Two relay DO outputs, Modbus TCP and MQTT, WiFi module WJ170

W: External antenna N: Internal antenna X: Suction cup antenna

Figure 1 Appearance of WJ170 module

Product features:

- Two relay outputs, WiFi communication control
- Supports communication protocols such as TCP Server, UDP, MQTT, etc
- Built in web page function, can control relays through web pages
- Wide power supply range: 8~32VDC
- High reliability, easy programming, and easy application
- Standard DIN35 rail installation, convenient for centralized wiring
- Users can set module IP addresses and other parameters on the webpage
- Low cost, small size, modular design
- Dimensions: 106 mm x 59mm x 37mm

Typical applications:

- Signal control, monitoring, and MQTT reporting
- TCP network, data collection
- Intelligent building control, security engineering and other application systems
- Industrial automation control system
- Industrial site signal isolation and long-distance transmission
- Equipment operation monitoring and control
- Measurement of sensor signals
- Acquisition and recording of industrial field data

Product Overview:

The WJ170 product enables transparent data exchange between sensors and networks to control device operation. The operation of the equipment can be controlled by controlling the switch quantity generated by the relay through the network.

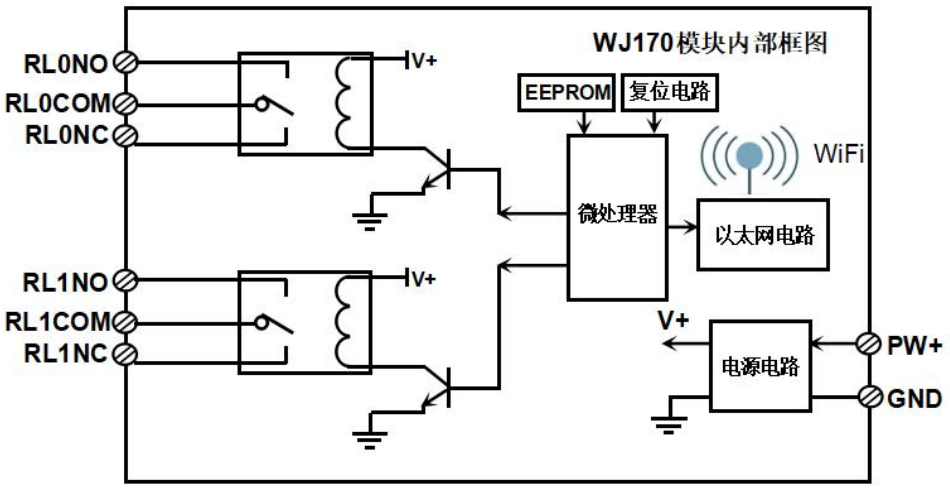


Figure 2 Internal Block Diagram of WJ170 Module

The WJ170 series products include power conditioning, relay control, and WiFi network interface communication. The communication method adopts MODBUS TCP protocol. TCP is a transport layer based protocol that is widely used and a reliable connection oriented protocol. Users can directly set module IP addresses, subnet masks, etc. on the webpage. Can be used for monitoring and controlling the operation of sensor devices.

The WJ170 series products are intelligent monitoring and control systems based on microcontrollers. The module IP address, subnet mask, and other configuration information set by the user are stored in non-volatile memory EEPROM.

The WJ170 series products are designed and manufactured according to industrial standards, with strong anti-interference ability and high reliability. The working temperature range is -45 ℃ to+80 ℃.

Function Introduction:

The WJ170 remote I/O module can be used to control the output of two switch signals.

1、 Switching signal output

2-channel C-type relay signal output, with normally open and normally closed contacts.

2. Communication Protocol

Communication interface: WiFi network interface. Can connect to WiFi within the local area network.

Communication protocol: MODBUS TCP protocol is adopted to achieve industrial Ethernet data exchange. It can also communicate with modules through TCP sockets.

Network cache: 2K bytes (for both sending and receiving)

Communication response time: less than 10mS.

3. Anti interference

There is a transient suppression diode inside the module, which can effectively suppress various surge pulses and protect the module.

Product selection:

WJ170 - WiFi - □

Form of antenna

W: External antenna

N: Built in antenna

X: Suction cup antenna

communication interface

WiFi: Output as WiFi network interface

Selection Example 1: Model: **WJ170 WiFi W** indicates WiFi interface and external antenna
Selection Example 2: Model: **WJ170-WiFi N** indicates WiFi interface with built-in antenna
Selection Example 3: Model: **WJ170-WiFi X** indicates WiFi interface, suction cup antenna

WJ170 General Parameters:

(Typical @+25 ℃, Vs is 24VDC)
Output type: C-type relay output, 2-channel (DO0~DO1). There are normally open, normally closed, and common ends.

