



Industrial Edge Gateway

USR-M300

User Manual



V2.0

Be Honest & Do Best

Your Trustworthy Smart Industrial IoT Partner

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1. Introduction

1.1. Overview

USR-M300 is a high-performance and scalable edge IOT gateway. This device integrates edge collection, data calculation, data reading and writing, active reporting, linkage control, IO collection and control and other functions. The collection protocol includes standard Modbus protocol and a variety of common PLC protocols, as well as industry-specific protocols. At the same time, the product also has routing and VPN as well as graphical programming functions to ensure data transmission security. Using graphical programming, users can develop independently to achieve the required functions.

USR-M300 is embedded in Linux kernel, with a main frequency of up to 1.2Ghz. It can access the Internet via Ethernet port, ADSL and LTE cat4 cellular network to achieve easy network deployment.

It is widely used in various industrial intelligent solutions such as industrial robot, smart factories, smart agriculture, smart water management system etc.

1.2. Features

- Dual-core professor with ultra-high performance, the main frequency is up to 1.2Ghz, providing high-performance processing resources for edge computing.
 - Supports Python development, for developing user custom applications.
 - Supports graphical programming to facilitate user development.
 - LTE 4G and Ethernet network serve as backups for each other to ensure stable network transmission without downtime.
 - Integrated 1*WAN/LAN and 1*LAN Ethernet port, VPN (PPTP,L2TP,OpenVPN) and firewall (Port mapping, port forwarding) protection to ensure safe data transmission.
 - Integrated 2 serial ports: 1*RS232/485, 1*RS485, which can transform traditional serial devices into IOT devices.
 - Comes with IO interface: 2*DI, 2*DO, 2*AI, flexible expandable IO module is supported.
 - Powerful edge gateway function: supports edge collection, edge computing, group reporting, and supports real-time collection of up to 2000 points.
 - Supports major industrial protocols including Modbus TCP/RTU, PLC protocols and OPC UA Server.
 - Support 2 socket channels, each channel supports TCP(SS)/UDP, MQTT(S) protocols.
- Cloud support: MQTT via AWS IOT, Alibaba Cloud, and PUSR Cloud.

The PLC acquisition protocols supported by M300:

Protocol	PLC brand	PLC model or description
Modbus	Delta, ABB, HollySys, Modicon	Delta DVP/AH500/AS200 series,

		AC500 (ABB), LK series (HollySys)
PPI	Siemens	S7-200
S7comm	Siemens	S7-200 smart, S7-1200, S7-1500, S7-300, S7-400
FX Protocol	Mitsubishi	FX2N (1N)/FX3U (Mitsubishi) FX5U Ethernet port, FX3U-ENET-ADP, Q series
MC 3C/3E	Mitsubishi	FX5U serial port
FINS TCP	Omron	CP series
FINS COM	Omron	CP series
DVP Series	Delta	DVP Series RTU

Other acquisition protocols supported by M300:

Protocol	description
DL/T645-2007	Meter protocol
IEC104 (southbound and northbound)	Power protocol
BACnet (southbound and northbound)	Building protocol

2. Get Started

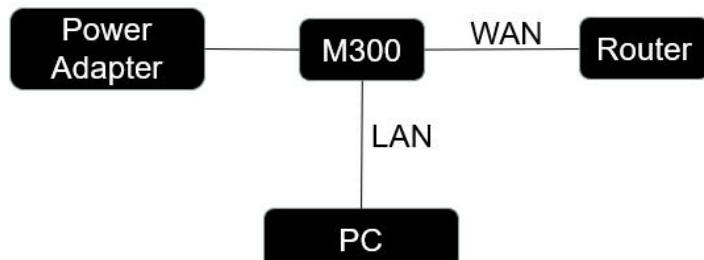
2.1. Hardware connection

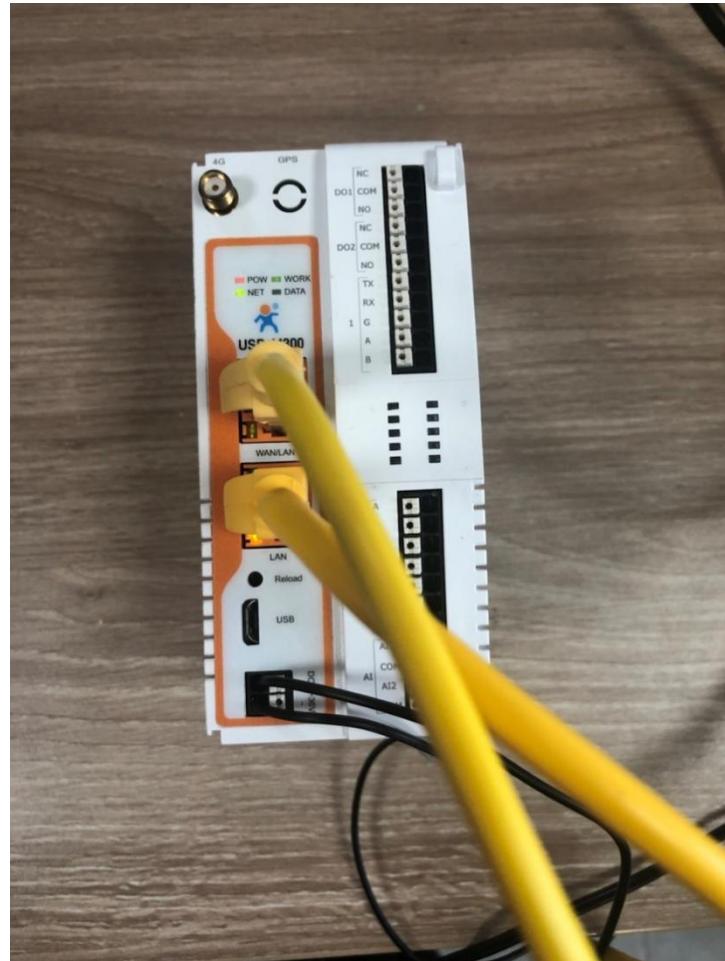
Preparation:

Power adapter 12V/1A * 1

Network cable * 1

The hardware connection diagram is like the following:





2.2. Login Gateway

Power on the USR-M300, connect PC to M300 via LAN port, users can login the gateway via Chrome or the other browser. The default network parameters are shown in the following table:

Table 1. Default network parameters

Parameter	Default value
LAN IP	192.168.1.1
Username	admin
Password	admin

Open the browser, enter 192.168.1.1 in the URL blank, and press Enter, it will navigate to the following webpage. After entering the login password, clicking login, the web page will show configuration page of USR-M300.



Figure 1. Login webpage

2.3. Brief introduction of the webpage

There are several tabs on the top of the webpage, users can set parameters of USR-M300 on the tab pages.

- Overview: On this page, users can quickly learn about the running status of the gateway, like system information, device status, cellular information and etc.
- Network: In this interface, there are many categories related to network connection. Users can set parameters such as WAN port, LAN port and cellular network.
- Edge Computing: With this functionality, the M300 gateway serves as host and actively sends the polling acquisition command to periodically obtain the point data of the serial and Ethernet devices and the data collected by the I/O interface.
- System Management: In this webpage, users can check the log information, and set the system time and so on.
- Python Application: With this functionality, users can deploy Python applications.

3. Overview Information

In this page, it includes system information, device status, cellular information, flow usage monitoring and performance of processor chipset.

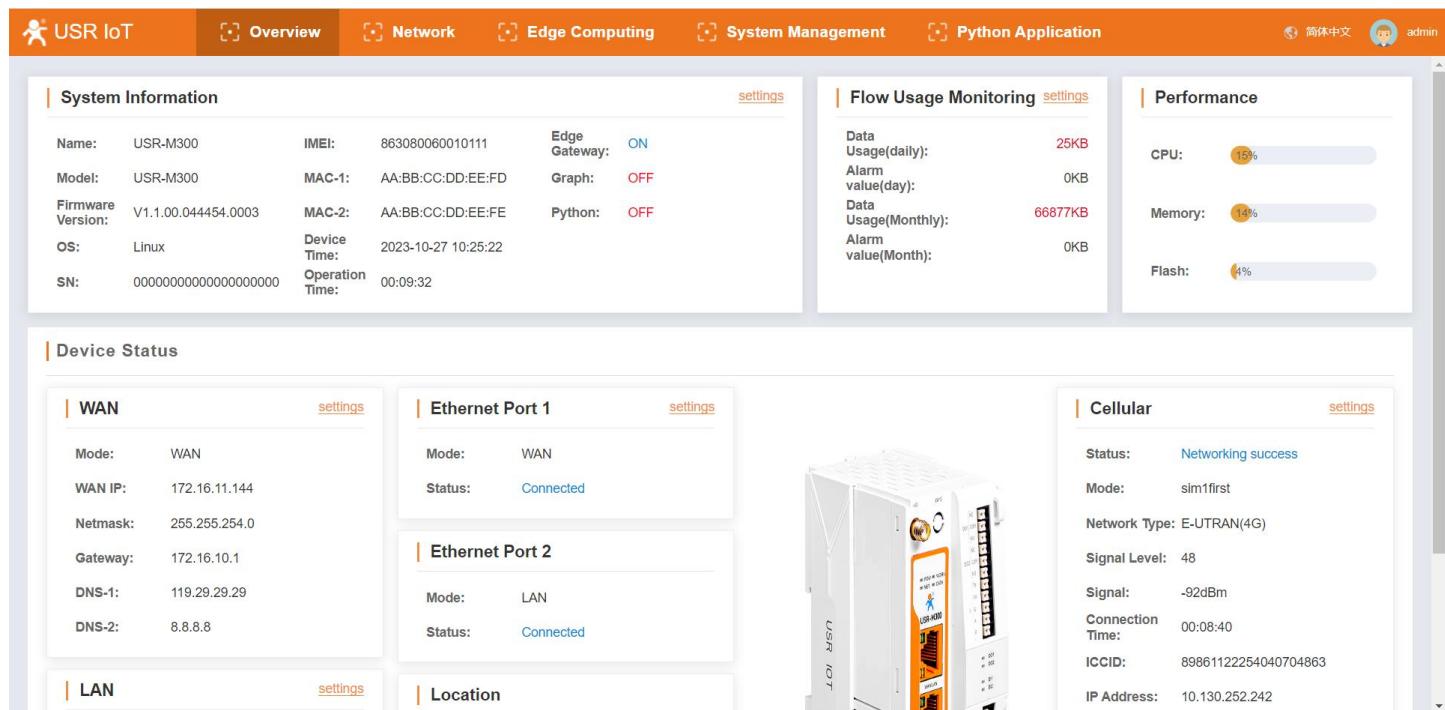


Figure 2. Status webpage

4. Network

4.1. Network switching

On this page, users can select the Internet connectivity priority, and can also set the information of PING detection.

