

Industrial Edge Gateway

USR-M300

IEC104
Protocol conversion



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Directory

目录

1. product introduction	3
2. IEC104 protocol.....	3
3. Environmental preparation.....	3
4. ConfigurationM300.....	3
4.1. Connection	3
4.2. ConfigureIEC104protocol conversion.....	4
5. Analog Slave Software Configuration	6
5.1. Create links	6
5.2. Open the collection point.....	7
6. view results	8
7. Update history.....	8

1. product introduction

The M300 is a high-performance, scalable, comprehensive edge gateway. The product integrates edge data acquisition, calculation, active reporting, data reading and writing, linkage control, IO acquisition and control functions, etc. The acquisition protocol includes standard Modbus protocol and a variety of common PLC protocols, as well as industry-specific protocols. Active reporting adopts group reporting mode, and json reporting template is customized to quickly realize the docking of server data formats. At the same time, the product also has routing and VPN and graphical program ming functions, graphical module design edge computing functions, to meet customer's own design needs. The product supports TCP/MQTT(S) protocol communication, supports multi-channel connection; supports Modbus RTU/TCP and OPC UA protocol conversion and other functions, and supports fast access to common platforms such as PUSR, Alibaba Cloud, AWS and Huawei Cloud.

The product adopts Linux core, the main frequency is up to 1.2GHz; the network adopts WAN/LAN plus 4G cellular design, the uplink transmission is more reliable, and the LAN port can be connected to external cameras and other devices, and the function application can be realized by combining its own routing function; the hardware integrates 2-way DI, 2-way DO, 2-way AI and 2-way RS485, which not only can realize the industrial field control and acquisition requirements, but also can realize linkage control according to various acquisition point data or status. It can be widely used in intelligent breeding, intelligent factories and other industrial intelligent solutions.

The product adopts expandable design in structure, which can be combined and applied by expanding modules with different functions, so as to better meet the requirements of IO quantity and communication interface in different scenarios. Convenient and cost effective.

2. IEC104 protocol

IEC104 protocol, formally known as IEC60870-5-104, is a standard developed by the International Electro technical Commission (IEC) to support network communication between power system automation equipment. The protocol uses TCP/IP as the underlying communication protocol for monitoring and controlling all types of equipment in power systems, including but not limited to substations, generators, switches, etc.

3. Environmental preparation

USR-M300 *1

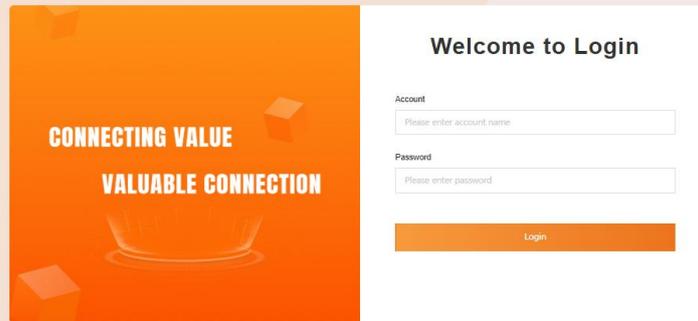
net cable*1

12V/1 A power adapter *1

4. Configuration M300

4.1. Connection

Connect the LAN port of the M300 to the computer and enter the built-in page of the M300 through the LAN port IP (192.168.1.1) in the browser of the computer. Enter your account password (default password is admin). Then click Login.



4.2. Configure IEC104 protocol conversion

(1) Under the interface of Edge Computing-Protocol Conversion-IEC104, configure the basic configurations of Local Port Number, COT Size, K, W, T0, T1, T2, T3 and Maximum Number of Connections, and click Apply.

·Server address:IP address of the machine

·Local port: custom.

COT Size: An important field used to identify the reason for the data transfer. Default is 2.

K: The maximum number of retransmissions before the host receives an acknowledgement during data transmission.

W: The maximum number of unacknowledged data frames a host can send before waiting for an acknowledgement.

