

Grating ruler, magnetic grating ruler, encoder, flowmeter, water electricity meter, single end or differential pulse signal to RS485 module, WJ156

Product features:

- Grating ruler magnetic grating ruler decoding conversion to standard Modbus RTU protocol
- High speed grating ruler magnetic grating ruler 4 times frequency counting, frequency up to 5MHz
- The module can output 5V power supply to power the grating ruler
- One differential grating ruler and one single end grating ruler are input at the same time
- Each group of input can be set as 2-way independent DI high-speed counter
- All count values support automatic saving after power failure
- Support pulse counting used as flowmeter, water meter, electricity meter and gas meter
- Reset and set the count value through RS-485 interface
- Built in WiFi supports Modbus TCP and MQTT communication protocols
- Built in webpage function, data can be queried through webpage
- User can programmatically set module address, baud rate, etc
- Wide power supply range: 8~32VDC
- Standard DIN35 guide rail installation, convenient for centralized wiring



WJ156 Module Appearance

Typical applications:

- Grating ruler magnetic grating ruler length measurement
- Pulse counting of flowmeter or electricity meter
- Product count of production line
- Position Data Measurement Drawing of CNC Machine Tool 1
- Encoder signal is transmitted to IPC
- Directly transfer data to control center instead of PLC

Product Overview:

WJ156 product realizes signal acquisition between sensor and host to decode encoder signal. WJ156 series products can be used in RS485 and WiFi bus industrial automation control systems, automated machine tools, industrial robots, three coordinate positioning systems, displacement measurement, stroke measurement, angle measurement, speed measurement, flow measurement, product counting, etc.

The products include pulse signal capture, signal conversion and RS-485 serial communication. Each serial port can connect 255 WJ156 series modules at most. The communication mode adopts ASCII code communication protocol or MODBUS RTU communication protocol. The baud rate can be set by code, and can be linked to the same RS-485 bus with the control module of other manufacturers, which is convenient for computer programming.

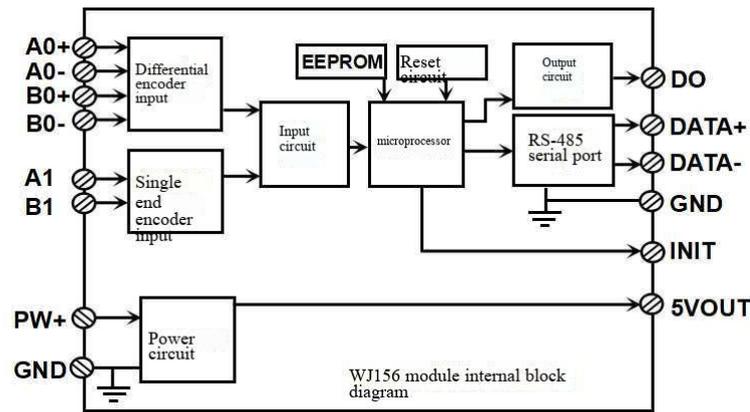


Figure 2 WJ156 Module Internal Block Diagram

WJ156 series products are intelligent monitoring and control systems based on single chip microcomputer. All user set configuration information such as address, baud rate, IP address and parameter setting are stored in non-volatile memory EEPROM.

WJ156 series products are designed and manufactured according to industrial standards, with strong anti-interference ability and high reliability. Operating temperature range $-40\text{ }^{\circ}\text{C}\sim+85\text{ }^{\circ}\text{C}$.

Function introduction:

WJ156 remote I/O module can be used to measure one channel of differential encoder signal and one channel of single ended encoder signal (both NPN and PNP can be used), and can also be set as two independent counters or DI status measurement.

1. Signal input

One channel of differential encoder signal input and one channel of single ended encoder signal, or two channels of differential independent counter and single ended independent counter. Single end signal can be connected to NPN, PNP, dry contact and wet contact. Please refer to the wiring diagram for details.

2. RS485 communication protocol

Communication interface: 1-way standard RS-485 communication interface.

Communication protocol: supports two protocols, the character protocol defined by the command set and the MODBUS RTU communication protocol. The module automatically identifies the communication protocol and can realize network communication with various brands of PLC, RTU or computer monitoring system.

Data format: 10 bits. 1-bit start bit, 8-bit data bit, 1-bit stop bit. No calibration.

Communication address (0~255) and baud rate (2400, 4800, 9600, 19200, 38400, 57600, 115200bps) can be set; The communication network can reach a maximum distance of 1200 meters, which is connected by twisted pair shielded cables.

High anti-interference design of communication interface, $\pm 15\text{KV}$ ESD protection, communication response time less than 100mS.

3. WiFi communication protocol

Communication interface: WiFi network interface. It can be connected to WiFi in the LAN and then to Ethernet.

Communication protocol: It supports MQTT protocol and can connect to various MQTT servers such as Alibaba Cloud, Tencent Cloud, Huawei Cloud, China Mobile IOT OneNET, Private Cloud, etc. MODBUS TCP protocol can also be used to realize data exchange of industrial Ethernet.

It also supports TCP/UDP/WebSocket and other communication protocols.

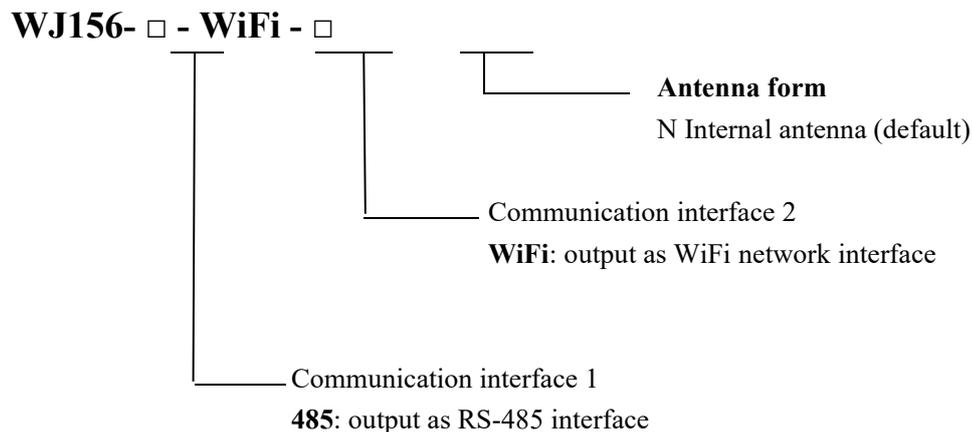
Network cache: 2K Byte (both receiving and sending)

Communication response time: less than 10mS.

4. Anti interference

Checksum can be set as required. There are transient suppression diodes inside the module, which can effectively suppress various surge pulses, protect the module, internal digital filtering, and also can well suppress power frequency interference from the power grid.

Product selection:



Model selection example: Model: **WJ156 – 485-WiFi-N** means the output is RS-485 interface, WiFi built-in antenna

WJ156 general parameters:

(typical @+25 °C, Vs is 24VDC)

Input type: encoder 5V differential signal input. Differential signal range: $\pm 200\text{mV} \sim \pm 7\text{V}$, one channel (A0+/A0-/B0+/B0-).

