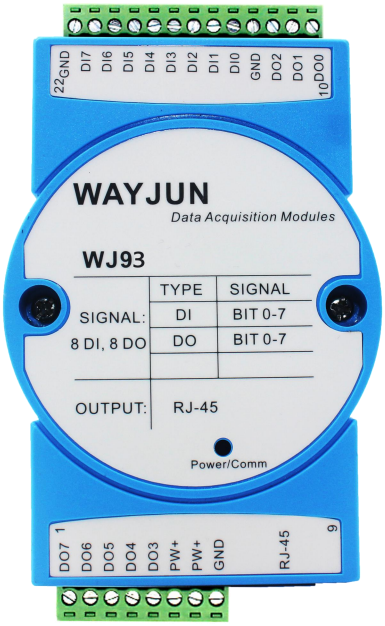
8-way DI high-speed counter, 8-way DO supports PWM output, Modbus TCP module WJ93



Product features:

- 8 switch inputs, 8 switch outputs
- Each DI channel can be used as a counter or frequency measurement
- Each DO channel can independently output PWM signals
- Both DI and DO support PNP and NPN switching functions
- Supports Modbus TCP communication protocol
- Built in web page function, which can query the level status through the web page
- Output status can be set through the webpage
- 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:

- Flow meter pulse counting or flow measurement
- LED lighting control or motor control
- Application system
- Ethernet industrial automation control system
- Industrial site signal isolation and long-distance transmission
- Equipment operation monitoring and control
- Measurement of sensor signals
- Industrial camera status monitoring and control
- IoT switch signal acquisition

Product Overview:

The WJ93 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.

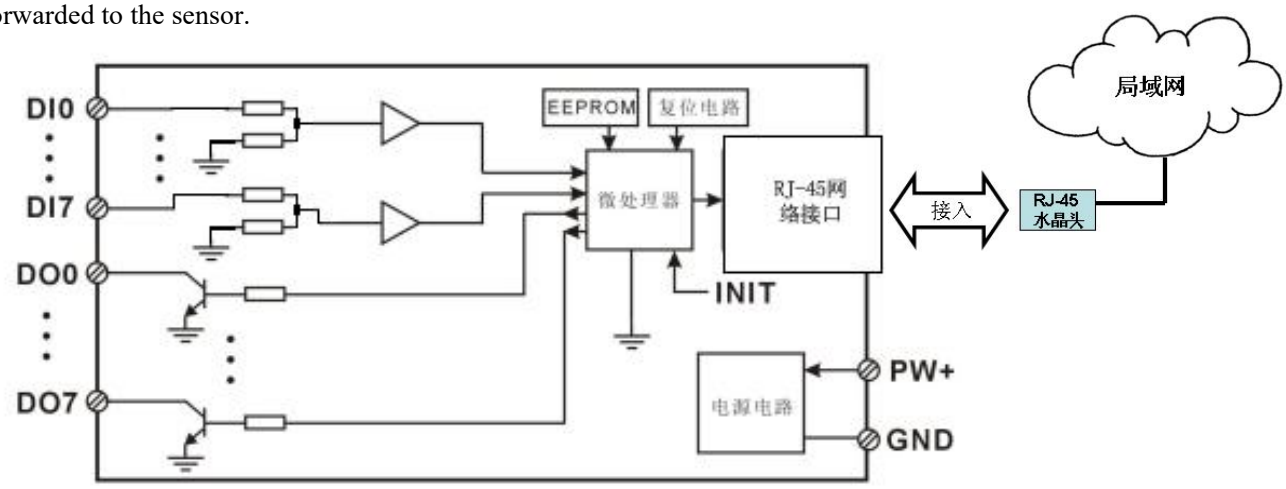


Figure 2 Internal Block Diagram of WJ93 Module

The WJ93 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 WJ93 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.

The WJ93 series products are designed and manufactured according to industrial standards, with no isolation between signal inputs/outputs, strong anti-interference ability, and high reliability. The working temperature range is -45 ℃ to+85 ℃.

Function Introduction:

The WJ93 remote I/O module can be used to measure eight switch signals and has eight switch outputs. Can be used as an 8-channel counter or 8-channel frequency measurement,

It can also output 8 PWM signals.

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; 8-channel switch signal output with open collector output, or internal pull-up output.

2、 Communication Protocol

Communication interface: RJ-45 network interface. The two indicator lights at the network port position, the Link light (green light) stays on after the network cable is plugged in, and the Data light (yellow light) will flash intermittently.

Communication protocol: MODBUS TCP protocol is adopted 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 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 model:

WJ93 - RJ45

Communication interface

RJ45: Output as RJ-45 network interface

WJ93 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

Frequency range 0-20KHz

Counting range 0-0xFFFFFFFF

Input resistance: 30K Ω

Output type: open collector output, voltage 0~30V, maximum load current 30mA, 8 channels (DO0~DO7).

To achieve a desired level output, an internal pull-up resistor with a resistance of 3K ohms can be turned on.
PWM frequency 1~65535Hz, duty cycle 0%~100%
Communication: MODBUS TCP communication protocol
Web page: Supports web access module and web page setting module parameters.
Interface: RJ-45 network 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: -45~+80 ℃
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 WJ93:

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

Figure 3: WJ93 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	DO7	Channel 7 switch signal output terminal	**twelve**	DO2	Channel 1 switch signal output terminal
two	DO6	Channel 6 switch signal output terminal	**thirteen**	GND	Negative terminal of power supply, signal common ground
three	DO5	Channel 5 switch signal output terminal	**fourteen**	DI0	Channel 0 switch signal input terminal
four	DO4	Channel 4 switch signal output terminal	**fifteen**	DI1	Channel 1 switch signal input terminal
five	DO3	Channel 3 switch signal output terminal	**sixteen**	DI2	Channel 2 switch signal input terminal
six	PW+	Positive end of power supply	**seventeen**	DI3	Channel 3 switch signal input terminal
seven	PW+	Positive end of power supply	**eighteen**	DI4	Channel 4 switch signal input terminal
eight	GND	Negative terminal of power supply, signal common ground	**nineteen**	DI5	Channel 5 switch signal input terminal
nine	RJ-45	network interface	**twenty**	DI6	Channel 6 switch signal input terminal
ten	DO0	Channel 0 switch signal output terminal	**twenty-one**	DI7	Channel 7 switch signal input terminal
eleven	DO1	Channel 1 switch signal output terminal	**twenty-two**	GND	Negative terminal of power supply, signal common ground

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

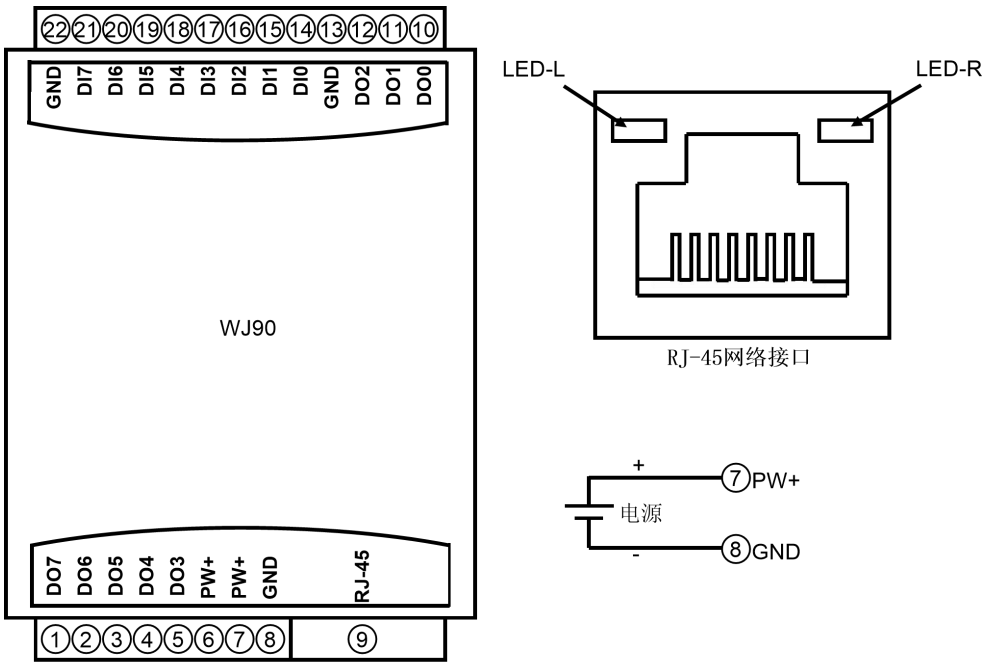
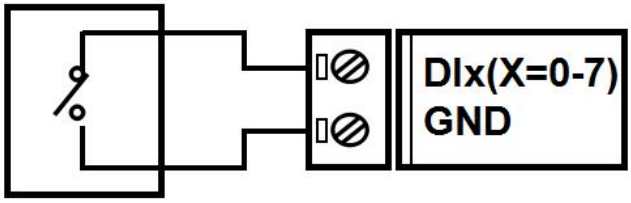
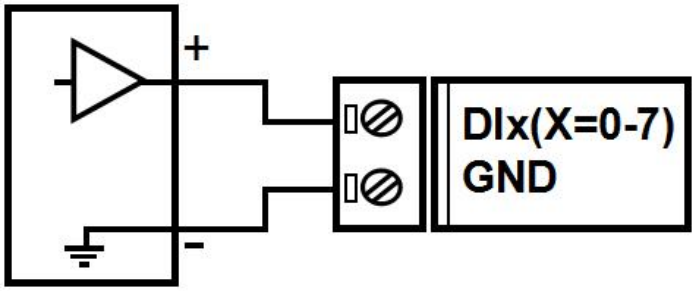
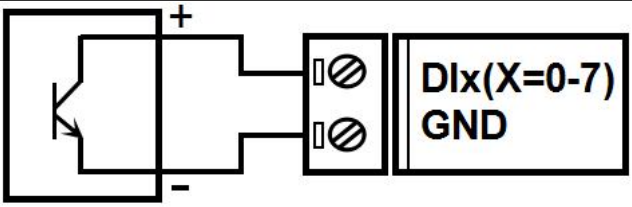


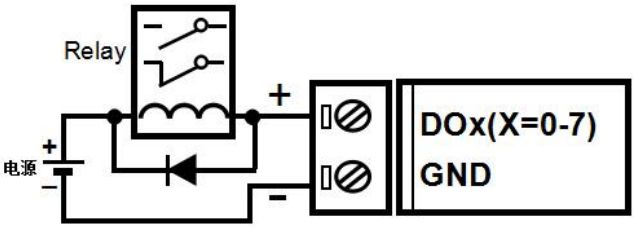
Figure 5 Wiring diagram of WJ93 module

Wiring diagram for switch signal input

Dry contact input	TTL/CMOS level, 24V level input
	
Need to open the internal pull-up resistor, set the 40082 register to 1, or send the character command $01Q1X.	**Need to turn off the internal pull-up resistor, set the 40082 register to 0, or send the character command $01Q0X**
Open collector input	
	
Need to open the internal pull-up resistor, set the 40082 register to 1, or send the character command $01Q1X.	

Note: The factory default is to turn off the pull-up function

Wiring diagram for switch signal output

Drive relay (NPN)	Level output (NPN with internal pull-up)
	
External power supply can be selected from 5~30VDC It can also be a power source that supplies power to the module The working current of the transistor is less than 30mA **Need to turn off the internal pull-up resistor, set the 40083 register to 0, or send the character command $01QX0**	Output high level equal to power supply voltage **Need to open the internal pull-up resistor, set the 40083 register to 1, or send the character command $01QX1.**

Note: The factory default is to turn off the pull-up function

Modbus TCP protocol

Please connect using Modbus dedicated port 502. The port number set on the webpage is invalid.

