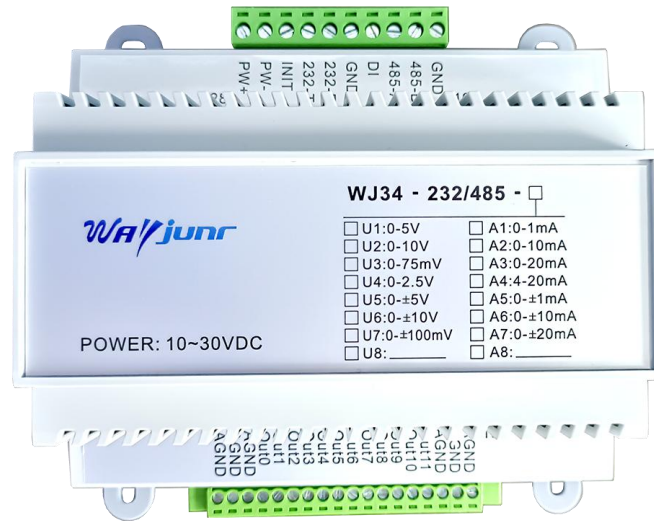


RS232/RS485 signal to 12 channel analog signal isolated D/A converter WJ34



**Figure 1** WJ34 module appearance **diagram**

**Product features:**

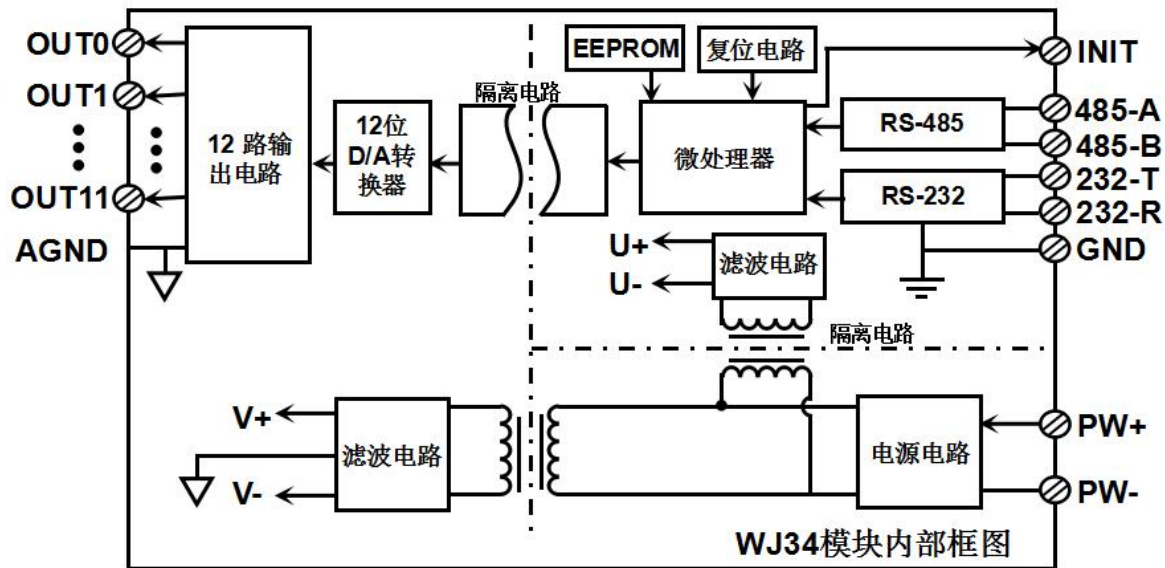
- RS-485/232 interface, isolated and converted into 12 standard analog signal outputs
- Optional output of 4-20mA or 0-10V to control other devices
- The accuracy of analog signal output is better than 0.2%
- Programmable calibration module output accuracy
- Isolation and voltage resistance between signal output/communication interfaces 3000VDC
- Wide power supply range: 10~30VDC
- High reliability, easy programming, easy installation and wiring
- Users can program module addresses, baud rates, etc
- Supports Modbus RTU communication protocol and automatic recognition protocol
- Standard DIN35 rail installation, pluggable terminal blocks
- Dimensions: 128 x 132 x 58mm

**Typical applications:**

- 0-10V standard analog signal output
- Intelligent building control, security engineering and other application systems
- RS-232/485 bus industrial automation control system
- Light control, LED intelligent dimming control
- Equipment operation debugging and control
- Remote transmission and signal restoration of sensor signals
- Industrial field actuator data given
- Development of medical and industrial control products
- 4-20mA signal output

**Product Overview:**

The WJ34 series products achieve the isolation and conversion of host RS-485/232 interface signals into standard analog signals for controlling remote devices. The WJ34 series products can be applied in industrial automation control systems based on RS-232/RS-485 bus, with standard signal outputs such as 4-20mA, 0-5V, 0-10V, etc., used to control execution equipment, control equipment, display instruments, etc. in industrial



sites.

