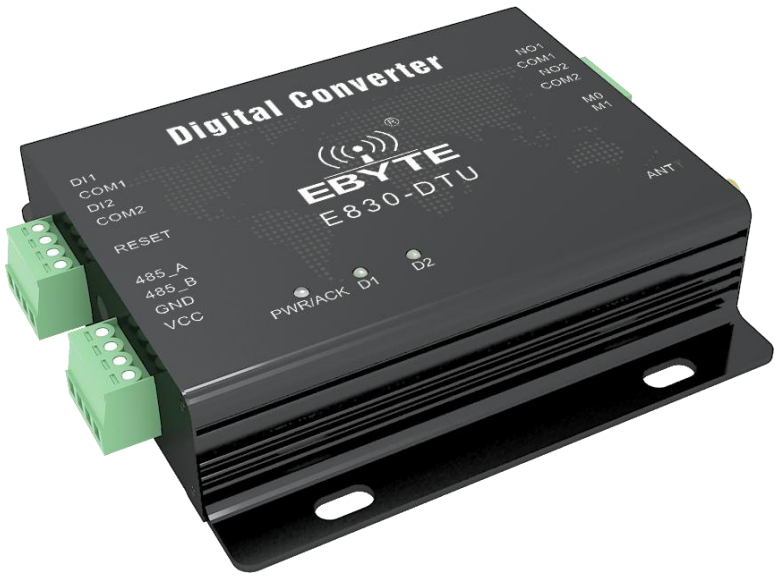
Digital/Switch Wireless Data Transmission Radio

E830-DTU (2 R2-433L)

User Manual



This manual may be changed as the product is continuously improved. Please refer to the latest version of the manual.
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Chapter 1 Product Introduction

1.1. Product Introduction

E830-DTU (2R2-433L) is a remote control product with switch quantity following and control acquisition functions. It supports 2-way isolated switch quantity input and 2-way relay output. The communication interface adopts RS-485 interface (only for configuration mode); the wireless acquisition function supports the standard MODBUS RTU protocol. This product is highly easy to use and can be widely used in signal acquisition, monitoring and control of industrial field equipment.

1.2. Features

- Support 2-way dry contact switch input;
- Support 2-way relay output;
- Adopt 433MHz frequency wireless data remote transmission;
- Digital quantity following, control and acquisition functions ;
- Supports 4 working modes: wireless control acquisition, wireless follow-up transmission mode, wireless follow-up receiving mode, and configuration mode, which can be selected through the DIP switch;
- Adopt Modbus RTU protocol data processing;
- and press it for 5s in wireless control acquisition mode , and the Modbus address will be restored to the default address 01;
- Built-in efficient watchdog with high reliability and stability;
- 3 two-color indicator lights show working status;
- The power supply has good over-current, over-voltage, and reverse connection protection functions.

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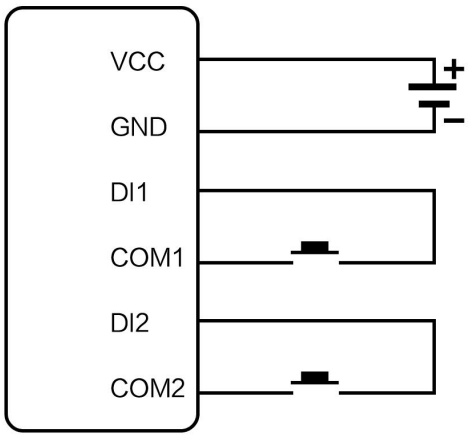
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Chapter 2 Quick Start

This chapter is a quick introduction to the E830-DTU (2R2-433L) 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.

2.1.Wiring method of each port

2.1.1.Input terminal wiring method

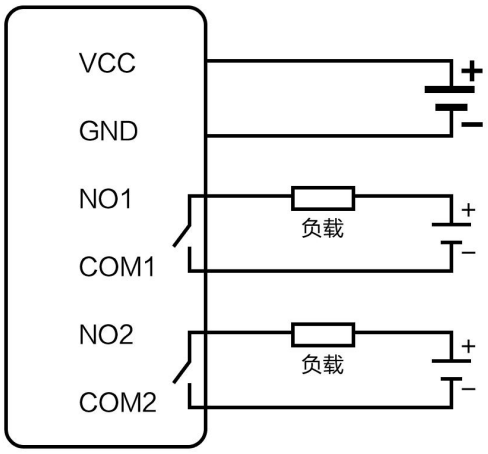


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2.1.2.Output connection method

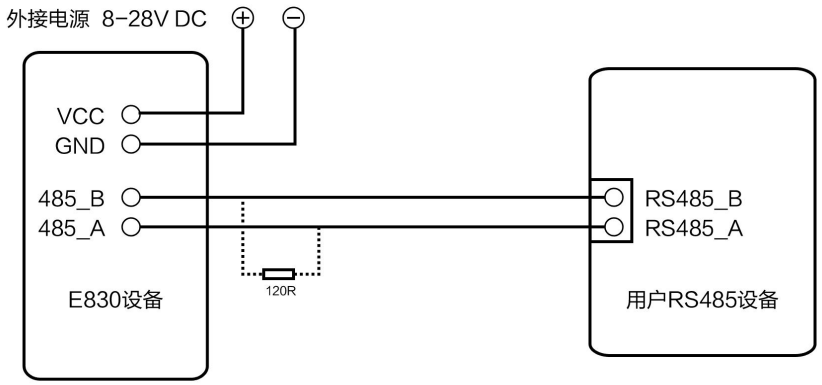


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2.1.3.RS485 connection method

In RS485 communication, attention should be paid to the matching of A and B lines. If abnormal communication is found, a 120R matching resistor should be added between A and B lines.