Encoder single end signal input, one channel (A1/B1). Low level: input <1V; high level: input 3.5~30V

Frequency range 0-5MHz (all channels input at the same time)

Encoder counting range -2147483647 ~ +2147483647, 4-fold frequency counting is adopted, and it is saved automatically after power failure

DI counter range 0~4294967295, power failure automatically saves

Communication 1: protocol RS-485 standard character protocol and MODBUS RTU communication protocol

Baud rate (2400, 4800, 9600, 19200, 38400, 57600, 115200bps) can be set by webpage

The address (0~255) can be set by webpage

Communication 2: MQTT communication protocol or MODBUS TCP communication protocol or TCP/UDP

Communication response time: 100 ms maximum

Working power supply: +8~32VDC wide power supply range, internal anti reverse connection and overvoltage protection circuit

Power consumption: less than 1W

Operating temperature: -45~+80 °C

Operating humidity: 10~95% (no condensation)

Storage temperature: -45~+80 °C

Storage humidity: 10~95% (no condensation)

Overall dimensions: 106 mm x 37mm x 59mm

Pin definition:

Pin	Name	Description	Pin	Name	Description
one	PW+	Positive end of power supply	eight	GND	Signal ground
two	GND	Negative terminal of power supply	nine	B1	Encoder 1 signal B input terminal
three	INIT	Initial state setting	ten	A1	Encoder 1 signal A input terminal
four	5Vout	5V distribution output	eleven	B0-	Encoder signal B0 input negative terminal
five	DO	Switch signal output terminal	twelve	B0+	Encoder signal B0 input positive end
six	DATA+	RS-485 signal positive terminal	thirteen	A0-	Encoder signal A0 input negative terminal
seven	DATA-	RS-485 signal negative terminal	fourteen	A0+	Encoder signal A0 input positive end

Table 1 Pin definition

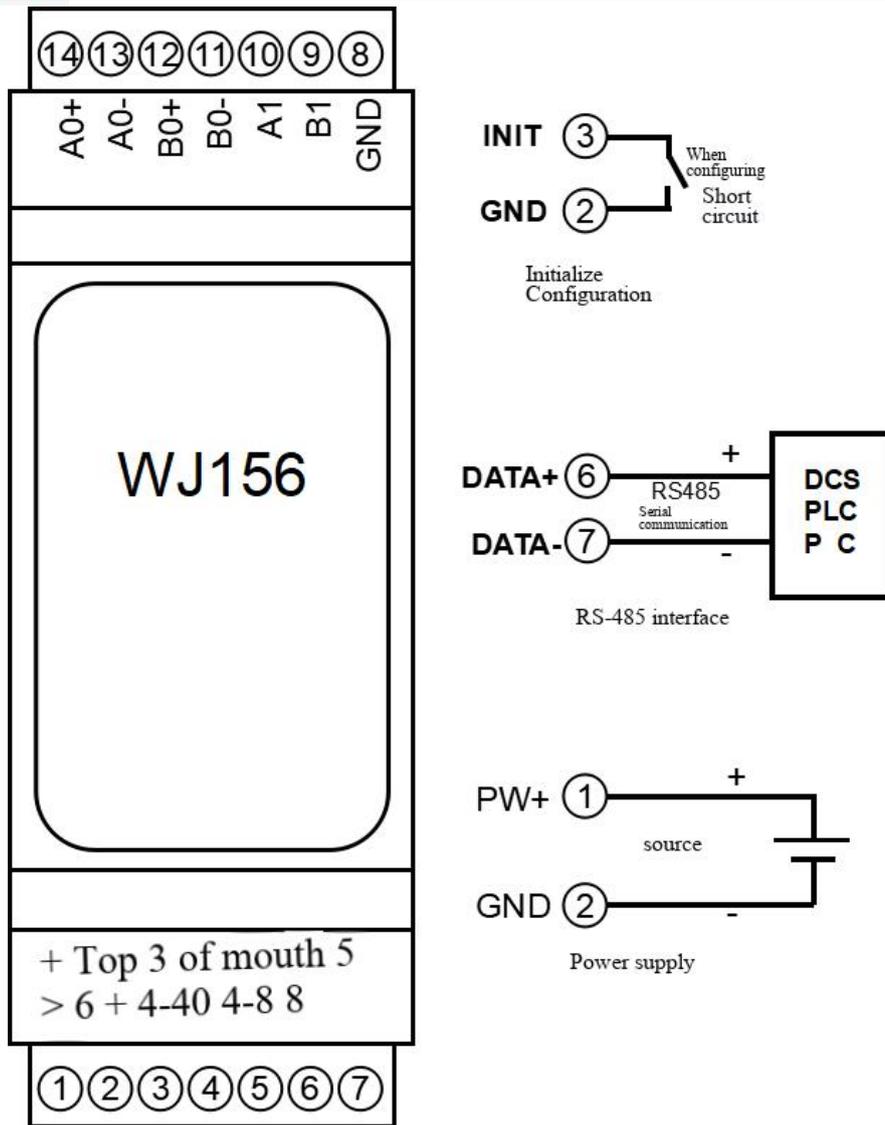


Figure 3 WJ156 Module Wiring Diagram

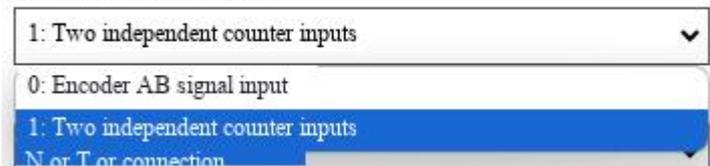
Signal input wiring diagram

	Mode 0: encoder mode	Mode 1: Counting mode
Channel 0: differential channel		

<p>Channel 1: single ended channel</p>	<p>Wiring diagram of 12V or 24V power supply single end encoder</p>	<p>Wiring diagram of 12V or 24V power supply sensor</p>
	<p>Wiring diagram of 5V power supply single end encoder</p>	<p>Wiring diagram of 5V power supply sensor</p>

Note 1: The factory default is **working mode 0**, and the DI count needs to be changed to **working mode 1** by issuing a command, as shown in the following figure:

A0B0 input counting mode



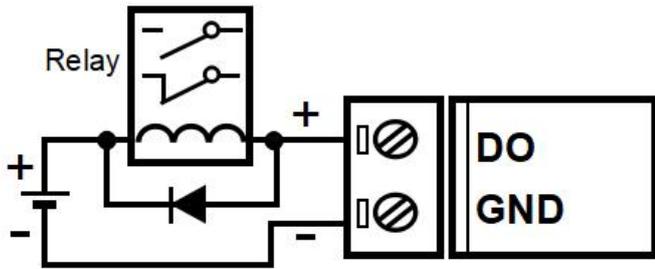
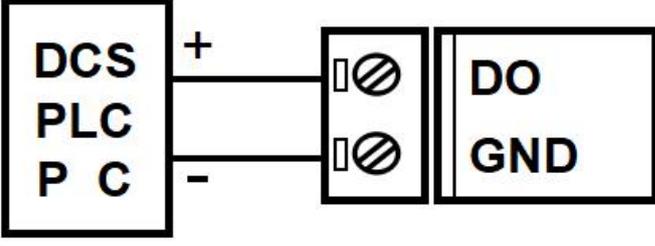
Note 2: The factory default is to turn off pull-up. If it is an NPN sensor, dry contact or switch input, the internal pull-up resistance needs to be turned on; Others, such as NPN sensor with pull-up resistance, PNP sensor, push-pull sensor, TTL level, etc., can be used directly. Turn on or off the internal pull-up resistor can be set on the configuration page, as shown in the following figure:

