Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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Features

- Support 8-channel digital isolation input, default dry contact;
- 8-channel digital output (NPN transistor open collector output) adopts Modbus RTU protocol data processing;
- Support command reset . After sending the A T+RESTORE \ r\n command to the 485 serial port within 3 seconds after power-on , the Modbus device address, RS485 serial port baud rate and check bit will be restored to factory settings.
- Support pulse counting, configurable as rising edge counting, falling edge counting, level counting
- Hardware watchdog, with high reliability;
- Multiple indicator lights show working status;
- The power supply has good over-current, over-voltage, reverse connection and other functions;
- Wide voltage input 8V -28V, 12V or 24V is recommended .
- Customers can customize functions such as conditional control (determining output based on input status) .

1. Quick Start

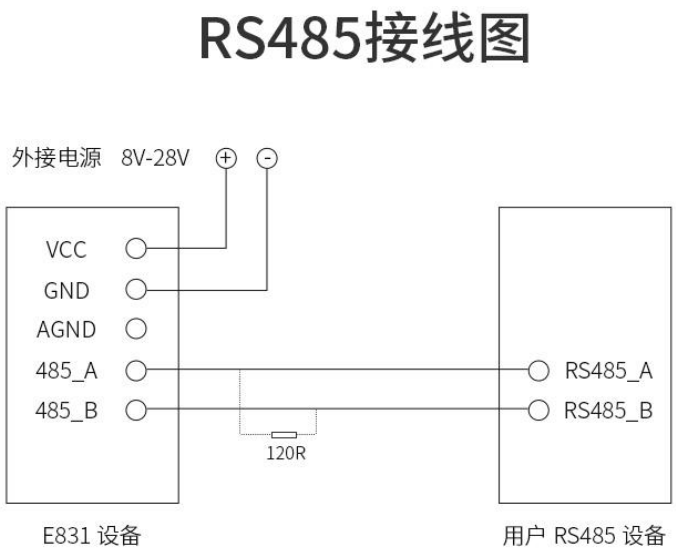
This chapter is a quick introduction to the E831 - RTU (8080T - 485) series products. It is recommended that users read this chapter systematically and follow the instructions to have a systematic understanding of the module products. Users can also select the chapters they are interested in to read as needed. For specific details and instructions, please refer to the subsequent chapters.

1.1. Port Connections

1.1.1. RS485 Connection

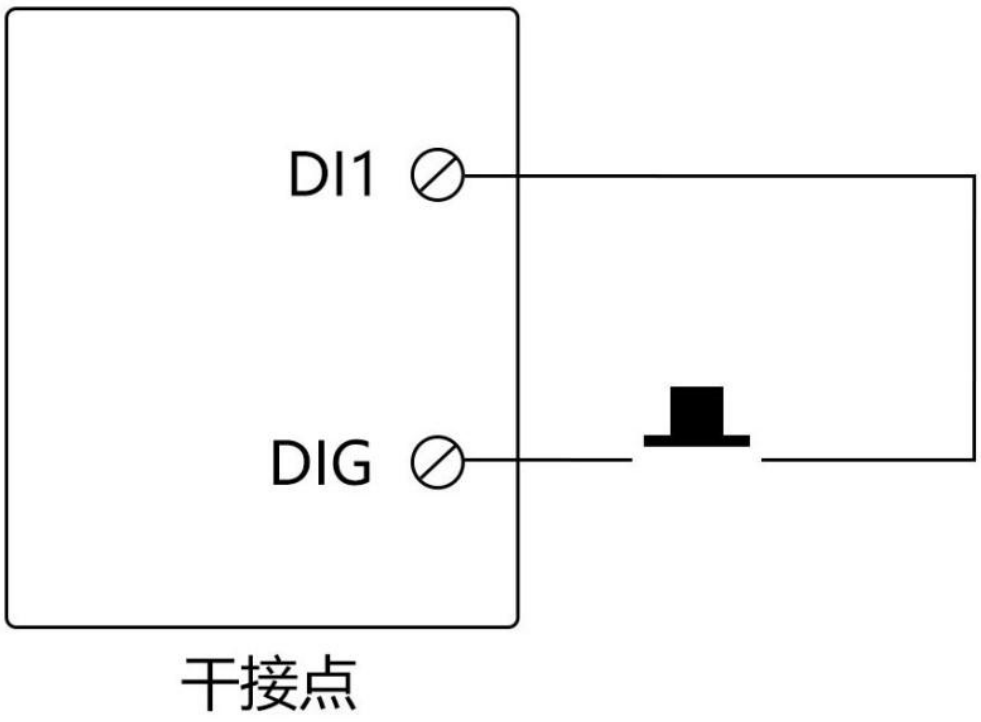
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Note: When the 485 bus transmits high-frequency signals, the signal wavelength is shorter than the transmission line. The signal will form a reflected wave at the end of the transmission line, interfering with the original signal. Therefore, a terminal resistor needs to be added at the end of the transmission line to prevent the signal from being reflected after reaching the end of the transmission line. The terminal resistor should be the same as the impedance of the communication cable, and the typical value is 120 ohms. Its function is to match the bus impedance and improve the anti-interference and reliability of data communication.

