Modbus RTU to Modbus TCP module, RS232/485 to WiFi module, WJ105

(Multi functional and cost-effective serial server module)

W external antenna N internal antenna X suction cup antenna

Figure 1 Appearance of WJ105 module

Product features:

- Modbus RTU protocol automatically converted to Mobus TCP protocol
- Supports polling slave data as a Modbus RTU master and reporting via MQTT
- Easily set WiFi passwords and configuration parameters on mobile phones
- RS232/485 baud rate can be set from 300 to 256000
- The working mode can be selected as TCP Server or TCP Client,
- UDP working mode, MODBUS protocol conversion mode;
- Support MQTT protocol, data can be reported to the cloud
- Support virtual serial port working mode
- Can cross gateways, switches, and routers
- It can work on the LAN or the Internet (extranet)
- Work port, target IP address, and port can be easily set
- Flexible serial data framing settings to meet users' various subcontracting needs

Typical applications:

- Serial port to industrial Ethernet
- Used for communication with the Internet of Things, real-time monitoring networks, and on-site devices
- Intelligent building control, security engineering and other application systems
- Ethernet industrial automation control system
- Industrial site signal isolation and long-distance transmission
- Equipment operation monitoring and control
- Conversion and transmission of sensor signals
- Acquisition and conversion of industrial field data
- IoT signal to RS232/485 conversion

Product Overview:

WJ105 is an industrial grade RS232/485 and WiFi protocol converter developed by Weijunrui Technology. This serial server is used to transparently transmit TCP network packets or UDP packets with RS232 or RS485 interface data. The serial server can easily connect serial devices to Ethernet and the Internet, achieving networked management of serial devices. Compared with similar products, its significant feature is stability, which allows for full duplex and uninterrupted transmission of large amounts of data without losing a single byte.

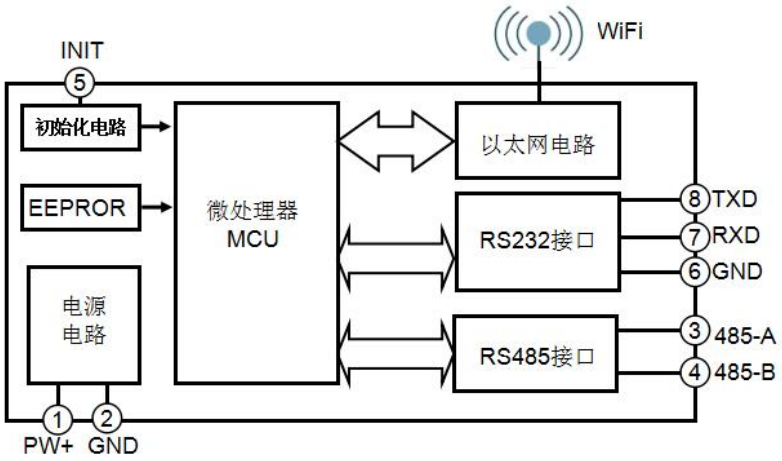


Figure 2 Internal Block Diagram of WJ105 Module

The WJ105 series products include power conditioning, analog switch switching, RS232 interface communication, RS485 interface communication, and WiFi network interface communication. It is an embedded Ethernet serial port data conversion device that integrates the TCP/IP protocol stack. Users can easily complete the network functions of embedded devices using it. It is equipped with a 32-bit processor, with a maximum frequency of 160MHz, fast speed, fast response, and high stability. Integrated WiFi interface, with a maximum baud rate of up to 1Mbps for serial communication. It has working modes such as TCP Server, TCP Client, UDP, and MODBUS protocol conversion, and can be set up through mobile networking.

Product model:

WJ105 - 232/485 – WiFi -

Form of antenna
W external antenna
N built-in antenna
X suction cup antenna
Communication interface 2
WiFi: for WiFi network interface
Communication interface 1
232/485: Supports RS232 interface or RS485 interface, can be selected through the webpage

WJ105 General Parameters:

(Typical @+25 ℃, Vs is 24VDC)
Transmission distance: RS232-15 meters,
RS485 to 1000 meters,
WiFi built-in antenna - about 20 meters,
WiFi external antenna - approximately 100 meters
CPU: 32-bit CPU;

WiFi security: WEP/WPA-PSK/WPA2-PSK;
WiFi frequency: 2.4-2.48GHz
Web page: Supports web access module and web page setting module parameters.
Communication: Transparent transmission from serial port to Ethernet
It can also be set to MODBUS RTU to MODBUS TCP communication protocol.
Protection: Built in TVS overvoltage protection;
Interface: WiFi network interface; RS232 interface or RS485 interface
Working power supply:+8~32VDC wide power supply range, with internal anti reverse and overvoltage protection circuits
Power consumption: less than 1W
Working temperature: -20~+70 ℃
Working humidity: 10~90% (no condensation)
Storage temperature: -45~+80 ℃
Storage humidity: 10~95% (no condensation)
Isolation voltage resistance: non isolated
Dimensions: 79 mm x 69.5mm x 25mm

