Switch quantity 8 in 4 out, high-speed Ethernet communication Socket free protocol remote IO module WJ94

Product features:

● 8 switch inputs, 4 switch outputs

● DI status changes automatically send status data, which can capture pulses

●DO adopts PNP output, which can directly drive intermediate relays

● Simultaneously supports Modbus TCP communication protocol

● Built in web page function, which can be queried and controlled through web pages

● Dual network ports support daisy chain connection for easy wiring

●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

● Web login can set a password for greater security

●Low cost, small size, modular design

● Dimensions: 120 x 70 x 43mm

Typical applications:

● Directly control the electric roller drive card

●Replace PLC control to achieve remote control and reduce costs

● Intelligent logistics warehouse automatic sorting system

●Ethernet industrial automation control system

●Intelligent lighting control system

● Equipment operation monitoring and control

●Measurement of sensor signals

● Industrial camera status monitoring and control

● IoT switch signal acquisition

Product Overview:

The WJ94 product is an IoT and industrial Ethernet acquisition module that enables transparent data exchange between sensors and networks.   Sensor data can be forwarded to the network, or data from the network can be forwarded to the sensor.
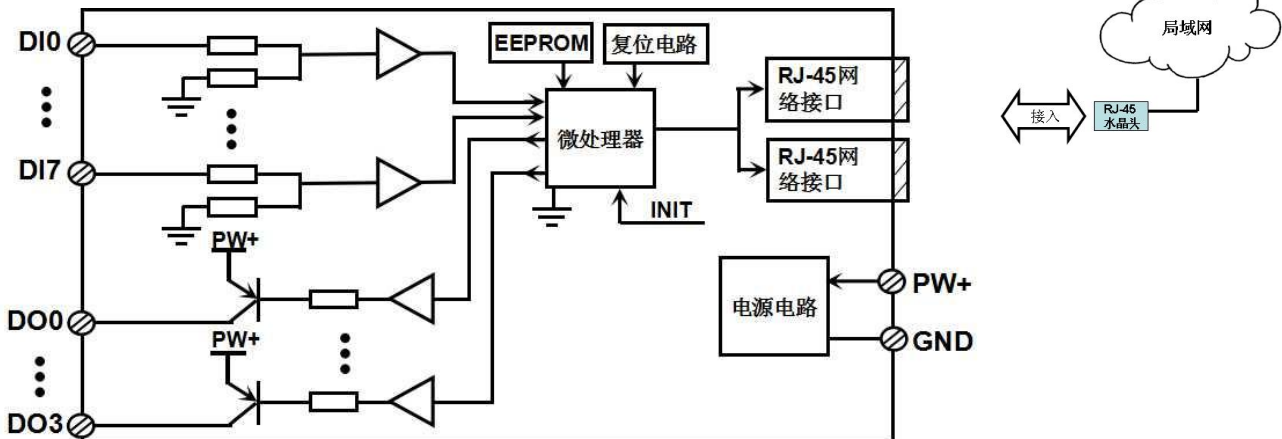

Figure 2 Internal Block Diagram of WJ94 Module

The WJ94 series products include power conditioning, switch quantity acquisition, transistor output, and RJ-45 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 WJ94 series products are intelligent monitoring and control systems based on microcontrollers, where user set module IP addresses, subnet masks, and other configuration information are stored in non-volatile memory EEPROM.

Function Introduction:

The WJ94 remote I/O module can be used to measure eight switch signals and has four switch outputs.

1、　　　Switching signal input and output

　　8-channel switch signal input, capable of connecting dry and wet contacts. Please refer to the wiring diagram for details;　4-channel switch signal PNP output, with an output voltage equal to the power supply voltage and a maximum output current of 100mA. Be careful not to overload the output, otherwise it will burn out the output channel.

2、　　　Communication Protocol

　　Communication interface: 2 RJ-45 network interfaces.　Each network port has two indicator lights. After the network cable is plugged in, the Link light (green light) will flash continuously, and the Data light (yellow light) will flash irregularly.　The data between two network ports can be freely exchanged.

　　Communication protocol: Adopt Socket free protocol or MODBUS TCP protocol to achieve industrial Ethernet data exchange.　You can also access the control module directly through the webpage.

