Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

E831-RTU(8080T-485) User Manual

Contents

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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 power-on, after sending AT+RESTORE\r\n command to the 485 serial port , the Modbus device address , RS485 serial port baud rate and parity bit will be restored to factory settings;
- Support pulse counting, which can be configured as rising edge counting, falling edge counting, and level counting.
- Hardware watchdog with high reliability;
- Multiple indicator lights show the working status;
- The power supply has good overcurrent, overvoltage, anti-reverse connection and other functions;
- Wide voltage input 8V-28V , 12V or 24V is recommended .
- Customizable functions, such as conditional control (determining how to output according to the input state).

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. Interesting chapters to read. Refer to subsequent chapters for specific details and instructions.

1.1 Port connection

1.1.1 RS485 connection
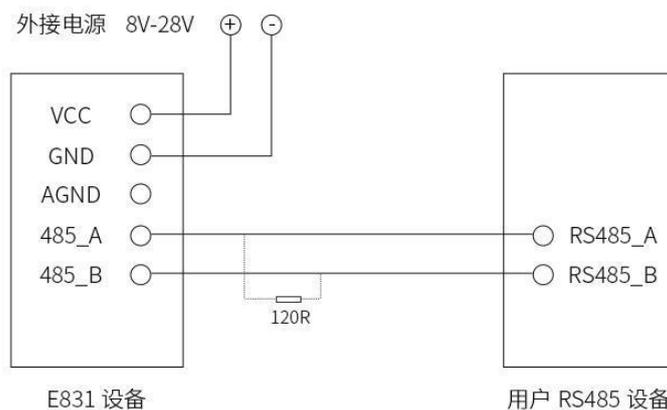
Note: When the 485 bus high-frequency signal is transmitted, the signal wavelength is shorter than that of the transmission line, and the signal will form a reflected wave at the end of the transmission line, which will interfere with the original signal, so it is necessary to add a terminal resistance at the end of the transmission line, so that the signal does not reflect after reaching the end of the transmission line. The terminal resistance should be the same as the impedance of the communication cable, with a typical value of 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 connection
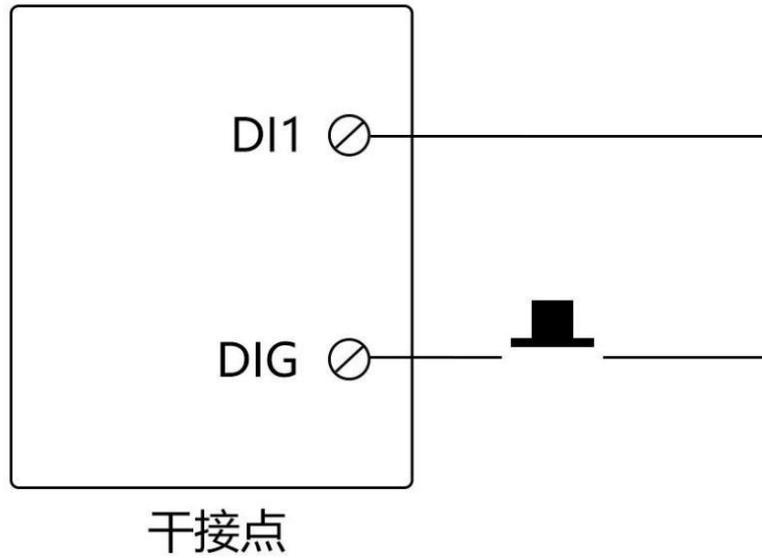
1.1.3 Digital output (NPN transistor open collector output) connection
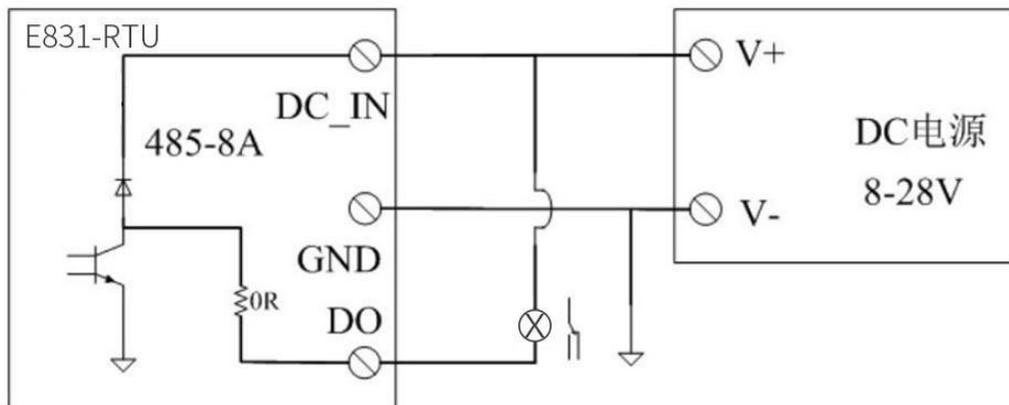
1.2 Simple to use