T0: The longest time the host waits for an acknowledgement after sending a message.

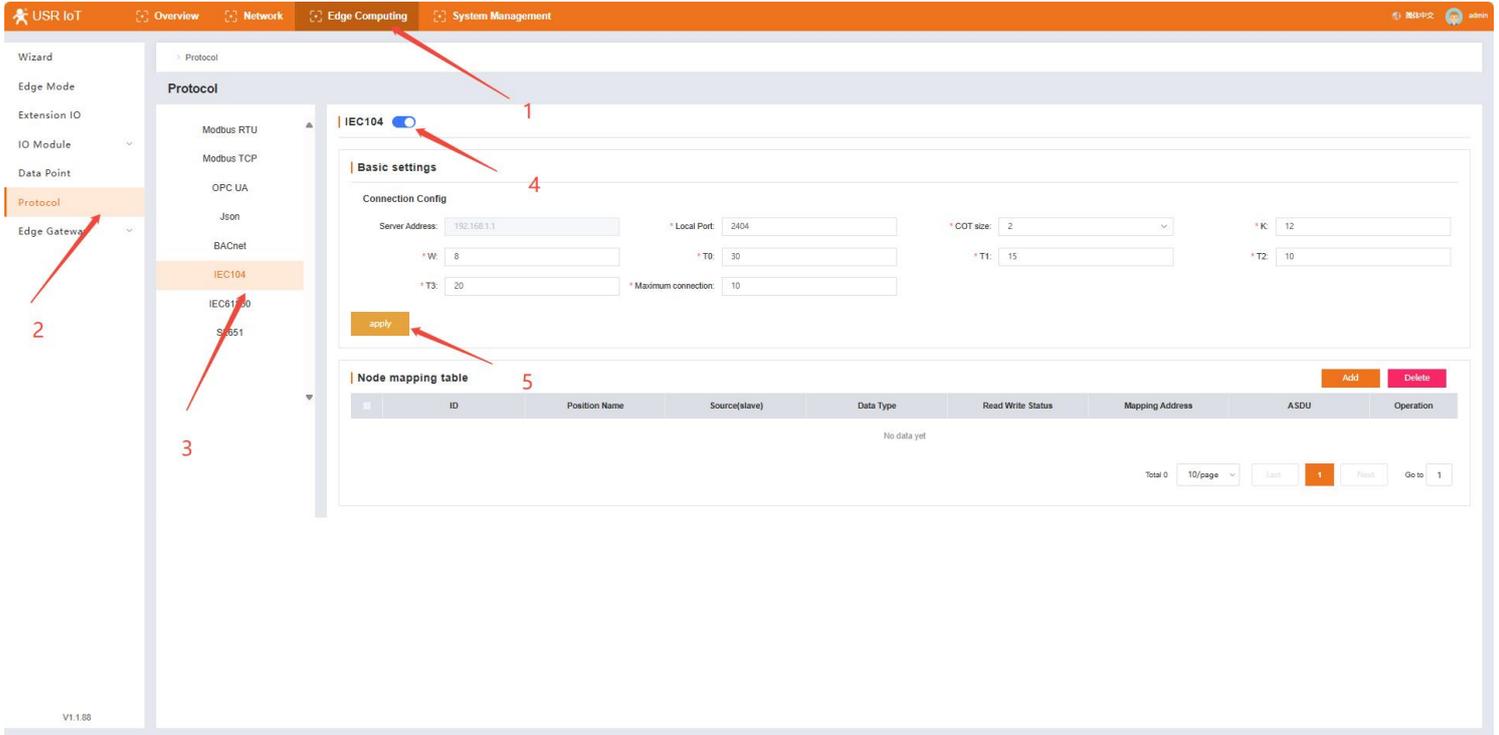
T1: The longest time the slave sends an acknowledgement after receiving a message.

T2: The longest time the host sends a life-detection request without receiving any data or acknowledgement.

