8-way NTC thermistor temperature conversion to RS-485/232, data acquisition module WJ226

Product features:

- Eight channel NTC temperature acquisition, isolated conversion to RS-485/232 output
- Can be quickly customized and linearized according to the NTC scale table
- Supports various NTC sensors such as 5K/10K/20K/100K
- Using a 12 bit AD converter, the measurement accuracy is better than 0.1%
- Isolation withstand voltage between signal input/output 1000VDC
- Wide power supply range: 8~32VDC
- High reliability, easy programming, and easy application
- Standard DIN35 rail installation, convenient for centralized wiring
- Users can program module addresses, baud rates, etc
- Supports Modbus RTU communication protocol and automatic recognition protocol
- Industrial flame retardant shell, RS485 port surge protection

diagram 1 WJ226 module appearance diagram

Typical applications:

- NTC temperature signal measurement
- RS-485 remote I/O, data acquisition
- Intelligent building control, security engineering and other application systems
- RS-232/485 bus industrial automation control system
- Industrial site signal isolation and long-distance transmission
- Equipment operation monitoring
- Measurement of sensor signals
- Acquisition and recording of industrial field data
- Development of medical and industrial control products
- Thermistor signal acquisition

Product Overview:

The WJ226 product realizes signal acquisition between sensors and hosts, used to detect NTC thermistor temperature signals. The WJ226 series products can be applied in industrial automation control systems with RS-232/485 bus, NTC thermistor temperature signal measurement, industrial field signal isolation, and long-distance transmission, etc.

The product includes power isolation, signal isolation, linearization, A/D conversion, and RS-485 serial communication. Each serial port can connect up to 255 WJ226 series modules, and the communication method adopts ASCII code communication protocol or MODBUS RTU communication protocol. The baud rate can be set by code and can be hung on the same RS-485 bus as control modules from other manufacturers, making it easy for computer programming.

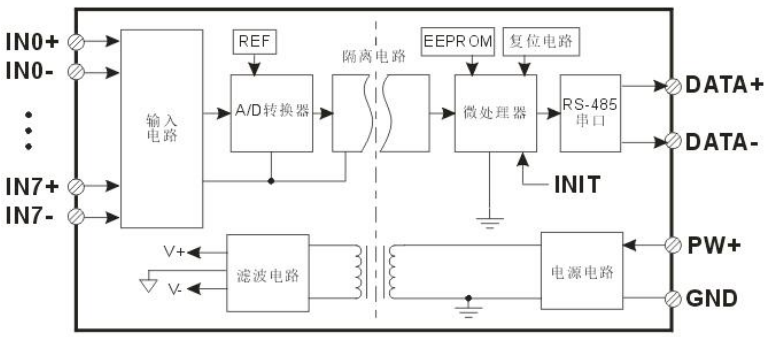


Figure 2 Internal Block Diagram of WJ226 Module

The WJ226 series products are intelligent monitoring and control systems based on microcontrollers. All user set calibration values, addresses, baud rates, data formats, parity checks, and other configuration information are stored in non-volatile memory EEPROM.

The WJ226 series products are designed and manufactured according to industrial standards, with isolation between signal inputs/outputs, capable of withstanding 1000VDC isolation voltage, strong anti-interference ability, and high reliability. The working temperature range is -40 ℃ to+85 ℃.

Function Introduction:

The WJ226 signal isolation acquisition module can be used to measure eight NTC thermistor signals.

1、 Analog signal input

12 bit acquisition accuracy, 8-channel NTC thermistor signal input. All signal input ranges have been calibrated before the product leaves the factory. Users do not need to calibrate.

2、 Communication Protocol

Communication interface: 1 standard RS-485 communication interface or 1 standard RS-232 communication interface, please 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 communication protocols and can achieve network communication with various brands of PLCs, RTUs, or computer monitoring systems.

Data format: 10 digits. 1 start bit, 8 data bits, and 1 stop bit.

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

High anti-interference design of communication interface, ± 15KV ESD protection, communication response time less than 100mS.

3、 anti-interference

Checksums can be set as needed. There is a transient suppression diode inside the module, which can effectively suppress various surge pulses, protect the module, and the internal digital filter can also effectively suppress power frequency interference from the power grid.