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

　　Communication response time: less than 5mS.

3、　　　anti-interference

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

Product model:

WJ94 - RJ45

　　　Communication interface

RJ45: Output as RJ-45 network interface

WJ94 General Parameters:

(Typical @+25 ℃, Vs is 24VDC)

Input type: switch input, 8 channels (DI0~DI7).

Low level: Input<1V

High level: Input 3.5~30V

Input resistance: 30K Ω

Output type: switch output, 4-channel (DO0~DO3).　PNP output, with an output voltage equal to the power supply voltage and a maximum load current of 100mA, can directly drive intermediate relays.

Communication: MODBUS TCP communication protocol

Web page: Supports web access module and web page setting module parameters.

Interface: 2 RJ-45 network interfaces.　The data between two network ports can be freely exchanged.

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

Power consumption: less than 2W

Working temperature: -10~+60 ℃

Working humidity: 10~90% (no condensation)

Storage temperature: -45~+80 ℃

Storage humidity: 10~95% (no condensation)

Isolation voltage resistance: non isolated

Dimensions: 120mm x 70mm x 43mm

Factory default parameters for WJ94:

模块名称:	WJ94-RJ45
MAC地址:	EE:22:0A:FC:3E:15
IP地址:	192.168.0.7
子网掩码:	255.255.255.0
默认网关:	192.168.0.1
工作方式:	Websocket
本地端口:	23
远程端口:	23
远程服务器地址:	192.168.0.201
自动上传数据:	是
上传时间间隔:	1000 ms
版本号:	1.0
密码:	

one hundred and twenty-three thousand four hundred and fifty-six

Figure 3: WJ94 Factory Default Parameters

1. How to restore factory settings?

1、 When the module is powered on, turn the Initiat switch to the Initiat position and then back to the NORMAL position.

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

Pin definition and wiring:

Pin	name	Description	Pin	name	Description
one	DO3	Channel 3 switch signal output terminal	**ten**	RJ-45	network interface
two	DO2	Channel 2 switch signal output terminal	**eleven**	DI0	Channel 0 switch signal input terminal
three	DO1	Channel 1 switch signal output terminal	**twelve**	DI1	Channel 1 switch signal input terminal
four	DO0	Channel 0 switch signal output terminal	**thirteen**	DI2	Channel 2 switch signal input terminal
five	PW+	Positive end of power supply	**fourte**	DI3	Channel 3 switch signal input

			en		terminal
six	GND	Negative terminal of power supply, signal common ground	**fifteen**	DI4	Channel 4 switch signal input terminal
seven	PW+	Positive end of power supply	**sixteen**	DI5	Channel 5 switch signal input terminal
eight	GND	Negative terminal of power supply, signal common ground	**seventeen**	DI6	Channel 6 switch signal input terminal
nine	RJ-45	network interface	**eighteen**	DI7	Channel 7 switch signal input terminal

