Two Channels Analog Signal to RS485/232 Converter

(WJ20 series A/D Converter, defaults MODBUS RTU)

Features:

>> 2-CH analog signal acquisition, isolated RS-485/232 output

>> 16-bit AD converter, testing accuracy>0.1%

>> Can Program and calibrate modules accuracy via RS-485/232 interface

>> Signal input/output: 3000VDC Isolation

>> Wide power supply: 8~32VDC

>> High reliability, easy programming, easy installation.

>> Can program setting module address, baud rate

>> 0-5V voltage signal or 4-20mA current signal input

>> Defaults MODBUS RTU communication protocol

>> DIN35 Rail-mounted

>> Small size (79.00x70.00x25.00mm)

Typical Application:

>> Signal measurement/monitoring/control

>> RS-485 remote I / O, data acquisition

>> RS-232/485 bus industrial automation control system

>> Industrial field signal data acquisition and recording

>> Industrial field signal isolation and long-term transmission

>> Medical, industrial product development

>> 4-20mA or 0-5V signal acquisition

Figure 1   WJ20

Product Overview:

WJ20 series products realize the signal acquisition between sensor and host, to measure analog signals. WJ20 products can be applied to RS-232/485 bus industrial automation control system,4-20mA / 0-5V signal measurement, monitoring and control, and signal isolation and long-term industrial transmission and so on.

Products include power supply isolation, signal isolation, linearization, A/D conversion and RS-485 serial communication. Each serial interface can connect up to 255 pieces WJ20 Series modules, communication mode defaults MODBUS RTU protocol, the default address is 01, baud rate is 9600, data format is 10bits, 1 start bit, 8bits data bit, 1 stop bit, no check. Also supports ASCII code communication protocol, baud rate can been set by the code, with other manufacturers control module hang in the same RS-485 bus for easy programming.
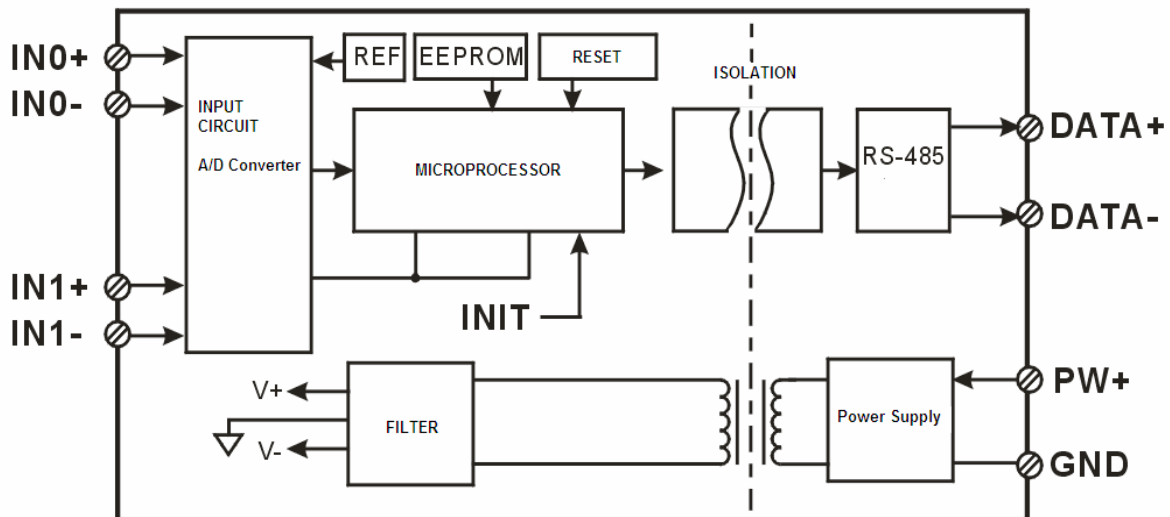

Figure 2   WJ20 Block Diagram

WJ20 series products are based on SCM's intelligent monitoring and control system, users set the calibration value, address, baud rate, data format, checksum status, and configuration information are all stored in nonvolatile memory EEPROM.

WJ20 products are according to industry standard design, isolation between signal input / output, can withstand voltage 3000VDC, high anti-interference ability and reliability. Operating temperature range is - 45 ~ +85 ℃.

Function Description:

WJ20 signal isolation acquisition module can be used to measure two channels voltage or current signal,

1. Analog signal input

16-Bit acquisition accuracy, two channels analog signal input. All products signal input range have been calibrated. In use, users also can program calibration easily.

