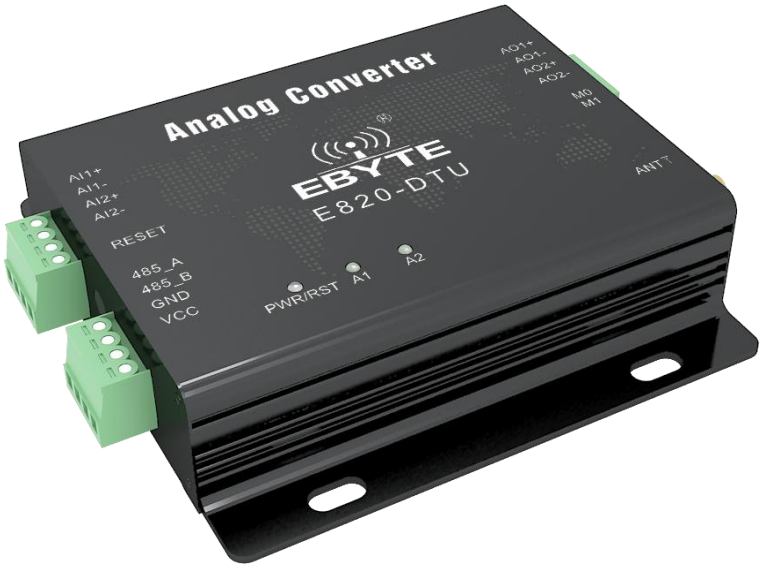
Analog Wireless Data Transmission Radio

E820-DTU(2I2-433L)

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

E820-DTU (2I2-433L) is an analog wireless data transmission radio that supports remote control products such as analog following and control acquisition. It supports wireless Modbus RTU protocol in control acquisition mode. This product is highly easy to use and users can easily and quickly integrate it into their own system to achieve remote control based on 433MHz wireless.

1.2. Features

- Support 2-way analog input, default current detection;
- Support 2-channel analog output, default current output;
- Support analog data remote transmission via 433MHz wireless;
- Support analog quantity following and control acquisition;
- Support 4 working modes: follow-up transmission, follow-up reception, control acquisition, and configuration mode;
- The control acquisition mode uses Modbus RTU protocol data processing;
- Support Reset touch button, long press for 5s to configure the device address and restore to factory settings;
- Built-in watchdog, with high reliability;
- 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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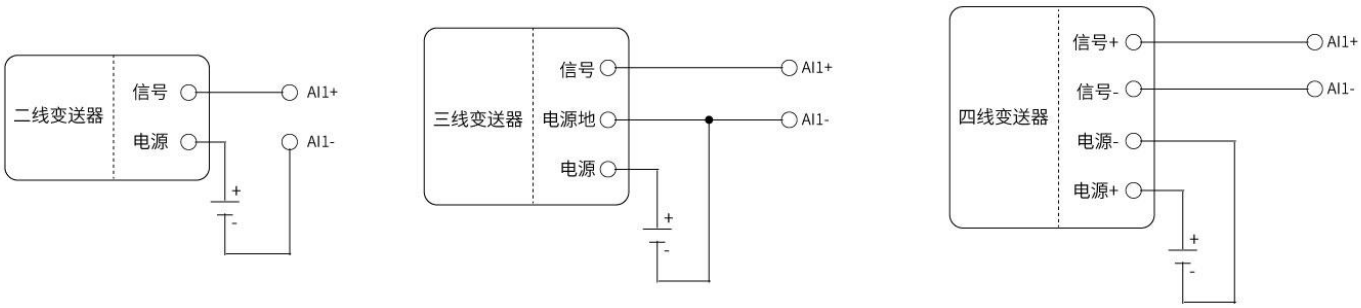
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Chapter 2 Quick Start

This chapter is a quick introduction to the E820-DTU (2 I 2-433L) 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.