Wiring: Connect the computer to E831-RTU (8080T-485) via USB to RS485.

Power supply: E831-RTU (8080T-485) working voltage is DC 8~28V, 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.

Once the device is found, click Stop

At this time, you can see the device address of the current device, click to read parameters or write parameters, you can read parameters and configuration parameters.

Note, do not check automatic refresh when configuring or reading parameters. Tick auto refresh to read and configure the input and output ports.
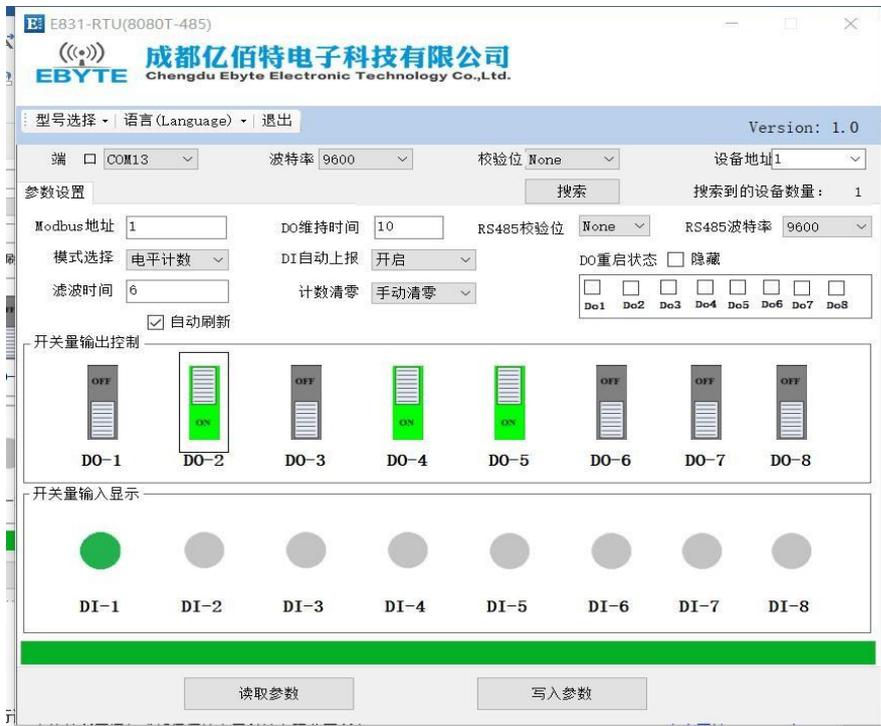
Note: Do not check automatic refresh when reading or writing parameters, and check automatic refresh after the configuration or reading is completed, otherwise the parameter writing or reading may not be successful.

2 Product introduction

E831-RTU(8080T-485) is an IO product that supports 8-channel digital input (default dry contact) and 8-channel digital output (NPN transistor open-collector output). Modbus RTU protocol is supported. The product has a high degree of ease of use, and users can easily and quickly integrate into their own systems.

