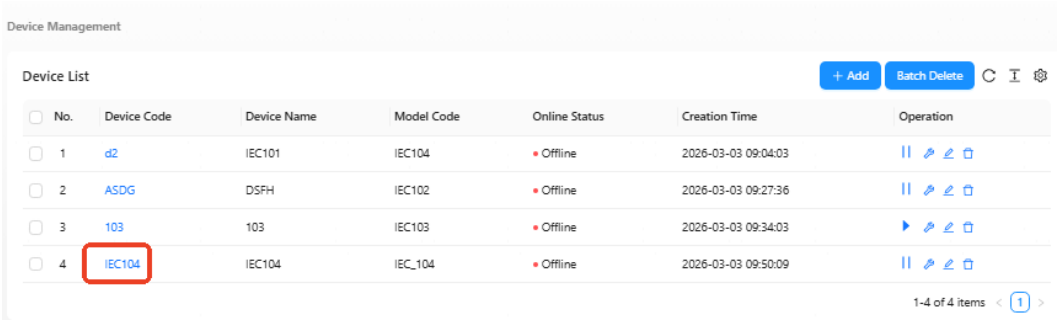
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commands

- Remote Pulse Interval: The time interval between sending counter interrogation commands

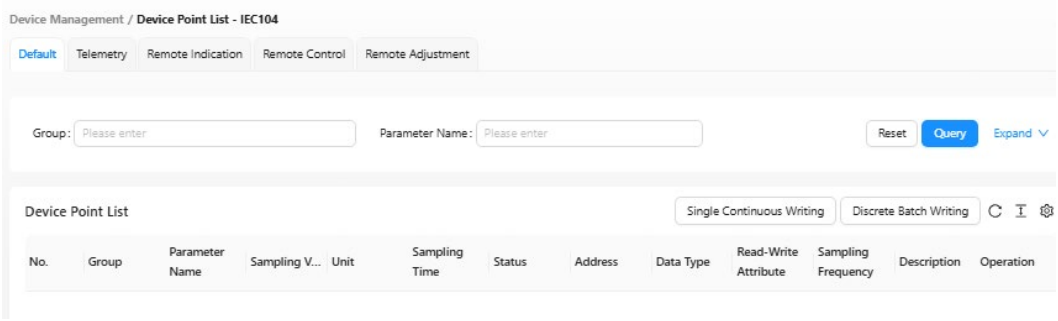
Step 5 Device status

After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.



Step 6 Device Point Table

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



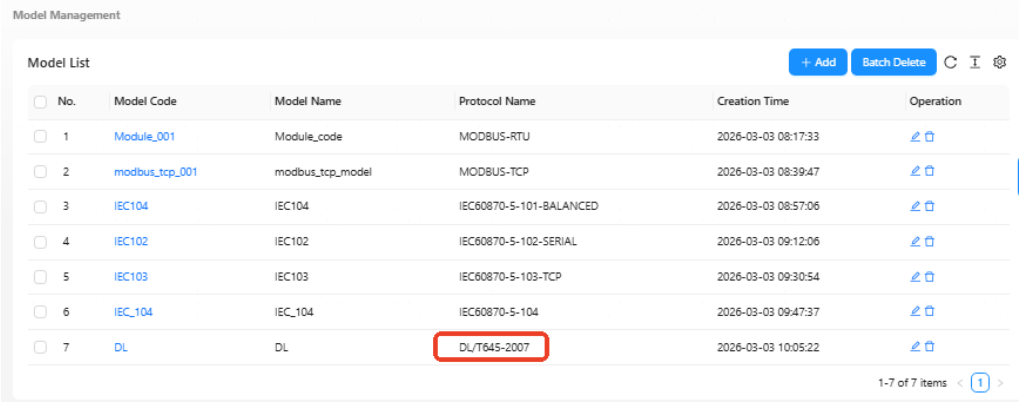
18.2.5 DL/T645-2007 Protocol

Operation Steps

Step 1 Add model.

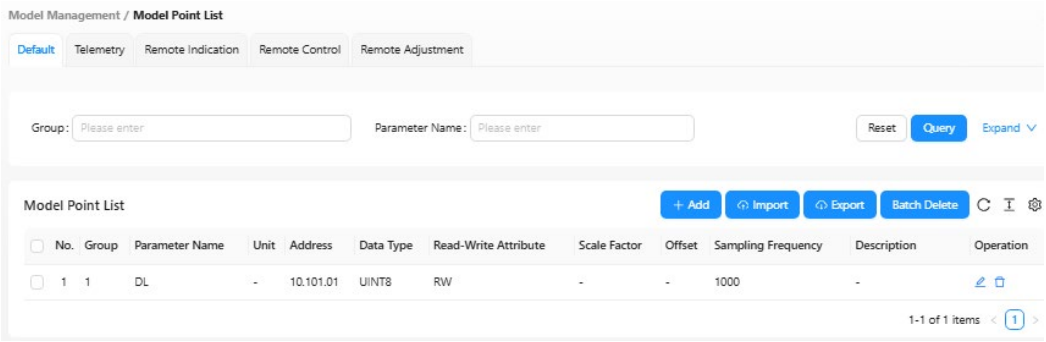
In the model management interface, click "Add" to create a new device model. Enter the model code and model name, and select "DL/T645-2007" as the protocol name.

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Step 2 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.



The format of each point address is "DI3_DI2_DI1_DI0". DI3, DI2, DI1, and DI0 are data identifiers for the DL/T645-2007 protocol. The scaling factor can be set according to the data format corresponding to the data item name in the protocol, or it can be freely configured.

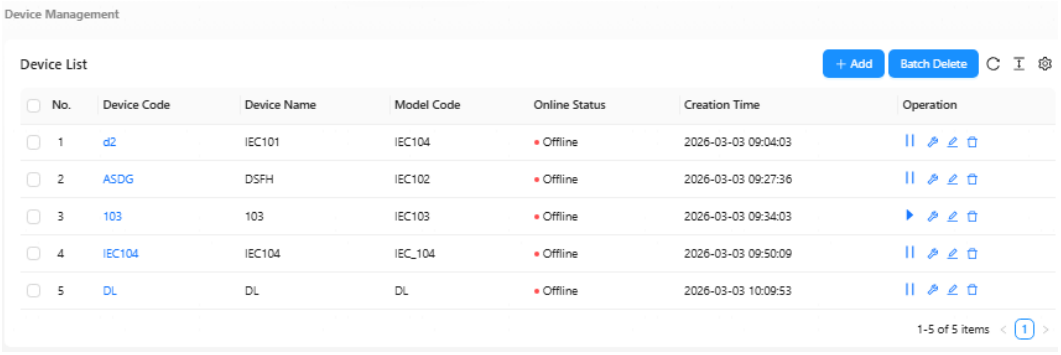
For example, the data for Phase A voltage in the standard is as follows: Set the address to "02_01_01_00" based on the data identifier, with the data format as "XXX.X". Therefore, the scaling factor is set to 0.1. This data item is read-only and cannot be written.

Data scale				Data format	Data length (bytes)	Unit	Function		Data Matters
							Read	Write	
DI_3	DI_2	DI_1	DI_0	xxx.x	2	V	*		A-phase voltage
02	01	01	00						

Step 3 Add device

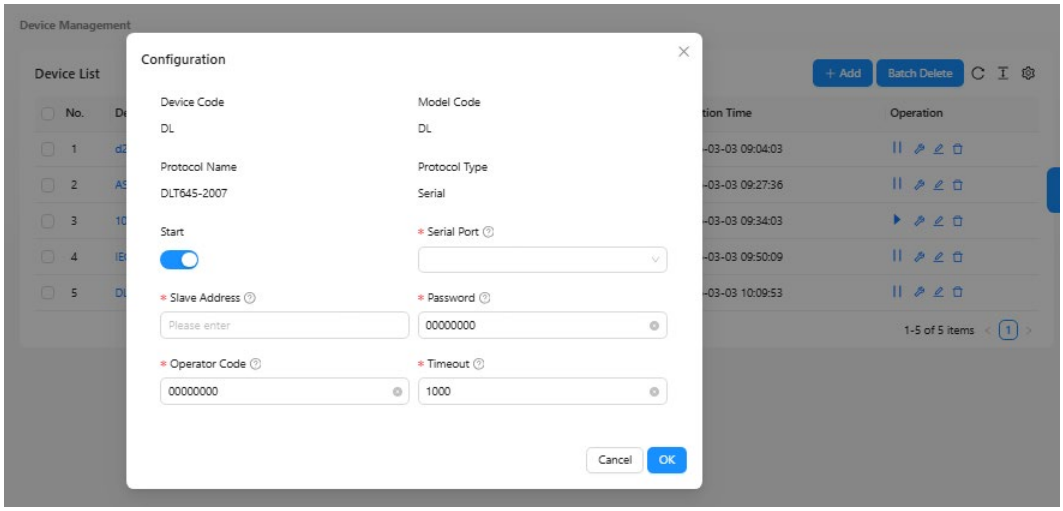
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In the management interface, click "Add" to create a new model. Enter the device code and device name, then select the DL/ T645-2007 related model code.



Step 4 Configure Device Parameter

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

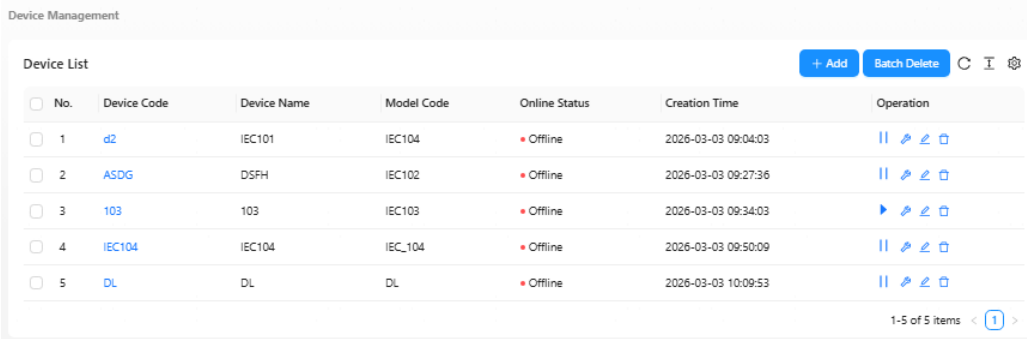


- Serial Port: The port of the serial interface.
- Slave Address: The meter's unique identification number.
- Password: Password permission and password, namely PAP2P1P0, where PA is the user's permission and P2P1P0 is the password.
- Operator Code: User identification code, formatted as C3C2C1C0.
- Timeout: Timeout period.

Step 5 Device status

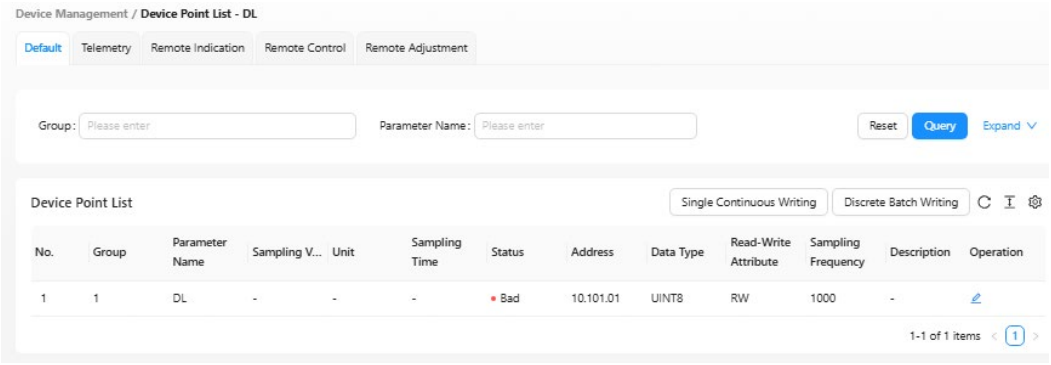
After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.

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Step 6 Device Point Table

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



18.2.6 DL/T645-1997 Protocol

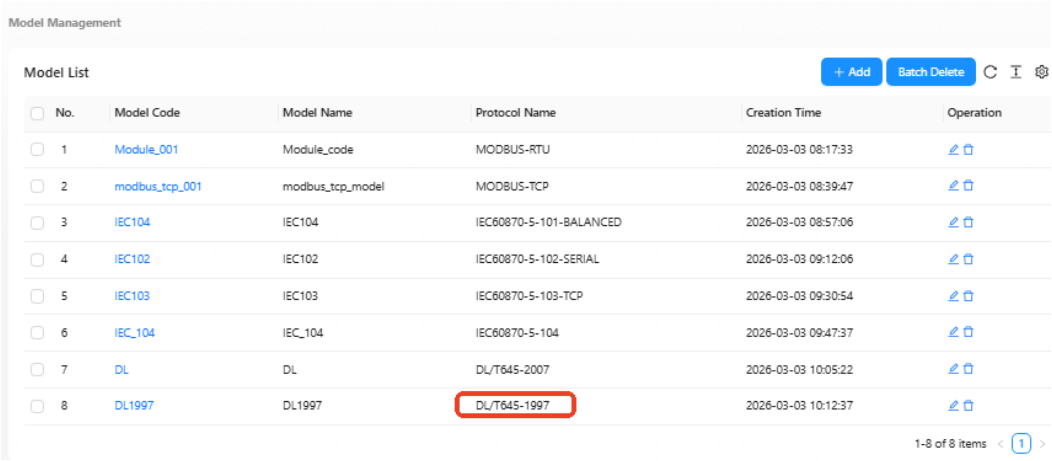
DL/T645 Protocol is a communication standard for data exchange between multi-function electricity meters and data acquisition devices. It defines the meter's data format, communication methods, and command sets to enable reliable communication and data interaction.

Operation Steps

Step 1 Add model.

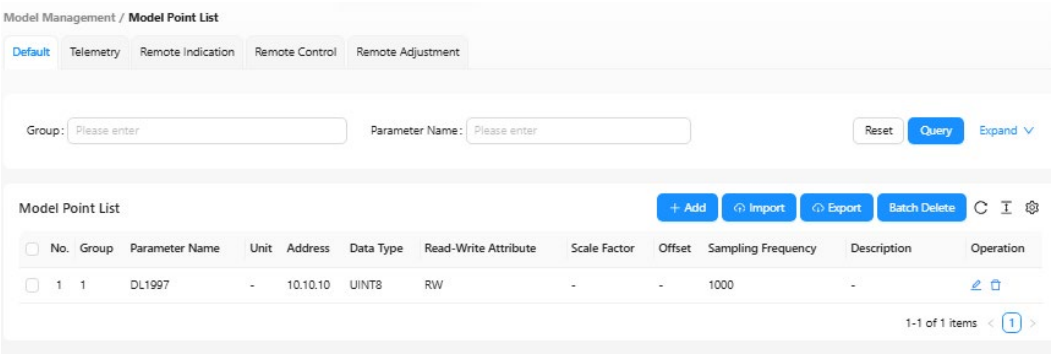
In the model management interface, click "New" to create a new device model. Enter the model code and model name, and select "DL/T645-1997" as the protocol name.

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Step 2 Configure Model Point Table.

After adding the model, click on the model code to enter the configuration interface for the model point table.



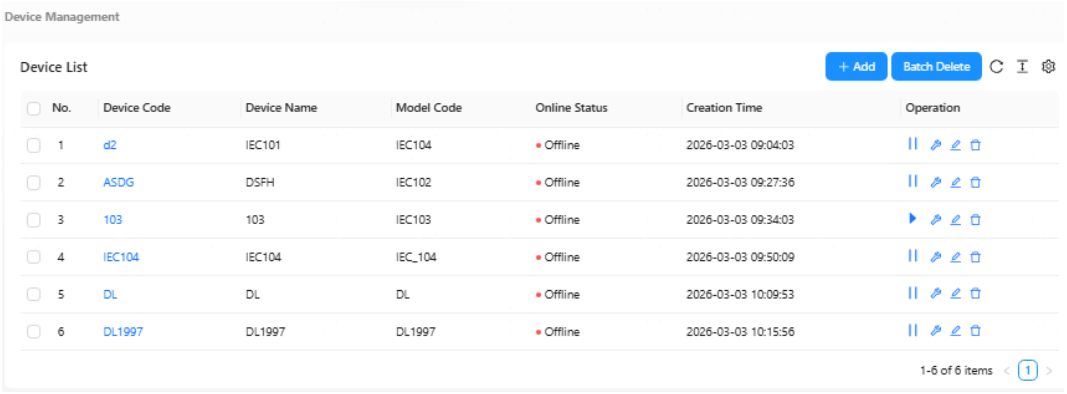
The format of each point address is "DI1_DI0". DI1 and DI0 are identification codes for DL/T645-1997 protocol. The scaling factor can be set according to the data format corresponding to the data item name in the protocol, or it can be freely configured.

Identification code				Data format	Data length (bytes)	Unit	Function		Data Matters
							Read	Write	
DI_1		DI_0		xxx	2	V	*		A-phase voltage
B	6	1	1						

Step 3 To add a device in the device management interface, click "New" to create a new device model. Enter the device code and device name, then select the DL/T645-1997 related

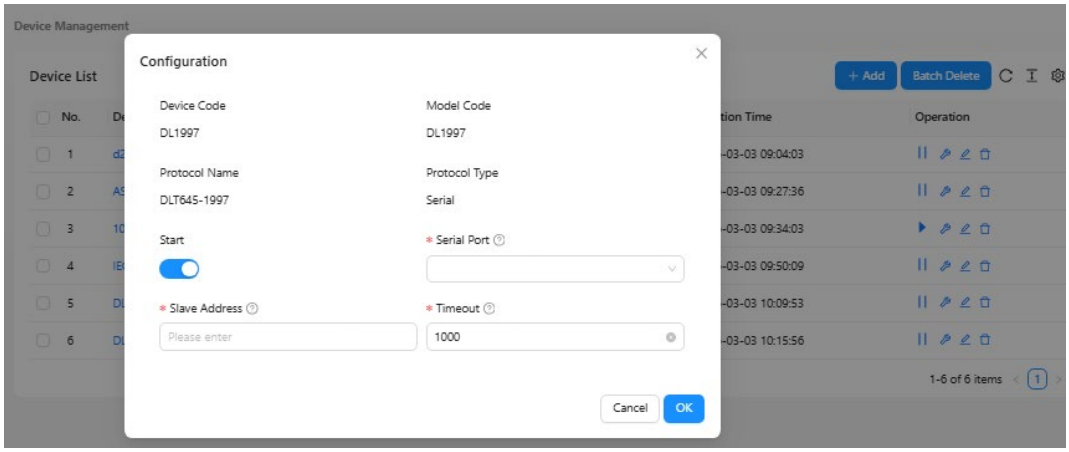
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model code.



Step 4 Configure device parameter.