Note: $T2 < T1$

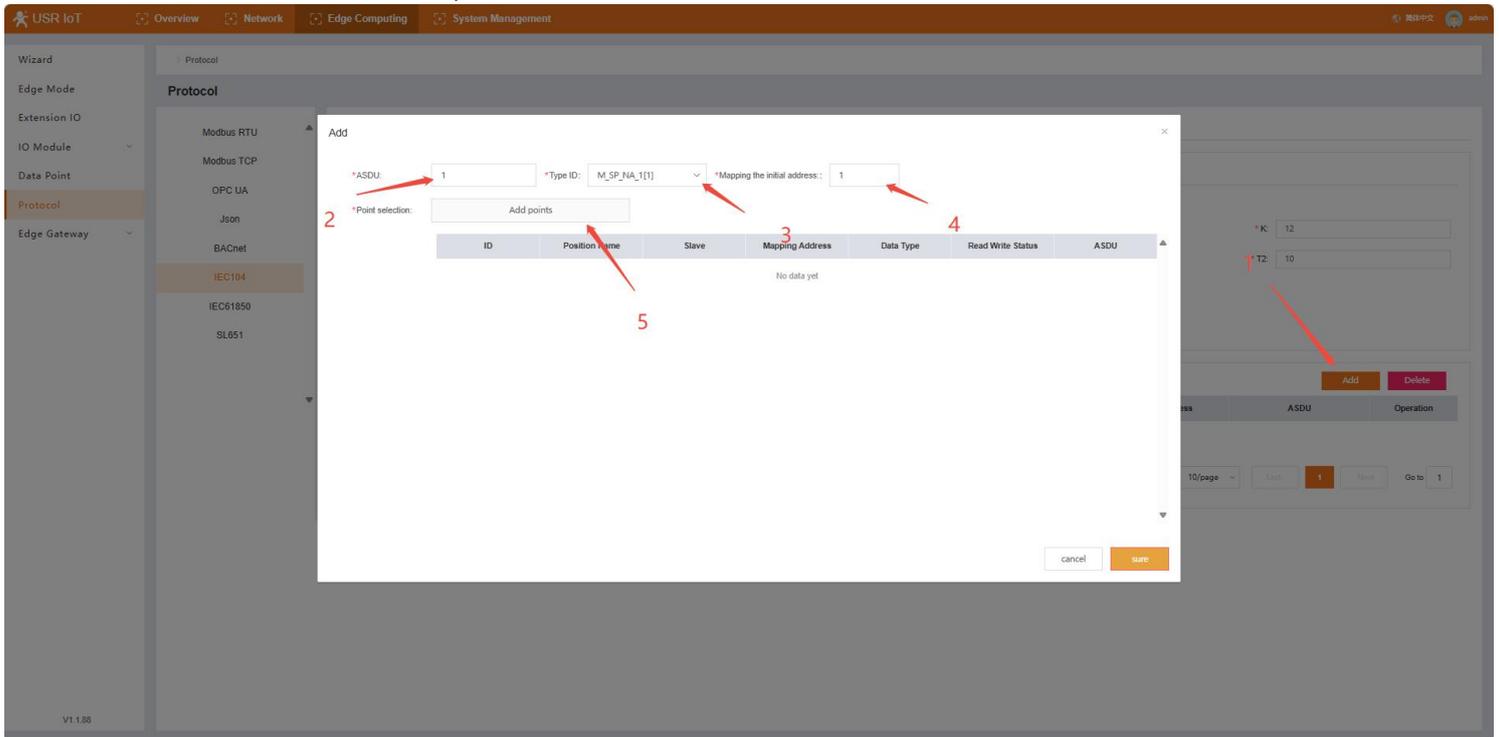
T3: The longest time the host waits for a response after sending a life-detection request.