Network Switch...

Network Switching

Cellular

Ethernet Port

WAN

LAN

Routing

Network Switching

* Network priority: Ethernet Primary

* Ping Interface: Custom

* Ping Server1: 119.29.29.29

Ping Server2: 8.8.8.8

* Ping Interval: 10 s

* Ping package size: 32 byte

* Ping Timeout: 2000 ms

apply

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4.2. Cellular

On this page, users can check the cellular information like the signal strength, IP address and so on. The APN information can be set in this page also.

The screenshot shows the 'Cellular' section of the USR IoT interface. On the left sidebar, 'Cellular' is selected. The main area displays the following information:

Status: connected

Active SIM:	SIM2	Signal:	50(-90dBm)	IP Address:	10.71.251.152
ICCID:	89861122254040704863	Network Status:	Connected	Netmask:	255.0.0.0
CIMI:	460113454989501	LAC:	5277	Gateway:	10.0.0.1
Operator:	CHN-TELECOM	Cell ID:	8D85F34	DNS:	218.2.2.2
Network Type:	E-UTRAN(4G)	Connection Time:	00:07:03		

Configuration:

Enable Cellular:

Network:

- * SIM Mode: SIM1 Primary
- * Maximum of 3 dials:
- * DNS Mode: Auto
- * Detection: SIM1&SIM2
- Interface:
- DNS1: 119.29.29.29
- * Detection: 10 s

4.3. Ethernet Port

On this page, users can change the work mode of Ethernet Port1. This port is WAN mode by default. And it can be changed to LAN mode. Then the users can get 2 Ethernet ports.

The screenshot shows the 'Ethernet Port' configuration page. On the left sidebar, 'Ethernet Port' is selected. The main area shows two Ethernet ports:

Ethernet Port 1: Work Mode (WAN) - **changed to LAN**

Ethernet Port 2: Work Mode (LAN)

A large 'apply' button is visible at the bottom.

4.4. WAN Interface

User can set the parameters of WAN port like network mode, DNS mode and MTU.

The screenshot shows the 'Network' tab selected in the top navigation bar. Under the 'WAN' section, there are two tabs: 'Status' and 'Configure'. The 'Status' tab displays network information: Network Type (dhcp), WAN IP (172.16.11.144), Gateway IP (172.16.10.1), MAC (AA:BB:CC:DD:EE:FD), Network (255.255.254.0), DNS (119.29.29.29), Receive (31.4 MB(236109)), Send (6.5 MB(53751)), Connection Time (01:23:13), and MTU (1500). The 'Configure' tab contains fields for Network Mode (DHCP), DNS Mode (Manual), DNS 1 (119.29.29.29), DNS 2 (8.8.8.8), and MTU (1500). A yellow 'apply' button is at the bottom.

4.5. LAN Interface

Users can set the basic information of LAN port like IP address, netmask and DHCP service. When the M300 enables the DHCP service, it can assign IP address to the terminal device connected to M300 via LAN port.

The screenshot shows the 'Network' tab selected in the top navigation bar. Under the 'LAN' section, there are two tabs: 'Status' and 'Configure'. The 'Status' tab displays LAN information: IP (192.168.1.1), Netmask (255.255.255.0), MAC (AA:BB:CC:DD:EE:FE), Send (24.1 MB(48204)), Receive (7.2 MB(68148)), and Connection Time (01:28:22). The 'Configure' tab has sections for 'DHCP Server List' and 'DHCP Host List'. The 'DHCP Host List' table shows one entry: USR-FEUWTMNMYOU with IP 192.168.1.34, MAC 00:0E:C6:72:70:E0, and Lease Time 23:05:48. The 'Static IP List' table is empty, showing 'No data yet'. Buttons for 'Add' and 'Delete' are available for the static IP list.

4.6. Routing

On this page, users can check the routing table and add needed static routing to USR-M300.

The screenshot shows the USR IoT web interface with the 'Routing' tab selected. On the left sidebar, 'Routing' is highlighted with a red border. The main content area displays two tables. The first table, titled 'Routing table', lists network routes with columns: Target, Gateway, Netmask, Flag, Metric, Ref, Use, and Interface. The second table, titled 'Static IPv4 Routes', has columns: Interface, Object, IPv4-Netmask, IPv4-Gateway, Metric, and Operation. Both tables show no data yet.

Target	Gateway	Netmask	Flag	Metric	Ref	Use	Interface
0.0.0.0	172.16.10.1	0.0.0.0	UG	0	0	0	wan
0.0.0.0	172.16.10.1	0.0.0.0	UG	5	0	0	wan
0.0.0.0	10.0.0.1	0.0.0.0	UG	10	0	0	usb0
10.0.0.0	0.0.0.0	255.0.0.0	U	0	0	0	usb0
172.16.10.0	0.0.0.0	255.255.254.0	U	0	0	0	wan
192.168.1.0	0.0.0.0	255.255.255.0	U	0	0	0	br-lan

Interface	Object	IPv4-Netmask	IPv4-Gateway	Metric	Operation
No data yet					

5. Edge Computing

5.1. Edge Mode

The edge mode is edge gateway by default. User can change the mode to Graphical Programming mode. The Graphical Programming is based on Node RED, in this mode, user can develop the application about the edge computing that they need.

How to use Node-RED, please refer to:

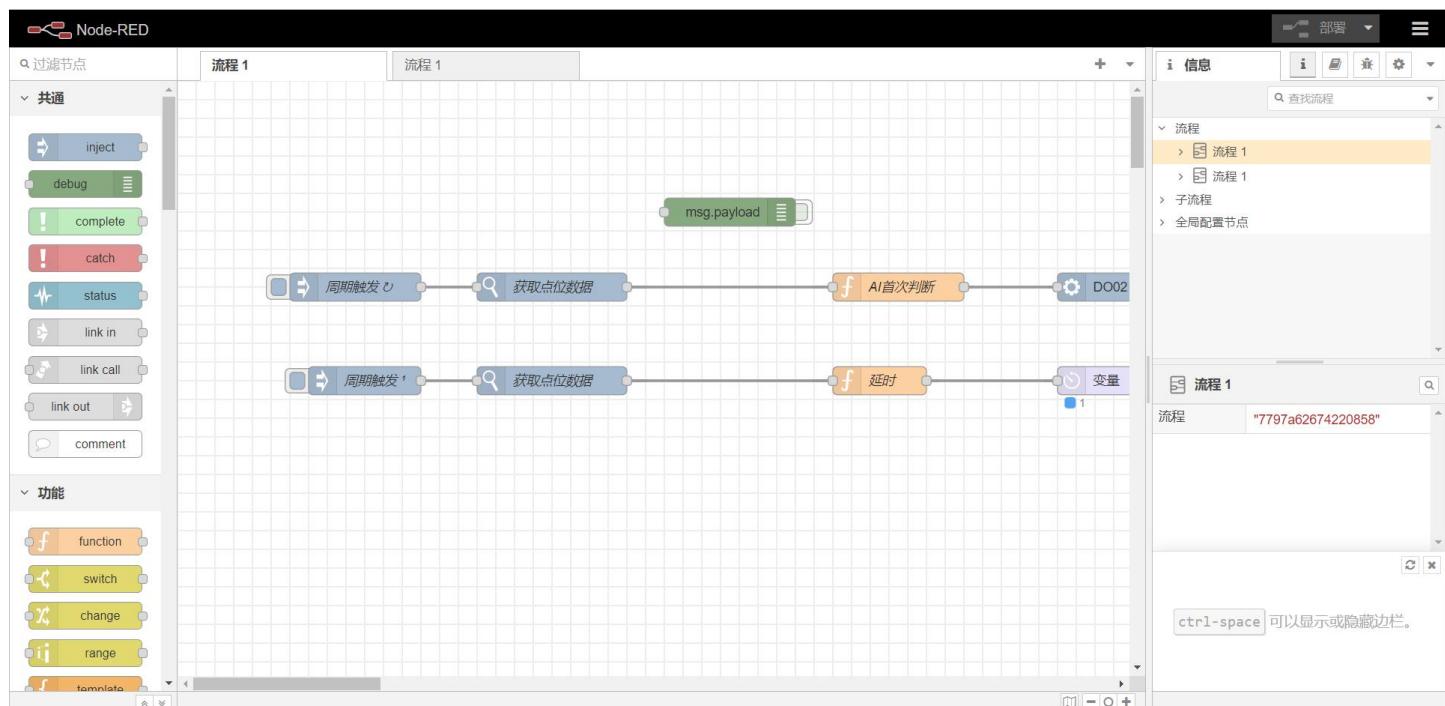
<https://github.com/May-Liu1/PUSRDoc/blob/May-Liu1-M300/Node-RED%20of%20USR-M300.md>

The file is in Branch May-Liu-M300.

The screenshot shows a GitHub repository page for 'May-Liu1 / PUSRDoc'. The repository is public and contains 2 branches and 0 tags. The 'Code' tab is selected. The repository description states: 'This branch is 52 commits ahead of main.' Below the description, there are two commit entries. The first commit is 'May-Liu1 Delete USR-M300.md' by '593e8e9' 11 minutes ago, which has 53 commits. The second commit is 'Node-RED of USR-M300.md' by 'Rename README.md to Node-RED of USR-M300.md' 12 minutes ago. On the right side, there is an 'About' section for 'USR-M300 Developer Do' which includes activity, star, watch, fork, and report repository statistics. There is also a 'Releases' section indicating 'No releases published'.

Note: This setting needs to reboot the M300 gateway. Waiting another 2 minutes after the M300 starting, then the Graphical Design page can be opened.

The screenshot shows the USR IoT Edge Mode configuration page. At the top, there are tabs for Overview, Network, Edge Computing, System Management, and Python Application. The Python Application tab is currently selected. On the left, a sidebar lists Edge Mode, IO Module, Status, Data Point, Protocol, and Edge Gateway. The main area is titled "Edge Mode" and contains a sub-section "Edge Computing: Graphical Programming". It includes a dropdown menu for "Edge Computing" (set to "Graphical Programming"), a "Design Flow: Graphical Design" button, and a note: "开启图形化功能，设备重启成功2min后，图形化可正常使用." (Enable graphical function, after successful device restart, graphical can be used normally after 2 minutes). A red "Apply" button is at the bottom. The footer indicates the version: V1.0.18.develop.0.



