8-CH encoder pulse counter or 16-CH DI high-speed counter
(MODBUS RTU module WJ69 Series)

Features:

>> The encoder is decoded and converted into standard MODBUS RTU protocol
>> Can be used as an encoder counter or speed measurement
>> Support 8 encoders to count at the same time, can identify forward and reverse
>> It can also be set as 16 independent DI high-speed counters
>> Encoder count value supports automatic saving after no power
>> DI input / power supply isolation: 3000VDC
>> Through the RS-485/232 interface can clear and set the count value
>> Wide power supply range: 8 ~ 32VDC
>> High reliability, convenient programming and easy application
>> Standard DIN35 rail installation, convenient for centralized wiring
>> The user can program the module address, baud rate, etc.
>> Dimensions: 120 mm x 70 mm x 43mm

Figure 1 WJ69

Applications:

>> Encoder pulse signal measurement
>> Flow meter pulse counting or flow measurement
>> Production line product count
>> Counting the number of logistics packages
>> Proximity switch pulse signal measurement
>> The encoder signal is transmitted remotely to the industrial computer
>> Smart Factory and Industrial Internet of Things
>> Instead of PLC, directly transmit data to the control center

Product Overview:

WAYJUN WJ69 products realize the signal acquisition between the sensor and the host, and is used to decode the encoder signal. WJ69 series products can be used in RS-232/485 bus industrial automation control systems, automated machine tools, industrial robots, three-coordinate positioning systems, displacement measurement, stroke measurement, angle measurement, speed measurement, flow measurement, product counting, etc.

Products include signal isolation, pulse signal capture, signal conversion and RS-485 serial communication. Each serial port can connect up to 255 WJ69 series modules. The communication method adopts ASCII code communication protocol or MODBUS RTU communication protocol. The baud rate can be set by code. It can be hung on the same RS-485 bus with other manufacturers' control modules, which is convenient for computers. Programming.

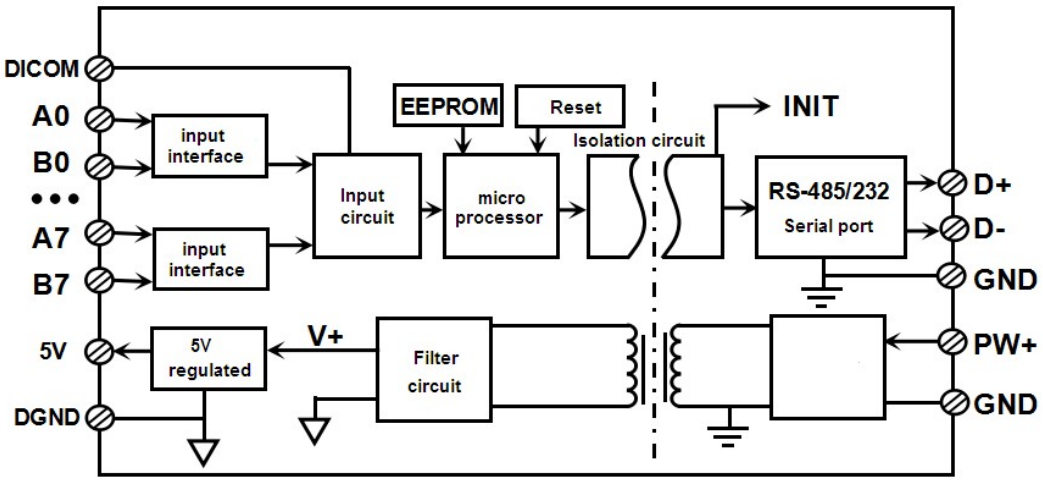


Figure 2: WJ69 Block Diagram

WJ69 series products are intelligent monitoring and control systems based on single-chip microcomputers. All user-set address, baud rate, data format, checksum status and other configuration information are stored in non-volatile memory EEPROM.

WJ69 series products are designed and manufactured in accordance with industrial standards. There is no isolation between signal input and output, with strong anti-interference ability and high reliability. Operating temperature range-45 ～+85 deg.C.

Function Description:

The WJ69 remote I/O module can be used to measure eight-channel encoder signals, and it can also be set as a 16-channel independent counter or DI state measurement.

1. Signal input

8-channel encoder signal input or 16-channel independent counter can be connected to dry contact and wet contact. Please refer to the wiring diagram section for details.

2. Communication protocol

Communication interface: 1 standard RS-485 communication interface or 1 standard RS-232 communication interface, specify when ordering and selecting.

Communication protocol: supports two protocols, the character protocol defined by the command set and the MODBUS RTU communication protocol. The module automatically recognizes the communication protocol and can realize network communication with various brands of PLC, RTU or computer monitoring systems.

Data format: 10 bits. 1 start bit, 8 data bits, 1 stop bit. No verification.

The communication address (0～255) and baud rate (2400, 4800, 9600, 19200, 38400, 57600, 115200bps) can be set; the longest distance of the communication network can reach 1200 meters, and it is connected through a twisted pair shielded cable.

The communication interface is designed with high anti-interference, ±15KV ESD protection, and the communication response time is less than 100mS.

3. Anti-interference

The checksum can be set as required. There are transient suppression diodes inside the module, which can effectively suppress various surge pulses, protect the module, and the internal digital filter can also suppress the power frequency interference from the power grid.

Product Selection:

WJ69 - □

Communication Interface

485： output is RS-485 interface

232： output is RS-232 interface

Sample 1: part No.:WJ69-232 means output is RS-232 interface

Sample 2: part No.: WJ69-485 means output is RS-485 interface

WJ69 general parameters:

(typical @ +25℃, Vs is 24VDC)

Input type: Encoder AB signal input, 8 channels (A0/B0~ A7/B7).

Low level: input <1V

High level: input 3.5 ~ 30V

The frequency range is 0-10KHz (all channels are input at the same time), and a single channel can support 50KHz input.