Product selection:

WJ226 - Z□ - T□ - □

Input type: NTC	Temperature range: T	communication interface
NTC1K	**T1:** -20-100℃	**232**: Output as RS-232 interface
NTC5K	**T2:** 0-100℃	**485**: Output as RS-485 interface
NTC10K	**T3:** 0-150℃	
NTC20K	**T4:** 0-200℃	
NTC50K	**T5:** 0-400℃	
NTC100K	**Tu:** User defined	
Other NTC		

Selection Example 1: Model: **WJ226-NTC10K-T1-485** indicates Input: NTC10K, Temperature Range: -20~100 ℃, Output: RS-485

Selection example 2: Model: **WJ226-NTC20K-T4-485** indicates input: NTC20K, temperature range: 0~200 ℃, output is RS-485

Selection example 3: Model: **WJ226-NTC3K-Tu-232** indicates input: NTC3K, temperature range: 0~50 ℃, output is RS-232

WJ226 General Parameters:

(Typical @+25 ℃, Vs is 24VDC)

Input type: NTC thermistor input

Accuracy: 0.1%

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

Bandwidth: -3 dB 10 Hz

Conversion rate: 5 Sps (factory default value, users can modify the conversion rate by issuing commands.)

You can set the AD conversion rate to 2.5 SPS, 5 SPS, 10 SPS, and 20 SPS by sending commands. (Channel conversion rate=AD conversion rate/number of open channels)

Note: Please recalibrate the **module after modifying** the **conversion rate, otherwise** the **measured data may have deviations. You can also specify the conversion rate when placing an order, and we will recalibrate the product according to the conversion rate you require when it leaves the factory.**

Common mode rejection (CMR): 120 dB (1k Ω Source Imbalance @ 50/60 Hz)

Normal mode suppression (NMR): 60 dB (1k Ω Source Imbalance @ 50/60 Hz)

Input protection: overvoltage protection, overcurrent protection

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

Baud rates (2400, 4800, 9600, 19200, 38400, 57600, 115200bps) can be selected by software

The address (0-255) can be selected by software

Communication response time: 100 ms maximum

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

Power consumption: less than 1W

Working temperature: -40~+85 ℃

Working humidity: 10~90% (no condensation)

Storage temperature: -40~+85 ℃

Storage humidity: 10~95% (no condensation)

Isolation withstand voltage: 1KVDC between input/output, 1 minute, leakage current 1mA

The RS-232/RS-485 output and power supply are grounded together.

Surge resistant voltage: 3KVAC, 1.2/50us (peak)

Dimensions: 120mm x 70mm x 43mm

Pin definition:

Pin	name	Description	Pin	name	Description
one	IN5+	Channel 5 thermistor input positive terminal	**eleven**	IN0-	Channel 0 thermistor input negative terminal
two	IN5-	Channel 5 thermistor input negative terminal	**twelve**	IN0+	Channel 0 thermistor input positive terminal
three	IN6+	Channel 6 thermistor input positive terminal	**thirteen**	IN1-	Channel 1 thermistor input negative terminal
four	IN6-	Channel 6 thermistor input negative terminal	**fourteen**	IN1+	Channel 1 thermistor input positive terminal
five	IN7+	Channel 7 thermistor input positive terminal	**fifteen**	IN2-	Channel 2 thermistor input negative terminal
six	IN7-	Channel 7 thermistor input negative terminal	**sixteen**	IN2+	Channel 2 thermistor input positive terminal
seven	DATA+	Positive end of RS-485/232 signal	**seventeen**	IN3-	Channel 3 thermistor input negative terminal
eight	DATA-	Negative terminal of RS-485/232 signal	**eighteen**	IN3+	Channel 3 thermistor input positive terminal
nine	PW+	Positive end of power supply	**nineteen**	IN4-	Channel 4 thermistor input negative terminal
ten	GND	Negative terminal of power supply, digital signal output ground	**twenty**	IN4+	Channel 4 thermistor input positive terminal

