1-CH pulse or 2-CH DI high speed counter, Modbus RTU module WJ150

Features：

>> Encoder decoding and converting into standard Modbus RTU protocol
>> Can be used as encoder counter or speed measurement
>> Support encoder counting, can identify forward and reverse
>> It can also be set as 2 independent DI high-speed counters
>> The count value supports automatic saving after power failure
>> DI input supports PNP and NPN input
>> Filter time can be set for relay and mechanical switch input
>> The count value can be cleared and set through the RS-485 interface
>> Wide power supply range: 8 ~ 32VDC
>> High reliability, convenient programming and easy application
>> Standard DIN35 rail installation, convenient for centralized wiring
>> User can programmatically set module address, baud rate, etc.

Figure 1 WJ150

Application:

>> Encoder pulse signal measurement
>> Flow meter pulse counting or flow measurement
>> Line product count
>> Counting the number of logistics packages
>> Proximity switch pulse signal measurement
>> The encoder signal is transmitted to the industrial computer
>> Water meter or electricity meter pulse count
>> Smart Factory and Industrial Internet of Things

Product Overview:

The WJ150 product realizes the signal acquisition between the sensor and the host, and is used to decode the encoder signal. WJ150 series products can be used in RS-485 bus industrial automation control systems, automated machine tools, industrial robots, three-coordinate positioning systems, displacement measurement, stroke measurement, angle measurement, rotational speed measurement, flow measurement, product counting, etc.

Products include signal acquisition, pulse signal capture, signal conversion and RS-485 serial communication. Each serial port can connect up to 255 WJ150 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 computer programming.

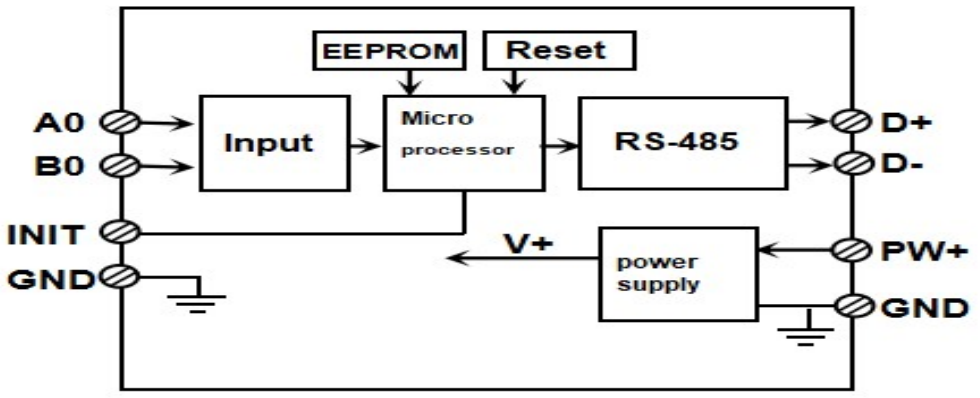


Figure 2: WJ150 Block Diagram

WJ150 series products are intelligent monitoring and control systems based on single-chip microcomputers. All configuration information such as address, baud rate, data format, checksum status, etc. set by the user are stored in the non-volatile memory EEPROM.

WJ150 series products are designed and manufactured according to industrial standards, with no isolation between signal input/output, strong anti-interference ability and high reliability. Operating temperature range -45℃～+85℃.

Function introduction:

WJ150 remote I/O module can be used to measure 1-channel encoder signal, and can also be set as 2-channel independent counter or DI state measurement.

1. Signal input

1-channel encoder signal input or 2-channel independent counter, which can be connected to dry contact and wet contact, and the input type can be set by command.

2. Communication protocol

Communication interface: 1 standard RS-485 communication interface.

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 PLC, RTU or computer monitoring systems of various brands.

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 be up to 1200 meters, which is connected by 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

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

Product Selection:

WJ150 - □

Communication Interface

485： output is RS-485 interface

part No.: WJ150 -485 means output is RS-485 interface

WJ150 general parameters:

(typical @ +25℃, Vs is 24VDC)

Input type: Encoder AB signal input, 1 channel (A0/B0).