RS485接线图



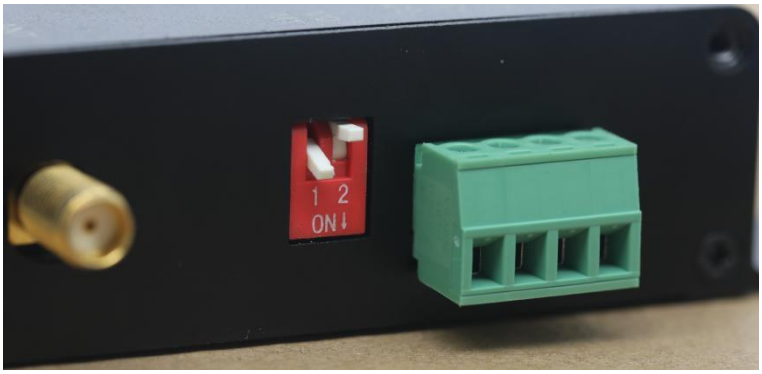
2.2. Getting Started with the Follow Feature

Prepare two E830-DTU (2R2-433L) and label them as device A and device B respectively . Make sure their parameters are the same (factory default parameters are sufficient) . Configure device A as the transmitter and device B as the receiver . After changing the mode , power on again for it to take effect .

Device A transmitter : M1M0=10

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Device B receiving end : M1M0=01





Device A changes, and the blue light of D1 turns on. The relay 1 of device B acts accordingly , and the green light of D1 turns on .

The input channel 2 of device A changes, and the blue light of D2 turns on. The relay 2 of device B acts accordingly , and the green light of D2 turns on .

In follow mode , when there is input at the transmitter, only the relay at the receiver will be activated, and the relay at the transmitter will not be activated.

2.3.Getting Started with Control Acquisition Function

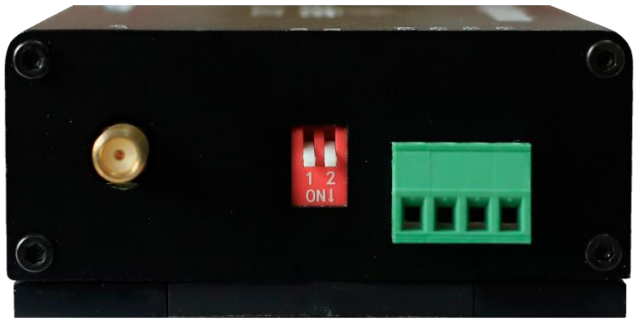
Prepare an E830 -DTU (2R2-433L) device and an E90-DT U radio. The wireless communication of the devices

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adopts the Modbus RTU protocol. Refer to the register table below to configure the wireless parameters of the E90-DT U radio to be consistent with the E830 -DTU (2R2-433L) device; configure the working mode of the E830 -DTU (2R2-433L) device through the dip switch.

E90-DTU mode: M1M0=00



E830-DTU acquisition control mode: M1M0= 11. After changing the mode , you need to power on again for it to take effect .

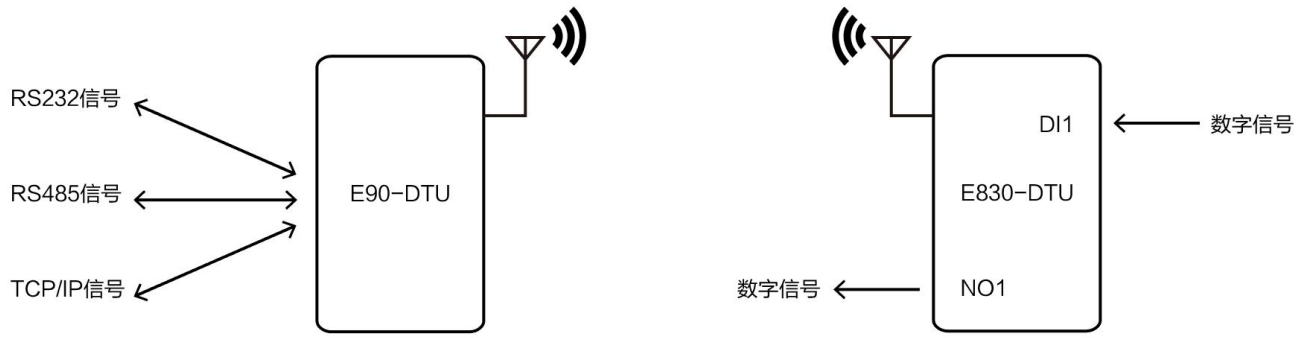


In acquisition mode, for example, the E90-DT U radio can read the input of channel 1 and channel 2 of the E830-DTU (2 R 2-433L) device through the command 01 02 00 00 00 02 F9 CB . When channel 2 has input and channel 1 has no input, the data value 01 02 01 02 20 49 will be returned , and the blue light of D 2 will be on.