About the specific current or voltage input range, please see product selection.

2. Communication protocol

Communication Interface: one channel standard RS-485 communication interface, or one standard RS-232 communication interface, specify when ordering.

Communication Protocols: defaults MODBUS RTU protocol, the default address is 01, baud rate is 9600, data format: 10bits, 1 start bit, 8 data bits, 1 stop bit, no check. Can be programmed using the kind of communication protocol, can be achieved with PLC, RTU of many Brands or computer monitoring system for network communication.

Data Format: 10 Bits. 1 start bit, 8 data bits, 1 stop bit.

Address: (0 to 255) and baud rate (2400,4800,9600,19200,38400,57600,115200bps) can be set, the most long-distance about communication networks is up to 1200 meters, through the twisted-pair shielded cable.

Communication interface of high anti-jamming design, ± 15KV ESD protection, communication response time is less than 100mS.

3. Anti-jamming

According to need to set the checksum. Module internal has transient suppression diodes, can inhibit a variety of surge pulse, protection module, and internal digital filter can also be well suppressed from the grid frequency interference.

Product Selection:

WJ20 - U(A)□ - □

Input Voltage or Current Signal ———┘   └——— Interface

U1：0-5V   **A1**：0-1mA   **485**：   output is RS-485 interface

U2：0-10V   **A2**：0-10mA   **232**：   output is RS-232 interface

　　　　　　　　A3：0-20mA

　　　　　　　　A4：4-20mA

Sample 1: part No.:**WJ20-A4-485**   4-20mA input signal，output is RS485 interface

Sample 2: part No.:**WJ20-U1-232**   0-5V input signal，output is RS232 interface

Sample 3: part No.:**WJ20-U2-485**   0-10V input signal，output is RS485 interface

General parameters:

(typical @ +25 ℃, Vs to 24VDC)

Input type: Input current / voltage input

Accuracy: 0.1%

Temperature drift:± 50 ppm / ℃ (± 100 ppm / ℃, maximum)

Input Resistance: 100Ω (4-20mA/0-20mA/0- 10mA current input)

　　　　　　　2KΩ (0-1mA current input)

　　　　　　　>200KΩ (0-5V/0-10V voltage input)

　　　　　　　>1MΩ (below 2.5V voltage input)

Bandwidth: -3 dB 10 Hz

AD Conversion rate: 10 SPS (Factory defaults, the user can issue commands to modify the conversion rate)

You can set the AD conversion rate 2.5 SPS, 5 SPS, 10 SPS, 20 SPS, 40 SPS, 80 SPS, 160 SPS, 320 SPS, 500 SPS, 1000 SPS command. (Channel conversion rate = AD conversion rate / Open numbers of channel)

NOTE: after Modify the conversion rate, need re-calibration module, otherwise the measurement data will be biased. You can also specify the conversion rate when ordering, we press the conversion rate you require recalibration in the factory.

Common Mode Rejection (CMR): 120 dB (1kΩ Source Imbalance @ 50/60 Hz)

Normal Mode Rejection (NMR): 60 dB (1kΩ Source Imbalance @ 50/60 Hz)

Input Protection: over-voltage protection, over-current protection

Communication: RS-485 protocol or RS-232 standard characters protocols and MODBUS RTU communication protocol

Baud Rate (2400, 4800, 9600, 19200, 38400 bps) can be selected via software

Address (0 to 255) can be selected via software

Communication Response Time: 100 ms maximum

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

Power Loss: less than 1W

Operating Temperature: - 45 ~ +80 ℃

Humidity: 10 ~ 90% (no condensation)

Storage Temperature: - 45 ~ +80 ℃

Storage Humidity: 10 ~ 95% (no condensation)

Isolation Voltage: input / output: 3KVDC, 1 minute, leakage current:1mA

Which output signal and power supply are common ground.