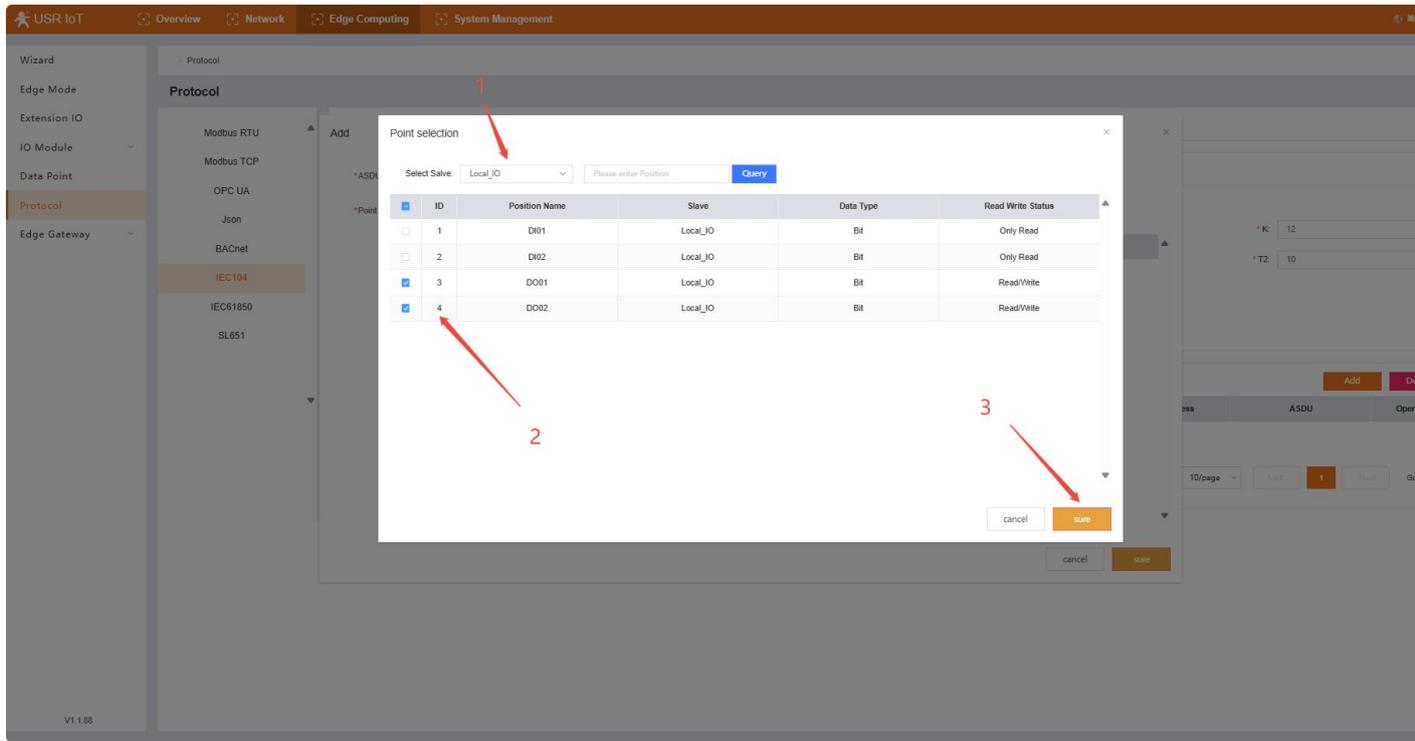
USR-M300 IEC104 protocol conversion



(2) To add point mapping, click Add in Point Mapping Table, fill in ASDU of slave, select Type ID, fill in Mapping Initial Address, select Add Point in Point, select slave to add point, select point to add, click OK after configuration. Then restart. (This test converts the DO point of the M300 it self).

ASDU: Slave device COA address, i.e. slave address.





5. Analog Slave Software Configuration

5.1. Create links

In this test, IEC104 Client Simulator software is used to simulate the master station to collect data converted from M300 protocol. Click "New Connection", fill in the corresponding configuration, and click OK after configuration.

·Server IP address: M300's local IP address

Server port: Local port of M300.

COT Size: An important field used to identify the reason for the data transfer. Default is 2.