Encoder counting range-2147483647 ~ +2147483647, automatically saved when power off

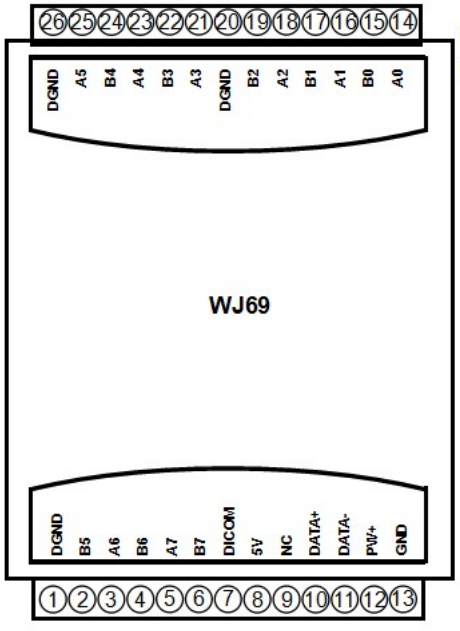
DI counter range 0 ~ 4294967295, reset after power off

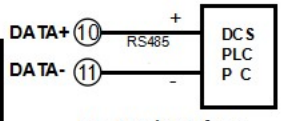
Input resistance: 30KΩ

Communication: Protocol RS-485 or RS-232 standard character protocol and MODBUS RTU communication protocol
Baud rate (2400, 4800, 9600, 19200, 38400, 57600, 115200bps) can be selected by software
Address (0～255) can be selected by software
Communication response time: 100 ms max
Working power supply: +8 ~ 32VDC wide power supply range, internal anti-reverse connection and overvoltage protection circuit
Power consumption: less than 1W
Working temperature:-45 ~ +80℃
Working humidity: 10 ~ 90% (non-condensing)
Storage temperature:-45 ~ +80℃
Storage humidity: 10 ~ 95% (no condensation)
Isolation withstand voltage: 3000V isolation between DI input and power supply, and the communication interface and power supply share the same ground.
Dimensions: 120 mm x 70 mm x 43mm

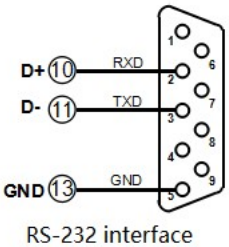
Footprint Function:

PIN	Name	Function	PIN	Name	Function
1	DGND	Signal Ground	14	A0	Encoder 0 signal input A
2	B5	Encoder 5 signal input B	15	B0	Encoder 0 signal input B
3	A6	Encoder 6 signal input A	16	A1	Encoder 1 signal input A
4	B6	Encoder 6 signal input B	17	B1	Encoder 1 signal input B
5	A7	Encoder 7 signal input A	18	A2	Encoder 2 signal input A
6	B7	Encoder 7 signal input B	19	B2	Encoder 2 signal input B
7	DICOM	Input signal common	20	DGND	Signal Ground
8	5V	5V power	21	A3	Encoder 3 signal input A
9	NC	No connect	22	B3	Encoder 3 signal input B
10	DATA+	RS-485 signal positive	23	A4	Encoder 4 signal input A
11	DATA-	RS-485 signal negative	24	B4	Encoder 4 signal input B
12	PW+	Power positive	25	A5	Encoder 5 signal input A
13	GND				Ground

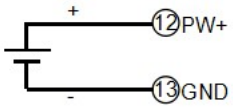




RS-485 interface

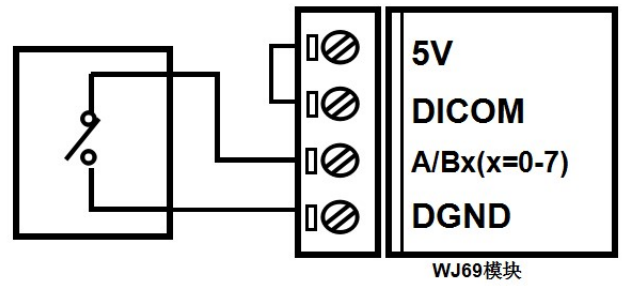
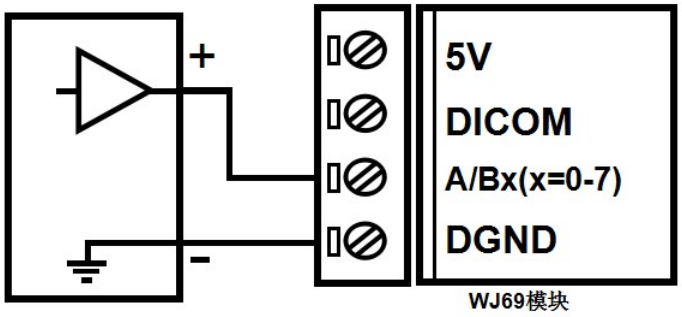


RS-232 interface

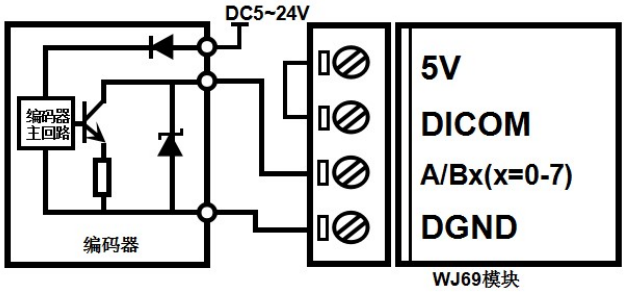
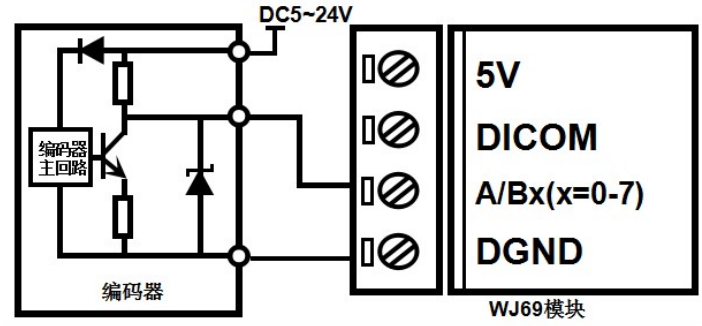
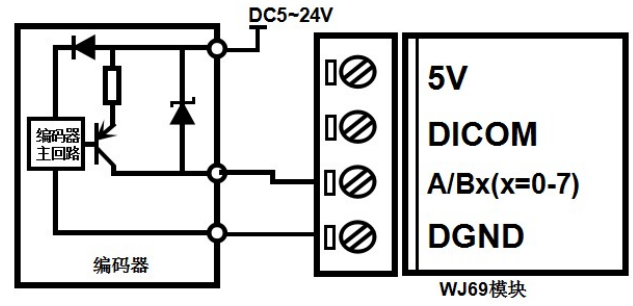
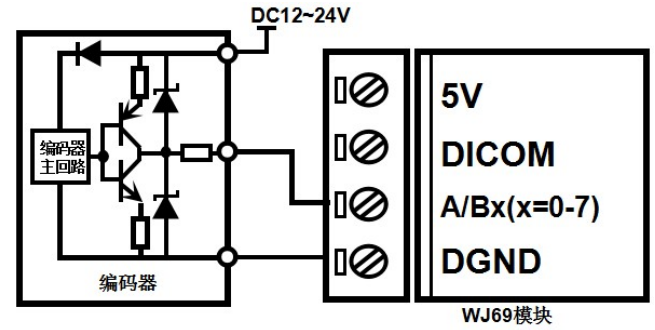