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

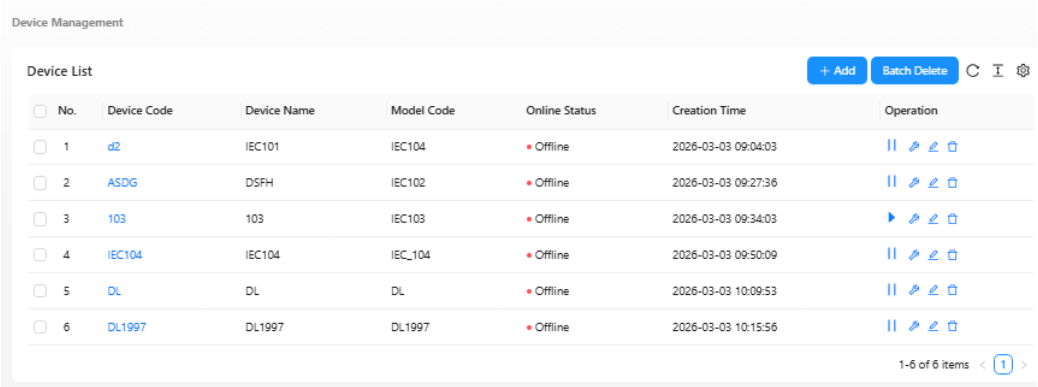


- Serial Port: The port of the serial interface.
- Slave Address: The meter's unique identification number.
- Timeout: Timeout period.

Step 5 Device status

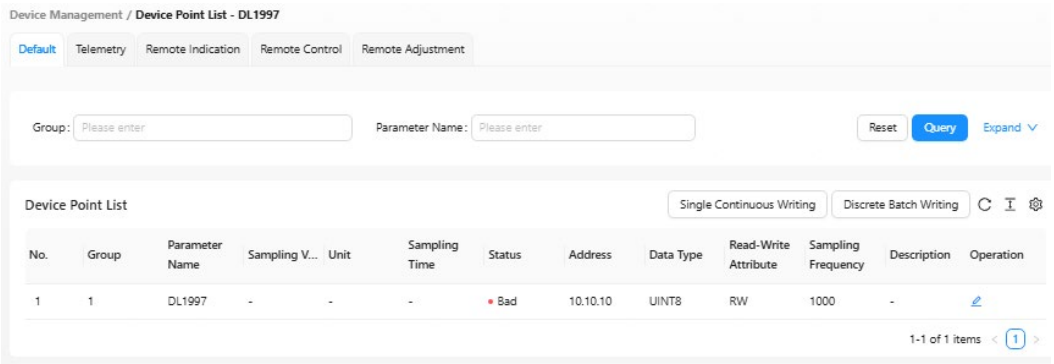
After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.

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Step 6 Device Point Table.

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



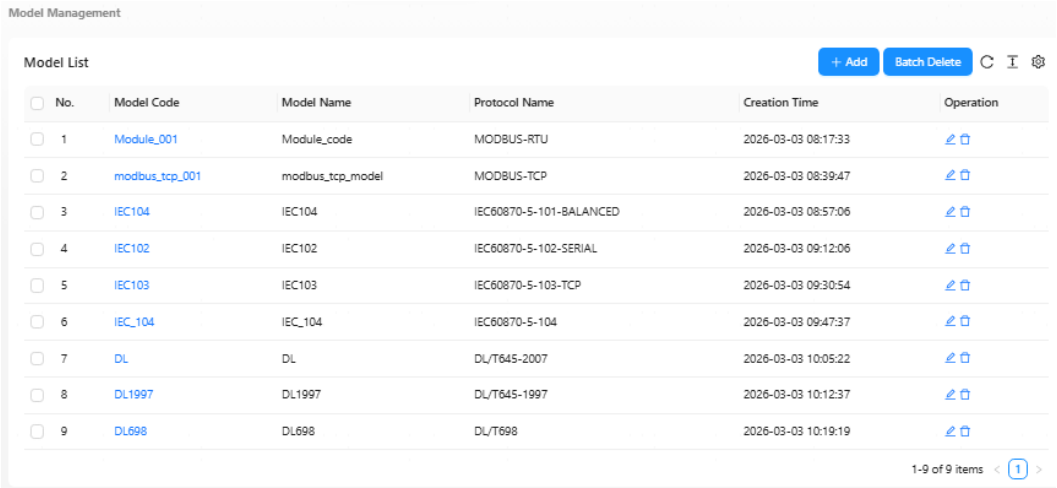
1.1.1 DLT/698 Protocol

Operation Steps

Step 1 Add model.

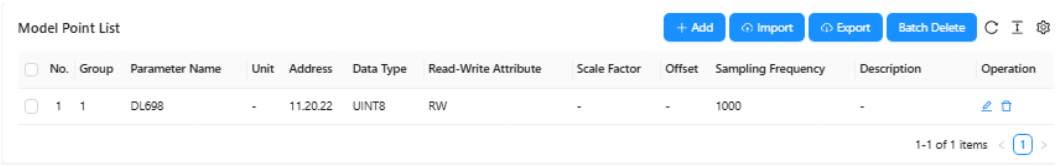
In the model management interface, click "New" to create a new device model. Enter the model code and model name, and select "DL/T698" as the protocol name.

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Step 2 Configure Model Point Table

After adding the model, click on the model code to enter the configuration interface for the model point table.



The format of each point address is "DI3_DI2_DI1_DI0". DI3, DI2, DI1, and DI0 are data identifiers for the DL/T698 protocol. The scaling factor can be set according to the data format corresponding to the data item name in the protocol, or it can be freely configured.

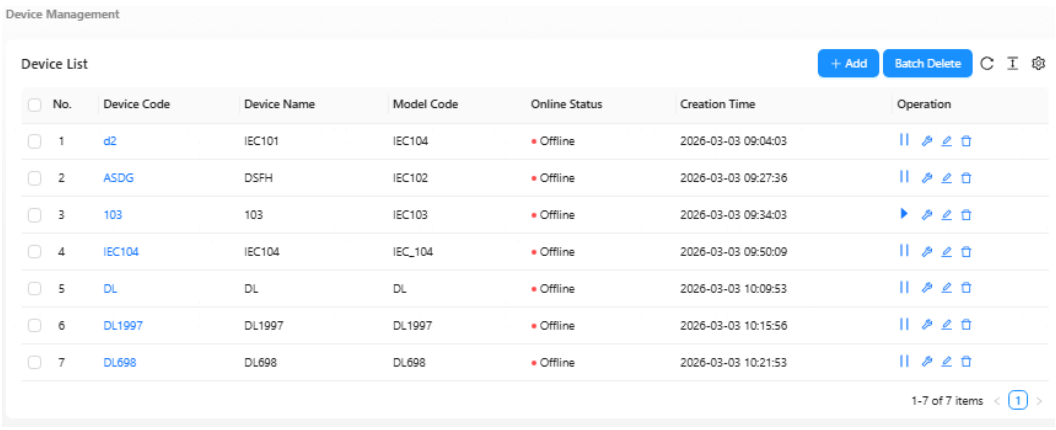
For example, the data for Phase A voltage in the standard is as follows: Set the address to "02_01_01_00" based on the data identifier, with the data format as "XXX.X". Therefore, the scaling factor is set to 0.1. This data item is read-only and cannot be written.

Data identification				Data format	Data length (bytes)	Unit	Function		Data Matters
							Read	Write	
DI_3	DI_2	DI_1	DI_0	xxx.x	2	V	*		A-phase voltage
02	00	02	01						

Step 3 Add device

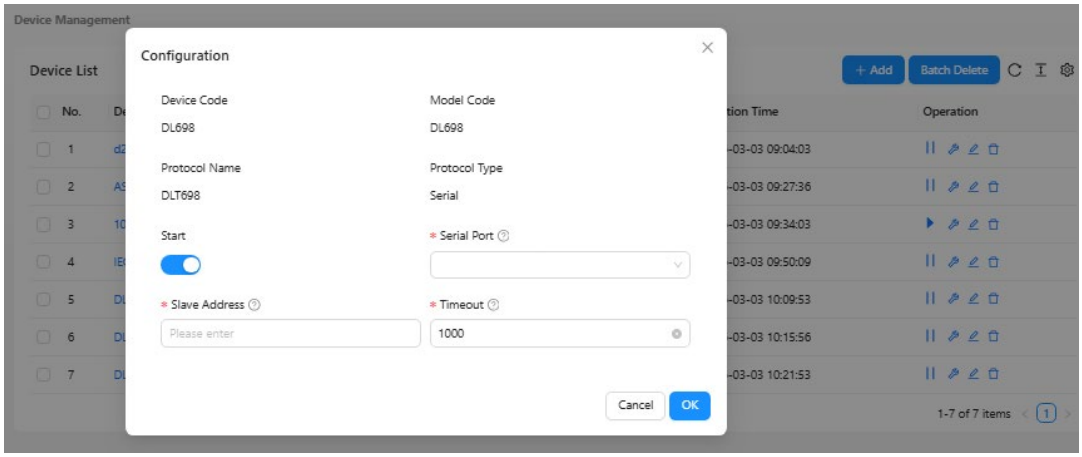
In the management interface, click "Add" to create a new model. Enter the device code and device name, then select the DL/ T698 related model code.

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Step 4 Configure Device Parameter

After adding the device, click the Configure button under the Operation column to enter the model configuration interface.

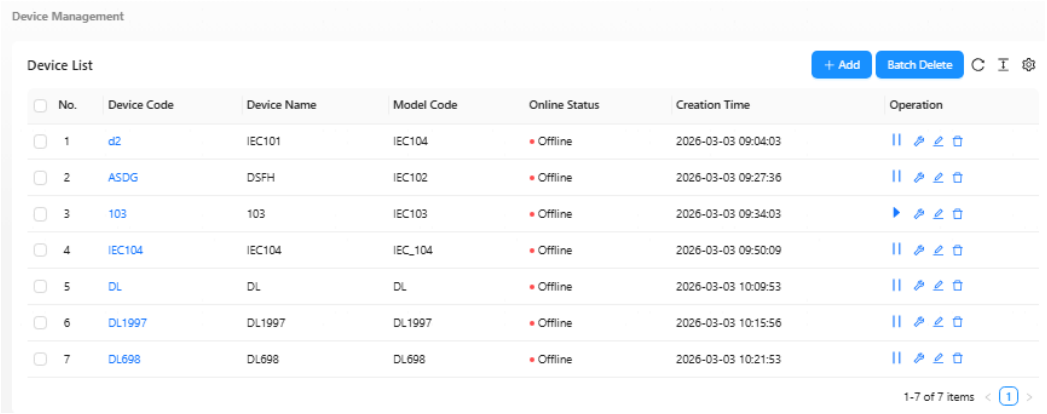


- Serial Port: The port of the serial interface.
- Slave Address: The meter's unique identification number.
- Timeout: Timeout period.

Step 5 Device status

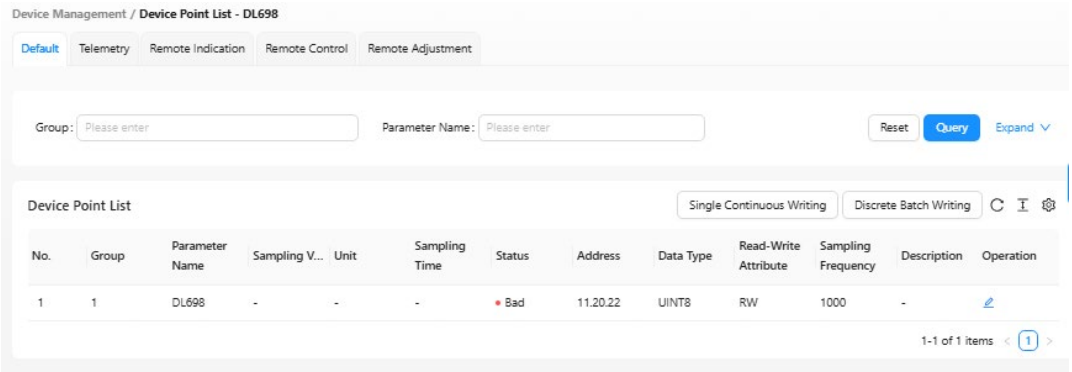
After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.

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Step 6 Device Point Table

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



1.1.2 CDT Protocol

The CDT protocol is used in remote monitoring and data acquisition (SCADA) systems to ensure efficient and accurate exchange of data information between substations, power plants, and dispatch centers.

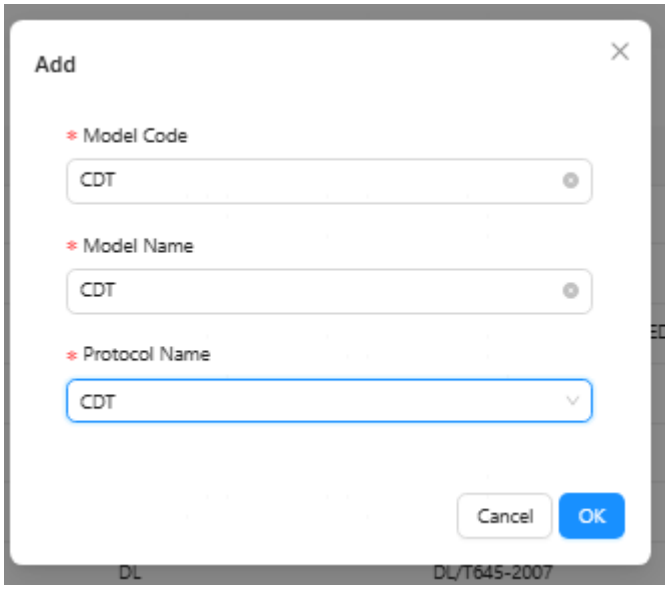
The point address identifier is composed of: word data: YCA_digital address, YCB_digital address, YCB_digital address, YX_digital address

Bit data: YX_Digital Address.Offset, YK_Operation Type_Dot Number, YT_Operation Type_Dot Number, YS_Dot Number

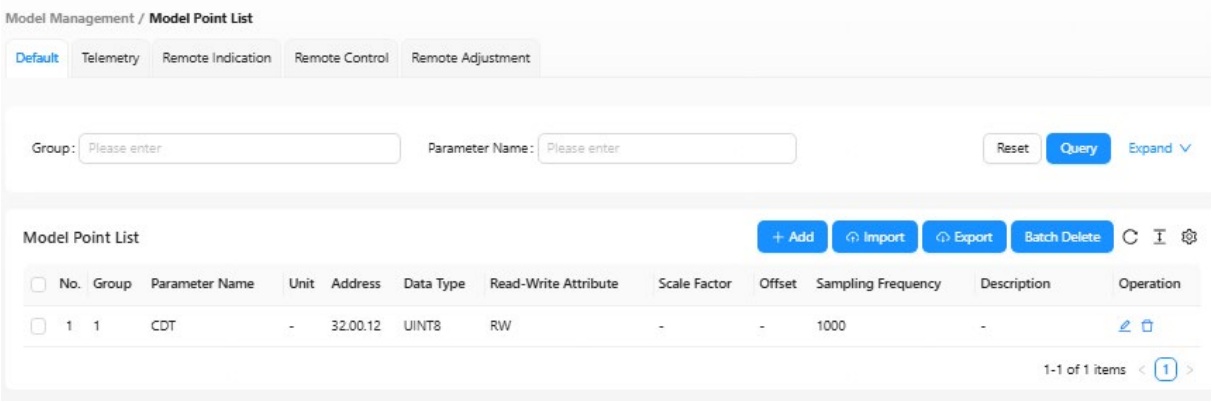
Operation Steps

Step 1 Add a model

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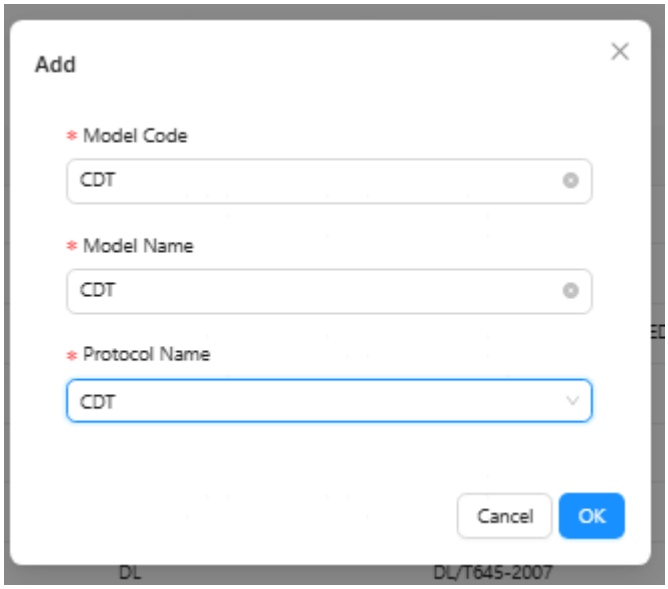


Step 2 Configuring Model Point Table

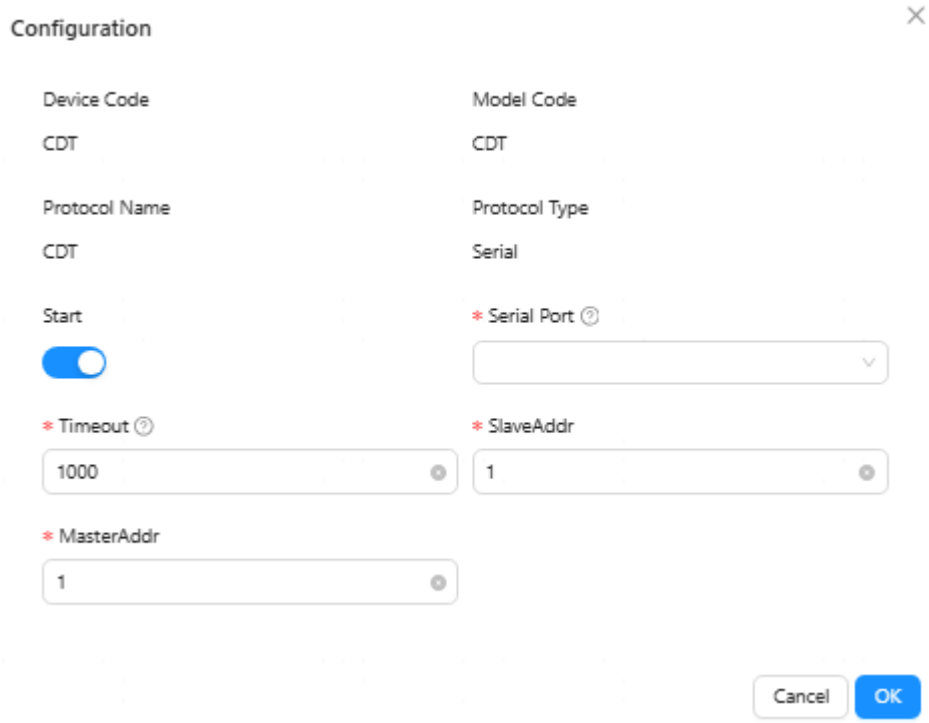


Step 3 Add Device In the device management interface, click New to create a new model, enter the device code and device name, and selectCDTRelevant model code.