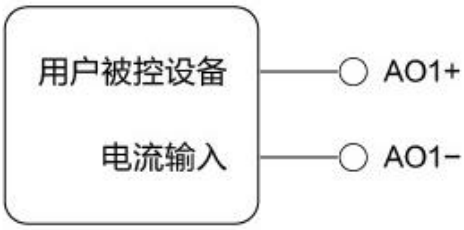
2.1 Wiring method of each port

2.1.1 Analog input connection



Analog input connection

2.1.2 Analog output connections



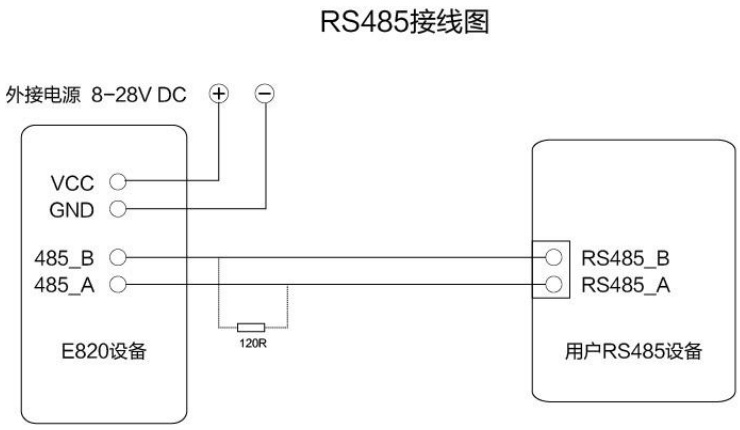
模拟量输出连接

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2.1.3 RS485 connection

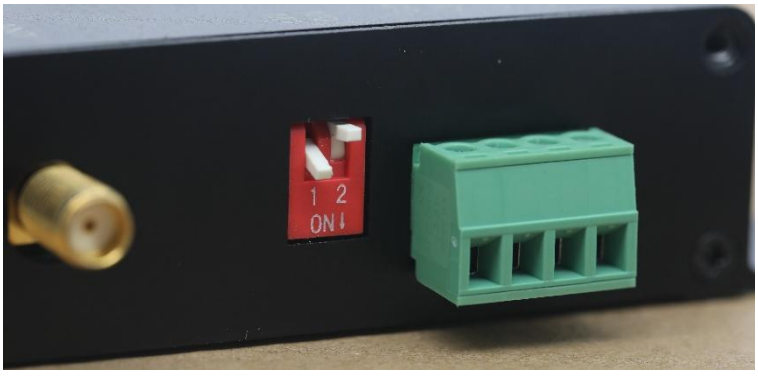
In RS485 communication, attention should be paid to the matching of A and B lines. If abnormal communication is found, a 120R matching resistor should be added between A and B lines.



2.2 Getting Started with the Follow Feature

Prepare two E820-DTU (2I2-433L) devices, device A and device B, and ensure that the parameter configuration is consistent (use the default parameters). Use the DIP switch to configure the working mode. Device A is configured to follow the transmission mode and device B is configured to follow the receiving mode. Device A uses analog input connection and device B uses analog output connection. Device A and device B can realize the following function.

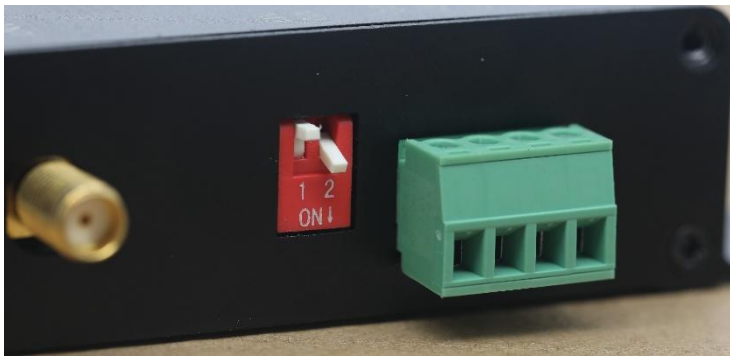
Device A, i.e. the transmitter, has its DIP switches configured to M1 = 0 , M0 = 1. After configuration, it needs to be powered on again.



Device B, i.e. the receiving end, has its DIP switches configured to M1=1, M0=0 . After configuration, it needs to be powered on again.