Contact load capacity: 1A 125VAC or 2A 30VDC.
Contact form: 2Z
Maximum switching voltage: 240VAC/120VDC
Maximum switching current: 2A

Communication: MODBUS TCP communication protocol or TCP socket character protocol or MQTT protocol
Web page: Supports web access module and web page setting module parameters.
Interface: WiFi network interface.
Communication response time: 100 ms maximum
Working power supply:+8~32VDC wide power supply range, with internal anti reverse and overvoltage protection circuits
Power consumption: less than 1W
Working temperature: -45~+80 ℃
Working humidity: 10~95% (no condensation)
Storage temperature: -45~+80 ℃
Storage humidity: 10~95% (no condensation)
Dimensions: 106 mm x 59mm x 37mm

Pin definition:

Pin	name	Description	Pin	name	Description
one	PW+	Positive end of power supply	five	INIT	Enter AP configuration mode switch
two	GND	Negative terminal of power supply, signal common ground			
three	RL1COM	Relay 1 common output terminal	six	RL0COM	Relay 0 common output terminal
four	RL1NC	Relay 1 normally closed output terminal	seven	RL0NC	Relay 0 normally closed output terminal
five	RL1NO	Relay 1 normally open output terminal	eight	RL0NO	Relay 0 normally open output terminal

Table 1 Pin Definition

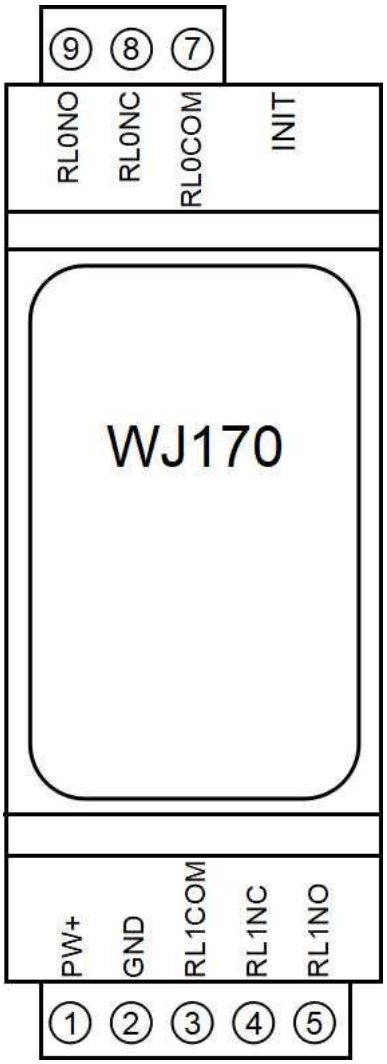
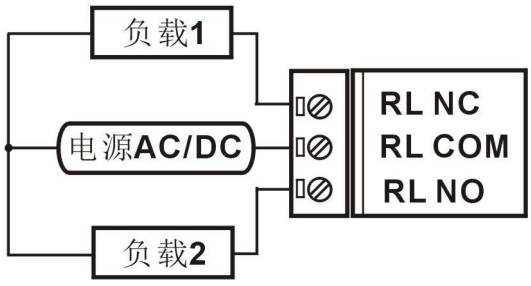
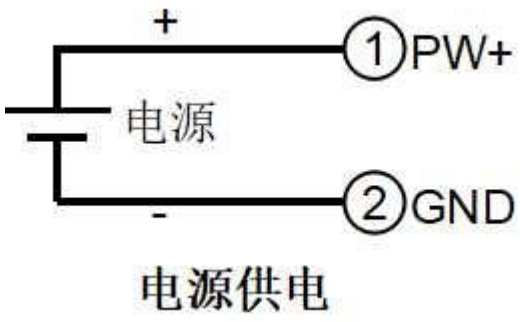


Figure 3 Wiring diagram of WJ170 module

Wiring diagram for switch signal output	**Power supply wiring diagram**
	
0: Relay disconnected, load 1 works, load 2 stops 1: Relay connected, load 1 stopped, load 2 started working	Module 1 and 2 are connected to the power supply, with a wide power supply range of+8~32VDC

Firstly, configure the WJ170 module through your mobile phone

1. Put the module into AP mode

(1) Connect the power, press and hold the module's switch (Initiat) for 3 seconds, and then release it.
(2) Open the wireless LAN on your phone or
Go to "Settings → WLAN" and find the WiFi name starting with "wifi8" to connect.