DI input mode

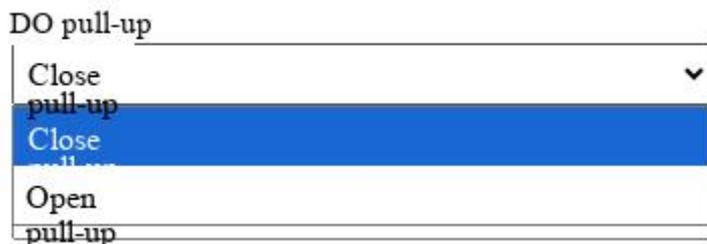


Switch signal output wiring diagram

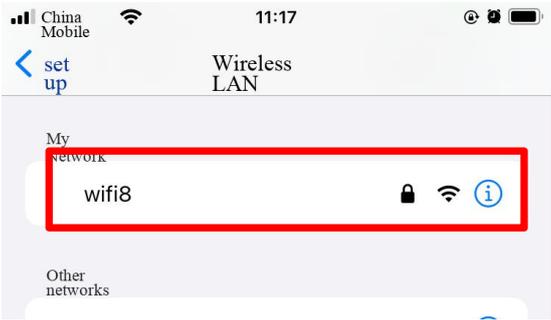
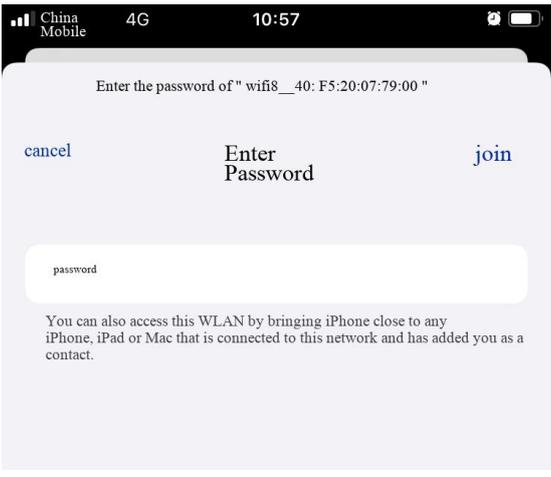
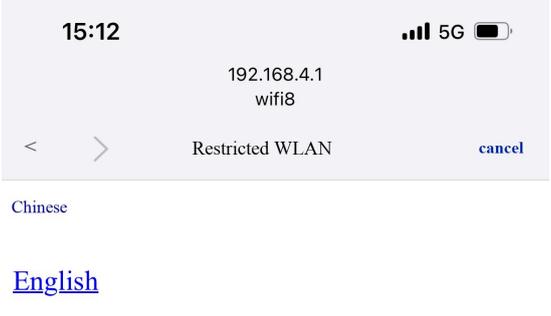
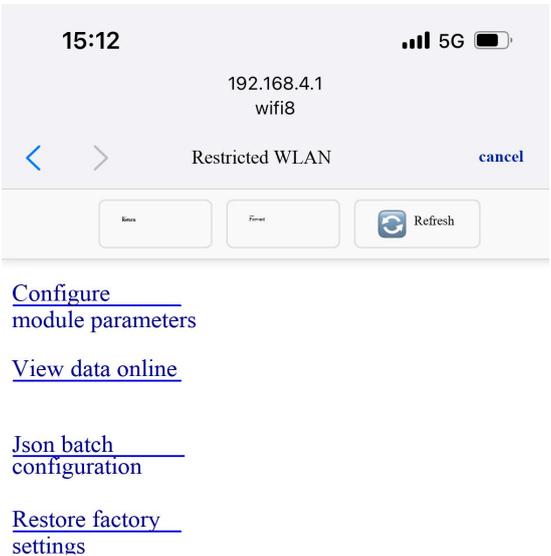
Drive relay (NPN)	Level output (web page open DO pull-up)

	
<p>External power supply can be 5~30VDC It can also be the power supply for the module NPN triode working current is recommended to be less than 50mA</p>	<p>The output high level is approximately equal to the power supply voltage, and the low level is approximately equal to 0V</p>

Note 1: The DO factory default is to turn off the pull-up, and the internal DO pull-up resistance can be set on the configuration page to turn on or off, as shown in the following figure:



First, configure the WJ156 module through the mobile phone

	<p>1. Let the module enter AP mode</p> <p>(1) Connect the power supply and short circuit the INIT of the module to GND.</p> <p>(2) Open the mobile phone "WLAN" or "Settings → WLAN", find the WiFi named "wifi8" to connect.</p>
	<p>The factory password of this module is 12345678, and then "join".</p>
	<p>Click "Chinese"</p>
 <p>Configure module parameters</p> <p>View data online</p> <p>Json batch configuration</p> <p>Restore factory settings</p>	<p>2. Enter the module webpage.</p> <p>After connecting the WiFi of the module, it will automatically jump to the module's built-in webpage after a few seconds, as shown in the left figure. If the mobile phone cannot automatically jump, you can also open the mobile browser and enter the website 192.168.4.1 to log in.</p> <p>Click the configuration module parameter link to enter the configuration interface</p>

192.168.4.1
wifi8

Restricted WLAN cancel

DI Settings

A0B0 input counting mode
0: Encoder AB signal input

A1B1 input counting mode
0: Encoder AB signal input

DI input mode
PNP or TTL or wet contact

Encoder 0 pulses per revolution
1000

Number of pulses per revolution of encoder 1
1000

Encoder 0 pulse rate
1

Encoder 1 pulse rate
1

DI counting edge (A0 ~ B1)
0000

Frequency refresh time (ms)
1000

DI Settings

A0B0 input counting mode
1: Two independent counter inputs

A1B1 input counting mode
1: Two independent counter inputs

DI input mode
PNP or TTL or wet contact

DI counting edge (A0 ~ B1)
0000

Independent counting mode frequency range
0: High speed measurement 0-5MHz

Frequency refresh time (ms)
1000

A0 Pulses per revolution
1000

3. Configure module DI parameters

Please modify the following parameters according to actual needs:

(1) A0B0~A1B1 input counting mode:

Counting mode 0: encoder AB signal input;

Counting mode 1: two independent counter inputs;

Please fill in according to the actual input sensor, and select encoder AB signal input for grating ruler and magnetic grating ruler.

(2) Encoder 0~1 pulses per revolution: pulses per revolution of the encoder. If you need to measure the speed, please set it according to the actual parameters. The module will automatically convert the rpm.

(3) Encoder 0~1 pulse magnification: set the actual value corresponding to each pulse. The default value is 1. The actual engineering value is converted from this value and the actual number of 4-fold frequency pulses. For example, if each pulse is 0.005mm, it can be set to 0.005, then the actual engineering value is $0.005 * \text{pulse number}$.

(4) DI input mode: NPN or PNP input is selected according to the actually connected sensor. After NPN input is selected, the internal pull up voltage is connected to the positive side of the power supply, and the pull up resistance is 10K ohms; Select PNP input and turn off the pull-up voltage internally.

(5) DI counting edge: different edge trigger counts can be set, 0 indicates the rising edge count, and 1 indicates the falling edge count. Normal use uses the default rising edge count.

(6) A0~B1 pulses per revolution: pulses per revolution of DI. If you need to measure the speed, please set it according to the actual parameters. The module will automatically convert the rpm.

(7) A0~B1 filtering time: the value range is 0 to 65535.