Table 1 Pin Definition

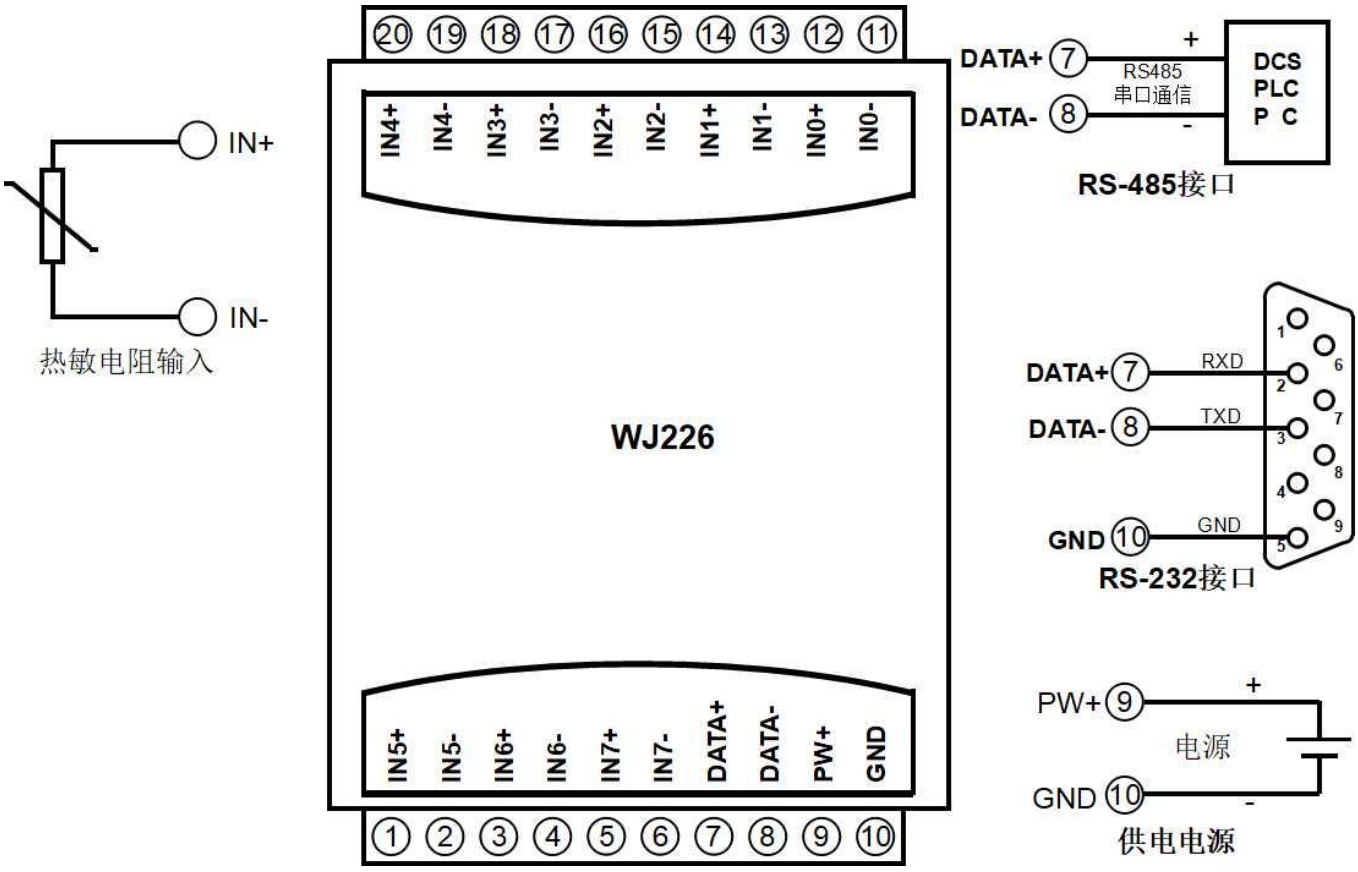


Figure 3 Wiring diagram of WJ226 module

WJ226 Character Protocol Command Set:

The factory initial settings of the module are as follows:

The address code is 01

Baud rate 9600 bps

No verification

If using an RS-485 network, a unique address code must be assigned, with a hexadecimal value between 00 and FF. Since the address codes of new modules are the same, their addresses will conflict with those of other modules. Therefore, when building the system, you must reconfigure the addresses of each WJ226 module. After connecting the power line and RS485 communication line of the WJ226 module, the address of the WJ226 module can be modified through configuration commands. The baud rate and parity check also need to be adjusted according to the user's requirements.