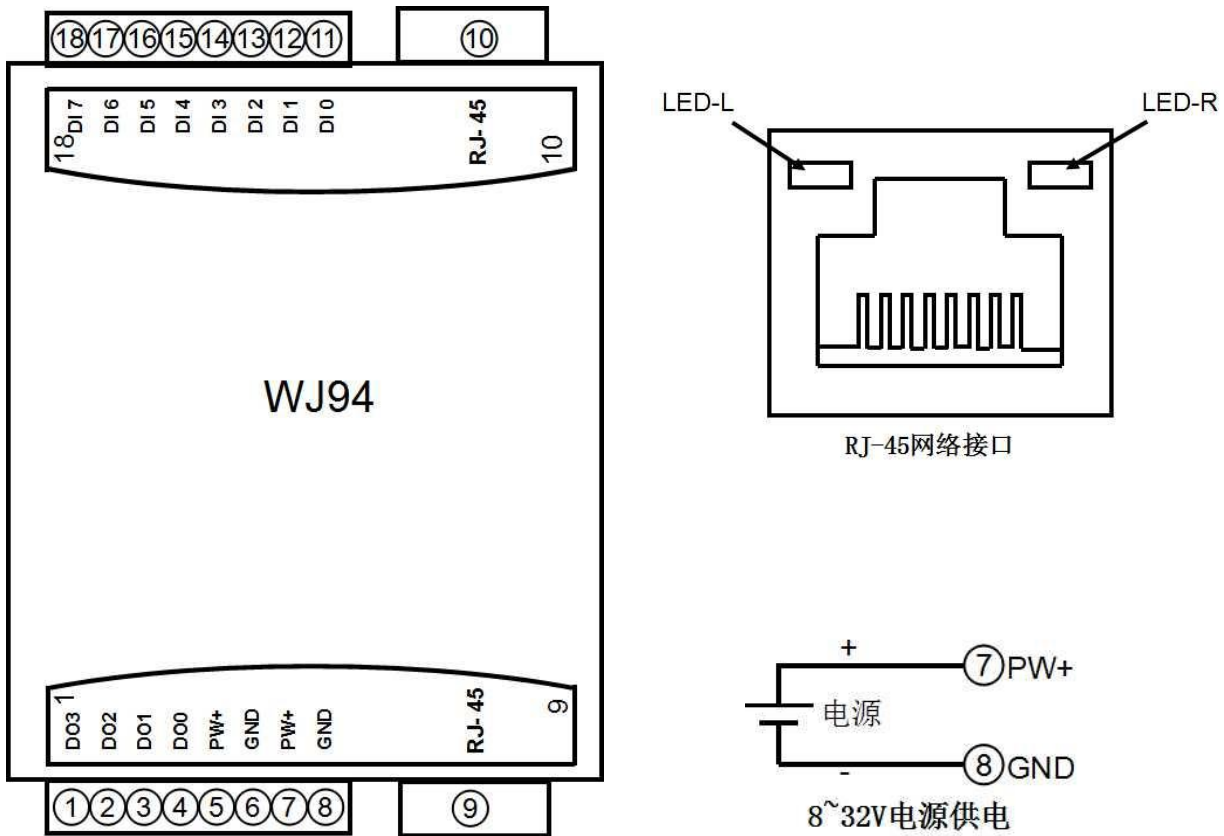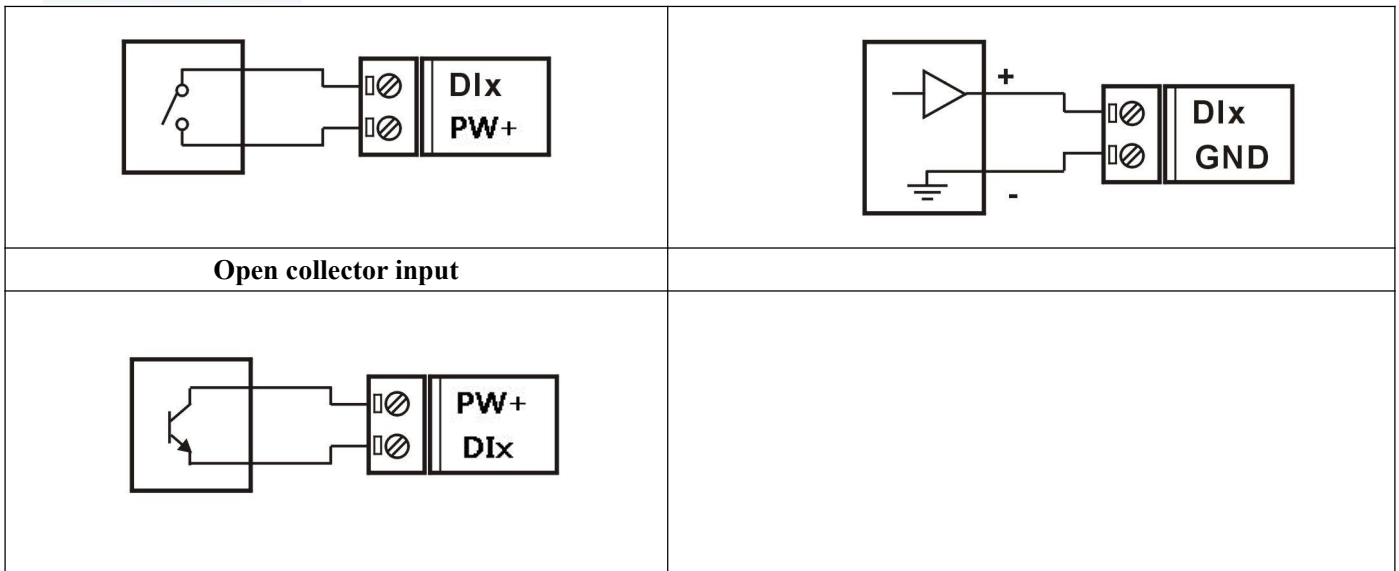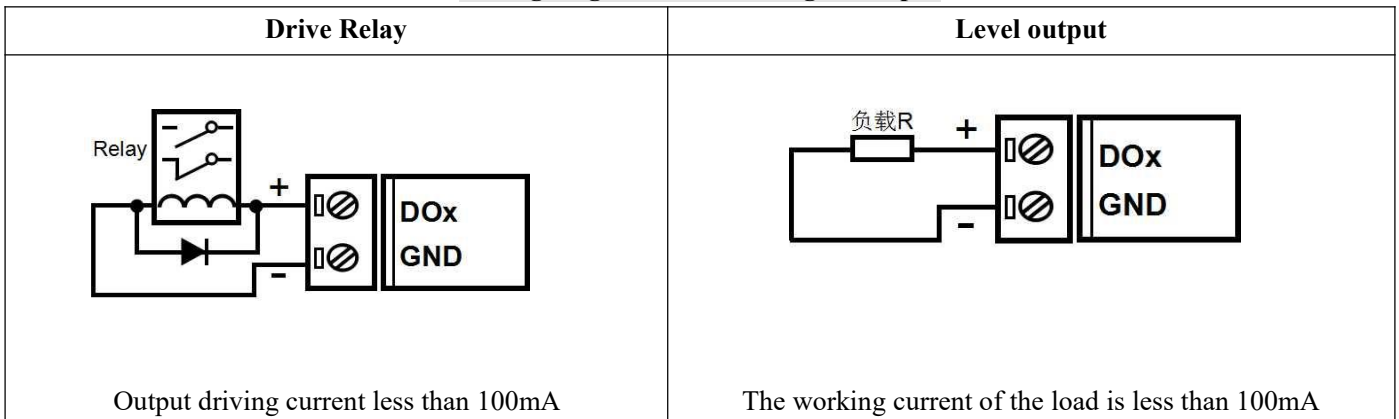Note: **The** pins **with the** same name are internally connected