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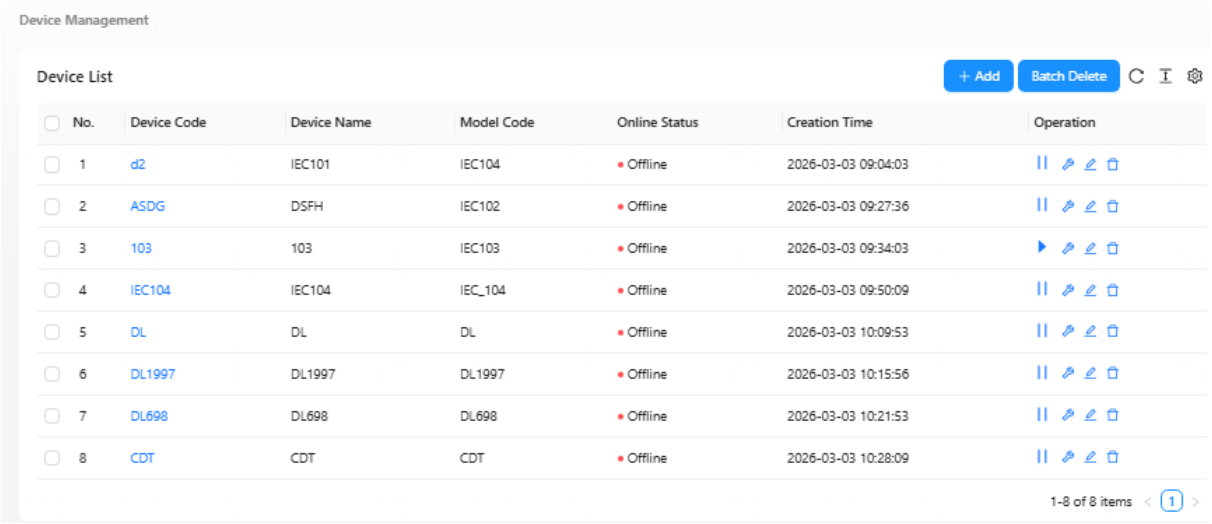
Step 4 Configure Device Parameters



- Serial Port: The port of the serial interface.
- Timeout: Timeout
- SlaveAddr: Terminal device address
- MasterAddr: Gateway device address

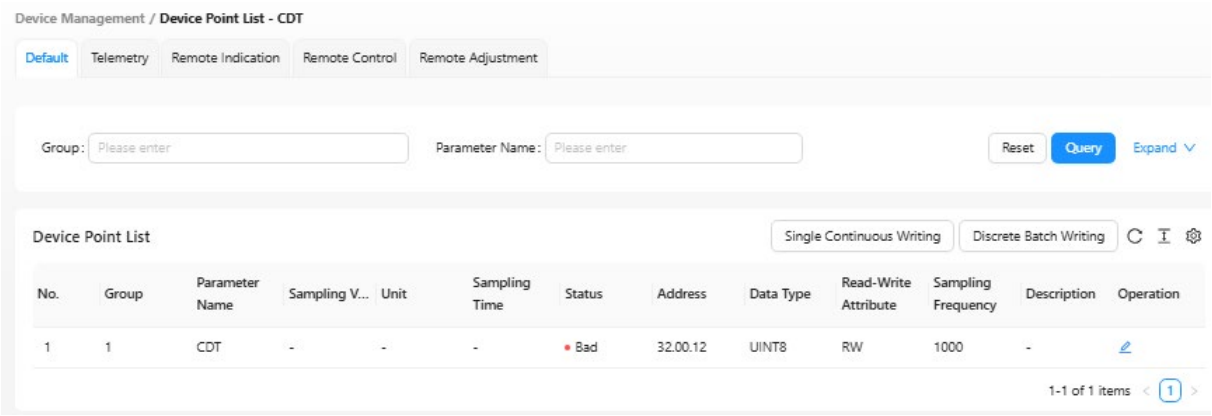
Step 5 Equipment status

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Step 6 Equipment point table

In the device management interface, click the relevant device code to view the detailed status of the device's data points.



18.3 Siemens PLC Protocol

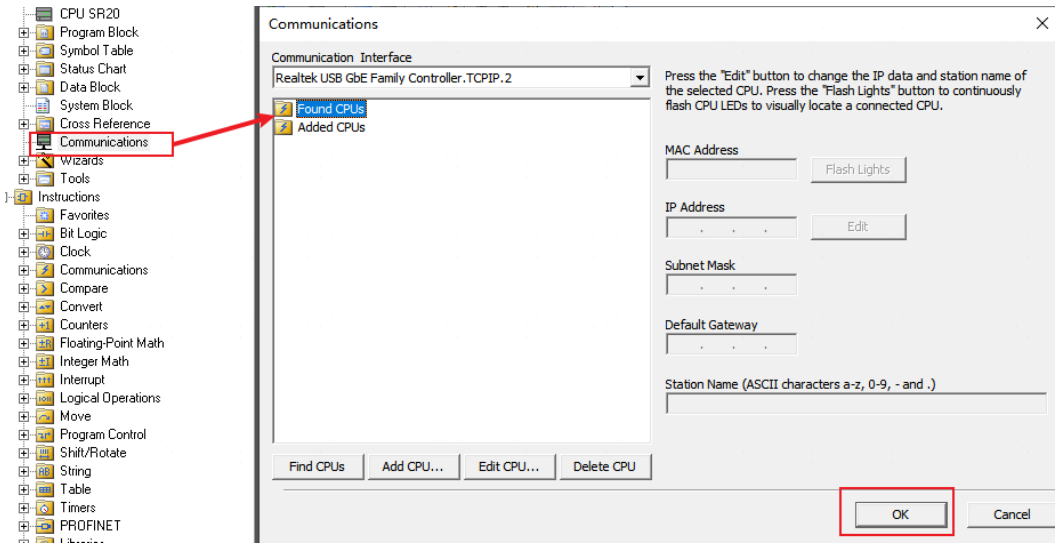
18.3.1 Siemens S7 200 Smart Protocol

Supported point position identifiers: bit registers support: I, Q, M, SM; word registers support: VB, VW, VD.

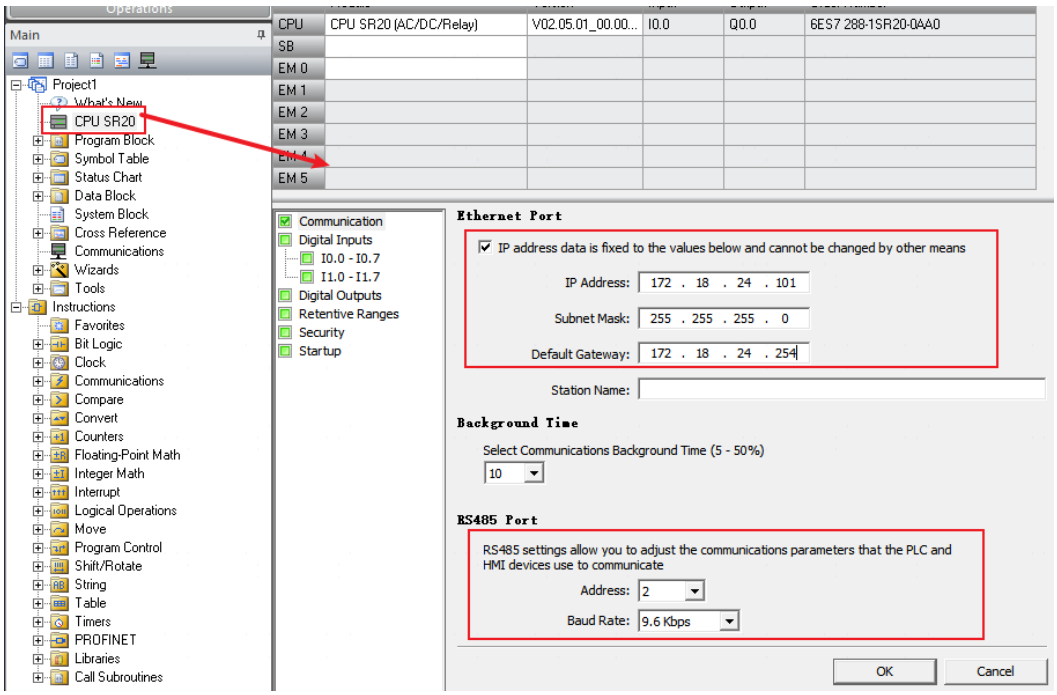
Operation Steps

Step 1 Connect the S7 200 Smart PLC to the network cable, and open the STEP 7-MicroWIN SMART software on the computer to configure communication.

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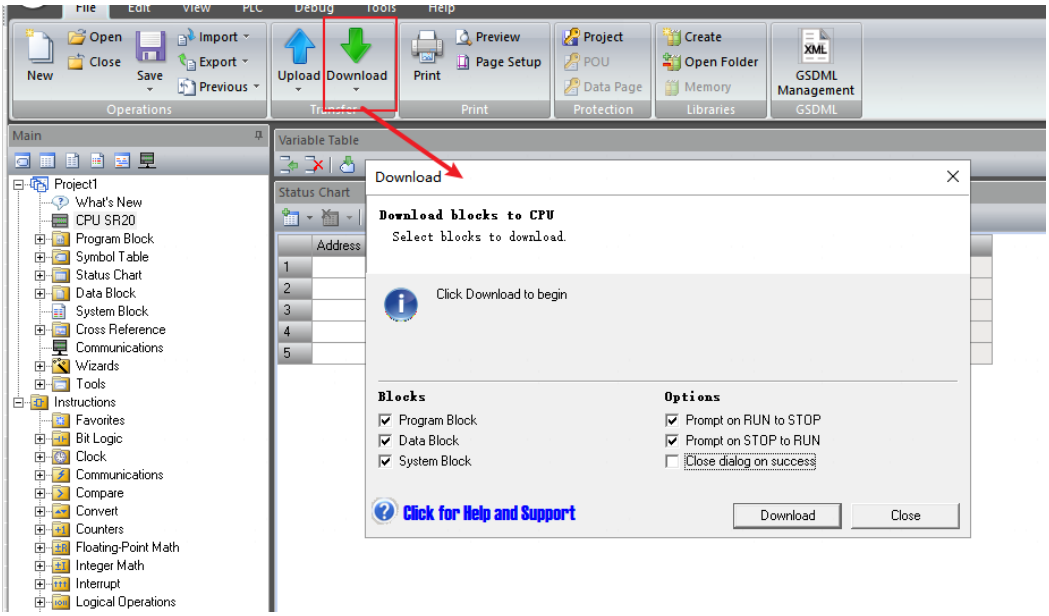


Step 2 Find the corresponding PLC device and configure the corresponding network information and serial communication information in the CPU module. Serial port supports baud rates of 9.6Kbps, 19.2Kbps, 187.5Kbps, with data bits as 8, parity as Even, and stop bits as 1.

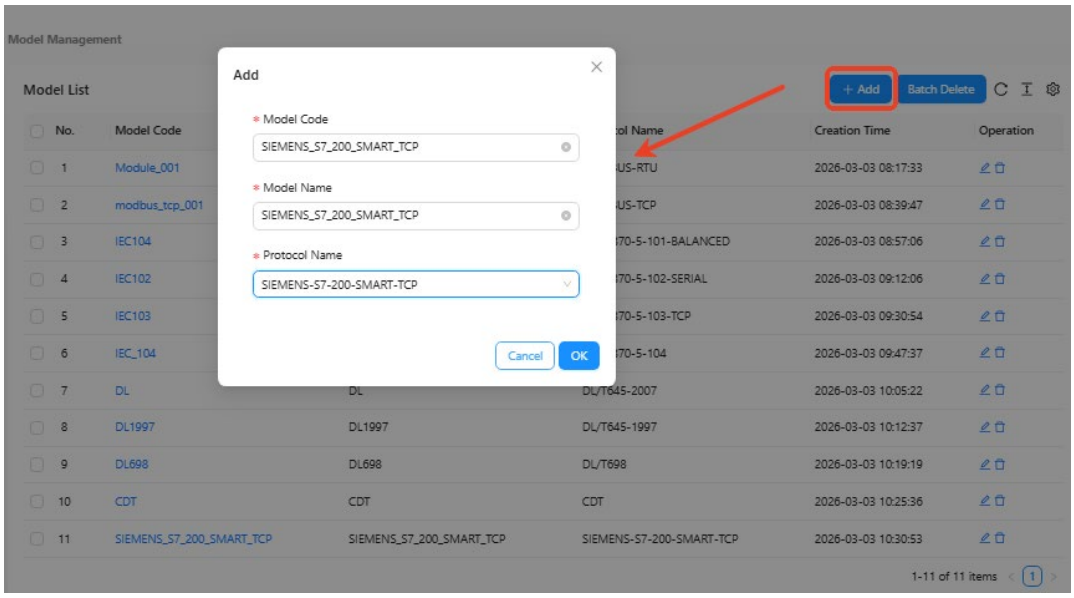


Step 3 After the configuration is completed, download the configuration to the PLC.

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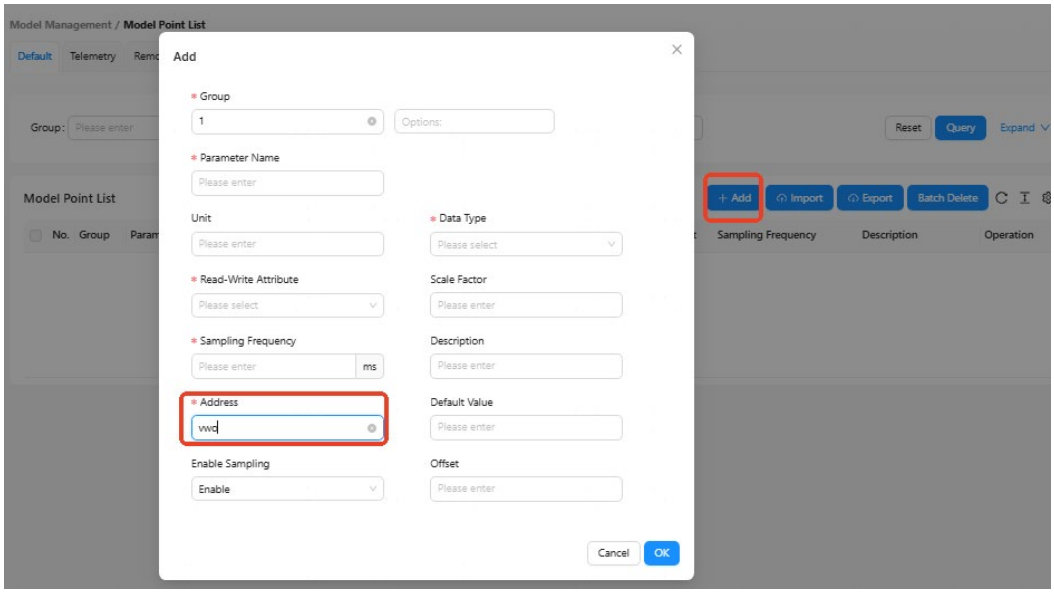


Step 4 Add New Device Model: Select Protocol as SIEMENS-S7-200-SMART-TCP

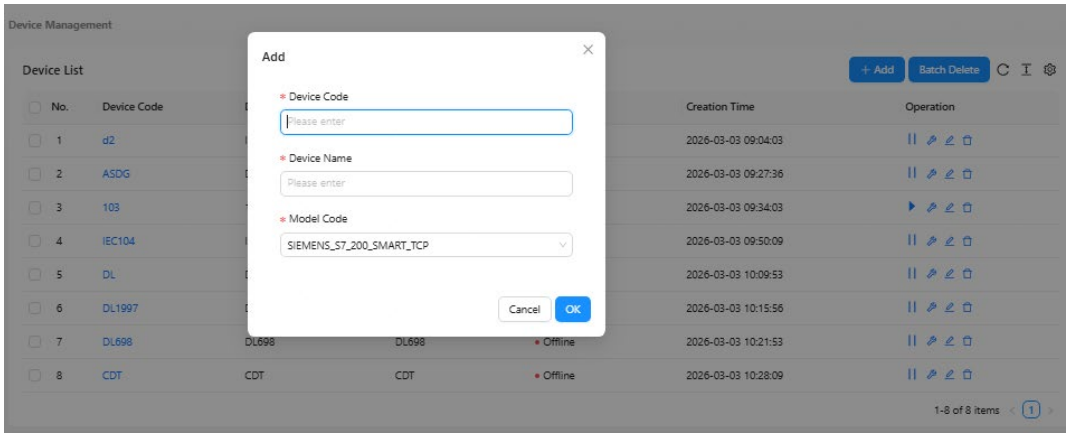


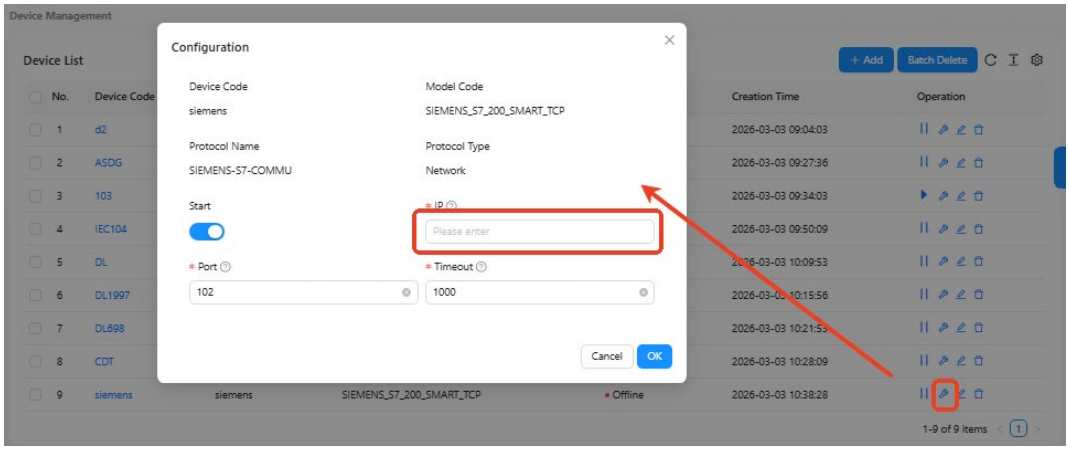
Step 5 Add Data Point: Address: Register Identifier + Offset Value

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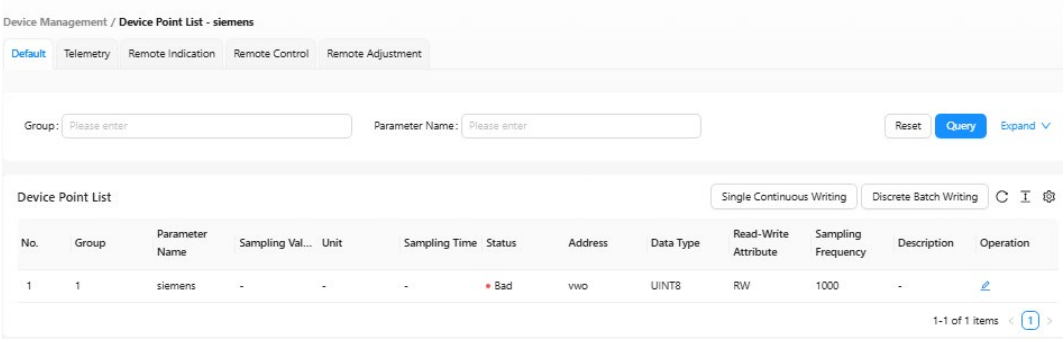
Step 6 Add a Siemens S7 200 Smart PLC device, and configure the IP address of the Siemens PLC.