Low level: input <1V

High level: input 3.5 ~ 30V

The frequency range is 0-50KHz

Encoder counting range -2147483647 ~ +2147483647

DI counter range 0 ~ 4294967295

Input resistance: 30KΩ

Communication: Protocol RS-485 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)

Dimensions: 106 mm x 59mm x 24mm

Footprint Function:

PIN	Name	Function	PIN	Name	Function
1	PW+	Power supply +	14	INIT	initial state settings
2	GND	Power supply −	15	GND	digital signal output ground
3	DATA+	RS-485 signal +	16	A0	Encoder 0 signal A input
4	DATA-	RS-485 signal -	17	B0	Encoder 0 signal B input

Table 1 Pin Definition

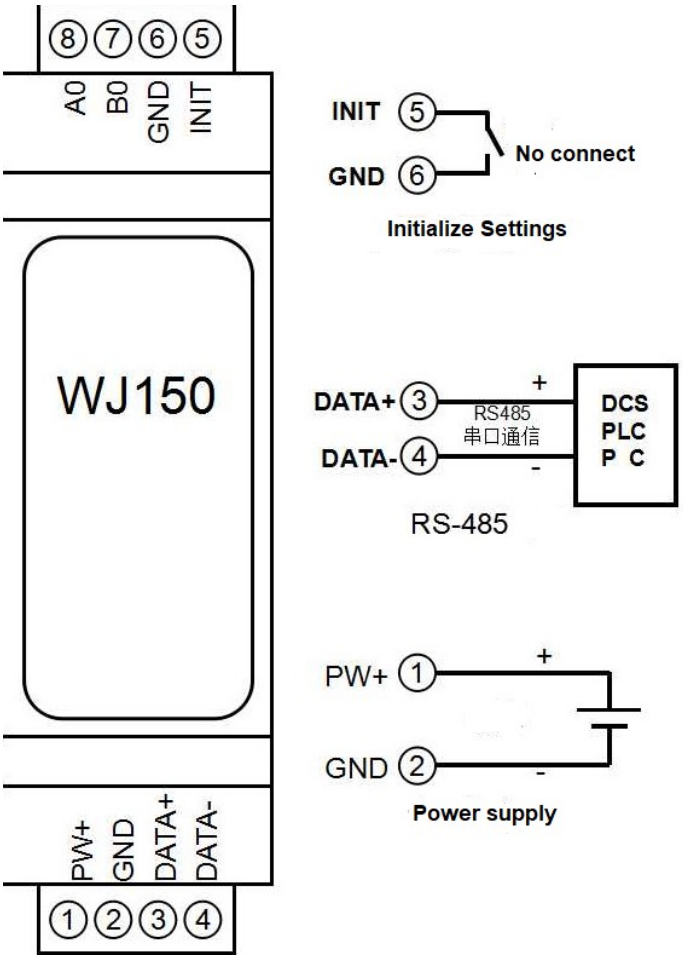
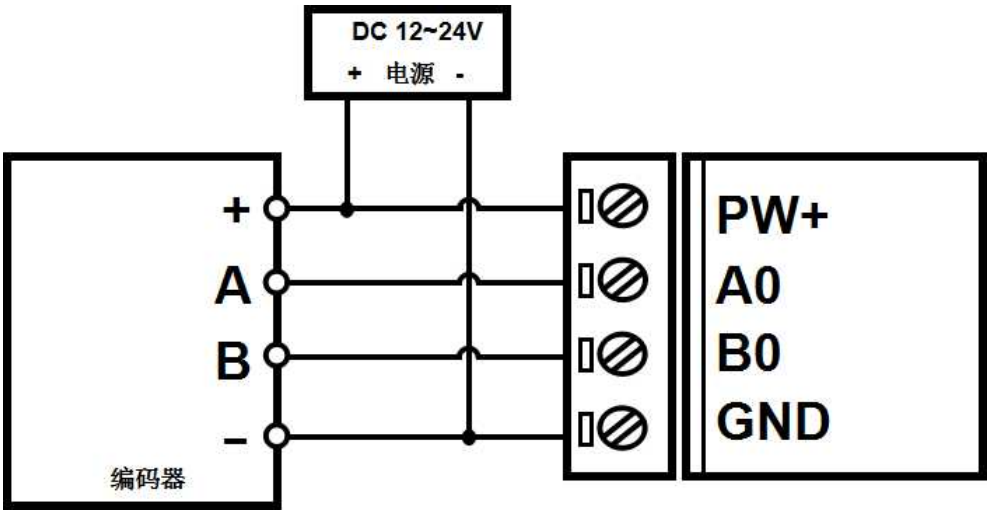


