

Change History

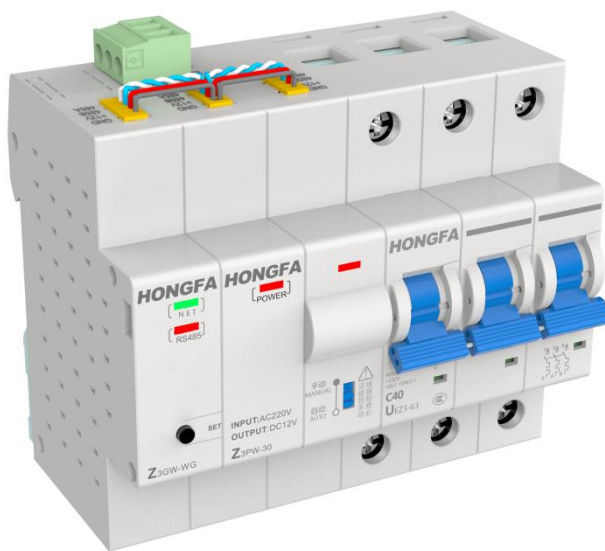
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V1.0	Newly formulated	two thousand and twenty-three point zero two	CFQ

catalogue

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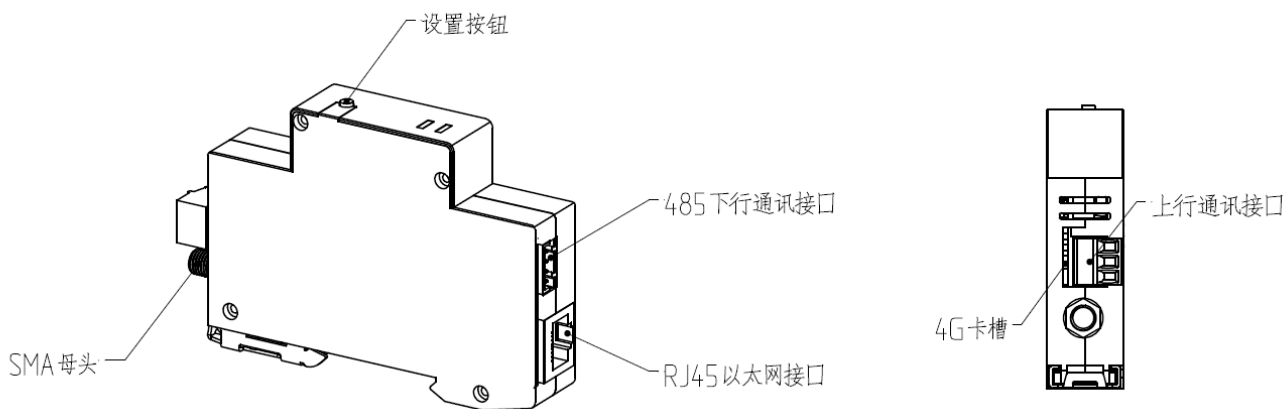
1. introduction

Before software debugging, please confirm that the installation and wiring of the gateway circuit breaker are correct.
The wiring diagram is as follows:



Wiring diagram of gateway, power supply, and circuit breaker

2. Function Introduction



Gateway Interface Diagram

2.1 Communication function

Note: Abbreviations represent W (WIFI), E (wired Ethernet), G (4G), R (RS485), U (RS232). Only one method can be selected for WEG gateway communication, and gateway settings must be done before use. Please use our company's configuration tool software for gateway configuration, and refer to the 3.2 Configuration Tool Instructions for operation.

Gateway Type	Communication method	Uplink transmission protocol	Downlink transmission protocol	Remarks
W	WIFI	MQTT (default)/Modbus TCP	Modbus RTU	Does not support 5G network connection, default baud rate for downlink is 9600, no verification, stop bit 1, data bit 8
E	Wired Ethernet	MQTT (default)/Modbus TCP	Modbus RTU	The default baud rate for the downlink is 9600, with no checksum, stop bit 1, and data bit 8
G	4G	MQTT	Modbus RTU	There are no restrictions on operators, including the Internet of Things, phone cards, traffic cards, etc; The default baud rate for the downlink is 9600, with no checksum, stop bit 1, and data bit 8
R	RS485	Modbus RTU	Modbus RTU	The default baud rate for uplink and downlink is 9600, without verification, with stop bit 1 and data bit 8
U	RS232	The data format is Modbus RTU	Modbus RTU	The default baud rate for uplink and downlink is 9600, without verification, with stop bit 1 and data bit 8

2.2 Indicator light function

Indicator light	state	explain
NET (green light)	1s slow flashing	AP hotspot mode, can be configured for WIFI distribution network or gateway
	100ms flash	Not connected to the network, currently connected
	Chang Liang	Connected to the network
	2 seconds slow flash and then fast flash	4G card not recognized, please check if the card is inserted correctly!
RS485 (red light)	1s slow flashing	Circuit breaker communication abnormal or gateway not connected (added) circuit breaker
	Chang Liang	Circuit breaker communication is normal
	100ms flash	Circuit breaker address configuration mode
Slow flashing of traffic lights simultaneously		Entering UDP distribution network state

2.3 Key functions

explain	operation
Activate AP hotspot mode	Press and hold for 3 seconds, the green light will slowly flash
Turn off AP hotspot mode	Long press for 3 seconds, green light flashes quickly
Enter the circuit breaker address configuration state	Press three times within 6 seconds and the red light will flash quickly
Exit the circuit breaker address configuration state	Press three times within 6 seconds (the gateway automatically refreshes the online device after each exit)
Enter the state of clearing the configured circuit breaker address and reconfiguring the address	Long press for 8 seconds, the red light flashes quickly; Assign circuit breaker addresses starting from address 1; Press three times to exit the state within 6 seconds
Entering UDP distribution network state	Press and hold for 3 seconds before releasing, and the green light will slowly flash; Press again three times and the red light will flash slowly

2.4 Add circuit breaker address configuration to the gateway

The intelligent gateway can automatically configure the communication address of the connected circuit breaker locally, and the gateway must also configure the circuit breaker information before reporting it to MQTT. The specific operation steps are as follows:

- 1) The gateway is connected to a circuit breaker, and the power supply is 12Vd. c, which is normal;

Press the gateway button 3 times within 6 seconds for a new gateway (without configuring a circuit breaker address), and the gateway red light will flash quickly to enter the address configuration state;

- 2) Set the blue dial code on the front of the first circuit breaker from automatic to manual position. The circuit breaker's green light flashes, and the gateway's red light remains on for about 2 seconds. Continue flashing quickly and successfully configure the address of this circuit breaker to 1;
- 3) Set the blue dial code on the front of the second circuit breaker from automatic to manual position. The circuit breaker's green light flashes, and the gateway's red light remains on for about 2 seconds. Continue flashing quickly and successfully configure the address of this circuit breaker to 2;
- 4) Repeat the above operation and configure the address of the newly added circuit breaker in sequence, with a maximum configuration of 16 units;
- 5) After the configuration is completed, press the gateway button 3 times within 6 seconds, and the gateway red light will turn on, indicating that the communication with the added circuit breaker is normal, and the circuit breaker dial will be set back to the automatic position;
- 6) If you need to add another circuit breaker, you can press the button 3 times again to enter the configuration status dial, and assign the address from the last ending address to continue. If you have already configured address 1-5 circuit breakers for the first time, and configure them again for the second time, start from address 6;
- 7) To clear the configured address and reconfigure it, press and hold the button for 8 seconds. After the red light changes to a fast flashing light, repeat steps 3-6 above and start configuring from address 1;

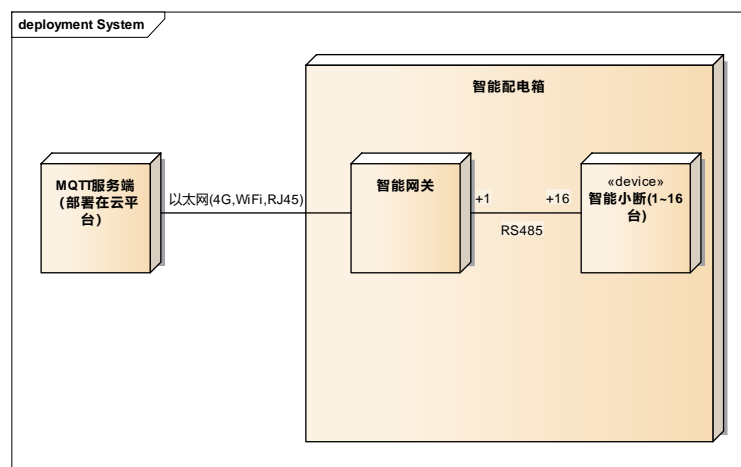
- 8) If the gateway red light does not stay on for 2 seconds during dialing configuration, and it keeps flashing fast, it indicates that the address configuration has failed and the circuit breaker is abnormal. Please replace this circuit breaker!