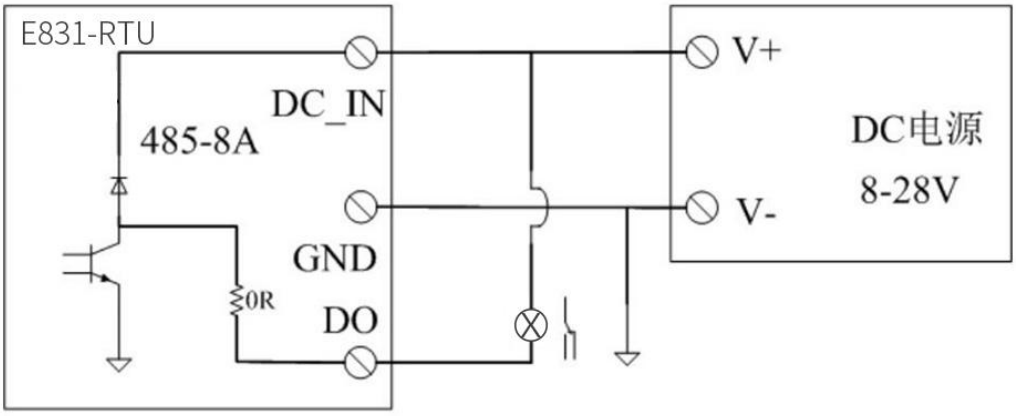
1.1.2. Digital input connections



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1.1.3. Digital output (NPN transistor open collector output) connection



1.2. Easy to use

Wiring: The computer is connected to E831 - RTU (8080T - 485) via USB to RS485 .

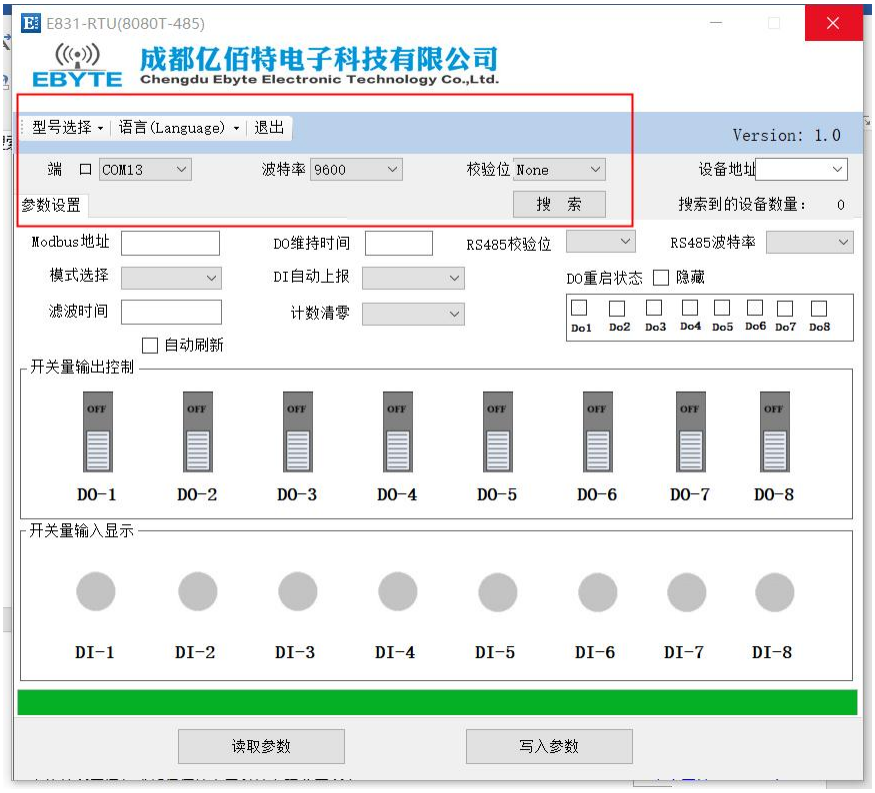
Power supply: The working voltage of E831 - RTU (8080T - 485) is DC 8 ~ 28 V, and 12V or 24V is recommended .

