RS485/RS232 signal conversion 0- ± 23V/0- ± 250mA constant voltage or constant current isolation driver WJ203

Product features:

- RS232/485 isolated conversion to 1 high current signal output
- Can set constant voltage source output or constant current source output
- Supports adjustable ± 23V voltage or ± 250mA current output
- The output has overcurrent and overvoltage protection as well as short-circuit protection
- Voltage or current output accuracy better than 0.2%
- Support setting the output voltage and current range
- Can quickly cut off output by switching on/off input
- Programmable calibration module output accuracy
- Isolation and voltage resistance between signal output/communication interface/power supply 1000VDC
- Wide power supply range: 10~32VDC
- 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
- Low cost, small volume modular design

Typical applications:

- Linear actuators for solenoid valves and proportional valves
- RS232/RS485 industrial programmable power supply
- RS485 bus industrial automation control system
- Light control, LED intelligent dimming control
- Equipment operation debugging and control
- Linear controller for electromagnetic switch
- DC motor control and forward/reverse control
- Electromagnetic drive coil or high-power load
- Machine vision lighting control

Product Overview:

The WJ203 series products implement remote devices such as host RS-485/232 interface signal isolation control solenoid valves, proportional valves, LED lights, DC motors, etc. The WJ203 series products can be applied in RS-485 bus industrial automation control systems, with 0~± 23V or 0~± 250mA outputs, used to control execution equipment, control equipment, lighting, and so on in industrial sites.

The product includes power isolation, signal isolation, D/A conversion, and RS-485 serial communication. Each serial port can connect up to 255 WJ203 series modules, and the communication methods use ASCII code communication protocol and MODBUS RTU communication protocol. The communication protocol is automatically recognized and replied to, and the baud rate can be set by code. It can be hung on the same RS-485 bus with control modules from other manufacturers, making it easy for computer programming.

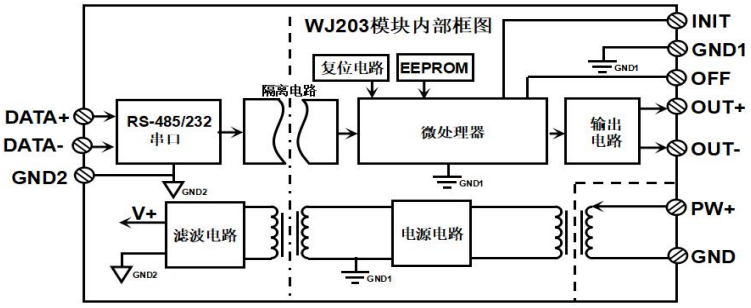


Figure 2 Schematic diagram of WJ203 product

The WJ203 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 WJ203 series products are designed and manufactured according to industrial standards, with isolation between signal output/communication interfaces, capable of withstanding 1000VDC isolation voltage, strong anti-interference ability, and high reliability. The working temperature range is -45 ℃ to+80 ℃.

WJ203 Function Introduction:

The WJ203 signal isolation D/A conversion module can be used to output one current or voltage signal.

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.

2、 Communication Protocol

Communication interface: 1 standard RS-485 communication interface.

Communication Protocol: Supports two protocols, the character protocol defined by the command set and the MODBUS RTU communication protocol. The module automatically recognizes 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:

WJ203 - □ - □ V / □ mA

Communication interface output voltage and current signal values

485: Input is RS-485 interface

232: Input is RS-232 interface

Selection Example 1: Model: **WJ203-485-23V/250mA** indicates RS-485 interface, 0- ± 23V signal output or 0- ± 250mA

signal output

Selection Example 2: Model: **WJ203-232-23V/250mA** for RS-232 interface, 0- ± 23V signal output or 0- ± 250mA signal output

WJ203 General Parameters:

(Typical @+25 ℃, Vs is 24VDC)

Output type: constant current output or constant voltage output, range 0~± 23V or 0~± 250mA

Accuracy: 0.2%

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

Output range: Current output 0~± 250mA

Voltage output 0~± 23V

Maximum output: current output of 250mA

Voltage output 23V

Output protection: output overvoltage protection, output overcurrent protection. Support switch signal to cut off output.