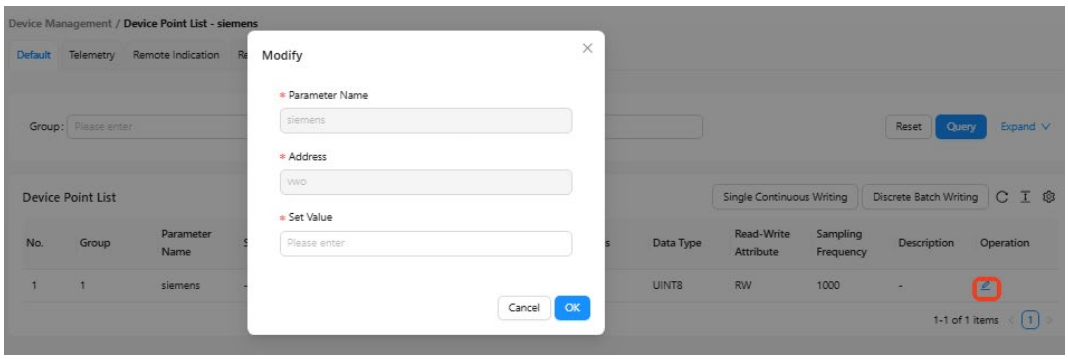


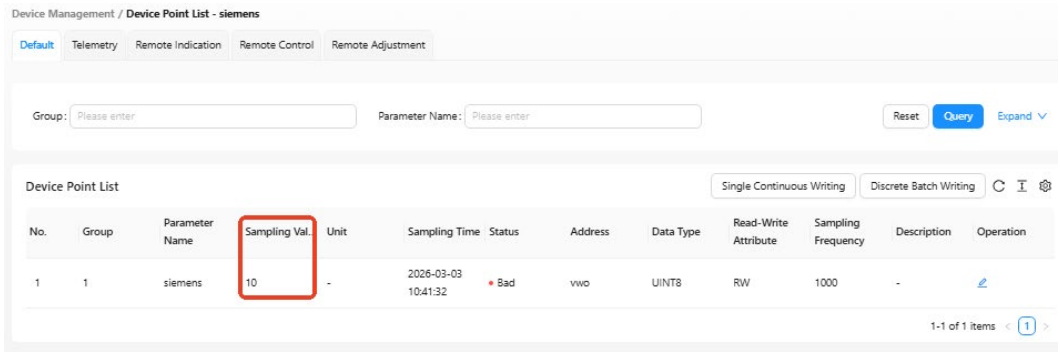


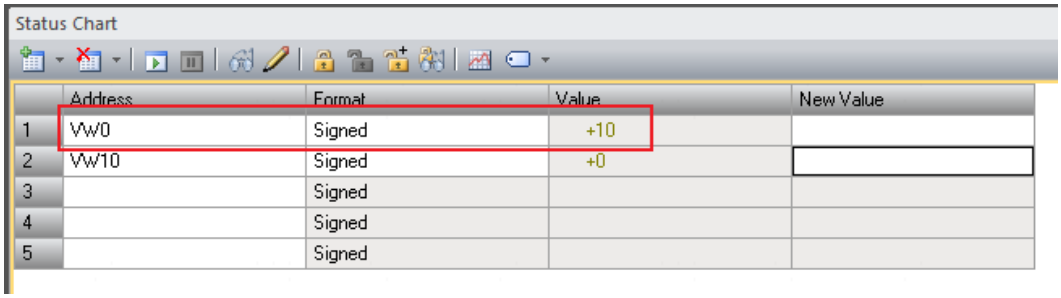
Step 7 Enter the device point table to view or modify the values of the points.

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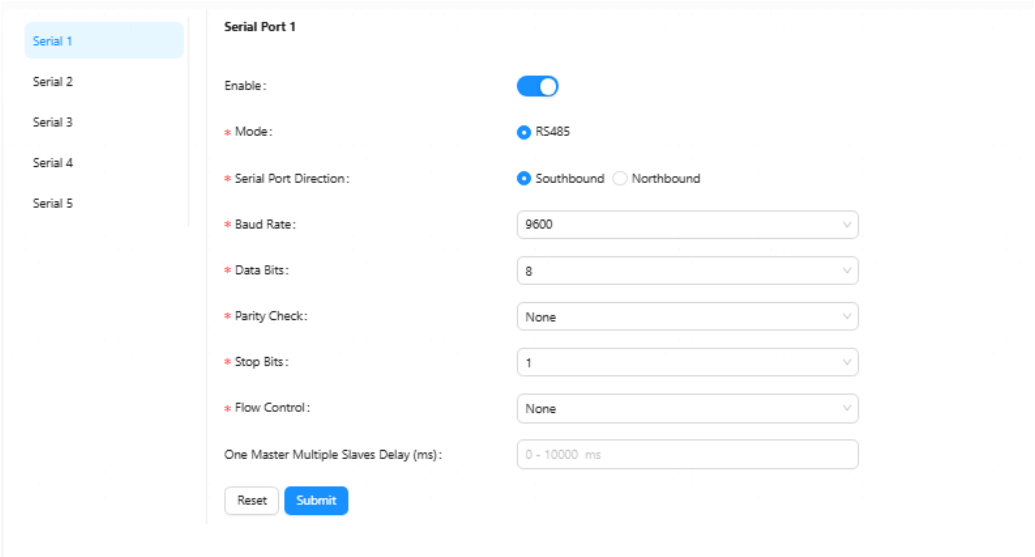
18.3.2 Siemens s7 200 PPI Protocol

- Supported point position identifiers: bit registers support: I, Q, M, SM; word registers support: VB, VW, VD
- The device configuration is consistent with the 2.2.1 Siemens S7 200 Smart PLC protocol

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Operation Steps

Step 1 In the web interface management, select the corresponding serial port to communicate with the PLC.

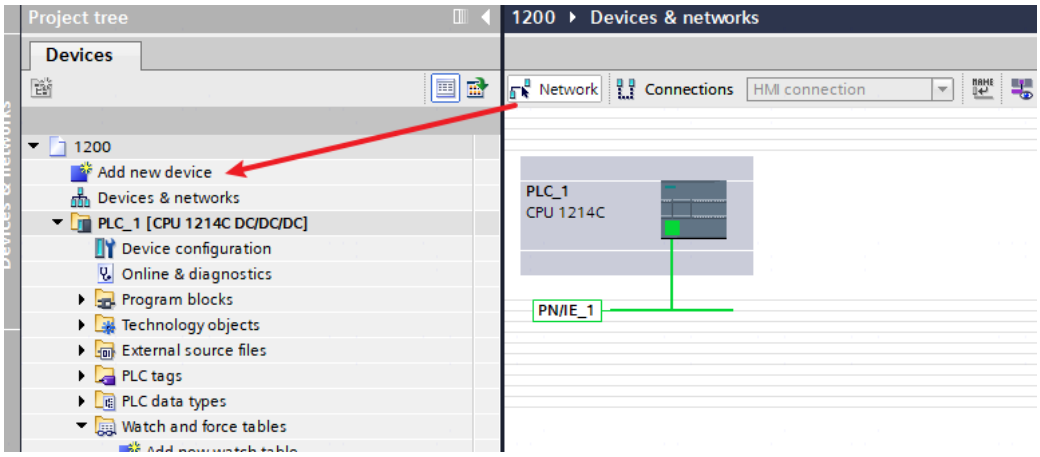


18.3.3 Siemens s7 1200 Protocol

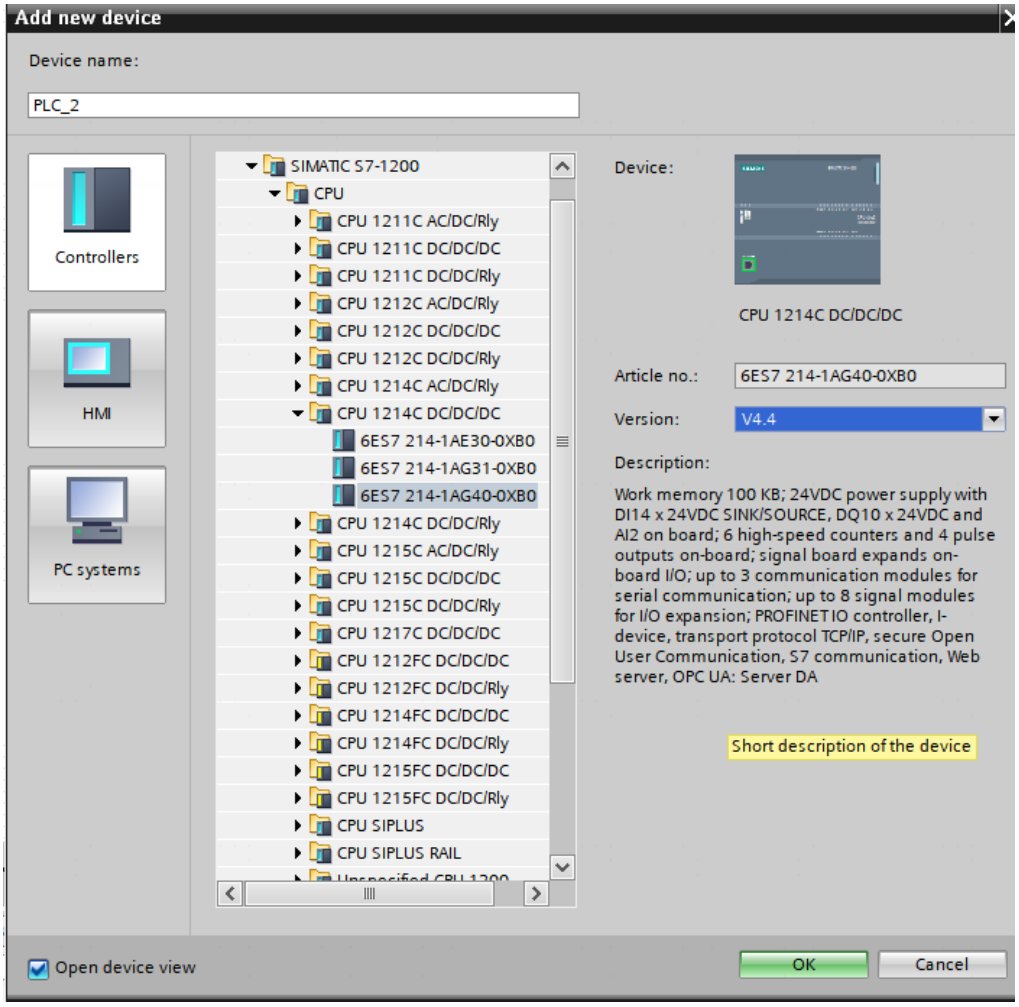
Supported point position identifiers: bit registers support: I, Q, M, SM; word registers support: VB, VW, VD, DB block.

Operation Steps

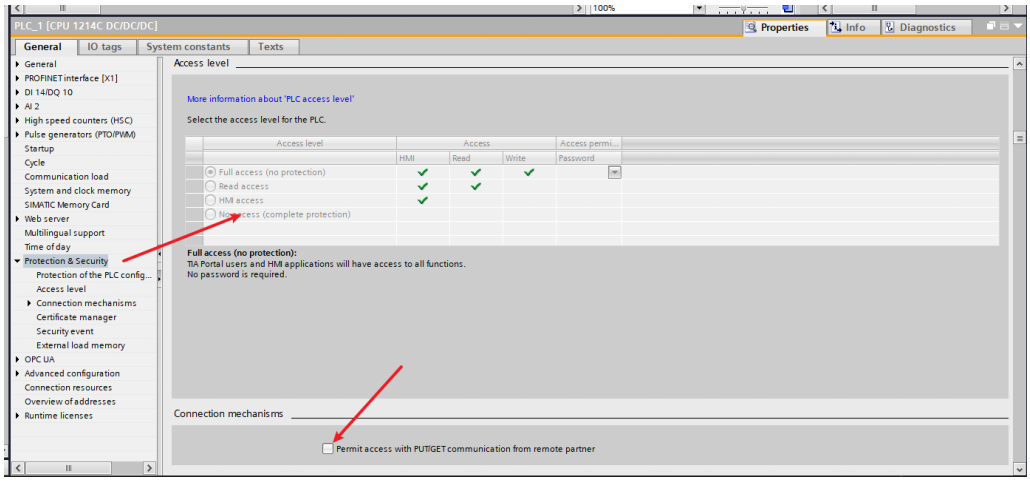
Step 1 Connect the S7-1200 PLC via Ethernet cable, then launch TIA Portal V17 on the computer for configuration.



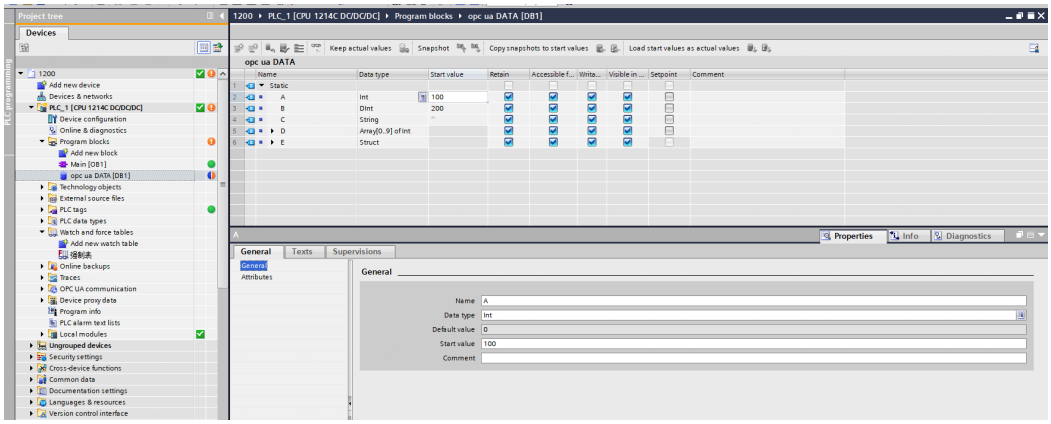
Copyright © 3onedata Co., Ltd.



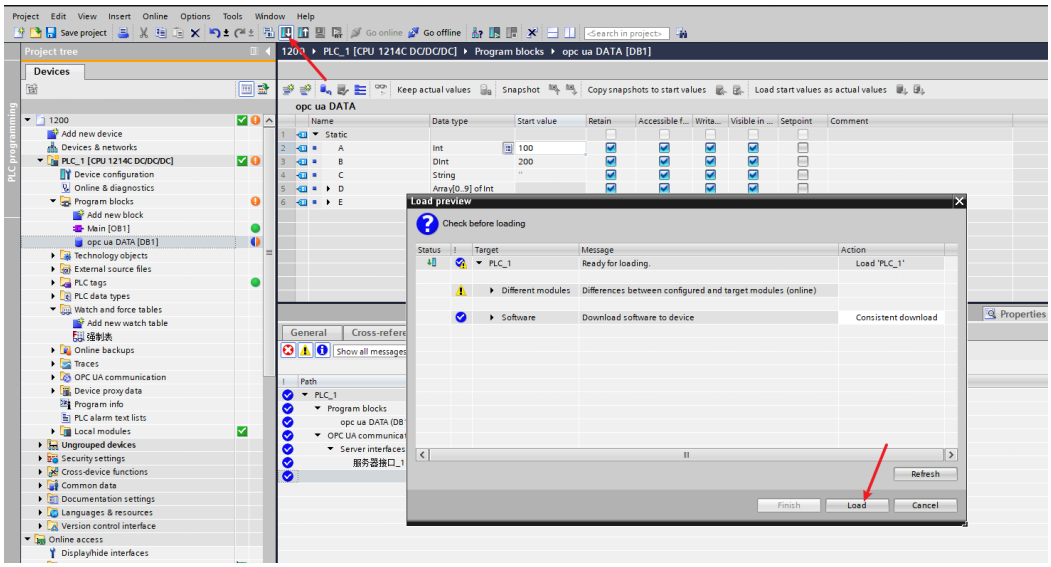
Step 2 The S7-1200 PLC permits PUT/GET communication access from remote devices.



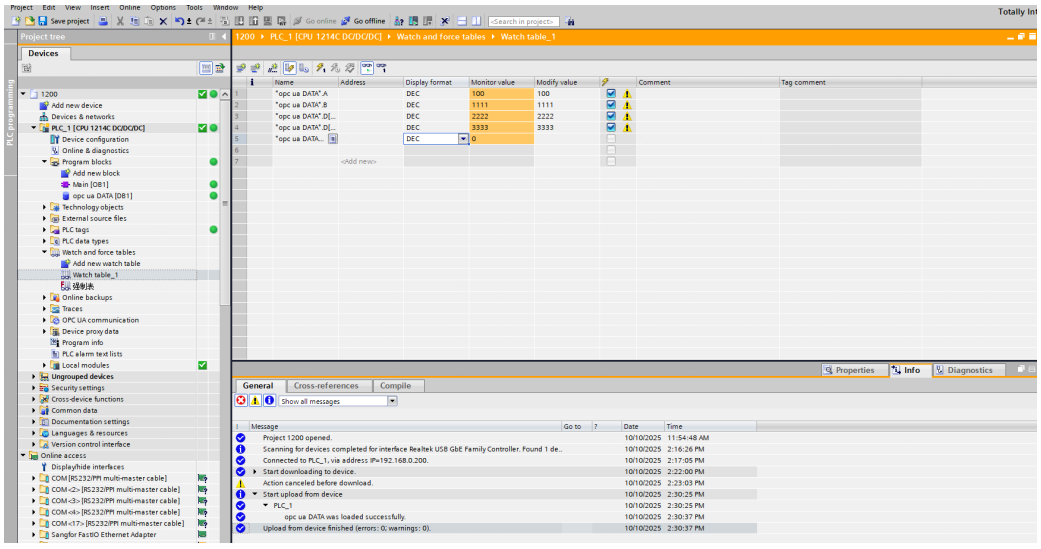
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Step 3 Compile, download, and load.

