5-CH DI,5-CH DO, Network Relay, Modbus TCP remote I/O module

Part No.: WJ95-RJ45

Features:

>> Five channels switch input, five channels relay output

>> Supports MODBUS TCP communication protocol

>> Built-in Webpage function, you can query level state via the webpage

>> The relay output state can be set via the webpage

>> DI signal input, DO output and power supply are isolated each other

>> Wide power supply range: 8 ~ 32VDC

>> High reliability, easy programming, easy application

>> Standard DIN35 rail mounting, small size

>> Users can set the module IP address and other parameters on the page

>> Webpage login can be set account and password

>> Dimensions: 120 x 70 x 43mm

Typical applications:

>> Industrial Ethernet signal level monitoring and control

>> Used for Internet of Things, real-time monitoring network and field device communication

>> Intelligent building control, security engineering and other applications

>> Ethernet industrial automation and control systems

>> Industrial field signal isolation and long-term transmission

>> Monitoring and control equipment operation

>> Measuring sensor signal

>> Get in touch with field data recording industry

>> IOT switch signal acquisition

Product Overview:

WAYJUN WJ95-RJ45 is a Internet of Things and Industrial Ethernet acquisition module, to achieve the formation transparent between sensor and network. WJ95-RJ45 can send sensor data exchange to network, or send the data forwards network to the sensor.
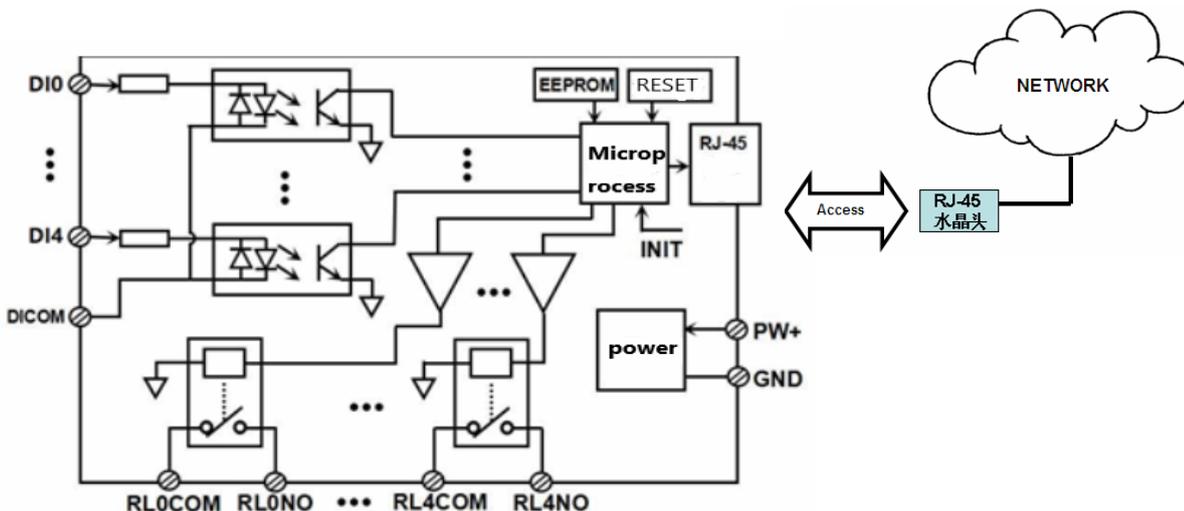

Figure 2   WJ95-RJ45 Block Diagram

WAYJUN WJ95-RJ45 includes power conditioning, switch acquisition, relay output and RJ-45 network interface communication. Communication uses MODBUS TCP protocol. TCP is based on the transport protocol, which is used widely to reliable connection-oriented protocol. The user can set module IP address, subnet mask, communication protocol directly on the page. The sensor device can be used to monitor and control.

WAYJUN WJ90-RJ45 is based on SCM's intelligent monitoring and control system, users set the module IP address, subnet mask and so on configuration information are all stored in nonvolatile memory EEPROM.