2.1 Basic parameters

	Name	Describe
Hardware parameters	Product size (H*W*D)	105*75*30mm
	product weight	256g
	interface	Crimping method, 1*12*5.08mm
	Operating Voltage	DC8V~28V, 12V or 24V is recommended, over 28V may damage the device prepare
	Working current	12V@ 56mA Standby Current 12V@ 86mA working current
	Communication Interface	RS485：1200~115200bps
	8 digital input interfaces	Dry contact, DI acquisition frequency 1KHz
	8 digital output interfaces	Open collector, DO contact capacity: 30V/50mA
	baud rate	The baud rate range is 1200~115200bps, and the production default is 9600
	Operating temperature	-20℃~+70℃
	storage temperature	-40℃~+85℃
	Working humidity	5%~95%
	Storage humidity	1%~95%

2.2 Dimensions and interface description
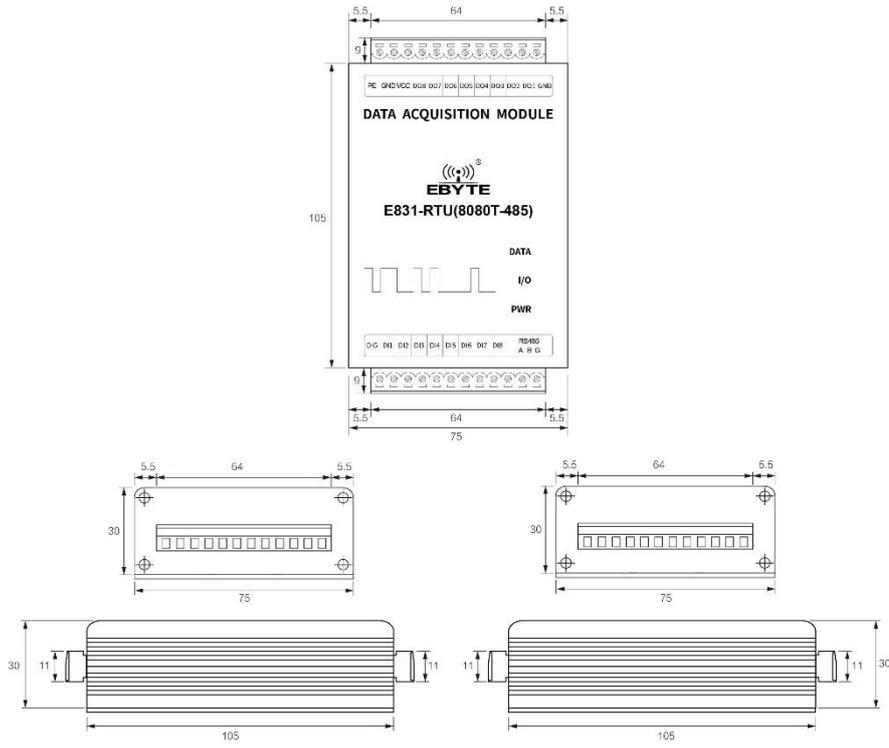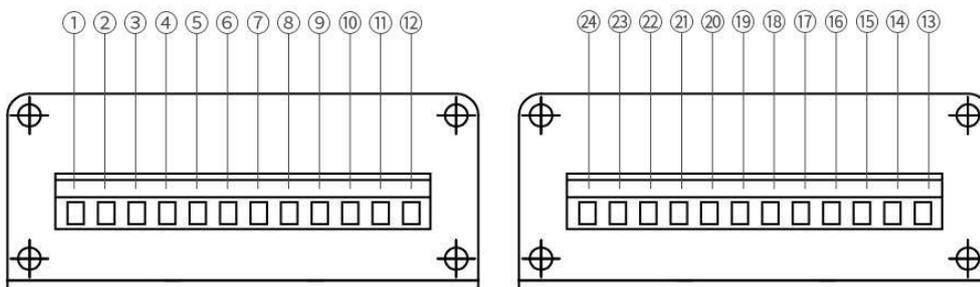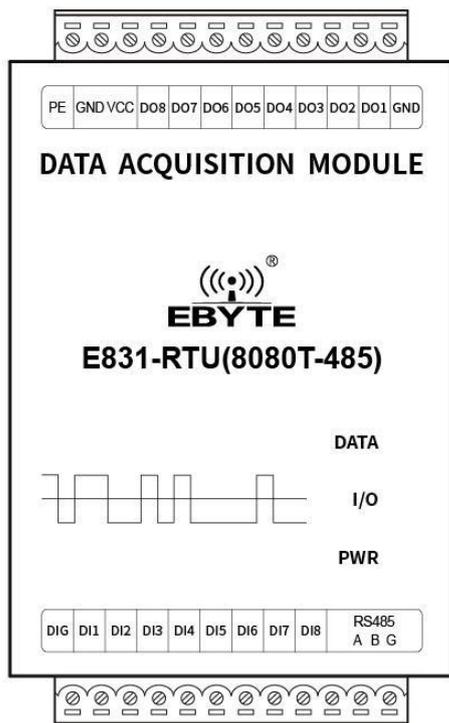
No.	Port and Other Definitions	Function	illustrate
1	ON	connect with the earth	connect with the earth
2	GND	Crimp power input negative pole	Power reference ground
3	VCC	Crimp power input positive pole	Power input terminal, DC 8V~28V, recommended 12V/24V
4	DO8	Digital output channel 8	NPN transistor open 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 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	DO2	Digital output channel 2	NPN transistor open collector output channel 2