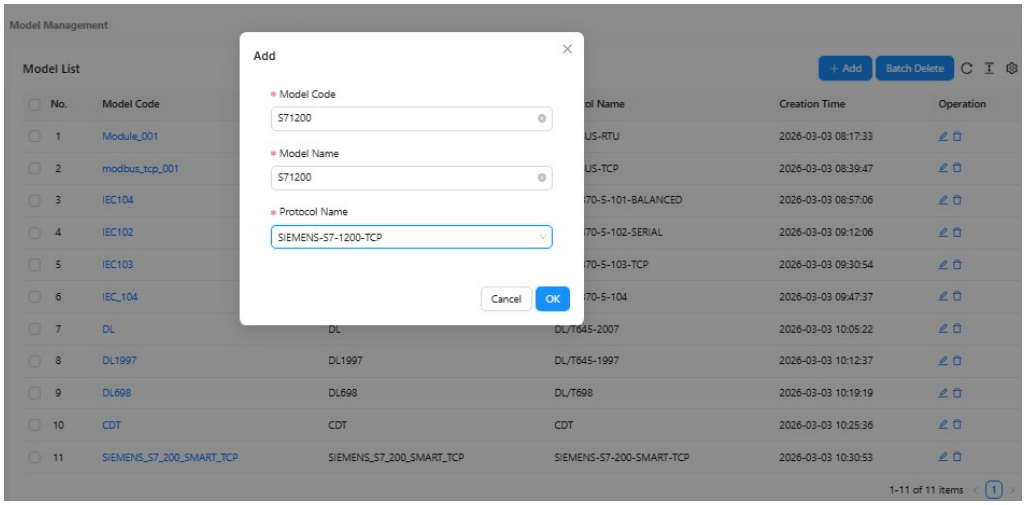


Step 4 Access online and add watch tables.

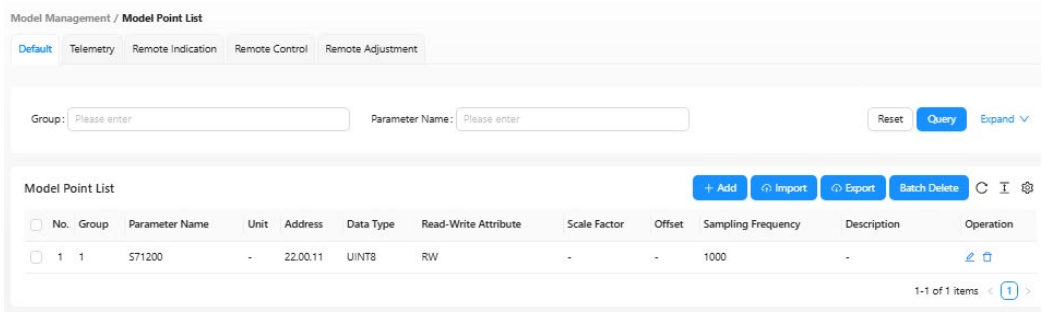


Step 5 Create new model

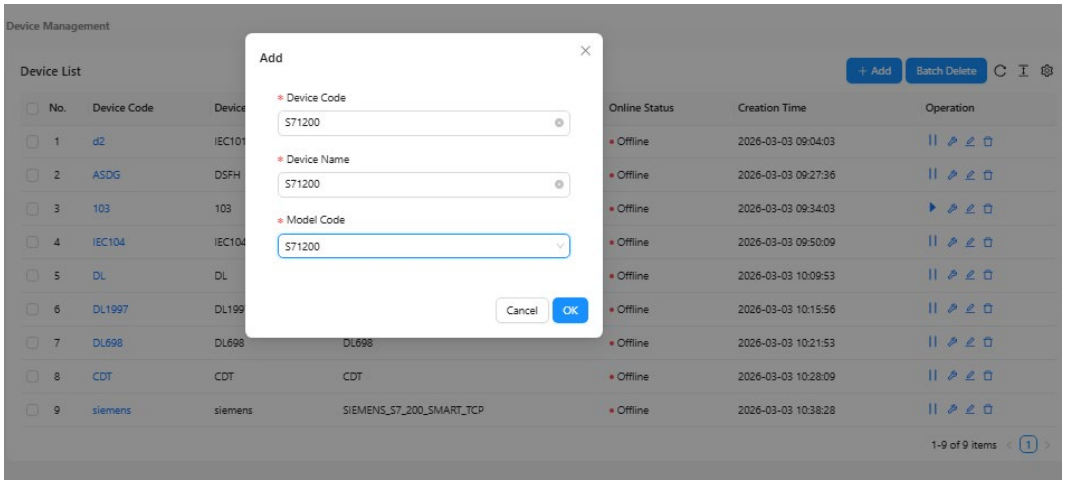
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Step 6 Add parameter table

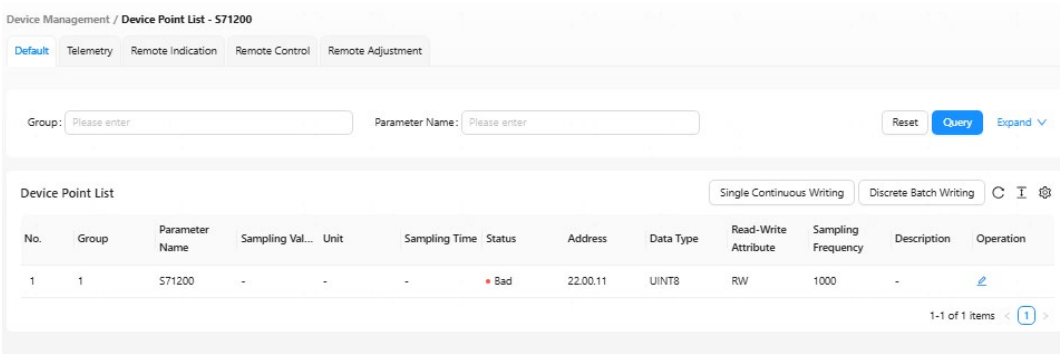


Step 7 Create new device.

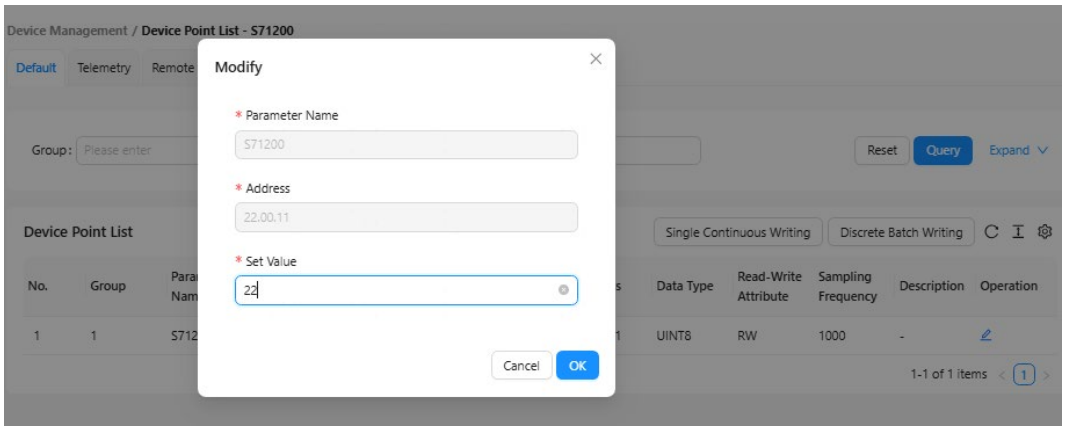


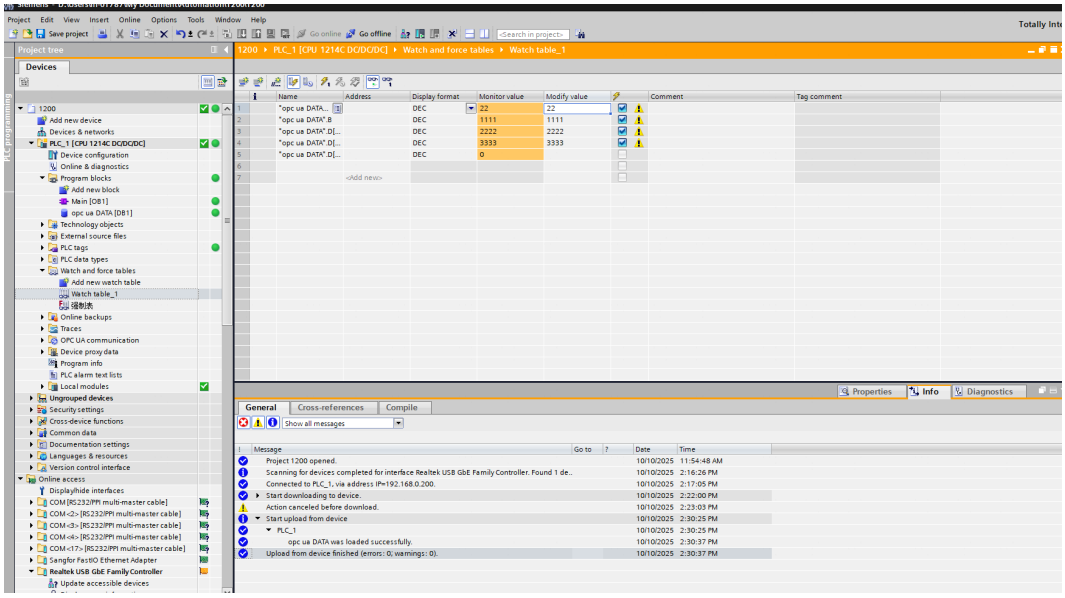
Step 8 Add and view parameters.

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Step 9 Modify parameter values via the web interface, then verify the changes in TIA Portal.

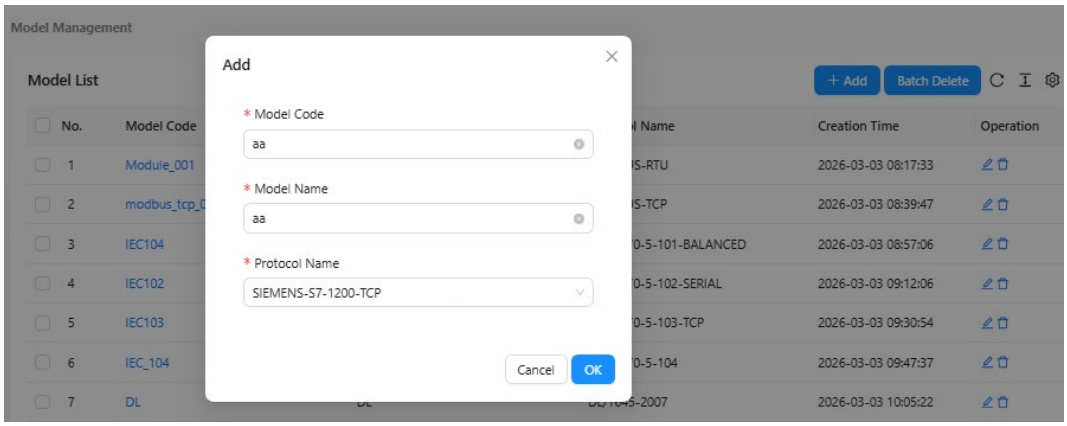


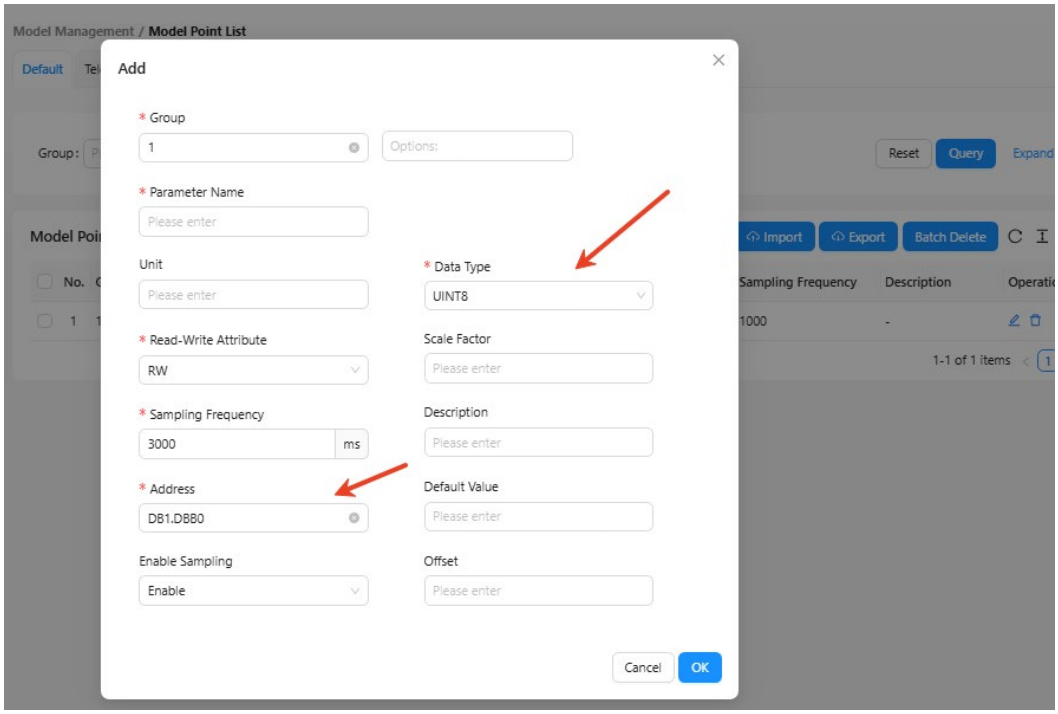


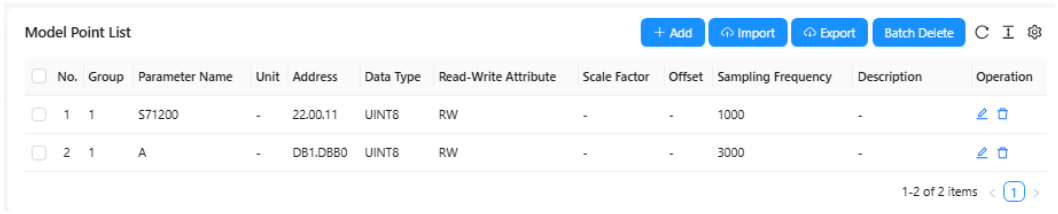
Step 10 Read/write gateway DB block addresses.

The DB block supports DB<n>.DB<B/W/D><n>. Note that the bool type (.) is not supported.

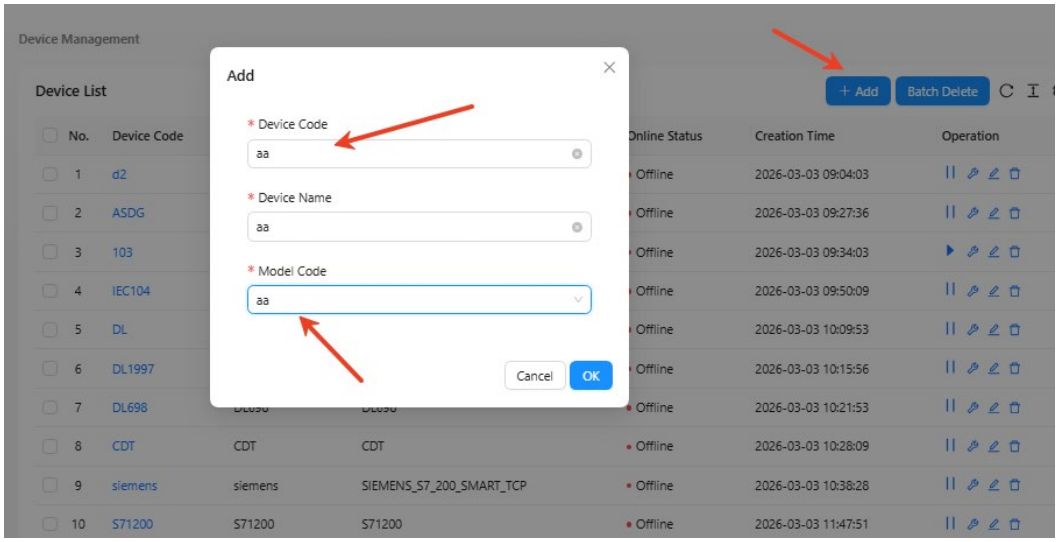
Copyright © 3onedata Co., Ltd.

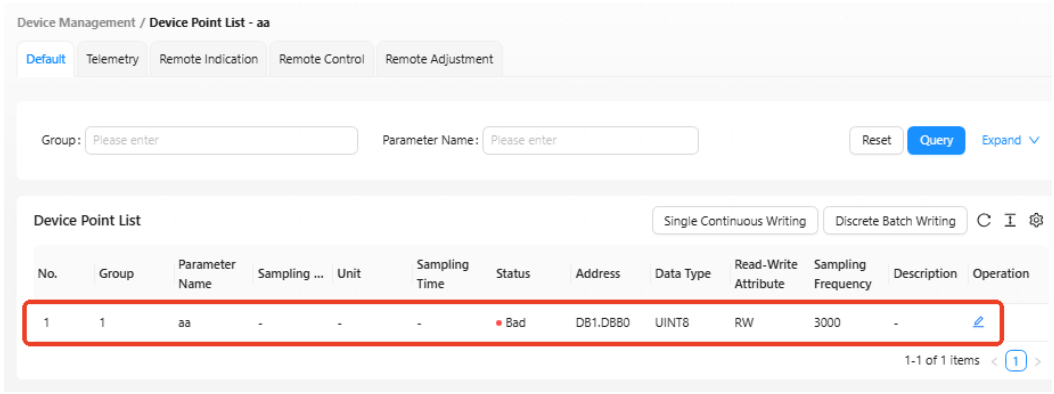


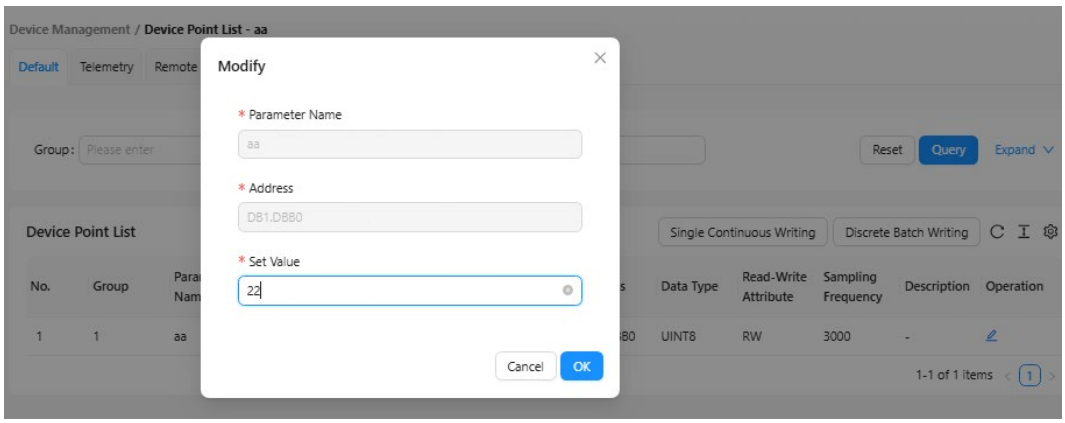




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18.4 RockWell Protocol

18.4.1 DF1 Protocol

The DF1 protocol is a serial communication protocol developed by Rockwell Automation in the United States. All series of programmable controllers and computers equipped with RSLinx

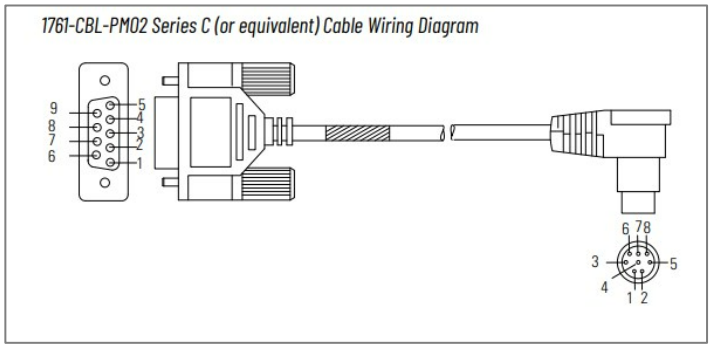
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communication software support the DF1 protocol. It is a character-based protocol with its physical layer built upon electrical standards such as RS-232 or RS-485.