2.5 MQTT Cloud Data Transmission

2.5.1 MQTT server connection

You can use our company's configuration tool to set the MQTT server domain name, username, password, and port that you need to connect to. For detailed operations, please refer to 【 3.2 Configuration Tool Instructions 】.

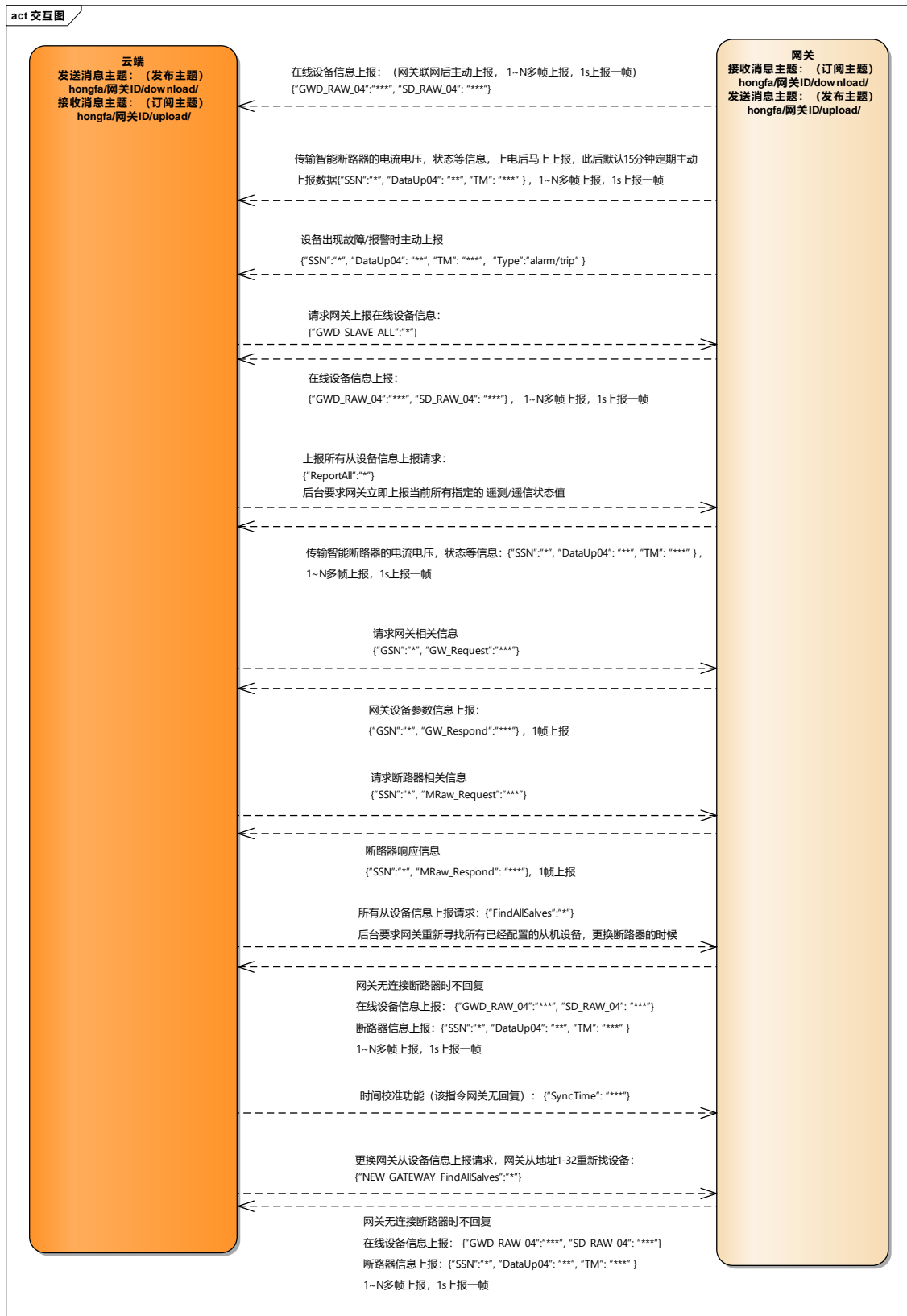
The deployment diagram of cloud and gateway is as follows:



Deployment diagram for cloud and gateway

Define two themes, one for reporting online device information, published by the lower computer (gateway) and subscribed by the upper computer (cloud); A theme for writing devices, published by the upper computer (cloud) and subscribed by the lower computer (gateway).

The interaction diagram between the cloud and gateway for the content in each topic is shown below:



Interaction diagram between cloud and gateway

It is recommended that the upper computer (cloud) parse the data of the gateway and slave devices as follows:

- 1) Obtain device information, wait for reporting or actively obtaining, obtain and store the number of gateway slave devices, the number of gateway online slave devices, the ID numbers and device types of each device.

Analyze the actively reported data or issue relevant requests based on the ID number and device type.

- 2) The real-time performance of data transmission is not very strong, and in practical applications, the real-time requirements for electrical parameter updates are also not high. The regular reporting period is 15 minutes. If you expect faster or slower reporting, you can set the reporting period for the gateway. If you need to actively obtain all electrical parameters, you can use the publication topic {"ReportAll": "*"}. For the opening and closing functions of multiple circuit breakers with high real-time performance, the 0x015D-0x0160 register of the gateway point table can be directly written and operated to achieve fast control. Please refer to the intelligent gateway communication protocol in the appendix. If necessary, "GW_Request" and "MRAW_Request" can be used to read and write all relevant parameters of the gateway and circuit breaker.

2.5.2 Actively reporting device information

Note: According to the 15min cycle, each circuit breaker uses a 4G flow rate of about 2M/month, and connecting 10 circuit breakers uses about 20M/month.

Report type	Reporting time	Reporting Information	Remarks
Periodic reporting	0.1-2000min (default 15min)	Gateway and all online circuit breaker information	
Voltage and current changes	1-1000% (default 30%)	Circuit breaker information	
Electricity change	0.001--60kWh (default 20kWh)	Circuit breaker information	
State change	real time	Circuit breaker information	Reporting of changes in opening and closing status, manual and automatic status
Alarm	real time	Alarm record information	
fault	real time	Fault record information	

2.5.3 Report Message Format

Submit subscription topic: hongfa/gateway ID number/upload/ Example: hongfa/FFFE200810095012/upload/(Please scan the front QR code for gateway ID)		
Report type	message format	Remarks

Gateway Information	{ "GWD_RAW_04": "****", "SD_RAW_04": "****" }			Report the ID number and device type of the gateway and circuit breaker, with a maximum of 16 slaves. Report one slave device information per frame, and report one frame every 1 second. For specific data analysis, please refer to [2.5.5 MQTT Message Data Analysis]
	type	Reporting scope	Number of reported frames	
	GWD_RAW_04	Appendix [Intelligent Gateway Communication Protocol] Registers 0x0000-0x0002	Report one frame per slave device	
	SD_RAW_04	Appendix [Intelligent Gateway Communication Protocol] Slave Device Information in Registers 0x0003-0x00C6		