Shock Voltage: 3KVAC, 1.2/50us (peak)

Dimensions: 79 mm x 70mmx25mm

Footprint Function:

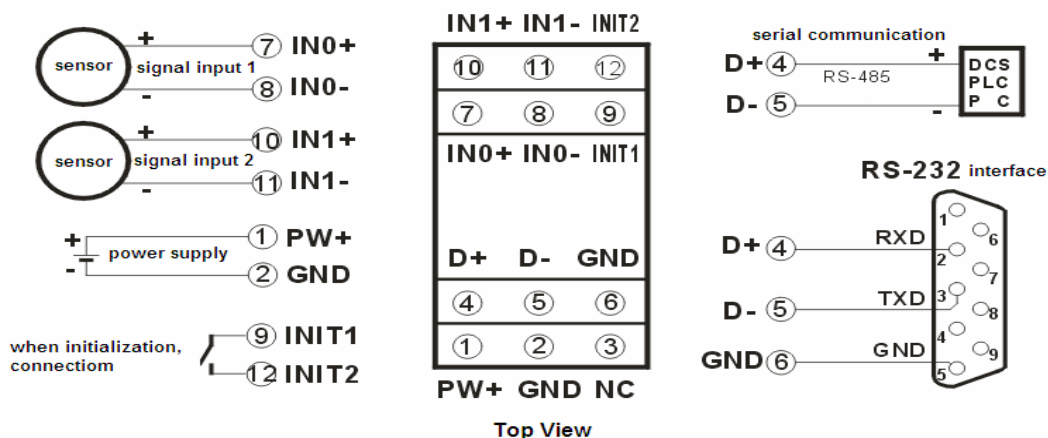| PIN	Name	Function	PIN	Name	Function
1	PW+	Power+	7	IN0+	Analog signal input 0+
2	GND	Power-	8	IN0-	Analog signal input 0-
3	INIT	Initialization state set	9	INIT1	Initial state setting
4	D+	RS-485 signal+	10	IN1+	Analog signal input 1+
5	D-	RS-485 signal-	11	IN1−	Analog signal input 1-
6	GND	Power-,Output port ground	12	INIT2	Initial state setting

Figure 3   WJ20 Wiring Diagram

MODBUS RTU communication protocol:

Module default protocol is MODBUS RTU communications protocol, the default address is 01, baud rate is 9600, data format is 10bits, 1 start bit, 8bits data bit, 1 stop bit, no check.

If you forget the module address and baud rate, you can shorten INIT1(PIN 9) to INIT2(PIN 12), and then restart the module power supply, the module restored to the default state temporarily: address 01, baud rate is 9600.

Users can query the address, baud rate and communication protocol register 40201-40203, get the module actual address, baud rate and communication protocol, also you can follow the need to modify the address, baud rate and communication protocol. Please note MODBUS communication please set register 40203 to 1, otherwise it can not MODBUS communication. When the INIT1(PIN 9) is turned off to INIT2(PIN 12), restart the module power supply, the module will re-set the actual address and baud rate to run.

Support MODBUS RTU communication protocol Function Code 03(Read Holding Registers) and Function Code 06(set a single Register), command format as standard MODBUS RTU protocol.

Example 1: If the module address is 01, hexadecimal sent: 010300000001840A, to get the register data 40001.

01	03	00	00	00	01	84	0A
Module address	Read holding register	Register address High	Register address low	Register quantity high	Register quantity low	CRC check low	CRC check high

If module reply: **010302199973BE** **read data:** 0x1999, if the range is 4-20mA or A3:0-20mA, conversion 0x1999*20mA/0x7FFF= 4mA.That indicates the input current is 4mA.

01	03	02	19	99	BE	73
Module address	Read holding register	Data Bytes	Data High	Data Lower	CRC check low	CRC check high

Example 2: The range is 4-20mA, you can also read the 4-20mA dedicated register data, register address 40021~40022, 4mA corresponds to 0x0000, 20mA corresponds to 0x7FFF. Examples as follows

If the module address is 01, hexadecimal sent: 010300140001C401, to get the register data 40021.

01	03	00	14	00	01	C4	01
Module address	Read holding register	Register address High	Register address low	Register quantity high	Register quantity low	CRC check low	CRC check high

If module reply: **010302199973BE** **read data:** 0x1999, if the range is 4-20mA, conversion 0x1999*16mA/0x7FFF= 3.2mA, adds ZERO 4mA, that indicates the input current is 7.2mA.