Operation Steps

Step 1 PLC communication connection.

Connect via Ethernet cable or serial cable using RS232. Use the Rockwell product with part number 1761-CBL-PM02 as a serial converter cable, or a custom-made RS232 serial cable.



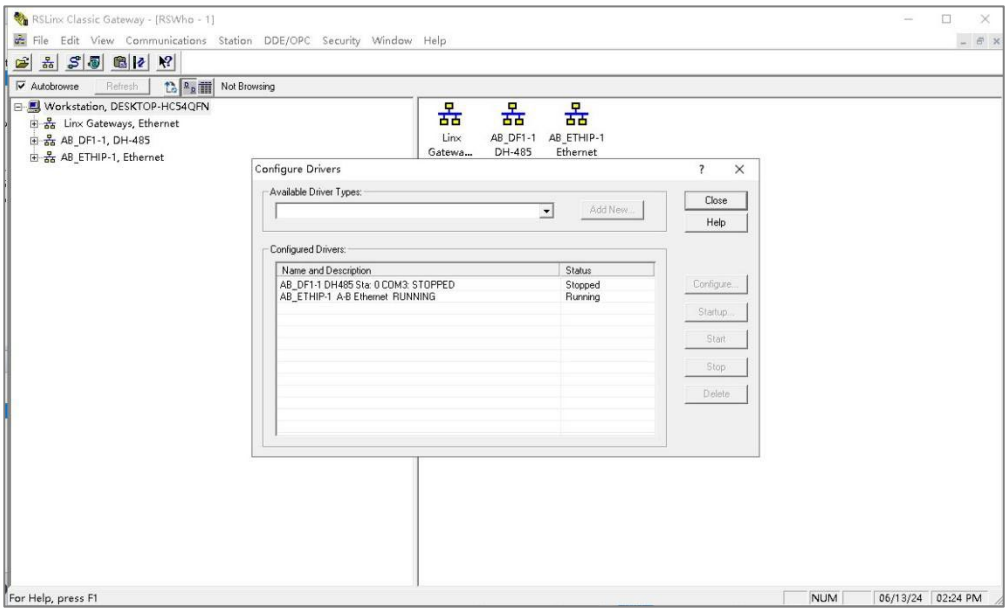
Ports

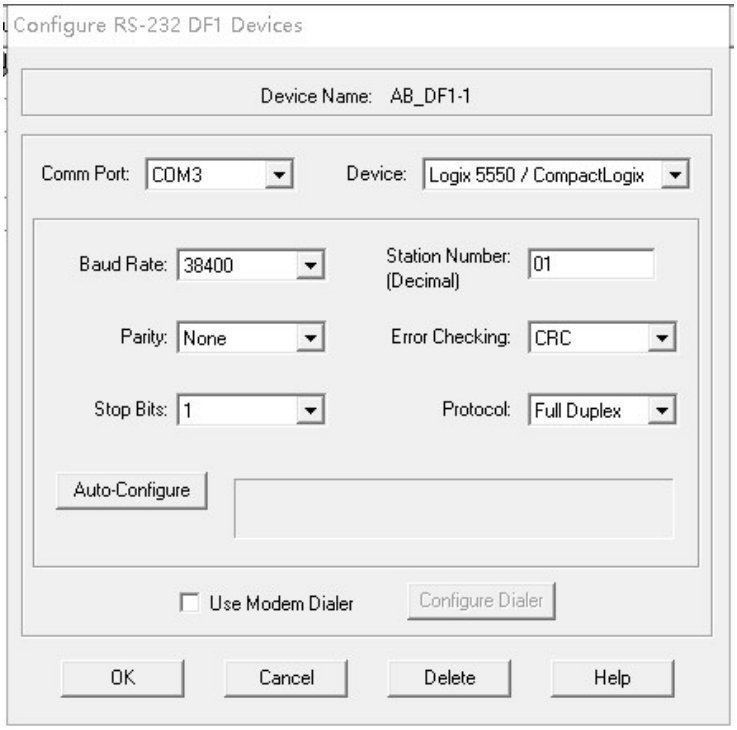
Pin #	DB-9 RS-232	RS-232 (8-pin mini-DIN) Communication Port(1) (1761-CBL-PM02 cable)	Port 3 DH-485 Connector
1	Received line signal detector (DCD)	Not applicable	Chassis ground
2	Received data (RxD)	Signal common (GRD)	Cable shield
3	Transmitted data (TxD)	Request to send (RTS)	Signal ground
4	DTE ready (DTR)	Received data (RxD)	DH-485 data B
5	Signal common (GRD)	Same state as port 1's DCD signal	DH-485 data A
6	DCE ready (DSR)	Clear to send (CTS)	Termination
7	Request to send (RTS)	Transmitted data (TxD)	Not applicable
8	Clear to send (CTS)	Not applicable	Not applicable
9	Not applicable	Not applicable	Not applicable

Step 2 Configure PC serial communication using RSLinx software.

RSLinx is a communication control software that can communicate with AB-PLC through various protocols. In "Condifure Drivers", select "RS-232 DF1 devices" for addition. After choosing the serial port number to be connected, click the "Auto-Configure" button for automatic configuration.

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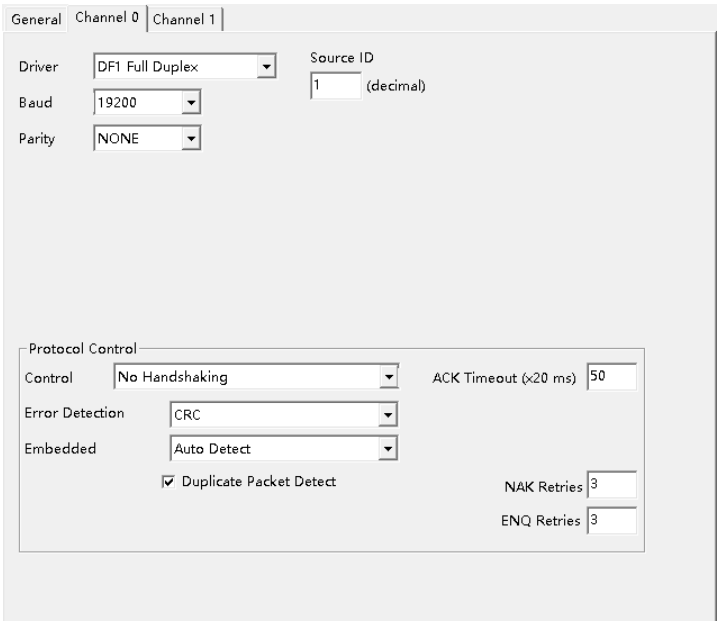




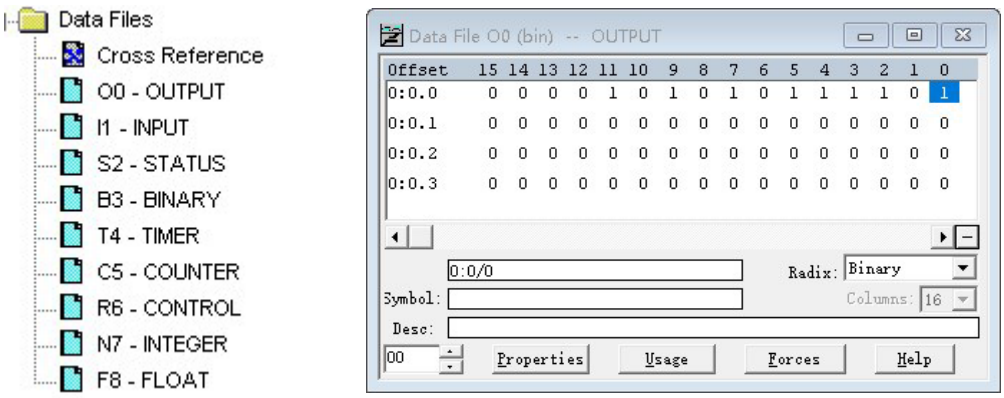
Step 3 Configure PLC communication parameters using RSLogix500 software.

The RSLogix500 software is a PLC program development software, and the PLC communication parameters are configured in "Channel Configuration". Among them, "Channel 0" is the PLC serial port, and "Channel 1" is the PLC network port. “Channel 0” uses the DF1 Full protocol by default, with a baud rate of 19200, 8 data bits, 1 stop bit, and no parity and flow control.

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Step 4 In the RSLogix500 software, the Data Files information of the PLC can be seen, such as viewing the output logic port status O0 file.

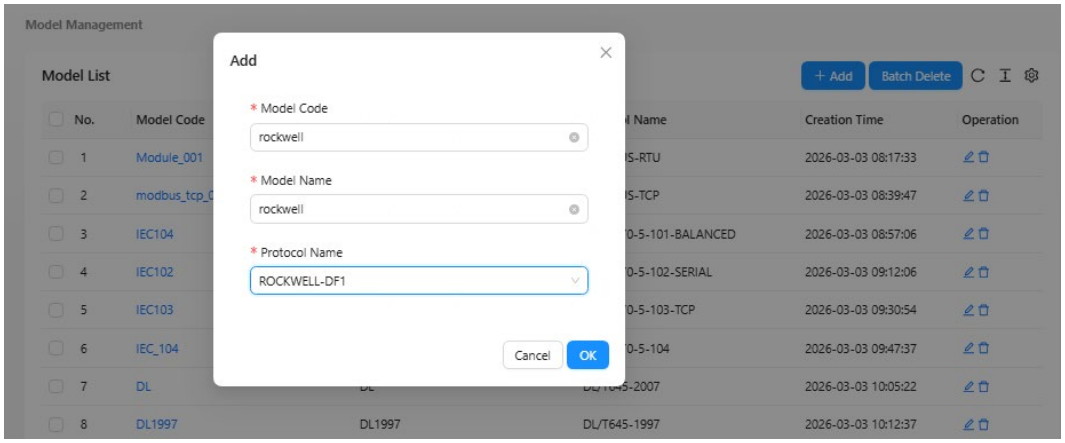


Step 5 After the configuration is completed, click "Download" to download the configuration to the PLC.

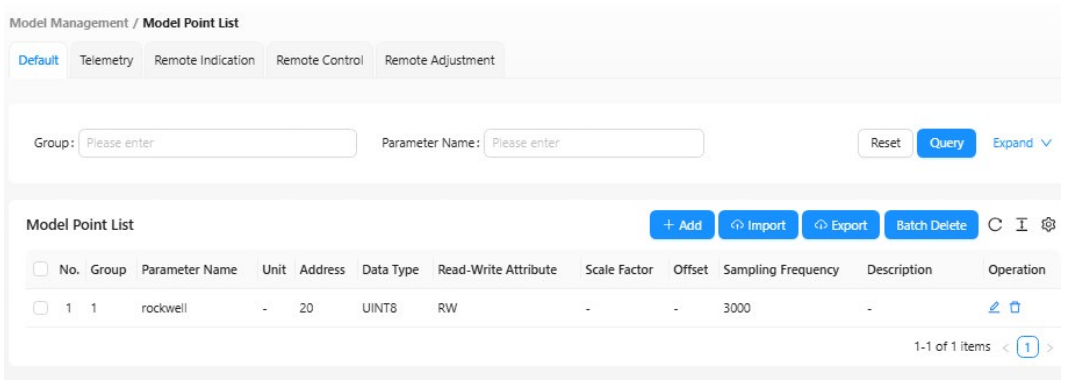
Step 6 Acquisition Gateway Configuration

Add new device model, select "ROCKWELL-DF1" Protocol

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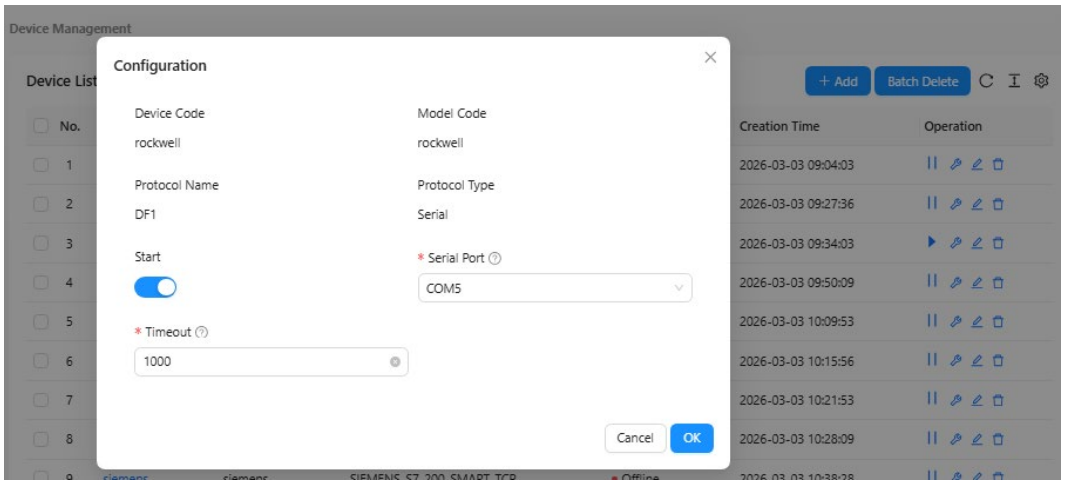


Step 7 Configure the parameters to be collected in the model point table of the newly added model.



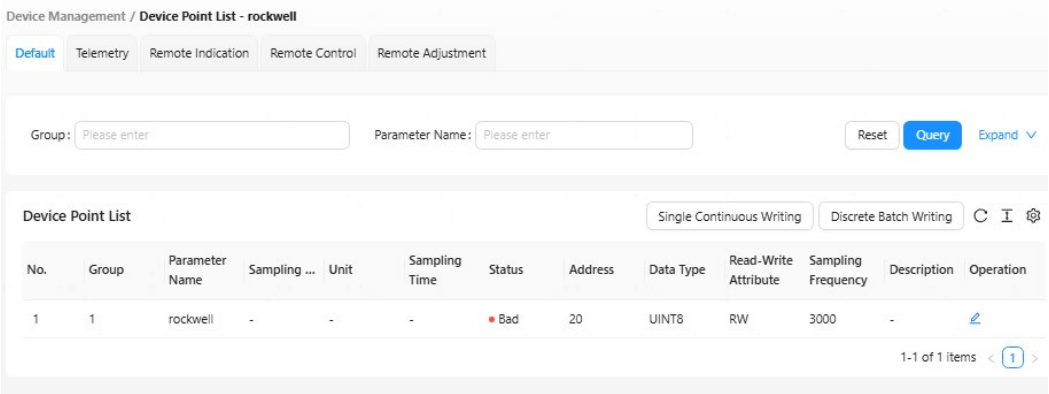
Configure the serial port parameters in the interface management, with a default baud rate of 19200, 8 data bits, 1 stop bit, and turn off flow control and parity check.

Step 8 In the device management, select the newly added device model, and configure the serial port number and timeout for device communication.



Step 9 Access the device details page to view PLC data collected by the gateway.

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18.5 OPC UA Protocol

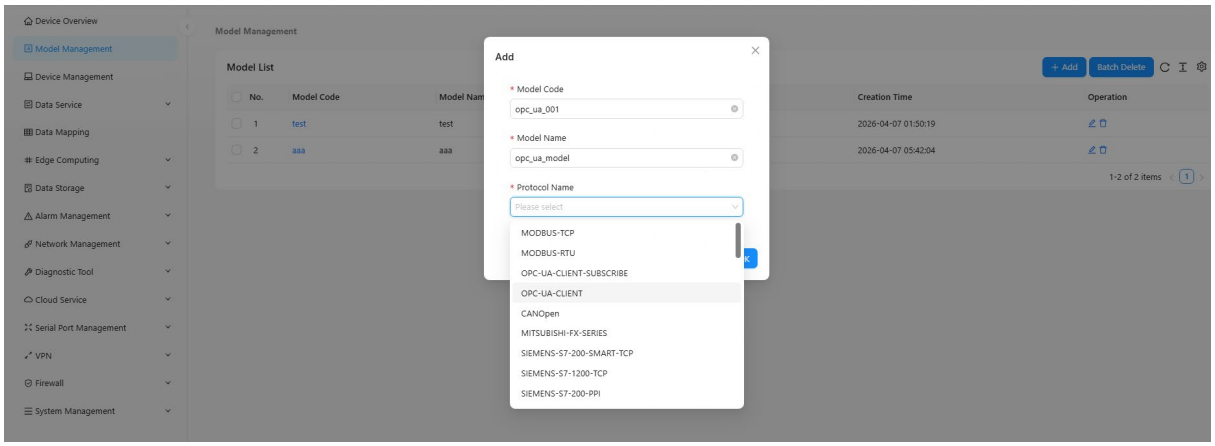
20.5.1 OPC UA Client Polling

Polling is an active data acquisition mechanism. The client sends requests to the server at regular intervals to obtain data from a specific node. After receiving the request, the server returns the current value of the node to the client.

Operation Steps

Step 1 Add model.