5.2. Preset Extension IO

As we all know, the M300 can work with extendable IO module to extend the IO numbers. If the extendable IO modules are connected to M300, users need to preset the IO modules on webpage. The IO modules sequence should be kept the same with the actual hardware sequence.

If the sequence on webpage is different from the hardware sequence of extendable IO modules, the work indicators on M300 will fast blink, and the work indicators on IO extendable modules will blink 4 times/s, then keep off for 2s.

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5.3. IO Module

There are 2 parts in this function, the detail information and the status of IO modules.

5.3.1. DI Interface

On this page, users can check the settings of digital input interfaces, and can also set the work mode of DI interfaces.

DI01: It means the first DI interface of USR-M300

DI22: It means the second DI input of the second extendable IO module.

DI27: It means the seventh DI input of the second extendable IO module.

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The default DI mode is Digital Input, users can click "Edit" to modify the settings.

Module	DI Mode	Filter time	Counter Mode	Count Frequency	Maximum range	Exceeds Maximum range
DI01	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI22	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI23	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI24	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI25	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI26	Digital Input	50 ms	Rising edge	5 ms	10000	loop

There is another function can be set on this page: Restart Hold of DO. This function is closed by default.

If the Restart Hold function is enabled, when we restart the M300, the DO will remain in the state before the power outage.

Module	DI Mode	Filter time	Counter Mode	Count Frequency	Maximum range	Exceeds Maximum range
DI01	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI22	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI23	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI24	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI25	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI26	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI27	Digital Input	50 ms	Rising edge	5 ms	10000	loop
DI28	Digital Input	50 ms	Rising edge	5 ms	10000	loop

5.3.2. Status of IO modules

On this page, users can check the status of IO interface. And can also control the DO interface. Click the DO button, the indicators of DO will turn on or turn off.

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DO Status	Value	Unit
DO01	ON	
DO02	OFF	
DO11	ON	
DO12	ON	
DO13	ON	
DO14	ON	

DI Status	Value	Unit
DI01	OFF	
DI02	OFF	
DI21	OFF	
DI22	OFF	
DI23	OFF	
DI24	OFF	
DI25	OFF	
DI26	OFF	
DI27	OFF	
DI28	OFF	

AI Status	Value	Unit
AI01	0uA	
AI02	0uA	
AI11	0uA	
AI12	0uA	
AI13	0uA	
AI14	0uA	

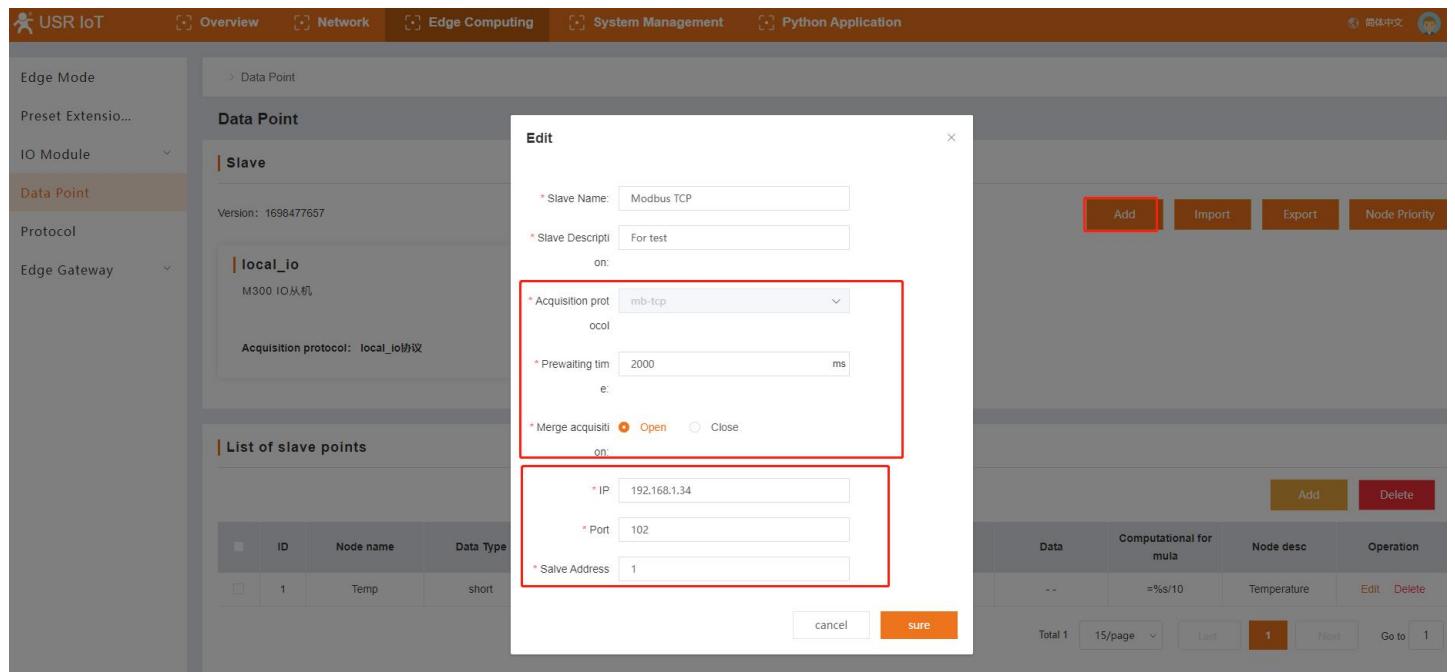
5.4. Data Point

Data Point Table is the core database of the edge computing gateway. The data and data-related information used by the edge gateway for acquisition, reporting, data reading and writing, protocol conversion and linkage control are all obtained from this point table. Therefore, during use, it is very important to add the data point table correctly and in detail.

The data point table contains two main elements: slaves and data points. Up to 20 slaves can be added, IO slaves and virtual slaves are fixed. The remaining 18 Slaves can be added as needed. Corresponding data points can be added to each slave. Except for the virtual slave, the total number of data points of all other slaves is up to 2000. The data points of each slave are actively polled and collected from the corresponding interface according to the protocol specified when adding the slave, and the collected data is correspondingly stored in the virtual register in the product.

For virtual slaves, up to 500 points can be added.

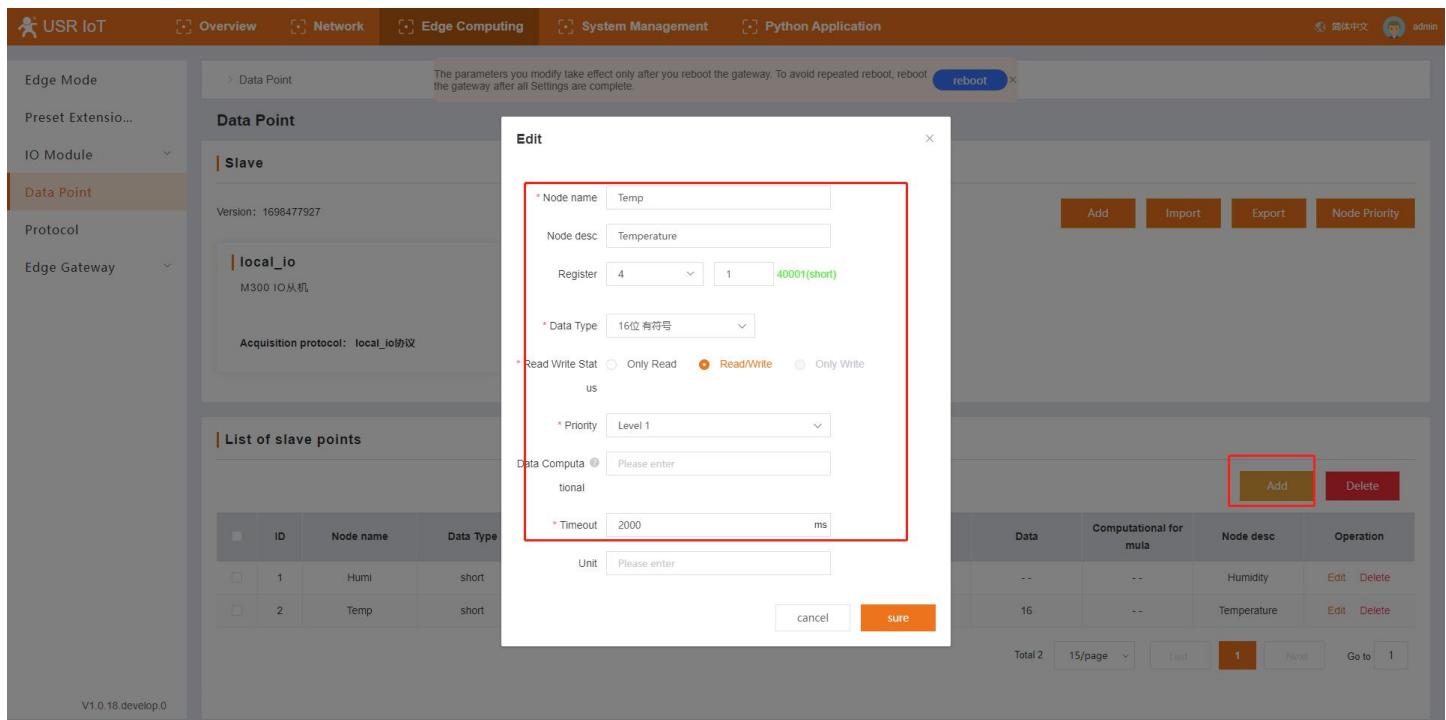
Let's add a slave first, the Modbus TCP protocol is used in this case.



Then add the data points of the Modbus TCP slave:

1>Click the Modbus TCP Slave

2>If we didn't add the data points before, the list of slave points is blank. Click the "Add" button to enter the point information.