power supply

DI counting input wiring diagram

Dry contact input	Level input
	
WJ69	

Encoder signal input wiring diagram

NPN type encoder	NPN type encoder with pull-up resistor
	
Encoder main circuit	Encoder main circuit
PNP type encoder	**Push-pull encoder**
	
Encoder main circuit	Encoder main circuit

WJ69 character protocol command set:

The factory initial settings of the module are as follows:

Address code : 01

Baud rate: 9600 bps

Checksum is disable

If you use the RS-485 network, you must assign a unique address code. The address code is a hexadecimal number between 00 and FF. Since the address codes of the new modules are the same, their addresses will be the same as others. The modules are contradictory, so when you build the system, you must reconfigure each WJ69 module address. After connecting the WJ69 module power cord and RS485 communication line, you can modify the address of the WJ69 module through configuration commands. The baud rate and checksum status also need to be adjusted according to user requirements. Before modifying the baud rate and checksum status, the module must first enter the default state, otherwise it cannot be modified.

Let the module into the default state:

WJ69 module has a **INIT** switch, which is on the side of the module. Turn the **INIT** switch to the **INIT** position, and then turn on the power, the module enters the default state at this time. In this state, the module is configured as follows:

Address code 00

Baud rate 9600 bps

Checksum is disable

At this time, you can modify the baud rate, checksum status and other parameters of the WJ69 module through configuration commands. When you are not sure about the specific configuration of a certain module, you can also turn the **INIT** switch to the **INIT** position to make the module enter the default state, and then reconfigure the module.

Note: Normal using, please turn the INIT switch to the NORMAL position.

The character protocol command is composed of a series of characters, such as the first code, address ID, variable, optional checksum byte and an end character (cr) to display the command. In addition to the synchronization command with the wildcard address "**", the host only commands one WJ69 module at a time.

Command format: **(Leading Code)(Addr)(Command)[data][checksum](cr)**

(Leading code) prefix is the first letter of the command. All commands require a command prefix, such as %,$,#,@,... etc. **1 - Character**

(Addr) module address code, if not specified below, range is from 00 ~ FF (hexadecimal). **2 - Character**

(Command) displays the command code or variable value. **Variable length**

[data] some data are required by the output command **Variable length**

[checksum] Checksum in brackets shows optional parameters. This option is only required when checksum is enabled. **2-character**

(cr) A control code character used for identification, (cr) as the carriage return end character, its value is 0x0D. **1-character**

When checksum is enabled, [Checksum] is required. It takes up 2 - characters. Both commands and replies must have a checksum feature attached. Checksum is used to check all input commands to help you find host-to-module command errors and module-to-host response errors. The checksum character is placed after the command or response character and before the carriage return character.

Calculation method: two characters, hexadecimal number, is the sum of ASCII code values of all characters sent before, and then the sum of the hexadecimal number 0xFF.

Application example: Disable verification and (checksum)

User command **$002(cr)**

Module answer **!00020600 (cr)**

Enable checksum

User command **$002B6 (cr)**

Module answer! **!00020600 A9 (cr)**

'$' = 0x24 '0' = 0x30 '2' = 0x32

B6=(0x24+0x30+0x30+0x32) AND 0xFF

'**!**' = 0x21 '0' = 0x30 '2' = 0x32 '6' = 0x36

A9=(0x21+0x30+0x30+0x30+0x32+0x30+0x36+0x30+0x30) AND 0xFF

Command response:

The reply information depends on various commands. The response also consists of several characters, including the first code, variable and end identifier. There are two kinds of first codes of response signals, '!' Or '>' indicates a valid command and '?' Is invalid. By checking the response information, you can monitor whether the command is valid

Note: 1. In some cases, many commands use the same command format. Make sure that the address you use is correct in a command. If you use the wrong address and this address represents another module, the command will take effect in the other module, so an error will occur.

2. You must enter the command in uppercase letters.

3. (cr) represents the carriage return character on the keyboard. Don't write it directly, it should be the Enter key.

1. Setting encoder working mode

Description: Set the encoder working mode, 0 or 1, and the factory default is 0. After the working mode is modified, the module must be restarted to take effect.

Operating mode 0: encoder AB signal input

Working mode 1: two independent counter inputs

Note: The following command remarks (operating mode 0) indicate that the data is valid only when the encoder operating mode is 0. Note (operation mode 1) indicates that the data is valid only when the encoder operation mode is 1.

Command response: **$AA3BBBBBBBB(cr)** Set the working mode of the encoder. It takes effect after restarting.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates successful setting

Parameter description: **BBBBBBBBBB** represents the working mode of 8 encoder channels, 8 numbers, and the order is encoder 7~encoder 0,

The value is 0: working mode 0; Value is 1: operating mode 1

Application example: user command (character format) **$01311110000 (cr)**

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

Description: Set encoder 7~encoder 4 as working mode 1, and encoder 3~encoder 0 as working mode 0.

2. Read the encoder working mode

Description: Read the working mode of the encoder.

Command format: **$AA4(cr)** read the operating mode of the encoder.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! BBBBBBBB (cr)** represents the working mode of 8 encoder channels, the number of which is 8, and the order is encoder 7~encoder 0, the value is 0: working mode 0; Value is 1: operating mode 1

Application example: user command (character format) **$014(cr)**

Module response (character format) **! 11110000 (cr)**

Description: Encoder 7~Encoder 4 is operating mode 1, Encoder 3~Encoder 0 is operating mode 0

3. Read switch status command

Description: Read back the switch status of all encoder input channels from the module.