In control mode, for example , the E90-DTU radio can control the E830-DTU (2 R 2-433L) device's relay 2 output to close and relay 1 output to disconnect through the command 01 05 00 00 FF 00 8C 3A, and the returned data value will be 01 05 00 00 FF 00 8C 3A, and the green light of D2 will be on.

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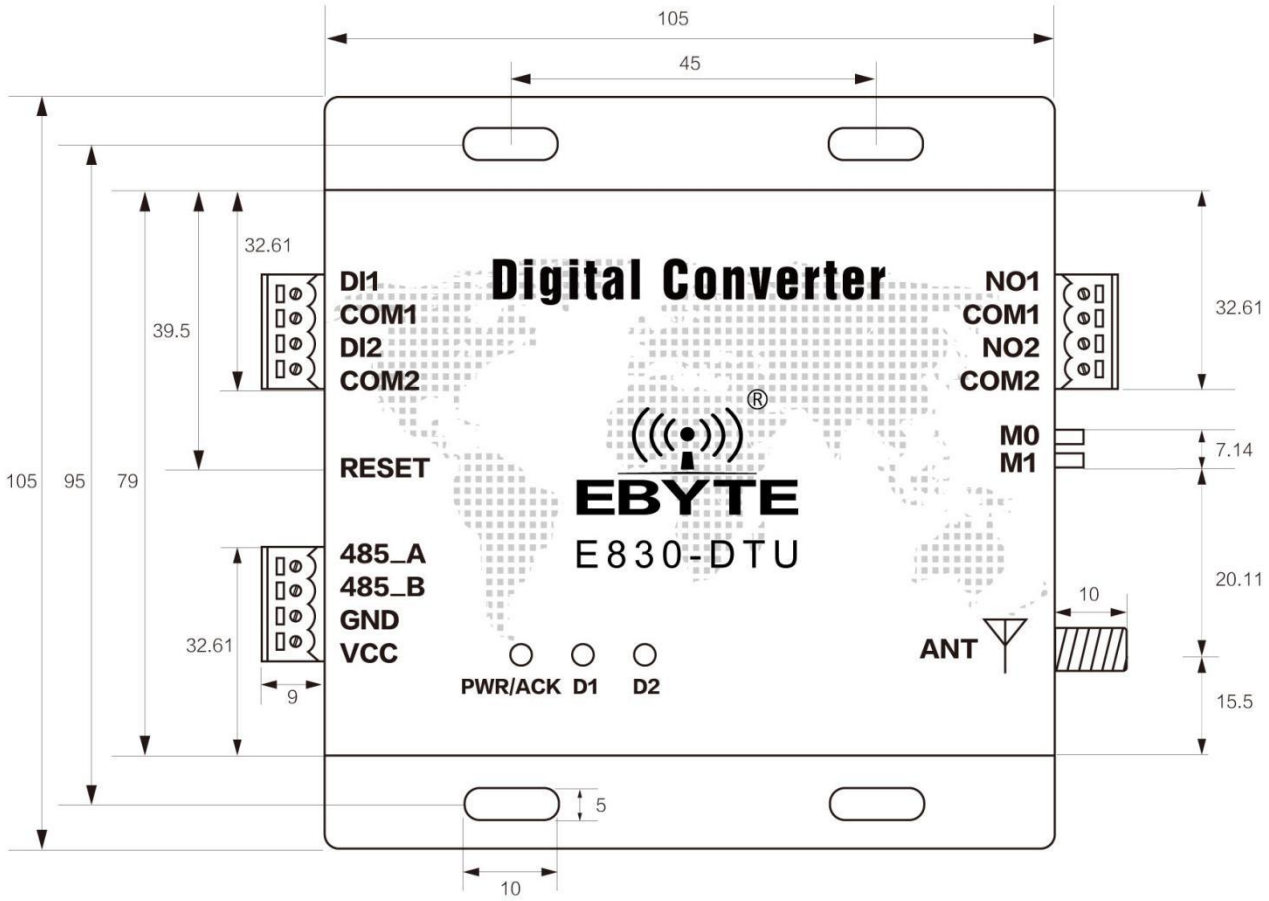
Chapter 3 Performance Parameters

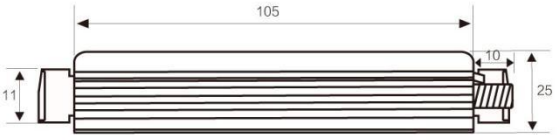
type	project	index
Wireless parameters	Factory default frequency	426MHz
	Transmit power	1W
Hardware Parameters	Product size (H*W*D)	124*105*25
	Product Weight	130 g ± 5 g
	Operating temperature	-40℃～+70℃
	Storage temperature	-40℃～+85℃
	Operating humidity	5%～95%
	Storage humidity	1%～95%
	Operating voltage	8～28V
	Relay output electrical parameters	Support 5A 30VDC or 5A 250VAC
	Data interface (3.81 terminal block)	RS485: 9600 bps
Software Parameters	Working Mode	Follow-up mode Follow receive mode Control Collection Configuration Mode
	Configuration Commands	Modbus RTU