1.2.1. RS485 bus control

Select the corresponding model and port, and click Search to search for the device.

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After searching for the device, click Stop.



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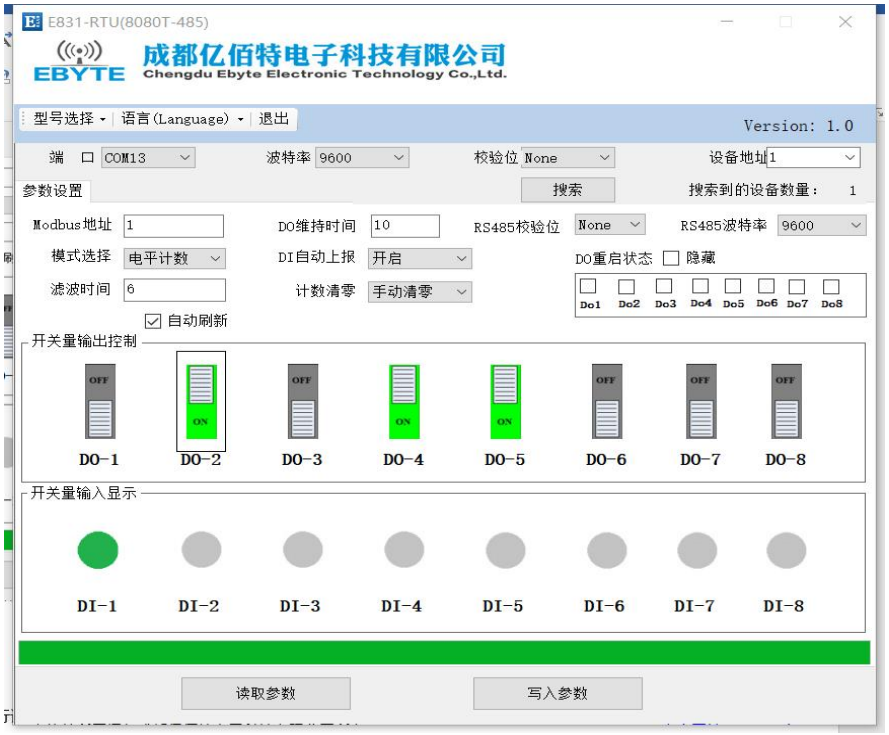
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At this time, you can see the device address of the current device. Click Read Parameters or Write Parameters to read and configure parameters.



Note: do not check the automatic refresh option when configuring or reading parameters.

Check Auto Refresh to read and configure the input and output ports.



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Note: Do not check the automatic refresh option when reading or writing parameters. Check the automatic refresh option after the configuration or reading is completed. Otherwise, the parameter writing or reading may not be successful.

2. Product Introduction

E831 -RTU (8080T - 485) is an IO product that supports 8 digital inputs (default dry contacts) and 8 digital outputs (NPN transistor open collector output). It supports Modbus RTU protocol. This product is highly easy to use and users can easily and quickly integrate it into their own systems.