**Figure 2** Schematic diagram of WJ34 product

The product includes power isolation, signal isolation, linearization, D/A conversion, and RS-485 serial communication. Each serial port can connect up to 255 WJ34 series modules, using ASCII code communication protocol and MODBUS RTU communication protocol for communication. The communication protocol is automatically recognized and replied to, and the baud rate can be set by code. It can be connected to other manufacturers' control modules on the same RS-485 bus for easy computer programming.

The WJ34 series products are intelligent monitoring and control systems based on microcontrollers. All user set calibration values, addresses, baud rates, data formats, checksum statuses, and other configuration information are stored in non-volatile memory EEPROM.

The WJ34 series products are designed and manufactured according to industrial standards, with isolation between signal output/communication interfaces. They can withstand an isolation voltage of 3000VDC, have strong anti-interference ability, and high reliability. The working temperature range is -45 °C to +80 °C.

### **WJ34 Function Introduction:**

The WJ34 signal isolation D/A conversion module can be used to output 12 common ground current or voltage signals.

#### 1、 Analog signal output

12 bit output accuracy, all signal output ranges have been calibrated before the product leaves the factory. During use, users can also easily program and calibrate themselves.

Please refer to the product selection for the specific current or voltage output range. The 12 output options must be the same.

#### 2、 Communication Protocol

Communication interface: 1 standard RS-485 communication interface and 1 standard RS-232 communication interface, which can communicate simultaneously without interfering with each other.

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:

**WJ34 - 232/485 - U(A)** □

Output voltage or current signal value

|                   |                   |
|-------------------|-------------------|
| <b>U1:</b> 0-5V   | <b>A1:</b> 0-1mA  |
| <b>U2:</b> 0-10V  | <b>A2:</b> 0-10mA |
| <b>U3:</b> 0-75mV | <b>A3:</b> 0-20mA |
| <b>U4:</b> 0-2.5V | <b>A4:</b> 4-20mA |
| <b>U5:</b> 0±5V   | <b>A5:</b> 0±1mA  |

Selection example 1: Model: **WJ34-232/485-A4** 4-20mA signal output

Selection Example 2: Model: **WJ34-232/485-U2** 0-10V Signal Output

Selection Example 3: Model: **WJ34-232/485-A7** 0- ± 20mA Signal Output

### WJ34 General Parameters:

(Typical @+25 °C, Vs is 24VDC)

Output type: current output/voltage output

Accuracy: 0.2%

Output imbalance: current output ± 0.5 uA/°C, voltage output ± 0.1 mV/°C

Temperature drift: ± 20 ppm/°C (± 30 ppm/°C, maximum)

Output load capacity: Current output 350 Ω (4-20mA/0-20mA/0- ± 20mA current output)

Voltage output 10mA (0-5V/0-10V/0- ± 5V voltage output)

Communication: RS-485 and RS-232 standard character protocols 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: +10~30VDC wide power supply range, with anti reverse and overvoltage protection circuits inside

Power consumption: less than 5W

Working temperature: -45~+80 °C

Working humidity: 10~90% (no condensation)

Storage temperature: -45~+80 °C

Storage humidity: 10~95% (no condensation)

Isolation and voltage resistance: Three isolation between communication interface/output/power supply: 3KVDC, 1 minute, leakage current 1mA

Among them, 12 analog signals are output from the same ground.

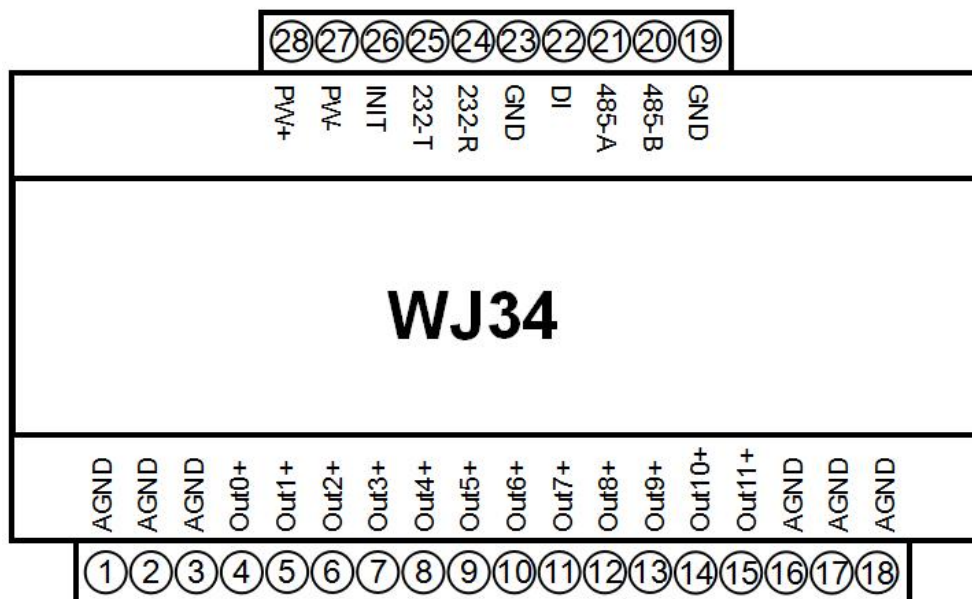
Surge resistant voltage: 3KVAC, 1.2/50us (peak)