(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.

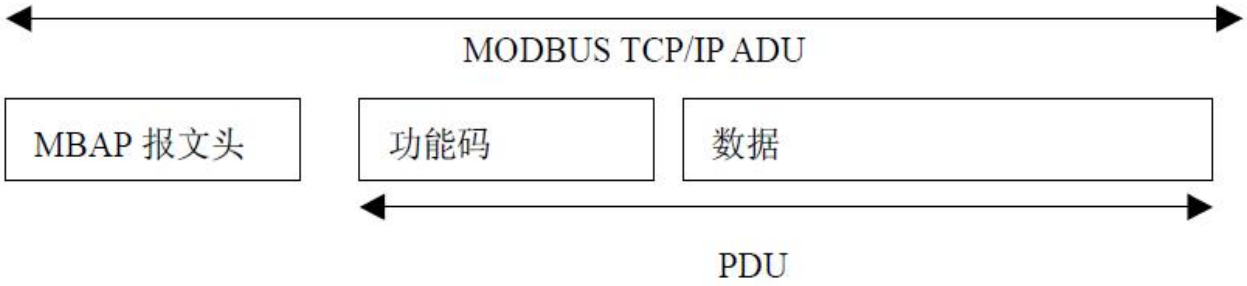


Figure 6: Request/Response of MODBUS on TCP/IP

(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, WJ93 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.
03	Read Holding Register	Read and hold register	1 represents high level, 0 represents low level.
05	Write Single Coil	Write a single coil	1 indicates that the transistor is conducting, and

			0 indicates that the transistor is disconnected.
06	Write Single Register	Write a single register	1 indicates that the transistor is conducting, and 0 indicates that the transistor is disconnected.
fifteen	Write Multiple Coils	Write multiple coils	
sixteen	Write Multiple Registers	Write multiple registers	

(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 identifier	01		Unit identifier	01
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			

03 (0x03) Read hold register

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

Example of function code 03, read 8-channel DI data, register address 40033:

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			05
	Unit identifier	01		Unit identifier	01
Function code		03	Function code		03
Starting address Hi		00	Byte count		02
Starting address Lo		twenty	Register value Hi (0x00)		00
Register number Hi		00	Register value Lo (DI7-DI0)		00
Register number Lo		01			

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

06 (0x06) Write a single register

In a remote device, use this function code to write a single hold register. The request PDU specifies the address written to the register. Address registers from scratch. Therefore, address register address 1 is 0.

The correct response is the same as a request.

For example, for function code 06, set all channels DO0~DO7 to 1, hexadecimal to 0xFF, and register address 40001:

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		06	Function code		06
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 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**
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

		08			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			

16 (0x10) Write multiple registers

In a remote device, use this function code to write multiple hold registers. The request PDU specifies the address written to the register. Address registers from scratch. Therefore, address register address 1 is 0. Example of function code 16, set the PWM values for channels DO0 and DO1 to 5 and 6, register address 40001:

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
		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
Byte count		04			
Register value Hi		00			
Register value Lo		05			
Register value Hi		00			
Register value Lo		06			

(5) Explanation of Register Address for **WJ93**

Supports registers with function codes 01, 05, and 15

Address 0X (PLC)	**Address (PC, DCS)**	**Data content**	**attribute**	**Data Explanation**
00001	0	DO0 output switch quantity	Read/ Write	Output status of DO channels 0-7 0 indicates that the transistor is

00002	one	DO1 output switch quantity	Read/ Write	disconnected, 1 indicates that the transistor is conducting
00003	two	DO2 output switch quantity	Read/ Write	
00004	three	DO3 output switch quantity	Read/ Write	
00005	four	DO4 output switch quantity	Read/ Write	
00006	five	DO5 output switch quantity	Read/ Write	
00007	six	DO6 output switch quantity	Read/ Write	
00008	seven	DO7 output switch quantity	Read/ Write	
00009	eight	DO0 output switch quantity	Read/ Write	Reset output status of DO channels 0-7 (default value is 0) 0 indicates that the transistor is disconnected after resetting, 1 indicates that the transistor conducts after resetting
00010	nine	DO1 output switch quantity	Read/ Write	
00011	ten	DO2 output switch quantity	Read/ Write	
00012	eleven	DO3 output switch quantity	Read/ Write	
00013	twelve	DO4 output switch quantity	Read/ Write	
00014	thirteen	DO5 output switch quantity	Read/ Write	
00015	fourteen	DO6 output switch quantity	Read/ Write	
00016	fifteen	DO7 output switch quantity	Read/ Write	
00017	sixteen	Output of DO channel 0 is reversed	Read/ Write	DO channels 0~7, (default value is 0) 0 indicates normal PWM output, 1 represents the output after PWM inversion
00018	seventeen	Output of DO channel 1 is reversed	Read/ Write	
00019	eighteen	Output of DO channel 2 is reversed	Read/ Write	
00020	nineteen	Output of DO channel 3 is reversed	Read/ Write	
00021	twenty	Output of DO channel 4 is reversed	Read/ Write	
00022	twenty-one	Output of DO channel 5 is reversed	Read/ Write	
00023	twenty-two	Output of DO channel 6 is reversed	Read/ Write	
00024	twenty-three	Output inversion of	Read/	