If it is 0, it means no filtering; Other values represent the filtering time, in mS (millisecond). If

B0 Pulses per revolution
1000

A1 Pulses per revolution
1000

B1 Pulses per revolution
1000

A0 filtering time
0

BO filtering time
0

A1 Filtering time
0

B1 Filtering time
0

A0 pulse rate
1

BO pulse rate
1

A1 pulse rate
1

B1 pulse rate
1

DO setting

DO pull-up
Close pull-up

Whether the DO0 level status is reversed
DO0 level status normal output

DO0 output mode
A1 upper frequency limit alarm

DO0 power on default level
0

DO0 alarm value
1000

DO0 alarm pulse time (ms)
500

the DI input point is a mechanical switch or a mechanical relay, it is recommended to set the filtering time as 20mS.

- (8) A0~B1 pulse magnification: set the actual value corresponding to each pulse. The default value is 1. The actual engineering value is converted from this value to the actual pulse. For example, if each pulse is 0.005mm, it can be set to 0.005, then the actual engineering value is 0.005 * pulse number.

RS485 / 232 setting

Module address
1

Module baud rate
9600

Module Parity
No verification

WiFi settings

WiFi account
W

WiFi password
.....

Working mode
TCP Server

Local IP settings
Set IP manually

IP address
192.168.0.16

Default gateway
192.168.0.1

Subnet mask
255.255.255.0

Local port
23

Automatic reporting interval (ms)
0

Module name
B0B21CAD5AEC

MQTT settings
Open MQTT function

MQTT server address

MQTT Client ID

MQTT user name

MQTT Password

4. DO setting

DO can be set as level output or frequency and PWM output.

It can also be set as the alarm output of the encoder.

Users can choose by themselves according to their needs.

For details, see Table 2: Definition of DO output mode

5. Configure module RS485 parameters

Please modify the following parameters according to actual needs:

- (9) Module Address: the communication ID of the module, which is 1 by default.
- (10) Module baud rate: the baud rate of module communication, which is 9600 by default
- (11) Parity check of module: the default is no parity check.

6. Configure module WiFi parameters

Please modify the following parameters according to actual needs:

- (12) WiFi account: Connect the WiFi covered here.
- (13) WiFi password: fill in the WiFi password. If it is already connected, do not enter it again.
- (14) Working mode: select the working mode and fill in according to the actual application.

Optional TCP Server, TCP Client, UDP, MODBUS TCP, Websocket, etc.

- (15) Local IP setting: If only MQTT protocol is used, it can be set to automatically acquire IP. If Modbus TCP or web page is required to access data, it is

MQTT port

MQTT Publishing
 Topic

MQTT publishing interval (ms)

MQTT Subscription
 Topic

**save and
reboot**

Mac address: B0: B2:1C: AD: 5A: EC ; Version: V1.0

recommended to manually set it to a fixed IP to facilitate communication through IP address and module.

- (16) IP address: set the IP address of the module. It must be the network segment where the current WiFi is located and not the same as the IP address of other devices in the LAN. For example, if the IP address of the WiFi router is 192.168.0.1, you can set the IP address of the module to 192.168.0.7
- (17) Default gateway: the gateway of the module. Fill in the IP address of the current WiFi router. For example, the IP address of the WiFi router is 192.168.0.1. Just fill in the IP address
- (18) Subnet mask: the subnet mask of the module. If there is no cross network segment, fill in the default value of 255.255.255.0
- (19) Local port: communication port of the module, and 502 port is generally used for MODBUS communication.
- (20) Remote server IP address: the remote server IP address, the server that TCP Client and UDP need to connect to.
- (21) Remote Server Port: The port of the server.
- (22) Auto Report Interval: the time interval for the module to report data regularly. If it is set to 0, data will not be automatically reported.
- (23) Automatic reporting of count changes: a piece of data is reported when the count changes. It can only be used in situations where the data changes very slowly, or a large amount of data will be sent.
- (24) Module Name: the user defines the name of a module to distinguish different modules.
- (25) MQTT setting: If MQTT communication is used, the MQTT function needs to be turned on.
- (26) MQTT server address: fill in the URL of the MQTT server,
 For example: broker.emqx.io
 If the IP address of the local server is 192.168.0.100, you can write 192.168.0.100
- (27) MQTT Client ID , Please fill in the user name, password, port, publishing topic, subscription topic and other parameters according to the requirements of the MQTT server. The QoS of MQTT is 0 and cannot be modified.
- (28) MQTT publishing interval: the interval between

the module automatically publishing data to the MQTT server, in ms. Setting it to 0 means canceling the scheduled publishing function.

7. Save parameters

After parameter setting, click the Save and Restart button, the module will save the parameters and restart automatically, then disconnect the INIT and GND of the module, and the module will work according to the set parameters.

8. View data online on the webpage

Click the [online view data](#) link on the module home page to enter the data view interface. As shown in the left figure.

The left figure shows that channel 0 is set to mode 0 (encoder), and channel 1 is set to mode 1 (single pulse)

If the IP address of the module is 192.168.0.5, the user can also access the link [192.168.0.5/readData](#) to obtain data in Json format.

DI status indicates the level status of the input.

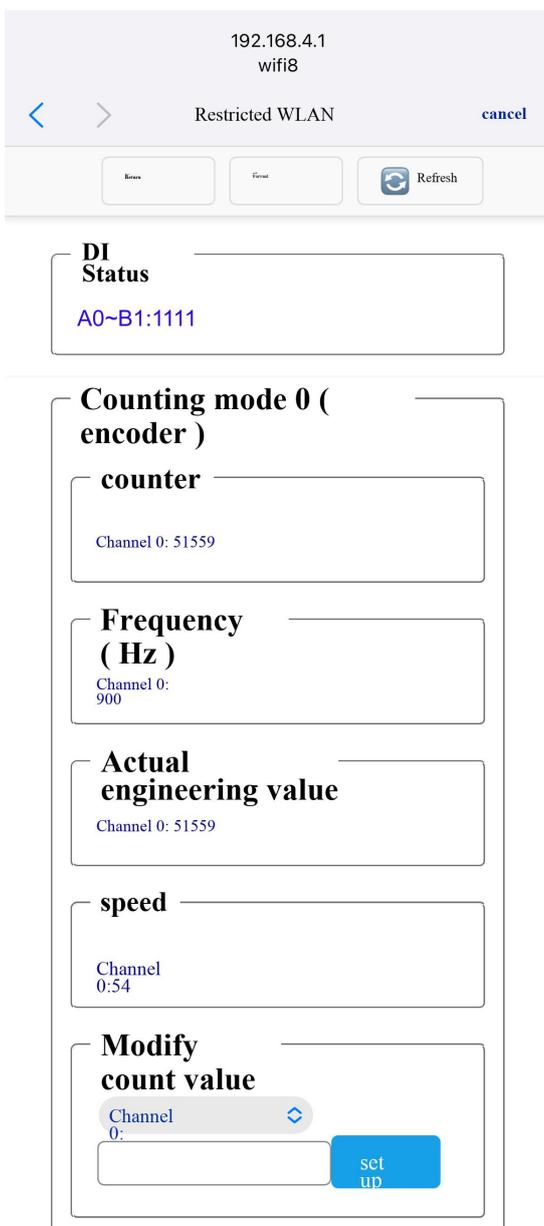
The pulse counter is the cumulative number of measured pulses.

The pulse frequency is the number of pulses per second.

The actual engineering value is obtained by multiplying the value of the pulse counter by the pulse multiplication rate set on the web page. It is used to automatically convert the actual flow, length, output and other data.

The speed is converted from frequency and pulses per revolution. It is used to automatically convert the actual rpm.