Pin definition and wiring:

Pin	name	Description	Pin	name	Description
one	PW+	Positive end of power supply	**five**	INIT	Restore factory settings
two	GND	Negative terminal of power supply, signal common ground	six	GND	232 data GND
three	485-A	485 data interface A	seven	RXD	232 data receiving RXD
four	485-B	485 data interface B	eight	TXD	232 data transmission TXD

Note: The pins with the same name are internally connected

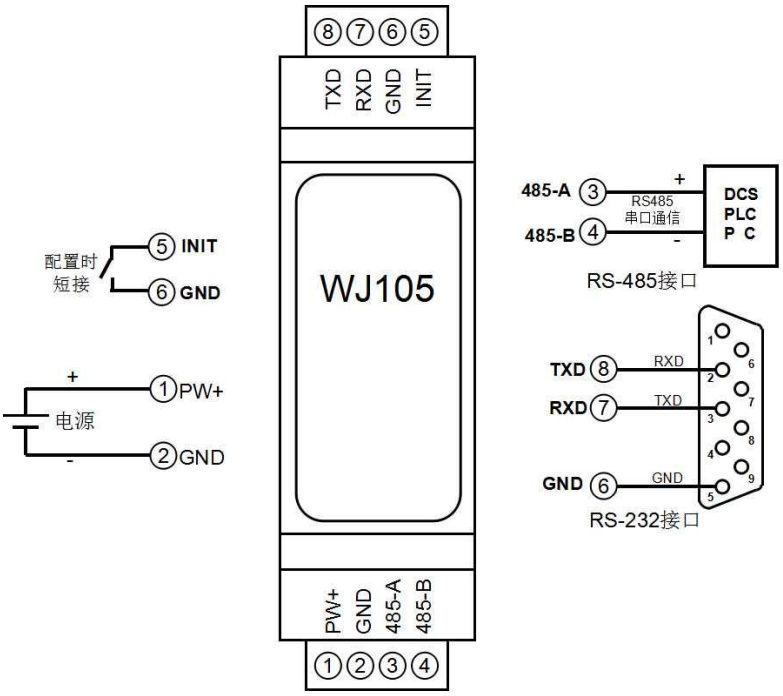


Figure 3 Wiring diagram of WJ105 module

Firstly, configure the WJ105 module through your mobile phone

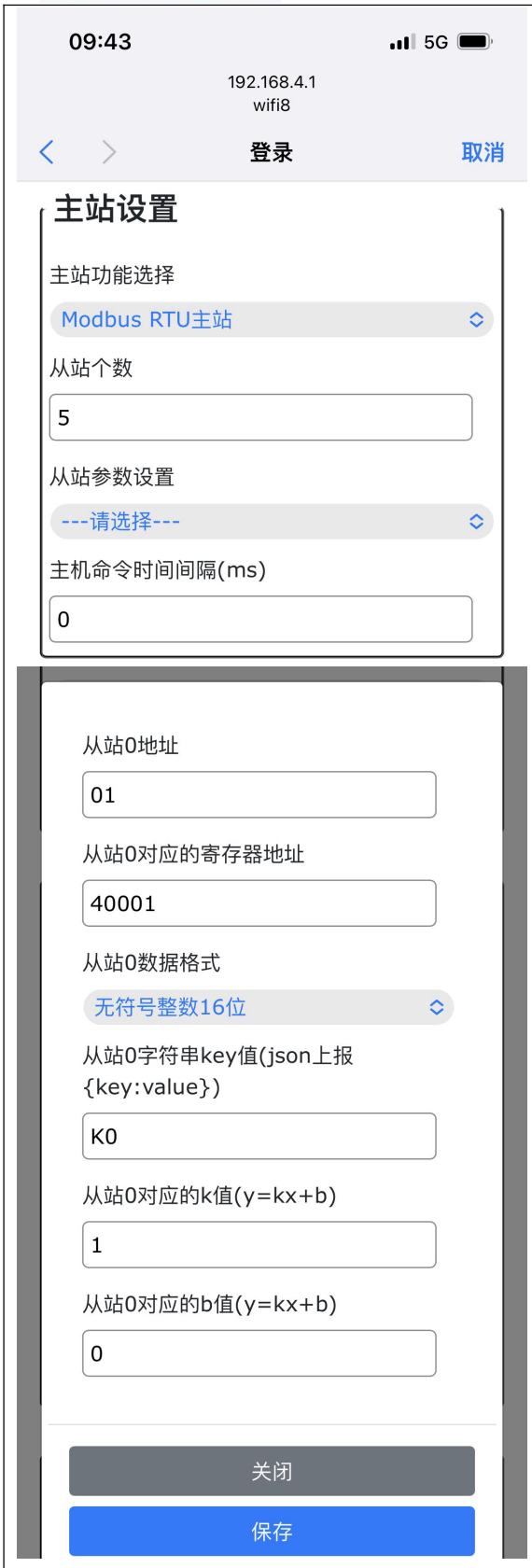
1. Put the module into AP mode

(1) Short circuit the 5th pin (Initiat) and 6th pin (GND) of the module, and then turn on the power.
(2) Open the wireless LAN on your phone or
Go to "Settings → WLAN" and find the WiFi name "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. Enter the settings interface