11	DO1	Digital output channel 1	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, optional
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 the 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
21	DI3	Digital input channel 3	Form dry contact with DIG
22	DI2	Digital input channel 2	Form dry contact with DIG
23	DI1	Digital input channel 1	Form dry contact with DIG
24	YOU	Digital input signal reference ground	Digital input signal reference ground, used in conjunction with DI use
LED lights			
DATA	Serial data indication	Two-color light, green indicates data reception, blue indicates data transmission	
I/O	I/O status indicator	Two-color light, any channel of input has signal green indicator light, any channel of output has signal blue indicator. The indicator light is on, when there is both output and input, it is on at the same time, and the indicator light is cyan.	
PWR	Power indicator	Red LED, always on	

Notice: Grounding: It is recommended to connect the case to the ground

2.3 Instruction reset description

Within 3 seconds of power-on, send the command to the 485 serial port: AT+RESTORE\r\n to reset the MODBUS address of the machine, the serial port baud rate, and the parity parameters are the default parameters (1, 9600, no parity).

3 Modbus

3.1 Modbus address table

Register address table (function code: 0x01H, 0x05H, 0x0FH, 0x03H, 0x06H, 0x10H)					
register address	Number of registers	register properties	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	DO5 digital output	read/write		
00022 (0x0015)	1	DO6 digital output	read/write		
00023 (0x0016)	1	DO7 digital output	read/write		
00024 (0x0017)	1	DO8 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		
10021 (0x0014)	1	DI5 digital input	read only		

| 10022 (0x0015) | 1 | DI6 digital input | read only | | |

10023 (0x0016)	1	DI7 digital input	read only			
10024 (0x0017)	1	DI8 digital input	read only			
reserve						
40049 (0x0030)	1	DI1 pulse count value	read only	0-65535		
40050 (0x0031)	1	DI2 pulse count value	read only	0-65535		
40051 (0x0032)	1	DI3 pulse count value	read only	0-65535	03	0x
40052 (0x0033)	1	DI4 pulse count value	read only	0-65535		
40053 (0x0034)	1	DI5 pulse count value	read only	0-65535		
40054 (0x0035)	1	DI6 Pulse count value	read only	0-65535		
40055 (0x0036)	1	DI7 pulse count value	read only	0-65535		
40056 (0x0037)	1	DI8 Pulse count value	read only	0-65535		
reserve						
40065 (0x0040)	1	DI1-DI8 pulse count clear	just write	0x00 - 0xFF	0x 06	
reserve						
40078 (0x004D)	1	Device address	read/write	1 - 247		0x
40079 (0x004E)	1	baud rate	read/write	0 - 7	03 06	0x
40080 (0x004F)	1	Check Digit	read/write	0 - 2	10	0x
40082 (0x0051)	1	Automatic reporting of switch value	read/write	0 - 1		
40083 (0x0052)	1	Digital output time setting (milliseconds)	read/write	100-65535		
40085 (0x0054)	1	Switch restart output state setting	read/write	0x00 - 0x100		
reserve						
40300 (0x012B)	1	version number	read only	--	03	0x