To clear the count value, you can write 0 to the table, and



Counting mode 1 (single pulse)

counter

A1:1994298
B1:1996300

Frequency (Hz)

A1:900
B1:900

Actual engineering value

A1:1994298
B1:1996300

speed

A1:54
B1:54

Modify count value

A0:

set up

Modify DO / PWM

Level status of DO0:

set up

PWM0 frequency (1-65535) :

PWM0 duty cycle (0-10000) :

set up

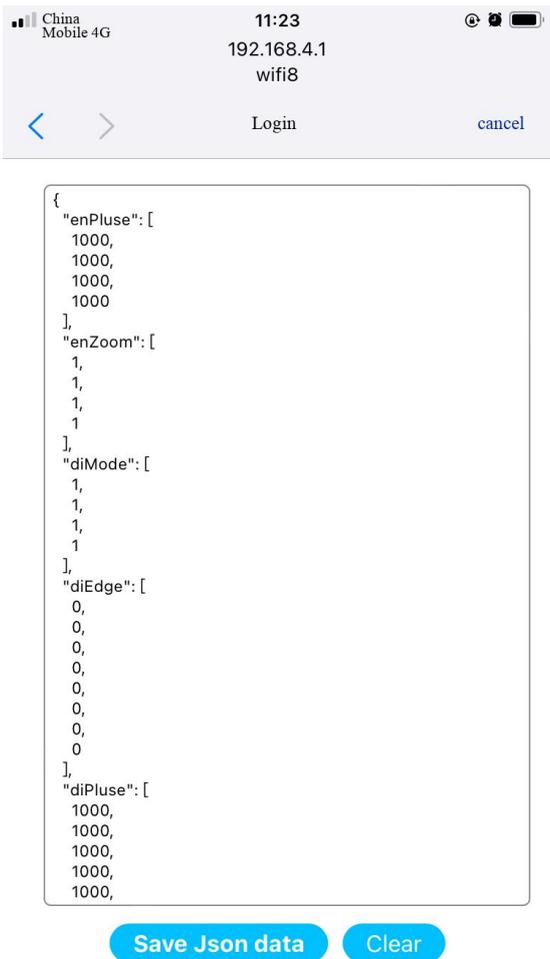
then click Set to clear the count value. You can also set other values to modify the count value.

Modify DO/PWM

DOO level status: set 0 or 1.

PWM0 frequency (1-65535): set the frequency value as PWM output.

PWM0 duty ratio (0-10000): when used as PWM output, set the duty ratio.



9. Batch setting parameters

Click the [Json batch configuration](#) link on the module home page to enter the batch setting interface. As shown in the left figure.

The data must be in standard Json format. You can set all parameters or only some parameters.

If there are many products to set, you can save time by batch setting.

Click Save Json data after filling in.

Example 1: Only modify the WiFi account password to send:

```

{
  "WifiSsid": "w",
  "WifiPassword": "12345678",
  "setIP": 1,
  "ipAddress": "192.168.0.5",
  "gateway": "192.168.0.1",
  "netmask": "255.255.255.0",
}

```

Example 2: Only modifying MQTT parameters can send:

```

{
  "setMQTT": 1,
  "mqttHostUrl": "broker.emqx.io",
  "port": 1883,
  "clientId": "mqtt_test_001",
  "username": "",
  "passwd": "",
  "topic": "mqtt_topic_001",
  "pubTime": 2000,
  "pubonchange": 0
}

```

9. The module webpage can also be opened on the LAN

If the module has been connected to the local wifi, you can enter the module IP in the computer or mobile browser, such as 192.168.0.5, and open the module web page (provided that the computer IP or mobile IP is in the same network segment as the module, and the login web page should be based on the IP address of the current module), then you can enter the module internal web page. You can also configure the module or read the module data in the same way as the above table.

Character communication protocol:

The following commands are sent according to the module address as the default 01. If the module address is modified, please change 01 to the new address.

The following communication protocols can be used for TCP/UDP communication of RS485 and WiFi.

RS485 communication: the factory default address is 01, the baud rate is 9600, and there is no parity check. If you forget the address and baud rate, you can short the INIT to GND, and the module will enter the configuration mode. The address is 01, the baud rate is 9600, and there is no parity check. You can view the parameters or reconfigure the parameters by connecting your mobile phone to WiFi, or you can send a configuration command to modify the parameters. Please disconnect INIT and GND after setting.

WiFi communication: If you want to set the WiFi account, password and other parameters, you can short the INIT to GND, and the module will enter the AP configuration mode. The WiFi name AP generated by the mobile phone connection module will enter the configuration interface. Please disconnect INIT and GND after setting.

MQTT protocol: After the connection is successful, send a command to the [MQTT subscription topic of the module](#), and the reply data is displayed on the [MQTT publication topic of the module](#).

TCP Server, TCP Client, UDP Mode, Web Socket and other working modes: After the connection is successful, you can send commands and receive data.

If automatic reporting is set for WiFi communication, the reported data format is the same as the reply format of [\(1. Read data command\)](#).

1、 Read Data Command

Send: # 01 (WiFi communication, if the scheduled automatic reporting is set, the module will report data regularly instead of sending commands)

Reply: {"devName": "B0B21CAD5AEC", "time": 144273, "diMode": [1,1], "diState": [1,0,1,0], "enCounter": [-207915, -197544], "enFrequency": [0,0], "enActualData": [-207915, -197544], "enSpeed": [0,0], "diCounter": [6500649264311150582188025], "diFrequency": [10110110110], "diActualData": [650064926431150582138025], "diSpeed": [6, 6, 6, 6]}

Format description:

Encoder data is arranged in the order of channel 0~3; The independent DI data is arranged in the order of A0, B0~A3 and B3.

"DevName" module name, which can be modified on the webpage as required

"Time" module internal time, in mS.

"DiMode" module counting mode. **Counting mode 0:** encoder AB signal input; **Counting mode 1:** two independent counter inputs

"DiState" DI state indicates the level state of the input.

The accumulated number of pulses measured by the "enCounter" encoder counter adopts the 4-fold frequency counting method. (**Counting mode 0**)

"EnFrequency" encoder pulse frequency is the number of pulses per second. (**Counting mode 0**)

The actual engineering value of the "enActualData" encoder is obtained by multiplying the value of the encoder pulse counter by the pulse multiplication rate set on the web page. It is used to automatically convert the actual flow, length, output and other data. (**Counting mode 0**)

"EnSpeed" encoder speed is converted from encoder frequency and pulses per revolution. It is used to automatically

convert the actual speed or flow per minute.

(Counting mode 0)

"DiCounter" The cumulative number of pulses measured by the independent counter.**(Counting mode 1)**

The "diFrequency" pulse frequency is the number of pulses per second.**(Counting mode 1)**

The actual project value of "diActualData" is obtained by multiplying the pulse counter value by the pulse multiplication rate set on the web page. It is used to automatically convert the actual flow, length, output and other data.**(Counting mode 1)**

"DiSpeed" speed is converted from frequency and pulses per revolution. It is used to automatically convert the actual rpm.**(Counting mode 1)**

You can also read a single group of data, such as the encoder counter:

Send: # 01>diSpeed

Reply: {"enCounter": [0,0]}

For example, read the actual engineering value of encoder:

Send: # 01>enFrequency

Reply: {"enFrequency": [0,0]}

Read other parameters and send corresponding parameter characters.

2. Set encoder 0~1 count value command

The encoder 0~1 count value can be 0 or other values, and can be reset or modified.