3>Added slave and data points:

The screenshot shows the 'Data Point' configuration screen. At the top, there's a note about rebooting to apply changes. The 'Slave' section is selected, showing a 'local_io' entry and a 'Modbus TCP' entry. The 'Modbus TCP' entry is highlighted with a red box. It contains the text 'For test' and 'Acquisition protocol: mb-tcp协议'. Below this is a table titled 'List of slave points' with two entries:

ID	Node name	Data Type	Address	Read Write Status	Priority	Timeout(ms)	Data	Computational formula	Node desc	Operation
1	Humi	short	4 0001	ReadWrite	Level 1	2000	--	--	Humidity	Edit Delete
2	Temp	short	4 0001	ReadWrite	Level 1	2000	16	--	Temperature	Edit Delete

At the bottom right, there are buttons for 'Add', 'Import', 'Export', and 'Node Priority'. Below the table are pagination controls: 'Total 2', '15/page', 'Last', a page number '1' (highlighted with a red box), 'Next', and 'Go to 1'.

4>After all the slave and data points are added, and other settings are ok, please reboot the M300 to make the changed parameters take effect.

This screenshot is identical to the previous one, but the 'reboot' button at the top is highlighted with a red box. A large red arrow points from this button down towards the table below. The rest of the interface is the same, showing the 'Data Point' configuration screen with the 'Slave' section selected and the 'Modbus TCP' entry highlighted.

5>Check the collected data.

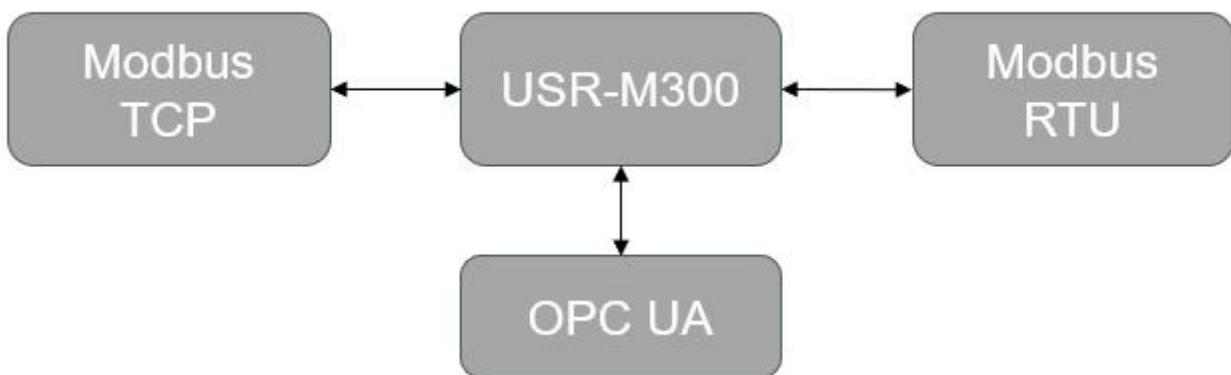
The screenshot shows the USR IoT software interface with the 'Modbus Slave - [Mbslave]' window open. The window has tabs for 'Edge Computing', 'System Management', and 'Python Application'. Below the tabs are buttons for 'Add', 'Import', 'Export', and 'Node Priority'. The main area displays two tables: 'IO' and 'Node'. The 'IO' table lists data points with columns for Address, Alias, and Data. The 'Node' table lists nodes with columns for ID, Node name, Data Type, Address, Read Write Status, Priority, Timeout(ms), Data, Computational formula, Node desc, and Operation. Two specific rows in the 'Data' column of both tables are highlighted with red arrows pointing to each other.

ID	Node name	Data Type	Address	Read Write Status	Priority	Timeout(ms)	Data	Computational formula	Node desc	Operation
1	Humi	short	4 0002	ReadWrite	Level 1	2000	17	--	Humidity	Edit Delete
2	Temp	short	4 0001	ReadWrite	Level 1	2000	16	--	Temperature	Edit Delete

5.5. Protocol

USR-M300 supports mutual conversion between different protocols, such as Modbus RTU/TCP, Modbus TCP and OPC UA, Modbus RTU and OPC UA , BACNET (Northbound transmission) , IEC104 (northbound and southbound),IEC61850 (northbound),SL651(northbound).More protocol conversions are in development.

With this function, users no need to worry about being unable to communicate due to different protocols between the terminal device and the server, because the M300 will convert the point data of all slave devices into a unified protocol format, making it easier for the server to issue and collect data using a unified protocol.



We have added Modbus TCP slave in section 5.4. In this section, will convert Modbus RTU to Modbus TCP using the protocol conversion function.

➤Basic settings:

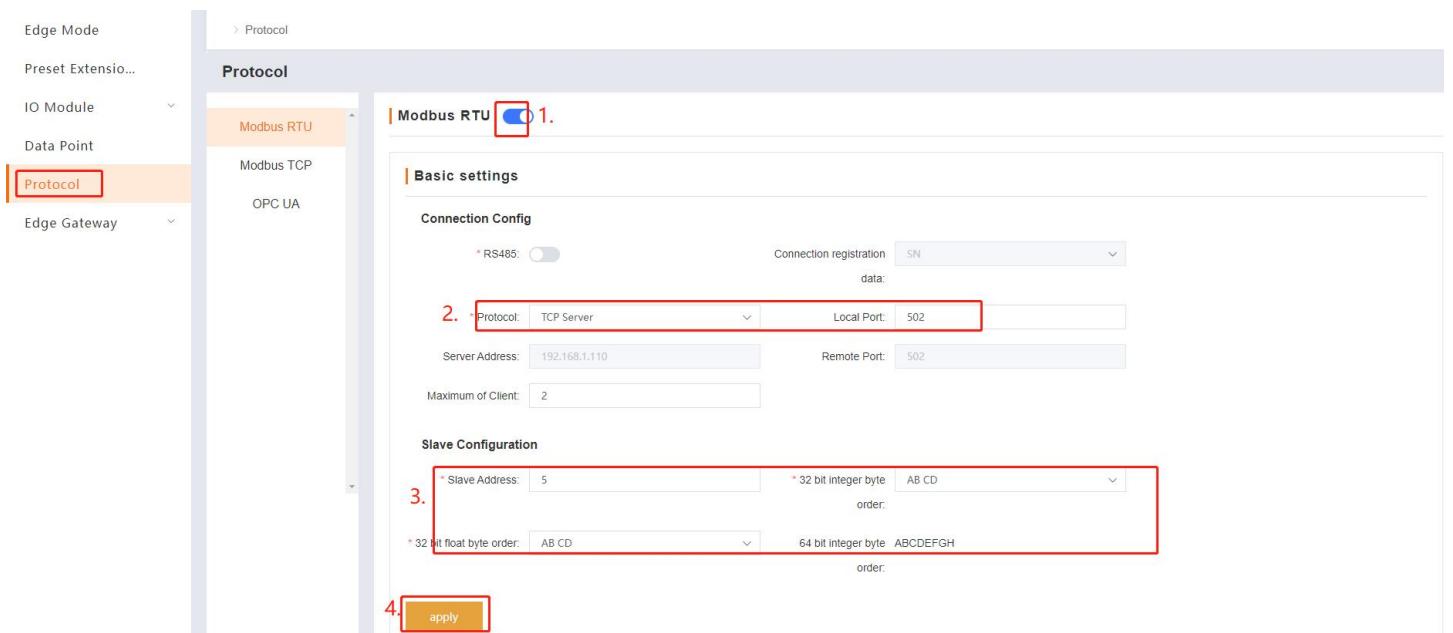
1>Enable Modbus RTU function,

2>Set protocol and local port, in this case, keep them the default parameters

3>Set the Slave address to 5, we add the 16 bit points in Section 5.4, so keep the 32 bit data the default parameters.

4>Click “Apply”, then the window will pop up prompting you to reboot M300 device. We can reboot device after setting all parameters.

Then continue to set mapping point table parameters.