Circuit breaker information	{ "SSN": "*", "DataUp04": "****", "TM": "****" }			Actively report the current and voltage status of the intelligent circuit breaker based on the device ID number, and upload 22 registers (44 bytes) at a time. Due to the large amount of data, it needs to be uploaded in frames with an interval of 1 second. Refer to different data point tables for device type analysis.
	'SSN' is the circuit breaker ID number; TM "is the gateway time: year, year, day, hour, minute, second; 'DataUp04' refers to the reported content:			
	Equipment type	Reporting scope	Number of reported frames	
	M-series 1P series	【 M-series 1P/1PN/1PNL/2P communication protocol 】 Registers 0x0000-0x003F	three	
	M-series 3P series	Registers 0x0000-0x0091 [M-series 3P/3PN/3PNL/4P communication protocol]	five	

	<table> <tr> <td>C/CP series</td><td>[C/CP Communication Protocol] Registers 0x0000-0x003F</td><td>three</td></tr> </table> <p>Note: Please refer to the official website of Hongfa Group for the communication protocol of the above intelligent circuit breaker https://www.hongfa.cn/Product/Item/UEZ3-63 Download the document "UEZ3 Series Intelligent Small Circuit Breaker Software Manual", and the protocol can be found in the appendix of the document.</p>	C/CP series	[C/CP Communication Protocol] Registers 0x0000-0x003F	three							
C/CP series	[C/CP Communication Protocol] Registers 0x0000-0x003F	three									
Alarm	<p>{ "SSN": "*", "DataUp04": "* *", "TM": "* * *", "Type": "alarm" }</p> <p>'SSN' is the circuit breaker ID number;</p> <p>TM "is the gateway time: year, year, day, hour, minute, second;</p> <p>'DataUp04' refers to the reported content:</p> <table> <tr> <th>type</th><th>Reporting scope</th><th>Number of reported frames</th></tr> <tr> <td>M-series 1P series</td><td>Registers 0x00F0-0x00F8 [M-series 1P/1PN/1PNL/2P communication protocol]</td><td>one</td></tr> <tr> <td>M-series 3P series</td><td>Register 0x0150-0x015F [M-series 3P/3PN/3PNL/4P communication protocol]</td><td>one</td></tr> </table> <p>Note: Please refer to the official website of Hongfa Group for the communication protocol of the above intelligent circuit breaker https://www.hongfa.cn/Product/Item/UEZ3-63 Download the document "UEZ3 Series Intelligent Small Circuit Breaker Software Manual", and the protocol can be found in the appendix of the document.</p>	type	Reporting scope	Number of reported frames	M-series 1P series	Registers 0x00F0-0x00F8 [M-series 1P/1PN/1PNL/2P communication protocol]	one	M-series 3P series	Register 0x0150-0x015F [M-series 3P/3PN/3PNL/4P communication protocol]	one	<p>Actively report the alarm frame when an alarm occurs, including information such as voltage, current, temperature, and time during the alarm; For specific data analysis, please refer to [2.5.5 MQTT Message Data Analysis]</p>
type	Reporting scope	Number of reported frames									
M-series 1P series	Registers 0x00F0-0x00F8 [M-series 1P/1PN/1PNL/2P communication protocol]	one									
M-series 3P series	Register 0x0150-0x015F [M-series 3P/3PN/3PNL/4P communication protocol]	one									

<p>fault</p>	<p>{ "SSN": "*", "DataUp04": " * *", "TM": " * * *", "Type": "trip" }</p> <p>'SSN' is the circuit breaker ID number;</p> <p>TM "is the gateway time: year, year, day, hour, minute, second;</p> <p>'DataUp04' refers to the reported content:</p> <table border="1" data-bbox="391 577 1029 1249"> <thead> <tr> <th>type</th><th>Reporting scope</th><th>Number of reported frames</th></tr> </thead> <tbody> <tr> <td>M-series 1P series</td><td>【 M-series 1P/1PN/1PNL/2P communication protocol 】 Registers 0x0040-0x0048</td><td>one</td></tr> <tr> <td>M-series 3P series</td><td>【 M-series 3P/3PN/3PNL/4P communication protocol 】 Register 0x00A0-0x00AF</td><td>one</td></tr> </tbody> </table> <p>Note: Please refer to the official website of Hongfa Group for the communication protocol of the above intelligent circuit breaker https://www.hongfa.cn/Product/Item/UEZ3-63 Download the document "UEZ3 Series Intelligent Small Circuit Breaker Software Manual", and the protocol can be found in the appendix of the document.</p>	type	Reporting scope	Number of reported frames	M-series 1P series	【 M-series 1P/1PN/1PNL/2P communication protocol 】 Registers 0x0040-0x0048	one	M-series 3P series	【 M-series 3P/3PN/3PNL/4P communication protocol 】 Register 0x00A0-0x00AF	one	<p>Actively report the fault frame when a fault occurs, including information such as voltage, current, temperature, and time during the fault; For specific data analysis, please refer to [2.5.5 MQTT Message Data Analysis]</p>
type	Reporting scope	Number of reported frames									
M-series 1P series	【 M-series 1P/1PN/1PNL/2P communication protocol 】 Registers 0x0040-0x0048	one									
M-series 3P series	【 M-series 3P/3PN/3PNL/4P communication protocol 】 Register 0x00A0-0x00AF	one									
<p>Gateway Request Reply</p>	<p>{ "GSN": "*", "GW_Respond": " * * *" }</p>	<p>'GSN' is the gateway ID number, and 'GW_Respond' is the reply data. For specific data analysis, please refer to [2.5.5 MQTT Message Data Analysis]</p>									
<p>Circuit breaker request reply</p>	<p>{ "SSN": "*", "MRaw Response": " * * *" }</p>	<p>'SSN' is the circuit breaker ID number, MRaw Respond "is the reply data. For specific data analysis, please refer to [2.5.5 MQTT Message Data Analysis]</p>									

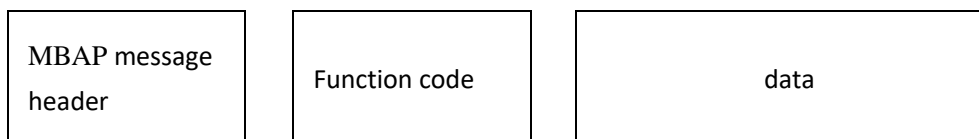
2.5.4 Publish Request

Publish request subject: hongfa/gateway ID number/download/ Example: hongfa/FFFE200810095012/download/(Please scan the front QR code for gateway ID)		
Request Type	message format	Remarks
Circuit breaker request	{ "SSN": "*", "MRaw Request": "*" * * }	According to the corresponding circuit breaker ID number, read and write the values of the relevant registers of the intelligent circuit breaker. After reading and writing, there is a response, and a maximum of 22 registers (44 bytes) can be read and written at a time; Please refer to [2.5.5 MQTT Message Data Analysis] for the data frame format, and refer to the corresponding protocol for the data point table based on the device type. Please go to the official website of Hongfa Group for the communication protocol of intelligent circuit breakers https://www.hongfa.cn/Product/Item/UEZ3-63 The protocol for downloading the document "UEZ3 Series Intelligent Small Circuit Breaker Software Manual" can be found in the appendix of this document.
Gateway Request	{ "GSN": "*", "GW_Request": "*" * * }	Read or write gateway related registers, such as reporting cycle, timing control, and one key control, with a maximum of 22 registers (44 bytes) read and written at a time; Please refer to [2.5.5 MQTT Message Data Analysis] for data frame format, and refer to Appendix [Intelligent Gateway Communication Protocol] for data point table
Online device information reporting request	{ "GWD_SLAVE_ALL": "*" }	Actively obtain gateway and online device information, with any "*" content
All requests for reporting device information	{ "ReportAll": "*" }	The gateway immediately reports information on all currently configured circuit breakers; Any content of '*'
Redirect device reporting request	{ "FindAllSales": "*" }	The gateway will search for all configured circuit breaker devices again, report device information again after searching, and use it after replacing the circuit breaker; Any content of '*'
Replace gateway device information reporting request	{ "NEW_GATEWAY-FindAllSales": "*" }	After replacing the gateway, search for all circuit breaker devices and search for all devices from addresses 1-32; Any content of '*'
Time calibration	{ "SyncTime": "*" * * * }	Time calibration, sending this command can simultaneously calibrate the time of the gateway and circuit breaker; The content of '*' * * * is 'year, month, day, hour, minute, and second'. For example, if it is written as '221214153005' at 15:30:05 on December 14, 2022