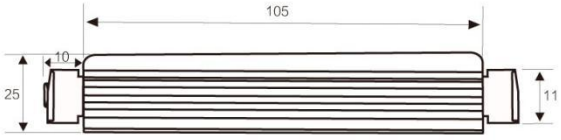
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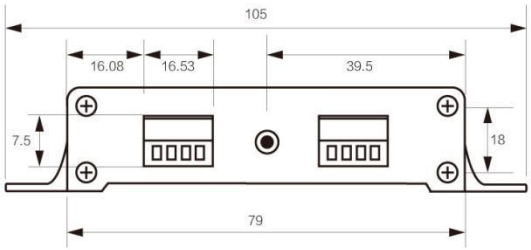
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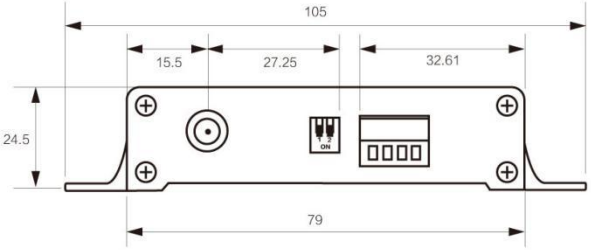
Chapter 4 Installation Dimensions







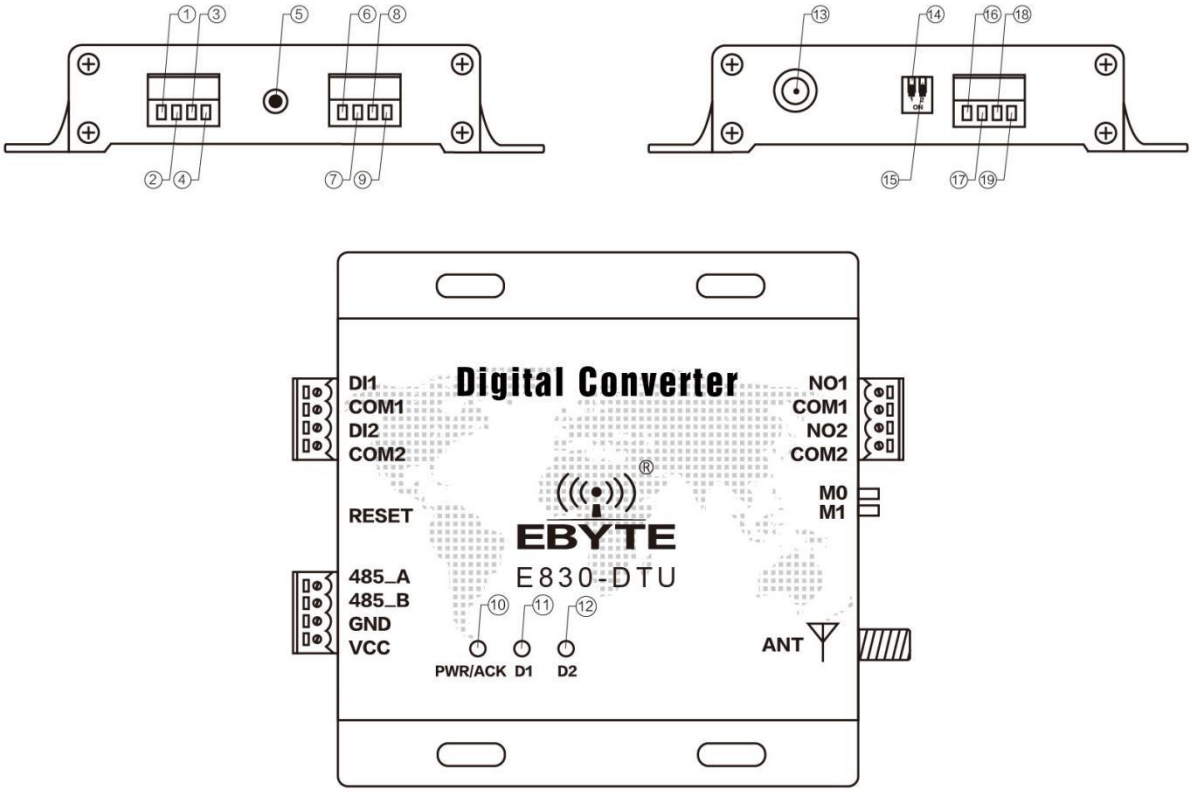




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Chapter 5 Description of each part



Serial number	Standard Definition	Function	illustrate
1	DI1	Switch input channel 1	Switch quantity acquisition 1 channel, optocoupler isolation
2	COM1	Switch input channel 1	The common terminal of input channel 1 is internally connected to the module ground.
3	DI2	Switch input channel 2	2-channel switch quantity acquisition, optocoupler isolation
4	COM2	Switch input channel 2	The common terminal of input channel 2 is internally connected to the module ground.
5	RESET	Reset button	In the acquisition mode, you can press and hold the touch button for 5 seconds to reset the Modbus address to the default address 01
6	485_A	RS-485 Interface A	RS-485 interface A is connected to device A interface and is only used for configuration parameters
7	485_B	RS-485 interface B	RS-485 interface B is connected to device B interface and is only used for configuration parameters
8	GND	Press-wire power input negative pole	Power reference ground