Figure 5 Wiring diagram of WJ94 module

Wiring diagram for switch signal input

Dry contact input	TTL/CMOS level, 24V level input

Open collector input	

Wiring diagram for switch signal output

Drive Relay	Level output
Output driving current less than 100mA	The working current of the load is less than 100mA

Modbus TCP protocol

(1) Modbus TCP data frames:

Transmission over TCP/IP Ethernet, supporting Ethernet II and 802.3 frame formats. As shown in Figure 3, the Modbus TCP data frame consists of three parts: packet header, function code, and data.
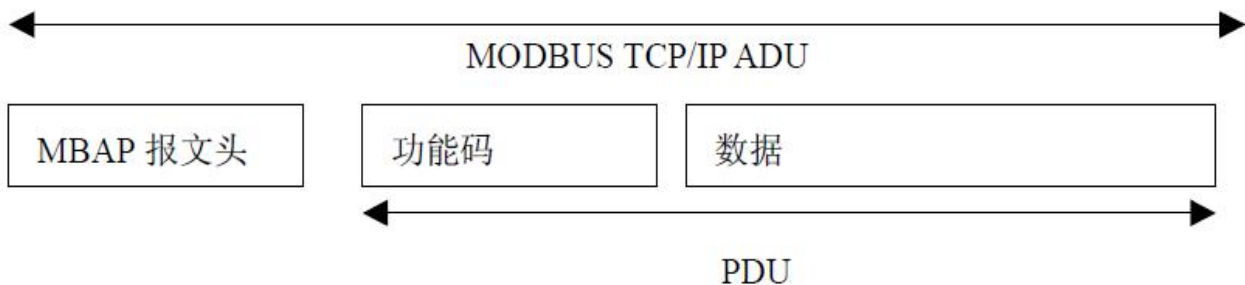
Figure 6: Request/Response of MODBUS on TCP/IP

(2) MBAP message header description:

The MBAP header (MBAP, Modbus Application Protocol, Modbus Application Protocol) is divided into 4 fields, totaling 7 bytes, as shown in Table 1.