➤Node mapping table

1>Click “Add” button,

2>Select the register type and enter the initial register address,

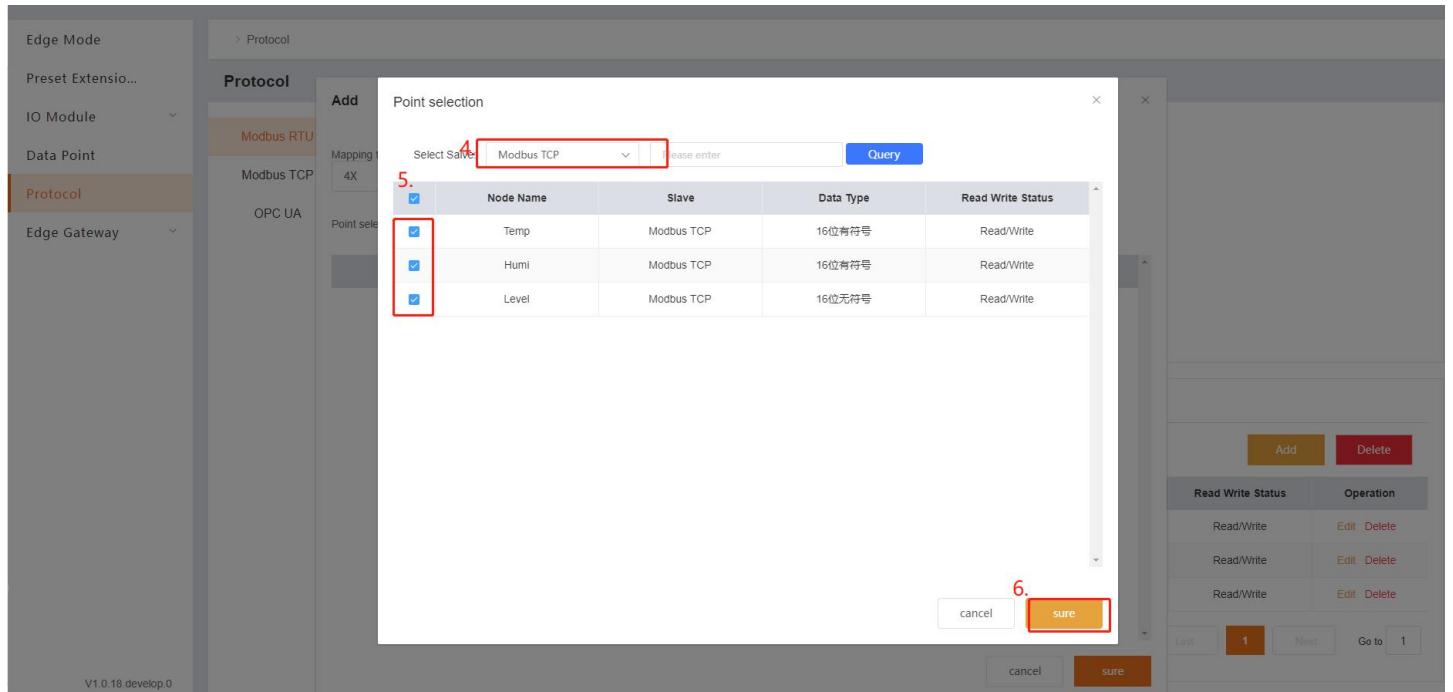
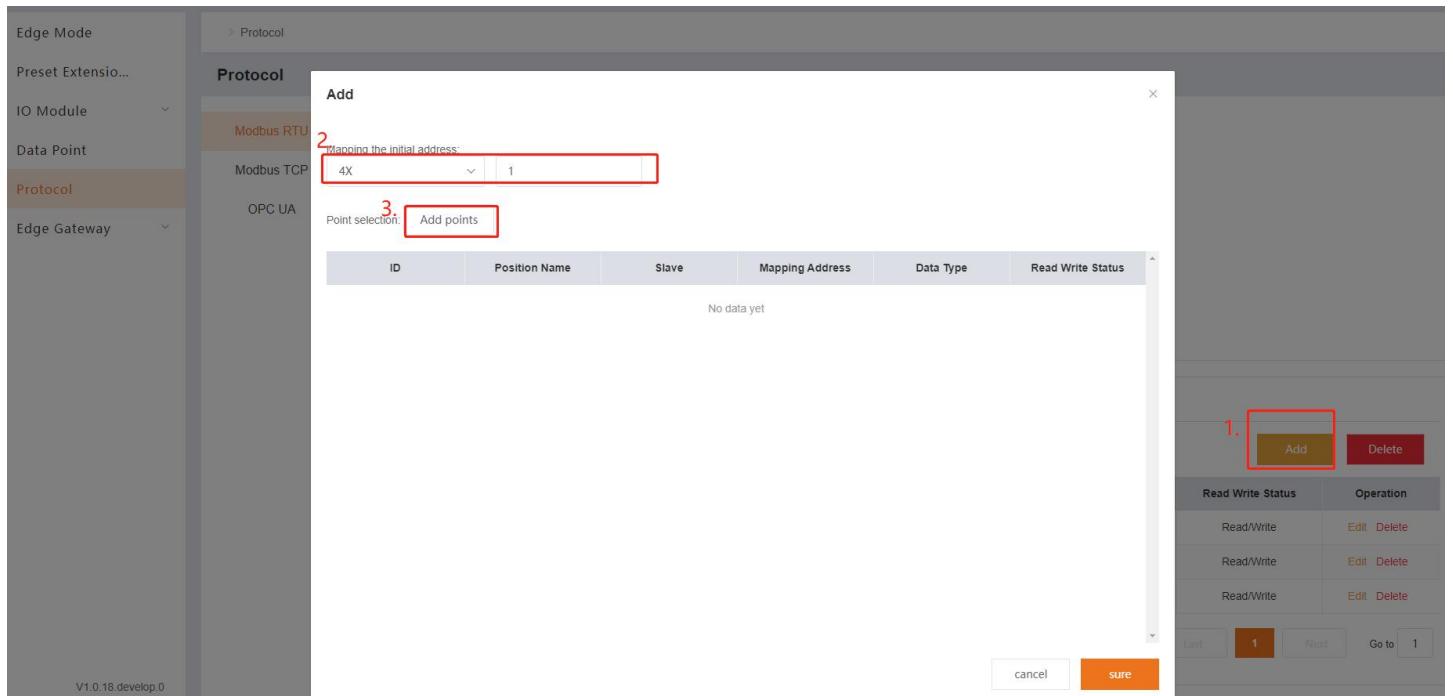
3>Click “Add points” ,

4>Select the slave just added: Modbus TCP,

5>Select the needed data points,

6>Click “Sure”

7>Reboot USR-M300



The screenshot shows the 'Protocol' configuration page for Modbus RTU. In the 'Slave Configuration' section, 'Slave Address' is set to 5, '32 bit integer byte order' is AB CD, and '64 bit integer byte order' is ABCDEFGH. The 'Node mapping table' lists three data points: Level (Modbus TCP, 16位无符号, 40003), Humi (Modbus TCP, 16位有符号, 40002), and Temp (Modbus TCP, 16位有符号, 40001). The 'apply' button is at the bottom.

ID	Position Name	Source(slave)	Data Type	Mapping Address	Read Write Status	Operation
1	Level	Modbus TCP	16位无符号	40003	ReadWrite	Edit Delete
2	Humi	Modbus TCP	16位有符号	40002	ReadWrite	Edit Delete
3	Temp	Modbus TCP	16位有符号	40001	ReadWrite	Edit Delete

➤To test the function

Send Modbus RTU command to query data point, and the green part is the response from M300.

The screenshot shows the 'Protocol' configuration page for Modbus RTU. In the 'Slave Configuration' section, 'Slave Address' is set to 5, '32 bit float byte order' is AB CD, and '64 bit integer byte order' is ABCDEFGH. The 'Node mapping table' lists three data points: Level (Modbus TCP, 16位无符号, 40003), Humi (Modbus TCP, 16位有符号, 40002), and Temp (Modbus TCP, 16位有符号, 40001). The 'apply' button is at the bottom. To the right, the 'Network Assistant' tool is open, showing a log of communication between the device and a host computer. A red box highlights a specific message in the log: '2023-10-28 17:03:54.167/TX> 05 03 00 00 10 00 11 7E 3A'. This message corresponds to the 'SEND' message shown in the log.

5.6. Edge Gateway

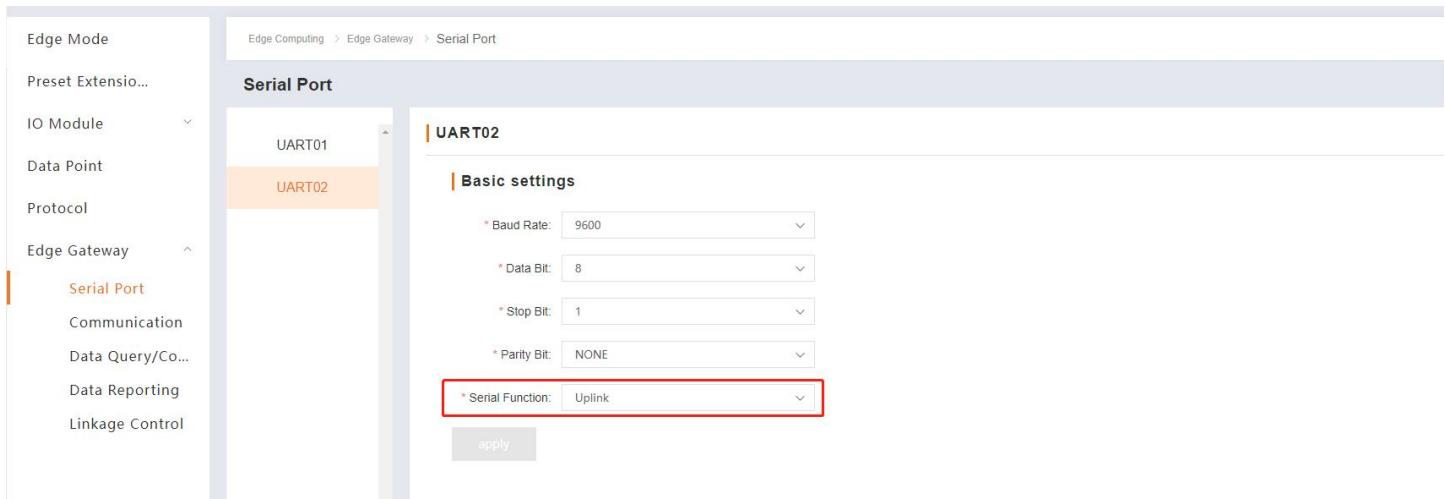
5.6.1. Serial Port

On this page, users can set the basic parameters of UART, like baud rate, data bit, stop bit and parity bit.

For UART2, it has one more parameter: Serial Function. The default is “Downlink”.

Downlink: The device connected to the serial port is Slave device,

Uplink: The device connected to the serial port is Master device.



5.6.2. Communication

USR-M100 supports 2 independent communication channels. It provides multiple communication modes like TCP client/TCP server/UDP/MQTT client/http client. It has the AWS cloud built-in, users can use it conveniently. In this case, we set the communication parameters like the following picture.

The screenshot shows the 'Communication' configuration page. Under 'Communication1', the 'Basic settings' section includes fields for Communication Protocol (TCP Client), Remote Server Address (192.168.1.99), Local Port (0), and Remote Port (8234). The 'Communication Protocol' field is highlighted with a red box.

5.6.3. Data Query/Control

With this function, users can query and control data points via Json format. Click "Add" to add link channel, in this case, we choose the Link1.

The Json command format is like the following:

```
{"rw_prot": {"Ver": "Protocol Version", "dir": "Data Direction", "id": "Information ID", "r_data": [{"name": "Node Name"}], "w_data": [{"name": "Node Name", "value": "data"}]}}
```

Description of items:

Field Name	Description
rw_prot	Protocol Header
Ver	Protocol Version
dir	Data Direction
id	User defined parameter. The id is same in query/control and response data. Sometimes, the query/control data is high frequency, the response data may be disordered. The program in network can confirm the relevant response data by the id.
r_data	The data load for querying data
w_data	The data load for controlling data
name	The node name described on section 5.4
value	Means the data need to be sent to the data points described

The screenshot shows the USR IoT software interface. On the left, there's a sidebar with various options like Edge Mode, Preset Extension, IO Module, Data Point, Protocol, Edge Gateway, Serial Port, Communication, Data Query/Control (which is selected), Data Reporting, and Linkage Control. The main area has tabs for Overview, Network, Edge Computing, System Management, and Python Application. Below these tabs, it says "Edge Computing > Edge Gateway > Data". There's a note: "The parameters you modify take effect only after you reboot the gateway. To avoid repeated reboot, reboot the gateway after all Settings are complete." A "reboot" button is next to this note. The central part is titled "Data Query/Control" with a "Data Query/Control" toggle switch turned on. Below it is a "Select Channel" dropdown set to "Link one". A modal window titled "New" is open, showing a JSON configuration. The JSON code is as follows:

```

    "下发": [
        {
            "rw_prot": [
                {
                    "Ver": "1.0.1",
                    "dir": "down",
                    "id": "12345",
                    "r_data": [
                        {
                            "name": "node0101"
                        },
                        {
                            "name": "node0102"
                        }
                    ],
                    "w_data": [
                        {
                            "name": "node0101",
                            "value": "35"
                        },
                        {
                            "name": "node0102",
                            "value": "52"
                        }
                    ]
                }
            ]
        }
    ]

```

At the bottom of the modal, there are "cancel" and "sure" buttons. A red arrow points from the "Link one" dropdown in the modal to the "Add" button in the top right corner of the modal window.