K: The maximum number of retransmissions before the host receives an acknowledgement during data transmission.

W: The maximum number of unacknowledged data frames a host can send before waiting for an acknowledgement.

T0: The longest time the host waits for an acknowledgement after sending a message.

T1: The longest time the slave sends an acknowledgement after receiving a message.

T2: The longest time the host sends a life-detection request without receiving any data or acknowledgement. Note:

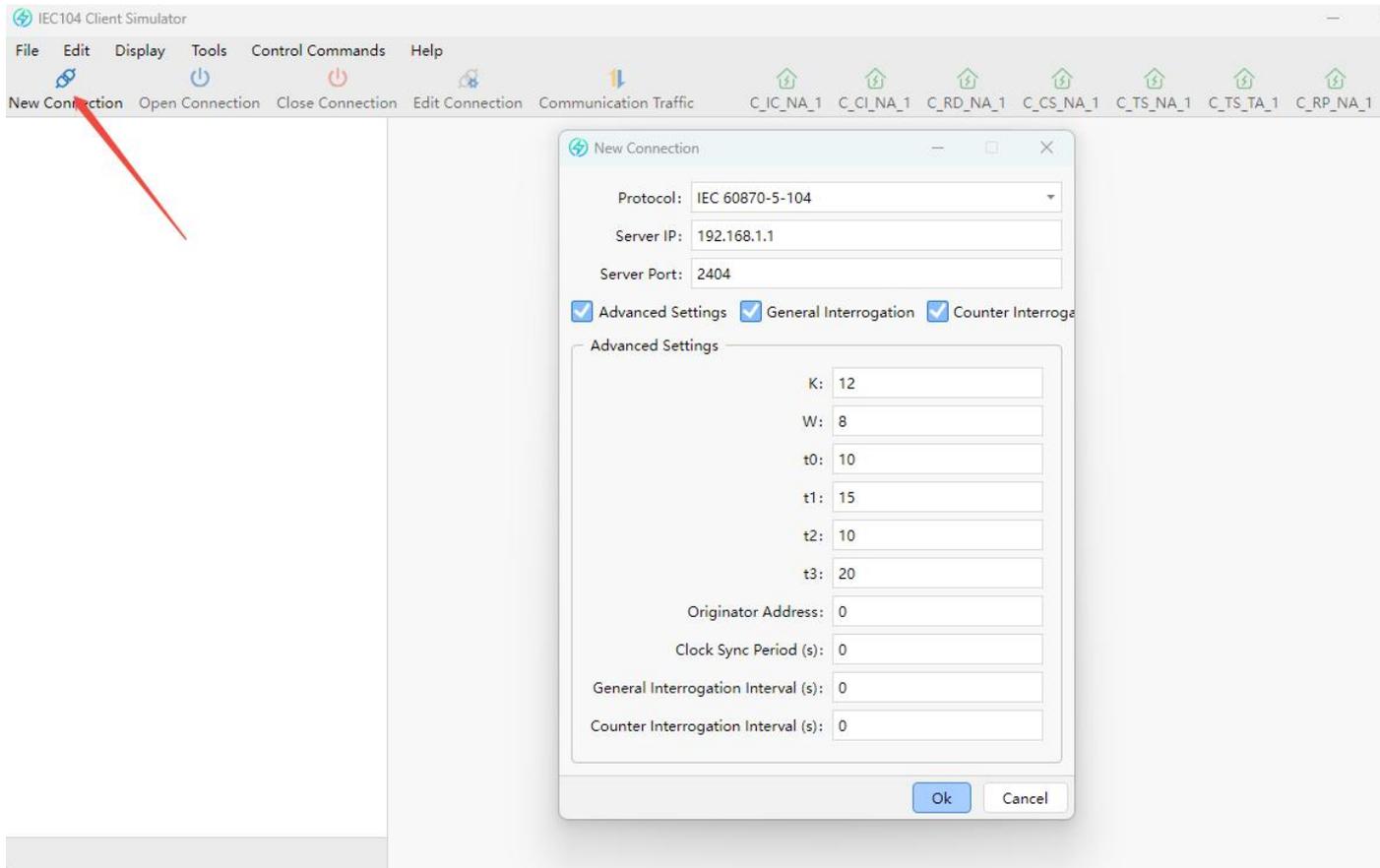
T2T1<

T3: The longest time the host waits for a response after sending a life-detection request.