3.2 Modbus address table

Modbus address table	
1 (default)	1
2	2
3	3

...	...
245	245
246	246
247	247

3.3 RS485 serial port baud rate code table

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

3.4 RS485 serial port check digit value table

Check Digit Value Table	
0 (default)	no verification
1	even parity
2	Odd parity

3.5 Configure parameters through the host computer

Select the "parameter setting" column to read and write parameters. For specific functions, see the product function introduction below.

Note: To set parameters, please clear "Auto Refresh" in the acquisition control page. In order to avoid the situation that the parameter writing is unsuccessful sometimes.

4 Product Function

4.1 Mode selection

The device supports 3 pulse counting methods, rising edge counting, falling edge counting and level counting, see the pulse counting and clearing section below.

4.2 IO basic functions

4.2.1 Switch 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 8-channel digital output status, assuming the return value is 03, which corresponds to the binary bit 0000 0011, which means that DO1 and DO2 are open. 8 bits represent the digital output status, which are DO8, DO7, DO6, DO5, DO4, DO3, DO2, DO1.

Modbus RTU protocol to read digital outputs:

s end	01	01	00 10	00 08	3C 09
	Device ModBus address	function code	Switch start address	Number of read switches	CRC check code

t ake over	01	01	01	03	11 89
	Device ModBus address	function code	returns the number of bytes	Digital output value	CRC check code

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 Write DO2 digital output, write value is FF 00; close D02 port, write value 00 00. Modbus RTU protocol to write digital output:

sen d	01	05	00 11	FF 00	DC 3F
	Device ModBus address	function code	switch address	write value	CRC check code

tak e over	01	05	00 11	FF 00	DC 3F
	Device ModBus address	function code	switch address	write value	CRC check code

Function code 0x0F Write DO2, DO3 digital output, the write value should be 0x03, corresponding to binary bit 0000 0011, (note that the starting address here starts from DO2)

Modbus RTU protocol to write digital output:

s end	01	0F	00 11	00 02	0 1	0 3	62 95
	Device ModBus address	function code	switch address	Number of write switches	number of bytes	write value	CRC check code

t ake over	01	0F	00 11	00 02	84 0F
	Device ModBus address	function code	switch address	write value	CRC check code

4.2.2 Read switch DI input

Function code: 02, read (switch value) 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 -channel digital input value , DI input terminal 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

17

binary 0000 0101 , and 8 bits represent the digital input value, which are DI8 , DI7 , DI6 , DI5 , DI4 , DI3 , DI2, DI1.
Modbus RTU protocol to read digital inputs:

send	01	02	00 10	00 08	78 09
	Device ModBus address	function code	Switch start address	Number of read switches	CRC check code

take over	01	02	01	05	61 8B
	Device ModBus address	function code	returns the number of bytes	digital input value	CRC check code

4.3 IO Features

4.3.1 Pulse count and count clear

The device supports 3 pulse counting methods, rising edge counting, falling edge counting and level counting. This value can be written into the (0x0053) register by writing the corresponding

The value is set. When writing 0 , it means rising edge counting, writing 1 means falling edge counting, and writing 2 means level counting. For example, when counting on rising edge is selected, it will count only when DI detects that it is a rising edge of level, and other functions are similar.

In addition, the device also supports input count filtering function, and the signal must be maintained for several adoption cycles before it can be confirmed. The default value is 15,15 sampling cycles to be confirmed, the range is 1~20 , the value can be set by writing the corresponding value to the (0x0054) register, and the sampling cycle is 1ms. Note that this function only supports level counting. The pulse count will not be saved after the power is turned off.

Count clearing also supports manual clearing and automatic clearing functions: automatic clearing after the input count is read, or manual clearing, which can be set. If it is automatically cleared, the register value will be cleared after   each read. If it is manually cleared, it will either reach the maximum count of 65536 and clear, or write the register to clear it. Register to (0x0055)

Writing 0 means manual clearing, and writing 1 means automatic clearing. Note that when it is set to automatic clearing, manual clearing has no effect.