Command format: **#AA(cr)**

Parameter description: # delimiter. The hexadecimal is 23H

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: > **CCCCCCCC,DDDDDDDD (cr)** command is valid.

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

Parameter description: > delimiter. Hex is 3EH

CCCCCCCC represents the read encoder input switch status, 8 numbers, and the order is B7A7 B6A6 B5A5 B4A4

DDDDDDDD represents the read encoder input switch status, 8 numbers, and the order is B3A3 B2A2 B1A1 B0A0,

value is 0: input low level; Value is 1: input high level

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Application example: user command (character format) **#01(cr)**

Module response (character format) **>00001010,00000111(cr)**

Description: The module input switch status is **00001010**, and the sequence is B7A7 B6A6 B5A5 B4A4

A4: Low B4: High A5: Low B5: High

A6: Low B6: Low A7: Low B7: Low

The module input switch status is 00000 111, and the order is B3A3 B2A2 B1A1 B0A0

A0: high level B0: high level A1: high level B1: low level

A2: low-level B2: low-level A3: low-level B3: low-level

4. Read encoder counter data command (operation mode 0)

Description: Read the data of encoder counter, you can read all encoders or a single encoder. '+' Indicates forward rotation and '-' indicates reverse rotation.

Command format: **#AA2(cr)**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted

to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

2 indicates the command of reading encoder 0~encoder 7 counter data**.**

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!+AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA, +AAAAAAAAAA (cr)**

Command format: **# AA2N (cr)** Read channel N count value

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

2 indicates the command to read counter data.

N indicates the command to read encoder N counter data.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!+AAAAAAAAAA(cr)**

Application example 1: user command (character format) **#012(cr)**

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

Note: The count value of all encoders is forward +12345678

Application example 2: user command (character format) **#0120(cr)**

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

Note: The count value of encoder 0 is reverse -12345678.

5. Read encoder input frequency command (working mode 0)

Description: Read the frequency input by the encoder. You can read all encoders or single encoders. '+' Indicates forward rotation and '-' indicates reverse rotation.

Command format: **# AA3**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

3 means reading encoder 0~encoder 7 input frequency command.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **+ AAAAAA.AA,+AAAAAA.AA,+AAAAAA.AA,+AAAAAA.AA, +AAAAAA.AA, +AAAAAA.AA, +AAAAAA.AA,+AAAAAA.AA (cr)**

Command format: **# AA3N** read encoder N input frequency

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by **30H** and **31H** in hexadecimal.

3 means read input frequency command.

N means reading encoder N input frequency command.

(cr) End character, upper computer enter key, hexadecimal is **0DH**.

Answer format: **! +AAAAAA.AA (cr)**

Application example 1: user command (character format) **#013(cr)**

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

Note: The input frequency value of all encoders is forward rotation+1KHz.

Application example 2: user command (character format) **#0130(cr)**

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

Note: The input frequency value of encoder 0 is reverse - 1KHz.

6. Read encoder input speed command (working mode 0)

Description: Read the rotational speed input by the encoder. You can read all encoders or single encoders. '+' Indicates forward rotation and '-' indicates reverse rotation.

Command format: **#AA4**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by **30H** and **31H** in hexadecimal.

4 means reading encoder 0~ 7 input speed command.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!+AAAAA,+AAAAA,+AAAAA,+AAAAA, +AAAAA,+AAAAA,+AAAAA,+AAAAA (cr)**

Command format: **#AA4N** read encoder N input speed

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

4 indicates read input speed command.

N represents the speed command input by reading encoder N.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! +AAAAA (cr)**

Application example 1: user command (character format) **#014(cr)**

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

Note: The input speed value of all encoders is positive+1000 rpm.

Application example 2: user command (character format) **#0140(cr)**

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

Note: The input speed value of encoder 0 is reverse - 1000 rpm.

7. Modify the value command of encoder counter (working mode 0)

Description: Modify the value of the encoder counter, or set it to zero to count again.

Command format: **$AA1N+AAAAAAAAAA(cr)** Modify the count value of encoder N, where N is the encoder code and the value is 0~7. When N is set to 'M', it means that the count value of all encoders is set at the same time.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates successful setting

Application example 1: user command (character format) **$0113+0000000000(cr)**

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

Note: Set the count value of encoder 3 to 0.

Application example 2: user command (character format) **$011M+0000000000(cr)**

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

Note: Set the count value of all encoders to 0.

Application example 3: user command (character format) **$011M+0000003000(cr)**

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

Note: Set the count value of all encoders to+3000.

8. Set the number of pulses per revolution of the encoder (operating mode 0)

Description: Set the number of pulses per revolution of the encoder. Set according to the input encoder parameters. The factory default value is 1000. The encoder speed can be read only after the correct number of pulses is set.

Command format: **$AA5NAAAAA (cr)** sets the number of pulses per revolution of the encoder.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

5 Set the number of pulses per revolution command of the encoder.

N Encoder code, value 0~7.

AAAAA represents the number of pulses, such as 1000800 or 600.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates successful setting

Application example: user command (character format) **$015100300(cr)**

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

Note: Set the number of pulses per revolution of encoder 1 to 300.

9. Read the number of pulses per revolution of the encoder (operating mode 0)

Description: Read the number of pulses per revolution of all encoders.

Command format: **$AA6(cr)** reads the number of pulses per revolution of all encoders in the order of 0~7.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by **30H** and **31H** in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH

Answer format: **! AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA (cr)** represents the number of pulses per revolution from encoder 0 to encoder 7.

Application example: user command (character format) **$016(cr)**

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

Note: The number of pulses per revolution of all encoders is 1000.

10. Set whether the encoder count value is automatically saved after power failure (working mode 0)

Description: Set whether the counting value of the encoder is automatically saved after power failure. The factory default value is 1 (automatic saving).

Command format: **$AASW (cr)** sets whether the encoder's power-off is automatically saved.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

S Sets whether the encoder power off automatically saves the command.