WAYJUN WJ90-RJ45 is according to industry standard design, No-isolation between signal input / output, high anti-interference ability and reliability. Operating temperature range is - 45 ~ +85 ℃.

Function Description:

WJ95-RJ45 remote I/O module can be used to measure 5 channels switch signal input, and 5 channels digital output signal, and 5 channels relay output.

1. Switch signal input and output

5-CH switch signal input, which can be connected to dry contact and wet contact, details refer to the wiring diagram. 5-CH switch signal output open collector output

2. Communication protocol

Communication Interface: RJ-45 network interface. The two lights of Ethernet port position, when after the network cable plugged the **Link (Green)** will be light all the time, **Data (Yellow)** will flash from time to time.

Communication Protocols: supports MODBUS TCP protocols, can achieve industrial Ethernet data exchange. Also users can access the control module directly via the web.

Network Cache: 2K Byte (both receive and send)

Response Time: <100ms

3. Anti-jamming

Module internal has transient suppression diodes, can inhibit a variety of surge pulse, protection module.

Product Part No.:

WJ95 - <u>RJ45</u>

              Communication Interface

         RJ45: RJ-45 output network interface

WJ95 General Parameters:

(typical @ +25 ℃, Vs to 24VDC)

Input type: switch signal input, 5 channels (DI0~DI4)

         Low level: input<1V

         High level: input 4~30V

Input Resistance: 3KΩ

Output type: A type relay output, 5 channels (DO0~DO4). Normally open output.

         Contact load capacity: 5A 250VAC/30VDC.

         Contact form: 1H

         Maximum switching voltage: 250VAC / 30VDC

         Maximum switching current: 5A

         Maximum switching power: 1250VA / 150W

Communication: MODBUS TCP communication protocol

Web: support web to access module, support web setting module parameters

Interface: RJ-45 network interface

Power Supply: +8 ~ 32VDC wide range power supply, internal anti-reverse and over-voltage protection circuit

Power Loss: less than 2W

Operating Temperature: - 45 ~ +80 ℃

Humidity: 10 ~ 90% (no condensation)

Storage Temperature: - 45 ~ +80 ℃

Storage Humidity: 10 ~ 95% (no condensation)

Isolation Voltage: 3000V isolation

Dimensions: 120 mm x 70 mm x 43mm

WJ95-RJ45 factory default parameters:

Figure 3 WJ95-RJ45 Factory Default

>> How to restore factory setting?

    1.With the module working, turn the INIT switch to the INIT position and then back to the NORMAL position.

    2. Wait 30 seconds and the module will automatically return to the factory settings. The parameters are shown in Figure 3. The web login password is automatically restored to 123456.

Footprint Function:

PIN	Name	Function	PIN	Name	Function
1	DI0	Channel 0 switch signal output	10	RL0COM	Channel 0 relay contact
2	DI1	Channel 1 switch signal output	11	RL0NO	Channel 0 relay contact
3	DI2	Channel 2 switch signal output	12	RL1COM	Channel 0 relay contact
4	DI3	Channel 3 switch signal output	13	RL1NO	Channel 1 relay contact
5	DI4	Channel 4 switch signal output	14	RL2COM	Channel 2 relay contact
6	DICOM	Switch signal common ground	15	RL2NO	Channel 2 relay contact
7	PW+	Power supply +	16	RL3COM	Channel 3 relay contact
8	GND	Power supply -	17	RL3NO	Channel 3 relay contact
9	RJ-45	Network interface	18	RL4COM	Channel 4 relay contact
			19	RL4NO	Channel 4 relay contact
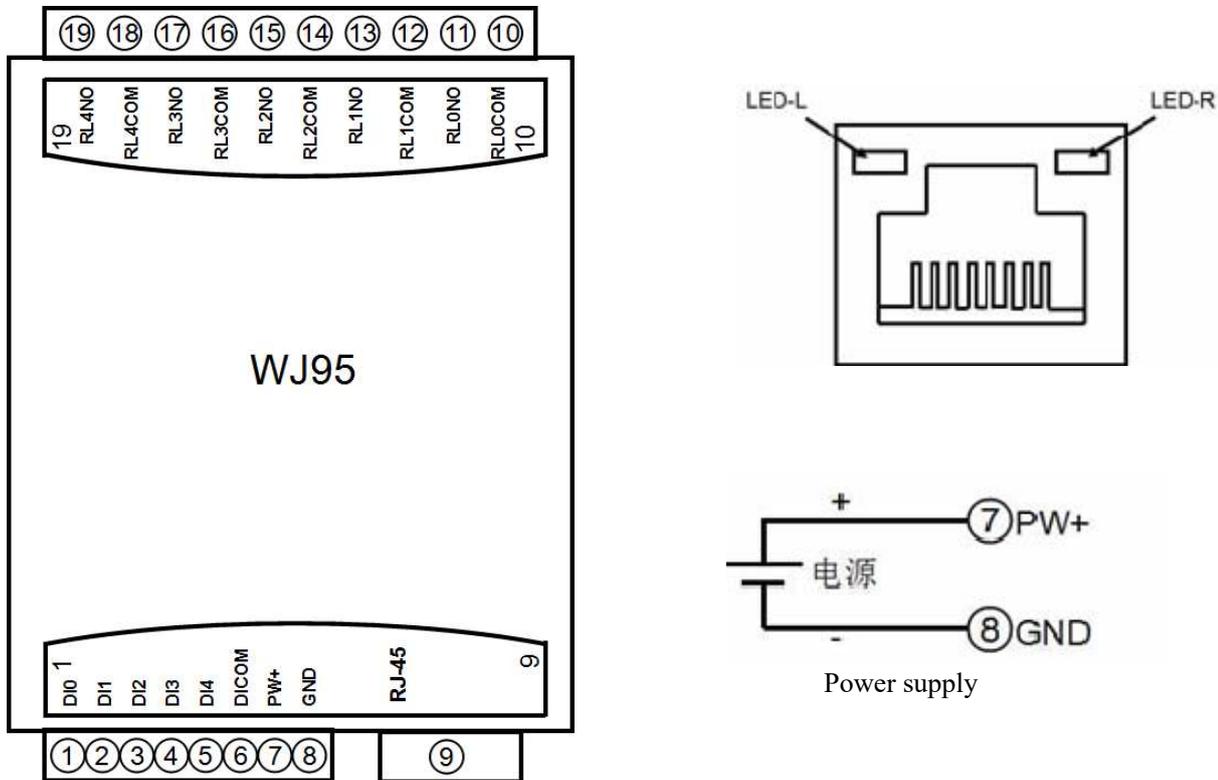
Figure 5   WJ95-RJ45 Wiring Diagram

Switch signal input wiring diagram

Dry contact input	TTL/CMOS level, 24V level input
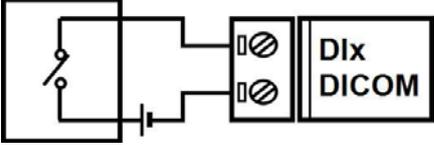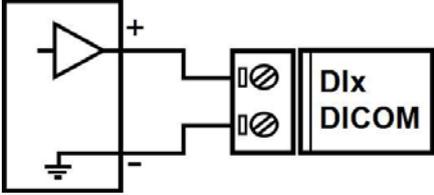
Open collector input	
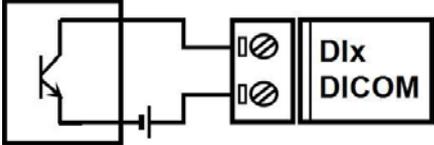
Switch signal output wiring diagram

Drive Relay	Drive load
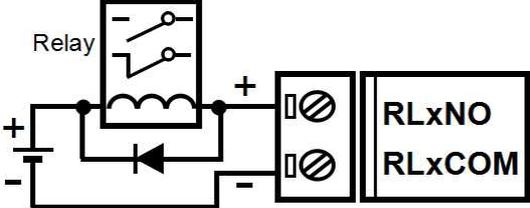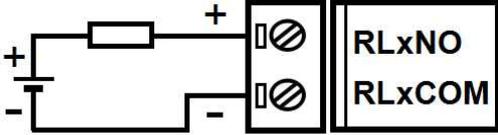
MODBUS TCP protocol