4.3.1.1 Read pulse count value

Function code: 03, read holding register
Address range: 40049 (0x0030)~40056 (0x0037)
Description: The maximum value of pulse count is 65535 Example:
DI1 has detected 16 pulses currently, DI2 has detected 3 pulses currently, read the digital input count value of DI1 and DI2, and read the pulse count value by Modbus RTU protocol:

send	01	03	00 30	00 02	C4 04
	Device ModBus address	function code	initial address	number of reads	CRC check code

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 check code

4.3.1.2 Manual reset pulse count value

Function code: 06, write hold register address range: 40065 (0x0040)
Description: 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 count is restarted. example:

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

sen d	01	06	00 40	00 0a	08 19
	Device ModBus address	functi on code	address	write value	CRC check code

t ake over	01	06	00 40	00 0a	08 19
	Device ModBus address	funct ion code	address	write value	CRC check code

4.3.2 Automatic reporting of digital input DI

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

The Modbus register corresponding to the automatic reporting setting of the switching value is 40081 (0x0050), the value corresponding to the function: 0, the automatic reporting function of the switching value is turned off

1. The switch value is automatically reported and transmitted through RS485

The switch value change upload protocol is listed in the following table, in which the frame header 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, DI8 is 0x00 , 0x01 , 0xFF, where

0x00 means the digital input is disconnected,

0x01 means the digital input is closed,

0xff means that the digital input has not changed,

The values   of DI1 to DI8 in the table represent that the status of DI1, DI2, DI5, DI6, DI7, DI8 is updated to open, the status of DI3 is updated to closed, and the status of DI4 has not changed. The last two bytes are the modbus CRC16 calculation value.

Note: When set to rising edge counting mode, trigger once, DI value is 00, when set to falling edge counting mode, trigger once, DI value is 01. Also 0xff means no change.

frame header	DI 1	DI2	DI 3	DI 4	DI5	DI6	DI7	DI8	Modbu s CRC
0xAA 0xBB	0x 00	0x 00	0x 01	0xf f	0x00	0x00	0x00	0x00	0x05 0x97

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 (0x0052), and its value range is 100-65535ms . If the value is lower than 100ms , the default digital output is closed to hold state, that is, the digital It remains on after the output is closed. If it is set to 100ms and above , such as 500ms , after sending the digital output close command, the switch value will be closed for 500ms, and then automatically disconnected after 500ms.

4.3.4 Switch DO restart output state setting

Whether the device keeps the state before power off or restarts to keep the specific output state, 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 (0x0054), and its value range is 0x00-0x100 . When the value of this register is 0x100 , the last digital output state is maintained after power off and restart; when the value of this register is 0x00-0xFF , the lower 8 bits determine the digital output state of the device restarting, bit6 corresponds to DO6, bit5 corresponds to DO5, bit4 corresponds to DO4, bit1 corresponds to DO1, such as when the power is turned on, DO4, DO2 are in the closed state, DO3, DO1 and other ports are in the open state, the corresponding register value is 0000 1010 , that is, 0xa0, "1" is the closed state , "0" is disconnected.

Important Notice

Ebyte reserves the right of final interpretation and modification of all contents in this manual.

Due to the continuous improvement of the hardware and software of the product, this manual may be changed without prior notice, and the latest version of the manual shall prevail.

Protecting the environment, everyone is responsible: In order to reduce the use of paper, this manual is only printed in Chinese, and the English manual only provides electronic documents. If necessary, please download from our official website; , we only provide product manuals according to a certain proportion of the order quantity , not every digital radio station is equipped with one by one, please understand.

Revise history

Version	Date	Revision Notes	Maintenance man
1.0	-	Initial version	-
1.1	2019/8/19	Format revision	Linson
1.2	2020/4/2	DO parameter modification	Linson

About us

Technical support: support@cdebyte.com
Documents and RF Setting download link: www.ebyte.com
Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com
----
Phone: +86 028-61399028
Web: www.ebyte.com
Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China