Please modify the following parameters according to actual needs:

（1）Main station function selection

Optional: transparent transmission mode and Modbus RTU master station

（2）Slave parameter settings for Modbus RTU master mode

Slave parameter settings for Modbus RTU master mode

（3）RS232/485 settings

Communication port selection: RS232 or RS485

And set parameters such as baud rate, data bits, parity bits, stop bits, etc. for the serial port

（4）WiFi settings

1. WiFi account

Connect to WiFi coverage in this area

2. WiFi password

Fill in the WiFi password. If it is already connected, do not enter it again.

3.operation mode

Select the working mode and fill in according to the actual application.

0:TCP Server
1:TCP Client
2:UDP
3:MODBUS TCP
4:Websocket

4.Local IP settings

Choice: Automatically obtain IP or manually set IP

5. IP Address: Remote Server IP

The IP address of the module 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 192.168.0.5

When the remote server IP is set to TCP Client and UDP working modes, it needs to be filled in. The default values for other working modes are sufficient.

6. Default gateway

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

7.Subnet mask

If the subnet mask of the module does not cross network segments,
Fill in the default value of 255.255.255.0

8. Local and remote ports

Fill in the local port number and remote port number according to the actual situation

9.Module Name

Module Name

10.MQTT settings

If MQTT communication is used, the MQTT function needs to be turned on.

11.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

12.MQTT Client ID, username, password, port, publishing topic
Subscription theme and other parameters

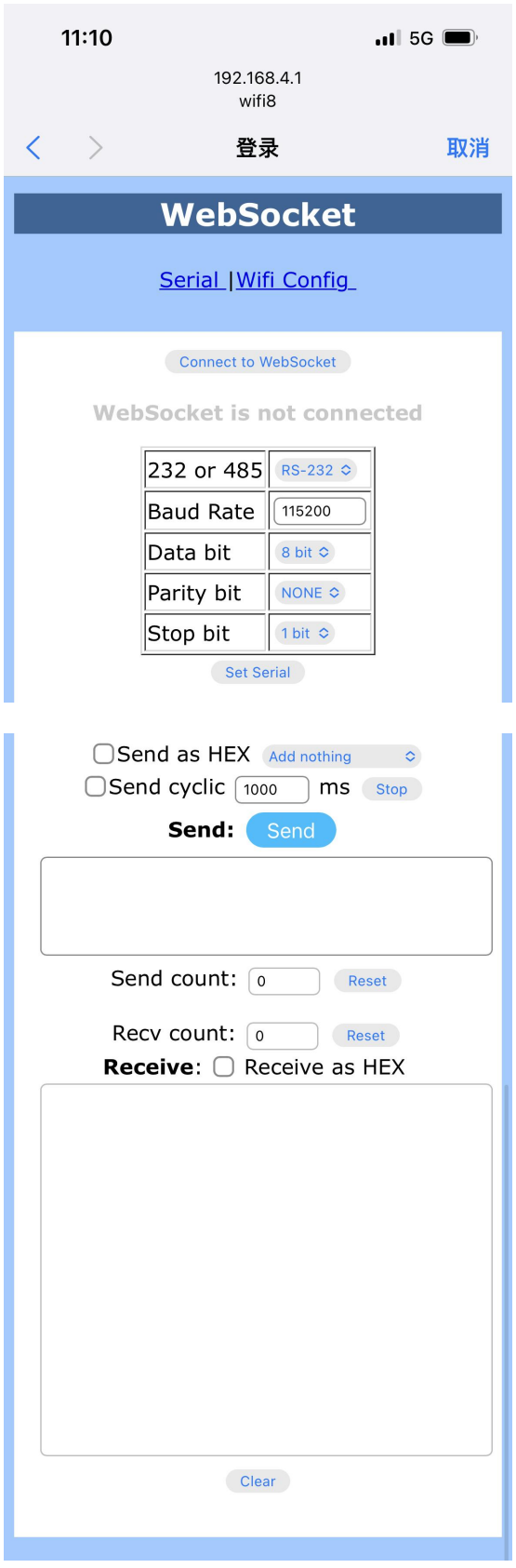
Please fill in according to the requirements of the MQTT server. The QoS of MQTT is 0 and cannot be modified.

13.MQTT publication interval

The time interval in milliseconds for the module to automatically publish data to the MQTT server. Set to 0 to cancel the scheduled publishing function.