Send: \$01 {"setEn0Count": 0, "setEn1Count": 0}

Or \$01 {"setEn0Count": 666, "setEn1Count": 777}

Only set a single channel: \$01 {"setEn0Count": 0}

Set the same value to all channels at the same time: \$01 {"setAllENCount": 0}

Reply:!01 (cr) indicates successful setting;?01 (cr) indicates command error

3. Set pulse counter A0~B1 count value command

Set the value of pulse counter A0~B1, which can be 0 or other values, and can be cleared or modified.

Send: \$01 {"setA0Count": 0, "setB0Count": 0, "setA1Count": 0, "setB1Count": 0} or \$01 {"setA0Count": 1000, "setB0Count": 2000, "setA1Count": 3000, "setB1Count": 1}

Only set a single channel: \$01 {"setA0Count": 0}

Set the same value to all channels at the same time: \$01 {"setAllDICount": 0}

Reply:!01 (cr) indicates successful setting;?01 (cr) indicates command error

4. Set DO output command

4.1 Set DO output. When the value of DO output mode is "0" (see Table 2: Definition of DO output mode), the following commands can be sent.

Send: \$01 {"setDO0": 0} or \$01 {"setAllDO": 1}

Reply:!01 (cr) indicates successful setting;?01 (cr) indicates command error

4.2 Set the PWM output frequency. When the DO output mode value is "1" (see Table 2: Definition of DO output mode), the following commands can be sent.

Send: \$01 {"setPWM0Fe": 1000} or \$01 {"setAllPWMFe": 1000}

Reply:!01 (cr) indicates successful setting;?01 (cr) indicates command error

4.3 Set the PWM output duty cycle. When the DO output mode value is "1" (see Table 2: Definition of DO output mode), the following commands can be sent.

Send: \$01 {"setPWM0Duty": 5000}

Note: "Percentage"="Value"/100, for example: 5000 represents 50%

Reply:!01 (cr) indicates successful setting;!01 (cr) indicates command error

5. Read configuration command

Read the configuration parameters of the module, or view them directly on the web page.

Sent:% 01ReadConfig

Reply: {"FeReset": [1000], "PWMReset": [5000], "doReset": [0], "doReverse": [1], "doMode": [0], "doAlarmValue": [0], "doAlarmPlus": [0], "NPNorPNP": 0, "doPull": 0, "enPlus": [10001000], "enZoom": [1,1], "diFeRange": 0, "diFeRefreshTime": 1000, "diMode": [0,0], "diEdge": [0,0,0,0], "diPlus": [1000100010001000], "diFilter": [0,0,0,0], "diZoom": [1,1,1], "saveData": 1, "ID": 1, "Baud": 9600, "Check": 0, "WifiSsid": "w", "WifiPassword": "12345678", "workmode": 0, "setIP": 1, "ipAddress": "192.168.0.16", "gateway": "192.168.0.1", "netmask": "255.255.255.0", "localPort": 23, "remoteServerIp": "192.168.0.100", "remotePort": 23, "sendTime": 0, "devName": "B0B21CAD5AEC", "setMQTT": 0, "mqttHostUrl": "", "port": 1883, "clientId": "", "username": "", "passwd": "", "topic": "", "pubTime": 2000, "subopic": ""}

Format description:

"FeReset": PWM0 power on default frequency, "PWMReset": PWM0 power on default duty cycle, "doReset": DO0 power on default level, "doReverse": whether DO0 level status is reversed, "doMode": DO0 output mode, see Table 2, "doAlarmValue": DO0 alarm value, "doAlarmPlus": DO0 alarm pulse time, "NPNorPNP": DI input mode, "doPull": DO pull-up, "enPlus": encoder 0 pulses per revolution, "enZoom": encoder 0 pulse multiplication, "diFeRange": independent counting mode frequency range, "diFeRefreshTime": frequency refresh time, "diMode": input counting mode, "diEdge": DI counting edge, "DiPlus": pulses per revolution, "diFilter": filtering time, "diZoom": A0 pulse multiplication rate, "saveData": whether to save the count value in case of power failure, "ID": module address, "Baud": module baud rate, "Check": module parity check, "WifiSsid": WiFi account, "WifiPassword": WiFi password, "workmode": working mode, "setIP": local IP setting, "ipAddress": local IP, "gateway": default gateway, "netmask": subnet mask, "localPort": local port, "remoteServerIp": remote server IP address, "remotePort": remote server port, "sendTime": automatic reporting

interval, "devName": module name, "setMQTT": MQTT setting, "mqttHostUrl": MQTT server address, "port": MQTT port, "clientId": MQTT client ID, "username": MQTT user name, "passwd": MQTT password, "topic": MQTT publishing subject, "pubTime": MQTT publishing interval, "subtopic": MQTT subscription topic

Where "doMode" is a two-way DO output mode: values are as follows

code	explain	code	explain
zero	DO0 as level output	eleven	Encoder 1 count upper limit alarm
one	DO0 as PWM output	twelve	Encoder 1 upper count alarm and clear
two	Encoder 0 count upper limit alarm	thirteen	Encoder 1 count upper and lower limit alarm
three	Encoder 0 count upper limit alarm and clear	fourteen	Encoder 1 counts the upper and lower limit alarm and clear to zero
four	Encoder 0 count upper and lower limit alarm	fifteen	Encoder 1 upper frequency limit alarm
five	Encoder 0 count upper and lower limit alarm and clear	sixteen	Encoder 1 upper and lower frequency alarm
six	Encoder 0 upper frequency limit alarm	seventeen	A1 count upper limit alarm
seven	Encoder 0 frequency upper and lower limit alarm	eighteen	A1 count upper limit alarm and clear
eight	A0 count upper limit alarm	nineteen	A1 upper frequency limit alarm
nine	A0 count upper limit alarm and clear		
ten	A0 upper frequency limit alarm		

Table 2 Definition of DO output mode

6. Set Configuration Command

The configuration parameters of the module can also be set directly on the web page. All or some parameters can be set, and the module will restart automatically after setting.

Send:

```
%01WriteConfig{"FeReset":[1000],"PWMReset":[5000],"doReset":[0],"doReverse":[1],"doMode":[0],"doAlarmValue":
[0],"doAlarmPluse":[0],"NPNorPNP":0,"doPull":1,"enPluse":[769,1000],"enZoom":[1,1],"diFeRange":0,"diFeRefreshT
ime":1000,"diMode":[1,1],"diEdge":[0,0,0,0],"diPluse":[1000,1000,1000,1000],"diFilter":[0,0,0,0],"diZoom":[1,1,1,1],"
saveData":1,"ID":1,"Baud":9600,"Check":0,"WifiSsid":"w","WifiPassword":"12345678","workmode":0,"setIP":1,"ipA
ddress":"192.168.0.16","gateway":"192.168.0.1","netmask":"255.255.255.0","localPort":23,"remoteServerIp":"192.168.
0.100","remotePort":23,"sendTime":0,"devName":"B0B21CAD5AEC","setMQTT":0,"mqttHostUrl":"","port":1883,"cli
entId":"","username":"","passwd":"","topic":"","pubTime":2000,"subtopic":""}
```

You can also set only a single parameter, for example, to modify the baud rate:% 01WriteConfig {"Baud": 115200}

For example, set power failure to not save count value:% 01WriteConfig {"saveData": 0}

Reply:!01 (cr) indicates successful setting;?01 (cr) indicates command error

Modbus communication protocol:

RS485 communication: support Modbus RTU protocol, factory default address is 01, baud rate is 9600, no parity check.If you forget the address and baud rate, you can short the INIT to GND, and the module will enter the configuration mode. The address is 01, the baud rate is 9600, and there is no parity check.You can view the parameters or reconfigure the parameters by connecting your mobile phone to WiFi, or you can send a configuration command to modify the parameters.Please disconnect INIT and GND after setting.