2.5.5 MQTT message data parsing

Note: All message data formats are in JSON format, hexadecimal. Please go to the official website of Hongfa Group for the communication protocol of intelligent circuit breakers <https://www.hongfa.cn/Product/Item/UEZ3-63> Download the document "UEZ3 Series Intelligent Small Circuit Breaker Software Manual". The intelligent gateway communication protocol can be found in the appendix of this document [5.1 Intelligent Gateway Communication Protocol]

The data content of MQTT is a character based hexadecimal number, which is similar to the data format of ModbusTCP and includes three parts: MBAP message header, function code, and data:



The MBAP message header includes the following fields:

field	length	describe	Client	server
CRC inspection code	2 bytes	Calculate from the third byte to the last byte	hold	hold
Start register address	2 bytes	The starting register address of the data, prepared for active data upload	hold	hold
length	2 bytes	The number of bytes	Initiated by client (request)	Initialized by server (response)
Unit identifier	1 byte	The identification code of a remote slave station connected on a serial link or other bus	Initialized by client	The server replicates from the received request (i.e. the address of the slave)

The function code supports the function of 0x03/0x04/0x06/0x10, and the data format is consistent with modbusTCP, as shown in the example below.

1) Actively reporting device data

Example message format: {"SSN": "1A2B22129200008", "DataUp04": "F45B000002F03042C000000... 0021", "TM": "221229174230"};

SSN "represents the ID number of the circuit breaker 1A2B221229200008," TM "represents 17:42:30 on December 29, 2022

The data parsing for 'DataUp04' is as follows (the parsing methods for 'GWD_RAW_04' and 'SD_RAW_04' are similar, first converting character hexadecimal to hexadecimal):

field	byte	example	describe
CRC verification code	2 bytes	F4 5B	Calculate from the third byte to the last byte
Register Start Address	2 bytes	00 00	Report data starting from register 0x0000
Byte A (all subsequent bytes)	2 bytes	00 2F	47 bytes of subsequent data

Mailing Address	1 byte	03	Gateway address is 255, circuit breaker address 1-247
Function code	1 byte	04	04 Read Function Code
Bytes B (all subsequent bytes)	1 byte	2C	44 bytes of data
Data 1	2 bytes	00 00	The starting register 0x0000 data is 0000 (according to the M-series 1PN device protocol, this register is in a protected state, so the current state of the device is normal and there is no fault alarm)
Data 2	2 bytes	00 00	The data of register 0x0001 is 0000 (according to the M-series 1PN device protocol, this register is in an alarm state, so the current state of the device is normal and there are no alarms)
			Registers 0x0002~0x0014 Register data
Data (Bytes B/2)	2 bytes	00 21	The data of register 0x0015 is 00 21 (in decimal format, it is 33. According to the M-series 1PN device protocol, this register is resolved as temperature, so the device temperature is 33 °C)

2) Post Request Reply

Example of request message format:

{"SSN": "1A2B2212229200008", "MRaw-Request": "AA270010000602040010000A"}; 'SSN' is the ID number of the circuit breaker that needs to be requested;

Example of reply message format: {"SSN": "1A2B2212229200008", "MRaw Response": "7F76001000170204143FC000000 25843660000002143AC800041F4CCCD"};

A1. Use the 03/04 function code to read gateway or circuit breaker information (request: "MRaw_Request" or "GW_Request" content)

field	byte	example	describe
CRC verification code	2 bytes	AA 27	Calculate from the third byte to the last byte
Register Start Address	2 bytes	00 10	
Bytes	2 bytes	00 06	
Mailing Address	1 byte	02	Gateway address is 255, circuit breaker address 1-247
Function code	1 byte	04	04 Read Function Code
Register Start Address	2 bytes	00 10	Reading starts from register 0x0010
Number of Registers	2 bytes	00 0A	10 registers

A2. Normal response reply (reply with the content of "MRaw_Respond" or "GW_Respond")

field	byte	example	describe
-------	------	---------	----------

CRC verification code	2 bytes	7F 76	Calculate from the third byte to the last byte
Register Start Address	2 bytes	00 10	
Byte A (all subsequent bytes)	2 bytes	00 17	
Mailing Address	1 byte	02	
Function code	1 byte	04	
Bytes B (all subsequent bytes)	1 byte	fourteen	
Data 1~Data 2	2*2 bytes	3F C0 00 00 00	Registers 0x0010~0x0011 data, analyzed according to the M-series IPN protocol, the current value is a hexadecimal to floating point number of 1.5A
Data 3	2 bytes	02 58	0x0012 data, analyzed according to the M-series IPN protocol, the leakage value is 600/100=6mA
Data 4~Data 5	2 * 2 bytes	43 66 00 00	0x0013~0x0014 data, analyzed according to the M-series IPN protocol, with a voltage of 230.0V as a floating point number
Data 6	2 bytes	00 21	0x0015 data, analyzed according to the M-series IPN protocol, with a temperature of 33 °C
Data 7~Data 8	2 * 2 bytes	43 AC 80 00	0x0016~0x0017 data, analyzed according to the M-series IPN protocol, with a power of 345.0W as a floating point number
Data 9~Data 10	2 * 2 bytes	41 F4 CC CD	0x0018~0x0019 data, analyzed according to the M-series IPN protocol, with a floating point capacity of 30.6kWh

A3. Abnormal response response response (reply with the content of "MRaw_Respond" or "GW_Respond")

field	byte	example	describe
CRC verification code	2 bytes	1A D4	Calculate from the third byte to the last byte
Register Start Address	2 bytes	00 10	
Bytes	2 bytes	00 03	
Mailing Address	1 byte	02	
Abnormal function code	1 byte	eighty-four	04 function code exception code, 03 function exception code is 83
Exception code	1 byte	01	01: Illegal function 02: Illegal data address 03: Illegal data value

B1. Use the 06 function code to modify the individual settings of the gateway or circuit breaker (request: "MRaw_Request" or "GW_Request" content)

field	byte	example	describe
CRC verification code	2 bytes	92 13	Calculate from the third byte to the last byte

Register Address	2 bytes	01 D0	
Bytes	2 bytes	00 06	
Mailing Address	1 byte	01	Gateway address is 255, circuit breaker address 1-247
Function code	1 byte	06	
Register Address	2 bytes	01 D0	M-series IPN device control register
Write data	2 bytes	00 01	Write data 00 01 and control the closing according to the M-series IPN protocol; Write 00 04 control opening

B2. Normal response response (reply with the content of "MRaw_Response" or "GW_Response")

field	byte	example	describe
CRC verification code	2 bytes	92 13	Calculate from the third byte to the last byte
Register Start Address	2 bytes	01 D0	
Bytes	2 bytes	00 06	
Mailing Address	1 byte	01	
Function code	1 byte	06	
Register Address	2 bytes	01 D0	
Write data	2 bytes	00 01	

B3. Abnormal response reply (reply with the content of "MRaw_Response" or "GW_Response")

field	byte	example	example
CRC verification code	2 bytes	EA 74	Calculate from the third byte to the last byte
Register Address	2 bytes	01 D0	
Bytes	2 bytes	00 03	
Mailing Address	1 byte	01	
Abnormal function code	1 byte	eighty-six	06 Function Exception Code
Exception code	1 byte	01	01: Illegal function 02: Illegal data address 03: Illegal data value

C1. Use the 10 function code to modify the settings of multiple consecutive parameters for the gateway or circuit breaker (request: "MRaw_Request" or "GW_Request" content)

field	byte	example	describe
CRC verification code	2 bytes	BE DF	Calculate from the third byte to the last byte
Register Start Address	2 bytes	02 46	
Byte A (all subsequent bytes)	2 bytes	00 0B	
Mailing Address	1 byte	FF	Gateway address is 255, circuit breaker address 1-247
Function code	1 byte	ten	