In section 5.4, the added data points have data already, now we can collect the data to the server. Set the Network Assistant as TCP server, the local port is 8234, USR-M300 work as TCP client to connect the TCP server. Then send Json command to collect the temperature and Humidity data, to control the level data at the same time. User can copy the Json command sample and change the query and control command based on the sample.

The screenshot shows the 'Data Query/Control' section of the USR IoT software. On the left sidebar, under 'Edge Gateway', 'Data Query/Co...' is selected. The main area displays a JSON configuration block with a red box highlighting the code provided in the question. Below the JSON is a 'apply' button.

```

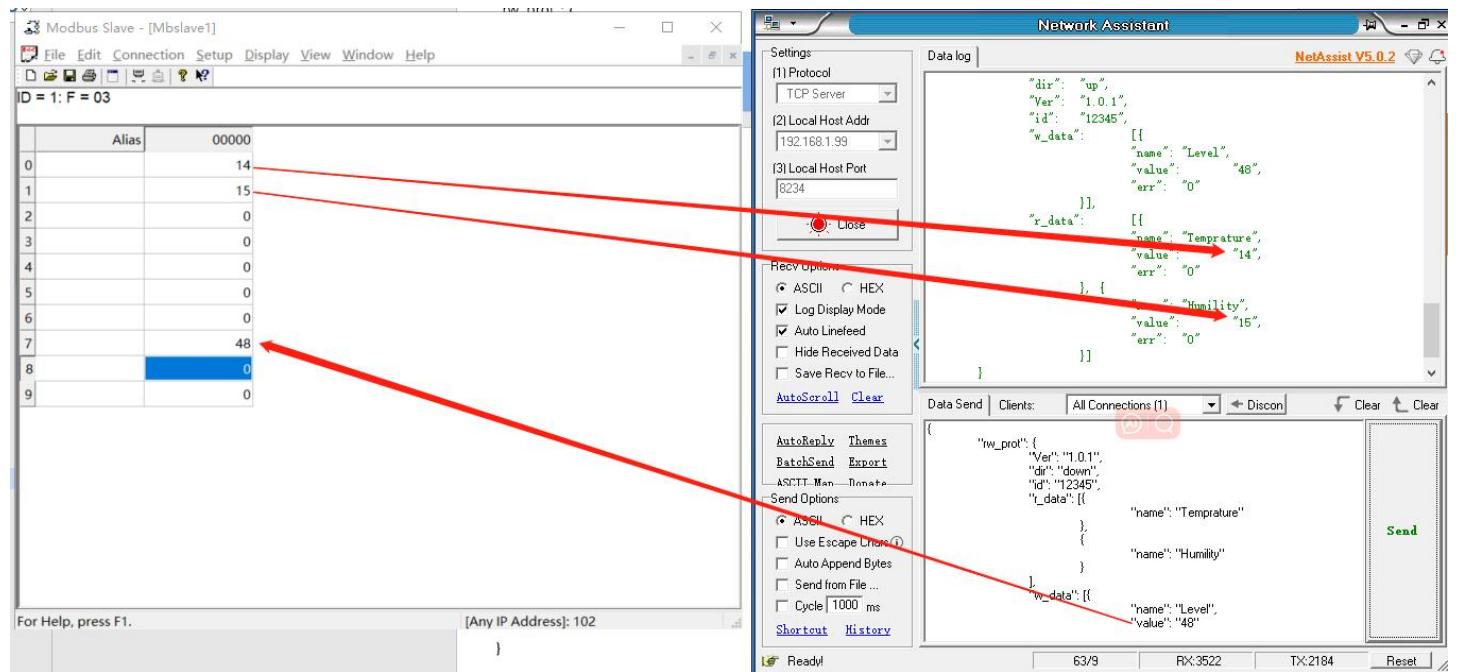
{
    "rw_prot": {
        "Ver": "1.0.1",
        "dir": "down",
        "id": "12345",
        "r_data": [
            {
                "name": "Temprature"
            },
            {
                "name": "Humidity"
            }
        ],
        "w_data": [
            {
                "name": "Level",
                "value": "48"
            }
        ]
    }
}

```

```

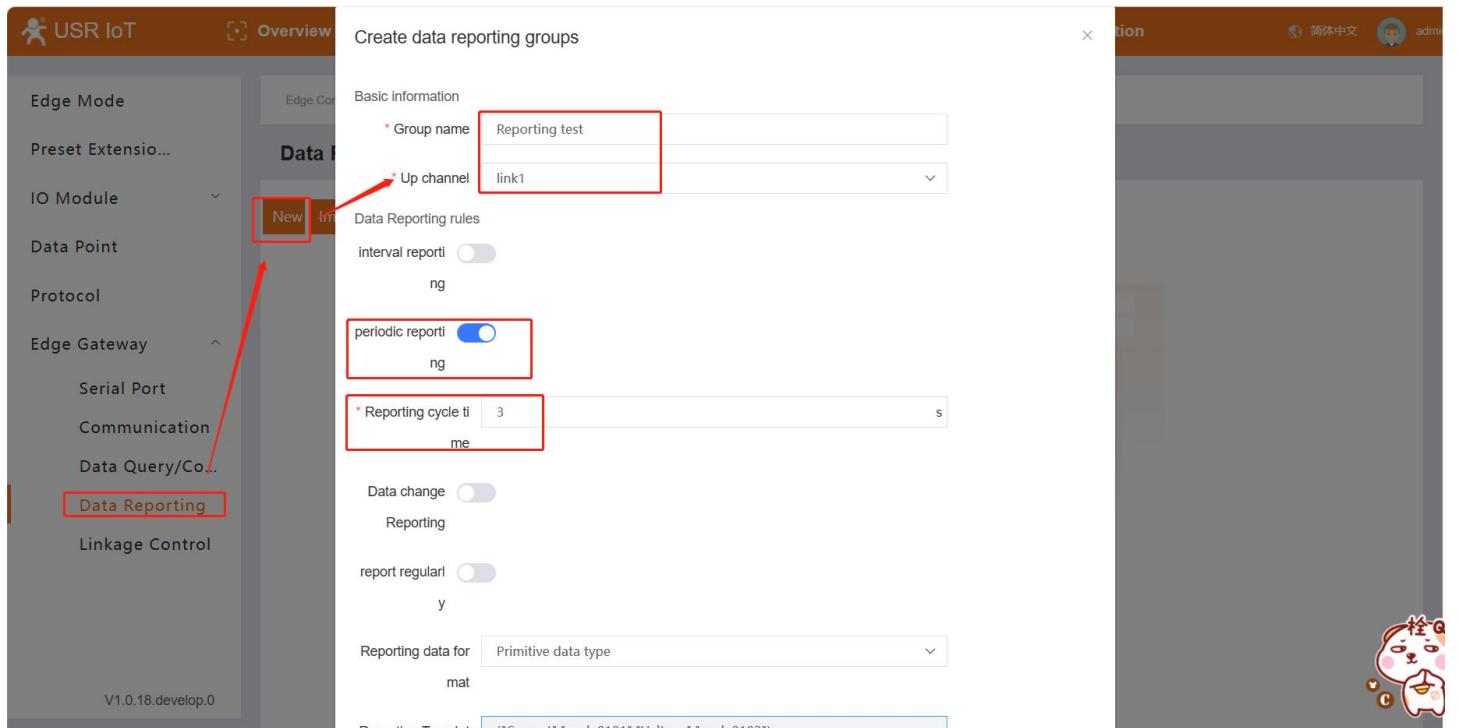
{
    "rw_prot": {
        "Ver": "1.0.1",
        "dir": "down",
        "id": "12345",
        "r_data": [
            {
                "name": "Temprature"
            },
            {
                "name": "Humidity"
            }
        ],
        "w_data": [
            {
                "name": "Level",
                "value": "48"
            }
        ]
    }
}