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For example, channel 1 of device A collects analog 10mA, and then channel 1 of device B outputs analog 10mA;

If device A channel 1 has no input, then device B channel 1 has no output;

When device A transmits data once, the blue lights of A1 and A2 flash once. When device B receives data once, the green lights of A1 and A2 flash once.

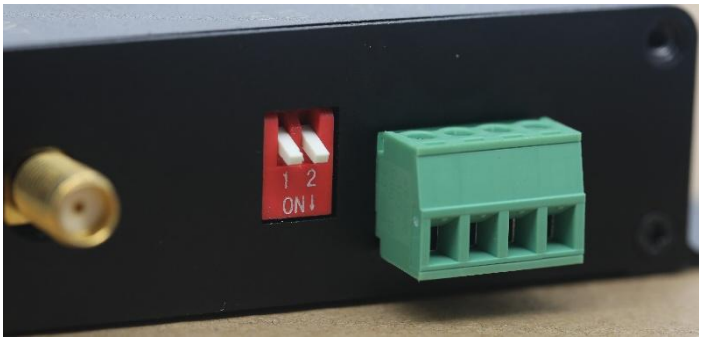


Note: In the follow function state, the analog output interface of device A does not work, and the analog input interface of device B does not work.

2.3 Quick Start to Control Acquisition Function

Prepare an E820-DTU (2I2-433L) device and an E90-DT U radio. The wireless communication of the devices adopts the Modbus RTU protocol. Refer to the wireless channel code value table and wireless response time code value table below to configure the wireless parameters of the E90-DT U radio to be consistent with the E820-DTU (2I2-433L) device.

Configure the working mode of the E820-DTU (2I2-433L) device through the DIP switch.



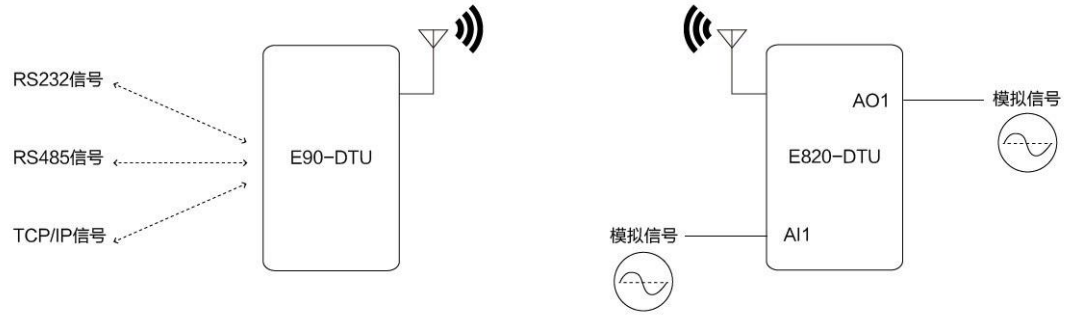
Control the acquisition mode, configure the dip switch to M1=0, M0=0 , and power on again after configuration .

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In acquisition mode, for example, the E90-DT U radio can read the 1-channel input of the E820-DTU (2I2-433L) device through the command 01 03 00 11 00 01 D4 0F. If the input is 10 mA , the ideal data returned can be 01 03 02 27 10 A2 78 . Where 0x2710H converts to 10000 D , which is 10.000 mA .

In control mode, for example , the E90-DTU radio can control the 1-channel output of the E820-DTU (2I2-433L) device through the command 01 06 00 41 27 10 C3 E2 , and the output is 10 mA . If written correctly, the returned data is 01 06 00 41 27 10 C3 E2 .