Register Start Address	2 bytes	02 46	
Number of Registers	2 bytes	00 02	Continuously writing 2 registers
Bytes B (all subsequent bytes)	1 byte	04	
Data 1	2 bytes	03 E8	The data written in the starting register 0x0246, according to the gateway protocol, is reported as electric energy change $1000 * 0.001 = 1 \cdot \text{kWh}$
Data 2	2 bytes	00 C8	The data written in register 0x0247, according to the gateway protocol, has a write cycle reporting time of $200 * 0.1 = 20\text{min}$

C2. Normal reply (reply to the content of "MRaw_Respond" or "GW_Respond")

field	byte	example	describe
CRC verification code	2 bytes	19 CE	Calculate from the third byte to the last byte
Register Start Address	2 bytes	02 46	
Bytes	2 bytes	00 06	
Mailing Address	1 byte	FF	
Function code	1 byte	ten	
Register Start Address	2 bytes	02 46	
Number of Registers	2 bytes	00 02	

C3. Exception response (reply with the content of "MRaw_Respond" or "GW_Respond")

field	byte	example	describe
CRC verification code	2 bytes	AB D2	Calculate from the third byte to the last byte
Register Start Address	2 bytes	02 46	
Bytes	2 bytes	00 03	
Mailing Address	1 byte	FF	
Abnormal function code	1 byte	ninety	
Exception code	1 byte	01	01: Illegal function 02: Illegal data address 03: Illegal data value

Note: Our company provides parsing APIs for the Java language. If necessary, please consult technical personnel.

2.6 Modbus TCP data transmission

The gateway of wired Ethernet and WiFi supports standard ModbusTCP data transmission, and it needs to be configured to ModbusTCP mode through the configuration tool. For specific usage, please refer to 【 3.2 Configuration Tool Instructions 】 .

2.6.1 Modbus TCP instruction message (standard format)

Format Content	byte	example	describe
serial number	2 bytes	00 01	
Protocol identification	2 bytes	00 00	TCP protocol identifier is 00 00
Bytes	2 bytes	00 06	
Unit identifier	1 byte	01	Communication address, gateway address 255, device address 1-247
Function code	1 byte	03/04/06/10	
PDU data	----	----	Different function codes result in different data frame structures

Example:

M-series 1PN control closing command: 00 00 00 00 00 06 01 06 01 D0 00 01

M-series 1PN control opening command: 00 01 00 00 00 06 01 06 01 D0 00 04

M series 3PN control closing command: 00 02 00 00 00 06 01 06 02 50 00 01

M-series 3PN control opening command: 00 03 00 00 00 06 01 06 02 50 00 04

2.6.2 Gateway AP hotspot modification configuration (only supported with W gateway)

Press and hold the gateway button for 3 seconds, the green light will change to a slow flashing start AP hotspot, and the laptop will be connected to the name HongFa_ Xxxx's WIFI network, password: 56781234. After the connection is successful, open our company's configuration tool, select TCP mode, IP: 192.168.4.1, port number: 8080, check the gateway version, and click "Connect successfully" to read and modify the gateway related parameters as needed (gateway communication address 255). Please refer to 【 3.2 Configuration Tool Instructions 】 for specific operations and configuration content.

2.6.3 WIFI/Ethernet transparent communication

After the gateway successfully connects to the network, TCP communication can be connected based on the gateway's IP address and port number, and circuit breaker information can be read. Please refer to 2.6.1 for the TCP instruction format, and refer to the corresponding communication protocol for the data point table based on the device type. You can also use our company's configuration tool to select the corresponding device type and address after TCP connection, which can read the electrical parameter information of the circuit breaker, control opening and closing, etc.

2.7 Modbus RTU data transmission (only supported with R/U gateway)

The gateway with uplink RS485/232 interface supports Modbus RTU serial port data type communication, and can communicate with the gateway and connected circuit breakers through the serial port. And it is compatible with

WIFI/wired Ethernet/4G communication and can be used together (regardless of whether it is connected to the network or not, serial communication can be normal). Please refer to the communication protocol in the appendix for the data point table, and refer to the RTU mode in [3.2 Configuration Tool Instructions] for communication using our company's configuration tool software.

2.8 Timing control

The gateway contains 8 scheduled tasks, each of which can set time, cycle, control enable, and control status. Settings can be modified by issuing instructions through gateway Modbus TCP or connecting to MQTT. Please refer to Appendix [Intelligent Gateway Communication Protocol].

Example: Set Timer 1 (register address 0x0176-0x017B) every Monday to Friday at 16:30. The switches with addresses 1, 3, 5, and 7 will automatically open, and the switches with addresses 2, 4, 6, and 8 will automatically close.

Register Address	Register Meaning	Register Value	analysis
0x0176	Minute hour	three thousand and sixteen	16:30
0x0177	Cyclic cycle	001F	Convert to binary (0000 0000 0001 1111) indicates a cycle from Monday to Friday
0x0178-0x0179	Control switch enable	0000 00FF	Convert to binary (0000 0000 000000 0000 1111 1111) to indicate address 1-8 circuit breaker opening control function
0x017A-0x017B	Control switch status	0000 00AA	Convert to binary (0000 0000 000000 0000 1010 1010) to indicate that devices at addresses 1, 3, 5, and 7 are opened, and devices at addresses 2, 4, 6, and 8 are closed

2.9 One click control

By simultaneously writing control enable and control commands to the gateway register 0x015D-0x0160, multiple devices can be controlled to open and close with one click. Settings can be modified by issuing instructions through gateway Modbus TCP or connecting to MQTT. Please refer to Appendix [Intelligent Gateway Communication Protocol].

Example: One click control circuit breaker addresses 1, 2, 3, and 4 for device opening, and addresses 5, 6, 7, and 8 for device closing. Use the 10 function code to simultaneously write data to the four registers of 0x015D-0x0160.

Register Address	Register Meaning	Register Value	analysis
0x015D-0x015E	Control switch enable	0000 00FF	Convert to binary (0000 0000 000000 0000 1111 1111) to indicate address 1-8 circuit breaker opening control function
0x015F-0x0160	Control switch status	0000 00F0	Convert to binary (0000 0000 0000 0000 0000 0000 1111 0000) to indicate that address 1, 2, 3, and 4 devices are opened, and address 5, 6, 7, and 8 devices are closed

3. Instructions for use

3.1 Communication debugging tools

- 1) Laptops
- 2) MQTT computer software
- 3) Hongfa Configuration Tool Software

3.2 Instructions for using configuration tools

3.2.1 TCP mode (used in gateway AP hotspot mode)

- 1) Press and hold the button for 3 seconds at the gateway, and the green light will slowly flash;
- 2) Laptop connected to WIFI account: HongFa_ XXXX, password: 56781234;
- 3) Open the configuration tool, select TCP in Modbus mode, IP: 192.168.4.1, port number: 8080, check the gateway version, click Connect, and once the connection is successful, proceed with the configuration operation.
- 4) After the configuration is completed, click to disconnect, and then press and hold the gateway button for 3 seconds. The green light will change to a fast flash to exit the hotspot mode, and wait for the green light to remain on to automatically connect to the network.



functional module	Include features	Remarks
Monitoring	[Slave Device Information]: Number of Slave Devices, Number of Slave Devices Online, Number of Successfully Configured Devices	Display the number of circuit breakers configured and connected to the current gateway, and the online number refers to the number of circuit breakers reported by MQTT normally
Monitoring	[Factory Parameters]: Gateway Type, Gateway ID, Gateway Time, Gateway Version, Factory Time	
Monitoring	[4G parameters]: 4G module self check, 4G signal strength, operator, 4G network type, SIM card status, IM card ICCID number, IMEI number, 4G network status	The relevant parameters can only be read after the 4G gateway card is inserted and connected to the network