Dimensions: 128mm x 132mm x 58mm

### Pin definition:

| Pin      | name   | Description                                 | Pin          | name   | Description                                 |
|----------|--------|---|--------------|--------|---|
| one      | AGND   | Analog signal output common ground terminal | fifteen      | Out11+ | Analog signal 11 output positive terminal   |
| two      | AGND   | Analog signal output common ground terminal | sixteen      | AGND   | Analog signal output common ground terminal |
| three    | AGND   | Analog signal output common ground terminal | seventeen    | AGND   | Analog signal output common ground terminal |
| four     | Out0+  | Analog signal 0 output positive terminal    | eighteen     | AGND   | Analog signal output common ground terminal |
| five     | Out1+  | Analog signal 1 output positive terminal    | nineteen     | GND    | Digital signal output ground                |
| six      | Out2+  | Analog signal 2 output positive terminal    | twenty       | 485-B  | RS-485 signal negative terminal             |
| seven    | Out3+  | Analog signal 3 output positive terminal    | twenty-one   | 485-A  | RS-485 signal positive terminal             |
| eight    | Out4+  | Analog signal 4 output positive terminal    | twenty-two   | DI     | DI input terminal                           |
| nine     | Out5+  | Analog signal 5 output positive terminal    | twenty-three | GND    | Digital signal output ground                |
| ten      | Out6+  | Analog signal 6 output positive terminal    | twenty-four  | 232-R  | RS-232 signal negative terminal             |
| eleven   | Out7+  | Analog signal 7 output positive terminal    | twenty-five  | 232-T  | Positive end of RS-232 signal               |
| twelve   | Out8+  | Analog signal 8 output positive terminal    | twenty-six   | INIT   | Initial state setting                       |
| thirteen | Out9+  | Analog signal 9 output positive terminal    | twenty-seven | PW-    | Negative end of power supply                |
| fourteen | Out10+ | Analog signal 10 output positive terminal   | twenty-eight | PW+    | Positive end of power supply                |