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: 10~32VDC wide power supply range, with internal anti reverse and overvoltage protection circuits

Power consumption: less than 10W.

Working temperature: -45~+80 ℃

Working humidity: 10~90% (no condensation)

Storage temperature: -45~+80 ℃

Storage humidity: 10~95% (no condensation)

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

Surge resistant voltage: 1KVAC, 1.2/50us (peak value)

Dimensions: 106.7 mm x 79 mm x 25mm

Pin definition:

Table 1 Pin Definition

Pin	name	Description	Pin	name	Description
one	PW+	Positive end of power supply	**seven**	OFF	Emergency shutdown terminal
two	NC	Empty feet	**eight**	GND1	Control signal common ground terminal
three	GND	Negative end of power supply	**nine**	INIT	Initial state setting
four	Out+	Analog signal output positive terminal	**ten**	DATA+	Positive end of RS-485/232 signal
five	Out-	Analog signal output negative terminal	**eleven**	DATA-	Negative terminal of RS-485/232 signal
six	NC	Empty feet	**twelve**	GND2	RS-485/232 signal ground

Note: **The** pins **with the** same name are internally connected

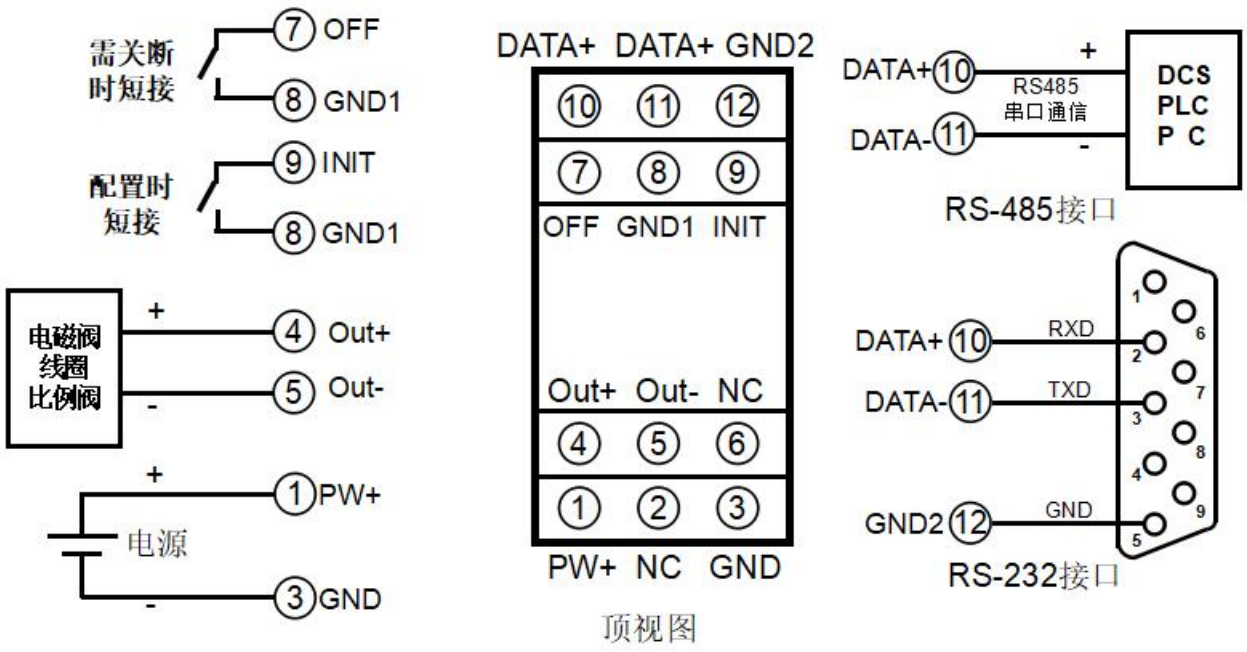


Figure 3 Wiring diagram of WJ203 module

Character Communication Protocol:

The factory initial settings of the module are as follows:

The address code is 01

Baud rate 9600 bps

No verification

If you need to modify parameters, please use the Modbus RTU protocol. The following command is sent using address 01. If the actual address has been modified, please change 01 to the actual hexadecimal address before sending.