01	03	02	19	99	BE	73
Module address	Read holding register	Data Bytes	Data High	Data Lower	CRC check low	CRC check high

Register Description:

Address 4X （PLC）	Address （PC，DCS）	Data	Property	Data Explanation
40001	0000	Input Analog Signal	Read Only	Integer, Channel 0 Data, 0x0000-0x7FFF
40002	0001	Input Analog Signal	Read Only	Integer, Channel 1 Data, 0x0000-0x7FFF
40021	0020	4-20mA special	Read Only	Integer, Channel 0 Data 4mA=0x0000 20mA=0x7FFF
40022	0021	4-20mA special	Read Only	Integer, Channel 1 Data 4mA=0x0000 20mA=0x7FFF
40061	0060	Input Analog Signal	Read Only	Integer, Channel 0 Data The range is defined by 40161 register
40062	0061	Input Analog Signal	Read Only	Integer, Channel 1 Data The range is defined by 40162 register
40101	0100	Channel 0 calibration	Read/Write	The product is factory calibrated and can be used without calibration. If you really need to recalibrate, check the calibration section and follow the steps.
40102	0101	Channel 1 calibration	Read/Write	
40161	0160	Channel 0 range	Read/Write	Integer, 0x0001-0x7FFF, the data of the modified 0060 register is converted in this range
40162	0161	Channel 1 range	Read/Write	Integer, 0x0001-0x7FFF, the data of the modified 0061 register is converted in this range
40201	0200	Module address	Read/Write	Integer, after restarting effective, range 0x0000-0x00FF
40202	0201	Baud rate	Read/Write	Integer, after restarting effective, range 0x0004-0x000A 0x0004 = 2400 bps，0x0005 = 4800 bps 0x0006 = 9600 bps，0x0007 = 19200 bps 0x0008 = 38400 bps，0x0009 = 57600 bps 0x000A = 115200bps
40203	0202	communications protocol	Read/Write	Integer, after restarting effective, Factory default is 1, 1 means MODBUS protocol, 0 indicates ASCII communication protocol
40204	0203	communications protocol	Read/Write	Integer, Range 0x0000-0x0009, The factory default is 2, please re-calibrate the module after modification. 0x0000 = 2.5 SPS，0x0001 = 5 SPS， 0x0002 = 10 SPS，0x0003 = 20 SPS， 0x0004 = 40 SPS，0x0005 = 80 SPS，

				0x0006 = 160 SPS，0x0007 = 320 SPS，
				0x0008 = 500 SPS，0x0009 = 1000 SPS
40211	0210	Module name	Read Only	High: 0x00 Low: 0x20
40221	0220	Channel status	Read/Write	High: 0x00 Low: Channel status (0xFF)

Table 5 MODBUS RTU register description

How to set WJ20 module character communication protocol:

1. Shorting INIT1 (PIN 9) and INIT2 (PIN 12), and then restart power supply, the module restored to the default state: address 01, baud rate is 9600. Checking address and baud rate register 40201-40203, setting the module address and baud rate, then setting the communication protocol to 0, that is, ASCII code communication protocol.

2. Disconnect INIT1 (PIN 9) to INIT2 (PIN 12), and then restart power supply, the module will enter the ASCII code protocol. According to the above set address and baud rate communication can be.

WJ20 character protocol command set:

Order is by a series of characters, such as first code, address ID, variables, an optional checksum byte and a terminator **(cr)** which can show command. In addition to wildcard address "**"synchronization command, the host only commands a WJ20 module once.

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) shows the command code or variable values. **Variable length**

[Data] some output command needs data **Variable length**

[Checksum] brackets Checksum (checksum) shows an optional parameter, only the checksum is enabled, need this option. **2 - Character**

(Cr) a control code character as identify , **(cr)** as a carriage return character, its value is 0x0D. **1 - Character**

When enabled checksum (checksum), users need [Checksum]. It accounted for 2 - character. Commands and responses must be attached checksum feature. Checksum used to check all input commands to help you find the host to the module command module to the host response to errors and mistakes. Checksum characters placed in command or in response to the character after the carriage return before.

Calculated as follows: two characters, the hexadecimal number for all issued prior to the ASCII values of and, then with hexadecimal digits 0xFF phase proceeds.

Examples: Disable checksum (checksum)

command: **$002(cr)**

response: **!00020600 (cr)**

Enable checksum

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

response: **!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:

Response message depends on a variety of commands. Response also is consists of several characters, includes leading code, variables and end tags. The first code of response signal has two:**'!'** Or **'>'** indicates that a valid command and **'?'** means 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. To ensure that you use a command in the address is correct, if you use the wrong address and this address represents another module, then the command will take effect in another module, resulting in an error.

2. the command must be entered in uppercase letters.