		DO channel 7	Write	
00025	twenty-four	Counting method for DI0 input	Read/ Write	DI channels 0~7, (default value is 0) 0 is the rising edge count, 1 is the falling edge count
00026	twenty-five	Counting method for DI1 input	Read/ Write	
00027	twenty-six	Counting method for DI2 input	Read/ Write	
00028	twenty-seven	Counting method for DI3 input	Read/ Write	
00029	twenty-eight	Counting method for DI4 input	Read/ Write	
00030	twenty-nine	Counting method for DI5 input	Read/ Write	
00031	thirty	Counting method for DI6 input	Read/ Write	
00032	thirty-one	Counting method for DI7 input	Read/ Write	
00033	thirty-two	DI0 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	thirty-three	DI1 input switch quantity	read-only	
00035	thirty-four	DI2 input switch quantity	read-only	
00036	thirty-five	DI3 input switch quantity	read-only	
00037	thirty-six	DI4 input switch quantity	read-only	
00038	thirty-seven	DI5 input switch quantity	read-only	
00039	thirty-eight	DI6 input switch quantity	read-only	
00040	thirty-nine	DI7 input switch quantity	read-only	

Supports registers with function codes 03, 06, and 16, and the addresses in the table are decimal numbers. The storage order for 32-bit long integers and floating-point numbers is CDAB.

Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**attribute**	**Data Explanation**
forty thousand and one	0	DO output PWM0	Read/ Write	DO output channels 0-7, PWM output value, Integer, range 0~10000
forty thousand and two	one	DO output PWM1	Read/ Write	
forty thousand and three	two	DO output PWM2	Read/ Write	
forty thousand	three	DO output PWM3	Read/	

and four			Write	
forty thousand and five	four	DO output PWM4	Read/ Write	
forty thousand and six	five	DO output PWM5	Read/ Write	
forty thousand and seven	six	DO output PWM6	Read/ Write	
forty thousand and eight	seven	DO output PWM7	Read/ Write	
forty thousand and nine	eight	DO channel 0~3 frequency	Read/ Write	Pulse frequency, (default value is 0) Integer, range 0~65535 Hz Set to 0, indicating switch output Set to 1~65535, indicating PWM output
forty thousand and ten	nine	DO channel 4-7 frequency	Read/ Write	
40017~40018	16~17	DI channel 0 count	Read/ Write	Long integers (0x0000000~0xFFFFFFFF), DI channels count from 0 to 7. The storage order is CDAB. The low 16 bits of channel 0 are stored in register 40017, The high 16 bits of channel 0 are stored in register 40018, The other channels follow the same pattern.
40019~40020	18~19	DI channel 1 count	Read/ Write	
40021~40022	20~21	DI channel 2 count	Read/ Write	
40023~40024	22~23	DI channel 3 count	Read/ Write	
40025~40026	24~25	DI channel 4 count	Read/ Write	
40027~40028	26~27	DI channel 5 count	Read/ Write	
40029~40030	28~29	DI Channel 6 Count	Read/ Write	
40031~40032	30~31	DI channel 7 count	Read/ Write	
forty thousand and forty-one	forty	Number of pulses per revolution for DI0	Read/ Write	An unsigned integer (default value at factory is 1000), set based on the number of pulses per revolution. After setting, registers 40101~40108 correspond to the speed of the corresponding channel.
forty thousand and forty-two	forty-one	Number of pulses per revolution for DI1	Read/ Write	
forty thousand and forty-three	forty-two	Number of pulses per revolution for DI2	Read/ Write	
forty thousand and forty-four	forty-three	Number of pulses per revolution for DI3	Read/ Write	
forty thousand and forty-five	forty-four	Number of pulses per revolution for DI4	Read/ Write	
forty thousand and forty-six	forty-five	Number of pulses per revolution for DI5	Read/ Write	
forty thousand	forty-six	Number of pulses per	Read/	

and forty-seven		revolution for DI6	Write	
forty thousand and forty-eight	forty-seven	Number of pulses per revolution for DI7	Read/ Write	
forty thousand and sixty-five	sixty-four	PWM0 reset output value	Read/ Write	PWM reset output values for channels 0 to 7, (The default value is 5000) Integer, range 0~10000
forty thousand and sixty-six	sixty-five	PWM1 reset output value	Read/ Write	
forty thousand and sixty-seven	sixty-six	PWM2 reset output value	Read/ Write	
forty thousand and sixty-eight	sixty-seven	PWM3 reset output value	Read/ Write	
forty thousand and sixty-nine	sixty-eight	PWM4 reset output value	Read/ Write	
forty thousand and seventy	sixty-nine	PWM5 reset output value	Read/ Write	
forty thousand and seventy-one	seventy	PWM6 reset output value	Read/ Write	
forty thousand and seventy-two	seventy-one	PWM7 reset output value	Read/ Write	
forty thousand and seventy-three	seventy-two	Channel 0~3 frequency reset value	Read/ Write	Pulse frequency reset output value, (default value is 0) Integer, range 0~65535 Hz Set to 0, indicating switch output Set to 1~65535, indicating PWM output
forty thousand and seventy-four	seventy-three	Channel 4-7 frequency reset value	Read/ Write	
Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**attribute**	**Data Explanation**
forty thousand and eighty-one	eighty	Automatic saving of DI count values	Read/ Write	0: Do not automatically save, power off and reset to zero; (default value is 0) 1: Power off automatically saves DI count value.
forty thousand and eighty-two	eighty-one	DI's pull-up switch	Read/ Write	0: DI turns off the pull-up voltage; (default value is 0) 1: Connect the pull-up voltage to DI.
forty thousand and eighty-three	eighty-two	DO's pull-up switch	Read/ Write	0: DO turns off the pull-up voltage; (default value is 0) 1: Connect the pull-up voltage to DO.
forty thousand and eighty-nine	eighty-eight	Parameter reset to factory settings	Read/ Write	If set to FF00, all register parameters of the module will be restored to factory settings, and the module will automatically restart after completion
forty thousand one hundred and one	one hundred	Speed of DI channel 0	read-only	Unsigned integer. The speed is calculated based on the number of pulses set in registers