```

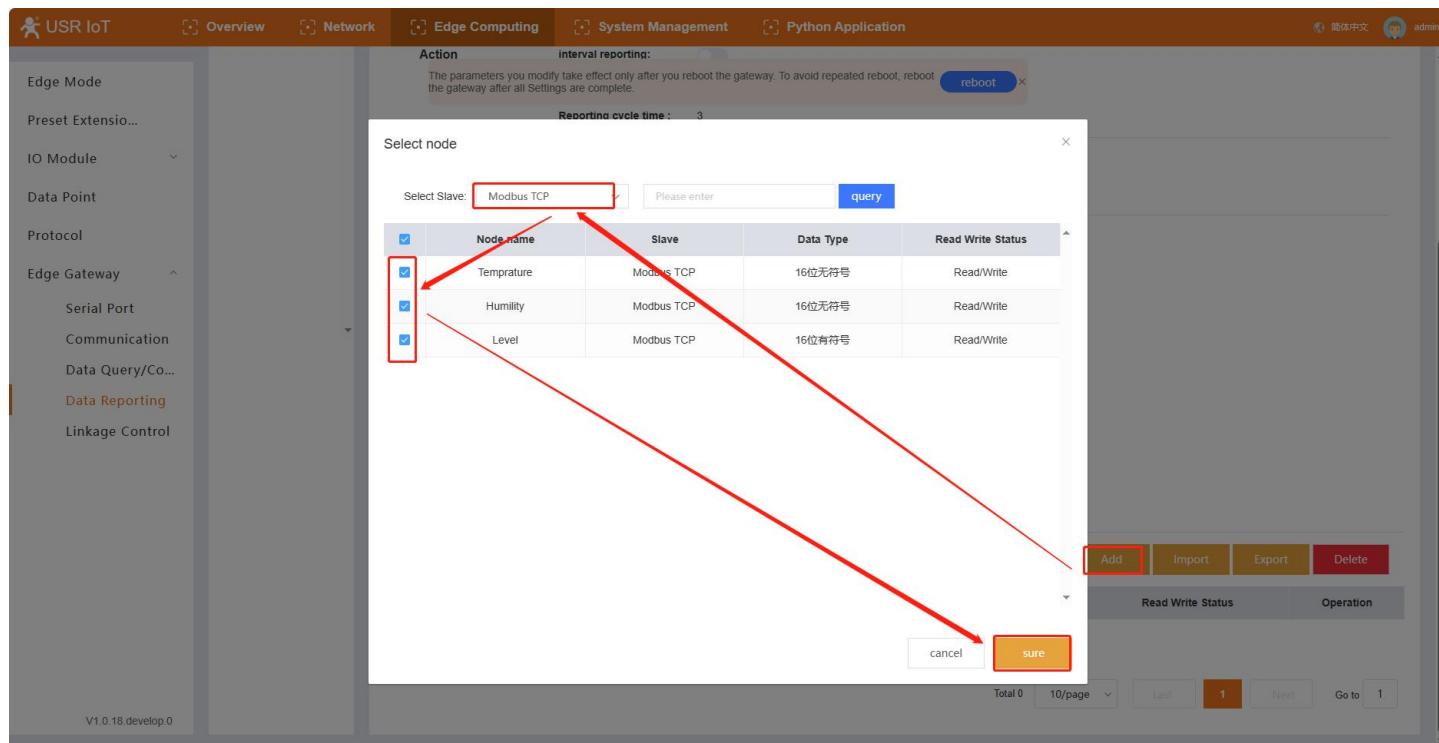


5.6.4. Data Reporting

The data reporting function will report the collected data on data point page to server actively. Users can send the data in different methods. The Reporting Template will be introduced later.



Then add the data points that need to be reported.



Json Template:

The data reporting function will upload point data to the server in Json format. Customers can customize the Json template according to the server's requirements to ensure that the uploaded data format meets the server's parsing requirements. The actual data points can be defined in the Json template.

In addition to data points, the Json template can also add some specific identifiers, such as the product's firmware version, SN, MAC and other parameters. These parameters can be processed as the unique identifier of the device. Directly add the relevant identification name in the value position of the Json template. During the reporting process, the device will substitute the data corresponding to the identification name and report it. For example, to report timestamp, set the Json template to {"time":"sys_local_time"},

Items	Description	Example
sys_ver	Firmware version	V1.0.14.000000.0000
sys_imei	IMEI	864452061930390
sys_sn	SN	02700122093000012356
sys_mac	MAC	D4AD20474662
sys_iccid	ICCID	89861122219045577705
sys_local_time	Local time	2023-05-27,22:35:44
sys_utc_time	UTC time	2023-01-12T18:15:02Z
sys_unix_time	Timestamp	1681985788

1

Data Reporting rules

Basic information	Up channel:	Link one
	Public topic:	(null)
Action	interval reporting:	<input checked="" type="checkbox"/>
	periodic reporting:	<input checked="" type="checkbox"/>
	Reporting cycle time :	3
	Data change Reporting:	<input checked="" type="checkbox"/>
	report regularly:	<input checked="" type="checkbox"/>
	Reporting data format:	Primitive data type
	Reporting Template:	<pre>{"time":"sys_local_time","Temperature":"Tempratur e","Humility":"Humility"}</pre>

The test result: USR-M300 reports the collected data according to the period cycle time and the content of the Json template.

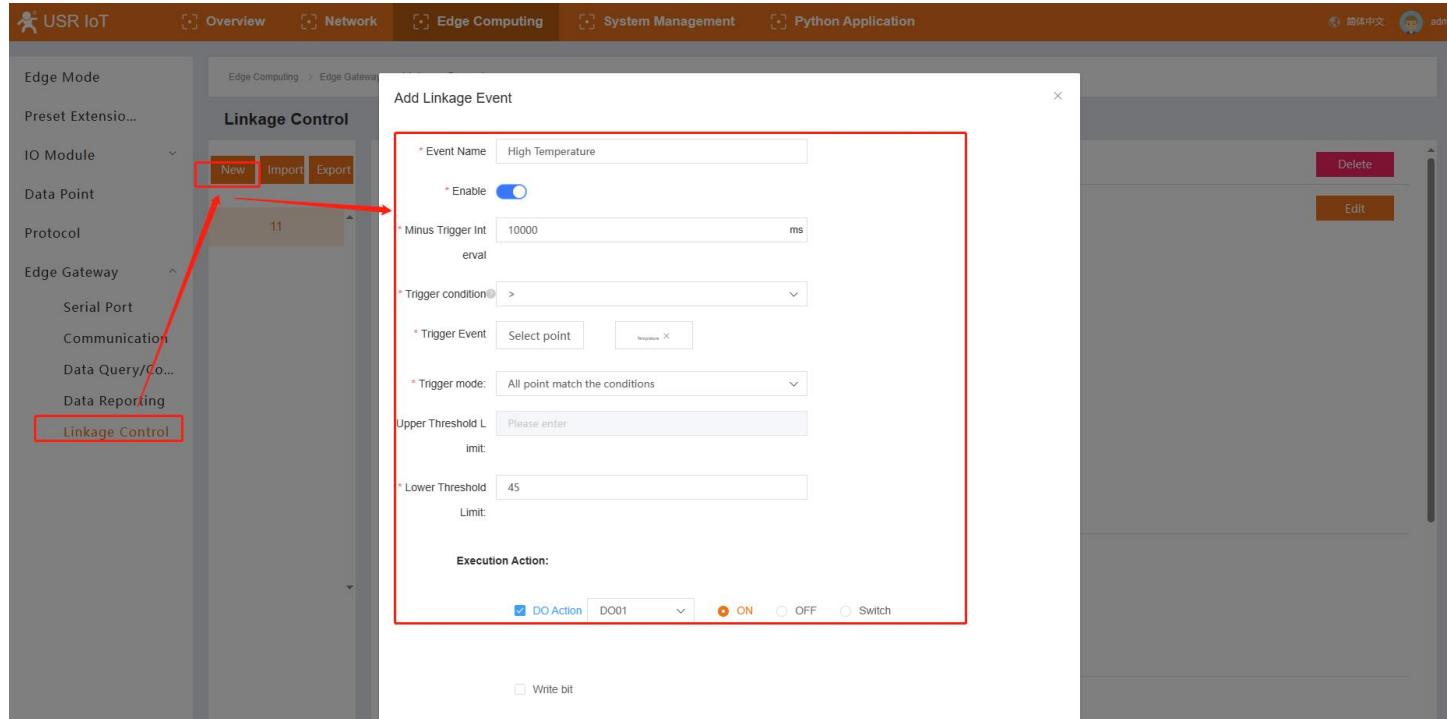
The screenshot shows the USR IoT software interface with the following components:

- Top Bar:** Includes tabs for Overview, Network, Edge Computing, System Management, Python Application, and user admin.
- Left Sidebar:** Shows sections for Edge Mode, Preset Extension, IO Module, Data Point, Protocol, Edge Gateway, Serial Port, Communication, Data Query, and Data Report. The Data Report section is highlighted with a red arrow pointing to the configuration window.
- Configuration Window (Data Report):** Displays the configuration for the Data Report rule. It includes fields for Up channel (Link one), Public topic (null), Action (interval reporting and periodic reporting enabled), Reporting cycle time (3), Data change Reporting (enabled), report regularly (enabled), Reporting data format (Primitive data type), and Reporting Template (JSON code: {"time":"sys_local_time","Temperature":"Tempratur
e","Humility":"Humility"}).
- Network Assistant Log:** A window titled "Network Assistant" showing a log of received ASCII messages. The log entries are:
 - [2023-11-01 18:01:24.880] RCV ASCII FROM 192.168.1.1 :37664> {"time": "Wed Nov 1 18:01:23 2023", "Temperature": "14", "Humility": "15"}
 - [2023-11-01 18:01:27.884] RCV ASCII FROM 192.168.1.1 :37664> {"time": "Wed Nov 1 18:01:26 2023", "Temperature": "14", "Humility": "15"}
 - [2023-11-01 18:01:30.880] RCV ASCII FROM 192.168.1.1 :37664> {"time": "Wed Nov 1 18:01:29 2023", "Temperature": "14", "Humility": "15"}
 - [2023-11-01 18:01:32.884] RCV ASCII FROM 192.168.1.1 :37664> {"time": "Wed Nov 1 18:01:32 2023", "Temperature": "14", "Humility": "15"}
 - [2023-11-01 18:01:36.884] RCV ASCII FROM 192.168.1.1 :37664> {"time": "Wed Nov 1 18:01:35 2023", "Temperature": "14", "Humility": "15"}
- Bottom Status Bar:** Shows connection status (All Connections (1)), Discon, and log levels (1039/9 RX:42829 TX:2184).

5.6.5. Linkage Control

The linkage function is mainly used to realize local closed-loop management, rapid alarm and emergency

applications. The product can support 50 linkage events internally.



Items	Description	Default Parameter
Event Name		None
Enable	Weather to enable the linkage control	Off
Minus Trigger Interval	When the trigger condition is met for several times in a short period, the trigger takes effect only when the interval between two triggers is greater than the set value.	None
Trigger condition	The action can be executed if the conditions are met, A total of 10 conditions are supported.	None
Trigger Event	Select the data point to start the trigger event.	
Trigger mode	All points match the conditions Any point matches the conditions	None
Upper Threshold Limit	The value range: 0~20000	None
Lower Threshold Limit	The value range: 0~20000	None

Description of trigger condition:

Trigger condition	Description	Extro
Forward Follow	If DI is high level, DO outputs high level. If DI is low level, DO outputs low level.	Only available for coil value.
Reverse Follow	If DI is high level, DO outputs low level. If DI is low level, DO outputs high level.	Only available for coil value.
Greater than	The collected value exceeds the threshold, an action is triggered.	Only the lower of the thresholds need be set.
Equal or greater than	The collected value is greater than or equal to the threshold, an action is triggered.	Only the lower of the thresholds need be set.
Less than	The collected value is less than the threshold, an action is triggered.	Only the upper of the thresholds need be set.
Equal or less than	The collected value is less than or equal to the threshold, an action is triggered.	Only the upper of the thresholds need be set.
In the Range (Including boundary data)	An action is triggered when the collected value is within the threshold range, and an action is triggered each time the collected value is within the range.	Upper and lower limits of the thresholds need be set.
In the Range (Excluding boundary data)	An action is triggered when the collected value is within the threshold range, and an action is triggered each time the collected value is within the range.	Upper and lower limits of the thresholds need be set.
Out of the Range(including boundary data)	An action is triggered when the collected value is outside the threshold range, and an action is triggered each time the collected value is outside the range.	Upper and lower limits of the thresholds need be set.
Out of the Range(excluding boundary data)	An action is triggered when the collected value is outside the threshold range, and an action is triggered each time the collected value is outside the range.	Upper and lower limits of the thresholds need be set.