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9	VCC	Press-wire power input positive terminal	Power input terminal, range: DC8~28V, recommended 12V, 24V
10	PWR/ACK	Power/ACK indicator	Two-color light, blue light is power indicator, always on when powered on, green light is ACK indicator
11	D1	Input/output indicator	Two-color light, when DI1 has input signal, the blue light is on; when relay 1 is activated, the green light is on
12	D2	Input/output indicator	Two-color light, when DI2 has input signal, the blue light is on; when relay 2 is activated, the green light is on
13	ANT	Wireless module antenna interface	433M antenna interface
14	M1	Dip switch 1	M0/M1 dial determines the working mode
15	M0	DIP switch 0	M0/M1 dial determines the working mode
16	COM2	Relay output channel 2	Relay 2 output common terminal
17	NO2	Relay output channel 2	Relay 2 output normally open
18	COM1	Relay output channel 1	Relay 1 output common
19	NO1	Relay output channel 1	Relay 1 output normally open

5.1. Reset button description

Long press for 5 seconds is effective . After the reset is successful , the three green indicator lights will flash at the same time .

Note : This function is only effective in the acquisition control mode , and only resets the Modbus address to 0 x01H. Other parameters will not be reset. To restore the default factory settings , please use the host computer for configuration.

5.2. Indicator Light Description

PWR/ ACK : Power/ACK indicator

When the DTU is powered on, the power light is always on and is blue. Only when the transmitter receives the ACK returned by the receiver, the dual-color indicator light will change from blue to purple and then back to blue . When you see the color change of the indicator light, it means that the transmitter has received the ACK from the receiver.

D1 : Input/output indicator light

Two-color light, when DI 1 has input signal , the blue light is on; when relay 1 is activated, the green light is on

D2 : Input/output indicator light

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Two-color light, when DI 2 has input signal , the blue light is on; when relay 2 is activated, the green light is on.

5.3. DIP switch description

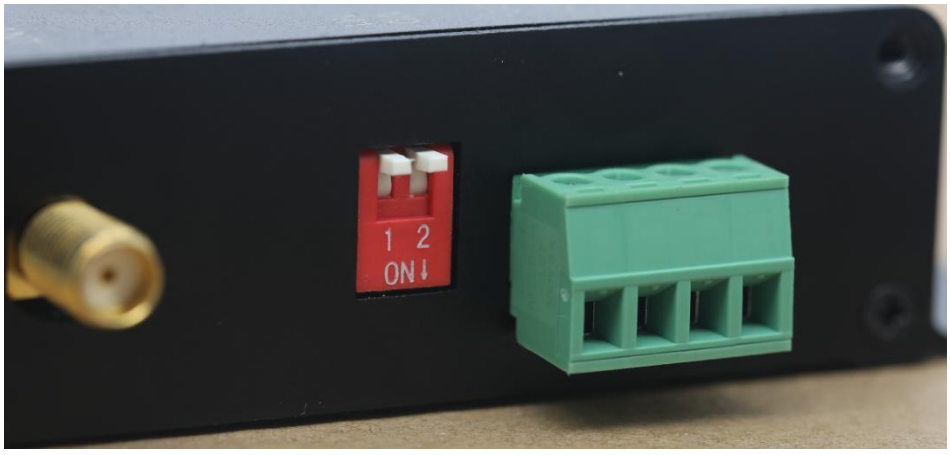
The working mode is established by the DIP switch (the state of M1M0, downward is "ON");

Note : After the mode is switched, the power must be turned on again for it to take effect.

model	Mode Category	M1	M0	Notes
Mode 0	Controlling the acquisition mode	1	1	Wireless control acquisition function
Mode 1	Follow-up mode	1	0	When the following function is used, the transmitter
Mode 2	Follow receive mode	0	1	When the follow function is used, the receiving end
Mode 3	Configuration Mode	0	0	Used to configure wireless parameters and Modbus related parameters