（1） Read data command

Sent: # 01

Reply: {"mode": 1, "value": 200}

Format Description:

The output mode currently set by 'mode'.

'value' is the output value currently set.

You can also read a single set of data:

#01>Mode **reply:** {"mode": 1}

#01>Value **reply:** {"value": 200}

（2） Set output mode command

If set to **0**, it represents **constant voltage output mode;**

If set to **1**, it represents **constant current output mode**,

Send: $01 {"setMode": 1}

Reply:! 01 (cr) indicates successful setting? 01 (cr) indicates a command error

3. Set output value command

Used to set the output value.

If it is output mode **0**, **constant voltage output mode**, this register is used to set the output voltage value, in mV. For example, setting it to 1000 means outputting 1V.

If it is output mode **1**, **constant current output mode**, this register is used to set the output current value, in units of 0.01mA. For example, setting it to 1000 means outputting 10mA.

Attention: If the output value exceeds the set upper and lower limits of voltage and current, it will be output according to the set upper and lower limits.

Send: $01 {"setValue": 2000}

Reply:! 01 (cr) indicates successful setting? 01 (cr) indicates a command error

Modbus RTU communication protocol:

The factory initial settings of the module are as follows:

The Modbus address is 01

Baud rate 9600 bps

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

Method to put the module into default state:

The WJ150 module has a special pin labeled as Initiat. Short circuit the Initiat pin to the GND1 pin, and then turn on the power. At this point, the module enters 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.

Supports Modbus RTU communication protocol, with command format following the standard Modbus RTU communication protocol.

The module supports Modbus function codes 03, 06, and 16.

Modbus RTU communication protocol register description:

Address 4X (PLC)	Address (PC, DCS)	Data content	attribute	Data Explanation
forty thousand and one	0	Output mode	Read/ Write	Output mode, integer, 0 or 1, The factory default is 0, and it will be saved after setting. **0**: Constant voltage output mode **1**: Constant current output mode After modifying the mode, the output

				value will be reset to zero.
forty thousand and two	one	Output value	Read/ Write	Signed 16 bit integer. Used to set the output value. After booting up, the value of the 40003 register will be automatically loaded. If it is output mode **0**, **constant voltage output mode**, this register is used to set the output voltage value, in mV. For example, setting it to 1000 means outputting 1V. If it is output mode **1**, **constant current output mode**, this register is used to set the output current value, in units of 0.01mA. For example, setting it to 1000 means outputting 10mA. **Attention:** If the output value exceeds the set upper and lower limits of voltage and current, it will be output according to the set upper and lower limits.
forty thousand and three	two	Automatic output value when powered on	Read/ Write	Signed 16 bit integer. After setting, it will be saved. The module will automatically output the value when powered on. After the module is powered on, it will automatically set the value of this register to the 40002 register, and the output will be automatically output according to the value of this register. The factory default is 0
Address 4X (PLC)	**Address (PC, DCS)**	**Data content**	**attribute**	**Data Explanation**
forty thousand and four	three	Lower limit of output voltage range （mV）	Read/ Write	Signed 16 bit integer, unit mV. Used to set the minimum voltage value for the output range. The factory default is -23000
forty thousand and five	four	Upper limit of output voltage range （mV）	Read/ Write	Signed 16 bit integer, unit mV. The highest voltage value used to set the output range. The factory default is 23000
forty thousand and six	five	Lower limit of output current range (0.1mA)	Read/ Write	A signed 16 bit integer with a unit of 0.01mA. Used to set the minimum current value for