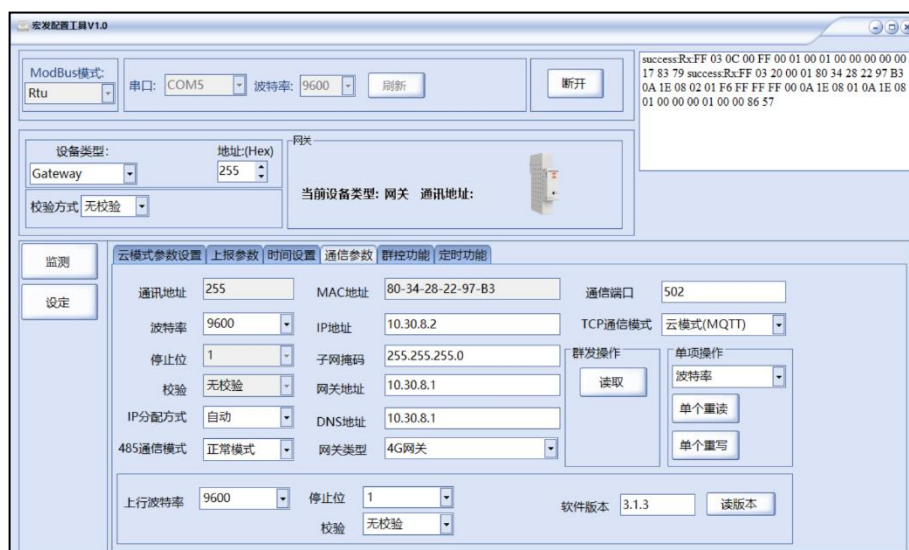
Setting	Cloud mode parameter settings: WIFI username, WIFI password, MQTT domain name, username, password, MQTT port number, data format, login method	The WIFI username and password only need to be configured for the WIFI gateway type; MQTT related settings only need to be set in cloud mode; Enter data in the input box, click [Write], wait for the prompt to succeed, and then write the next parameter. Only one parameter can be modified at a time.
Setting	【 Reporting parameters 】: Voltage and current change rate, current reporting switch, electrical energy reporting change, data cycle reporting	Set the gateway reporting conditions. If the current reporting switch is turned on, messages will be reported based on the set rate of change. If it is turned off, changes in current and voltage data will not be reported; Position the mouse in the display box that needs to be modified, click [Single item write], and wait for the prompt to be successful.
Setting	【 Time Setting 】: Set device time and synchronization device time	Enter the 2-digit year, month, day, hour, minute, and second in the input box, click on [Set Device Time] to modify the gateway system time, or directly click on [Synchronize Device Time] to write the computer system time into the gateway
Setting	[Communication parameters]: communication address, baud rate, stop bit, verification, IP allocation method (manual/automatic), 485 communication mode (normal/configured), MAC address, IP address, subnet mask, gateway address, DNS address, gateway type, communication port, TCP communication mode (cloud mode/regular Ethernet), uplink (baud rate, stop bit, verification), software version	[485 communication mode] must be selected as normal, [TCP communication mode] cloud mode is MQTT, and ordinary Ethernet mode is MODBUS TCP mode; The gray box can only be read and cannot be modified; Position the mouse in the display box that needs to be modified, click [Single item write], and wait for the prompt to be successful.
Setting	【 Group control function 】: Group control settings, group control intervals	Check the address of the device that needs to be controlled in the box, click the corresponding button to select the opening and closing action (on represents closing, OFF represents opening), and after setting it, click 【 One click control 】 to corresponding control the device action; The group control interval is the action interval of each device, which is 500ms by default. It is recommended to set it no less than 300ms.
Setting	【 Timing function 】: 8 timing controllers, including time setting, cycle setting, and group control setting	Pull down and select the timer 1-8 that needs to be set. After setting the time, checking the cycle, and setting the group control, click [One click to write parameters] to save the current timer settings

- 5) If you need to control the circuit breaker through hotspot mode, uncheck the gateway version and click Connect; After successful connection, select the corresponding device from the dropdown device type, enter the device address, and the interface will automatically switch to the circuit breaker function for operation



3.2.2 RTU mode (only supported with R/U gateway)

Use the USB to RS485/232 serial port tool to connect the gateway to the communication interface, open the configuration tool, select the RTU mode in Modbus mode, serial port number (click the [Refresh] button to update the current serial port connected to the computer, drop-down selection), baud rate (default 9600, drop-down selection), and click to connect; After successful connection, select Gateway from the 'Device Type' dropdown, enter the address 255, and select 'No Verification' by default for the 'Verification Method' to operate on the gateway related configuration (the function is completely the same as the TCP mode, see 3.2.1 for details). You can also operate the devices connected under the gateway through this method. Select the corresponding device type and enter the corresponding communication address for the address.



3.3 Communication debugging steps

3.3.1 WIFI communication

- 1) Configure device address: Connect the gateway to the circuit breaker 12Vd. c and power it on. Within 6 seconds, press the gateway button three times continuously. After the red light flashes quickly to enter the address configuration state, dial the circuit breaker in sequence. After the address configuration is completed, press the button three times continuously. A constant red light indicates successful configuration. For specific operations, please refer to 【 2.4 Gateway Add Circuit Breaker Address Configuration 】
- 2) Distribution network and parameter configuration: Press and hold the gateway button for 3 seconds, the green light will slowly flash, and enter hotspot mode. The laptop will be connected to WIFI with the name: HongFa_Xxxx, password: 56781234, open our company's configuration tool software, select TCP mode, IP: 192.168.4.1, port number: 8080, check the gateway version, and after successful connection, you can read, confirm, and configure the gateway parameters as needed. For specific operations, please refer to 【 3.2 Configuration Tool Instructions 】

function	Parameters need to be configured	Remarks
Distribution network	[Cloud Mode Parameter Settings]: Enter the WIFI username and password to connect to	Does not support connecting to 5G networks
MQTT	Cloud mode parameter settings: MQTT domain name, username, password, MQTT port number; 【 Communication parameters 】: 485 communication mode (normal), gateway type (WIFI), TCP communication mode (cloud mode)	Cloud mode (MQTT) and regular Ethernet mode (Modbus TCP) can only be used in either mode and cannot be used simultaneously
Modbus TCP	[Communication parameters]: IP allocation method (manual/automatic), 485 communication mode (normal), MAC address, IP address, subnet mask, gateway address, DNS address, gateway type (WIFI), communication port, TCP communication mode (normal Ethernet)	Using the automatic address allocation method, the gateway needs to successfully connect to the network first, and then enter the AP hotspot to read the correct IP address; If manual (static) address allocation is used, the set gateway IP address is used.

- 3) After configuring all parameters, press and hold the button for 3 seconds, and the green light will flash quickly. Waiting for the green light to remain on indicates successful network connection.
- 4) MQTT cloud operation:
 - A. Open the MQTT tool on the computer;
 - B. Log in to the server with the same address, port number, username, and password as the server set by the gateway;
 - C. After successful connection, the subscription gateway reports a message with the subscription topic: hongfa/gateway ID number/upload/;
 - D. Post message topic: hongfa/gateway ID number/download/;
 - E. Please refer to 【 2.5MQTT Cloud Data Transmission 】 for the specific format and resolution of message reporting and distribution.

5) Modbus TCP operation:

- A. Follow steps 1-3 above to configure the gateway parameters and connect to the network normally;

- B. Use the IP address, port number, and other information obtained from the gateway to connect to the upper TCP debugging tool for communication (or use our company's configuration tool).
- C. The TCP instruction is in the standard Modbus TCP format, which can be referred to in [2.6.1 Modbus TCP Instruction Message (Standard Format)]. Please refer to the communication protocol for the data point table according to the device type.

3.3.2 Ethernet communication connection

Insert the RJ45 network port of the gateway into the network cable and connect it to the router. Follow steps 1-5 of [3.3.1] above (no network configuration is required in step 2, select RJ45 Ethernet for [gateway type], and other operations are the same).

3.3.3 4G communication

Insert a valid 4G card correctly according to the printing direction on the side of the gateway, and follow steps 1-4 of [3.3.1] above. (In step 2, there is no need for network distribution, select 4G for [Gateway Type], other operations are the same).