(1) MODBUS TCP Data Frame

Transmitting over TCP/IP, supports Ethernet II and 802.3 frame formats. Figure 3, MODBUS TCP Data Frame includes a header, function code and data three parts.
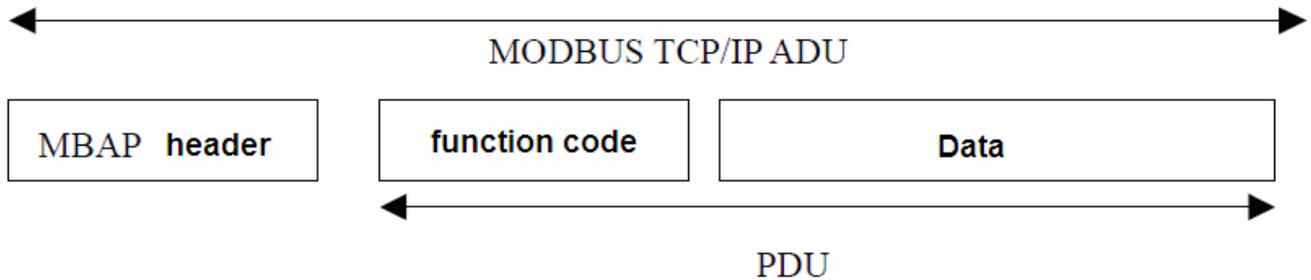
Figure 6: MODBUS request/response over TCP/IP

(2) MBAP Header description:

The length of **MBAP** header (MBAP, MODBUS Application Protocol) is seven Bytes, it is composed of four parts. As shown in Table 1:

Fields	Length（B）	Description
Transaction Identifier	2 Bytes	Identification of a MODBUS Request / Response transaction.
Protocol Identifier	2 Bytes	0=MODBUS protocol
Length	2 Bytes	Number of following bytes
Unit identifier	1 Byte	Identification of a remote slave connected on a serial line or on other buses.

Table 1: MBAP header

(3) MODBUS Function Codes Description

MODBUS function contains three types:

(1) Public function code: Defined function code to ensure uniqueness by MODBUS.org recognized

(2) User-defined function code contains two groups: 65~72 and 100~110, no recognition, but does not guarantee the uniqueness of the code used. If change to the public code, need be required to RFC approved;

(3) Reserved function code for using by certain companies in certain traditional equipment, not as a public purpose.

In a typical public function code, WJ95-RJ45 supports certain function code, as indicated below:

Function Code	Name	Description
01	Read Coil Status	1 means high level, 0 means high level
03	Read Holding Register	1 means high level, 0 means high level
05	Write Single Coil	1 means triode conduction, 0 means triode off
06	Write Single Register	1 means triode conduction, 0 means triode off

(4) Supported Functions Code Description

01 (0x01) Read Coils

This function code is used to read from 1 to 2000 contiguous status of coils in a remote device. The Request PDU specifies the starting address, i.e. the address of the first coil specified, and the number of coils. In the PDU Coils are

---

addressed starting at zero. Therefore coils numbered 1-16 are addressed as 0-15.

   The coils in the response message are packed as one coil per bit of the data field. Status is indicated as 1= ON and 0= OFF. The LSB of the first data byte contains the output addressed in the query. The other coils follow toward the high order end of this byte, and from low order to high order in subsequent bytes.

   If the returned output quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the high order end of the byte). The Byte Count field specifies the quantity of complete bytes of data.

Here is an example: function code 01, read 8 channels DI data, register address 00033~00040：

Request			Response		
Field Name		**(Hex)**	**Field Name**		**(Hex)**
MBAP Header	Transaction Identifier	01	MBAP Header	Transaction Identifier	01
		00			00
	Protocol Identifier	00		Protocol Identifier	00
		00			00
	Length	00		Length	00
		06			04
	Unit identifier	01		Unit identifier	01
Function Code		01	Function Code		01
Staring Address Hi		00	Byte Count		01
Staring Address Lo		20	Output status DI7-DI0		00
Quantity of Outputs Hi		00			
Quantity of Outputs Lo		08			

03 (0x03) Read Holding Registers

   This function code is used to read the contents of a contiguous block of holding registers in a remote device. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore registers numbered 1-16 are addressed as 0-15.