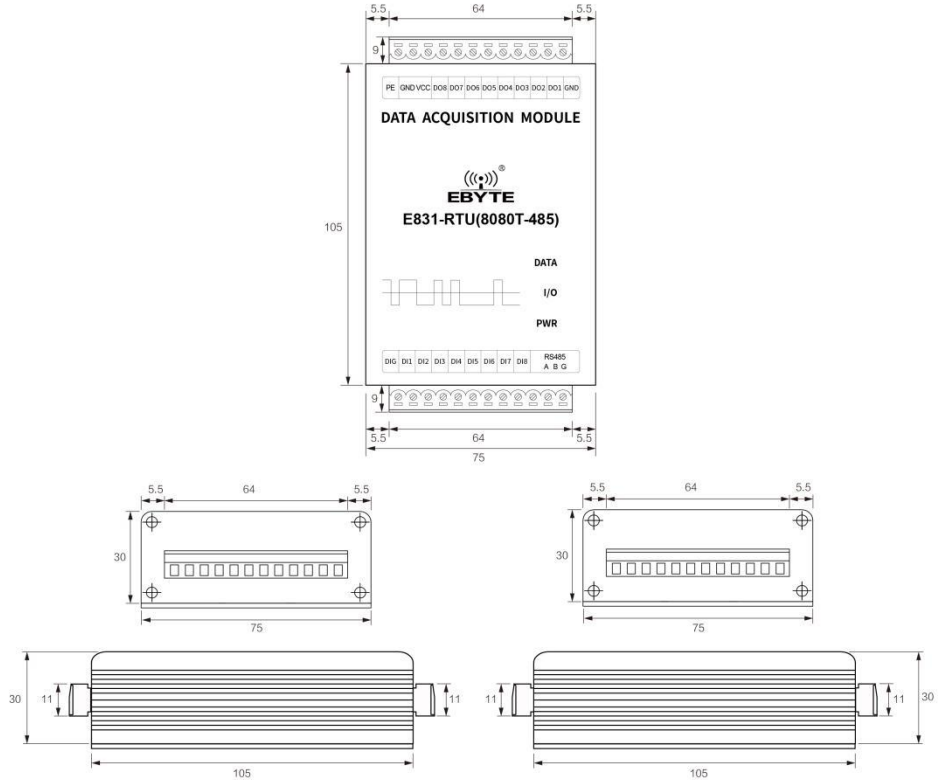
2.1. Basic parameters

	project	index
Hardware Parameters	Product size (H*W*D)	105*75*30 mm
	Product Weight	256 g
	Interface	Wire pressing method, 1 *12*5.08mm
	Operating voltage	DC 8V~28V , 12V or 24V is recommended , exceeding 28V may damage the device
	Working current	1 2V@ 5 6mA standby current 1 2V @ 8 6 mA operating current
	Communication interface	RS485: 1200 ~ 115200bps
	8-channel digital input interface	Dry contact, D I acquisition frequency 1 KHz
	8-channel digital output interface	Open collector, D O contact capacity: 4 0V/1A
	Baud rate	Baud rate range: 1 200 ~ 115200bps , default is 9 600
	Operating temperature	-20℃~ + 70℃
	Storage temperature	-40℃~+85℃
	Operating humidity	5%~95%
	Storage humidity	1%~95%