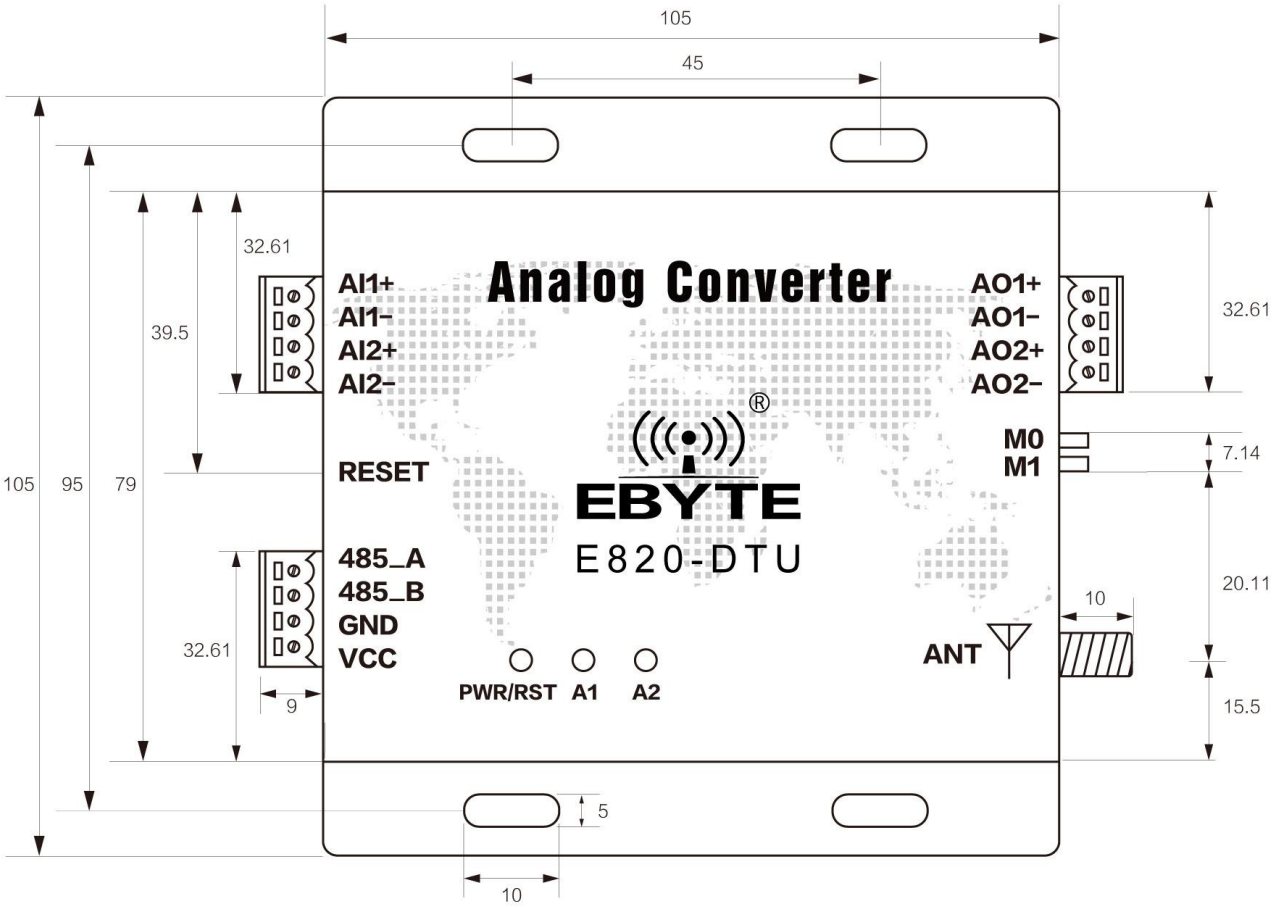
Chapter 2 Performance Parameters

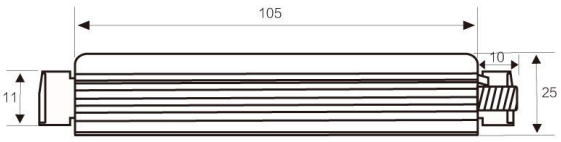
Type	Item	Index
Wireless parameters	Standard frequency band	433MHz
	Transmit power	1W
Hardware Parameters	Product size (H*W*D)	124*105*25
	Product Weight	243.2g±5g
	Operating temperature	-20℃～ + 70℃
	Storage temperature	-40℃～+85℃
	Operating humidity	5%～95%
	Storage humidity	1%～95%
	Operating voltage	8～28V
	Current acquisition range	0mA ~ 20mA
	Current output range	0mA ~ 20mA
	Accuracy	0.2 %
	Data Interface	RS485: 9600 bps
Software Parameters	Working Mode	Follow transmission, follow reception, control acquisition, configuration mode
	Configuration Commands	Modbus RTU