forty thousand one hundred and two	one hundred and one	Speed of DI channel 1	read-only	40041~40048.
forty thousand one hundred and three	one hundred and two	Speed of DI channel 2	read-only	
forty thousand one hundred and four	one hundred and three	Speed of DI channel 3	read-only	
forty thousand one hundred and five	one hundred and four	Speed of DI channel 4	read-only	
forty thousand one hundred and six	one hundred and five	Speed of DI channel 5	read-only	
forty thousand one hundred and seven	one hundred and six	Speed of DI channel 6	read-only	
forty thousand one hundred and eight	one hundred and seven	Speed of DI channel 7	read-only	
40129~40130	128~129	Frequency of DI channel 0	read-only	32-bit floating-point number, collected frequency. The storage order is CDAB. If floating-point numbers are not supported and integers need to be read, please refer to registers 40145~40160
40131~40132	130~131	Frequency of DI channel 1	read-only	
40133~40134	132~133	Frequency of DI channel 2	read-only	
40135~40136	134~135	Frequency of DI channel 3	read-only	
40137~40138	136~137	Frequency of DI channel 4	read-only	
40139~40140	138~139	Frequency of DI channel 5	read-only	
40141~40142	140~141	Frequency of DI channel 6	read-only	
40143~40144	142~143	Frequency of DI channel 7	read-only	
40145~40146	144~145	Frequency of DI channel 0	read-only	32-bit long integer, collected frequency. The storage order is CDAB. The low 16 bits of channel 0 are stored in register 40129, The high 16 bits of channel 0 are stored in register 40130, The other channels follow the same
40147~40148	146~147	Frequency of DI channel 1	read-only	
40149~40150	148~149	Frequency of DI channel 2	read-only	
40151~40152	150~151	Frequency of DI	read-	

		channel 3	only	pattern.
40153~40154	152~153	Frequency of DI channel 4	read-only	
40155~40156	154~155	Frequency of DI channel 5	read-only	
40157~40158	156~157	Frequency of DI channel 6	read-only	
40159~40160	158~159	Frequency of DI channel 7	read-only	
40181~40188	180~187	DI channels 0~7 Filtering time	Read/ Write	Filtering time for DI channels 0-7 Unsigned integer. Each register corresponds to the filtering time of a channel. 1 represents a filtering time of 1mS, with the photoelectric switch input set to 0 and the mechanical switch or relay input recommended to be set to 20-100mS. The setting will take effect after restarting.
forty thousand two hundred and eleven	two hundred and ten	Module Name	read-only	High bit: 0x00 Low bit: 0x93

Character Protocol Socket Communication

In working modes such as Websocket, TCP Server, TCP Client, UDP Mode, the following character protocols can be used for communication.

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

Under the working modes of Websocket, TCP Server, and TCP Client,
After successful communication connection, data will be automatically uploaded. UDP Mode does not automatically Uploading data requires issuing commands to read the data.

1. Read DI and DO switch status command

Description: Read back all output channel switch status, switch reset status, and input channel switch status from the module.

Command format: **# 01**

Response format:>**AAAAAAAA, BBBBBBB, CCCCCCCC** commands are valid.

? The **01 (cr)** command is invalid or an illegal operation.

Parameter description:>delimiter. Hexadecimal is 3EH

AAAAAAAA represents the read output switch status, consisting of 8 numbers arranged in the order of DO7~DO0,

Value 0: Output transistor disconnected; Value 1: Output transistor connected

BBBBBB represents the read reset output switch status, consisting of 8 numbers arranged in the order of DO7~DO0,

Value 0: Output transistor disconnected; Value 1: Output transistor connected

CCCCCCCC represents the read input switch status, consisting of 8 numbers arranged in the order of DI7~DI0,

Value 0: Input low level; Value 1: Input high level

Application example: User command (character format) **# 01**

Module response (character format)**>00011000000110000000111**

(Hexadecimal format): **213032303130300D**

Explanation: The module output switch status is 00011000, arranged in the order of DO7~DO0

Channel 0: transistor disconnected Channel 1: transistor disconnected Channel 2: transistor disconnected Channel 3: transistor connected

Channel 4: transistor connected Channel 5: transistor disconnected Channel 6: transistor disconnected Channel 7: transistor disconnected

After resetting the module, the output switch status is 00001010, arranged in the order of DO7~DO0

Channel 0: transistor disconnected Channel 1: transistor connected Channel 2: transistor disconnected Channel 3: transistor connected

Channel 4: transistor disconnection Channel 5: transistor disconnection Channel 6: transistor disconnection Channel 7: transistor disconnection

The input switch status of the module is 00000 111, and the arrangement order is 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

2. Set DO transistor output command

Description: Set the status of all output channel transistors. The factory setting for all channels is 00000000.

Command format: **# 011ABCD**

Parameter description: # delimiter. Hexadecimal is 24H

011 represents the command to set the transistor output

AB channel selection, can choose all output channels or a single output channel.

Set output: Setting AB to 00 means setting all output channels. If setting a single channel, character A must be set to 1, and character B can be set to 0-7, representing 8 transistor DO output channels.

Set reset output: Setting AB to FF means setting the reset output values for all channels. If setting the reset output for a single channel, character A must be set to E, and character B can be set to 0-7, representing 8 transistor DO output channels.

CD output value.

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

Then there are two hexadecimal numbers, as shown in the figure on the right

C				D			
DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0

C represents channels 7 to 4

D represents channels 3 to 0

Bit value is 0:

Set the output transistor to disconnect

Bit value is 1:

Set the output transistor to turn on

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

00: Set the X-channel output transistor to disconnect

01: Set the X-channel output transistor to turn on

Response format:**!** The **01 (cr)** command is valid.

? The **01 (cr)** command is invalid or an illegal operation.