2.2. Dimensions, interface description

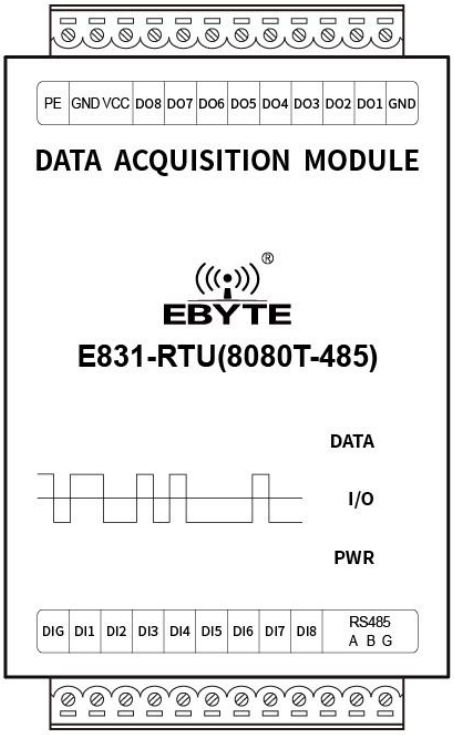
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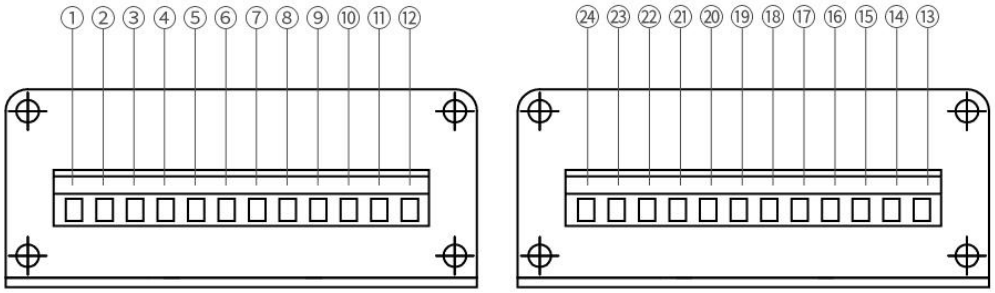
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Serial number	Port and other definitions	Function	illustrate
1	P E	Connecting with the Earth	Connecting with the Earth
2	GND	Press-wire power input negative pole	Power reference ground
3	VCC	Press-wire power input positive terminal	Power input terminal, DC 8 V~ 28 V, 12V/24 V recommended
4	DO8	Digital output channel 8	NPN transistor open collector output channel 8
5	DO7	Digital output channel 7	NPN transistor open collector output channel 7
6	DO6	Digital output channel 6	NPN transistor open collector output channel 6
7	DO5	Digital output channel 5	NPN transistor open collector

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			output channel 5
8	DO4	Digital output channel 4	NPN transistor open collector output channel 4
9	DO3	Digital output channel 3	NPN transistor open collector output channel 3
10	D O2	Digital output channel 2	NPN transistor open collector output channel 2
11	DO1	Digital output channel 2	NPN transistor open collector output channel 1
12	GND	Signal reference ground	Signal reference ground
13	RS485-G	RS485 signal reference ground	RS485 signal reference ground, not connected
14	RS485-B	RS485 interface B	RS485 interface B is connected to device B interface
15	RS485-A	RS485 interface A	RS485 interface A is connected to device A interface
16	DI8	Digital input channel 8	Form dry contact with DIG
17	DI7	Digital input channel 7	Form dry contact with DIG
18	DI6	Digital input channel 6	Form dry contact with DIG
19	DI5	Digital input channel 5	Form dry contact with DIG
20	DI4	Digital input channel 4	Form dry contact with DIG
twenty one	DI3	Digital input channel 3	Form dry contact with DIG
twenty two	DI2	Digital input channel 2	Form dry contact with DIG
twenty three	DI1	Digital input channel 1	Form dry contact with DIG
twenty four	DIG	Digital input signal reference ground	Digital input signal reference ground, used in conjunction with D I terminal
LED Light			
DATA	Serial port data indication	Two-color light, green indicates data receiving, blue indicates data sending	
I /O	Input and output status indicator	Two-color light, the green indicator light will light up when any input has a signal, and the blue indicator light will light up when any output has a signal. When there is both output and input, both will light up at the same time, and the indicator light will be cyan.	
PWR	Power indicator	Red LED, long on	

Notice:

Grounding : It is recommended to connect the shell to the ground

2.3. Command reset description

Within 3 seconds after power-on, send the command: AT +RESTORE \ r\n to the 485 serial port to reset the MODBUS address, serial port baud rate, and parity check parameters of the machine to

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the default parameters (1, 9600, no check).