Chapter 6 Parameter Configuration

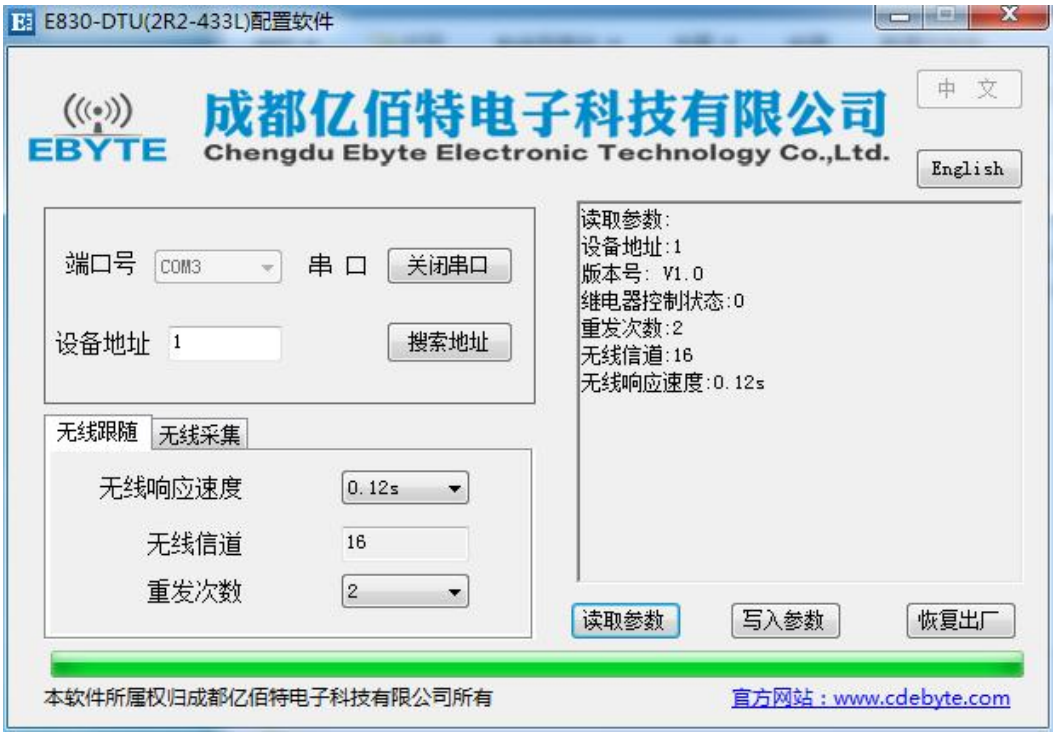
Configuration mode (M1M0=00), you can configure the parameters through the host computer :



Device address : It is the current Modbus address of DTU, ranging from 0-248 . The smaller the value, the faster the host computer searches, and the larger the value, the slower the search speed . When the address is changed by the host computer, the address must be searched again to change other parameters to take effect.

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Chapter 7 Follow Mode

7.1. Wireless response speed

It is the time it takes for data to be input from the input port, transmitted through the wireless module , and then to the relay action at the output end of the DTU at the other end ;

There are 5 levels in total . The smaller the time , the faster the speed, the smaller the delay, and the closer the distance.

E830-DTU wireless response time code value table		E90-DTU corresponding air rate
1	320m s	1200bps
2	200m s	2400bps (factory default)
3	120ms (factory default)	4800bps
4	100 m s	9600bps
5	80 m s	19200bps

7.2. Wireless Channel

The frequency of DTU wireless communication is 0 to 31 channels in total, and the corresponding frequency points are

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as shown in the figure below :

E 830-DTU wireless channel code value table		E90-DTU corresponding frequency channel and module address	
Corresponding frequency	Corresponding channel	Corresponding channel	Corresponding address
410 MHz	0	0	0000
411 MHz	1	1	0101
412 MHz	2	2	0202
439MHz	29	29	1 D1D
440MHz	30	30	1E1E
441 MHz	31	31	1 F 1 F

E90-DTU address conversion method : first change the decimal channel to a hexadecimal value, and then set the high and low bits of the address to this value . For example : the E830 channel is 16, then the E90 parameter needs to set the channel to 16 (corresponding to hexadecimal 0x10), and the high and low bits of the address are set to 10, that is, the address is 1010. As shown in the figure:

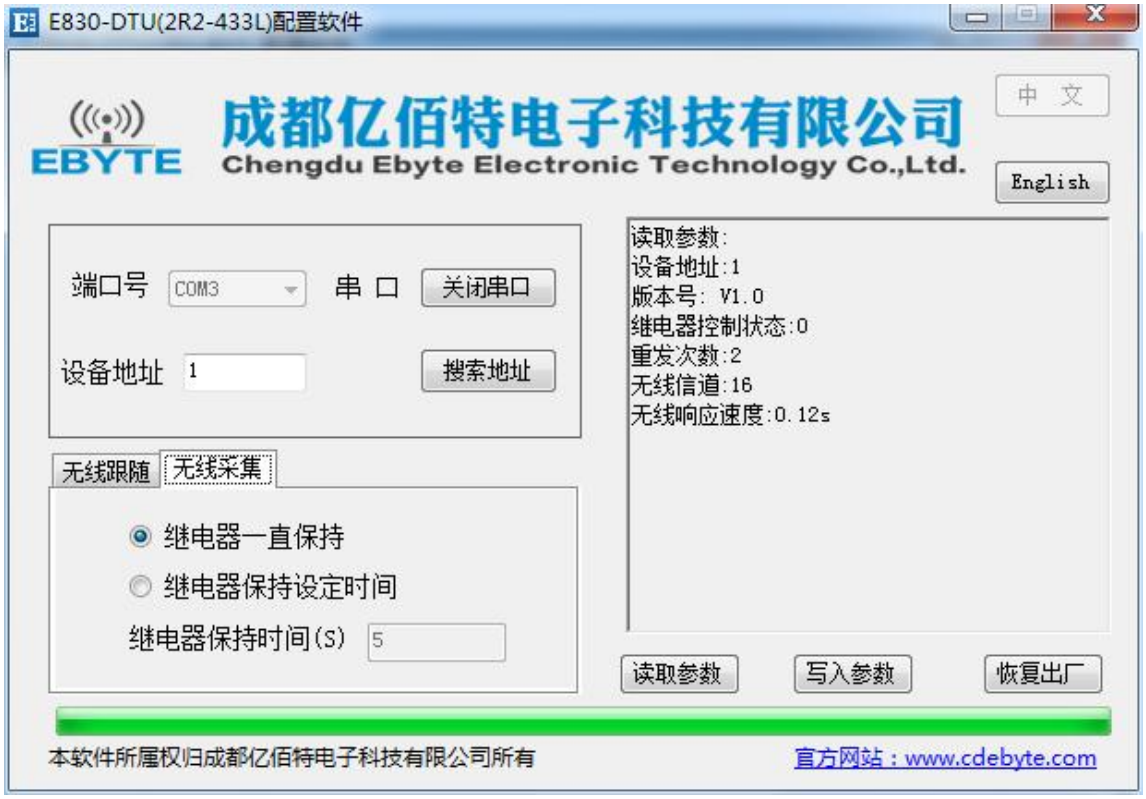


7.3. Resend times

It is the number of times the transmitter will resend data when the DTU receiver does not receive data in follow mode , which avoids data packet loss. However , the more retransmissions, the longer the transmission time will be . The actual number of transmissions = the number of retransmissions + 1. The range is from 0 to 10 times , and the default is 2 times.

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Chapter 8 Collection Mode

8.1. The relay keeps

In the acquisition mode , the control state of the relay is always maintained . The default is that the relay is always maintained.

8.2. Relay hold setting time

The control state of the relay is maintained for a certain period of time, and the holding time can be defined by yourself ;

Note: The valid value of relay holding time (S) is an integer, and decimals are invalid ;

When the relay control state is 0 , the relay is always on and the relay holding time cannot be set ; only when the relay control state is 1 can the relay holding time be set.

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Chapter 9 ModBus

9.1. Default factory settings

Wireless Channel	Modbus Address	Response time	Resend times	Relay control status
16	01	0.12 s	2	0

Note: When the wireless channel is 16 , the DTU operating frequency is 426 MHz.

9.2. Modbus Address Table

9.2.1. Coil reading and writing instructions

Coil address table (function code: 0x01H, 0x05H, 0x0FH)					
address	parameter	Read/Write	Minimum	Maximum	illustrate
00001	NO1	Read/Write	0x0000	0xFF00	Read/write the status of relay 1
00002	NO2	Read/Write	0x0000	0xFF00	Read/write the status of relay 2

Note: When sending a modbus command, the address in the table needs to be reduced by one.

Example 1: Use function code 01 to read the coil output status. For example, the command to read output ports NO1 and NO2 is as follows:

01	01	00 00	00 02	bd cb
Device ModBus address	Function code	Starting address	Coil quantity	CRC checksum

Return data value:

01	01	01	02	D0 49
Device ModBus address	Function code	Data length	Coil value	CRC checksum

Send command: 01 01 00 00 00 02 bd cb

Return data: 01 01 01 02 D0 49

In the return value, the coil value is 02, corresponding to the binary bit 0000 0010, 1 represents the relay output is closed, 0 represents the relay output is open. Bit0 is 0, which means the relay output NO1 is open; bit1 is 1, which means the relay output NO2 is closed.

Example 2: Use function code 05 to write an output coil, for example, to close the output of relay N01, and send the command as follows:

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01	05	00 00	FF 00	8C 3A
Device ModBus address	Function code	address	Write value	CRC checksum

Return data value:

01	05	00 00	FF 00	8C 3A
Device ModBus address	Function code	address	Write value	CRC checksum

Send command: 01 05 00 00 FF 00 8C 3A

Return data: 01 05 00 00 FF 00 8C 3A

In the sending command, the written value FF 00 represents ON, that is, the relay is closed; the written value 00 00 represents OFF, that is, the relay is disconnected.

Example 3: Use the 0F function code to write two output coils, for example, to close the output of relay N02 and disconnect the output of relay N01. The command sent is as follows:

01	0F	00 00	00 02	01	02	5F 56
Device ModBus address	Function code	Starting address	Number of coils	Data length	Write value	CRC checksum

Return data value:

01	0F	00 00	00 02	D40A
Device ModBus address	Function code	Starting address	Number of coils	CRC checksum

Send command: 01 0F 00 00 00 02 01 02 5F 56

Return data: 01 0F 00 00 00 02 D4 0A

In the sending instruction, the value 02 is written, which corresponds to the binary 0000 0010. Bit 0 is 0, which means OFF, that is, relay N01 is disconnected; bit 1 is 1, which means ON, that is, relay N02 is closed.

9.2.2 Discrete address table

Discrete address table (function code: 0x02H)					
address	**parameter**	**Read/Write**	**Minimum**	**Maximum**	**illustrate**
10001	DI 1	Read-only	0	1	Read the status of digital input channel 1
10002	DI 2	Read-only	0	1	Read the status of digital input channel 2

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Note: When sending a modbus command, the address in the table needs to be reduced by one;

Example 1: Use function code 02 to read discrete input, for example, read DI2 and DI1 switch inputs, and send the following command:

01	02	00 00	00 02	F9 CB
Device ModBus address	Function code	Starting address	Number of coils	CRC checksum

Return data value:

01	02	01	02	20 49
Device ModBus address	Function code	Data length	Input Status	CRC checksum

Send command: 01 02 00 00 00 02 F9 CB

Return data: 01 02 01 02 20 49

In the returned data, the input state is 02, corresponding to the binary 0000 0010, bit0 is 0, representing disconnection, that is, the switch input DI1 is in the disconnected state; bit1 is 1, representing closing, that is, the switch input DI2 is in the closed state.