1、 Read Measurement Data Command

Description: Returns the analog input measurement data from the module in the currently configured data format

Command Format：**#AA(cr)**

Parameters: # delimiter character. Hexadecimal 23H

AA module address, range is 00-FF(hexadecimal). Factory address is 01, converted to hexadecimal ASCII code for each character. Such as address 01 into hexadecimal are 30H and 31H.

(cr)   is the terminating character, carriage return (0Dh)

Response：   **>(data)(cr)**   command is valid.

?AA(cr)   invalid command or illegal operation.

Parameter Description: >   delimiter character. Hexadecimal is **3EH**

(data)   Returns data. The data format is in Engineering Units，Percent of FSR, Two’s complement hexadecimal, Hexadecimal is each character ASCII code .Refer to Chapter 2 Command Set.

(cr)   terminating character, carriage return (0Dh)

There is no response if the module is format error or communication error or address does not exist, the module does not respond. If you are using serial communication software, but can not enter the return key characters, please switch to hexadecimal format for communicate

Example: Commands (character format)   **#01(cr)**

(Hexadecimal format)   **2330310D**

Module response (character format)   **>+12.000+16.000 (cr)**

(Hexadecimal format)   **3E2B31322E3030302B31362E3030300D**

Description: In the address 01H module, input is (Data format is engineering units):Channel 0: +12.000mA   Channel 1: +16.000mA

Input **#01** then click the sending command or press Enter key, note do not input (cr), it is on behalf of the Enter key. On the received data line will show **>+00.000+00.000**

2、 Read Channel N Analog Input Module Data Command

  Description: Read back channel N analog input data from the module, as the current data formats

  Command Format：#**AAN(cr)**

  Parameters: # delimiter character.

  AA   module address, range is 00-FF(hexadecimal). Factory address is 01, converted to hexadecimal

        ASCII code for each character. Such as address 01 into hexadecimal are 30H and 31H.

  N   channel code 0~1, if hexadecimal: 30H~ 37H

  (cr) is the terminating character, carriage return (0Dh)

Response **: >(data)(cr)** command is valid.

          ?AA(cr) invalid command or illegal operation.

Parameters: > delimiter character

        (data) Returns channel N data. The data format is in Engineering Units，Percent of FSR, Two's complement

hexadecimal or ohms.Refer to Chapter 3 Command Set.

        (cr) terminating character, carriage return (0Dh)

        There is no response if the module is format error or communication error or address does not exist.

Example: Commands (character format) **#010(cr)**

          (Hexadecimal format) **233031300D**

        Module response (character format) **>+18.000 (cr)**

        (Hexadecimal format) **3E2B31382E3030300D**

At address 01H module, channel 0 input is +18.000mA (Data format is engineering units)

3、 Set WJ20 Module Command

  Description: Set address, input ranges, baud rate, data formats, checksum and state to a WJ20 module,

        counter data are stored in a EEPROM.

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

  Parameter :   **%**   delimiter character

          AA   module address, (range 00-FF) represents the 2-character hexadecimal. Factory address is 01,

converted to hexadecimal for each character ASCII code. Such as address 01 into hexadecimal for 30H and 31H

          NN   indicates new module hexadecimal address, value NN range is 00~FF. Convert hex to ASCII for

each character. Such as address 18 into hexadecimal for 31H and 38H.

          TT   hexadecimal indicates type code.WJ20 must been set 00

        CC   Baud Rate code (hexadecimal)

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

Table 2   Baud rate code

FF   Hexadecimal 8-bit represents the data format, checksum. Note from bits2 to bits5 not be set to zero.

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

Table 3   Data format, checksum and code

Bit7：Reserved bits (must set to 0)

Bit6：checksum states, if 0:Disabled, if 1: Enabled

Bit5-bit2：Not used(must set to 0)

Bit1-bit0：Data Format Bit

    00：Engineering Units

    01：% of FSR

    10：Twos complement hexadecimal

(cr)   terminating character, carriage return (0Dh)

Response: !AA(cr)   command is valid

    ?AA(cr) command is invalid or illegal operation, or do not set up line before changing baud rate or checksum

Parameter Description:

    !   delimiter character which indicates a valid command.

    ?   delimiter character which indicates a invalid command.

    AA   represents input module address

    (cr)   terminating character, carriage return (0Dh)

If you configure module for the first time, AA=00 and NN equal to new address. If reconfigure module changing address, input range, data formats, AA equals to present configured address, NN equals to the current or new address. If reconfigure module changing baud rate or checksum state, must install command string, make them in listening mode, module address is 00H, also AA=00H, NN=present or new address.