3. Modbus

3.1. Modbus Address Table

Register address table (function code: 0x01H, 0x05H, 0x0FH, 0x03H, 0x06H, 0x10H)					
Register Address	Number of registers	Register attributes	Register Type	Register value range	Support function code
00017 (0x0010)	1	DO1 digital output	Read/Write	0x0000 or 0xFF00 (0x05 function code) 0-1 (0x01, 0x0F function code)	0x01 0x05 0x0F
00018 (0x0011)	1	DO2 digital output	Read/Write		
00019 (0x0012)	1	DO3 digital output	Read/Write		
00020 (0x0013)	1	DO4 digital output	Read/Write		
00021 (0x0014)	1	DO 5 digital output	Read/Write		
00022 (0x0015)	1	DO 6 digital output	Read/Write		
00023 (0x0016)	1	D O7 digital output	Read/Write		
00024 (0x0017)	1	D O8 digital output	Read/Write		
reserve					
10017 (0x0010)	1	DI1 digital input	Read-only	0-1	0x02
10018 (0x0011)	1	DI2 digital input	Read-only		
10019 (0x0012)	1	DI3 digital input	Read-only		
10020 (0x0013)	1	DI4 digital input	Read-only		
100 21 (0x001 4)	1	DI 5 digital input	Read-only		
1002 2 (0x001 5)	1	DI 6 digital inputs	Read-only		
1002 3 (0x001 6)	1	DI7 digital input	Read-only		
1002 4 (0x001 7)	1	D I 8 digital inputs	Read-only		
reserve					
40049 (0x00 30)	1	DI1 pulse count value	Read-only	0 - 65535	0x03
40 0 50 (0x00 31)	1	DI2 pulse count value	Read-only	0 - 65535	
40051 (0x00 32)	1	DI3 pulse count value	Read-only	0 - 65535	
40052 (0x00 33)	1	DI4 pulse count value	Read-only	0 - 65535	
4005 3 (0x00 3 4)	1	DI 5 pulse count value	Read-only	0 - 65535	
4005 4 (0x00 3 5)	1	DI 6 pulse count value	Read-only	0 - 65535	

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4005 5 (0x003 6)	1	DI7 pulse count value	Read-only	0-65535	
4005 6 (0x003 7)	1	DI8 pulse count value	Read-only	0-65535	
reserve					
40065 (0x00 40)	1	DI1-DI8 pulse count reset	Write only	0x00 - 0x F F	0x06
reserve					
40078 (0x00 4D)	1	Device Address	Read/Write	1 - 247	0x03 0x06 0x10
40079 (0x00 4E)	1	Baud rate	Read/Write	0 - 7	
40080 (0x00 4F)	1	Check digit	Read/Write	0 - 2	
40082 (0x00 51)	1	Automatic reporting of switch quantity	Read/Write	0 - 1	
40083 (0x00 52)	1	Digital output time setting (milliseconds)	Read/Write	100 -65535	
40085 (0x00 54)	1	Switch restart output status setting	Read/Write	0x00 - 0x10 0	
reserve					
40300 (0x012B)	1	Version Number	Read-only	--	0x03

3.2. Modbus address table

Modbus address table	
1 (default)	1
2	2
3	3
…	…
24 5	24 5
24 6	24 6
24 7	24 7

3.3. RS485 serial port baud rate code value table

Baud rate code value table	
0	1200
1	2400
2	4800
3 (default)	9600
4	19200
5	38400
6	57600
7	115200

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3.4. RS485 serial port check bit code value table

Check digit value table	
0 (default)	No verification
1	Even parity
2	Odd Parity

3.5. Configure parameters via the host computer

Select the " Parameter Setting " column to read parameters, write parameters, and see the product function introduction below for specific functions .

Note: When setting parameters, please clear the "Auto Refresh" in the acquisition control page to avoid the situation where the parameters cannot be written successfully.



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4. Product Features

4.1. Mode Selection

The device supports three pulse counting methods: rising edge counting, falling edge counting and level counting. See the section on pulse counting and clearing below.

4.2. Basic IO functions

4.2.1. Switching DO output

4.2.1.1.Read switch DO output

Function code: 01, read coil status
Address range: 00017 (0x0010) ~ 00023 (0x0017)
example:

Read the status of 8 digital outputs. Assume the return value is 03, corresponding to the binary bit 0000 0011, which means DO1 and DO2 are turned on. The 8 bits represent the digital output status, which are DO 8, DO 7, DO6, DO5, DO4, DO3, DO2 , and DO1 .