W 0: Do not save automatically; 1: Automatically save the encoder count value when the power is off.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates successful setting

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

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

Note: Set the encoder not to save the count value, and automatically reset the count after cutting off the power.

11. Read counter data command (operation mode 1)

Description: Read the data of the counter, you can read all channels or single channel.

Command format: **#AA5(cr)**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

5 indicates the command to read channel A0~channel B7 counter data. The order of arrangement is A0, B0,~~, A7, B7.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA, AAAAAAAAAA (cr)**

Command format: **#AA5N(cr)**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

5 indicates the command to read counter data.

N indicates the command to read channel N counter data. N value: 0123456789ABCDEF, corresponding to A0~B7

(cr) End character, upper computer enter key, hexadecimal is 0DH.

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

Application example 1: user command (character format) **#015(cr)**

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

Note: The count value of all channels is 12345678.

Application example 2: user command (character format) **#015F(cr)**

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

Note: The count value of channel B7 is 12345678.

12. Read input frequency command (operation mode 1)

Description: Read the input frequency. You can read all channels or single channel.

Command format: **#AA6**

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

6 means to read channel A0~channel B7 input frequency command.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA,AAAAAA.AA (cr)**

Command format: **#AA6N** read channel N input frequency

AA module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H

and 31H in hexadecimal.

6 means read input frequency command.

N means to read channel N input frequency command. N value: 0123456789ABCDEF, corresponding to A0~B7

(cr) End character, upper computer enter key, hexadecimal is 0DH.

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

Application example 1: user command (character format) **#016(cr)**

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

Note: The input frequency value of all channels is 1KHz.

Application example 2: user command (character format) **#016E(cr)**

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

Note: The input frequency value of channel A7 is 1KHz.

13. Modify the value command of DI counter (operation mode 1)

Description: Modify the value of DI counter, or set it to zero to count again.

Command format: **$AA2N+AAAAAAAAAA(cr)** Modify the count value of counter N, N is the counter code, and the value is 0123456789ABCDEF, corresponding to A0~B7. When N is set to 'M', it means to set the count value of all channels at the same time.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

Application example 1: user command (character format) **$012F+0000000000(cr)**

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

Note: Set the count value of channel B7 to 0.

Application example 2: user command (character format) **$012M+0000000000(cr)**

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

Note: Set the count value of all channels to 0.

Application example 3: user command (character format) **$012M+0000003000(cr)**

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

Note: Set the count value of all channels to+3000.

14. Set the counting mode of DI counter (operation mode 1)

Description: Set whether the DI counter is counting the rising edge or the falling edge. The factory setting is 00000000，00000000. Default is rising edge count，the settings take effect after the module is restarted.

Command format: **$AA7AAAAAAAA,BBBBBBBB(cr)** Sets the counting method of DI counters.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates setting successfully

Parameter description: **AAAAAAAA** represents channel status, 8 numbers, and the order is B7A7 B6A6 B5A5 B4A4, **BBBBBBBB** represents channel status, 8 numbers, and the order is B3A3 B2A2 B1A1 B0A0，value is 0: the rising edge count of the channel, value is 1: the falling edge count of this channel

Application example: user command (character format) **$01711110000,00001111(cr)**

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

Note: Set the falling edge count of B7~A6 channels and the rising edge count of B5~A2 channels, Set the falling edge count of B1~A0 channels.

15. Reading the counting mode of DI counter (operation mode 1)

Description: Read whether the DI counter is a rising edge count or a falling edge count.

Command format: **$AA8(cr)** Read the counting method of DI counter.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AAAAAAAA,BBBBBBBB (cr)** indicates the counting method of DI counter.

Parameter description: **AAAAAAAA** represents channel status, 8 numbers, and the order is B7A7 B6A6 B5A5 B4A4

BBBBBBBB represents channel status, 8 numbers, and the order is B3A3 B2A2 B1A1 B0A0

value is 0: the rising edge count of the channel, value is 1: the falling edge count of this channel

Application example: user command (character format) **$018(cr)**

Module response (character format) **! 11110000,00001111 (cr)**

Note: The falling edge of channels B7~A6 is counted, the rising edge of channels B5~A2 is counted, and the falling edge of channels B1~A0 is counted.

16. Set DI filter time (operation mode 1)

Description: Set the filter time of DI. 1 means 1mS, and the factory default is 0. The photoelectric switch input is set to 0, and the mechanical switch or relay input is recommended to be set to 20~100. The settings take effect after restarting.

Command format: **$01LWNAAAAA** sets the filtering time of DI channel N. N is the counter code, the value is 0123456789ABCDEF, corresponding to A0~B7. When N is set to 'M', it means that the filtering time of all channels is set at the same time. AAAAA stands for filtering time, such as 0, 20 or 50.

Answer format: **! 01(cr)** indicates setting successfully

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

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

Note: Set the filtering time of B0 to 20, that is, 20 ms.

17. Read DI filter time (operation mode 1)

Description: Read the filtering time of all DI channels

Command format: **$01LR** reads the filtering time of all DIs in the order of A0, B0,~~, A7, B7.

Answer format: **! AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA, AAAAA** represents the filtering time of A0,B0, ~ ~ ~ ,A7,B7.

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

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

Note: The filtering time of all DI channels is 20mS.

18. Set all parameters set by the above character command to restore factory settings.

Description: The parameters set by the setting module with the above character command are restored to the factory settings, and the module will restart automatically after completion.

Command format: **$AA900(cr)** Set parameters to restore factory settings.

Parameter description: **AA** module address, value range: 00~FF (hexadecimal). The factory address is 01 and converted to hexadecimal ASCII code for each character. For example, address 01 is replaced by 30H and 31H in hexadecimal.

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **! AA(cr)** indicates that the setting is successful and the module will restart automatically.

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

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

Note: The parameters are restored to factory settings.

19. Configure WJ69 module command

Description: Set the address, baud rate and checksum status for a WJ69 module. The configuration information is stored in the non-volatile memory EEPROM.

Command format: **%AANNTTCCFF(cr)**

Parameter description: **%** delimiter.

AA module address, value range: 00~FF (hexadecimal).

NN represents the hexadecimal address of the new module, and the value NN ranges from 00 to FF.

TT Type code is represented by hexadecimal. The WJ69 product must be set to 00.

CC The baud rate is represented by hexadecimal.