9.2.3 Register Address Table

Register address table (function code: 0x03H, 0x06H, 0x10H)						
40033	ModBus Address	2	Read/Write	0	248	address
40034	Relay control status setting	2	Read/Write	0	1	0 (default), the relay is always on; 1. The relay remains on for the set time.
40035	Relay holding time setting	2	Read/Write	1	1000	It is effective when the relay status is 1, and the default is 5S
40036	Resend times	2	Read/Write	0	10	Default 2 times
40037	Wireless Channel	2	Read/Write	0	31	Wireless communication channel
40038	Wireless response time	2	Read/Write	0	4	The default value is 2. For details, see the wireless response time description.
40039	Device version information	2	read	0	65535	Device version information

Notice:

1. When sending a modbus command, the address in the table needs to be reduced by one;

2. The setting values of registers 40034 and 40035 are only valid in control acquisition mode, and the setting value of register 40036 is only valid in follow mode;

3.40039 register is read-only, so it only supports 03H function code, and does not support 06H and 10H function codes.

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Example 1. Use function code 03 to read register values, such as reading Modbus address registers. The command is as follows:

01	03	00 20	00 01	85 C0
Device ModBus address	Function code	Read register starting address	Read register length	CRC checksum

Return data value:

01	03	02	00 01	79 84
Device ModBus address	Function code	Read returns the number of bytes	Register Value	CRC checksum

Send command: 01 03 00 20 00 01 85 c0

Return data: 01 03 02 00 01 79 84

The returned register value is 00 01, which means the device address is 1.

Example 2. Use function code 06 to write a register. For example, to write the retransmission count register value to 5 times, the command is as follows:

01	06	00 23	00 05	B8 03
Device ModBus address	Function code	Write register address	Write register value	CRC checksum

Return data value:

01	06	00 23	00 05	B8 03
Device ModBus address	Function code	Write register address	Write register value	CRC checksum

Send command: 01 06 00 23 00 05 B8 03

Return data: 01 06 00 23 00 05 B8 03

In the sending instruction, the write register value is 00 05, which means the write value of the retransmission count register is 5.

Example 3. Use function code 10 to write multiple registers, for example, set the value of the retransmission count register to 8 and the value of the wireless channel register to 16:

01	10	00 23	00 02	04	00 08 00 10	31 AC
Device ModBus address	Write Command	Starting address	Write register number	Number of bytes written	Write register value	CRC checksum

Return data value:

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01	10	00 23	00 02	B0 02
Device ModBus address	Write Command	Starting address	Number of registers	CRC checksum

Send command: 01 10 00 23 00 02 04 00 08 00 10 31 AC

Return data: 01 10 00 23 00 02 B0 02

In the sending instruction, the write register value is 00 08 00 10, 00 08 is the retransmission register value, and 00 10 is the wireless channel register value.

Chapter 10 Precautions for use

1. Do not operate this radio in flammable places (such as coal mines) or near explosive and dangerous objects (such as detonators).
2. A suitable DC regulated power supply should be selected, which is required to have strong resistance to high-frequency interference, small ripple, and sufficient load capacity; it is best if it also has overcurrent, overvoltage protection and lightning protection functions to ensure the normal operation of the digital radio station.
3. Do not use the device in an environment that exceeds the environmental characteristics of the digital radio, such as high temperature, humidity, low temperature, strong electromagnetic field, or dusty environment.
4. Do not allow the digital radio to continuously operate at full load, otherwise the transmitter may burn out.
5. The ground wire of the digital radio should be well connected with the ground wire of the external device (such as PC, PLC, etc.) and the ground wire of the power supply, otherwise it is easy to burn out the communication interface, etc.; never plug or unplug the serial port when it is powered on.
6. When testing a digital radio station, a matching antenna or a 50 Ω dummy load must be connected, otherwise the transmitter may be easily damaged. If an antenna is connected, the distance between the human body and the antenna should be more than 2 meters to avoid injury. Do not touch the antenna during transmission.
7. Wireless data transmission stations often have different communication distances in different environments. The communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment. In order to ensure stable communication, it is recommended to reserve more than 50% of the communication distance margin.
8. If the measured communication distance is not ideal, it is recommended to analyze and improve the communication distance from the perspective of antenna quality and antenna installation method. You can also contact support@cdebyte.com for help .

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9. When selecting a power supply, in addition to retaining a 50% current margin as recommended, you should also pay attention to the ripple not exceeding 100mV.

Chapter 11 Important Statement

1. Ebyte reserves the final right of interpretation and modification of all contents in this manual.
2. 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.

Chapter 12 Revision History

Version	Revision Date	Revision Notes	Maintainer
1. 3	20 25 - 0 5 - 26	Modified Versions	hu

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