The factory password for this module is: 12345678, then "Join".

2. Enter the module webpage.

After connecting to the WiFi of the module, wait a few seconds and it will automatically redirect to the built-in webpage of the module, as shown in the left figure. If the phone cannot automatically redirect, you can also open the mobile browser and enter the website 192.168.4.1 to log in.
Click on the configuration module parameter link to enter the configuration interface

3. Parameter settings

DO0, DO1 default power on level

0 represents normally closed channel connection, 1 represents normally open channel connection

4. Configure module WiFi parameters

Please modify the following parameters according to actual needs:

（1） WiFi account: Connect to the WiFi coverage in this area.

（2） WiFi password: Fill in the WiFi password, if already connected, do not re-enter.

（3） Local IP settings: If only MQTT protocol is used, it can be set to automatically obtain IP. If you want to access data through Modbus TCP or web pages, it is recommended to manually set it to a fixed IP address to facilitate communication between the IP address and the module.

（4） IP address: Set the IP address of the module, which must be in the current WiFi network segment and not the same as the IP address of other devices in the local area network. For example, if the IP of the WiFi router is 192.168.0.1, the IP of the module can be set to 192.168.0.7

（5） Default gateway: The gateway of the module, fill in the IP address of the current WiFi router. For example, if the IP address of a WiFi router is 192.168.0.1, simply fill in this IP address

（6） 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

（7） Local port: The communication port of the module, and MODBUS communication generally uses port 502.

（8） Remote server IP address: The remote server IP, TCP client, and UDP server that needs to be connected to.

（9） Remote server port: The port of the server.

（10） Automatic reporting interval: The time interval for the module to report data at regular intervals, set to 0 to indicate that data will not be automatically reported.

（11） Automatic reporting of count changes: Report a data point when there is a change in the count, which can only be used in situations where the data changes very slowly, otherwise a large amount of data will be sent.

（12） Module Name: User defined name for a module to distinguish between different modules.

（13） MQTT settings: If MQTT communication is used, the MQTT function needs to be turned on.

（14） MQTT server address: Fill in the URL of the MQTT server,
For example: brokere.emqx.io
If the local server IP is 192.168.0.100, you can write 192.168.0.100

（15） Please fill in the MQTT client ID, username, password, port, publish topic, subscribe topic, and other parameters according to the requirements of the MQTT server. The QoS of MQTT is 0 and cannot be modified.

（16） MQTT publishing interval: The time interval in milliseconds during which the module automatically publishes data to the MQTT server. Set to 0 to cancel the scheduled publishing function.

（17） Automatic MQTT publishing for DI status changes: default is' No '. This function is only suitable for situations where the pulse changes very slowly. If any channel has a pulse change, it will publish data to the MQTT server once. It is not recommended to set it to "Yes" for situations with rapid pulse changes.
Otherwise, there will be a large amount of data sent.

5. Save parameters

After completing the parameter settings, click the save and restart button, and the module will save the parameters and automatically restart.

6. View data online on the webpage

Click on the online data viewing link on the module's homepage to enter the data viewing interface. As shown in the left figure.

If the IP address of the module is 192.168.0.5, users can also obtain JSON format data by accessing the link 192.168.0.5/readData.

(1) Click the "on" or "off" button to control the relay output.

7. Batch setting parameters

Click on the Json Batch Configuration link on the module's homepage to enter the Batch Settings interface. As shown in the left figure.

The data must be in standard JSON format, and all parameters can be set or only some parameters can be set.

If there are many products to be set up, batch setting can save time.

After completing the filling, click the button Save Json data.

Example 1: Only changing the WiFi account password can 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, "puboncchange": 0 }

8. The module webpage can also be opened on the local area network

If the module is already connected to the local WiFi, you can enter the module IP in the computer or mobile browser, such as 192.168.0.5, to open the module webpage (provided that the computer IP or mobile IP is in the same network segment as the module, and the login operation should be based on the current module IP address), and then enter the internal webpage of the module. You can also configure modules or read module data, and the operation method is the same as the table above.

Character Communication Protocol:

MQTT protocol: After a successful connection, a command is sent to the MQTT subscription topic of the module, and the replied data is displayed on the MQTT publication topic of the module.