There is no response if the format error or communication error or address does not exist.

Example: **command**   **%0111000600(cr)**

          response   **!11(cr)**

Description: %   delimiter character

    00   indicates you want to configure the WJ20 module original address set to 01H.

    11   indicates new module hexadecimal address is 11H

    00   indicates type code, WJ20 must been set to 00

    06   indicates baud rate: 9600 baud

    00   indicates data format is Engineering Units, checksum is disabled

4、Read Set Status Command

Description: Read configuration for a specified WJ20 module.

Command Format: **$AA2(cr)**

Parameter: **$**   delimiter character

    AA   module address, (range 00-FF) represents the 2-character hexadecimal

    2   indicates read set state command

    (cr)   terminating character, carriage return (0Dh)

Response: !AATTCCFF(cr)   command is valid

    ?AA(cr)   command is invalid or illegal operation

    !   delimiter character

    AA   represents input module address

    TT   Type Code

    CC   Baud rate code, Table 2

    FF   Table 3

    (cr)   terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example: **command** **$302(cr)**

response **!300F0600(cr)**

! delimiter character

30 indicates WJ20 module address is 30H

00 indicates input type code

06 represents that baud rate is 9600 baud

00 represents that data format is Engineering Units, disable checksum

5、Offset Calibration Command

Description: Calibrates an analog input module channel N offset errors

Command Format**: $AA1N(cr)**

Parameter: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

1 represents offset calibration command

N channel code 0~1

(cr) terminating character, carriage return (0Dh)

Response: ! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

(cr) terminating character, carriage return (0Dh)

Products have been calibrated, user can use them directly. After calibrating offset command, then calibrate gain errors. During calibration, WJ20 modules need to be connected to the input of the appropriate input signal. Different input range requires a different input voltage or current. (See following Calibration information)

There is no response if the format error or communication error or address does not exist.

Example: **command** **$0110(cr)**

response **!01(cr)**

Calibrate channel 0 offset at address 01H module.

6、Gain Calibration Command

Description: Calibrates an analog input module gain errors

Command Format**: $AA0N(cr)**

Parameter: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

0 represents gain calibration command

N channel code 0~1

(cr) terminating character, carriage return (0Dh)

Response: ! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

(cr) terminating character, carriage return (0Dh)

Products have been calibrated, user can use them directly. After calibrating offset command, then calibrate gain errors. During calibration, WJ20 module needs to be connected to the input of the appropriate input signal. Different input range requires a different input voltage or current. (See following Calibration information)

There is no response if the format error or communication error or address does not exist.

Example: **command** **$0101(cr)**

Response **!01 (cr)**

Calibrate channel 1 gain errors at address 01H module.

7、 Read Module Name Command

Description: Return the module name from the specified analog input module

Command Format**:** **$AAM(cr)**

Parameter: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

M represents Read module name command

(cr) terminating character, carriage return (0Dh)

Response:!AA(Module Name)(cr) command is valid

?AA(cr) command is invalid or illegal operation

! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

(Module Name) module name WJ20

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example: command **$08M(cr)**

response **!08WJ20 (cr)**

Module is WJ20 at address 08H

8. Enable or Disable Channel Command

Description: Send enable or disable module data acquisition channel command to a specified module.

Command Format**: $AA5VV(cr)**

Parameters: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

5 enable or disable module data acquisition channel command

VV two hex:

The first represents Channel 7~4

The second represents Channel 3~0

0: Disable

1: enable

IN7	IN6	IN5	IN4	IN3	IN2	IN1	IN0
Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit2	Bit 1	Bit 0
V				V			

(cr) terminating character, carriage return (0Dh)

Response: !AA(cr) command is valid

?AA(cr) command is invalid or illegal operation

! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example: command **$08537(cr)**

response **!08 (cr)**

Description: set channel value: 0x37

3 is 0011, means enable Channel 5 and 4, disable Channel 7 and 6.

7 is 0011, means enable Channel 2, 1 and 0, disable Channel 3.

9. Read Channel Status Command

Description: Read channel status command to a specified analog input module

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Command Format: **$AA6(cr)**

Parameter: **$**   delimiter character

AA   module address, (range 00-FF) represents the 2-character hexadecimal

6 read channel status command

(cr)   terminating character, carriage return (0Dh)

Response: **!AAVV(cr)**   command is valid

?AA(cr)   command is invalid or illegal operation

!   delimiter character which indicates a valid command.