Method to put the module into default state:

There is an Initiat switch located on the side of the WJ226 module. Turn the Initiat switch to the Initiat position, then turn on the power, and the module will enter the default state. In this state, the configuration of the module is as follows:

The address code is 00

Baud rate 9600 bps

No verification

When unsure of the specific configuration of a module, you can also turn the Initiat switch to the Initiat position, then turn on the power to put the module into default mode, and then reconfigure the module.

The character protocol command consists of a series of characters, such as the prefix, address ID, and variables.

Note: In some cases, many commands use the same command format. To ensure that the address you are using is correct in a command, if you use the wrong address that represents another module, the command will take effect in that module, resulting in an error.

2. Commands must be entered in uppercase letters.

1. Read measurement data command

Explanation: Read back the temperature values of all channel NTC from the module.

Command format: **# 01**

Parameter description: # delimiter. Hexadecimal is 23H

01 module address, with a value range of 00 to FF (hexadecimal). The factory address is 01, which is converted to hexadecimal as the ASCII code for each character. If address 01 is replaced with hexadecimal, it will be 30H and 31H

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

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

Parameter description:>delimiter. Hexadecimal is 3EH

(data) represents the retrieved data. Users can issue commands to modify the zero and full values of the data as needed, and the modified data will be converted based on the new zero and full values.

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

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

If a channel has been closed, the read data will be displayed as space characters.

If the serial communication software you are using cannot input the enter key character, please switch to hexadecimal format for communication.

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

Module response (character format)**>+012.00+016**.00+16.000+016.00+016.00+016.00+016.00+016.00+016.00+016.00**+018.16 (cr)**

Explanation: The input for address 01H module is (data format is engineering unit):

Channel 0:+12 degrees Channel 1:+16 degrees Channel 2:+16 degrees Channel 3:+16 degrees

Channel 4:+16 degrees Channel 5:+16 degrees Channel 6:+16 degrees Channel 7:+18.16 degrees

Enter **# 01** and click send command**.**

On the received data line, it will display**>+0.0000+0.0000+0.0000+0.0000+0.0000**+0.**0000**+0.0000**+0.0000+0.0000+0.0000**

2. Read channel N analog input module data command

Explanation: Retrieve the temperature value of NTC for channel N from the module.

Command format: **# 010**

Parameter description: # delimiter.

01 module address, with a value range of 00 to FF (hexadecimal). The factory address is 01, which is converted to hexadecimal as the ASCII code for each character. If address 01 is replaced with hexadecimal, it will be 30H and 31H.

Channel code 0-7, hexadecimal 30H~37H

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

? The **AA (cr)** command is invalid or an illegal operation or channel is closed.

Parameter description:>delimiter.

(data) represents the read back data of channel N. Users can issue commands to modify the zero and full values of the data as needed, and the modified data will be converted based on the new zero and full values.

(cr) End symbol, enter key on the upper computer (0DH).

Other instructions: If there is a syntax error, communication error, or if the address does not exist, the module will not

respond.

Application example: User command (character format) **# 010**

Module response (character format)**>-018.00 (cr)**

Explanation: The input for channel 0 on address 01H module is -18 degrees

3. Configure WJ226 module command

Explanation: Set the address, baud rate, and parity for a WJ226 module. The configuration information is stored in non-volatile memory EEPROM.

Command format:**% AANNTTCCFF**

Parameter description:**%** delimiter.

AA module address, with a value range of 00 to FF (hexadecimal).

NN represents the new module hexadecimal address, with values ranging from 00 to FF.

TT uses hexadecimal to represent type encoding. The WJ226 product must be set to 00.

CC uses hexadecimal to represent baud rate encoding.

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

Table 2 Baud rate codes

FF uses 8 bits in hexadecimal to represent parity check.

00: No verification

10: Odd verification

20: Even verification

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

? The **AA (cr)** command is invalid or an illegal operation, or a 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 symbol, upper computer enter key, hexadecimal is 0DH.

Other instructions: If you are configuring the module for the first time, AA=00, NN equals the new address.

If the format is incorrect, the communication is incorrect, or the address does not exist, the module will not respond.

Application example: User command**% 0011000600**

Module response**! 11(cr)**

Explanation:**%** delimiter.

00 means that the original address of the WJ226 module you want to configure is 00H.