**Table 1 Pin Definition**



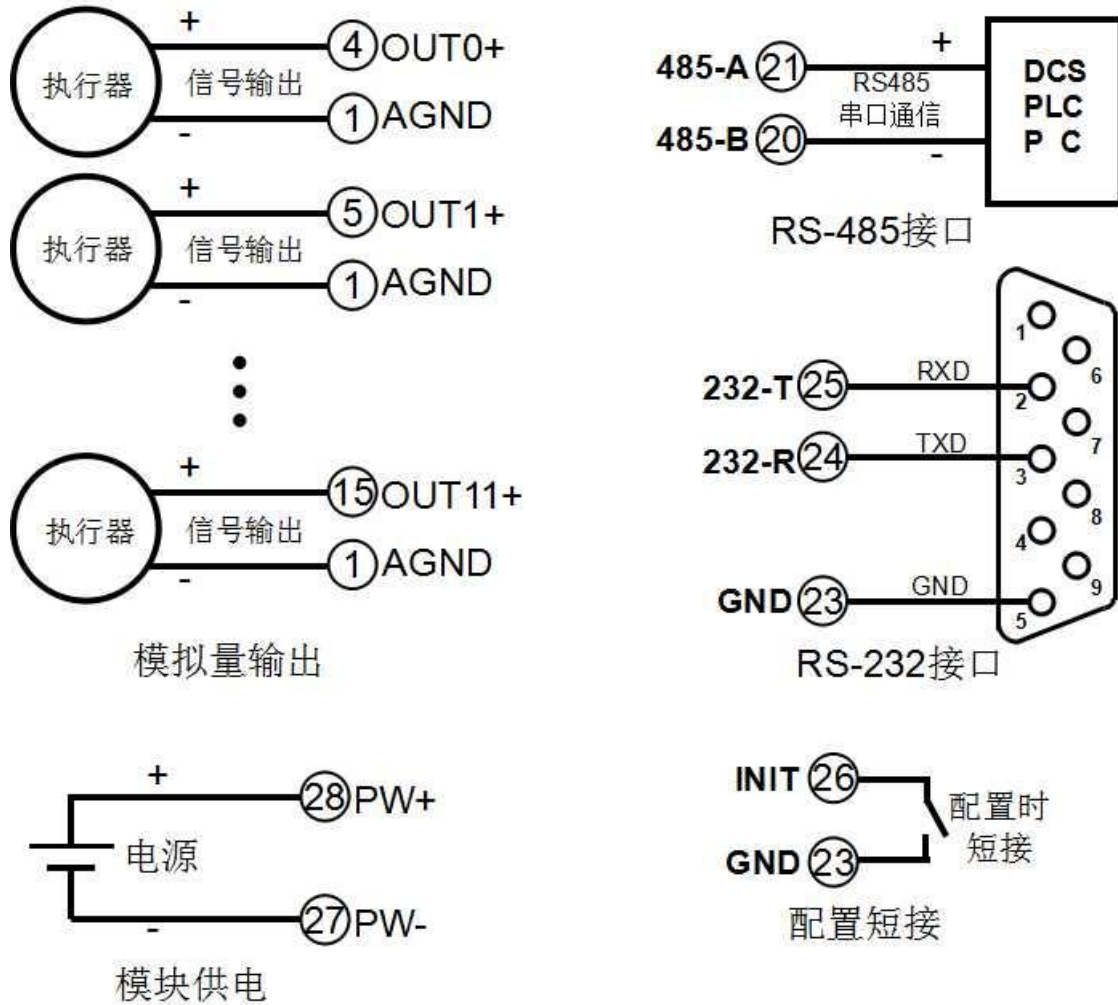


Figure 3 Wiring diagram of WJ34 module

**WJ34 Character Protocol Command Set:**

The factory initial settings of the module are as follows:

**The address code is 01**

**Baud rate 9600 bps**

**Prohibition of checksum verification**

If using an RS-485 network, a unique address code must be assigned, which is a hexadecimal number between 00 and FF. Since the address codes of new modules are the same, their addresses will conflict with other modules. Therefore, when building the system, you must reconfigure the addresses of each WJ34 module. After connecting the power line and RS485 communication line of the WJ34 module, the address of the WJ34 module can be modified through configuration commands. The baud rate and checksum status also need to be adjusted according to the user's requirements. Before modifying the baud rate and checksum status, the module must first enter the default state, otherwise it cannot be modified.

**Method to put the module into default state:**

The WJ34 module has a special pin labeled as Initiat. Short circuit the Initiat pin to the ground wire (GND pin), 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

Prohibition of checksum verification

At this point, the baud rate, checksum status, and other parameters of the WJ34 module can be modified through configuration commands. When unsure of the specific configuration of a module, the Initiat pin can also be short circuited to the ground (GND pin), then the power supply can be turned on to put the module into default state, and then the module can be reconfigured.

The character protocol command consists of a series of characters, such as the prefix, address ID, variables, optional checksum bytes, and a command terminator (**cr**) used to display the command. The host only commands one WJ34 module at a time, except for synchronous commands with wildcard address "\*" \*".

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

The **leading code** is the first letter in the command. All commands require a command prefix, such as %, \$, #, @ Wait.

### 1-character

The address code of the **(Addr)** module, if not specified below, ranges from 00 to FF (hexadecimal). **2-character**

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

**[data]** Some data required for output commands. **Variable length**

The **Checksum** in parentheses is an optional parameter that is only required when checksum is enabled. **2-character**

**(cr)** is a control code symbol used for recognition, and (cr) serves as the carriage return terminator with a value of 0x0D.

### 1-character

When checksum is enabled, [Checksum] is required. It occupies 2 characters. Both commands and responses must be accompanied by checksum features. The checksum is used to check all input commands to help you detect errors in host to module commands and module to host responses. The checksum character is placed after the command or response character and before the carriage return.

Calculation method: Two characters, hexadecimal number, which is the sum of the ASCII code values of all the characters previously sent, and then combined with the hexadecimal number 0xFF to obtain the result.

Application example: Prohibit checksum

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

Module response! **00020600 (cr)**

Enable checksum

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

Module 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

Response to Command:

The response information depends on various commands. The response also consists of several characters, including the initial code, variables, and ending identifier. There are two types of initial codes for response signals, '!' Or '>' represents a valid command while '?' It represents invalidity. By checking the response information, it is possible to monitor whether the command is valid

**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. Set the analog output value command for channel N

Explanation: Set the analog output value for channel N of the analog output module in the current configured data format.

Command format: **# AAN (data) (cr)**

Parameter description: # delimiter.

**AA** 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.

**N** channel codes 0~B. If all channels need to be set simultaneously, replace the channel number with M.

**(data)** represents the analog data output of channel N to be set. The data format can be engineering units, percentage of FSR, hexadecimal complement. For detailed instructions, please refer to Article 3 of the command set.

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

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

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

Parameter description:>delimiter.

**(cr)** End symbol, upper computer enter key, hexadecimal is 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+16.000 (cr)**

(Hexadecimal format) **233031302B31362E3030300D**

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

(Hexadecimal format) **3E0D**

Explanation: Set the output value of channel 0 on address 01H module to+16.000mA (data format in engineering units).

### 2. Command to set the analog output value of channel N after power on or reset

Explanation: Set the analog output value for channel N of the analog output module in the current configured data format.

Command format: **# AASN (data) (cr)**

Parameter description: # delimiter.

**AA** 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.

**S** means to set the analog output value after power on or reset.

**N** channel codes 0~B. If all channels need to be set simultaneously, replace the channel number with M.

**(data)** represents the analog data output after the channel N to be set is powered on. The data format can be engineering units, percentage of FSR, hexadecimal complement. For detailed instructions, please refer to Article 3 of the command set.