   The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Here is an example: function code 03, read 8 channels DI data, register address: 40033

Request			Response		
Field Name		**(Hex)**	**Field Name**		**(Hex)**
MBAP Header	Transaction Identifier	01	MBAP Header	Transaction Identifier	01
		00			00
	Protocol Identifier	00		Protocol Identifier	00
		00			00
	Length	00		Length	00
		06			05
	Unit identifier	01		Unit identifier	01
Function Code		03	Function Code		03
Staring Address Hi		00	Byte Count		02
Staring Address Lo		20	Register value Hi（0x00）		00
No. of Registers Hi		00	Register value Lo（DI7-DI0）		00
No. of Registers Lo		01			

05 (0x05) Write Single Coil

   This function code is used to write a single output to either ON or OFF in a remote device. The Request PDU specifies the forced coil address. Coils are addressed starting at zero. Therefore, coil numbered 1 is addressed as 0. The requested ON/OFF state is specified by a constant in the coil value field. A value of 0xFF00 hex requests the coil to be ON. A value of 0x0000 requests the coil to be OFF. All other values are illegal and will not affect the coil.

Correct response and request are the same.

Here is an example: function code 05, set channel DO0 to ON, also as 1, register address: 00001

Request			Response		
Field Name		**(Hex)**	**Field Name**		**(Hex)**
MBAP Header	Transaction Identifier	01	MBAP Header	Transaction Identifier	01
		00			00
	Protocol Identifier	00		Protocol Identifier	00
		00			00
	Length	00		Length	00
		06			06
	Unit identifier	01		Unit identifier	01
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 Single Register

   This function code is used to write a single holding register in a remote device.   The Request PDU specifies the address of the register to be written. Registers are addressed starting at zero. Therefore register numbered 1 is addressed as 0.

The normal response is an echo of the request.

Here is an example: function code 06, set channels DO0~DO7, all as 1, Hex is 0xFF, register address: 40001

Request			Response		
Field Name		**(Hex)**	**Field Name**		**(Hex)**
MBAP Header	Transaction Identifier	01	MBAP Header	Transaction Identifier	01
		00			00
	Protocol Identifier	00		Protocol Identifier	00
		00			00
	Length	00		Length	00
		06			06
	Unit identifier	01		Unit identifier	01
Function Code		06	Function Code		06
Registers Address Hi		00	Registers Address Hi		00
Registers Address Lo		00	Registers Address Lo		00
Registers Value Hi		00	Registers Value Hi		00
Registers Value Lo		FF	Registers Value Lo		FF

(5) WJ95-RJ45 Register Address Description

Address 0X（PLC）	Address（PC，DCS）	Data	Property	Data Description
00001	0000	Output Switch	Read/write	Channel 0 output status
00002	0001	Output Switch	Read/write	Channel 1 output status
00003	0002	Output Switch	Read/write	Channel 2 output status
00004	0003	Output Switch	Read/write	Channel 3 output status
00005	0004	Output Switch	Read/write	Channel 4 output status
00011	0010	Output Switch	Read/write	Channel 0 Reset output status
00012	0011	Output Switch	Read/write	Channel 1 Reset output status
00013	0012	Output Switch	Read/write	Channel 2 Reset output status
00014	0013	Output Switch	Read/write	Channel 3 Reset output status
00015	0014	Output Switch	Read/write	Channel 4 Reset output status
00033	0032	Input Switch	Read only	Channel 0 level status
00034	0033	Input Switch	Read only	Channel 1 level status
00035	0034	Input Switch	Read only	Channel 2 level status
00036	0035	Input Switch	Read only	Channel 3 level status
00037	0036	Input Switch	Read only	Channel 4 level status
40001	0000	Output Switch	Read/write	Channel 0-4 output status
40011	0010	Output Switch	Read/write	Channel 0-4 Reset output status
40033	0032	Input Switch	Read only	Channel 0-4 level status
40211	0210	Module Name	Read only	High level：0x00 Low level：0x95

Character protocol Socket communication

In the working mode of Websocket, TCP Server, TCP Client, UDP Mode, etc., the following character protocol communication can be used.