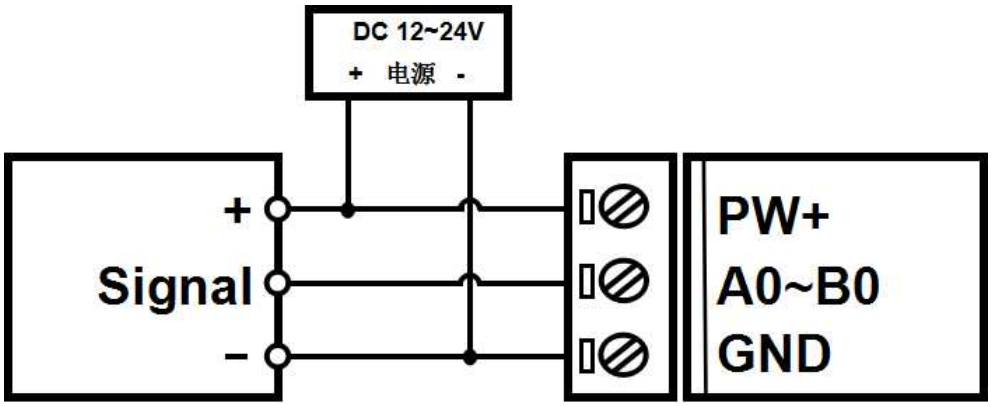
Figure 3 WJ150 wiring diagram

Encoder signal input wiring diagram (working mode 0)



Note: The factory default is to close the pull-up. If it is an NPN encoder, you need to open the internal pull-up resistor, set the 40082 register to 1, or send the character command $01Q1. Others such as NPN encoders with pull-up resistors, PNP encoders, push-pull encoders, etc. can be used directly. If you want to turn off the internal pull-up resistor, set the 40082 register to 0, or send the character command $01Q0

DI count input wiring diagram (working mode 1)



Note 1: The factory default is working mode 0, the DI count needs to be changed to working mode 1 by sending a command, method 1: send the command $0131, after receiving the reply !01, it will take effect after 10 seconds of shutdown. Method 2: The register 40001 is changed to 1. After receiving the reply, it will take effect after 10 seconds of shutdown.

Note 2: The factory default is to close the pull-up. If it is an NPN sensor, dry contact or switch input, you need to open the internal pull-up resistor, set the 40082 register to 1, or send the character command $01Q1. Others such as NPN sensors with pull-up resistors, PNP sensors, push-pull sensors, TTL level, etc. can be used directly. If you want to turn off the internal pull-up resistor, set the 40082 register to 0, or send the character command $01Q0

WJ150 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 WJ150 module power cord and RS485 communication line, you can modify the address of the WJ150 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:

WJ150 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

When you are not sure about the specific configuration of a certain module, you can also turn the **INIT** switch to the **INIT** position, then turn on the power to make the module enter the default state, and then reconfigure the module.

The character protocol command is composed of a series of characters, such as the first code, address ID, variables.

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. Commands must be entered in uppercase letters.

1. Set the encoder operating 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.

Working mode 0: encoder AB signal input

Working mode 1: two independent high-speed counter inputs

Note: The following command remark **(operating mode 0)** indicates that the data is valid only when the encoder operating mode is 0.

Note (operating mode 1) indicates that the data is valid only when the encoder operating mode is 1.

Command format: **$AA3B** sets the encoder working mode. It takes effect after restart.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

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

Parameter description: **B** represents the encoder working mode, and the value is 0: the working mode. Value is 1: operating mode 1

Example: User command (character format) **$0131**
Module response (character format) **! 01(cr)**
Note: Set the encoder to working mode 1 and two-way high-speed counter mode.