WiFi communication: support Modbus TCP protocol.If you want to set the WiFi account, password and other parameters, you can short the INIT to GND, and the module will enter the AP configuration mode. Connect the mobile phone to the Wifi8 name AP generated by the module to enter the configuration interface.Please disconnect INIT and GND after setting.

\

The registers of Modbus RTU communication protocol and Modbus TCP communication protocol are as follows:

Support function code 01

Address (PLC)	0X	Address (PC, DCS)	Data content	attribute	Data description
00001		zero	A0 input status	read-only	Level status of channel A0~B3 0 indicates low level input, 1 indicates high level input
00002		one	B0 input status	read-only	
00003		two	A1 input status	read-only	
00004		three	B1 input status	read-only	
00005		four	A0 input status	read-only	Inverted value of level state of channel A0~B3 1 indicates low level input, 0 indicates high level input
00006		five	B0 input status	read-only	
00007		six	A1 input status	read-only	
00008		seven	B1 input status	read-only	

Support function codes 03, 06, 16

Address (PLC)	4X	Address (PC, DCS)	Data content	attribute	Data description
40001~40002		0~1	Encoder 0 count	Read/Write	Encoder AB phase counter (counting mode 0)
40003~40004		2-3	Encoder 1 count	Read/Write	<p>The data is a signed long integer in hexadecimal format. Negative numbers use two complements,</p> <p>Positive number (0x00000000~0x7FFFFFFF),</p> <p>Negative number (0xFFFFFFFF~0x80000001),</p> <p>The storage order is CDAB.</p> <p>The counting method is 4-fold frequency counting, and the data is 4 times of the actual pulse number.</p> <p>The counter is cleared to write 0 directly to the corresponding register, You can also write other values as needed.</p>
40005~40006		4-5	Frequency of encoder 0	read-only	Pulse frequency of encoder (counting mode 0)
40007~40008		6~7	Encoder 1 frequency	read-only	<p>The data is a 32-bit floating point number, and the storage order is CDAB.</p> <p>The data is the frequency calculated according to the actual number of pulses per second, not 4 times the frequency.</p>
40009~40010		8~9	Encoder 0 actual engineering value	read-only	Actual engineering value of encoder (counting mode 0)
40011~40012		10-11	Actual engineering value of encoder 1	read-only	<p>The data is a 32-bit floating point number, and the storage order is CDAB.</p> <p>It is the value obtained by multiplying the encoder counter value by the pulse multiplication rate set on the web page</p>
40013~40014		12-13	Speed of encoder 0	read-only	<p>Encoder speed (counting mode 0)</p> <p>The data is a 32-bit signed long integer, and the storage order is CDAB. The speed is converted according to the number of pulses per revolution set in the configuration page.</p>
40015~40016		14-15	Speed of encoder 1	read-only	
40017~40018		16-17	Channel A0 count	Read/Write	Channel A0~B1 counter (counting mode 1)
40019~40020		18-19	Channel B0 count	Read/	The data is an unsigned long integer,

			Write	The storage order is CDAB.Hexadecimal format, (0x00000000~0xFFFFFFFF) , The counter is cleared to write 0 directly to the corresponding register, or other values can be written as required.
40021~40022	20~21	Channel A1 count	Read/ Write	
40023~40024	22-23	Channel B1 count	Read/ Write	
40025~40026	24-25	Frequency of channel A0	read-only	Pulse frequency of channel A0~B1, (counting mode 1) The data is a 32-bit floating point number, and the storage order is CDAB.
40027~40028	26-27	Frequency of channel B0	read-only	
40029~40030	28~29	Frequency of channel A1	read-only	
40031~40032	30~31	Frequency of channel B1	read-only	
40033~40034	32~33	Engineering value of channel A0	read-only	Actual engineering value of channel A0~B1 (counting mode 1) The data is a 32-bit floating point number, and the storage order is CDAB. The value is the pulse count value multiplied by the pulse magnification set on the web page.It is used for automatic calculation of flow or length.
40035~40036	34~35	Engineering value of channel B0	read-only	
40037~40038	36~37	Engineering value of channel A1	read-only	
40039~40040	38~39	Engineering value of channel B1	read-only	
Address 4X (PLC)	Address (PC, DCS)	Data content	attribute	Data description
40041~40042	40~41	Speed of channel A0	read-only	Speed of channel A0~B1 (counting mode 1) Long integer (0x00000000~0xFFFFFFFF), The storage order is CDAB, The speed is converted according to the pulse number set in the configuration page.
40043~40044	42~43	Speed of channel B0	read-only	
40045~40046	44~45	Speed of channel A1	read-only	
40047~40048	46~47	Speed of channel B1	read-only	
forty thousand and fifty-one	fifty	PWM of DO0 output	Read/ Write	DO output channel 0~1, PWM output value, Integer, range 0~10000
forty thousand and fifty-two	fifty-one	DO0 pulse frequency	Read/ Write	

forty thousand and sixty-eight	sixty-seven	Count clear register	write	<p>Unsigned integer, the default value is 0. Modify this register to clear the encoder counter or channel counter. After modification, the register will automatically return to 0.</p> <p>Write 10: set encoder 0 count value to 0, Write 11: set encoder 1 count value to 0, Write 18: set all encoder count values to 0, Write 20: set the channel A0 count value to 0, Write 21: set the channel B0 count value to 0, Write 22: set channel A1 count value to 0, Write 23: Set the channel B1 count value to 0, Write 36: Set all channel count values to 0. Writing other values is invalid.</p>
forty thousand two hundred and eleven	two hundred and ten	Module name	read-only	High bit: 0x01 Low bit: 0x56

Modbus RTU communication example:

03 (0x03) Read Holding Register

If the module address is 01 and **010300000002C40B** is sent in hexadecimal, the data in the register can be obtained.

01	03	00	00	00	02	C4	0B
Module address	Read Holding Register	Register address high order	Register address low order	Number of registers high order	Register number low order	CRC check low order	CRC Check High

If the module replies: **010304CA90FFFC476**, the data read is 0xFFFFCA90, which is replaced by -13680 in decimal system, it means that the current count value of encoder 0 is -13680.

01	03	04	CA	ninety	FF	FF	C4	seventy-six
Module address	Read Holding Register	Number of bytes of data	Data 1 high bit	Data 1 low order	Data 2 high bit	Data 2 low order	CRC check low order	CRC Check High

If the module address is 01 and **01030064000285D4** is sent in hexadecimal, the data of the register can be obtained.

01	03	00	sixty-four	00	02	eighty-five	D4
Module address	Read Holding Register	Register address high order	Register address low order	Number of registers high order	Register number low order	CRC check low order	CRC Check High

If the module replies: **010304CA90FFFC476**, the data read is 0xFFFFCA90, which is replaced by 4294953616 √ in decimal system, it means that the current count value of channel A0 is 4294953616.

01	03	04	CA	ninety	FF	FF	C4	seventy-six
Module address	Read Holding Register	Number of bytes of data	Data 1 high bit	Data 1 low order	Data 2 high bit	Data 2 low order	CRC check low order	CRC Check High

06 (0x06) Write a single register

If the module address is 01, **01060043000AF819** is sent in hexadecimal, that is, the count value of encoder 0 is cleared.

01	06	00	forty-three	00	0A	F8	nineteen
Module address	Write a single holding register	Register address high order	Register address low order	data-high	data-low	CRC check low order	CRC Check High

If the module replies: 01060043000AF819, the setting is successful, and the count value of encoder 0 is changed to 0.