11 indicates that the new module's hexadecimal address is 11H.

00 type code, WJ226 product must be set to 00.

06 represents a baud rate of 9600 baud.

00 indicates no verification.

4. Read configuration status command

Explanation: Read configuration for a specified WJ226 module.

Command format: **$012**

Parameter description: **$**delimiter.

01 module address, with a value range of 00 to FF (hexadecimal).

2 represents the command to read the configuration status

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

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

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

Parameter description:**!** Boundary symbol.

AA represents the input module address.

TT stands for type code.

CC stands for baud rate encoding. See Table 2

FF is shown in Table 3

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

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

Application example: User command **$012**

Module response**! 01000600(cr)**

Explanation:**!** Boundary symbol.

01 indicates that the WJ226 module address is 01H.

00 default value.

06 represents a baud rate of 9600 baud.

00 indicates that checksum is prohibited.

5. Set module AD conversion rate

Description: Set the AD conversion rate of the module. Among them, channel conversion rate=AD conversion rate/number of opened channels. The slower the sampling rate, the more accurate the data collected. Users can adjust it according to their needs. The default conversion rate at the factory is 10SPS.

Note: Please recalibrate the **module after modifying** the **conversion rate, otherwise** the **measured data may have deviations. You can also specify the conversion rate when placing an order, and we will recalibrate the product according to the conversion rate you require when it leaves the factory.**

Command format: **$AA3R**

Parameter description: **$**delimiter.

AA module address, with a value range of 00 to FF (hexadecimal).

3 represents the command to set conversion rate

R conversion rate code, which can range from 0 to 3

Code R	0	one	two	three						
Conversion rate	2.5 SPS	5 SPS	10 SPS	20 SPS						

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

? Invalid or illegal operation of **AA (cr)** command

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 symbol, upper computer enter key, hexadecimal is 0DH.

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

Application example 1: User command **$0032**

Module response**! 00 (cr)**

Explanation: Set the AD conversion rate to 10SPS.

Application example 2: User command **$0033**

Module response**! 00 (cr)**

Explanation: Set the AD conversion rate to 20SPS.

6. Read module AD conversion rate

Explanation: Read the AD conversion rate of the module. Among them, channel conversion rate=AD conversion rate/number of opened channels. The slower the sampling rate, the more accurate the data collected.

Command format: **$AA4**

Parameter description: **$**delimiter.

AA module address, with a value range of 00 to FF (hexadecimal).

4 represents the read conversion rate command

Response syntax:**!** The **AAR (cr)** command is valid.

? Invalid or illegal operation of **AA (cr)** command

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

? The delimiter indicates that the command is invalid.

AA represents the input module address.

R conversion rate code, which can range from 0 to 3

Code R	0	one	two	three						
Conversion rate	2.5 SPS	5 SPS	10 SPS	20 SPS						

(cr) End symbol, enter key on the upper computer (0DH).

Other instructions: If there is a syntax error, communication error, or if the address does not exist, the module will not respond.

Application example 1: User command **$004**

Module response**! 002 (cr)**

Explanation: The current AD conversion rate is 10SPS.

Application Example 2: User Command **$004**

Module response**! 003 (cr)**

Explanation: The current AD conversion rate is 20SPS.

7. Reset all parameters set by the above character command to factory settings.

Explanation: The parameters set by the module using the above character commands are restored to factory settings.

Command format: **$AA900** Set parameters to factory settings.

Parameter description: **AA** module address, value range 00~FF (hexadecimal). The factory address is 01, which is converted to hexadecimal as the ASCII code for each character. If address 01 is replaced with hexadecimal, it will be 30H and 31H.

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

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

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

Explanation: Parameters are reset to factory settings.