Table 1: MBAP Message Header

Domain	Length (B)	Description
Transmission identification	2 bytes	Indicate the transmission of a MODBUS query/response
Protocol Logo	2 bytes	0=MODBUS protocol
Length	2 bytes	Subsequent byte count
Unit identifier	1 byte	Identification code of remote slave station connected on serial link or other bus

(3) Modbus function code:

Modbus function codes are divided into three types, namely:

(1) Public Function Code: Defined function codes that ensure their uniqueness and are recognized by Modbus.org;

(2) There are two sets of user-defined function codes, namely 65-72 and 100-110, which do not require approval but do not guarantee the uniqueness of code usage.   If it becomes public code, it needs to be approved by RFC;

(3) The reserved functional code, which is used by certain companies on certain traditional devices, cannot be used for public purposes.

Among the commonly used public function codes, WJ94 supports some function codes, as shown below:

Function code		name	explain
01	Read Coil Status	Read coil status	1 represents high level, 0 represents low level.
05	Write Single Coil	Write a single coil	1 represents high level, 0 represents low level.
fifteen	Write Multiple Coils	Write multiple coils	

(4) Description of supported function codes

01 (0x01) Reading coil

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

Divide the coils in the response message into individual coils based on each bit in the data field.   The indication status is 1=ON and 0=OFF.   The first data serves as the LSB (least significant bit) of the byte, and the subsequent coil data is arranged in ascending order to form an 8-bit byte.   If the returned output quantity is not a multiple of eight, the remaining bits in the last data byte will be filled with zeros (up to the high-order end of the byte).   The byte count field indicates the complete number of bytes in the data

Example of function code 01, read 8-channel DI data, register addresses 00033~00040:

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			04
	Unit	01		Unit identifier	01

identifier				
Function code	01	Function code		01
Starting address Hi	00	Byte count		01
Starting address Lo	twenty	Output status DI7-DI0		00
Output quantity Hi	00			
Output quantity Lo	08			

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 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

15 (0x0F) Write multiple coils

On a remote device, use this function code to write multiple outputs 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.   The data is converted from hexadecimal to binary and arranged in bits, with a bit value of 1 requesting the coil to be ON and a bit value of 0 requesting the coil to be OFF.

For example, for function code 15, set channel DO0 and DO1 to ON, which is 00000011, and register address 00001:

request			response		
Field Name		**hexadecimal**	**Field Name**		**hexadecimal**
	Transmission identificatio	01		Transmission identification	01
	n	00			00

MBAP message header	n		MBAP message header		
	Protocol Logo	00		Protocol Logo	00
		00			00
	length	00		length	00
		06			06
	Unit identifier	01		Unit identifier	01
Function code		0F	Function code		0F
Start address Hi		00	Start address Hi		00
Starting address Lo		00	Starting address Lo		00
Number of coils Hi		00	Number of coils Hi		00
Number of coils Lo		02	Number of coils Lo		02
Byte count		01			
Output value		02			

(5) Explanation of Register Address for WJ94

Address 0X (PLC)	Address (PC, DCS)	Data content	attribute	Data Explanation
00001	0000	Output switch quantity	Read/Write	Output status of DO channels 0~3 0 represents a low level, 1 represents high level
00002	0001	Output switch quantity	Read/Write	
00003	0002	Output switch quantity	Read/Write	
00004	0003	Output switch quantity	Read/Write	
00033	0032	Input switch quantity	read-only	Level status of DI channels 0-7 0 represents a low-level input, 1 represents a high-level input
00034	0033	Input switch quantity	read-only	
00035	0034	Input switch quantity	read-only	
00036	0035	Input switch quantity	read-only	
00037	0036	Input switch quantity	read-only	
00038	0037	Input switch quantity	read-only	
00039	0038	Input switch quantity	read-only	
00040	0039	Input switch quantity	read-only	

Socket Communication Freedom Protocol

In working modes such as TCP Server, TCP Client, UDP Mode, the following free protocol communication can be used.

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

In TCP Server and TCP Client working modes, communication connections

After success, data will be automatically uploaded.　UDP Mode does not automatically

Uploading data requires issuing commands to read the data.