If the auto upload data is set to "Yes" in the configuration settings,

in the working mode of Websocket, TCP Server, and TCP Client,

The data will be uploaded automatically after the communication

connection is successful. UDP Mode does not automatically

To upload data, you need to send a command to read the data.

Automatically Uploading: Yes ▼
Upload Time Interval: 1000 ms

1. Read Measurement Data Command

Description: Returns all output channel switch status, switch reset status and input channel switch status from the module

Command Format：**#00**

Response format: >**AAAAA,BBBBB,CCCCC**   command is valid

                ?00(cr)   command is invalid or illegal

Parameters: **>** delimiter character. Hexadecimal 3EH

        AAAAA   represents reading output switch status, 5 numbers, the order is DO4~DO0

                The value is 0: output relay is off   value is 1: output relay is on

        BBBBB   represents reading output switch state after reset, 5 numbers, and the order is DO4~DO0.

The value is 0: output relay is off   value is 1: output relay is on

CCCCC   represents reading input switch state, 5 numbers, and the order is DI4~DI0.

Example: Commands (character format)   **#00**

Module response (character format): **>11000,01010,00111**

(Hexadecimal format)   **213032303130300D**

Description: Module output switch state is 11000, the order is **DO4~DO0**.

Channel 0: relay is disconnected. Channel 1: relay is disconnected. Channel 2: relay is disconnected.

Channel 3: relay is on. Channel 4: relay is on.

After the module is reset, output switch state is 01010, and the order is **DO4~DO0**.

Channel 0: relay is disconnected. Channel 1: relay is on. Channel 2: relay is disconnected.

Channel 3: relay is on. Channel 4: relay is disconnected.

The module input switch state is 00111, and the order is **DI4~DI0**.

Channel 0: High level. Channel 1: High level

Channel 2: High level. Channel 3: Low level. Channel 4: Low level

2. Set Relay Output Command

Description: Set all output channels relay states.

Command Format: **#01ABCD**

Parameters: #   delimiter character. Hexadecimal 24H

01   Indicates the setting relay output command

AB   Channel selection, you can select all output channels or a single output channel.

Setting output: setting AB to 00, means setting all output channels. If a single channel is set, character A must be set to 1 and character B can be set to 0-4, representing 5 numbers relay DO output channels.

Setting reset output: Setting AB to FF means setting the all channels reset output value. If the single channel reset output is set, the character A must be set to E, and the character B can be set to 0-4, representing 5 numbers relay DO output channels.

CD   output value

1**.** If it is set for all channels (AB=00 or AB=FF)

Then two hexadecimal numbers,

as shown on the right

C represents channel four

D represents channel 3~0

Bit value is 0:

Setting output relay is disconnected

Bit value is 1:

Setting output relay is on.

2. If it is set for a single channel (AB=1x or AB=EX, X indicates the channel to be set), it can only be set to 00 or 01

00: Set the X channel output relay to disconnect

01: Set the X channel output relay to be on.

Response format: **!00(cr)**   command is valid

?00(cr)   command is invalid or illegal

Example 1:   Commands (character format)   **#01000F**

Module response (character format):   **!00(cr)**

Description: Set all channels (AB=00) output to 0FH, and convert to binary 0000 1111, then module output switch status is:

Channel 0: Relay is on. Channel 1: Relay is on. Channels 2: Relay is on. Channel 3: Relay is on. Channel 4: Relay is

disconnected

Example 2:   Commands (character format)   **#011201**

       Module response (character format):   **>(cr)**

      Description: Set channel 2 relay to be on.