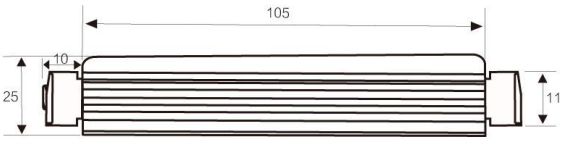
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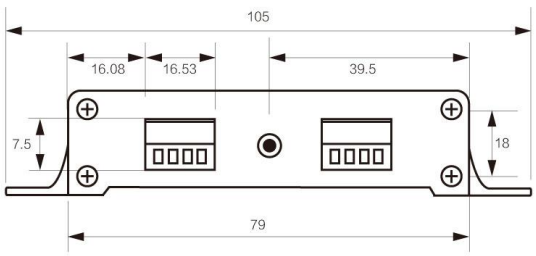
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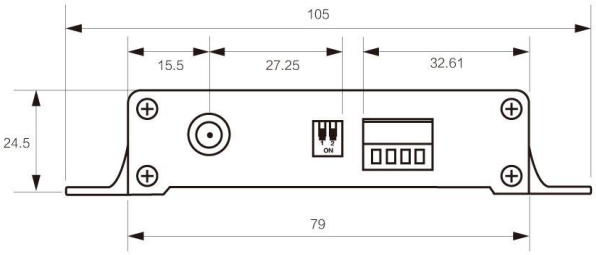
Chapter 3 Installation Dimensions







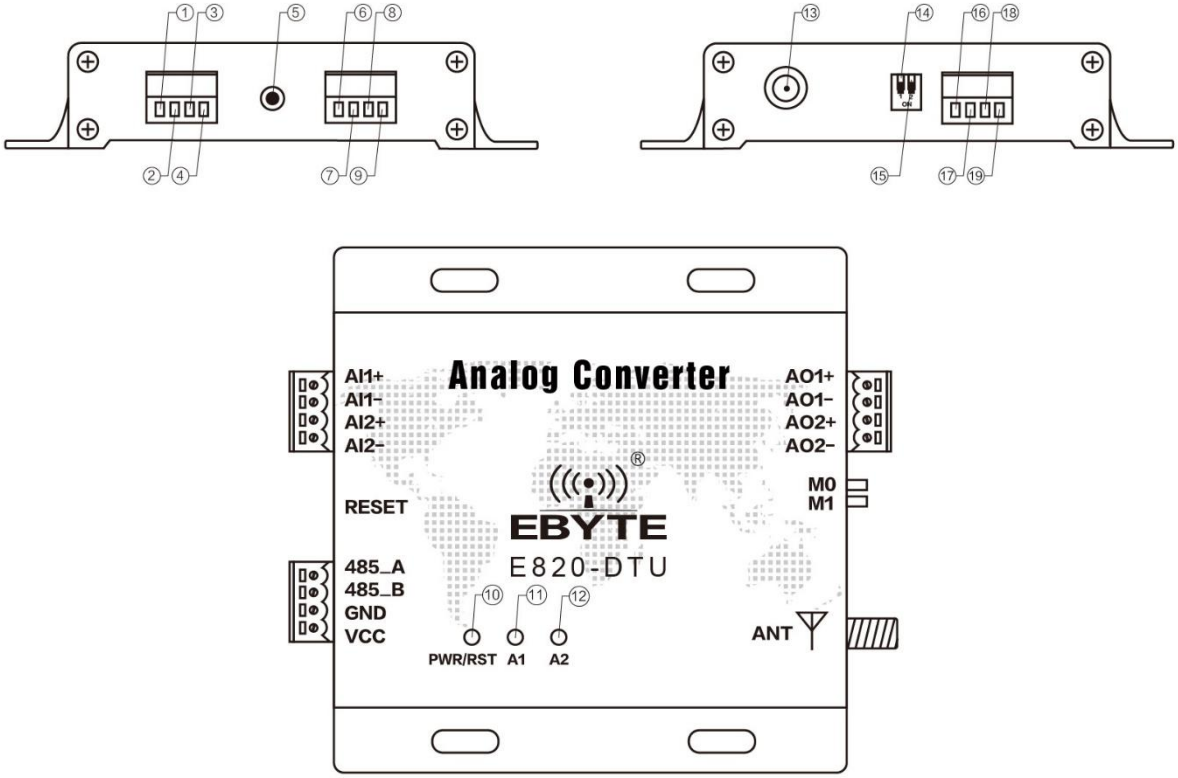




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Chapter 4 Description of each part