2. Read encoder operating mode

Description: Read the working mode of the encoder.
Command format: **$AA4** Read the encoder working mode
Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.
Answer format: **! B (cr)** represents the working mode of 8 encoder channels, 8 numbers, and the sequence is encoder 7 to encoder 0, Value 0: working mode 0. Value is 1: operating mode 1
Application example: User command (character format) **$014**
Module response (character format) **! 1 (cr)**
Note: encoder is working mode 1

3. Read switch status command

Description: Read back all encoder input channels the on-off status from the module.
Command format: **# AA (cr)**
Parameter description: # delimiter. Hexadecimal is 23H
AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.
Answer format: **>CC (cr)** command is valid.
? 01 (cr) command invalid or illegal operation.
Parameter Description: > Delimiter. Hexadecimal is 3EH
CC represents the read encoder input switch status, 8 numbers, and the sequence is B0A0, Value is 0: input low level; Value is 1: input high level
(cr) End character, upper computer enter key, hexadecimal is 0DH.
Example: User command (character format) **#01**
Module response (character format) **>01(cr)**
Note: The module input switch status is **01**, and the sequence is B0A0
A0: high level B0: low level

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

Description: Read the encoder counter data. "+" Represents forward rotation, and '-' represents reverse rotation.
Command format: **# AA2**
AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.
2 indicates the command to read encoder counter data.
Answer format: **!+AAAAAAAAA(cr)**
Example: User command (character format) **#012**
Module response (character format) **!+0012345678 (cr)**
Note: the encoder counting value is forward +12345678

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

Description: Read the encoder input frequency. "+" Represents forward rotation, and '-' represents reverse rotation.

Command format: **# AA3**

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

3 indicates the command to read the encoder input frequency.

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

Application example: User command (character format) **#013**

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

Note: The encoder input frequency value is forward +1KHz.

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

Description: Read the encoder speed input. "+" Represents forward rotation, and '-' represents reverse rotation.

Command format: **# AA4**

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

4 indicates reading encoder 0~encoder 7 input speed command.

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

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

Application example: User command (character format) # 014 (cr)

Module response (character format) + 01000 (cr)

Note: The input speed value of the encoder is forward+1000 revolutions.

7. Numerical command to modify encoder counter (operating mode 0)

Description: To modify the encoder counter value, you can also set it to zero and re-count.

Command format: **$AA1+AAAAAAAAAAAA** Modify the count value of the encoder.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

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

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

Example 1: User command (character format) **$011+0**

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

Note: Set the encoder count value to 0.

Example 2: User command (character format) **$011+3000**

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

Note: Set the count value of the encoder to +3000.

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

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

Command format: **$AA5AAAAA** 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, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is

converted into hexadecimal, it will be 30H and 31H.

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

AAAAA represents the number of pulses, such as 1000, 800 or 600.

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

Application example: User command (character format) **$01500300**

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

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

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

Description: Read the pulses per revolution of all encoders.

Command format: **$AA6** reads the number of pulses per revolution of the encoder.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

Answer format: **! AAAAA (cr)** indicates the number of pulses per revolution of the encoder.

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

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

Note: The number of pulses per revolution of the encoder is 1000.

10. Read counter data command (operating mode 1)

Description: The counter data can be read from all channels or from a single channel.

Command format: **# AA5**

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

5 indicates the command to read the counter data of channel A0~channel B0. Order A0, B0.

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

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

Command format: **# AA5N**

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

5 indicates the command to read counter data.

N indicates the command to read the channel N counter data. N value: 01, corresponding to A0~B0

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

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

Application Example 1: User Command (Character Format) **#015**

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

Note: The count value of all channels is 12345678.

Application Example 2: User Command (Character Format) **# 0151**

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

Note: The count value of channel B0 is 12345678.

11. Read input frequency command (operating mode 1)

Description: The input frequency can be read from all channels or from a single channel.

Command format: **# AA6**

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

6 indicates the input frequency command from channel A0 to channel B0.

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

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

Command format: **# AA6N** Read Channel N Input Frequency.

AA module address, ranging from 00 to FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

6 indicates the command to read the input frequency.

N represents the input frequency command of read channel N. N value: 01, corresponding to A0~B0

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

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

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

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

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

Application Example 2: User Command (Character Format) **#0160(cr)**

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

Note: The input frequency value of channel A0 is 1KHz.

12. Modify the numerical value command of DI counter (operating mode 1)

Description: Modify the DI counter value, or set it to zero to re-count.