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

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

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

Parameter description:>delimiter.

**(cr)** End symbol, upper computer enter key, hexadecimal is 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 **# 01S0+04.000 (cr)**

Module response>**(cr)**

Explanation: Set the power on output value of channel 0 on address 01H module to+04.000mA (data format in engineering units).

### 3. Configure analog output module command

Explanation: Set the address, output range, baud rate, data format, and checksum status for an analog output module. The configuration information is stored in non-volatile memory EEPROM.

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

Parameter description: % delimiter.

**AA** 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.

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

**TT** uses hexadecimal to represent type encoding. The WJ34 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-bit hexadecimal to represent data format and checksum. Note that from bits2 to bits5, it is not necessary to set it to zero.

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

Table 3 Data format, checksum code

**Bit7:** Reserved bit, must be set to zero

**Bit6:** checksum status, 0: prohibited; For 1: Allow

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

**Bit1-bit0:** Data format bit.

00: Engineering Units

01: Percentage of Full Scale (% of FSR)

10: Two complement in hexadecimal

11: Ohms (only adjustable for thermistor products)

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

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 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 module is reconfigured to change the address, output range, and data format, AA equals the currently configured address, and NN equals the current or new address. If you want to reconfigure the module to change the baud rate or checksum status, you must install a configuration jumper to put the module into the default state. At this time, the



module address is 00H, that is, AA=00H, NN is equal to the current or new address.

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

Application example: User command% **0011000600 (cr)**

Module response! **11(cr)**

Explanation:% delimiter.

**00** means that the original address of the analog output module you want to configure is 00H.

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

**00** type code, WJ34 product must be set to 00.

**06** represents a baud rate of 9600 baud.

**00** indicates that the data format is in engineering units and checksum is prohibited.

#### 4. Read configuration status command

Explanation: Read configuration for a specified analog output module.

Command format: **\$AA2 (cr)**

Parameter description: \$delimiter.

**AA** 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 module address.

**TT** stands for type code.

**CC** stands for baud rate encoding. See Table 3

**FF** is shown in Table 4

**(cr)** End symbol, upper computer enter key, hexadecimal is 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 **\$302 (cr)**

Module response! **300F0600(cr)**

Explanation:! Boundary symbol.

**30** indicates that the address of the analog output module is 30H.

**00** represents the output type code.

**06** represents a baud rate of 9600 baud.

**00** indicates that the data format is in engineering units and checksum is prohibited.

#### 5. Offset calibration command

Explanation: The zero offset of the output value of channel N in the calibration module.

Command format: **\$AA1N (cr)**

Parameter description: \$delimiter.

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

**1** Indicates the offset calibration command.

**N** channel code 0-B

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

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

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

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

? The delimiter indicates that the command is invalid.

**AA** represents module address

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

Other instructions: The product has been calibrated before leaving the factory, and users can use it directly without calibration.

When calibrating an analog output module, first calibrate the offset command, and then calibrate the gain.

When calibrating, the analog output module needs to be connected to a multimeter to monitor the output signal on the channel to be calibrated. Use the first command in the command set to set the analog output, adjust it to the zero value displayed in the multimeter, and then input the calibration offset command. For specific calibration methods, please refer to the calibration module chapter.

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

Application example: User command **\$0110 (cr)**

Module response! **01(cr)**

Explanation: Perform offset calibration on channel 0 of address 01H module.

### 6. Gain calibration command

Explanation: The output value of channel N in the calibration module has a full gain.

Command format: **\$AA0N (cr)**

Parameter description: \$delimiter.

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

**0** Indicates the gain calibration command.

**N** channel code 0-B

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

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

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

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

? The delimiter indicates that the command is invalid.

**AA** represents module address

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

Other instructions: The product has been calibrated before leaving the factory, and users can use it directly without calibration.

When calibrating an analog output module, calibrate the offset first, and then calibrate the gain.

When calibrating, the analog output module needs to be connected to a multimeter to monitor the output signal on the channel to be calibrated. Set the analog output using the first command in the command set, adjust the output signal displayed in the multimeter to the full value, and then input the calibration gain command. For specific calibration methods, please refer to the calibration module chapter.

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

Application example: User command **\$0100 (cr)**

Module response! **01(cr)**

Explanation: Perform gain calibration on channel 0 of address 01H module.

### 7. Read back command for analog output value of channel N

Explanation: The analog output module reads back the analog output value of channel N and the power on output value.

If no setting command has been entered, reply with an error.

Command format: **\$AADN (cr)**

Parameter description: \$delimiter.

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

**D** represents the command to read back the analog output value.

**N** channel code 0-B

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

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

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

Parameter description: ! Boundary symbol.

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

**(data)** represents the analog data output from channel N that is read back. The data format can be engineering units, percentage of FSR, hexadecimal complement. For detailed instructions, please refer to Article 3 of the command set.