4. Save parameters

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



5. Websocket online testing

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

6. 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,
  "pubonchange": 0
}
```

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

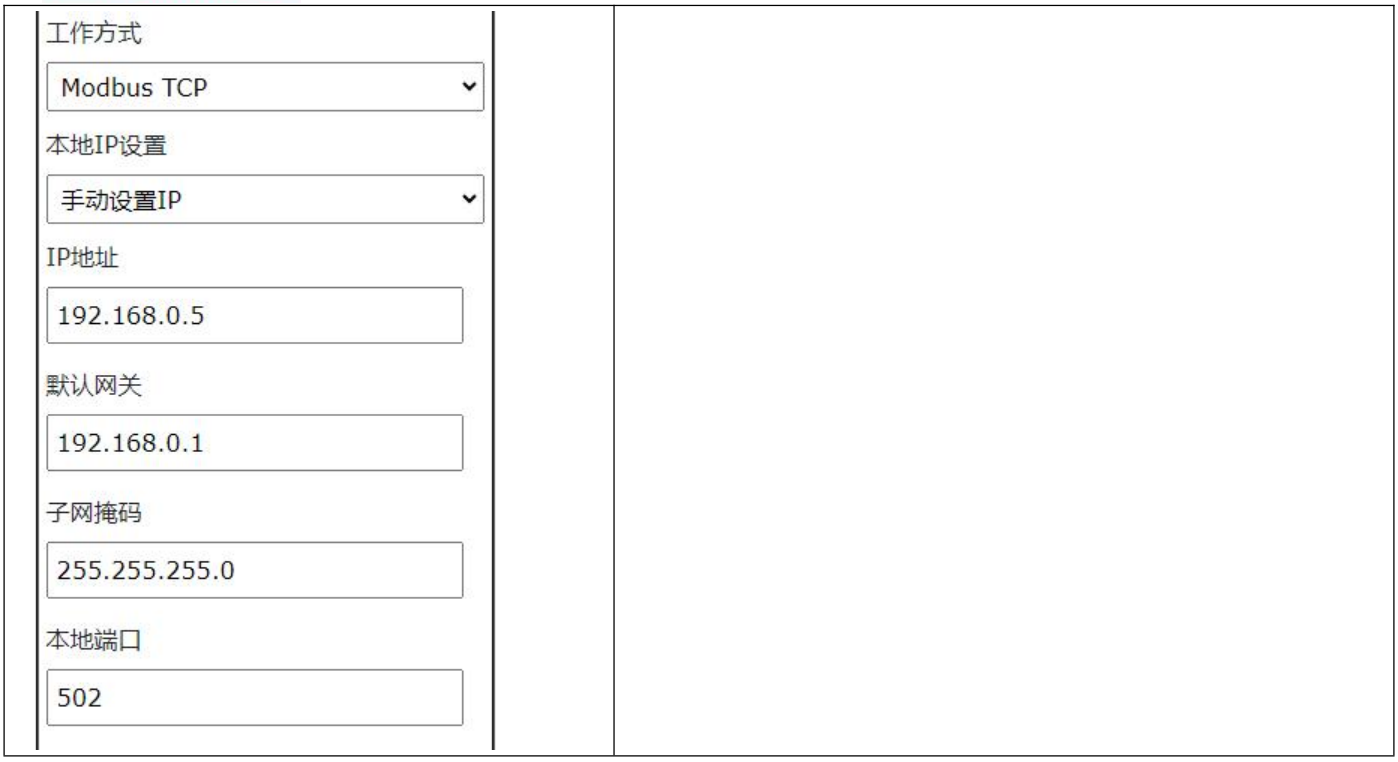
If the module is already connected to the local WiFi, you can enter the module IP in the computer or mobile browser, such as 192.168.0.5, to open the module webpage (provided that the computer IP or mobile IP is in the same network segment as the module, and the login operation should be based on the 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.

MODBUS RTU communication protocol to TCP Server communication protocol

How to set MODBUS RTU communication protocol to MODBUS TCP communication protocol?