Command format: **$AA2N+AAAAAAAAAA** Modify the count value of counter N. N is the counter code, and the value is 0 or 1, corresponding to A0~B0. Setting N to 'M' means that the count value of all channels is set at the same time.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

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

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

Example 1: User command (character format) **$0121+0**

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

Note: Set the count value of channel B0 to 0.

Example 2: User command (character format) **$012M+0**

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

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

Example 3: User command (character format) **$012M+3000**

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

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

13. Set the counting mode of DI counter (operating mode 1)

Description: Set whether the DI counter counts on the rising edge or the falling edge. The factory setting is 00. Default is rising edge count.The settings take effect after the module is restarted.

Command format: **$AA7BB** sets the counting method of DI counters.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

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

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

Parameter description: **BB** represents the channel status, 2 numbers, and the sequence is B0A0,

Value is 0: count the rising edge of the channel; Value is 1: the channel falling edge count

Application example: User command (character format) **$01711**

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

Note: Set the falling edge count of B0~A0 channels.

14. Reading counting mode DI counter counting mode (operating mode 1)

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

Command format: **$AA8 (cr)** reads the counting method of DI counters.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.

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

Answer format: **! BB (cr)** indicates the counting mode of DI counter.

Parameter description: **BB** represents the channel status in the order of B0A0,

Value is 0: count the rising edge of the channel; Value is 1: the channel falling edge count

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

Module response (character format) **! 11 (cr)**

Note: Count the falling edge of channel B1~A0.

15. Read DI input speed command (operating mode 1)

Description: Read the rotational speed of DI input, you can read all DI, or read single DI‘

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

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

Command format: **# 018N** read DI channel N input speed

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

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

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

Note: The input speed of all DI channels is 1000 revolutions.

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

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

Note: The input speed value of DI0 is 1000 revolutions.

16. Set the number of pulses per revolution of DI (operating mode 1)

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

Command format: **$01DWNAAAAA** Set the per revolution pulses number of DI channel N. N is the counter code, 0

or 1, corresponding to A0~B0, AAAAA represents the number of pulses, such as 1000800 or 600, etc.

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

Application example: user command (character format) **$01DW100300**

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

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

17. Read DI pulses per revolution (operating mode 1)

Description: Read the pulses per revolution of all DI channels.

Command format: **$01DR** reads the number of pulses per revolution of all DI in the order A0~B0.

Answer format: **! AAAAA, AAAAA**

Indicates the number of pulses per revolution of DI0~DI1.

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

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

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

18. Set the DI filtering time (operating mode 1)

Description: Set the filtering time of DI. Unit: mS, 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 20~100mS. The settings will take effect after restart.

Command format: **$01LWNAAAAA** Set the filtering time of DI channel N. N is the counter code, with a value of 0 or 1, corresponding to A0~B0. AAAAA represents the filtering time, such as 0, 20 or 50.

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

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

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

Note: Set the filtering time of DI1 as 20mS.

19. Read the DI filter time (operating mode 1)

Description: Read the filtering time of all DI channels.

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

Answer format: **! AAAAA, AAAAA** represents the filtering time of DI0~DI1.

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

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

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

20. Set whether the count value is automatically saved after power failure

Description: Set whether the count value is automatically saved in case of power failure. The factory default value is 1 (automatically saved in case of power failure).

Command format: **$01SW**

Parameter description: **S** sets whether to automatically save the command when the count value is powered off.

W 0: Do not save automatically, power off and reset; 1: The count value is saved automatically after power failure.

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

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

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

Note: The setting does not save the count value, and the count will be reset automatically after power failure.

21. Set DI pull-up switch

Description: Set the pull-up switch of DI. The factory default value is 0 (DI turns off pull-up function).

Command format: **$01QX**

Parameter description: **Q** sets the pull-up switch command of DI.

X 0: DI closing pull-up voltage; 1: DI is connected with pull-up voltage.

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

Application example: User command (character format) **$01Q1**

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

Note: Set DI connection pull-up voltage. When DI is NPN input, it can be set as DI pull-up voltage.

22. Command to configure WJ150 module

Description: Set the address, baud rate and parity of a WJ150 module. The configuration information is stored in the non-volatile memory EEPROM.

Command format: **% AANNTTCCFF**

Parameter description: **%** delimiter.

AA address module, ranging from 00 to FF (hexadecimal).

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

TT uses hex to represent type coding. WJ150 products must be set to 00.