Application Example 1: User Command (Character Format) **# 011000F**

Module response (character format)**! 01(cr)**

Explanation: Set the output of all channels (AB=00) to 0FH, and convert it to binary to 0000 1111,

So the switch state output by the module is:

Channel 0: transistor connected Channel 1: transistor connected Channel 2: transistor connected Channel 3: transistor connected

Channel 4: transistor disconnection Channel 5: transistor disconnection Channel 6: transistor disconnection Channel 7: transistor disconnection

Application Example 2: User Command (Character Format) **# 0111201**

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

Explanation: Set the transistor of channel 2 to be connected.

Application Example 3: User Command (Character Format) **# 011FFFF**

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

Explanation: Set the reset output of all channels (AB=FF) to FFH, which is converted to binary as 1111 1111,

After the module is reset, all channel transistors are turned on.

3. Read DI counter data command

Explanation: Reading the data of the counter can read all channels or a single channel.

Command format: **# 012** Read channel 0~channel 7 counter data

Response format:**! AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAA**

AAAA, AAAAAAAAAA, AAAAAAAAAA(cr)

Command format: **# 012N** Read channel N counter data

Response format:**! AAAAAAAAAA(cr)**

Application Example 1: User Command (Character Format) **# 012**

Module response (character format)**! 0012345678, 0012345678, 0012345678, 0012345678, 0012345678, 0012345678, 0012345678, 0012345678 (cr)**

Explanation: The count value for all channels is 12345678.

Application Example 2: User Command (Character Format) **# 0120**

Module response (character format)**! 0012345678(cr)**

Explanation: The count value for channel 0 is 12345678.

4. Read the input frequency command of DI

Explanation: The frequency of the input can be read for all channels or for a single channel.

Command format: **# 013** Read channel 0~channel 7 Input frequency

Response format:**!**

AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA, AAAAAA.AA (cr)

Command format: **# 013N** read channel N input frequency

Response format:**! AAAAAA.AA (cr)**

Application Example 1: User Command (Character Format) **# 013**

Module response (character format)**! 001000.00,001000.00,001000.00,001000.00,001000.00,001000.00, 001000.00,001000.00(cr)**

Explanation: The input frequency value for all channels is 1KHz.

Application Example 2: User Command (Character Format) **# 0130**

Module response (character format)**! 001000.00(cr)**

Explanation: The input frequency value for channel 0 is 1KHz.

5. Read the PWM command of DO

Explanation: Reading the output PWM can read all channels, single channels, and reset PWM values.

Command format: **# 014** Read PWM values for channels 0 to 7

Response format:**! AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA(cr)**

Command format: **# 014S** read channel 0~channel 7 reset PWM value

Response format:**! AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA, AAA.AA(cr)**

Command format: **# 014N** Read PWM value of channel N

Response format:**! AAA.AA (cr)**

Command format: **# 014SN** Read channel N's reset PWM value

Response format:**! AAA.AA (cr)**

Application Example 1: User Command (Character Format) **# 014**

Module response (character format)**! 050.00,050.00,050.00,050.00,050.00,050.00,050.00,050.00(cr)**

Explanation: The PWM value for all channels is 50%.

Application Example 2: User Command (Character Format) **# 0140**

Module response (character format)**! 050.00(cr)**

Explanation: The PWM value for channel 0 is 50%.

6. Set the PWM command for DO

Explanation: Setting the output PWM value or resetting the PWM value can only be set for a single channel. The factory setting for all channels is 050.00.

Command format: **# 015NAAA AA** sets the PWM value for channel N

Response format:**! 01 (cr)** indicates successful setting

Command format: **# 015SNAAA AA** sets the reset PWM value for channel N

Response format:**! 01 (cr)** indicates successful setting

Application Example 1: User Command (Character Format) **# 0150050.00**

Module response (character format)**! 01(cr)**

Explanation: Set the PWM value for channel 0 to 50%.

Application Example 2: User Command (Character Format) **# 015S0050.00**

Module response (character format)**! 01(cr)**

Explanation: Set the reset PWM value for channel 0 to 50%.

7. Read the frequency command of PWM for DO

Explanation: Read the output PWM frequency and also read the reset PWM frequency.

Command format: **# 016** Read PWM frequency

Response format:**!** AAAAA**, BBBBB (cr)** AAAAA represents the frequency of channels 0-3, BBBBB represents the frequency of channels 4-7

Command format: **# 016S** read reset PWM value

Response format:**! AAAAA, BBBBB (cr)** AAAAA represents the reset frequency of channels 0-3, BBBBB represents the reset frequency of channels 4-7

Application Example 1: User Command (Character Format) **# 016**

Module response (character format)**! 01000,02000(cr)**

Explanation: The PWM frequency for channels 0-3 is 1KHz, and the PWM frequency for channels 4-7 is 2KHz.

Application Example 2: User Command (Character Format) **# 016S**

Module response (character format)**! 00100,00200 (cr)**

Explanation: The PWM reset frequency for channels 0-3 is 100Hz, and the PWM reset frequency for channels 4-7 is 200Hz.

8. Set the PWM frequency command for DO

Explanation: To set the output PWM frequency or reset PWM frequency, only a single channel can be set. Range 00000~65535, set to 00000 to turn off PWM output and output as switch level output. The factory setting for all channels is 00000.

Command format: **# 017NAAAA** N=0 indicates setting the PWM frequency for channels 0-3, N=1 indicates setting the PWM frequency for channels 4-7.

Response format:**! 01 (cr)** indicates successful setting

Command format: **# 017SNAAAAA** N=0 indicates setting the PWM reset frequency for channels 0-3,

N=1 indicates setting the PWM reset frequency for channels 4-7.

Response format:**! 01 (cr)** indicates successful setting

Application Example 1: User Command (Character Format) **# 017000100**

Module response (character format)**! 01(cr)**

Explanation: Set the PWM frequency of channels 0-3 to 100Hz.