	If you need to convert MODBUS TCP communication protocol to MODBUS TCP communication protocol, you need to set the working mode, local port, and baud rate. Working mode: 3 (representing Modbus TCP) Local port: 502 Baud rate: Set according to the communication baud rate of Modbus RTU on site Once modified, click on 'Save Settings'. Then restart the module.



2. Example of converting MODBUS RTU communication protocol to MODBUS TCP communication protocol.

Open **MODBUS** testing software**:** ModScan32

Select Connection Connect from the menu

Set as follows in the pop-up window:

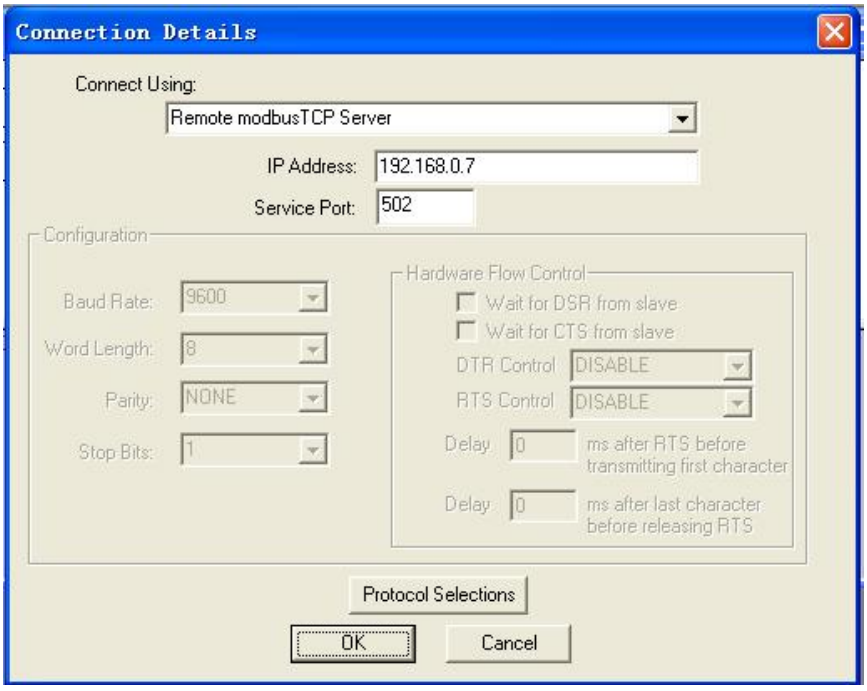


Figure 5: Settings for WJ105 using ModScan32 software

After completing the setup, the data uploaded from the existing device can be read. The figure is as follows:

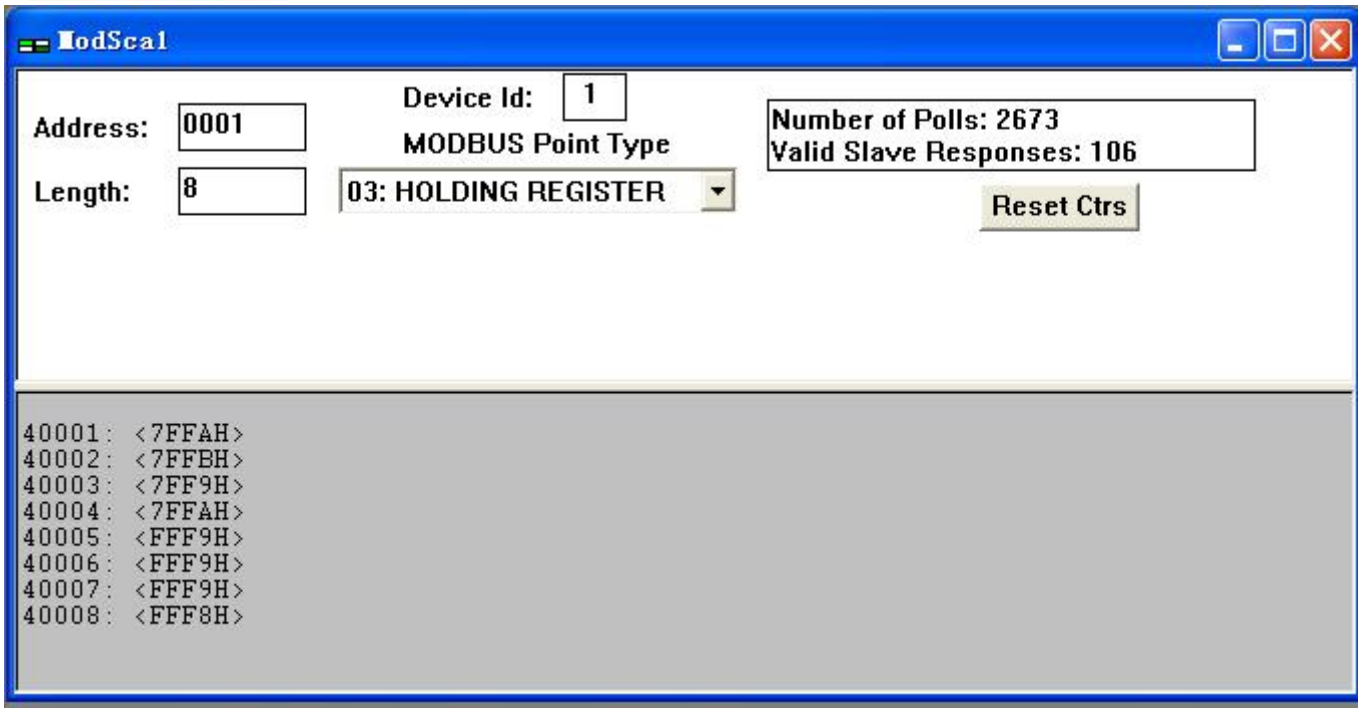


Figure 6: WJ105 using ModScan32 software to read existing device data

TCP Server working mode

How to set up the communication protocol for TCP Server to serial port?

If you need to use TCP Server working mode, you need to set the working mode, local port, and baud rate:
Working mode: 0 (representing TCP Server)