Under working modes such as **TCP Server, TCP Client, UDP Mode, Web Socket**, **etc.:** After a successful connection, commands can be sent and data can be received.

1. Read data command

Send: # 01 (If timed automatic reporting is set, there is no need to send commands, the module will report data at regular intervals)

Reply: {"devName": "083A8DE9ACBD", "time": 58539, "doState": [0,0]}

Format Description:

The module name 'devName' can be modified on the webpage as needed

The internal time of the 'time' module, measured in mS.

DO0~DO1 switch status of the "doState" module

0 represents normally closed channel connection, 1 represents normally open channel connection

You can also read a single set of data:

#01>doState

Reply: {"doState": [1,0]}

2. Set relay output

$01{"setDO":[1,0]}

$01{"setDO1":[1]}

$01{"setDO0":[0]}

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

3. Read configuration commands

The configuration parameters of the reading module can also be viewed directly on the webpage.

Send:% 01ReadConfig

Reply: {"initial DO0": 0, "initial DO1": 0, "WifiSid": "w", "WifiPassword": "12345678", "work mode": 0, "setIP": 1, "ipAddress": "192.168.0.5", "gateway": "192.168.0.1", "netmask": "255.255.255.0", "localPort": 23, "remoteServerIP": "192.168.0.160", "remotePort": 23, "sendTime": 0, "devName": "083A8DE9AB5C", "setMQTT": 0, "mqttHostURL":

"broker. emqx. io", "port": 1883, "costId": "083A8DE9AB5C", "username": "", "passwd": "", "topic": "pub", "pubTime": 2000, "subtopic": "sub", "version": "V1.00", "mac": "08:3A: 8D: E9: AB: 5C"}

4. Set configuration commands

The configuration parameters of the module can also be set directly on the webpage. You can set all or some parameters, and the module will automatically restart after setting.

send out:

%01WriteConfig{"initialDO0":0,"initialDO1":0,"WifiSsid":"w","WifiPassword":"12345678","workmode":0,"setIP":1,"ipAddress":"192.168.0.5","gateway":"192.168.0.1","netmask":"255.255.255.0","localPort":23,"remoteServerIp":"192.168.0.160","remotePort":23,"sendTime":0,"devName":"083A8DE9AB5C","setMQTT":0,"mqttHostUrl":"broker.emqx.io","port":1883,"clientId":"083A8DE9AB5C","username":"","passwd":"","topic":"pub","pubTime":2000,"subtopic":"sub","version":"V1.00","mac":"08:3A:8D:E9:AB:5C"}

You can also set only a single parameter, such as modifying WIFI:% 01WriteConfig {"WifiSid": "w"}

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

Modbus TCP protocol

Register address description for WJ170 (note: addresses are all decimal numbers)

Supports registers with function codes 01, 05, and 15.

Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**attribute**	**Data Explanation**
00001	0	Output relay	Read/ Write	Output status of channel 0
00002	one	Output relay	Read/ Write	Output status of channel 1

Table 5 Modbus Rtu Register Description

05 (0x05) Write a single coil

On a remote device, use this function code to write a single output as ON or OFF. The request PDU specifies the mandatory coil address. Address the coil from scratch. Therefore, addressing coil address 1 is 0. The constant of the coil range indicates the requested ON/OFF state. Hexadecimal value 0xFF00 requests the coil to be ON. Hexadecimal value 0x0000 requests the coil to be OFF. All other values are illegal and have no effect on the coil.

The correct response is the same as a request.

For example, for function code 05, set channel DO0 to ON, which is 1, and register address 00001:

request			**response**		
Field Name		**hexadecimal**	**Field Name**		**hexadecimal**
MBAP message header	Transmission identification	01	MBAP message header	Transmission identification	01
		00			00
	Protocol Logo	00		Protocol Logo	00
		00			00
	length	00		length	00
		06			06
	Unit	01		Unit identifier	01

	identifier				
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

Common problems with WJ170

1， How to determine the status of a module based on lighting

The **light** is on **twice** for **1 second:** the module is waiting for the configured AP mode and can be connected to the module's WiFi 8 network settings parameters using a mobile phone.

The **light** is on **once** every **1** second**:** the module is currently connected to WiFi. If it cannot be connected for a long time, please reset the WiFi parameters of the module.

The **light** is on **once** every **5** seconds**:** the module has been connected to WiFi and is working normally.