**(cr)** End symbol, upper computer enter key, hexadecimal is 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 **\$01D0 (cr)**

Module response! **01+12.000 (cr)**

Explanation: The current output value of channel 0 on module 01H is +12.000mA (data format is in engineering units).

### Output range and data format:

The analog output module uses three data formats:

00: Engineering Units

01: Percentage of Full Scale (% of FSR)

10: Two complement in hexadecimal

| Output range               | data format              | maximum | minimum                        |
|----------------------------|--------------------------|---------|--------------------------------|
| <b>A4: 4-20mA</b>          | Engineering unit         | +20.000 | +04.000                        |
|                            | Percentage of Full Scale | +100.00 | +020.00                        |
|                            | Hexadecimal complement   | FFF     | three hundred and thirty-three |
| <b>A3: 0-20mA</b>          | Engineering unit         | +20.000 | ±00.000                        |
|                            | Percentage of Full Scale | +100.00 | ±000.00                        |
|                            | Hexadecimal complement   | FFF     | 000                            |
| <b>U1: 0-5V</b>            | Engineering unit         | +5.0000 | ±0.0000                        |
|                            | Percentage of Full Scale | +100.00 | ±000.00                        |
|                            | Hexadecimal complement   | FFF     | 000                            |
| <b>U2: 0-10V</b>           | Engineering unit         | +10.000 | ±00.000                        |
|                            | Percentage of Full Scale | +100.00 | ±000.00                        |
|                            | Hexadecimal complement   | FFF     | 000                            |
| <b>U8/A8: User defined</b> | Engineering unit         | +100.00 | ±000.00                        |
|                            | Percentage of Full Scale | +100.00 | ±000.00                        |
|                            | Hexadecimal complement   | FFF     | 000                            |

Table 4 Output Range and Data Format

Application example:

1. The output range is A4: 4~20mA, set the output to 4 mA, and the command is as follows:

Engineering Unit User Command # **010+04.000 (cr)**

Full scale percentage user command # **010+020.00 (cr)**

Hexadecimal complement user command # **010333 (cr)**

2. The output range is U1: 0~5V, set the output to 3V, and the command is as follows:

- Engineering unit user command # **010+3.0000 (cr)**
- Full scale percentage user command # **010+060.00 (cr)**
- Hexadecimal complement user command # **010999 (cr)**

### **Calibration module:**

**The product has been calibrated before leaving the factory, and users can use it directly without calibration.**

During use, you can also use the product's calibration function to recalibrate the module. When in school, the module needs to use a high-precision multimeter to monitor its output.

To improve calibration accuracy, it is recommended to use the following equipment for calibration:

1. A voltage/current measuring instrument with a precision of 5 and a half bits or higher monitors the accuracy of the output signal

#### Calibration process

1. Select the output channel to be calibrated and connect the corresponding voltage or current measuring instrument according to the output range of the module.
2. Set the channel output zero signal that needs to be calibrated for the analog output module, usually 0mA, 4mA, or 0V. Set the analog output by using the first command in the command set, and adjust the output signal displayed in the measuring instrument to the zero value.
3. After the signal stabilizes, send the offset calibration **\$AA1N** command to the analog output module (N represents the channel code currently being calibrated, 0~B).
4. Set the channel output full-scale signal that needs to be calibrated for the analog output module. Set the analog output by using the first command in the command set, and adjust the output signal displayed in the measuring instrument to the full-scale value.
5. After the signal stabilizes, send the gain calibration **\$AA0N** command to the analog output module (N represents the channel code currently being calibrated, 0~B).
6. Calibration completed

### **Modbus RTU communication protocol:**

The module has the function of automatically identifying communication protocols, and can directly communicate using Modbus RTU communication protocol.

Initial settings for WJ34 module at factory: **Address 01, baud rate 9600 bps**

If you forget the address and baud rate of the module, you can put the module into default mode and then query the address and baud rate registers 40201-40202 to obtain the actual address and baud rate of the module. You can also modify the address and baud rate as needed.

#### **Method to put the module into default state:**

The WJ34 module has a special pin labeled as Initiat. Short circuit the Initiat pin to the ground wire (GND1 pin), then turn on the power, and the module will enter the default state. In this state, the module is configured with an address of 01 and a baud rate of 9600 bps.

**The Modbus function codes supported by the module are 03 and 06.** Please refer to Table 4 for the correspondence between Modbus data content and output, which is the same as when the data format of the character protocol is hexadecimal complement.

### Example of Modbus RTU communication protocol application:

1. Supports Modbus RTU communication protocol **function code 03** (read hold register), with command format following the standard Modbus RTU communication protocol.