01	06	00	forty-three	00	0A	F8	nineteen
Module address	Write a single holding register	Register address high order	Register address low order	data-high	data-low	CRC check low order	CRC Check High

Modbus TCP communication example:

01 (0x01) read coil

In a remote device, use this function code to read the 1 to 2000 continuous status of the coil. The request PDU specifies the starting address, that is, the first coil address and coil number specified. Address the coil from zero. Therefore, addressing coils 1-16 are 0-15.

The coil in the response message is divided into a coil according to each bit in the data field. The indication status is 1=ON and 0=OFF. The first data is used as the LSB (least significant bit) of the byte, and the subsequent coil data is arranged in high order to form a byte of 8 bits. If the number of returned outputs is not a multiple of eight, zero will be used to fill the remaining bits in the last data byte (up to the high end of the byte). The number of bytes field indicates the complete number of bytes of data

Example of function code 01:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00		00	
	Agreement Flag	00		Agreement Flag	00
		00		00	
	length	00		length	00
06		04			
Unit identifier	01	Unit identifier	01		
Function code		01	Function code		01
Start address Hi		00	Number of bytes		01
Start address Lo		twenty	output data		00
Output quantity Hi		00			
Output quantity Lo		08			

03 (0x03) Read Holding Register

In a remote device, use this function code to read the contents of the continuous block of the holding register. The request PDU specifies the starting register address and the number of registers. Address registers from zero. Therefore, addressing registers 1-16 are 0-15. In the response message, each register has two bytes, the first byte is the data high bit, and the second byte is the data low bit.

Example of function code 03:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00			Agreement Flag
	00	length		00	
	00			Unit identifier	01
	06				
Function code		03	Function code		03
Start address Hi		00	Number of bytes		02
Start address Lo		twenty	Register value Hi		00
Register No. Hi		00	Register value Lo		00
Register No. Lo		01			

05 (0x05) Write single coil

On a remote device, use this function code to write a single output as ON or OFF. The request PDU indicates the forced coil address. Address the coil from zero. Therefore, address coil address 1 is 0. The constant of the coil value field indicates the ON/OFF status of the request. The hexadecimal value 0xFF00 requests that the coil be ON. The hexadecimal value 0x0000 requests that the coil be OFF. All other values are illegal and have no effect on the coil.

The correct response is the same as the request.

Example of function code 05:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00			Agreement Flag
	00	length		00	
	00			Unit identifier	01
	06				
Function code		05	Function code		05
Output address Hi		00	Output address Hi		00
Output address Lo		00	Output address Lo		00
Output value Hi		FF	Output value Hi		FF
Output value Lo		00	Output value Lo		00

06 (0x06) Write a single register

In a remote device, use this function code to write a single holding register. The request PDU indicates the address to be written to the register. Address registers from zero. Therefore, address register address 1 is 0.

The correct response is the same as the request.

Example of function code 06:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00			Agreement Flag
	00	length		00	
	00			06	Unit identifier
	01				
	Function code			06	Function code
Register address Hi		00	Register address Hi		00
Register address Lo		00	Register address Lo		00
Register value Hi		00	Register value Hi		00
Register value Lo		FF	Register value Lo		FF

15 (0x0F) Write multiple coils

On a remote device, use this function code to write multiple outputs as ON or OFF. The request PDU indicates the forced coil address. Address the coil from zero. Therefore, address coil address 1 is 0. The constant of the coil value field indicates the ON/OFF status of the request. The data is converted from hexadecimal system to binary system and arranged in bits. If the bit value is 1, the request coil is ON, and if the bit value is 0, the request coil is OFF.

Example of function code 15:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00			Agreement Flag
	00	length		00	
	00			06	Unit identifier
	01				
	Function code			0F	Function code
Start address Hi		00	Start address Hi		00
Start address Lo		00	Start address Lo		00
Number of coils Hi		00	Number of coils Hi		00

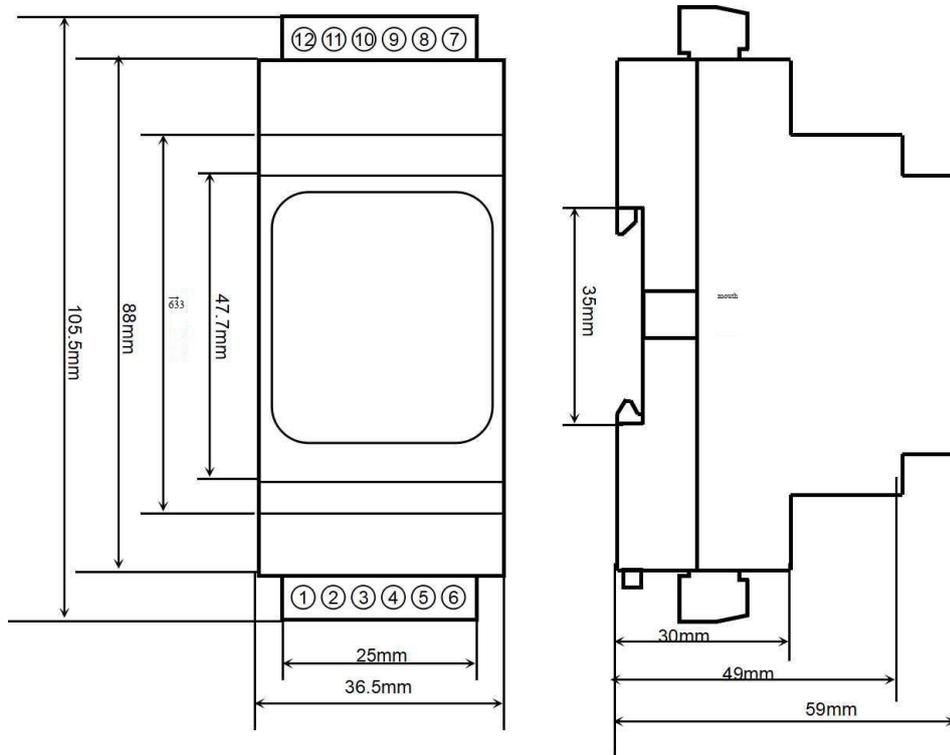
Number of coils Lo	02	Number of coils Lo	02
Number of bytes	01		
Output value	02		

16 (0x10) Write multiple registers

In a remote device, use this function code to write multiple holding registers. The request PDU indicates the address to be written to the register. Address registers from zero. Therefore, address register address 1 is 0. Example of function code 16:

request			response		
Field Name		Hexadecimal	Field Name		Hexadecimal
MBAP header	Transmission ID	01	MBAP header	Transmission ID	01
		00			00
	Agreement Flag	00		Agreement Flag	00
		00			00
	length	00		length	00
		0B			06
Unit identifier	01	Unit identifier	01		
Function code		ten	Function code		ten
Start register address Hi		00	Start register address Hi		00
Start register address Lo		00	Start register address Lo		00
Number of registers Hi		00	Number of registers Hi		00
Number of registers Lo		02	Number of registers Lo		02
Number of bytes		04			
Register value Hi		00			
Register value Lo		05			
Register value Hi		00			
Register value Lo		06			

Overall dimension: (unit: mm)



Warranty:

Within two years from the date of sale of this product, if the user complies with the storage, transportation and use requirements, but the product quality is lower than the technical indicators, the product can be returned to the factory for free maintenance. In case of damage due to violation of operating regulations and requirements, the device cost and maintenance cost shall be paid.

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