2. Cross network segment issues

If the IP of the device and the communicating PC are not in the same network segment and are directly connected via Ethernet or under the same sub router, then the two cannot communicate at all.

give an example:

Device IP: 192.168.0.7

Subnet mask: 255.255.255.0

PC's IP: 192.168.1.100

Subnet mask: 255.255.255.0

Due to the device's IP being 192.168.0.7, it is unable to log in to the device's webpage or ping it on the PC.

If you want the two to communicate, you need to set the subnet mask of the device and PC, as well as the subnet mask on the router, to 255.255.0.0, so that you can log in to the module webpage.

3. The device can ping, but the webpage cannot be opened

There may be several reasons for this:

1) The device has set a static IP address that conflicts with the IP addresses of existing devices in the network

2) The HTTP server port has been modified (default should be 80)

3) Other reasons

Solution: Reset the device to an unused IP address; Restore factory settings or enter the correct port when opening the browser.

4. Every once in a while, there is a disconnection and reconnection

Every once in a while, there will be a phenomenon of disconnection and reconnection

Reason: There is an issue of IP address conflict between the serial server and other devices

5. Communication is **abnormal, network connection cannot** be established**, or search cannot** be **found**

The firewall of the current computer needs to be turned off (in the Windows firewall settings)

Three local ports must not conflict, meaning they must be set to different values. Default values are 23, 26, and 29

Having illegal MAC addresses, such as full FF MAC addresses, may result in inability to connect to the target IP address or duplicate MAC addresses.

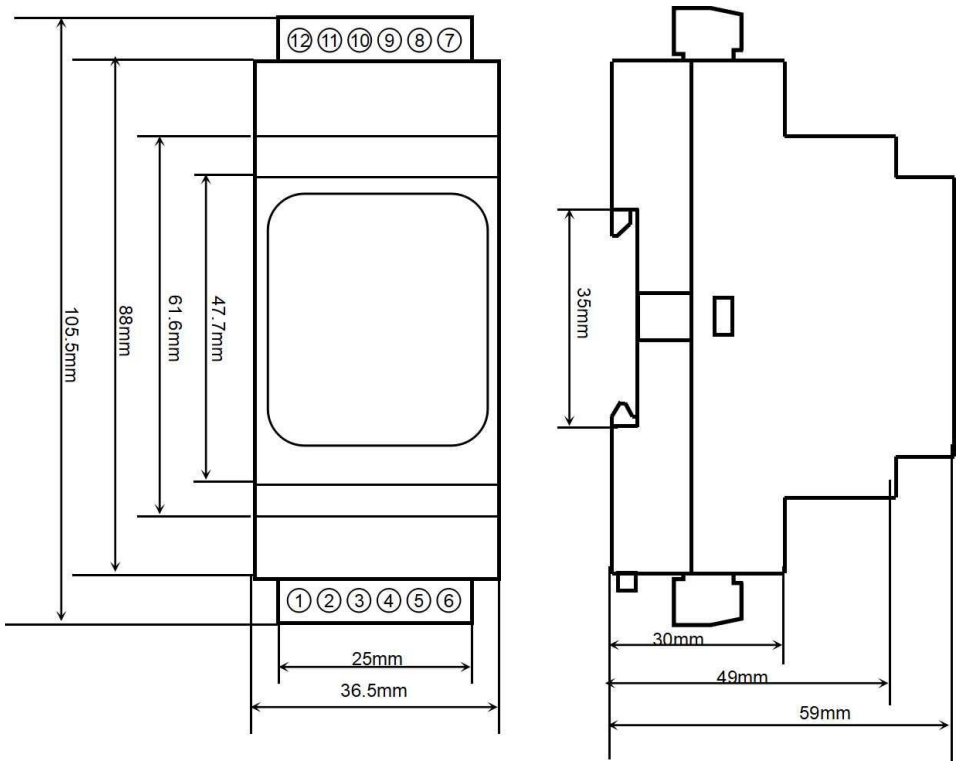
Illegal IP addresses, such as network segments that are not in the same network segment as the router, may not be able to access the external network.

6. Hardware problem search

Poor power supply from the power adapter or poor contact of the plug

If the power light and network port light are not on, it means there is no power supply or the hardware is broken

Dimensions: (Unit: mm)



Can be installed on standard DIN35 rails

guarantee:

Within two years from the date of sale, if the user complies with the storage, transportation, and usage requirements and the product quality is lower than the technical specifications, it can be returned to the factory for free repair. If damage is caused due to violation of operating regulations and requirements, device fees and maintenance fees shall be paid.

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