Baud rate code	Baud rate
04	2400 baud
05	4800 baud
06	9600 baud
07	19200 baud
08	38400 baud
09	57600 baud
0A	115200 baud

Table 2 Baud rate code

FF 8 hexadecimal digits represents the data format and checksum. Note that bits2 to bits5 do not have to be set to zero

Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit2	Bit 1	Bit 0

Table 3 Data format, checksum code

Bit7: reserved bit, must be set to zero

Bit6: checksum status, 0: prohibited; Is 1: allowed

Bit5-bit2: No, it must be set to zero.

Bit1-bit0: data format bit. 00: Engineering Units

10: Two completion in hexadecimal

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Answer format: **!AA(cr)** command is valid.

?AA(cr) command is invalid or illegal, or the configuration jumper is not installed before changing the baud rate or checksum.

Parameter description: **!** The delimiter indicates that the command is valid.

? The delimiter indicates that the command is invalid.

AA represents the input module address

(cr) End character, upper computer enter key, hexadecimal is 0DH.

Other instructions: If you configure the module for the first time, AA=00, NN equals the new address. If the reconfiguration module changes the address, input range, and data format, AA is equal to the currently configured address, and NN is equal to the current or new address. If you want to reconfigure the module to change the baud rate or checksum state, you must install the configuration jumper to make the module enter the default state. At this time, the module address is 00H, that is, AA=00H, and NN is equal to the current or new address.
If format error or communication error or address does not exist, the module will not respond.

Application example: user command **%0011000600(cr)**
Module answer **!11(cr)**
Description: **%** delimiter.
00 means the WJ69 module original address is 00H that you want.
11 indicates that the hexadecimal address of the new module is 11H.
00 type code, WJ69 product must be set to 00.
06 indicates the baud rate 9600 baud.
00 indicates that the data format is engineering unit, and checksum is prohibited.

20. Read Configuration Status Command

Description: Read the configuration for the specified WJ69 module.
Command format: **$AA2(cr)**
Parameter description: **$** delimiter.
AA module address, value range: 00~FF (hexadecimal).
2 indicates read configuration status command
(cr) End character, upper computer enter key, hexadecimal is 0DH.
Answer format: **!AATTCCFF(cr)** command is valid.
?AA(cr) command is invalid or illegal.
Parameter description: ! delimiter.
AA represents the input module address.
TT stands for type code.
CC stands for baud rate coding. See Table 2
FF See Table 3
(cr) End character, upper computer enter key, hexadecimal is 0DH.
Other instructions: If the format error or communication error or address does not exist, the module will not respond.
Application example: user command **$302(cr)**
Module answer **!300F0600(cr)**
Description: **!** delimiter.
30 means WJ69 module address is 30H.
00 indicates input type code.
06 indicates baud rate 9600 baud.
00 indicates checksum is prohibited.

Modbus RTU communication protocol:

The factory default settings of the module are as follows:

Modbus address is 01

Baud rate 9600 bps

Data format: 10 bits. 1-bit start bit, 8-bit data bit, 1-bit stop bit. No verification.

Method to put the module into the default state:

There is an INIT switch at the side of the WJ69 module. Turn the INIT switch to the INIT position, and then turn on the power. At this time, the module enters the default state. In this state, the module reverts to the default state temporarily: the address is 01, and the baud rate is 9600. When unsure of the specific configuration of a module, the user can query the address and baud rate register 40201-4022 to get the actual address and baud rate of the module, or modify the address and baud rate as needed.

Note: Please turn the INIT switch to the NORMAL position during normal use.

Modbus RTU communication protocol is supported, and the command format is in accordance with the standard Modbus RTU communication protocol.

Function codes supported by WJ69, see the following for details:

Function code		Name	Description
01	Read Coil Status	Read coil status	address 0x starts
03	Read Holding Register	Read Holding Register	address 4x starts
05	Write Single Coil	Write Single Coil	address 0x starts
06	Write Single Register	Write Single Register	address 4x starts
15	Write Multiple Coils	Write Multiple Coils	address 0x starts
16	Write Multiple Registers	Write Multiple Registers	address 4x starts

Register address description

Registers supporting function codes 01, 05 and 15

Address 0X (PLC)	Address (PC, DCS)	Data content	Properties	Data description
00001	0	A0 counting method	Read/write	Counting mode of channels A0~B7 (The default value is 0) 0 is the rising edge count, 1 is the falling edge count The settings take effect after the module is restarted. It is normal to use the default value without modification。
00002	1	B0 counting method	Read/write	
00003	2	A1 counting method	Read/write	
00004	3	B1 counting method	Read/write	
00005	4	A2 counting method	Read/write	
00006	5	B2 counting method	Read/write	
00007	6	A3 counting method	Read/write	
00008	7	B3 counting method	Read/write	
00009	8	A4 counting method	Read/write	
00010	9	B4 counting method	Read/write	
00011	10	A5 counting method	Read/write	
00012	11	B5 counting method	Read/write	
00013	12	A6 counting method	Read/write	
00014	13	B6 counting method	Read/write	
00015	14	A7 counting method	Read/write	
00016	15	B7 counting method	Read/write	
00033	32	A0 Input switching value	Read only	Level status of encoder input point 0 indicates low level input, 1 indicates high level input
00034	33	B0 Input switching value	Read only	
00035	34	A1 Input switching value	Read only	
00036	35	B1 Input switching value	Read only	
00037	36	A2 Input switching value	Read only	
00038	37	B2 Input switching value	Read only	
00039	38	A3 Input switching value	Read only	
00040	39	B3 Input switching value	Read only	
00041	40	A4 Input switching value	Read only	
00042	41	B4 Input switching value	Read only	
00043	42	A5 Input switching value	Read only	
00044	43	B5 Input switching value	Read only	
00045	44	A6 Input switching value	Read only	
00046	45	B6 Input switching value	Read only	
00047	46	A7 Input switching value	Read only	
00048	47	B7 Input switching value	Read only	