Modbus RTU communication protocol:

The factory initial settings of the module are as follows:

The Modbus address is 01

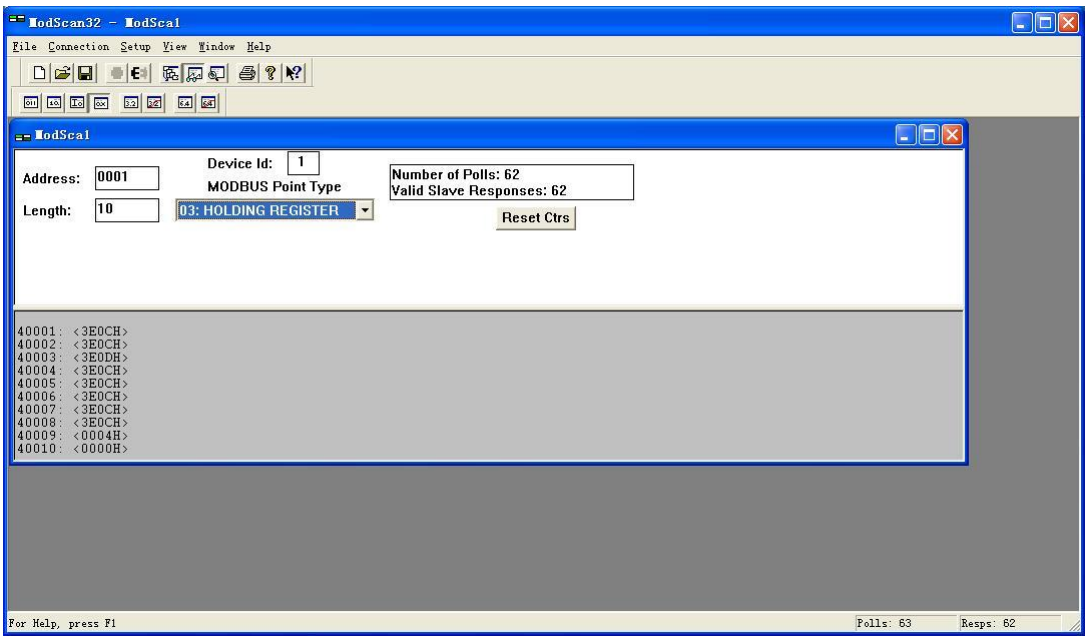
Baud rate 9600 bps

Method to put the module into default state:

There is an Initiat switch located on the side of the WJ226 module. Turn the Initiat switch to the Initiat position, then turn on the power, and the module will enter the default state. In this state, the module temporarily returns to its default state: address 01, baud rate 9600. When unsure of the specific configuration of a module, users 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 needed.

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

Supports Modbus RTU communication protocol **function codes 03** (read hold register), **06** (write single register), and **16** (write multiple registers), with command formats following the standard Modbus RTU communication protocol. Modbus software testing example:



Supports registers with function codes 03, 06, and 16, and the addresses in the table are decimal numbers. 32-bit long integers and floating-point numbers with the lower 16 bits in front.

Address 4X (PLC)	Address (PC, DCS)	Data content	attribute	Data Explanation
forty thousand and one	0	IN0 temperature value	read-only	Signed integers, temperature data for channels IN0~IN7, Divide the data by 10 to obtain the actual temperature. For example, reading 1005 indicates a temperature of 100.5 degrees
forty thousand and two	one	IN1 temperature value	read-only	
forty thousand and three	two	IN2 temperature value	read-only	
forty thousand and four	three	IN3 temperature value	read-only	

forty thousand and five	four	IN4 temperature value	read-only	
forty thousand and six	five	IN5 temperature value	read-only	
forty thousand and seven	six	IN6 temperature value	read-only	
forty thousand and eight	seven	IN7 temperature value	read-only	
40061~40062	60~61	IN0 temperature value	read-only	32-bit floating-point number, temperature data for channels IN0~IN7. The data read from this register is the actual temperature value.
40063~40064	62~63	IN1 temperature value	read-only	
40065~40066	64~65	IN2 temperature value	read-only	
40067~40068	66~67	IN3 temperature value	read-only	
40069~40070	68~69	IN4 temperature value	read-only	
40071~40072	70~71	IN5 temperature value	read-only	
40073~40074	72~73	IN6 temperature value	read-only	
40075~40076	74~75	IN7 temperature value	read-only	
forty thousand two hundred and one	two hundred	Module address	Read/ Write	Integer, effective after restart, range 0x0000-0x00FF
forty thousand two hundred and two	two hundred and one	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
forty thousand two hundred and three	two hundred and two	Parity check	Read/ Write	Integer, takes effect after restart 0: No verification 1: Odd verification 2: Even verification
forty thousand two hundred and four	two hundred and three	Conversion rate	Read/ Write	Integer, range 0x0000-0x0003, The factory default is 1. Please recalibrate the module after modification. 0x0000 = 2.5 SPS，0x0001 = 5 SPS， 0x0002 = 10 SPS， 0x0003 = 20 SPS
forty thousand	two hundred and ten	Module Name	read-	High bit: 0x02 Low bit: 0x26