·Clock synchronization period: The time interval between the master sending a clock synchronization request to the slave.

Total call-up interval: The cycle time for the master to send a message requesting all data to the slave.

USR-M300 IEC104protocol conversion



5.2. Open the collection point

Click on the established link, and then "open the connection", the corresponding point will be automatically generated below the link.

IOA	GroupName	VariableName	SIQ.SPI	SIQ.BL	SIQ.SB	SIQ.NT	SIQ.IV	COT
1			False	False	False	False	False	INTERROGATED_E
2			False	False	False	False	False	SPONTANEOUS (3

SINGLE-POINT INFORMATION WITH QUALITY DESCRIPTOR		带品质描述词的单点信息	
SIQ	::= CP8{SPI,RES,BL,SB,NT,IV}	SIQ	::= CP8{SPI,RES,BL,SB,NT,IV}
SPI	::= BS1[1]<0..1>	SPI	::= BS1[1]<0..1>
<0>	::= OFF	<0>	::= 开
<1>	::= ON	<1>	::= 合
RES = RESERVE	::= BS3[2..4]<0>	RES = RESERVE	::= BS3[2..4]<0>
BL	::= BS1[5]<0..1>	BL	::= BS1[5]<0..1>
<0>	::= not blocked	<0>	::= 未被闭锁
<1>	::= blocked	<1>	::= 被闭锁
SB	::= BS1[6]<0..1>	SB	::= BS1[6]<0..1>
<0>	::= not substituted	<0>	::= 未被取代
<1>	::= substituted	<1>	::= 被取代
NT	::= BS1[7]<0..1>	NT	::= BS1[7]<0..1>
<0>	::= topical	<0>	::= 当前值
<1>	::= not topical	<1>	::= 非当前值
IV	::= BS1[8]<0..1>	IV	::= BS1[8]<0..1>
<0>	::= valid	<0>	::= 有效
<1>	::= invalid	<1>	::= 无效

6. view results

The screenshot displays the USR IoT management interface. The top navigation bar includes 'Overview', 'Network', 'Edge Computing', and 'System Management'. The left sidebar shows a navigation menu with 'Data Point' selected. The main content area is titled 'Data Point' and shows a 'Slave' configuration with 'Local_IO' (online) and 'Slave_Status' (offline). Below this is a 'List of slave points' table with columns for ID, Node name, Data Type, Decimal Number, Address, Read Write Status, Priority, Timeout(ms), Data, Acquisition formula, Control formula, Node desc, and Operation.

ID	Node name	Data Type	Decimal Number	Address	Read Write Status	Priority	Timeout(ms)	Data	Acquisition formula	Control formula	Node desc	Operation
1	DO02	Bit	0	DO 02	ReadWrite	Level 1	2000	1	..	..	..	Edit Delete
2	DO01	Bit	0	DO 01	ReadWrite	Level 1	2000	1	..	..	..	Edit Delete
3	DI02	Bit	0	DI 02	Only Read	Level 1	2000	0	..	..	..	Edit Delete

An 'IEC104 Client Simulator' window is overlaid on the interface, showing a table of variables and their values. Red arrows point from the simulator to the 'Data' column in the 'List of slave points' table.

IOA	Groupname	VariableName	SIQ_0L	SIQ_0R	SIQ_0B	SIQ_NT	SIQ_IV	COT
1			True	False	False	False	False	SPONTANEOUS (3
2			True	False	False	False	False	SPONTANEOUS (3

7. Update history

Versions	Update content	Turnover time
V1.0.0	First edition	2025-03-11

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