Registers supporting function codes 03, 06 and 16

Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**Properties**	**Data description**
40001	0	Encoder 0 working mode	Read/write	Encoder operating mode, integer, 0 or 1, The factory default is 0 (it takes effect only after modification after restart）**working mode 0**： Encoder AB signal input **working mode 1:** two independent counter inputs The following register remarks **(working mode 0)** indicate that the data is valid only when the encoder operation mode is 0. Note **(working mode 1)** indicates that the data is valid only when the encoder operation mode is 1.
40002	1	Encoder 1 working mode	Read/write	
40003	2	Encoder 2 working mode	Read/write	
40004	3	Encoder 3 working mode	Read/write	
40005	4	Encoder 4 working mode	Read/write	
40006	5	Encoder 5 working mode	Read/write	
40007	6	Encoder 6 working mode	Read/write	
40008	7	Encoder 7 working mode	Read/write	
40017~40018	16~17	Encoder 0 count	Read/write	Encoder 0~7 counter **(working mode 0)** The data is a signed long integer, The storage order is CDAB. hexadecimal format, negative numbers use complement （two's complement） Positive number (0x00000000~0x7FFFFFFF), Negative number (0xFFFFFFFF~0x80000001), Clear the counter and write 0 directly to the corresponding register, You can also write other values as needed.
40019~40020	18~19	Encoder 1 count	Read/write	
40021~40022	20~21	Encoder 2 count	Read/write	
40023~40024	22~23	Encoder 3 count	Read/write	
40025~40026	24~25	Encoder 4 count	Read/write	
40027~40028	26~27	Encoder 5 count	Read/write	
40029~40030	28~29	Encoder 6 count	Read/write	
40031~40032	30~31	Encoder 7 count	Read/write	
40033~40034	32~33	Channel A0 count	Read/write	Channel A0~B7 counter **(working mode 1)** The data is an unsigned long integer, Storage order is CDAB. Hexadecimal format, (0x00000000~0xFFFFFF), the counter is cleared and 0 is written directly to the corresponding register, or other values can be written as required.
40035~40036	34~35	Channel B0 count	Read/write	
40037~40038	36~37	Channel A1 count	Read/write	
40039~40040	38~39	Channel B1 count	Read/write	
40041~40042	40~41	Channel A2 count	Read/write	
40043~40044	42~43	Channel B2 count	Read/write	
40045~40046	44~45	Channel A3 count	Read/write	
40047~40048	46~47	Channel B3 count	Read/write	
40049~40050	48~49	Channel A4 count	Read/write	
40051~40052	50~51	Channel B4 count	Read/write	
40053~40054	52~53	Channel A5 count	Read/write	
40055~40056	54~55	Channel B5 count	Read/write	

40057~40058	56~57	Channel A6 count	Read/write	
40059~40060	58~59	Channel B6 count	Read/write	
40061~40062	60~61	Channel A7 count	Read/write	
40063~40064	62~63	Channel B7 count	Read/write	

Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**Properties**	**Data description**
40068	67	Count clear registe	write	Unsigned integer, default is 0, modify this register to clear encoder counter or channel counter. After modification, the register will automatically return to 0. Write 10: set the count value of encoder 0 to 0, Write 11: set the count value of encoder 1 to 0, Write 12: set the count value of encoder 2 to 0, Write 13: set the count value of encoder 3 to 0, Write 14: set the count value of encoder 4 to 0, Write 15: set the count value of encoder 5 to 0, Write 16: set the count value of encoder 6 to 0, Write 17: set the count value of encoder 7 to 0, Write 18: set all encoder count values to 0, Write 20: set the count value of channel A0 to 0, Write 21: Set the count value of channel B0 to 0, Write 22: Set the count value of channel A1 to 0, Write 23: Set the count value of channel B1 to 0, Write 24: Set the channel A2 count value to 0, Write 25: Set the count value of channel B2 to 0, Write 26: Set the count value of channel A3 to 0, Write 27: Set the count value of channel

				B3 to 0, Write 28: Set the count value of channel A4 to 0, Write 29: Set the count value of channel B4 to 0, Write 30: set the count value of channel A5 to 0, Write 31: Set the count value of channel B5 to 0, Write 32: set the count value of channel A6 to 0, Write 33: Set the count value of channel B6 to 0, Write 34: Set the count value of channel A7 to 0, Write 35: Set the count value of channel B7 to 0, Write 36: Set the count value of all channels to 0 Writing other values is invalid.
40073	72	Encoder 0 pulse number	Read/write	encoder pulse number **(working mode 0)** Unsigned integer (factory default value is 1000), which is set according to the number of pulses per revolution of the encoder. After setting, registers 40101~40108 are the speed of the corresponding channel.
40074	73	Encoder 1 pulse number	Read/write	
40075	74	Encoder 2 pulse number	Read/write	
40076	75	Encoder 3 pulse number	Read/write	
40077	76	Encoder 4 pulse number	Read/write	
40078	77	Encoder 5 pulse number	Read/write	
40079	78	Encoder 6 pulse number	Read/write	
40080	79	Encoder 7 pulse number	Read/write	
40089	88	Restore parameters to factory settings	Read/write	Set to FF00, the parameters of all registers of the module will be restored to the factory settings, and the module will restart automatically after completion

Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**Properties**	**Data description**
40101	100	Encoder 0 speed	Read only	Encoder speed **(working mode 0)** Signed integer, positive and negative means positive and negative. The speed is converted according to the number of pulses set in registers
40102	101	Encoder 1 speed	Read only	
40103	102	Encoder 2 speed	Read only	
40104	103	Encoder 3 speed	Read only	
40105	104	Encoder 4 speed	Read only	