CC is encoded in hexadecimal to represent the baud rate.

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 uses 8 bits in hex to represent parity.

00: No verification

10: Odd check

20: Even check

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

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

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

? The delimiter indicates that the command is invalid.

AA represents the address of the input module

(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 format is wrong or the communication is wrong or the address does not exist, the module will not respond.

Application example: user command **% 0011000600**

Module answer **! 11(cr)**

Description: **%** delimiter.
00 means that the original address of the WJ150 module you want to configure is 00H.
11 indicates that the new module's hex address is 11H.
00 type code, WJ150 products must be set to 00.
06 indicates the baud rate of 9600 baud.
00 means no verification.

23. Read configuration status command

Description: Read the configuration of a designated WJ150 module.

Command format: **$AA2**

Parameter description: **$** delimiter.
AA address module, ranging from 00 to FF (hexadecimal).
2 indicates the command to read the configuration status
(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 indicates the input module address.
TT indicates type code.
CC indicates baud rate coding. See Table 2
FF means verification
(cr) End character, upper computer enter key, hexadecimal is 0DH.

Other instructions: If the format is wrong or the communication is wrong or the address does not exist, the module will not respond.

Application example: user command **$012**
Module answer **! 01000600(cr)**

Description: **!** delimiter.
01 means the WJ150 module address is 01H.
00 indicates the input type code.
06 indicates the baud rate of 9600 baud.
00 means no verification.

24. 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 factory settings, and the module automatically restarts after completion.

Command format: **$AA900** set parameters to restore factory settings.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted into hexadecimal to ASCII code of each character. For example, if the address 01 is converted into hexadecimal, it will be 30H and 31H.
(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.

Modbus RTU communication protocol:

The factory default settings for 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 calibration.

How to make the module enter the default state:

WJ150 modules have a special pin labeled INIT. After the INIT pin is short circuited to the GND pin, turn on the power, and the module will enter the default state. In this state, the module temporarily reverts to the default state: the address is 01 and the baud rate is 9600. When the specific configuration of a module is uncertain, the user can query the address and baud rate registers 40201-40202 to obtain the actual address and baud rate of the module, or modify the address and baud rate as required.

Support Modbus RTU communication protocol, and the command format follows the standard Modbus RTU communication protocol.

WJ150 register address description

Registers supporting function codes 01, 05 and 15

Address 0X（PLC）	Address （PC，DCS）	Data	Property	Data Description
00001	0	A0 counting mode	Read/write	Counting mode of channel A0~B0 (The default value is 0) 0 is the rising edge count, 1 is the count of falling edge The settings take effect after the module is restarted. It does not need to be modified normally, just use the default value.
00002	1	B0 counting mode	Read/write	
00033	32	A0 input switching value	Read only	Level state of encoder input point 0 indicates low level input, 1 indicates high level input
00034	33	B0 input switching value	Read only	

Registers supporting function codes 03, 06 and 16

Address 4X（PLC）	Address （PC，DCS）	Data	Property	Data Description
40001	0	Encoder working mode	Read/write	Encoder working mode, integer, 0 or 1, The factory default is 0 (it takes effect only after the modification is restarted) **Working mode 0**: encoder AB signal input **Working mode 1**: two independent counter inputs The following register remark (**operating mode 0**) indicates that the data is valid only when the encoder operating mode is 0. Note (**operating mode 1**) indicates that the data is valid only when the encoder operating mode is 1.
40017~40018	16~17	Encoder count	Read/write	Encoder counter (**operating mode 0**) The data is a signed long integer in hexadecimal format. Negative numbers use two's complement, Positive (0x00000000~0x7FFFFFFF), Negative (0xFFFFFFFF~0x80000001), The counter is cleared to write 0 directly to the corresponding register, You can also write other values as needed. The lower 16 bits are in register 40017, The upper 16 bits are in register 40018
40033~40034	32~33	Channel A0 Count	Read/write	Channel A0~B7 counter (**operating mode 1**) The data is an unsigned long integer in hexadecimal format (0x00000000~0xFFFFFFFF), The lower 16 bits of channel A0 are in register 40033, The upper 16 bits of channel A0 are in register 40034, The same rule applies to other channels. Clear the counter to write 0 directly to the corresponding register, or write other values as required.
40035~40036	34~35	Channel B0 Count	Read/write	
40041	40	Channel A0 pulses number	Read/write	Pulse number of channel A0~B0 (**operating mode 1**) Unsigned integer (factory default value is
40042	41	Channel B0 pulses	Read/write	