Serial number	Standard Definition	Function	Description
1	AI1+	Analog signal input channel 1 positive	Analog signal input pin, forming an input with AI1-
2	AI1-	Analog signal input channel 1 negative	Used in pairs with AI1+
3	AI2+	Analog signal input channel 2 positive	Analog signal input pin, forming an input with AI1-
4	AI2-	Analog signal input channel 2 negative	Used in pairs with AI2
5	RESET	Reset button	Long press for 5s to reset the device address
6	485_A	RS_485 interface A	RS_485 interface A is connected to device A interface
7	485_B	RS_485 interface B	RS_485 interface B is connected to device B interface
8	GND	Press-wire power input negative pole	Power reference ground
9	VCC	Press-wire power input positive terminal	Power input terminal, DC 8V~28V, 12V/24V recommended
10	PWR/RST	Power/reset successful indication	Two-color light, blue light is the power indicator, green light is the reset success indicator
11	A1	Wireless transmit/receive data	Two-color light, blue light indicates transmitting data, green light

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		indication	indicates receiving data (channel 1)
12	A2	Wireless transmit/receive data indication	Two-color light, blue light indicates transmitting data, green light indicates receiving data (channel 2)
13	ANT	Antenna interface	433MHz Antenna
14	Dip switch	Mode Selection	M1M0 (00, 01, 10, 11)
15	AO2-	Analog signal output channel 2 negative	Used in pairs with AO-
16	AO2+	Analog signal output channel 2 positive	Analog signal output pin, forming output with AO2-
17	AO1-	Analog signal output channel 1 negative	Used in pairs with AO+
18	AO1+	Analog signal output channel 1 positive	Analog signal output pin, forming output with AO1-

Note: It is recommended to connect the shell to the ground . The RS485 interface is only enabled when parameters are configured in configuration mode, and it does not work in other modes .

4.1 Reset button description

Long press for 5 seconds is effective . After the reset is successful , the RST light flashes. (Only valid in follow-receive, control acquisition, and configuration modes, only reset the device address to 0 x01H)

4.2 Indicator Light Description

In follow or control acquisition mode, A1 and A2 are used for wireless data indication;

In the follow-up transmission mode, each time data is transmitted, the A1 and A2 blue lights flash once; in the follow-up receiving mode, each time data is received, A1, A2 green lights flash once;

In the control acquisition mode, when there is data interaction in channel 1, the blue light of A1 flashes once, and when there is data interaction in channel 2, the blue light of A2 flashes once.

4.3 DIP switch description

The working mode is established by the DIP switch (the status of M1M0, downward is "1"), and it will take effect only after power is turned on again.

Mode	Mode type	M1	M0	Notes
Mode 0	Control Collection	0	0	Wireless control acquisition function
Mode 1	Follow the launch	0	1	When the following function is used, the transmitter

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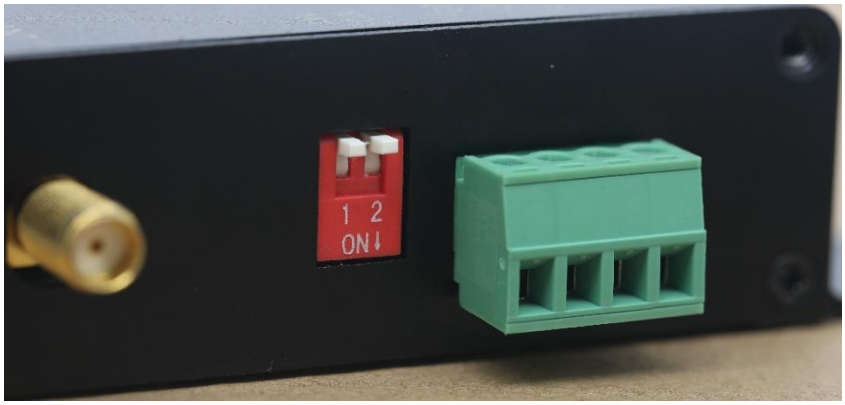
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Mode 2	Follow Receive	1	0	When the follow function is used, the receiving end
Mode 3	Configuration parameters	1	1	Host computer configuration related parameters