自动上传数据: 是 ▼
上传时间间隔: 1000　ms

1. Automatically send data after DI status changes

Explanation: After any DI state of the module changes, the module automatically sends a data message to the connected device.

Command format: Not required

Response format: 06 XX 07 3 hexadecimal numbers.

Parameter description: **06** represents the starting character, a hexadecimal number.

XX represents the input switch status and is a hexadecimal number. Each bit represents a DI channel, arranged in the order of DI7~DI0,

Bit value 0: Input low level;　Bit value 1: Input high level

07 represents the terminator, a hexadecimal number.

Application example 1: Module response (hexadecimal): **06 07 07**

Explanation: The input switch status of the module is 07, converted to binary as 00000 111, and arranged in the order of DI7~DI0

Channel 0: High Level Channel 1: High Level Channel 2: High Level Channel 3: Low Level

Channel 4: Low Level Channel 5: Low Level Channel 6: Low Level Channel 7: Low Level

Application example 2: Module response (hexadecimal): **06 FF 07**

Explanation: The input switch status of the module is FF, converted to binary as 11111111, and arranged in the order of DI7~DI0

Channel 0: High Level Channel 1: High Level Channel 2: High Level Channel 3: High Level

Channel 4: High Level Channel 5: High Level Channel 6: High Level Channel 7: High Level

2. Read DI status command

Explanation: Read the current status of DI

Command format: 05 1 hexadecimal number.

Response format: 06 XX 07 3 hexadecimal numbers.

Parameter description: **06** represents the starting character, a hexadecimal number.

XX represents the input switch status and is a hexadecimal number. Each bit represents a DI channel, arranged in the order of DI7~DI0,

Bit value 0: Input low level;　Bit value 1: Input high level

07 represents the terminator, a hexadecimal number.

Application example 1: User command (hexadecimal): **05**

Module response (hexadecimal): **06 11 07**

Explanation: The input switch status of the module is 11, converted to binary as 00010001, and arranged in the order of DI7~DI0

Channel 0: High Level Channel 1: Low Level Channel 2: Low Level Channel 3: Low Level

Channel 4: High Level Channel 5: Low Level Channel 6: Low Level Channel 7: Low Level

Application example 2: User command (hexadecimal): **05**

Module response (hexadecimal): **06 00 07**

Explanation: The input switch status of the module is 00, converted to binary as 00000000, and arranged in the order of DI7~DI0

Channel 0: Low Level Channel 1: Low Level Channel 2: Low Level Channel 3: Low Level

Channel 4: Low Level Channel 5: Low Level Channel 6: Low Level Channel 7: Low Level

3. Set DO output command

Description: Set the status of all DO channels.

Command format: **02 XX 03** 3 hexadecimal numbers.

Parameter description: **02** represents the starting character, a hexadecimal number.

XX represents the output state, which is a hexadecimal number. The high 4 bits are invalid, and the low 4 bits each represent a DO channel, arranged in the order of DO3~DO0, with a bit value of 0: output low level;   Bit value 1: Output high level

03 represents the terminator, a hexadecimal number.

Response format: No response required

Application example 1: User command (hexadecimal): **02 0F 03**

Explanation: Set the module output to 0F, convert it to binary as 00001111, and arrange it in the order of DO3~DO0

Channel 0: High Level Channel 1: High Level Channel 2: High Level Channel 3: High Level

Application example 2: User command (hexadecimal): **02 03 03**

Explanation: Set the module output to 03, convert it to binary as 000000 11, and arrange it in the order of DO3~DO0

Channel 0: High Level Channel 1: High Level Channel 2: Low Level Channel 3: Low Level

Application example 3: User command (hexadecimal): **02 00 03**

Explanation: Set the module output to 03, convert it to binary as 00000000, and arrange it in the order of DO3~DO0

Channel 0: Low Level Channel 1: Low Level Channel 2: Low Level Channel 3: Low Level

Operations and settings on web pages

Enter the default module IP in the computer or mobile browser, which is 192.168.0.7 by default, to open the module webpage (provided that the computer IP or mobile IP is in the same network segment as the module, and logging in to the webpage requires logging in based on the current module's IP address). Enter the password, which is 123456 by default, and click "Login" to enter the data display interface. There is a Chinese English switch icon in the upper right corner, which can be clicked to switch between Chinese and English.