		number		60), which is set according to the number of pulses per revolution of the input signal. After setting, registers 40109~40110 are the speed of the corresponding channel.
40068	0067	Count clear register	Write	Unsigned integer, default is 0. Modify this register to clear the encoder counter or channel counter. After modification, the register will automatically return to 0. **Write 10: set the encoder count value to 0,** Write 20: Set the channel A0 count value to 0, Write 21: Set the channel B0 count value to 0, **Write 22: Set the channel A0 and B0 count value to 0.** Writing other values is invalid.
Address 4X（PLC）	**Address （PC，DCS）**	**Data**	**Property**	**Data Description**
40073	72	encoder 0 pulses number	Read/write	Encoder pulses number **(operating 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, register 40101 is the speed of the corresponding channel.
40081	80	Count value is saved automatically	Read/write	0: Do not save automatically, power off and reset; 1: The count value is saved automatically after power failure. (The default value is 1)
40082	81	DI Pull up switch	Read/write	0: DI closing pull-up voltage; (The default value is 0) 1: DI is connected with pull-up voltage.
40089	88	Restore parameters to factory settings	Read/write	If it is set to FF00, the parameters of all registers of the module will return to the factory settings, and the module will restart automatically after completion
40101	100	Encoder speed	Read only	Speed of encoder **(operating mode 0)**

				Signed integer, positive and negative indicate positive and negative. The speed is converted according to the number of pulses set in register 40073.
40109	108	Channel A0 speed	Read only	Speed of channel **(operating mode 1)** Unsigned integer. The speed is converted according to the number of pulses set in registers 40041~40042.
40110	109	Channel B0 speed	Read only	
40129~40130	128~129	Encoder frequency	Read only	Pulse frequency of encoder **(operating mode 0)** Data is a 32-bit floating point number The lower 16 bits of floating point number are in register 40129 The upper 16 bits of floating point number are in register 40130
40145~40146	144~145	Channel A0 frequency	Read only	Pulse frequency of the channel **(operating mode 1)** Data is a 32-bit floating point number The lower 16 bits of channel A0 floating point number are in register 40145 The upper 16 bits of channel A0 floating point number are in register 40146 Channel B0 similar
40147~40148	146~147	Channel B0 frequency	Read only	
40181	180	Channel A0 filter time	Read/write	Filtering time of channel **(operating mode 1)** Unsigned integer. The unit is mS. The photoelectric switch input is set to 0, and the mechanical switch or relay input is recommended to be set to 20~100mS. The settings will take effect after restart.
40182	181	Channel B0 filter time	Read/write	
Address 4X（PLC）	**Address** （PC，DCS）	**Data**	**Property**	**Data Description**
40201	0200	Module address	Read/write	Integer, effective after restart, range:

				0x0000-0x00FF
40202	0201	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
40203	202	Parity check	Read/write	Integer, effective after restart 0: No verification 1: Odd check 2: Even check
40211	0210	Module address	Read only	High bit：0x01 Low bit：0x50

Table 5 Modbus Rtu Register Description

Communication example 1: If the module address is 01 and **010300100002C5CE** is sent in hexadecimal, the data in the register can be obtained.

01	03	00	10	00	02	C5	CE
Module address	read holding register	register address high	register address low	register number high	register number low	CRC check low	CRC check high

If the module replies: **010304CA90FFFFC476**, the data read is 0xFFFFCA90, and the decimal system is - 13680, it 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	Data bytes	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 in hexadecimal: **010300200002C5C1** 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	Registers number high	Registers number low	CRC check low	CRC check high

If the module replies: **010304CA90FFFFC476**, the data read is 0xFFFFCA90, which is replaced by 4294953616 in decimal system, it means that the current count value of channel A0 is 4294953616.