3.3.4 Uplink RS485/232 communication

When the gateway **【 485 mode 】** is set to normal mode, local communication with the gateway and the connected circuit breaker can be achieved through the uplink serial port (regardless of whether the gateway is connected to the network or not). You can use any serial communication tool software, with a default baud rate of 9600, no verification, data bit 8, and stop bit 1. You can also use our company's configuration tool software [Modbus Mode] to select the RTU mode. For specific operations, please refer to [3.2 Configuration Tool Instructions].

4. Common faults and handling

- 1) WIFI cannot connect to the network and keeps flashing green: confirm that the written WIFI username and password are correct. If it is in MQTT mode, it is also necessary to confirm whether the relevant settings of the MQTT server are correct; And does not support 5G network connection.
- 2) The gateway is connected to the network. How to obtain the gateway IP address: After connecting to the network, long press the button for 3 seconds and the green light slowly flashes to enter the AP hotspot mode. Use our company's configuration tool to read the gateway IP information, confirm, and then long press the button to exit the hotspot mode and automatically connect to the network.
- 3) The 4G card has been inserted but the green light is not always on: if the gateway green light is always on for 2 seconds and then flashes quickly, it indicates that the card is not recognized. Confirm whether the direction of the 4G card insertion is consistent with the side label; If the green light keeps flashing rapidly, confirm whether the MQTT server that needs to be connected is running normally and whether the 4G card is down and in arrears.
- 4) The green light of the gateway is always on, but there is no reporting information on MQTT: confirm whether the gateway has configured a circuit breaker address, and there is no reporting if the address has not been configured;
- 5) Gateway red light flashing slowly: The gateway has not been configured with a circuit breaker address, or the configured circuit breaker is disconnected and has abnormal communication. Please check the wiring.

- 6) How to obtain the ID number of the circuit breaker connected under the gateway through MQTT: MQTT cloud mode, based on the reported information, the content of the "SSN" can be obtained as the ID number.
- 7) MQTT sends control messages without reply: confirm whether the SN number and communication address in the instruction correspond correctly; If there is no response, confirm whether the circuit breaker dial switch is in the "automatic" position. The instruction format is standard JSON format, and the symbols must be in English!
- 8) MQTT continuous message loss: Each message should be distributed at least 1 second apart, and multiple messages cannot be distributed at the same time.

5. appendix

5.1 Intelligent Gateway Communication Protocol

Communication Variable Point Table					
address	Meaning of variables	data type	Function code	Convert Format	unit
Equipment type					
0x0000	Gateway device type	unsigned int	0x04	21: WiFi version gateway 22: Ethernet RJ45 gateway 23: 4G gateway	/
0x0001	Number of gateway slave devices (total number of configured devices)	unsigned int	0x04	Range 0-16	/
0x0002	The number of online slave devices in the gateway (the total number of online devices polled for the first power on, and the subsequent offline slave devices are indicated by communication fault bits to re poll the number of online slave devices: 1. Power off, 2. Press the gateway button 6 times, 3. The upper computer sends instructions)	unsigned int	0x04	Range 0-16	/
0x0003-0x0006	Device ID number of the gateway (8 bytes)	unsigned int	0x04	The highest byte is FF, the second byte is a random number, and the others are the factory time	/
0x0007	First slave circuit breaker type	unsigned int	0x04	Circuit breaker equipment type: 1: 1P-M series 2: 1PN M Series 3: 1PNL - M series 4: 3P-M series 5: 3PN M Series 6: 3PNL - M series 8: CP C series 10: C-C series 12: 2P-M series 16: 4P - M series 13: UEM5Z1-3PN (Electronic Plastic Shell) 14: UEM5Z1-4P (Electronic Plastic Shell) 15: UEM5Z1-3P (Electronic Plastic Shell)	/

0x0008	Address of the first slave circuit breaker	unsigned int	0x04	1-247	/														
0x0009-0x000C	The ID number of the first slave circuit breaker	unsigned int	0x04		/														
0x000D-0x0012	The second slave circuit breaker information, in the same format as (0x0007-0x000C)	unsigned int	0x04	Second slave device information	/														
(0x0007+(i-1) * 6) - (0x000C+(i-1) * 6)	The i-th slave circuit breaker information (i range 3-31), in the same format as (0x0007-0x000C)	unsigned int	0x04	The i-th slave device information	/														
0x0061-0x0066	The 16th slave circuit breaker information, in the same format as (0x0007-0x000C)	unsigned int	0x04	16th slave device information	/														
0x00C7	Current network status	unsigned int	0x04	0: disconnected, 1: connected, 2: connected successfully, 3: hotspot mode, 4: 4G card not inserted	/														
0x00C8	4G module self test results (4G card must be inserted, and self test must be performed every time the power is turned off and powered on)	unsigned int	0x04	0: Self test failed, 1: Self test successful	/														
0x00C9	4G signal strength (obtained during operation, others obtained during registration, maximum value obtained during registration, and later obtained periodically)	unsigned int	0x04	0-100%	/														
0x00CA-0x00D3	Operator (supported only for 4G gateways)	Character type	0x04	Character length 20	/														
0x00D4	Network type (supported only for 4G gateways)	Character type	0x04	<table><tr><td>0</td><td>GSM</td></tr><tr><td>2</td><td>UTRAN</td></tr><tr><td>3</td><td>GSM W/EGPRS</td></tr><tr><td>4</td><td>UTRAN W/HSDPA</td></tr><tr><td>5</td><td>UTRAN W/HSUPA</td></tr><tr><td>6</td><td>UTRAN W/HSDPA and HSUPA</td></tr><tr><td>7</td><td>E-UTRAN</td></tr></table>	0	GSM	2	UTRAN	3	GSM W/EGPRS	4	UTRAN W/HSDPA	5	UTRAN W/HSUPA	6	UTRAN W/HSDPA and HSUPA	7	E-UTRAN	/
0	GSM																		
2	UTRAN																		
3	GSM W/EGPRS																		
4	UTRAN W/HSDPA																		
5	UTRAN W/HSUPA																		
6	UTRAN W/HSDPA and HSUPA																		
7	E-UTRAN																		
0x00D5	Network status (supported only for 4G gateways)	Character type	0x04	<table><tr><td>0</td><td>Not registered ME is not currently searching a new operator</td></tr></table>	0	Not registered ME is not currently searching a new operator	/												
0	Not registered ME is not currently searching a new operator																		

					to register to		
				1	Registered, home network		
				2	Not registered, but MT is currently trying to attach or search an operator to register to		
				3	Registration denied		
				4	Unknown		
				5	Registered, Roaming		
0x00D6-0x00DF	SIM card status (supported only for 4G gateways)	Character type	0x04	Maximum character length 20 The meaning can be found in Note 1		/	
0x00E0-0x00F8	SIM card ICCID number (supported only for 4G gateways)	Character type	0x04	Maximum character length 50		/	
0x00F9-0x0107	IMEI number (mobile device number) (Supported only for 4G gateways)	Character type	0x04	Maximum character length 30		/	
System parameter area							
0x0150	Gateway time (minutes (low bytes), seconds (high bytes))		unsigned int	0x03/0x06/0x10	BCD code format	/	
0x0151	Gateway time (day (low byte), hour (high byte))		unsigned int	0x03/0x06/0x10	BCD code format	/	
0x0152	Gateway time (year (low byte), month (high byte))		unsigned int	0x03/0x06/0x10	BCD code format	/	
0x0158	Downlink Baud Rate (default 9600)		unsigned int	0x03/0x06/0x10	1: 9600 (default to 1) 2 :14400 3:19200	/	
0x0159	Bit0	Stop bit	unsigned int	0x03/0x06/0x10	0:1 bit stop bit 1:2 bit stop bit	/	
	Reserved	/		/	/	/	
0x015B	Gateway Type		unsigned int	0x03/0x06/0x10	21: WiFi version gateway 22: Ethernet RJ45 gateway 23: 4G gateway	/	
0x015C	The total number of sub devices successfully configured (written to the new gateway after replacing the gateway, and the device needs to be searched again after writing)		unsigned int	0x03/0x06/0x10	Range 0-16	/	