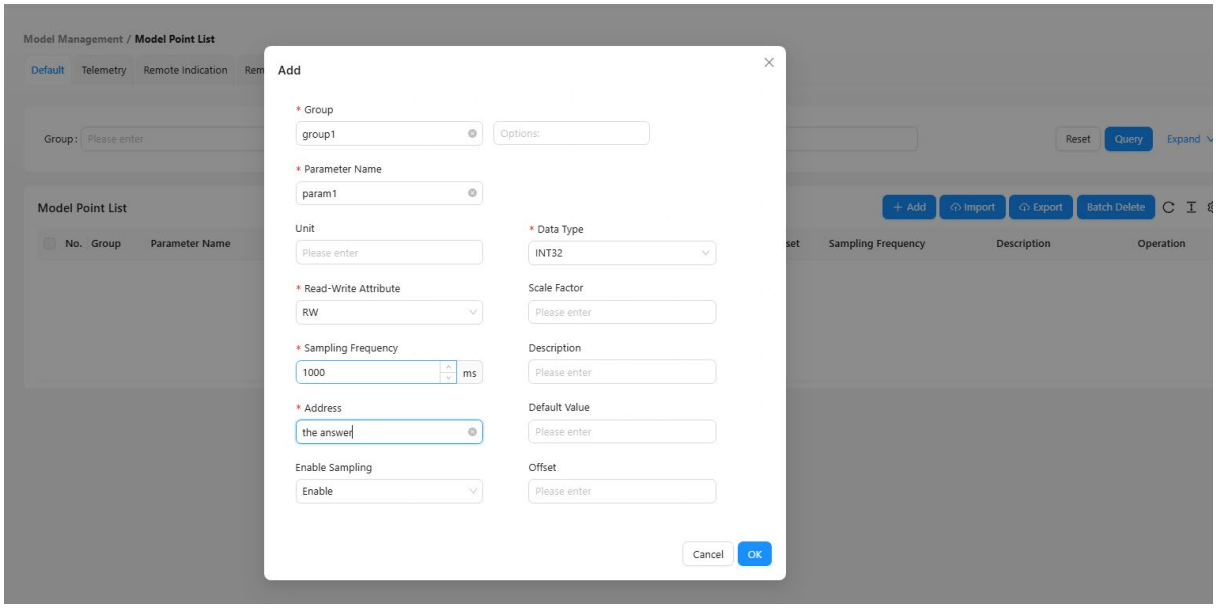
In the device model management interface, click "Add" to create an OPC UA device model. Customize the Model Code and Model Name, then select “OPC-UA” from the Protocol dropdown menu.



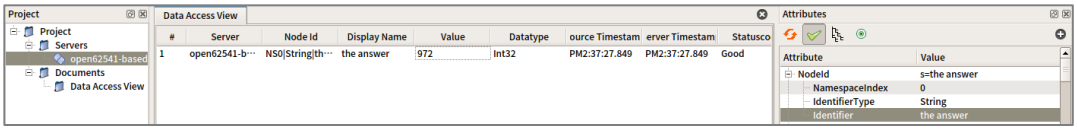
Step 2 Configure Model Point Table.

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On the Device Model Management page, click the OPC UA model code to enter the model point table. Click "New" to configure point parameters.

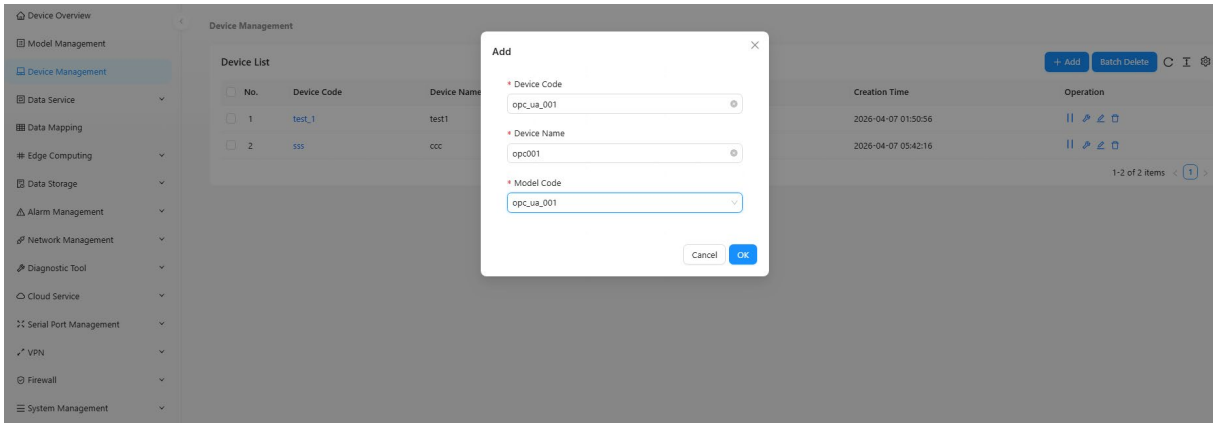


The point address of the OPC UA protocol model is the identifier of the node in the address space. The data type should be consistent with the data type of the node.



Step 3 Add device.

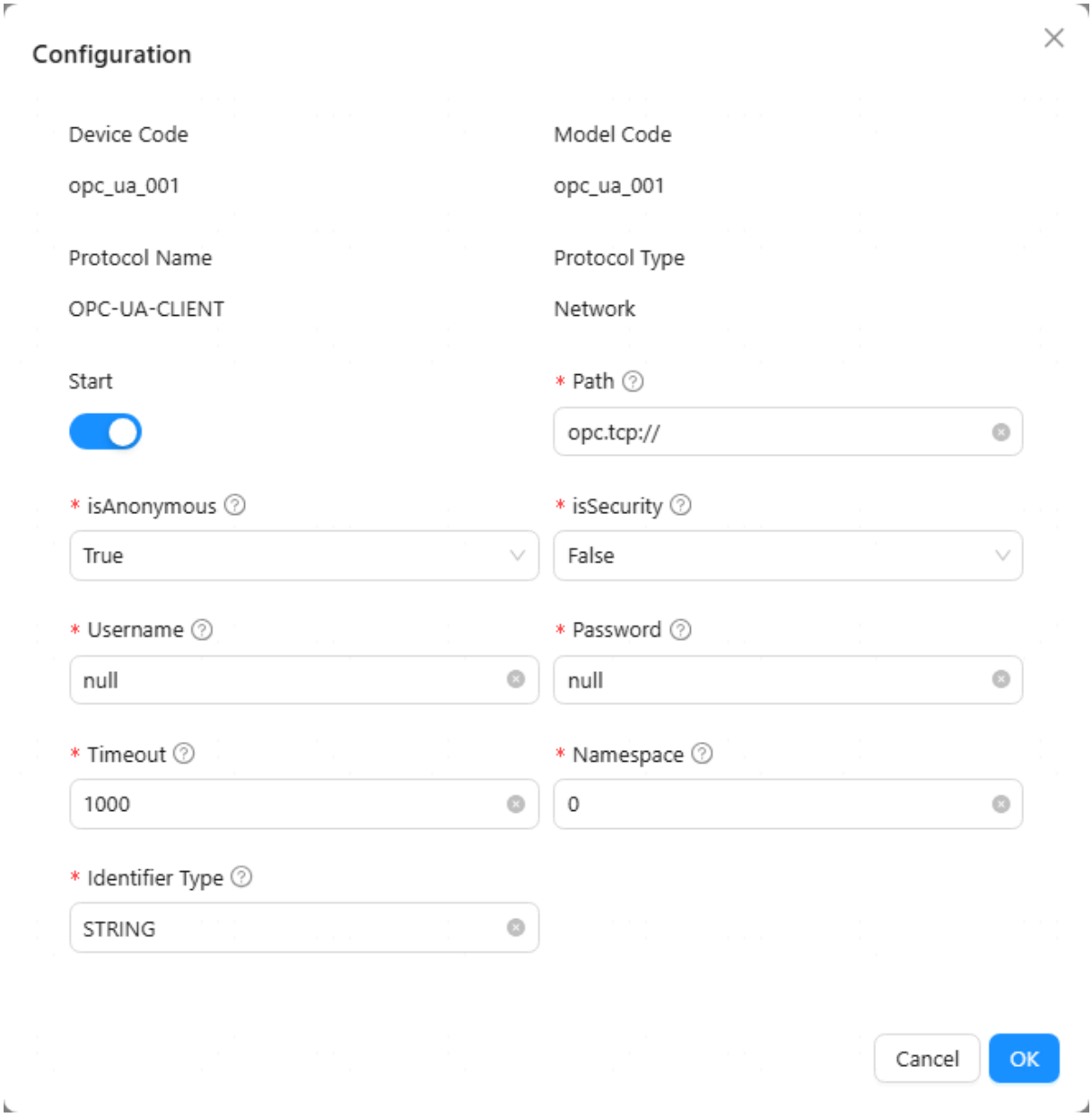
On the Device Management page, click "New" to create OPC UA Device. Customize the Device Code and Device Name, then select a pre-configured Model Code.



Step 4 Configure device parameter.

After adding the device, click the 'Configure' button in the Operation column to set up the newly created device.

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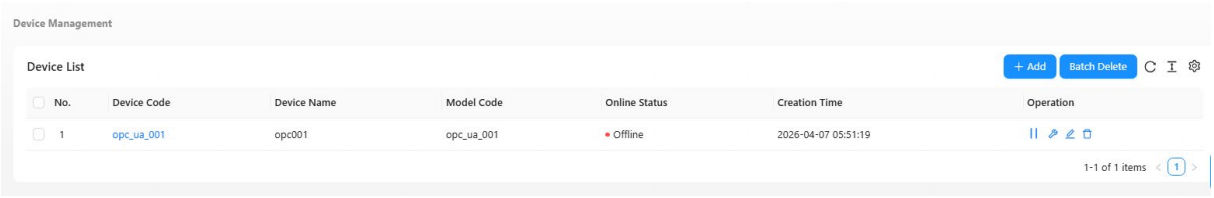


- IP: The IP address of opc ua server.
- Port: The port of the opc ua server.
- Timeout: Timeout period.
- isAnonymous: Whether to log in anonymously, true: Anonymous login, false: Non-anonymous login.

Step 5 Device status

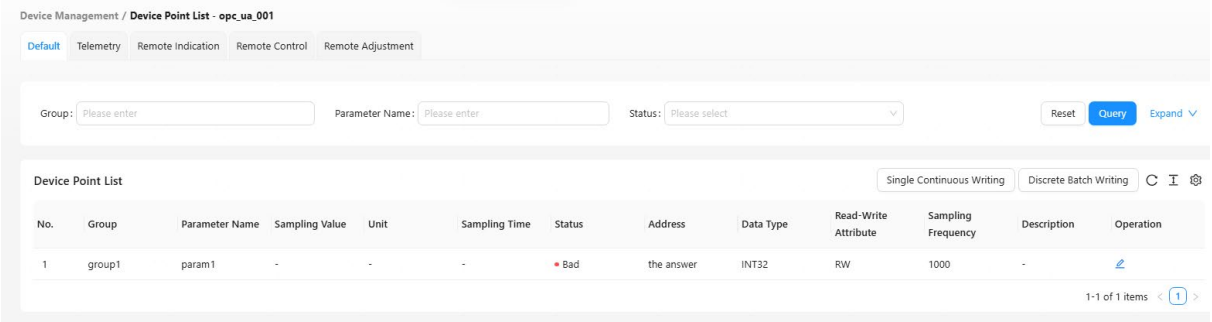
After completing device parameter configuration, you can check the device's online status and other information in the Device Management interface.

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Step 6 Device Point Table.

In the Device Management interface, click the device code to access its Point Table, where you can view detailed status of all data points.



20.5.2 OPC UA Client Subscription

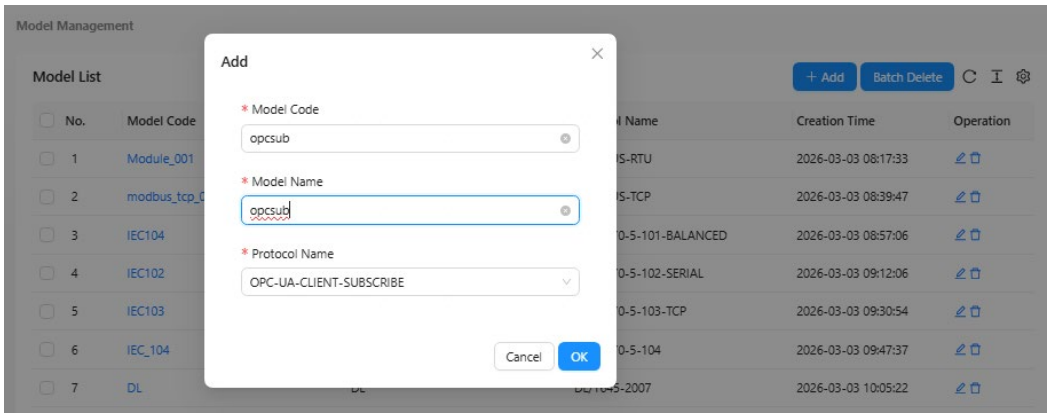
Subscription is an event-driven data acquisition mechanism in OPC UA. The client subscribes to the server for the nodes of interest (such as sensor data, device status, etc.), and the server monitors the changes of these nodes. When the value of a node changes or meets specific conditions (such as reaching a threshold), the server will actively push the updated data to the client.

Operation Steps

Step 1 Add model.

In the device model management interface, click "New" to create an OPC UA Client Subscribe device model. Customize the Model Code and Model Name, then select “OPC-UA-CLIENT-SUBSCRIBE” from the Protocol dropdown menu.

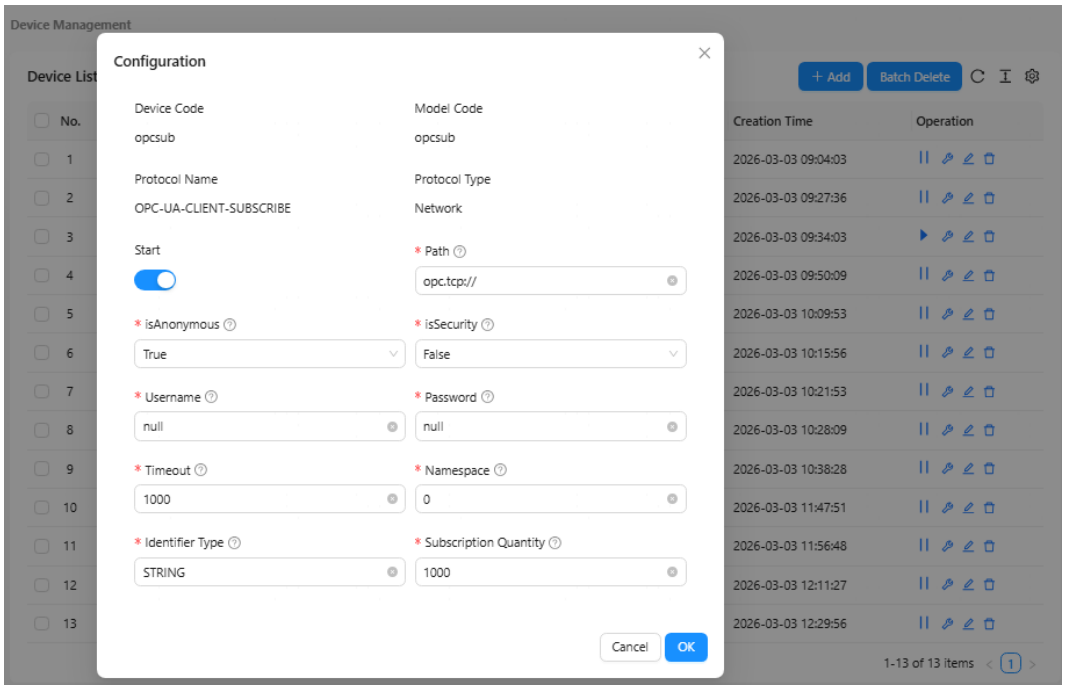
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Step 2 Configure the model point list, polling with OPC UA Client

Step 3 Add device

Step 4 Configure Device Parameter



- Subscription Quantity: Quantity of nodes subscribed per request to OPC UA Server
- All other configuration items remain consistent with the OPC UA Client polling capability.

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18.6 CNC Protocol

18.6.1 FANUC Protocol

Supports data acquisition from FANUC devices with RJ45 Ethernet ports using fixed-parameter address tables.

Operation Steps

Step 1 Connect the FANUC CNC to the network cable and operate via the HMI interface.

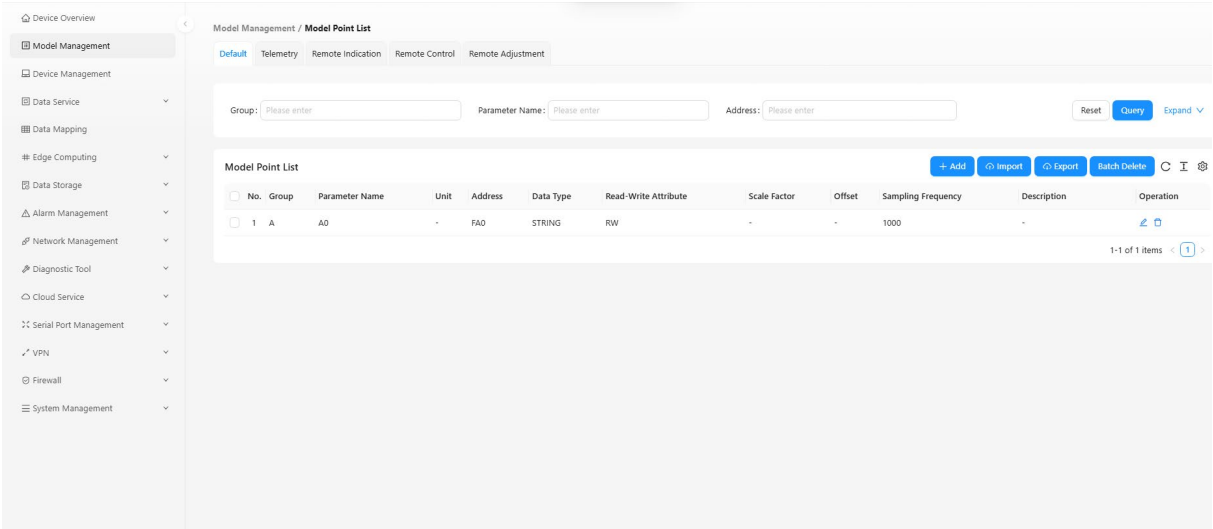
Step 2 Press the System key on the main panel (as shown in the figure) to access the system interface.

Step 3 Press the right page-turning toggle key to switch to the embedded options, then press the embedded button to jump to the IP setting interface and configure the IP address.