Local port: 23
Baud rate: Set according to the communication baud rate on site
Once modified, click on 'Save Settings'. Then restart the module.

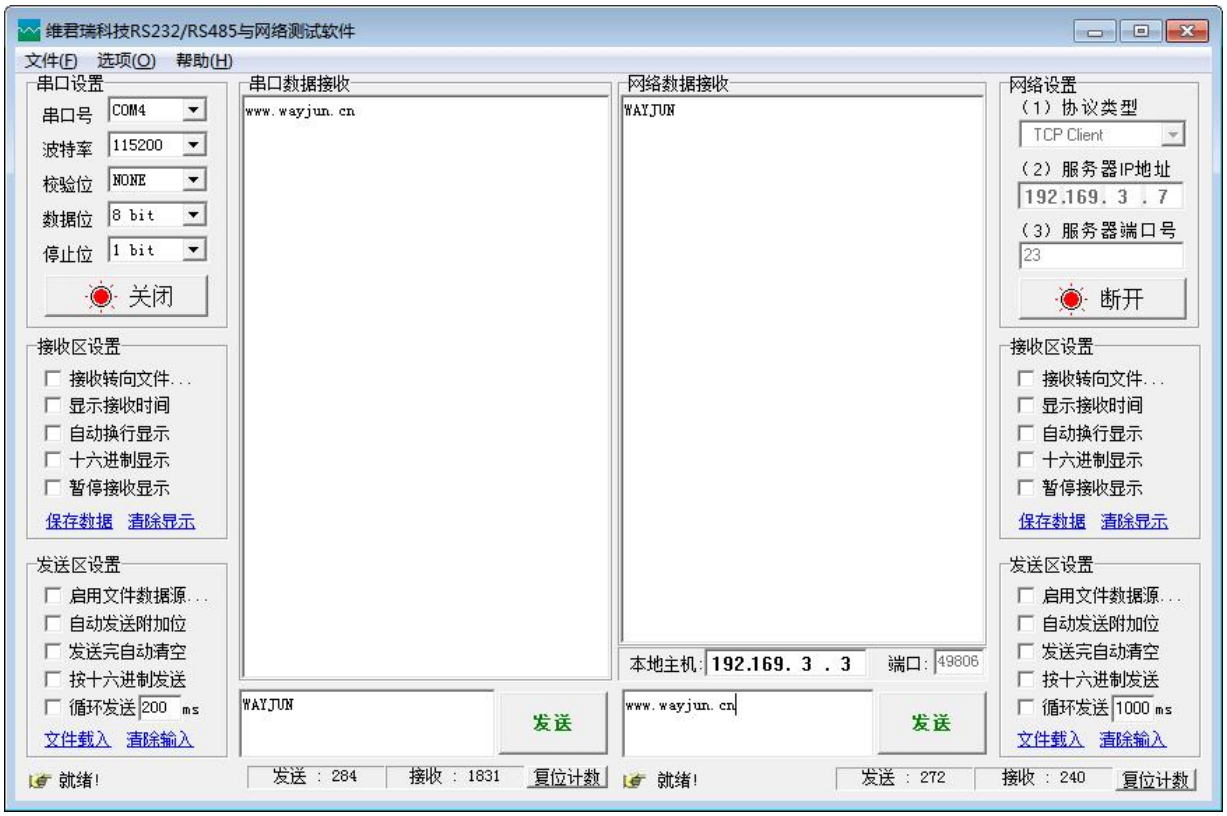
2. An instance of the communication protocol for converting TCP Server to serial port.

Open **network** testing software**:** Wayjun TCP and COM test

Serial port settings: Set according to the COM port and communication baud rate of the on-site serial port.

Network settings: Protocol type: TCP Client

IP address: 192.169.3.7 Port 23



Websocket working mode

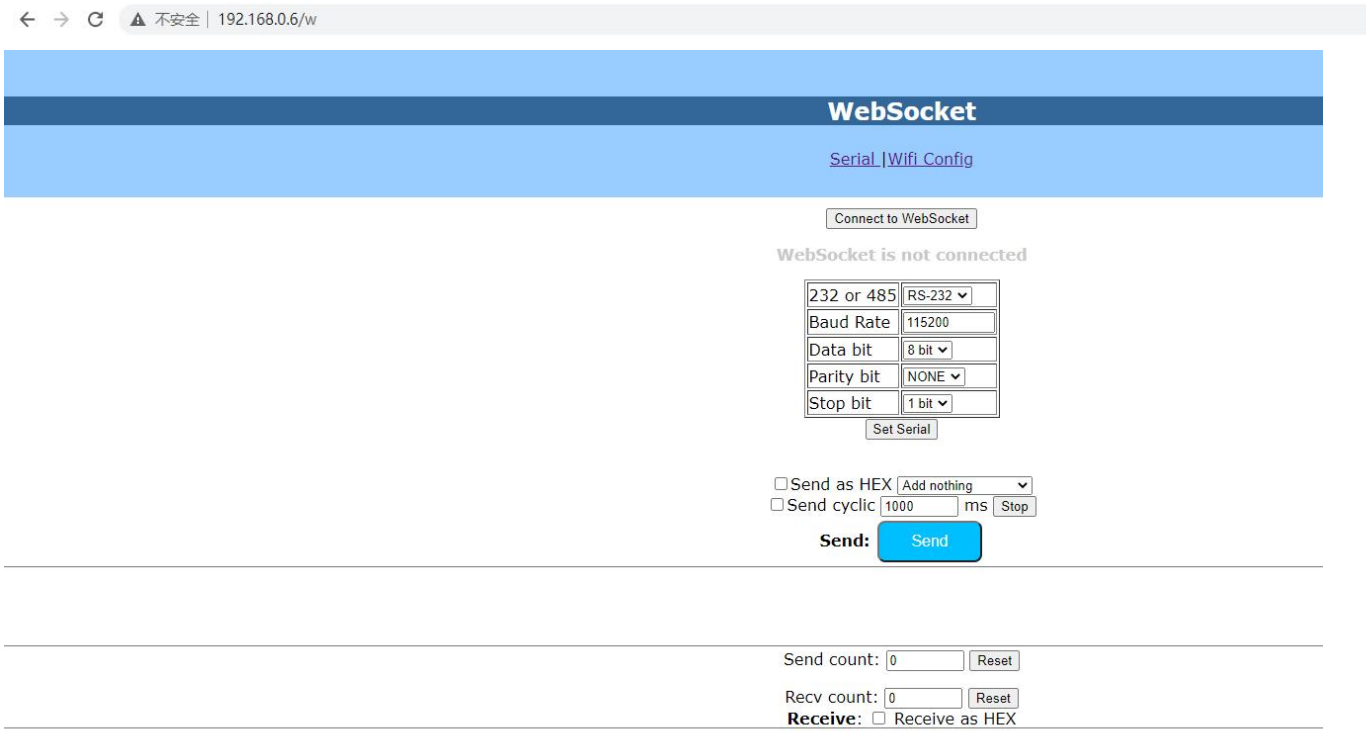
How to set the communication protocol for converting Websocket to serial port?

	If you need to use Websocket working mode, you need to set the working mode and baud rate: Working mode: 4 (representing Websocket) Baud rate: Set according to the communication baud rate on site Once modified, click on 'Save Settings'. Then restart the module.