?   delimiter character which indicates a invalid command.

AA   represents input module address

VV   two hex:

The first represents Channel 7~4

The second represents Channel 3~0

0: Disable

1: enable

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example: command $186 (cr)

response   ! 18FF (cr)

Description: The current Channel status value is 0xFF.

0xFF is 1111, 1111, means all channels are enabled at address 18H.

10、Set Communication Protocol Command.

Description: Set the module communication protocol to characters protocol or MODBUS RTU protocol.

Command Format**: $AAPV(cr)**

Parameter: **$**   delimiter character

AA   module address, (range 00-FF) represents the 2-character hexadecimal

P   set communication protocol command

V   protocol code, 0 or 1

0：characters protocol

1：MODBUS RTU protocol

(cr)   terminating character, carriage return (0Dh)

Response: **!AA(cr)**   command is valid

?AA(cr)   command is invalid or illegal operation

!   delimiter character which indicates a valid command.

?   delimiter character which indicates a invalid command.

AA   represents input module address

(cr)   terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Set command protocol must be effective by default.

Example 1:   command $00P1(cr)

response   !00 (cr)

Set protocol command to MODBUS RTU

Example 2:   command $00P0(cr)

response   !00 (cr)

Set protocol command to characters protocol

11. Set module AD conversion rate

Description: Set the module AD conversion. Channel conversion rate = AD conversion rate / Open numbers of channel The slower sampling rate, the more accurate data collection. The user can send commands to modify the conversion rate, the factory default is 80 SPS.

NOTE: after Modify the conversion rate, need re-calibration module, otherwise the measurement data will be biased. You can also specify the conversion rate when ordering, we press the conversion rate you require recalibration in the factory.

Command Format: **$AA3R(cr)**

Parameter: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

3 represents setting conversion rate command

R conversion rate code (0~9)

Code R	0	1	2	3	4	5	6	7	8	9
conversion rate	2.5 SPS	5 SPS	10 SPS	20 SPS	40 SPS	80 SPS	160 SPS	320 SPS	500 SPS	1000 SPS

(cr) terminating character, carriage return (0Dh)

Response: !AA(cr) command is valid

?AA(cr) command is invalid or illegal operation

! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example 1: **command** **$0036(cr)**

response **!00 (cr)**

set module AD conversion rate for 160SPS

Example 2: **command** **$0035(cr)**

response **!00 (cr)**

set module AD conversion rate for 80SPS

12. Read module AD conversion rate

Description: Read the module AD conversion. Channel conversion rate = AD conversion rate / Open numbers of channel. The slower sampling rate, the more accurate data collection.

Command Format: **$AA4(cr)**

Parameter: **$** delimiter character

AA module address, (range 00-FF) represents the 2-character hexadecimal

4 represents setting conversion rate command

(cr) terminating character, carriage return (0Dh)

Response: !AAR(cr) command is valid

?AA(cr) command is invalid or illegal operation

! delimiter character which indicates a valid command.

? delimiter character which indicates a invalid command.

AA represents input module address

R conversion rate code (0~9)

Code R	0	1	2	3	4	5	6	7	8	9
conversion rate	2.5 SPS	5 SPS	10 SPS	20 SPS	40 SPS	80 SPS	160 SPS	320 SPS	500 SPS	1000 SPS

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example 1: **command** **$004(cr)**

response **!006 (cr)**

Current module AD conversion rate for 160SPS

Example 2: **command** **$004(cr)**

response **!005 (cr)**

Current module AD conversion rate for 80SPS

Input Ranges& Data Formats

WJ20 uses three data formats: 00：Engineering Units

01：% of FSR

10：Twos complement hexadecimal

Note: If choose MODBUS RTU, only one data format: Twos complement hexadecimal

Input Range	Data Format	+F.S	ZERO	-F.S	Displayed Resolution
A1：0-1mA	Engineering Units	+1.0000	±0.0000	-1.0000	0.1uA
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB
A2：0-10mA	Engineering Units	+10.000	±00.000	-10.000	1uA
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB
A3：0-20mA **A4：4-20mA**	Engineering Units	+20.000	±00.000	-20.000	1uA
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB
U1：0-5V	Engineering Units	+5.0000	±0.0000	-5.0000	100uV
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB
U2：0-10V	Engineering Units	+10.000	±00.000	-10.000	1mV
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB
A8：用户自定义 **U8：用户自定义**	Engineering Units	+100.00	±000.00	-100.00	0.01%
	% of FSR	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFF	000000	8000	1LSB