Example 3:   Commands (character format)   **#01FF1F**

       Module response (character format): **!00(cr)**

      Description: Set all channels (AB=FF) reset output to 1FH, and convert to binary 0001 1111, then all channels relay after module reset are on.

Actions and settings on the webpage

Enter the default module IP in the computer or mobile browser,the default is 192.168.0.7, which can open the module webpage (provided that the computer IP or mobile IP and module are on the same network segment. The login webpage should be based on the IP address of the current module.

Login operation), enter the password, the default is 123456, click "Login",

You can enter the data display interface, there are Chinese and

English switch signs in the upper right corner, click then

you can switch between Chinese and English signs.

1. web page real-time collection:

Since this page uses websocket to realize real-time data collection by webpage,

it is recommended to test using Google Chrome or IE10 browser.

After the connection is successful, the web page will automatically update

the data (note how the module works, it must be set to "Websocket," and the

automatic upload data should be set to "Yes" or you can't get the data),

you can also set the AI range through the webpage and other parameters.

DO and AO parameters can also be set through the webpage. if your

mobile browser supports websocket, you can also use your mobile phone to

read data and set parameters.

Data Table

Channels	Data		
DO0		ON	OFF
DO1		ON	OFF
DO2		ON	OFF
DO3		ON	OFF
DO4		ON	OFF
DO0 Reset		ON	OFF
DO1 Reset		ON	OFF
DO2 Reset		ON	OFF
DO3 Reset		ON	OFF
DO4 Reset		ON	OFF
DI0			
DI1			
DI2			
DI3			
DI4			

2. Configure network parameters:

(a) module name

The module name defaults is WJ95-RJ45, and user can modify

as needed.

(b) MAC address

The MAC address can be changed according to user needs.

(c) IP address

The current module IP address, factory default is: 192.168.0.7,

the IP address can be modified.

(c) subnet mask

Used to divide the subnet range size (usually 255.255.255.0),

which can be modified by the user.

(d) default gateway

The only way to access the external network (usually fill in the router IP

(d) working method

The default is Websocket, which supports up to 6 Websocket communication.

Can be set to TCP Server, TCP Client, UDP Mode, Modbus TCP, etc.

communication method. Up to 6 TCP Servers can be supported in TCP Server mode.

(c) local port

Configuring Network

Module Name:	WJ95-RJ45
MAC Address:	D7:D1:7B:97:89:DB
IP Address:	192.168.0.7
Subnet Mask:	255.255.255.0
Gateway:	192.168.0.1
Work Mode:	Websocket ▼
Local Port Number:	23
Remote Port Number:	23
Remote Server IP:	192.168.0.201
Automatically Uploading:	Yes ▼
Upload Time Interval:	1000 ms
Version:	
Password:	

Save and Reboot   Default Settings

The local port default is 23 and can be modified by the user.

(c) remote port

The working mode is TCP Client, and UDP Mode is filled in according to the actual situation.

(e) remote server address

It is the IP address of the remote server. The working mode is TCP Client, and UDP Mode is filled in according to the actual situation.

(e) automatically upload data

Whether to upload measurement data automatically in Websocket, TCP Server, TCP Client, UDP Mode, etc.

(f) upload time interval

The time interval at which the measurement data is uploaded automatically. The default is to upload data once in 1 second.

(b) version number

The version is incremented from 1.0.

(g) password

Setting parameters must be entered with the correct password to take effect. The password is the web login password,the factory default is 123456.

After the parameters are filled in, click the "Save and Restart" button, the module will save the parameters and restart automatically.

FAQ about WJ95-RJ45

1>> Across the network Segment problems

If the communication PC and device IP are not a network segment, and it is in a straight line, or under a sub-router, then they are unable to communicate simply.

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

Device IP is 192.168.0.7, then the result could not land equipment page on the PC, also can not ping it.

If you want them to be able to communicate, you need set to 255.255.0.0 about the subnet mask of device/PC and the router, so that we can login module pages.

2>> Device can ping but can not open the page

There may be several causes:

1) The device is set up static IP, but conflicts to the existing device network IP

2) HTTP server port was to be modified (default should be 80)

3) Other reasons

Workaround: Re-set up an unused IP to the device, restore factory settings or input the correct port when open the browser.