Step 4 Press the Focas2 button to navigate to the port number and timeout configuration interface. After setting the port number and time, restart the device. Note: The device must operate in Built-in Board Mode. If the display shows pcmia Mode, press the operation button to switch to Built-in Board Mode.

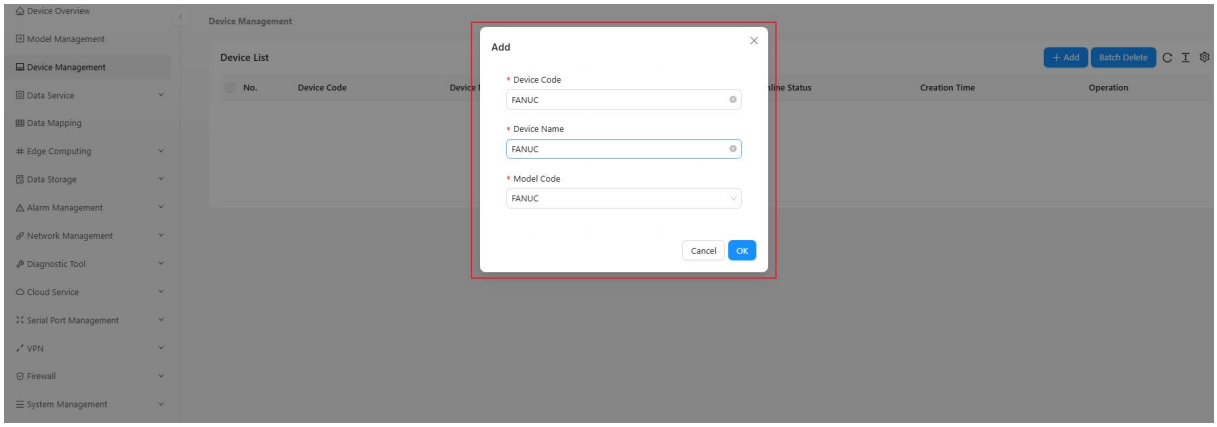
Step 5 Create a new fanuc model

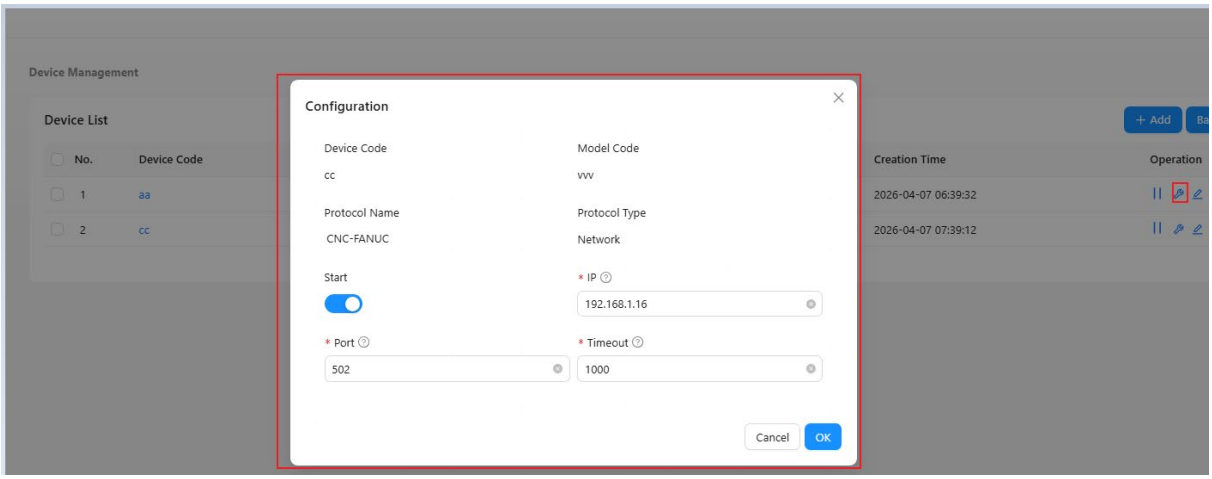
Step 6 Connect the FANUC CNC to the Ethernet cable and import parameters via the HMI interface according to the provided parameter table.



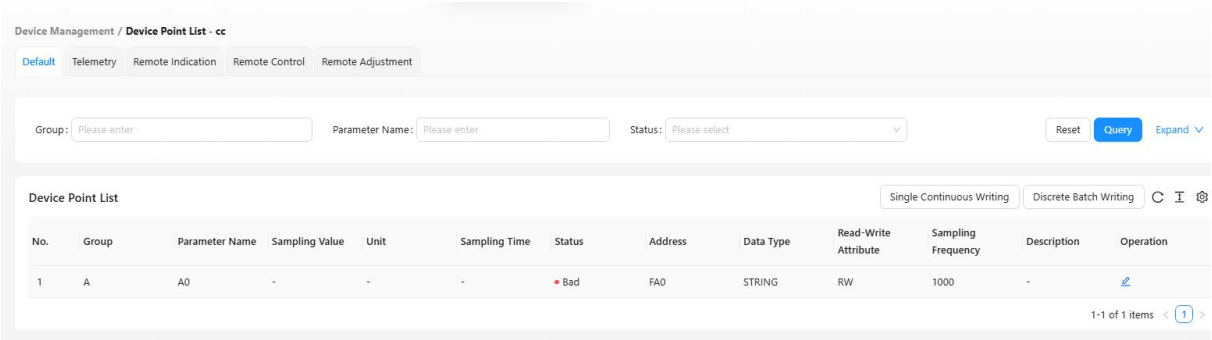
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Step 7 Create a new device and configure the ip and port





Step 8 View the collected machine tool data

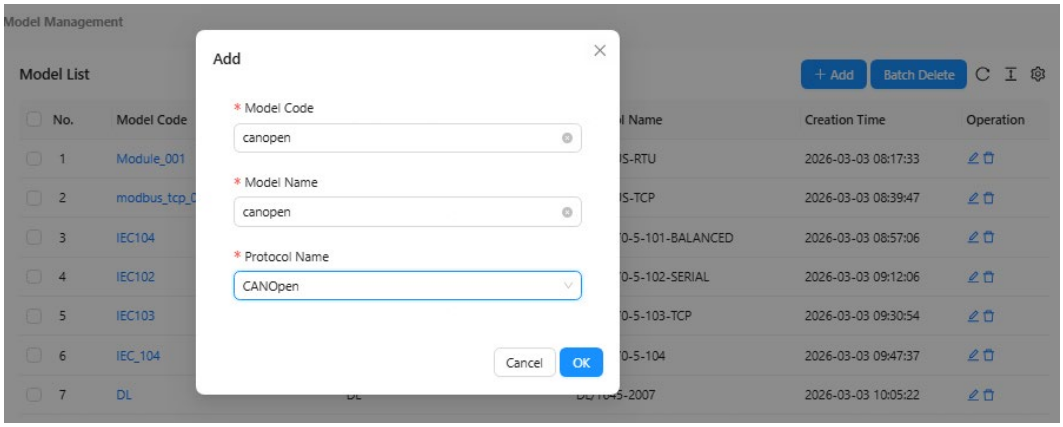


18.7 CANopen protocol

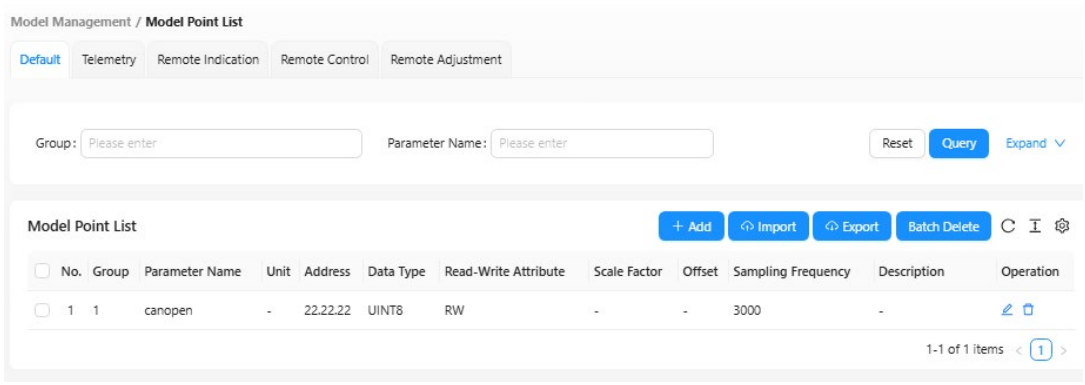
Operation Steps

Step 1 Add new devices after adding canopen models

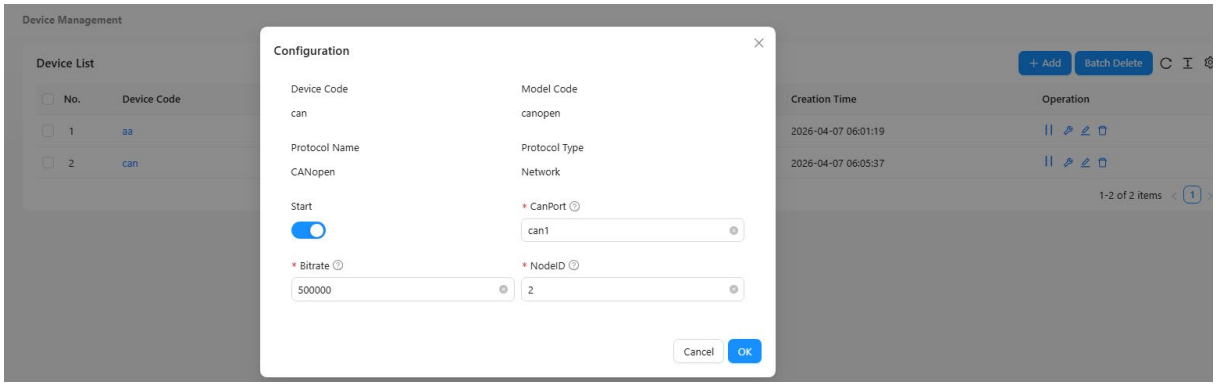
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Step 2 Add points, the address format is index sub-index



Step 3 Set the can port and baud rate and slave ID after adding a new device



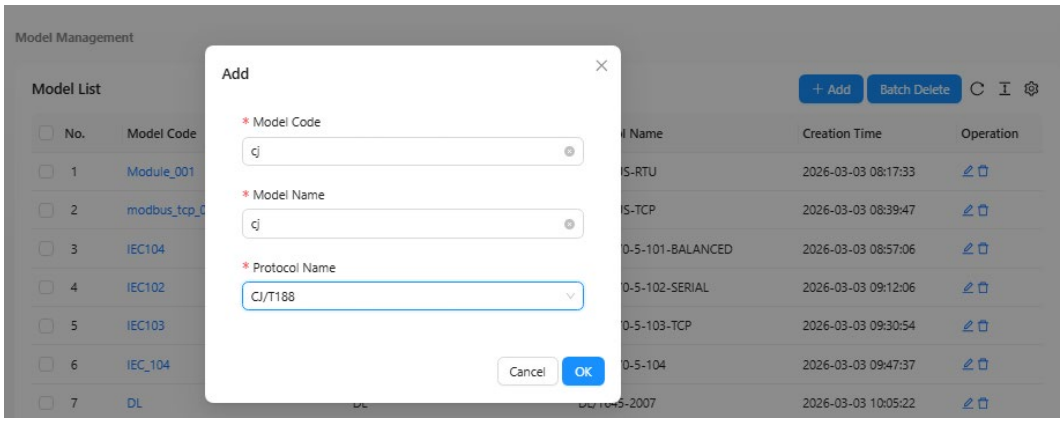
Step 4 Data can be collected when the configuration is complete

18.8 CJ/T188 Protocol

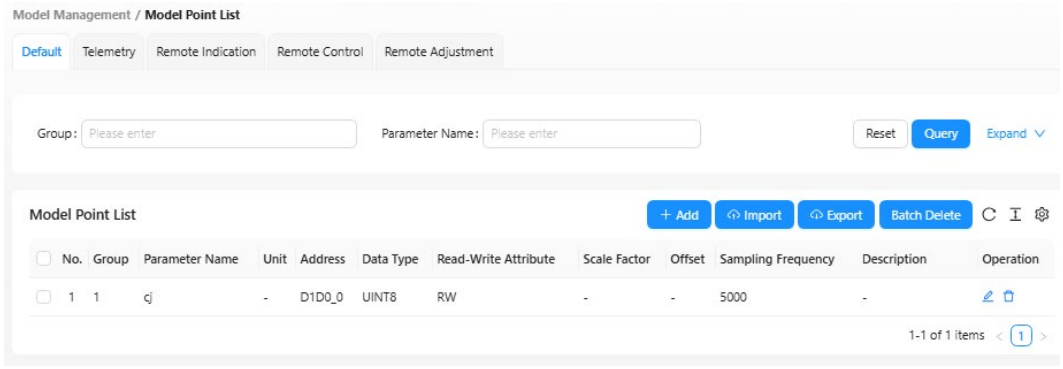
Operation Steps

Step 1 Add new equipment after adding CJ/T188 model

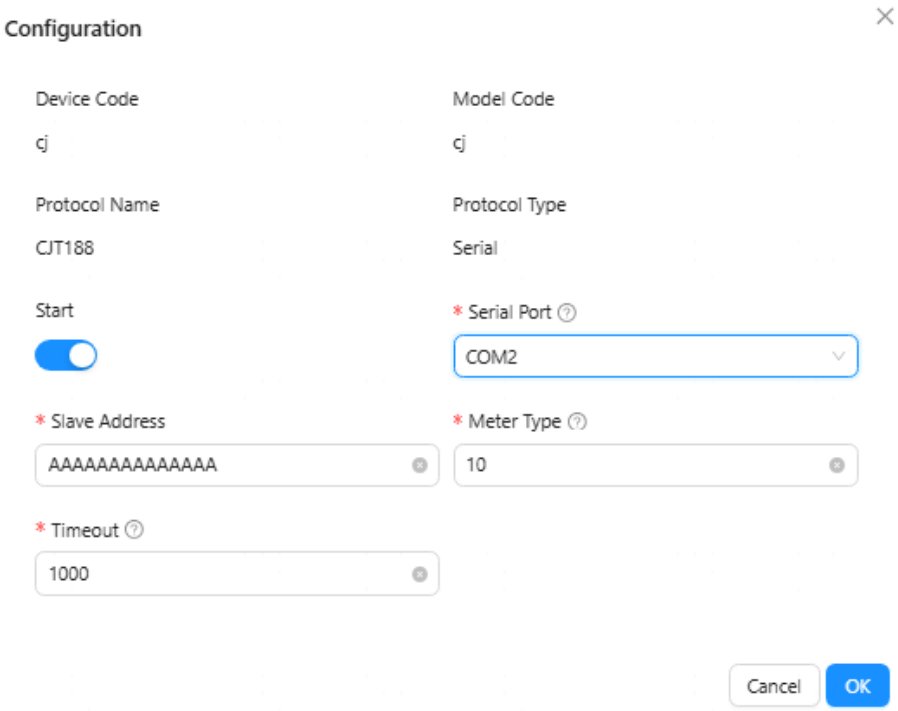
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Step 2 Add point, address format: D1D0_0, default to 0 when no sub-index



Step 3 Configure serial port, device table number and table type after adding new settings



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Table Type:

Meter Type	Code (T)	appearance
10H ~19H: Water meter	10H	Cold water meter
	11H	Domestic hot water meter
	12H	Direct drinking water meter
	13H	Reclaimed water meter
20H ~29H: Heat meter	20H	Heat meter (heat capacity)
	21H	Heat meter (cooling capacity)
	22H	Heat meter (heat and cooling capacity)
30H ~39H: gas meter	30H	gas meter
40H ~49H: Custom instrument	-	-

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19 Maintenance and Service

Since the date of product delivery, our company provides 5-year product warranty. According to our company's product specification, during the warranty period, if the product exists any failure or functional operation fails, our company will repair or replace the product for users free of charge. However, the commitments above do not cover damage caused by improper usage, accident, natural disaster, incorrect operation or improper installation.

In order to ensure that consumers benefit from our company's managed switch products, consumers can get help and solutions in the following ways:

- Internet Service;
- Service Hotline;
- Product repair or replacement;

19.1 Internet Service

More useful information and tips are available via our company website. Website: http://www.3onedata.com

19.2 Service Hotline

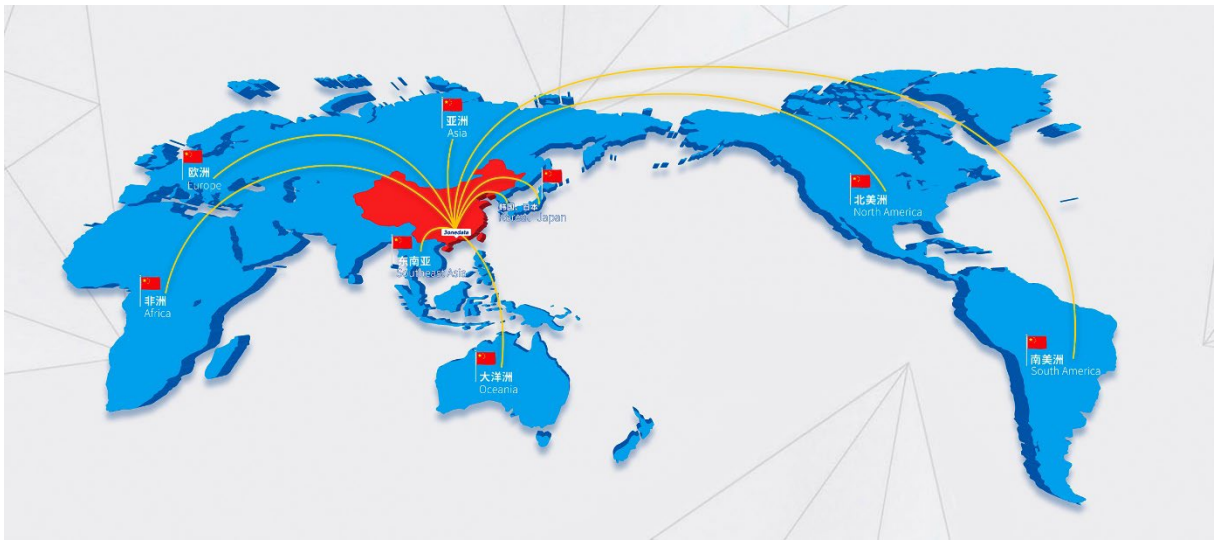
Users of our company's products could call technical support office for help. Our company has professional technical engineers to answer your questions and help you solve the product or usage problems ASAP. Free service hotline: +86-4008804496

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19.3 Product Repair or Replacement

As for the product repair, replacement or return, customers should firstly confirm with the company's technical staff, and then contact the salesmen to solve the problem. According to the company's handling procedure, customers should negotiate with our company's technical staff and salesmen to complete the product maintenance, replacement or return.

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