Application Example 2: User Command (Character Format) **# 017S100500**

Module response (character format)**! 01(cr)**

Explanation: Set the reset PWM frequency for channels 4-7 to 500Hz.

9. Read DI input speed command

Explanation: Reading the speed of DI input can read all DIs or a single DI‘

Command format: **# 018** Read DI0~DI7 input speed.

Response format:**! AAAAA,AAAAA,AAAAA,AAAAA, AAAAA,AAAAA,AAAAA,AAAAA (cr)**

Command format: **# 018N** Read DI Channel N Input Speed

Response format:**! AAAAA (cr)**

Application Example 1: User Command (Character Format) **# 018**

Module response (character format)**! 01000,01000,01000,01000, 01000,01000,01000,01000 (cr)**

Explanation: The input speed value for all DI channels is 1000 revolutions per minute.

Application Example 2: User Command (Character Format) **# 0180**

Module response (character format)**! 01000(cr)**

Explanation: The input speed value of DI0 is 1000 revolutions per minute.

10. Modify the numerical command of DI counter

Explanation: You can modify the value of the DI counter and reset it to zero to start counting again.

Command format: **$011NAAAAAAAA** Modify the count value of channel N

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$011500000000000**

Module response (character format)**! 01(cr)**

Explanation: Set the count value of channel 5 to 0.

11. Set the PWM output reverse command for DO

Explanation: Set whether the PWM output needs to be inverted between high and low levels before outputting. The factory setting is 00000000.

Command format: **$013BBBBB** Set whether PWM output takes the reverse command.

Response format:**! 01 (cr)** indicates successful setting

Parameter description: **BBBBBB** represents the switch state, with 8 numbers arranged in the order of DO7~DO0

Value 0: The PWM output of this channel is normal; Value 1: The PWM of this channel takes the inverse output

Application example: User command (character format) **$013000000**

Module response (character format)**! 01(cr)**

Explanation: Set all channel PWM to output normally.

12. Read whether the PWM output of DO takes the reverse command

Explanation: Check if the PWM output is set to reverse.

Command format: **$014** Read PWM output to determine if the command is reversed.

Response format:**! BBBBBBB (cr)** indicates whether the PWM output is set to reverse

Parameter description: **BBBBBB** represents the switch state, with 8 numbers arranged in the order of DO7~DO0

Value 0: The PWM output of this channel is normal; Value 1: The PWM of this channel takes the inverse output

Application example: User command (character format) **$014**

Module response (character format)**! 11111110(cr)**

Explanation: The 0-channel PWM outputs normally, while the 1-7 channel PWM outputs in reverse.

13. Set the counting method of DI counter

Explanation: Set the DI counter to count rising or falling edges. The factory setting is 00000000.

Command format: **$015BBBBB** Set the counting method of the DI counter.

Response format:**! 01 (cr)** indicates successful setting

Parameter description: **BBBBBB** represents switch status, 8 numbers, arranged in the order of DI7~DI0

Value 0: The rising edge count of the channel; Value 1: The descending edge count of this channel

Application example: User command (character format) **$01511110000**

Module response (character format)**! 01(cr)**

Explanation: Set the falling edge count for channels 7 to 4 and the rising edge count for channels 3 to 0.

14. Read the counting method of DI counter

Explanation: Read whether the DI counter counts the rising edge or the falling edge.

Command format: **$016** reads the counting method of the DI counter.

Response format:**! BBBBBB (cr)** represents the counting method of the DI counter.

Parameter description: **BBBBBB** represents switch status, 8 numbers, arranged in the order of DI7~DI0

Value 0: The rising edge count of the channel; Value 1: The descending edge count of this channel

Application example: User command (character format) **$016**

Module response (character format)**! 11111110(cr)**

Explanation: 0 channel rising edge count, 1-7 channel falling edge count.

15. Set the number of pulses per revolution for DI

Explanation: Set the number of pulses per revolution for DI. Set according to the parameters of the device connected to DI, with a factory default value of 1000. Only after setting the correct number of pulses can the DI speed be read.

Command format: **$017NAAAA** sets the number of pulses per revolution for DI channel N. **AAAAA** represents the

number of pulses, such as 1000800 or

600 and so on.

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$017100300**

Module response (character format)**! 01(cr)**

Explanation: Set the number of pulses per revolution for DI1 to 300.

16. Read the number of pulses per revolution of DI

Explanation: Read the number of pulses per revolution for all DI channels.

Command format: **$018** reads the number of pulses per revolution for all DIs, arranged in sequence from 0 to 7.

Response format:**! AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA (cr)**

Indicates the number of pulses per revolution for DI0~DI7.

Application example: User command (character format) **$018**

Module response (character format)**! 01000, 01000, 01000, 01000, 01000, 01000, 01000, 01000 (cr)**

Explanation: The number of pulses per revolution for all DI channels is 1000.

17. Set whether the DI count value will be automatically saved when the power is turned off

Explanation: Set whether the count value of DI is automatically saved when the power is turned off. The factory default value is 0 (not automatically saved, reset to zero when the power is turned off).

Command format: **$01SW**

Parameter description: **S** sets whether the count value of DI is automatically saved when the power is turned off.

W 0: Do not automatically save, power off and reset to zero; 1: Power off automatically saves DI count value.

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$01S0**

Module response (character format)**! 01(cr)**

Explanation: Set DI to not save count values and automatically reset the count after power failure.

18. Set the pull-up switch for DI and DO

Description: Set the pull-up switch for DI and DO, with a factory default value of 00 (both DI and DO have the pull-up function turned off).

Command format: **$01QXY**

Parameter description: **Q** sets the pull-up switch command for DI and DO.

X 0: DI turns off the pull-up voltage; 1: Connect the pull-up voltage to DI. X: Keep the original settings.

Y 0: DO turns off the pull-up voltage; 1: Connect the pull-up voltage to DO. X: Keep the original settings.