Modbus RTU protocol reads digital output:

send	01	01	00 10	00 0 8	3C 09
	Device ModBus address	Function code	Switch value starting address	Read switch quantity	CRC checksum

take over	01	01	01	03	11 89
	Device ModBus address	Function code	Returns the number of bytes	Digital output value	CRC checksum

4.2.1.2.Control switch DO output

Function code: 05, write single coil status; 0F , write multiple coil status
Address range: 00017 (0x0010) ~ 00023 (0x0017)
example:

Function code 0x05 writes DO2 digital output and writes a value of FF 00; closes D 02 port and writes a value of 00 00.

Modbus RTU protocol writes digital output:

send	01	05	00 11	FF 00	DC 3F
	Device ModBus address	Function code	Switch address	Write value	CRC checksum

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take over	01	05	00 11	FF 00	DC 3F
	Device ModBus address	Function code	Switch address	Write value	CRC checksum

Function code 0x0 F writes DO2, DO3 digital output, the written value should be 0 x03 , corresponding to the binary bit 0000 0011, (note that the starting address here starts from DO2)

Modbus RTU protocol writes digital output:

send	01	0F	00 11	00 02	01	03	62 95
	Device ModBus address	Function code	Switch address	Write switch quantity	Number of bytes	Write value	CRC checksum

take over	01	0F	00 11	00 02	84 0F
	Device ModBus address	Function code	Switch address	Write value	CRC checksum

4.2.2. Read switch quantity DI input

Function code: 02, read (switch quantity) input status

Address range: 10017 (0x0010) ~ 10023 (0x0017)

Note: The device defaults to dry contact input. When DI and DIG are short-circuited, the read value should be 1; when DI and DIG are not short-circuited, the read value should be 0.

example:

Read 8 digital input values, DI input terminals DI1 and DIG are short-circuited, DI2 and DIG are not short-circuited, DI3 and DIG are short-circuited, and DI4 and DIG are not short-circuited. The read digital input value is 0x05, corresponding to the binary bit 0000 0101. The 8 bits represent the digital input value, which are DI8 , DI7 , DI6 , DI5 , DI4, DI3, DI2, and DI1.

Modbus RTU protocol reads digital input:

send	01	02	00 10	00 08	78 09
	Device ModBus address	Function code	Switch value starting address	Read switch quantity	CRC checksum

take over	01	02	01	05	61 8B
	Device ModBus address	Function code	Returns the number of bytes	Digital input value	CRC checksum

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4.3. IO Features

4.3.1. Pulse counting and count clearing

The device supports three pulse counting modes: rising edge counting, falling edge counting and level counting. The value can be set by writing the corresponding value to the (0 x0053) register. Writing 0 represents rising edge counting, writing 1 represents falling edge counting, and writing 2 represents level counting. If rising edge counting is selected, it will only count when D I detects a rising edge of the level. Other functions are similar.

In addition, the device also supports input count filtering function. The signal must be maintained for several sampling cycles before it can be confirmed. The default value is 15 , and 15 sampling cycles can be confirmed. The range is 1~20 values. This value can be set by writing the corresponding value to the (0 x0054) register. The sampling cycle is 1ms. Note that this function only supports level counting mode.

The pulse count is not saved after power failure.

Count clearing also supports manual clearing and automatic clearing: automatic clearing after input count reading, or manual clearing, which can be set. If it is automatic clearing, the register value will be cleared after each reading. If it is manual clearing, it will either be cleared when the count reaches the maximum value of 65536, or cleared by writing to the register. Writing 0 to the (0x0055) register represents manual clearing, and writing 1 represents automatic clearing. Note that when it is set to automatic clearing, manual clearing does not work.

4.3.1.1.Read pulse count value

Function code: 03, read holding register

Address range: 40049 (0x00 30) ~ 4005 6 (0x00 37)

Note: The maximum value of pulse count is 65535

example:

DI1 has currently detected 16 pulses, and DI2 has currently detected 3 pulses. Read the digital input count values of DI1 and DI2.