Example:

1.   Input Range is A4:4-20mA, Input is 4mA:

	Command	**#010(cr)**
Engineering Units	Response	**>+04.000(cr)**
Percent of FSR	Response	**>+020.00(cr)**
Twos complement	Response	**>1999(cr)**

2. Input Range is U1:0-5V, Input is 3V

	Command	**#010(cr)**
Engineering Units	Response	**>+3.0000(cr)**
Percent of FSR	Response	**>+060.00(cr)**
Twos complement	Response	**>4CCC(cr)**

Module Calibration:

We have calibrated the module, the user can use directly.

You can also use the product calibration function to re-calibrate the module. During calibration, the module need to been entered the appropriate signal, different input range needs different input signals.

In order to improve calibration accuracy, it is recommended to calibrate using the following equipment:

1. A stable output, low noise DC voltage / current signal source
2. A five and a half or more high-precision voltage / current measuring instruments to monitor the accuracy of the input signal

Calibration:

1. According to the module input range, connects to the corresponding input signal.

   Which WJ20 module zero calibration is at input 0,full scale calibration is at the input full-scale 100% . For example, input signal is **4-20mA**, when calibrate zero, input **0mA**, when full-scale calibration, input **20mA**.

   input signal is **0-5V**, when calibrate zero, input **0V**, when the full-scale calibration, input **5V**.

2. To WJ20 module input zero signal, usually is **0mA** or **0V**.
3. Until the signal stabilized, MODBUS protocol modification register 40101 (channel 0) or register 40102 (channel 1) is 0xFF00, the module will be zero calibration, or in the character protocol to the WJ20 module to send offset calibration **$ AA1N** command (N is on behalf of the current calibration channel code).
4. To WJ20 module input 100% of full scale current or voltage signal.
5. Until the signal is stable, MODBUS protocol modification register 40101 (channel 0) or register 40102 (channel 1) is 0xFFFF, the module will be full-scale calibration, or under the character protocol to the WJ20 module to send gain calibration **$ AA0N** command (N is on behalf of the current calibration channel code).Finished

Size(unit:mm)   DIN35 Rail Mounted
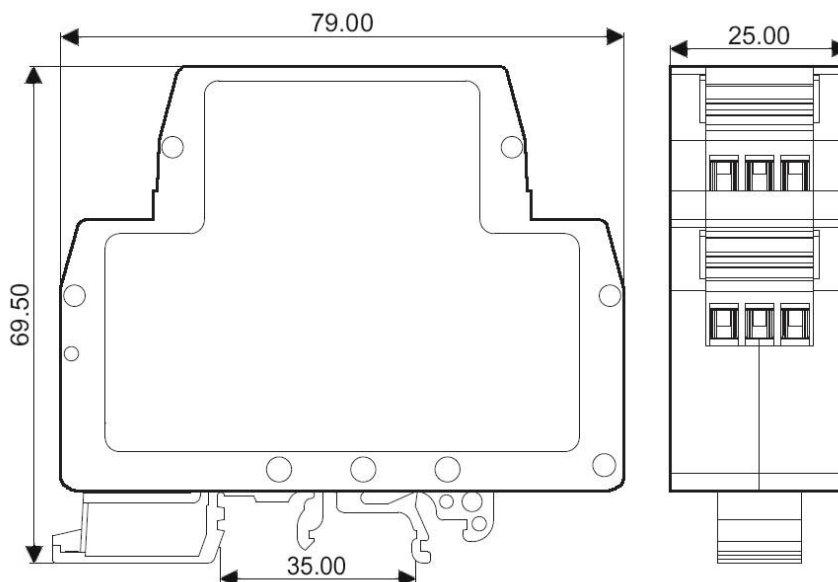
Note:

1. Before using, according to packing lists, and product labels, check the quantity, models and specifications

2. When measure the signal directly, please set the terminal tighten

3. There are no damaged insulation, conductive dust and corrosive fumes of metal in the environment

4. Installation pitch ≥10mm

5. We have adjusted well, do not adjust arbitrarily

6. Two years warranty. But if clients damage products by themselves or tear off any labels on the product, we can not exchange

7. Products can not been used in strong magnetic field

8. Internal no anti-lightning circuit

9. Specifications subject to change without notice

Warranty

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

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