Communication example: If the module address is 01, send in hexadecimal: **01030000001840A** to retrieve the data from the register.

|                |                        |                           |                          |                        |                       |                   |                    |
|----------------|------------------------|---------------------------|--------------------------|------------------------|-----------------------|-------------------|--------------------|
| 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: **0103020FFFFDF4**, the read data is 0x0FFF, which means the current output is the maximum value.

|                |                        |                                 |           |          |                   |                    |
|----------------|------------------------|---------------------------------|-----------|----------|-------------------|--------------------|
| 01             | 03                     | 02                              | 0F        | FF       | FD                | F4                 |
| 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 |

2. Supports Modbus RTU communication protocol **function code 06** (write to a single register), with command format following the standard Modbus RTU communication protocol.

Communication example: If the module address is 01, send in hexadecimal: **0106000000FC9CE**, which means set the output data to 0x000F.

|                |                         |                           |                          |           |          |                   |                    |
|----------------|-------------------------|---------------------------|--------------------------|-----------|----------|-------------------|--------------------|
| 01             | 06                      | 00                        | 00                       | 00        | 0F       | C9                | CE                 |
| Module address | Write a single register | Register Address High Bit | Low bit register address | data-high | data-low | CRC check low bit | CRC check high bit |

If the module replies: **0106000000FC9CE**, the setting is successful

|                |                         |                           |                          |           |          |                   |                    |
|----------------|-------------------------|---------------------------|--------------------------|-----------|----------|-------------------|--------------------|
| 01             | 06                      | 00                        | 00                       | 00        | 0F       | C9                | CE                 |
| Module address | Write a single register | Register Address High Bit | Low bit register address | data-high | data-low | CRC check low bit | CRC check high bit |

### Register Description:

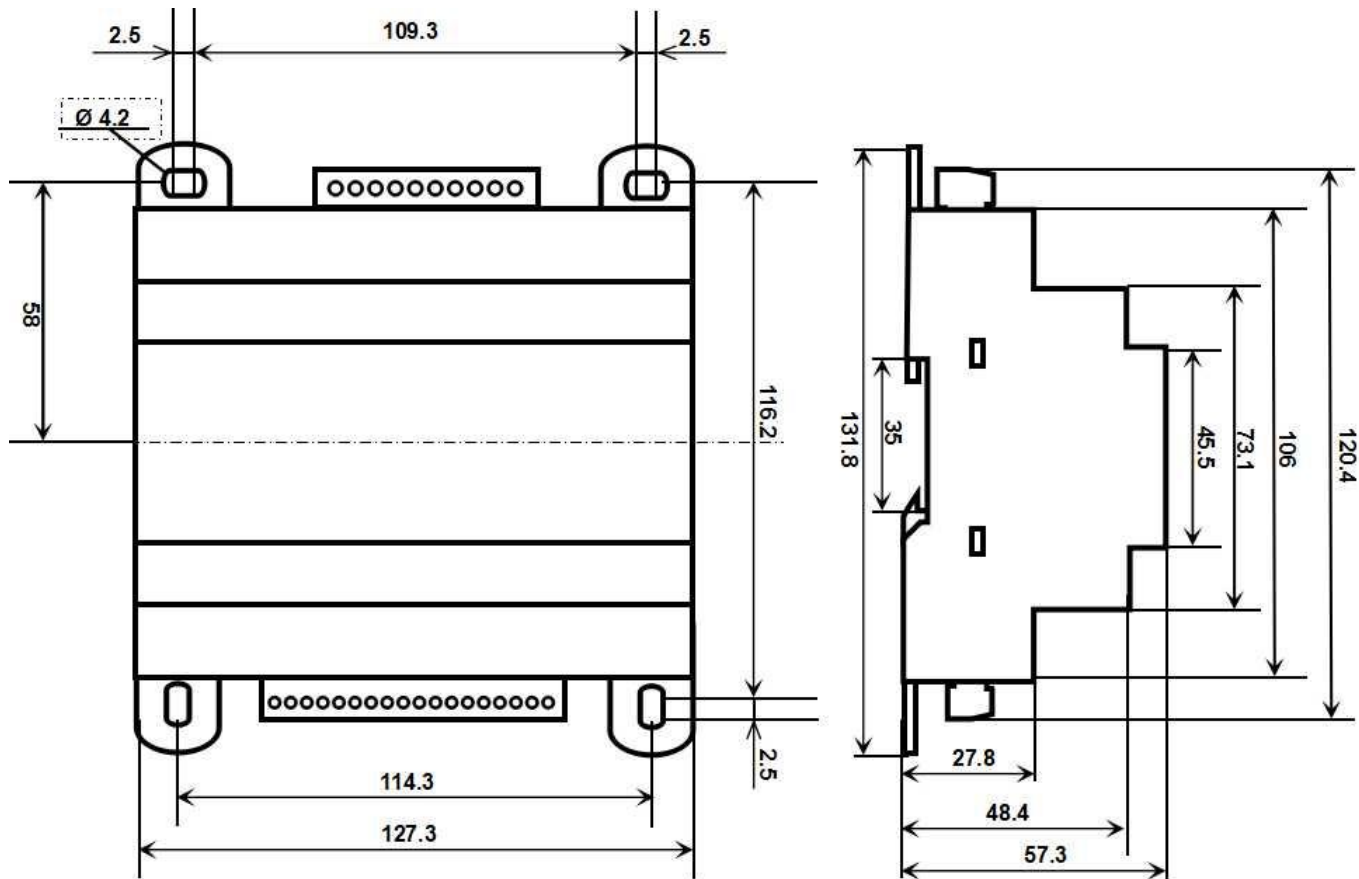
| Address 4X (PLC)         | Address (PC, DCS) | Data content        | attribute  | Data Explanation                |
|--------------------------|-------------------|---------------------|------------|---------------------------------|
| forty thousand and one   | 0                 | Out0(0x0000-0x0FFF) | Read/Write | Channel 0 analog output value   |
| forty thousand and two   | one               | Out1(0x0000-0x0FFF) | Read/Write | Channel 1 analog output value   |
| forty thousand and three | two               | Out2(0x0000-0x0FFF) | Read/Write | Channel 2 analog output value   |
| forty thousand and four  | three             | Out3(0x0000-0x0FFF) | Read/Write | Channel 3 analog output value   |
| forty thousand and five  | four              | Out4(0x0000-0x0FFF) | Read/Write | Channel 4 analog output value   |
| forty thousand and six   | five              | Out5(0x0000-0x0FFF) | Read/Write | 5th channel analog output value |
| forty thousand and seven | six               | Out6(0x0000-0x0FFF) | Read/Write | 6th channel analog output value |