1，Real time collection of web pages:

Due to the use of WebSocket on this page to achieve real-time data collection from web pages,

It is recommended to use Google Chrome browser or IE10 browser for testing.

After successful connection, the webpage will automatically update data (note how the module works)

Must be set to 'Websocket', and automatic data upload must be set to

Yes, otherwise data cannot be obtained. Alternatively, the AI range can be set through the webpage

Waiting for parameters.   If your mobile browser supports WebSocket, you can also use it

Mobile phone reads data.

数据表格

通道	数据
DO0	☐
DO1	☐
DO2	☐
DO3	☐
设置DO	
DI0	0
DI1	0
DI2	0
DI3	0
DI4	0
DI5	0
DI6	0
DI7	0

2. Configure network parameters:

(a) Module Name

The default module name is WJ94-RJ45, and users can modify the module name as needed.

(b) MAC address

The MAC address can be changed according to user needs.

(c) IP address

The current IP address of the module is 192.168.0.7 by factory default, and the IP address can be modified.

(c) Subnet mask

Used to divide the subnet range size (usually 255.255.255.0), which users can modify.

(d) Default gateway

The necessary path to access the external network (usually filled in with the IP address of the router).

(d) Working methods

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

Can be set as TCP Server, TCP Client, UDP Mode, Modbus TCP, etc

Communication method.　Under TCP Server mode, a maximum of 6 TCP servers are supported.

(c) Local port

The default local port is 23, which 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

In Websocket, TCP Server, TCP Client, UDP Mode and other modes,

Do you need to automatically upload measurement data.

(f) Upload time interval

The time interval for automatic uploading of measurement data.　The default is to upload data once every second.

(b) Version number

　The version increases from 1.0 onwards.

(g) , Password

Setting parameters requires entering the correct password to take effect.　The password is the web login password, which defaults to 123456 at the factory.

After completing the parameter filling, click the "Save and Restart" button, and the module will save the parameters and automatically restart.

Common problems with WJ94

1. 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.

2. 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.

3. 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

4. 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.

5. 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

Network cable or network port hardware issues, check the status of the network port lights

There is a hardware issue with the network port. You can check the status of the network port, etc. The green light should be constantly on and the yellow light should be flashing, not constantly on or off. Otherwise, it is a hardware issue

Password error. If you forget the password, you can restore the factory configuration (with the module powered on, turn the Initiat switch to the Initiat position, and then turn it back to the NORMAL position. Wait for 30 seconds, and the module will automatically return to the factory settings. The parameters are shown in Figure 3. The webpage login password will be automatically restored to 123456.)

Dimensions: (Unit: mm)
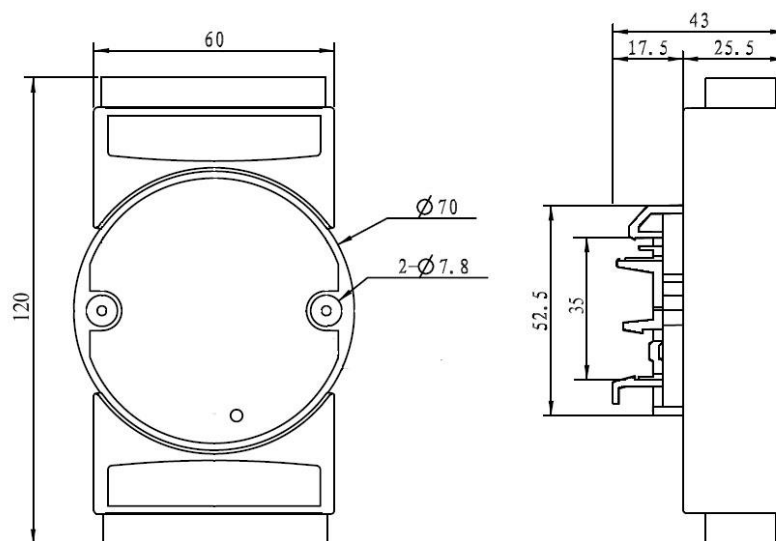
Can be installed on standard DIN35 rails

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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