Communication example 3: If the module address is 01, send **01060043000AF819** in hexadecimal, 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

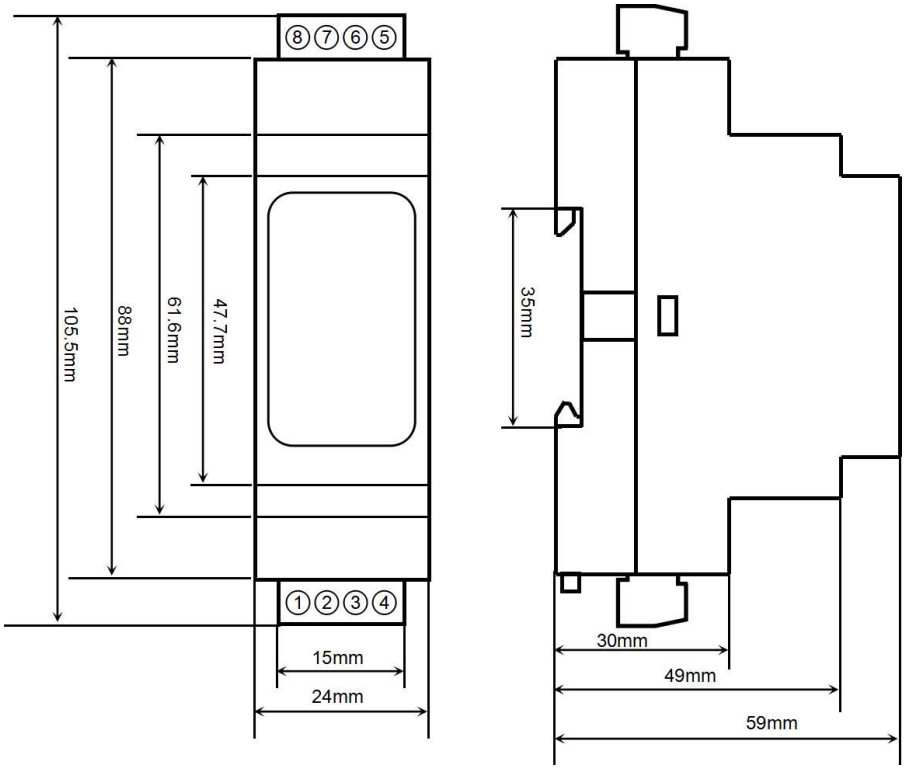
If the module replies: **01060043000AF819**, the setting is successful, and the count value of encoder 0 is modified to 0

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

common problem:

1. Counting frequency? 50K
2. Counting range? 20 billion
3. How to reset? Software clearable 0
4. Do you want to save data after power failure? Data can be saved after power cut
5. Encoder type? Incremental encoder, NPN, PNP, push-pull, basically all except differential encoder
6. Type of photoelectric switch? NPN, PNP, TTL, push-pull
7. The read count data is 0? The operating mode needs to be modified according to the sensor
   Working mode 0: encoder AB signal input (factory default)
   Working mode 1: two independent high-speed counter inputs
8. How to change to working mode 1? Method 1: Send the command $0131 and receive a reply! After 01, it will take effect 10 seconds after shutdown
   Method 2: The register 40001 is changed to 1. After receiving the reply, the shutdown takes effect 10 seconds later
9. How to turn on the pull-up resistor for NPN or dry contact input? Send character command $01Q1, or set 40082 register to 1
10. How to turn on filtering when the count value increases a lot at a time of contact? Send commands $01LW000020 and $01LW100020, or change registers 40181 and 40182 to 20
11. Normal setting steps of rain gauge, mechanical water meter, flowmeter, electricity meter, etc.:
    1: Send character command $01Q1, or set 40082 register to 1
    2: Send commands $01LW000020 and $01LW100020 or change registers 40181 and 40182 to 20
    3: Send the command $0131 and receive the reply! After 01, the shutdown takes effect 10 seconds later, or the mask register 40001 is modified to 1. After receiving the reply, the shutdown takes effect 10 seconds later
12. Modify the address baud rate and other methods: short circuit - power on - send a command - wait for reply - remove the short circuit - power on
13. Download testing software: soft.wayjun.net
14. Does it support 4-fold counting? No, please select model WJ153

Overall dimension: (unit: mm)



Guarantee:

Within two years, if the user complies with the storage, transportation and use requirements, but the product quality is lower than the technical indicators, the product can be returned to the factory for free maintenance. In case of damage caused by violation of operating regulations and requirements, the component cost and maintenance cost shall be paid.

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