3>> every once in a while, dropped reconnection occurs

Every once in a while, dropped reconnection phenomena occur

Cause: The serial server has an IP address conflict with other device

4>> Communication is not normal, not on the network links, or can not search

Currently used computer firewall needs to be closed (in the windows firewall settings)

Three local ports, not conflict, that is, must be set to different values, the default 23, 26, 29

With illegal MAC address, such as all-FF MAC address, there maybe appear unable to connect the target IP address, or MAC address repeat.

Illegal IP address, such as a router and network are not in a network segment, you may not be able to access the Internet.

5>> Find hardware problems

Bad power adapter, or plug connection is undesirable

Power light is not on, the LAN light is not bright, that is no power supply or the hardware is broken

Cable or network port hardware issues, view the status of the network port lights

Network interface hardware problems, you can check the network port status, etc., green light should be the long bright, yellow light should be flashing, instead of the long light or long off, otherwise it is a hardware problem

Wrong password, if you forget the password, you can restore the factory configuration (switch to **init**, the device is on 30 seconds, then put on the switch to **normal.** The parameters are shown in Figure 3. Web login password is restored to 123456 automatically)

Size(unit:mm)   DIN35 Rail Mounted
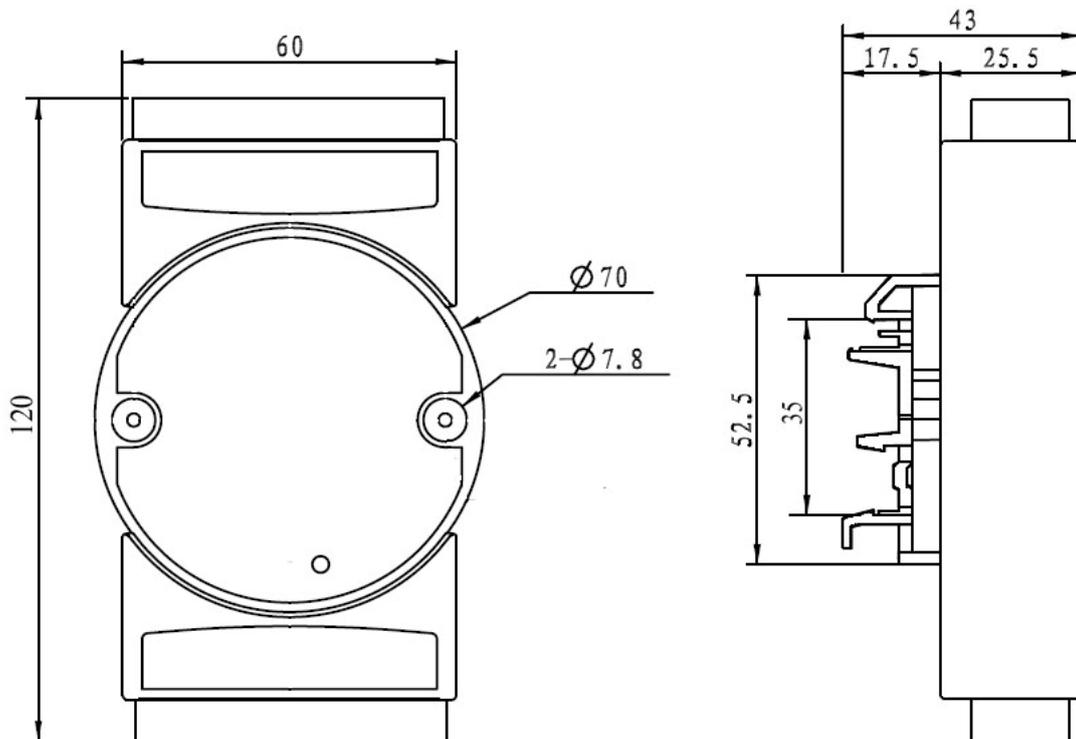
Warranty

Two years (but violate operating rules and requirements to create damage, clients need pay maintenance costs)

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