In this case, we add 2 events: High Temperature and Normal temperature,

The screenshot shows the 'Linkage Control' configuration page. On the left sidebar, under 'Edge Computing > Edge Gateway > Linkage Control', the 'Linkage Control' tab is selected. In the main area, a table lists two events:

Event Name	Trigger Event	Trigger condition	Upper Threshold Limit	Lower Threshold Limit
High Temperature	Temperature	>	0	45

Below the table, the 'Execution Action' section shows a 'DO Action' configuration:

- DO: DO01
- Action: ON

The screenshot shows the 'Linkage Control' configuration page. On the left sidebar, under 'Edge Computing > Edge Gateway > Linkage Control', the 'Linkage Control' tab is selected. In the main area, a table lists two events:

Event Name	Trigger Event	Trigger condition	Upper Threshold Limit	Lower Threshold Limit
Normal Temperature	Temperature	<	45	0

Below the table, the 'Execution Action' section shows a 'DO Action' configuration:

- DO: DO01
- Action: OFF

In High Temperature, if the value of temperature is higher than 45, then turn on DO1.

The screenshot shows the USR IoT software interface. At the top, there are tabs for Overview, Network, Edge Computing, System Management, Python Application, and a user account for admin. The main window is titled "Slave" and contains a "Modbus Slave - [Mbslave1]" configuration window. This window includes sections for Alias (00000), Data (Temperature: 45, Humidity: 15), and a "Linkage Control" table.

Linkage Control Table:

ID	Node name	Data Type	Address	Read Write Status	Priority	Timeout(ms)	Data	Computational formula	Node desc	Operation
1	DO02	bit	DO 02	ReadWrite	Level 1	2000	0	--	--	Edit Delete
2	DO01	bit	DO 01	ReadWrite	Level 1	2000	1	--	--	Edit Delete
3	DI02	bit	DI 02	Only Read	Level 1	2000	0	--	--	Edit Delete
4	DI01	bit	DI 01	Only Read	Level 1	2000	0	--	--	Edit Delete
5	AI02	ulong-ABCD	AI 02	Only Read	Level 1	2000	0	--	--	Edit Delete
6	AI01	ulong-ABCD	AI 01	Only Read	Level 1	2000	0	--	--	Edit Delete

At the bottom right of the interface, there is a cartoon character icon.

In Normal temperature, if the value of temperature is lower than 45, then turn off DO1.

This screenshot is identical to the one above, except the "Temperature" value in the Modbus Slave configuration window has been changed to 44. A red arrow points from the "Temperature" cell in the configuration window to the corresponding row in the "Linkage Control" table, specifically highlighting the "Data" column for DO01.

6. System Management

6.1. System Time

On this page, users can select Time Zone or set time manual. And can also set the NTP server.

System Time

LOG

System

PUSR Cloud Ser...

Access Tools

Location

V1.0.18.develop.0

System Time

Time Zone: UTC +8 [Modify](#)

Device Time: 2023-10-28 17:48:54 [Sync With Browser](#)

Set Time: [Set](#)

NTP

* NTP:

Server_1:

NTP Server_2:

[apply](#)

6.2. Log

Users can check and download log information on this page.

System Time

LOG

System

PUSR Cloud Ser...

Access Tools

Location

V1.0.18.develop.0

LOG

ID	Time	Level	Log
1	01046.598	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
2	00381.591	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
3	00382.577	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
4	00383.579	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
5	00384.591	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
6	00385.580	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
7	00386.583	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
8	00387.584	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
9	00388.584	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
10	00389.584	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.
11	00390.590	Warning	[nodered_module][nodered_service.c][163]:edge_read_write error.

[Start](#) [Download Log](#) [Clear History Log](#)

6.3. System

6.3.1. Configuration Management

➤System Config

This function mainly includes parameter export, import, and restore to factory settings. Using this

function, users can quickly copy product parameters.

The screenshot shows the 'Configuration Management' section of the USR IoT interface. On the left sidebar, under 'System', 'Configuration ...' is selected. In the main area, the 'System Config' section is highlighted with a red box. It contains three buttons: 'Export' (disabled), 'Import' (disabled), and 'Restore Factory Configuration'. Below this, there is a note: 'Note: The export point table will synchronously export the data point table, protocol conversion data point table, linkage control event table, and data reporting group table, and will be updated synchronously after importing'.

➤Edge Computing Config

The export point table will synchronously export the data point table, protocol conversion data point table, linkage control event table, and data reporting group table, and will be updated synchronously after importing.

The screenshot shows the 'Configuration Management' section of the USR IoT interface. On the left sidebar, under 'System', 'Configuration ...' is selected. In the main area, the 'Edge Computing Config' section is highlighted with a red box. It contains two buttons: 'Export' (disabled) and 'Import' (disabled). Below this, there is a note: 'Note: The export point table will synchronously export the data point table, protocol conversion data point table, linkage control event table, and data reporting group table, and will be updated synchronously after importing'.

6.3.2. Firmware Upgrade

On this page, the current firmware version is displayed, and it provides firmware upgrade operations. Select a valid firmware and click Start Upgrade to wait for the automatic upgrade of the product.

6.3.3. User Management

This function is mainly to set the username and password for logging in to the built-in web page. The username supports 4-30 characters, and the password supports 1-30 characters.

6.3.4. Reboot

Users can restart the device immediately or add a scheduled restart task and set the restart time on the same day. Restart tasks can be performed in 24 hours, accurate to the minute.

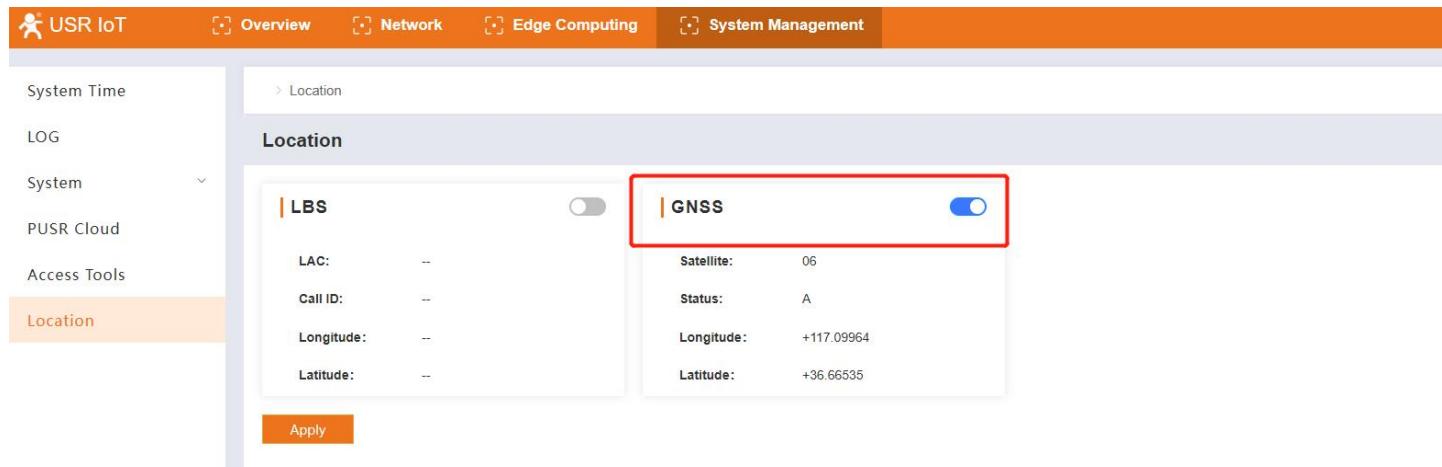
6.4. PUSR Cloud Service

This function is to facilitate customers to quickly connect to the public PUSR platform, through which equipment maintenance can be carried out. If it is a private deployed PUSR platform, users can enable the private deployment button and fill in the private IP address and port to connect.

6.5. Location

USR-M300 supports both LBS location and GPS location. The location function is not enabled by default. Users can enable the LBS location or GPS location manually.

6.5.1. GNSS



The screenshot shows the USR IoT web interface with the following details:

- Header:** USR IoT, Overview, Network, Edge Computing, System Management.
- Left Sidebar:** System Time, LOG, System, PUSR Cloud, Access Tools, Location (highlighted).
- Current View:** Location
- GNSS Configuration:**
 - LBS:** Toggled off.
 - GNSS:** Toggled on (highlighted with a red box).
 - Details:**

LAC:	--	Satellite:	06
Call ID:	--	Status:	A
Longitude:	--	Longitude:	+117.09964
Latitude:	--	Latitude:	+36.66535
- Buttons:** Apply

Satellite: The number of satellites simultaneously observed by GPS system.

Status: "A" means successful GPS positioning, "V" means GPS positioning failure.

Longitude: The longitude of the device's location.

Latitude: The latitude of the device's location.

Users can also send the GPS information to remote servers to achieve real-time monitoring of the USR-M300 device.

The screenshot shows the USR IoT software interface with the following details:

- Header:** USR IoT, Overview, Network, Edge Computing (selected), System Management.
- Left Sidebar:** Wizard, Edge Mode, Extension IO, IO Module, Data Point, Protocol, Edge Gateway, Serial Port, **Links** (highlighted with a red box), Reporting, Linkage Control.
- Central Content:**
 - Links Section:** Shows Link-1 (selected) and Link-2.
 - Link-1 Configuration:**
 - Basic settings:** Communication Protocol: TCP Client, Remote Server Address: 192.168.66.183, Local Port: 8899, Remote Port: 8234.
 - Connection registration: Disable.
 - SSL Protocol: Disable.
 - Report Cache Data:
 - Buttons:** apply (highlighted with a red box).
- Top Status Bar:** Edge Computing > Edge Gateway > Links. A note: "The parameters you modify take effect only after you reboot the gateway. To avoid repeated reboot, reboot the gateway after all Settings are complete." with a "reboot" button.

7. Contact Us

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