|                                    |              |                              |                |  |
|------------------------------------|--------------|------------------------------|----------------|--|
| forty thousand and eight           | seven        | Out7(0x0000-0x0FFF)          | Read/<br>Write | 7th channel analog output value  |
| forty thousand and nine            | eight        | Out8(0x0000-0x0FFF)          | Read/<br>Write | 8th channel analog output value  |
| forty thousand and ten             | nine         | Out9(0x0000-0x0FFF)          | Read/<br>Write | 9th channel analog output value  |
| forty thousand and eleven          | ten          | Out10(0x0000-0x0FFF)         | Read/<br>Write | 10th channel analog output value   |
| forty thousand and twelve          | eleven       | Out11(0x0000-0x0FFF)         | Read/<br>Write | 11th channel analog output value   |
|                                    |              |                              |                |  |
| forty thousand and twenty-one      | twenty       | Sout0 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 0                                |
| forty thousand and twenty-two      | twenty-one   | Sout1 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 1                                |
| forty thousand and twenty-three    | twenty-two   | Sout2 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 2                                |
| forty thousand and twenty-four     | twenty-three | Sout3 (0x0000-0x0FFF)        | Read/<br>Write | Output value of analog signal on channel 3   |
| forty thousand and twenty-five     | twenty-four  | Sout4 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 4                                |
| forty thousand and twenty-six      | twenty-five  | Sout5 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 5                                |
| forty thousand and twenty-seven    | twenty-six   | Sout6 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 6                                |
| forty thousand and twenty-eight    | twenty-seven | Sout7 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 7                                |
| forty thousand and twenty-nine     | twenty-eight | Sout8 (0x0000-0x0FFF)        | Read/<br>Write | Output value of electrical analog signal on channel 8                                |
| forty thousand and thirty          | twenty-nine  | Sout9 (0x0000-0x0FFF)        | Read/<br>Write | Output value of analog signal on channel 9   |
| forty thousand and thirty-one      | thirty       | Sout10 (0x0000-0x0FFF)       | Read/<br>Write | 10th channel electrical analog output value  |
| forty thousand and thirty-two      | thirty-one   | Sout11 (0x0000-0x0FFF)       | Read/<br>Write | Output value of electrical analog signal on channel 11                               |
|                                    |              |                              |                |  |
| forty thousand and fifty-one       | fifty        | Out0~Out11 (0x0000-0x0FFF)   | Read/<br>Write | Simultaneously set analog output values for channels 0-11                            |
| forty thousand and fifty-two       | fifty-one    | Sout0~Sout11 (0x0000-0x0FFF) | Read/<br>Write | Simultaneously set the power on output values for channels 0-11                      |
| forty thousand two hundred and one | 0200         | Module address               | Read/<br>Write | Integer, effective after restart, range 0x0000-0x00FF                                |
| forty thousand two hundred and two | 0201         | Baud rate                    | Read/<br>Write | Integer, effective after restart, range 0x0004-0x000A<br>0x0004 = 2400 bps, 0x0005 = |

|                                       |      |             |           |  |
|---------------------------------------|------|-------------|-----------|--|
|                                       |      |             |           | 4800 bps<br>0x0006 = 9600 bps , 0x0007 = 19200 bps<br>0x0008 = 38400 bps, 0x0009 = 57600 bps<br>0x000A = 115200bps |
| forty thousand two hundred and eleven | 0210 | Module Name | read-only | High bit: 0x00 Low bit: 0x34   |

Table 5 Modbus Rtu Register Description

**Dimensions: (Unit: mm)**



There are 4 screw holes that can be fixed with screws

**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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