40106	105	Encoder 5 speed	Read only	40073~40080
40107	106	Encoder 6 speed	Read only	
40108	107	Encoder 7 speed	Read only	
40129~40130	128~129	Encoder 0 frequency	Read only	Encoder pulse frequency **(working mode 0)** The data is a 32-bit floating point number, the storage order is CDAB.
40131~40132	130~131	Encoder 1 frequency	Read only	
40133~40134	132~133	Encoder 2 frequency	Read only	
40135~40136	134~135	Encoder 3 frequency	Read only	
40137~40138	136~137	Encoder 4 frequency	Read only	
40139~40140	138~139	Encoder 5 frequency	Read only	
40141~40142	140~141	Encoder 6 frequency	Read only	
40143~40144	142~143	Encoder 7 frequency	Read only	
40145~40146	144~145	Channel A0 frequency	Read only	Pulse frequency of encoder **(working mode 1)** The data is a 32-bit floating point number, The storage order is CDAB. If the device cannot read the floating point number, it can read the register 40217~40232
40147~40148	146~147	Channel B0 frequency	Read only	
40149~40150	148~149	Channel A1 frequency	Read only	
40151~40152	150~151	Channel B1 frequency	Read only	
40153~40154	152~153	Channel A2 frequency	Read only	
40155~40156	154~155	Channel B2 frequency	Read only	
40157~40158	156~157	Channel A3 frequency	Read only	
40159~40160	158~159	Channel B3 frequency	Read only	
40161~40162	160~161	Channel A4 frequency	Read only	
40163~40164	162~163	Channel B4 frequency	Read only	
40165~40166	164~165	Channel A5 frequency	Read only	
40167~40168	166~167	Channel B5 frequency	Read only	
40169~40170	168~169	Channel A6 frequency	Read only	
40171~40172	170~171	Channel B6 frequency	Read only	
40173~40174	172~173	Channel A7 frequency	Read only	
40175~40176	174~175	Channel B7 frequency	Read only	
40181~40196	180~195	Channel A0~B7 Filtering time	Read/write	Filtering time of channels A0~B7 **(working mode 1)** Unsigned integer. Each register corresponds to the filtering time of one channel. 1 means the filtering time is 1mS, the photoelectric switch input is set to 0, and the mechanical switch or relay input is recommended to be set to 20~100. The settings take effect after restarting.
Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**Properties**	**Data description**
40201	200	Module address	Read/write	Integer, effective after restart, range

				0x0000-0x00FF
40202	201	Baud rate	Read/write	Integer, effective after restart, range 0x0004-0x000A 0x0004 = 2400 bps， 0x0005 = 4800 bps 0x0006 = 9600 bps， 0x0007 = 19200 bps 0x0008 = 38400 bps， 0x0009 = 57600 bps 0x000A = 115200bps
40211	210	Module name	Read only	High: 0x00 low: 0x69
40217~40232	216~231	Frequency of channels A0 to B7	Read only	Pulse frequency of channels A0~B7 **(working mode 1)** The data is a 16-bit unsigned integer, and each register corresponds to one channel frequency.

Table 5 Modbus Rtu Register Description

Communication example 1: If the module address is 01, send it in hexadecimal: **010300100002C5CE** to obtain the register data.

01	03	00	10	00	02	C5	CE
Module address	Read Holding Register	Register address high	Register address low	Register quantity high	Register quantity low	CRC check low	CRC check high

If the module replies: **010304CA90FFFFC476**, the data read is 0xFFFFCA90, and the decimal number is - 13680, which means that the current count value of encoder 0 is - 13680.

01	03	04	CA	90	FF	FF	C4	76
Module address	Read Holding Register	Number of bytes of data	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit	CRC check low	CRC check high

Communication example 2: If the module address is 01, send **010300200002C5C1** in hexadecimal to obtain the data of the register.

01	03	00	20	00	02	C5	C1
Module address	Read Holding Register	Register address high	Register address low	Register quantity high	Register quantity low	CRC check low	CRC check high

If the module replies: **010304CA90FFFFC476**, the data read is 0xFFFFCA90, and the decimal number is 4294953616, which means that the current count value of channel A0 is 4294953616.

01	03	04	CA	90	FF	FF	C4	76
Module address	Read Holding Register	Data bytes number	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit	CRC check low	CRC check high

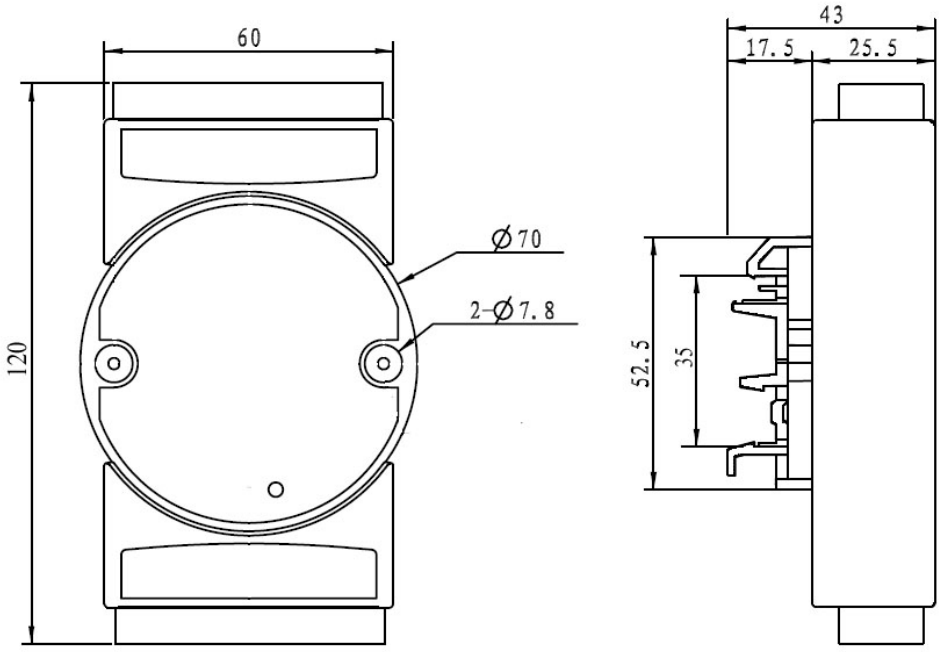
Communication example 3: If the module address is 01, send it in hexadecimal: **01060043000AF819**, that is, reset the count value of encoder 0

01	06	00	43	00	0A	F8	19
Module address	Write a single holding register	Register address high	Register address low	Data high	Data low	CRC check low	CRC check high

If the module replies: **01060043000AF819**, the setting is successful, and the count value of encoder 0 is changed to 0

01	06	00	43	00	0A	F8	19
Module address	Write a single holding register	Register address high	Register address low	Data high	Data low	CRC check low	CRC check high

Dimension: (unit: mm)



Din35 RAIL

Guarantee:

Within two years from the date of sale of this product, if the user complies with the storage, transportation and use requirements, and the product quality is lower than the technical index, it can be returned to the factory for free maintenance. In case of damage due to violation of operation regulations and requirements, the device cost and maintenance cost shall be paid.

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