				the output range. The factory default is -25000
forty thousand and seven	six	Output current range upper limit value (0.1mA)	Read/ Write	A signed 16 bit integer with a unit of 0.01mA. Used to set the maximum current value for the output range. The factory default is 25000
forty thousand and eight	seven	The slope of an increase or decrease	Read/ Write	An unsigned 16 bit integer, measured in milliseconds. (default to 0) Range 0~65535 Used to slowly complete a 0-100% change with a certain time slope after changing voltage or current. For example: 0 represents real-time changes. 100 means completing a 0-100% range change in 100ms 1000 represents a 0-100% range change completed in 1 second
forty thousand and eighty-nine	eighty-eight	Parameter reset to factory settings	Read/ Write	If set to FF00, all register parameters of the module will be restored to factory settings, and the module will automatically restart after completion
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 eleven	two hundred and ten	Module Name	read-only	High bit: 0x02 Low bit: 0x03

Table 5 Modbus Rtu Register Description

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: **010300000001840A** 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: **01030200017984**, the read data is 0x0001, which means it is in constant current output mode.

01	03	02	00	01	seventy-nine	eighty-four
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 and sent in hexadecimal: **010600012710C236**, it means setting the output value to 10000.

01	06	00	01	twenty-seven	ten	C2	thirty-six
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: **010600012710C236**, the setting is successful

01	06	00	01	twenty-seven	ten	C2	thirty-six
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

Calibration module:

The product has been calibrated before leaving the factory, and users can use it directly without calibration. Non professionals are not allowed to calibrate randomly.

During use, users can 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.

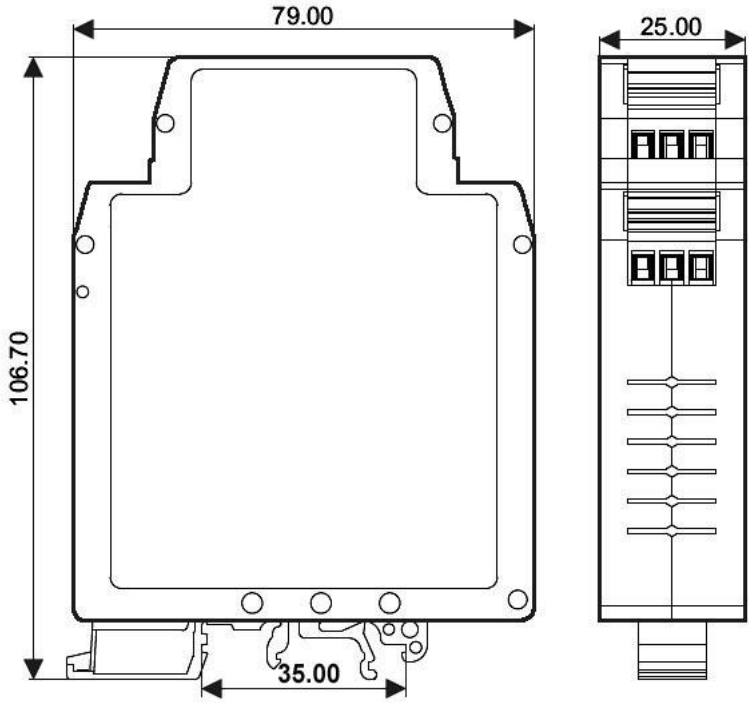
To improve calibration accuracy, it is recommended to use the following equipment for calibration:

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. The power supply for the module adopts 24VDC, with a power of over 50W.
1. 2. Output without load, measure the output voltage with a high-precision multimeter. Set the voltage output using the command **$01 {"setDAC0": 65000}**, with a value range of 0-65535, and adjust it to the output voltage displayed in the measuring instrument to 23V. After the signal stabilizes, send the **$01 {"saveDAC0": 23000}** command to the module.
2. 3. Short circuit the current range of the high-precision multimeter for positive and negative output. Set the current output using the command **$01 {"setDAC1": 65000}**, with a value range of 0-65535, and adjust it to the output current displayed in the measuring instrument to 250mA. After the signal stabilizes, send the **$01 {"saveDAC1": 25000}** command to the module.
4. Calibration completed

Dimensions: (Unit: mm)



Can be installed on standard DIN35 rails

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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