two hundred and eleven			only	

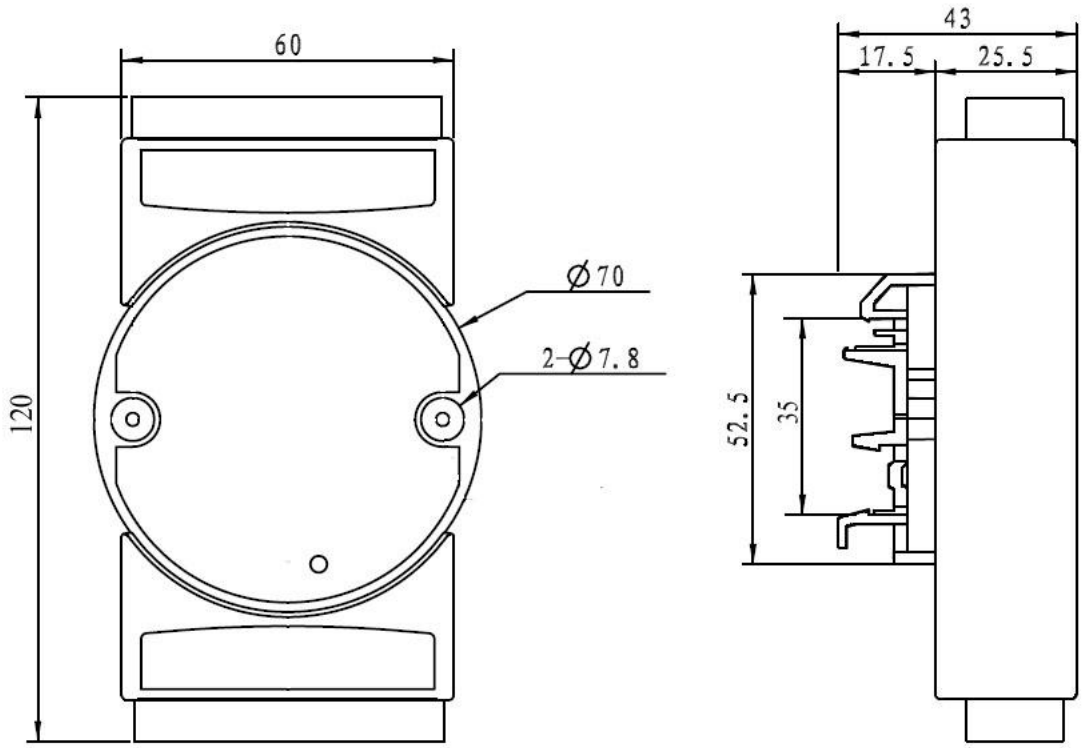
Communication example 1: If the module address is 01, sending in hexadecimal: **01 03 00 00 01 84 0A** can retrieve the data from register 40001.

01	03	00	00	00	01	eighty-four	0A
Module address	Read and hold register	Register Address High Bit	Low bit register address	Register quantity high	Low register quantity	CRC check low bit	CRC check high bit

If the module replies: **01 03 02 01 2C B8 09**, the read data is 0x012C, which is converted to 300 in decimal and divided by 10 to 30, it indicates that the current input temperature is 30 degrees.

01	03	02	01	2C	B8	09
Module address	Read and hold register	The number of bytes in the data	data-high	data-low	CRC check low bit	CRC check high bit

Dimensions: (Unit: mm)



Can be installed on standard DIN35 rails

Communication testing software:

After receiving the product, users can contact sales personnel and provide their QQ number or email address to receive the WAYJUN Test software. This testing software is used for communication testing between computers and WJ226 products. You can also download it from the website softwayjun.net.

guarantee:

Within two years from the date of sale, if the user complies with the storage, transportation, and usage requirements

and the product quality is lower than the technical specifications, it can be returned to the factory for free repair. If damage is caused due to violation of operating regulations and requirements, device fees and maintenance fees shall be paid.

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