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$01Q11**

Module response (character format)**! 01(cr)**

Explanation: Set both DI and DO to apply pull-up voltage. When DI is an NPN input, it can be set to turn on the DI pull-up voltage.

When DO requires voltage output, it can be set to turn on the DO pull-up voltage.

19. Set the filtering time for DI

Explanation: Set the filtering time for DI. 1 represents 1mS, and the factory default is 0. The photoelectric switch input is set to 0, and it is recommended to set the mechanical switch or relay input to 20~100mS. The setting will take effect after restarting.

Command format: **$01LWNAAAA** sets the filtering time for DI channel N. N is the counter code, with a value of 012345678, corresponding to DI0~DI7. Setting N to 'M' means setting the filtering time for all channels simultaneously. **AAAAA** represents filtering time, such as 0, 20, or 50.

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$01LW100020**

Module response (character format)**! 01(cr)**

Explanation: Set the filtering time for DI1 to 20, which is 20mS.

20. Read the filtering time of DI

Explanation: Read the filtering time of all DI channels.

Command format: **$01LR** reads the filtering time of all DIs, arranged in the order of DI0~DI7.

Response format:**! AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA**

Indicates the filtering time for DI0~DI7.

Application example: User command (character format) **$01LR**

Module response (character format)**! 00020, 00020, 00020, 00020, 00020, 00020, 00020, 00020 (cr)**

Explanation: The filtering time for all DI channels is 20mS.

21. Set up automatic reporting of data

Description: Set up automatic reporting of data. The module will automatically report the data you need according to the settings.

Command format: **$01CX** sets the data to be automatically reported. The upload code for X is as follows:

0: Automatically upload DI switch status (factory default)

1: Automatically upload DI count values

2: Automatically upload DI frequency

3: Automatically upload DI speed

4: Automatically upload DI count values, DI switch status, and speed

5: Automatically upload DI count values, DI switch status, frequency, and speed

6: Automatically upload DI count value, DI switch status

Response format:**! 01 (cr)** indicates successful setting

Application example: User command (character format) **$01C1**

Module response (character format)**! 01(cr)**

Description: Set up automatic upload of DI count values.

22. Reset all parameters set by the above character commands to factory settings.

Explanation: The parameters set by the above character commands in the module will be reset to factory settings, and the module will automatically restart after completion. The network parameters such as module IP will not change.

Command format: **$01900** Set parameters to factory settings.

Response format:**! 01 (cr)** indicates successful setup, and the module will automatically restart.

Application example: User command (character format) **$01900**

Module response (character format)**! 01(cr)**

Explanation: Parameters are reset to factory settings.

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.

2. Configure network parameters:

(a) Module Name

The default module name is WJ93-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 5 Websocket communications.
Can be set as TCP Server, TCP Client, UDP Mode, Modbus TCP, etc
Communication method. Under TCP Server mode, a maximum of 5 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 WJ93

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

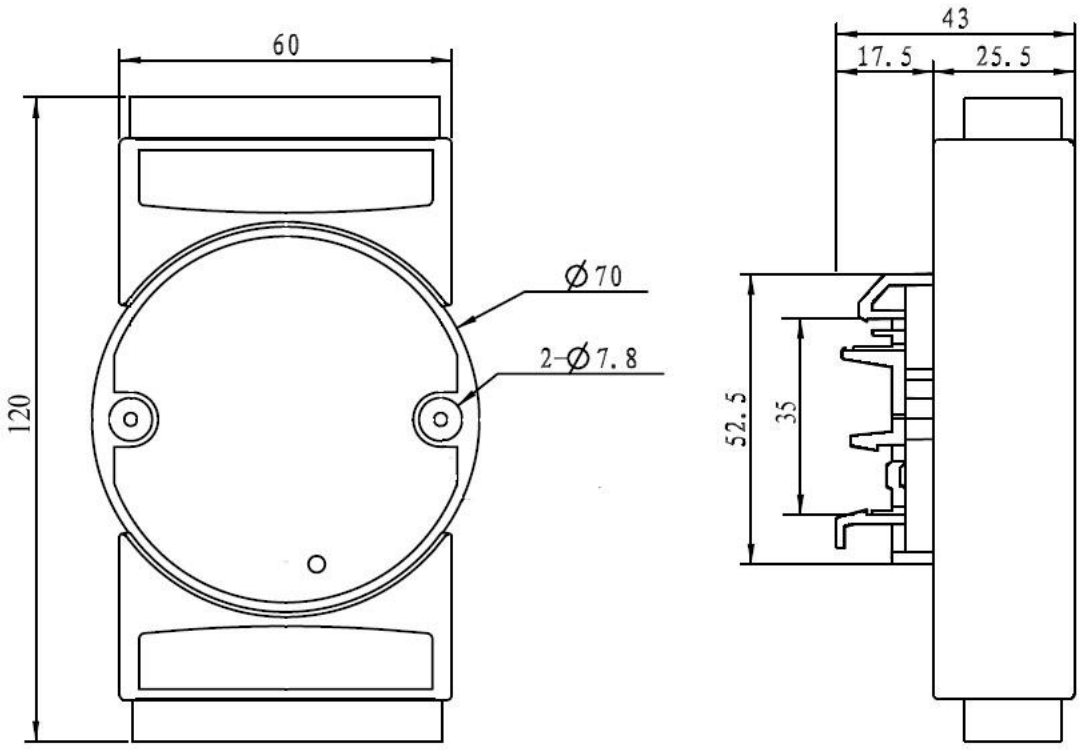
There is a hardware issue with the network port. You can check the status of the network port, etc. The green light should be constantly on and the yellow light should be flashing, not constantly on or off. Otherwise, it is a hardware issue

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.)

6. MODBUS TCP cannot connect

Please connect using Modbus dedicated port 502.

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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