2. An example of a communication protocol for converting Websocket to serial port.

Open the browser, enter the IP address of the module, plus/w. For example, if the IP address of the module is 192.168.0.6, enter 192.168.0.6/w in the browser

You can open the built-in webpage of the module. As shown in the following figure:

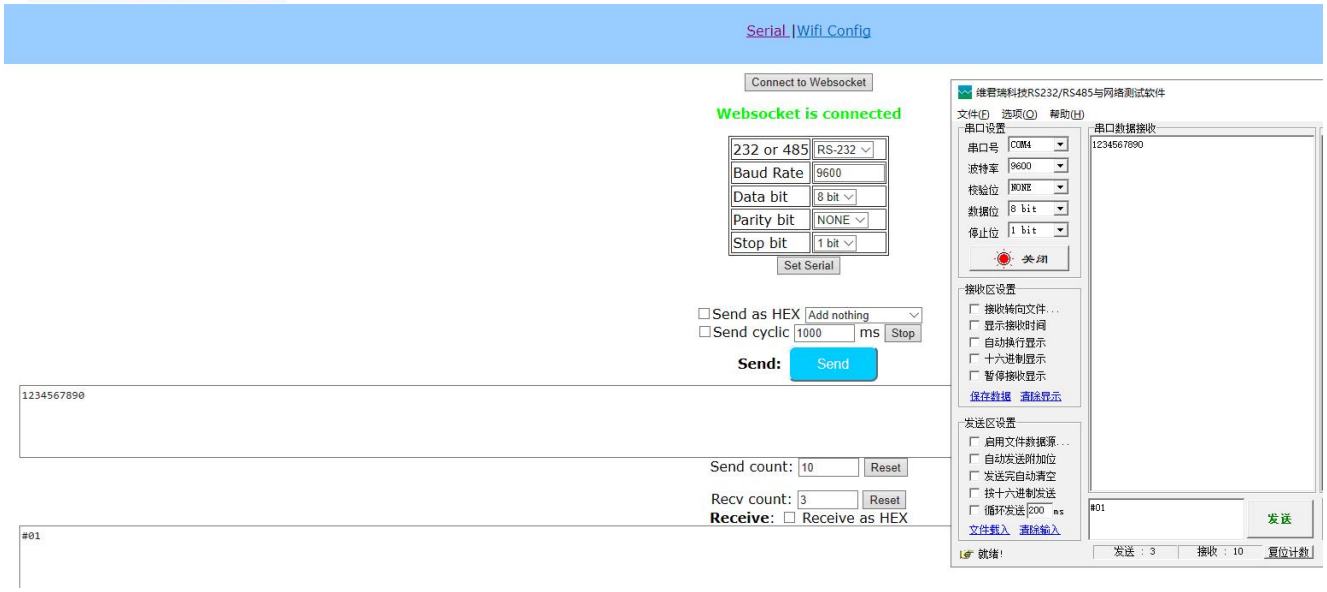


Click the button to connect to

Open **network** testing software**:** Wayjun TCP and COM test

Serial port settings: Set according to the COM port and communication baud rate of the on-site serial port.

Then send data to each other for testing.



Example of Modbus RTU Master Station

The following is an explanation of an 8-channel analog signal to RS-485 register, which can be connected to WJ105 to achieve the function of a Modbus RTU master station.

寄存器说明：（普通应用中读取高16位的数据即可满足精度要求）

地址 4X（PLC）	地址（PC，DCS）	数据内容	属性	数据说明
40001	0000	通道 0 的模拟量	只读	整数，通道 0~7 数据高 16 位
40002	0001	通道 1 的模拟量	只读	数据为 2 的补码方式
40003	0002	通道 2 的模拟量	只读	0x0000-0x7FFF 表示正数