Modbus RTU protocol reads pulse count value:

send	01	03	00 30	00 02	C4 04
	Device ModBus address	Function code	Starting address	Read quantity	CRC checksum

take over	01	03	04	00 10	00 03	BB F7
	Device ModBus address	Function code	Returns the number of bytes	DI1 count value	DI2 count value	CRC checksum

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4.3.1.2.Manually clear the pulse count value

Function code: 06, write holding register

Address range: 40065 (0x00 40)

Note: The lower four bits of the register value represent the counts of DI6 , DI5 , DI4, DI3, DI2, and DI1 respectively. Writing "1" means the count is cleared and the pulse counting starts again .

example:

Clear DI2 and DI4 pulse count values, and keep DI1 and DI3 pulse count values. The written value should be 0 x0a , and the corresponding binary value is 0000 1010.

Modbus RTU protocol clears pulse count value

send	01	06	00 40	00 0a	08 19
	Device ModBus address	Function code	address	Write value	CRC checksum

take over	01	06	00 40	00 0a	08 19
	Device ModBus address	Function code	address	Write value	CRC checksum

4.3.2. Digital input DI automatic reporting

The automatic reporting function of digital input is to transmit the changed value when the switch value changes. You can choose to transmit via RS485 or GPRS, or you can turn off the automatic reporting function.

Modbus register corresponding to the automatic reporting setting of the switch quantity is 40081 (0x00 50) , and the corresponding function is:

0， Disable the automatic reporting function of switch quantity

1， Switching quantity is automatically reported via RS485 transmission

The switch quantity change upload protocol is listed in the table below, where the frame headers 0xAA and 0xBB are fixed. When the counting mode is set to level counting, the value range of DI1, DI2, DI3, DI4, DI5 , DI6 , DI7 , and DI8 is 0x00, 0x01, and 0xFF.

0x00 means the digital input is disconnected.

0x01 means the digital input is closed.

0xff means that the digital input has not changed.

1 to DI8 in the table represent that the status of DI1, DI2, DI5 , DI6 , DI7 , and DI8 are updated to open, the status of DI3 is updated to closed, and the status of DI4 is unchanged. The last two bytes are the modbus CRC16 calculated values.

Note: When set to rising edge counting mode, the value of D I is 00 after one trigger, and when set to falling edge counting mode, the value of D I is 01 after one trigger. Similarly, 0 xff means no change.

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Frame Header	DI1	DI2	DI3	DI4	D I5	D I	D I7	DI8	Modbus CRC
0xAA 0xBB	0x00	0x00	0x01	0xff	0x 00	0x 00	0x 00	0x00	0x 05 0x 97

4.3.3. Digital output DO time setting

The switch pulse output time setting is to set the digital output time. The corresponding Modbus register is 40083 (0x00 52) , and its value range is 100-65535ms. If the value is lower than 100ms, the default digital output closure is in the hold state, that is, the digital output is always held after closing. If it is set to 100ms or more, such as 500ms, after sending the digital output closing command, the switch closure will be maintained for 500ms, and then automatically disconnected after 500ms.

4.3.4. Switch DO restart output state setting

Whether the device maintains the state before power failure or restarts to maintain a specific output state after power failure. This function is only valid when the device digital output time setting register value is less than 100ms.

The Modbus register corresponding to the switch restart output state setting is 40085 (0x00 54) , and its value range is 0x00-0x10 0. When the register value is 0x100, the last digital output state is maintained after power failure and restart; when the register value is 0x00-0x F F, the digital output state of the device restart is determined by the lower 8 bits, bit6 corresponds to DO6, bit5 corresponds to DO5, bit4 corresponds to DO4, and bit1 corresponds to DO1. For example, when power is on, DO4 and DO2 are in a closed state, and other ports such as DO3 and DO1 are in a disconnected state. The corresponding register value is 0000 1010, that is, 0xa0, "1" is a closed state, and "0" is a disconnected state.

Important Notice

- Ebyte reserves the final right of interpretation and modification of all contents in this manual.
- Due to the continuous improvement of the product hardware and software, this manual may be changed without prior notice. The latest version of the manual shall prevail.
- Protecting the environment is everyone's responsibility: To reduce paper usage, this manual is only printed in Chinese. The English manual is only available in electronic format. If necessary, please download it from our official website. In addition, unless otherwise requested by the user, when placing a bulk order, we will only provide product manuals in proportion to the order quantity. Not every digital radio will be provided with a manual. Please understand.

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Revision History

Version	Revision Date	Revision Notes	Maintainer
1.2	20 25 -05- 26	Version Changes	Blue

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