0x015D-0x015E	Control command inhibit and enable (group control online device command, does not support 06 function code, must simultaneously control variables of 0x015D-0x0160)		Unsigned 32-bit integer	0x03/0x10	Bit0: Address 1 Bit1: Address 2 Bit2: Address 3 Bit31: Address 32 0: Prohibit control, do not participate in group control 1: Enable control and participate in group control	/
0x015F-0x0160	control command		Unsigned 32-bit integer	0x03/0x10	Bit0: Control address 1 Bit1: Control address 2 Bit31: Control address 32 0: Opening, 1: Closing	/
0x0161	Group control time interval		unsigned int	0x03/0x06/0x10	Range 100-1000ms (default 500ms) It is recommended to connect 8 30W power supplies with an interval of 500ms. If the interval becomes smaller, it is necessary to increase the power supply. Group control only supports small circuit breakers	/
0x0162	Up RS485 baud rate		unsigned int	0x03/0x06/0x10	1: 9600 (default to 1) 2: 14400 3:19200 4: 38400 5:57600 6: 115200	/
0x0163	Bit0	Reserved	unsigned int	0x03/0x06/0x10	Reserved	/
	Bit1-2	Parity bit			0: No parity 1: Odd parity 2: Even parity, default 0	
Timing control						
0x0176	Timing control 1	Minute hour selection (high byte for minutes, low byte for hours)	Unsigned 16 bit integer	0x03/0x06/0x10	BCD code format (timing only supports small circuit breakers)	/
0x0177		Single cycle selection	Unsigned 16 bit integer	0x03/0x06/0x10	Y (0-0x7F, default 0), Bit0: Every Monday Bit1: Every Tuesday Bit2: Every Wednesday Bit3: Every Thursday Bit4: Every Friday Bit5: Every Saturday Bit6: Every Sunday	/

					0 indicates a single occurrence, Bit0-6 non 0 indicates a weekly cycle, and a single occurrence indicates that the control is no longer repeated after controlling once	
0x0178-0x0179		Enable switch address for control	Unsigned 32-bit integer	0x03/0x06/0x10	Bit0: Address 1 Bit1: Address 2 Bit2: Address 3 Bit31: Address 32 0: Prohibit control 1: Enable control	/
0x017A-0x017B		State of control	Unsigned 32-bit integer	0x03/0x06/0x10	Bit0: Control address 1 Bit1: Control address 2 Bit31: Control address 32 0: Opening, 1: Closing	/
0x017C		Reserved	Unsigned 16 bit integer	0x03/0x06/0x10		/
0x017D-0x0183	Timing control 2 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x0184-0x018A	Timing control 3 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x018B-0x0191	Timing control 4 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x0192-0x0198	Timing control 5 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x0199-0x019F	Timing control 6 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x01A0-0x01A6	Timing control 7 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
0x01A7-0x01AD	Timing control 8 (parameters are the same as timer 1)		Unsigned 16 bit integer	0x03/0x06/0x10		/
Factory parameter area						
0x01D1	Software version number		unsigned int	0x03	Y/10 (e.g. 235 represents 2.3.5)	/
Ethernet parameter area						
0x0230	IP allocation method (default 1)		Unsigned shaping	0x03/0x06/0x10	0: Manual, 1: Automatic (DHCP)	/
0x0231	MAC address byte 1 (high byte), MAC address byte 2 (low byte)		Unsigned shaping	0x03	Byte 1 (high byte), Byte 2 (low byte)	/

0x0232	MAC address byte 3 (high byte), MAC address byte 4 (low byte)	Unsigned shaping	0x03	Byte 3 (high byte), Byte 4 (low byte)	/
0x0233	MAC address byte 5 (high byte), MAC address byte 6 (low byte)	Unsigned shaping	0x03	Byte 5 (high byte), Byte 6 (low byte) The MAC address is bytes 1, 2, 3, 4, 5, 6 from left to right	/
0x0234	Ethernet IP address setting byte 1 (high byte), byte 2 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 1 (high byte), Byte 2 (low byte)	/
0x0235	Ethernet IP address setting byte 3 (high byte), byte 4 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 3 (high byte), Byte 4 (low byte) IP addresses from left to right are bytes 1, 2, 3, 4	/
0x0236	Communication port number	Unsigned shaping	0x03/0x06/0x10	Default 502 (Modbus TCP)	/
0x0237	Ethernet subnet mask address setting byte 1 (high byte), byte 2 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 1 (high byte), Byte 2 (low byte)	/
0x0238	Ethernet subnet mask address setting byte 3 (high byte), byte 4 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 3 (high byte), Byte 4 (low byte) The address is bytes 1, 2, 3, 4 from left to right	/
0x0239	Ethernet gateway address setting byte 1 (high byte), byte 2 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 1 (high byte), Byte 2 (low byte)	/
0x023A	Ethernet gateway address setting byte 3 (high byte), byte 4 (low byte)	Unsigned shaping	0x03/0x06/0x10	Byte 3 (high byte), Byte 4 (low byte) The address is bytes 1, 2, 3, 4 from left to right	/
0x023B	Ethernet Modbus host settings byte 1 (high byte), byte 2 (low byte) (DNS address, for MQTT protocol)	Unsigned shaping	0x03/0x06/0x10	Byte 1 (high byte), Byte 2 (low byte)	/
0x023C	Ethernet Modbus host settings byte 3 (high byte), byte 4 (low byte) (DNS address, for MQTT protocol)	Unsigned shaping	0x03/0x06/0x10	Byte 3 (high byte), Byte 4 (low byte) The address is bytes 1, 2, 3, 4 from left to right	/
0x023D	TCP communication mode (default 1)	Unsigned shaping	0x03/0x06/0x10	0: Cloud mode (MQTT), 1: Normal Ethernet mode (Modbus TCP, 4G does not support this mode)	/
0x023E	Rate of change on and off (changes in registers 0x241-0x246)	Unsigned shaping	0x03/0x06/0x10	0: Turn off rate of change judgment 1: Turn on rate of change judgment	/
0x023F	485 communication mode (default 0)	Unsigned shaping	0x03/0x06/0x10	Y (0: Normal mode, 1: Configuration mode) - For the host, the configuration mode is similar to the slave mode and allows for free	/

				configuration of information.	
0x0240	Failed reconnect timeout	Unsigned shaping	0x03/0x06/0x10	Y (0: indicates shutdown, 1-65535s) The default is 180s. If no data is received within 180s, the communication will be reinitialized, which is valid for Modbus TCP	/
0x0241	Voltage and current reporting rate of change (only supported for M-series circuit breakers)	Unsigned shaping	0x03/0x06/0x10	(1-1000)% Default 30%	/
0x0246	Electric energy reporting changes (only supported for M-series circuit breakers)	Unsigned shaping	0x03/0x06/0x10	(1-60000) * 0.001kWh Default 20000 (i.e. 20kWh)	/
0x0247	Data cycle reporting (supported by all devices)	Unsigned shaping	0x03/0x06/0x10	(1-20000) * 0.1min Default 150 (i.e. 15 minutes)	/
0x0248-0x0256	WIFI username	Character type	0x03/0x10	Maximum character length 30	/
0x0257-0x0265	WIFI password	Character type	0x03/0x10	Maximum character length 30	/
0x0266-0x028D	MQTT domain name (or IP address)	Character type	0x03/0x10	Maximum character length 80	/
0x028E-0x2AB	user name	Character type	0x03/0x10	Maximum character length 60	/
0x02AC-0x02C9	password	Character type	0x03/0x10	Maximum character length 60	/
0x02CA	MQTT port number	Unsigned shaping	0x03/0x10		/
0x02D1	MQTT protocol version	Unsigned shaping	0x03/0x10	Version 3 (for 3.1.0) Or 4 (default to 4 for 3.1.0), Gateway settings for 4G mode and wired Ethernet If the MQTT server version is 5, it must be 4 here	/