40004	0003	通道 3 的模拟量	只读	0x8000-0xFFFF 表示负数
40005	0004	通道 4 的模拟量	只读	如果用不到负数，读取到大于 0x7FFF 的
40006	0005	通道 5 的模拟量	只读	数据都换算成 0 即可。
40007	0006	通道 6 的模拟量	只读	
40008	0007	通道 7 的模拟量	只读	

Set WJ105 as the Modbus RTU master and configure 8 registers.

Data can be read on the network end.

Operations and settings on web pages

Enter module IP: 192.168.0.5 in the browser to open the module webpage (provided that the computer IP is in the same network segment as the module, login to the webpage should be based on the current module IP address)

Common problems with WJ105

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.

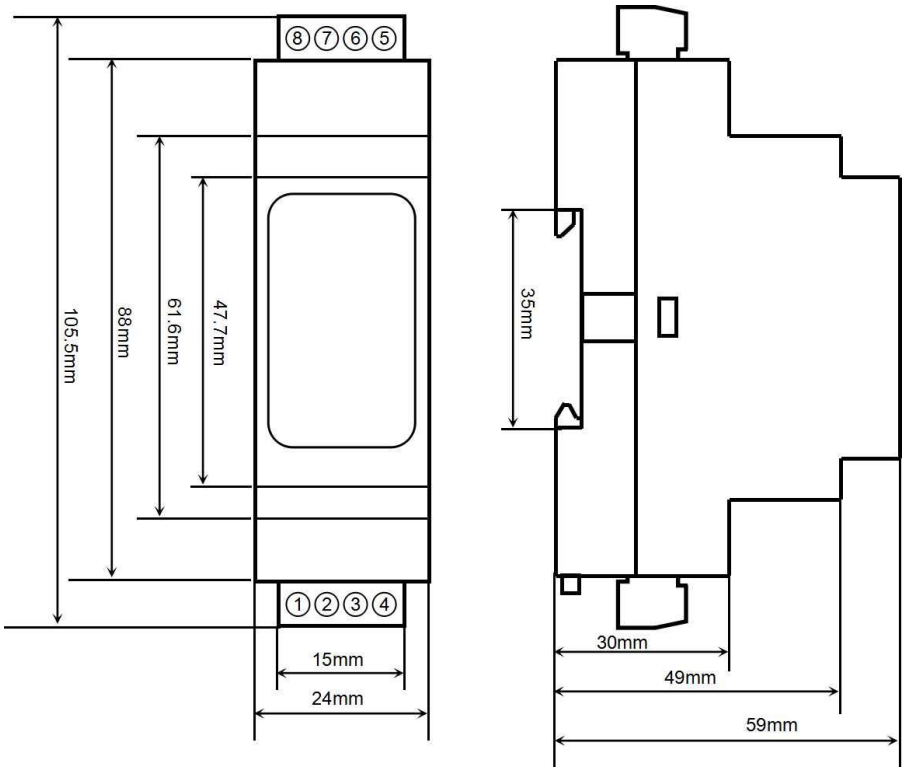
6. Hardware problem search

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

7. MODBUS TCP connection cannot be established

The working mode should be set to Modbus TCP, and the port number can only be 502, not any other numerical value.

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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