Chapter 5 Parameter Configuration

5.1 Parameter configuration mode

Configuration mode (M1M0=11), you can configure the parameters through the host computer :



5.2 Parameter configuration steps

Parameter configuration step 1: Select the corresponding serial port and open it.



Parameter configuration step 2: Click " Search Address " to search for the current device address of the device. You can see that the device address is displayed as 1. After changing the device address, please click " Search Address " first when operating .

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Parameter configuration step three: Read parameters.



Parameter configuration step 4: Write parameters.



5.3 Parameter interpretation

- Factory Reset

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Restore all parameters to default settings.

- Response time

There are 6 levels, namely 1.5s , 0.5s , 0.25s , 0.2s , 0.15s , 0.1s , and the default is 0.25s . The response time between communication devices must be consistent. The longer the response time, the longer the transmission distance; and the response time must be less than or equal to the update time.

- Update time

It only works in follow mode. The minimum update time is 0.5s and the maximum is 600s . It can only be a multiple of 0.5 , such as 14.5s , 300s , etc. The default is 1s . The update time refers to how often the following receiver changes data. The update time between communication devices must be consistent.

- Device Address

The device address refers to the current address of the device, the minimum is 1, the maximum is 247, and the default is 1.

- Wireless Channel

Wireless channel, that is, the communication channel of the device, has a minimum value of 0 and a maximum value of 31. The default value is 25. The wireless channels of the communication devices must be consistent.

Chapter 6 Mod Bus

6.1 Default factory settings

Device	Device Address	Wireless Channel		Wireless response time
E820-DTU(2I2-433 L)	0x01H	0x 19H		0.25s
E90-DTU		Frequency Channel	Module address	Air speed
		0x19H	0x19H	2 400bps

6.2 Modbus Address Table

The other address registers in this device are reserved and unused, the baud rate is fixed at 9600 bps, and the check bit is fixed at no check.

ModBus Register Address Table				
Address	Return Bytes	Variable Name	Type	Description
400 18 (0x0011)	2	AI 1 input, actual value (mA)	Read-only	0 -20000
400 19 (0x00 12)	2	AI2 input, actual value (mA)	Read-only	

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400 66 (0x0041)	2	AO1 output, actual value (mA)	Read/Write	0 -20000
400 67 (0x0042)	2	AO2 output, actual value (mA)	Read/Write	
400 82 (0x0051)	2	Device Address	Read/Write	1-247
40 085 (0x0054)	2	Wireless Channel	Read/Write	0 -31
400 86 (0x0055)	2	Wireless response time	Read/Write	0 -5

6.2.1 Wireless channel code value table

Wireless channel code value table		E90-DTU corresponding frequency channel and module address	
0	0	0	0x00
1	1	1	0x01
2	2	2	0x02
29	29	29	0x1d
30	30	30	0x1e
31	31	31	0x1f

6.2.2 Wireless response time code value table

Wireless response time code value table		E90-DTU corresponding air rate
0	1.5 s	300 bps
1	0.5 s	1200bps
2	0.25 s	2400bps
3	0.2 s	4800bps
4	0.15s	9600bps
5	0.1s	19200bps

6.3 Instruction Format

6.3.1 "03" reads a register

Use command 03 to read register values, for example, to read the analog input value of channel 1 of the device (ideal value 10 mA) :

01	03	00 11	00 01	D4 0F
Device ModBus address	Read Command	Start reading register address	Read register length	CRC checksum

After sending the above command to the device via E90-DTU, the device will return the following values:

01	03	02	27 10	A2 78

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Device ModBus address	Read Command	Read returns the number of bytes	Reading the return value	CRC checksum

The above 0x2710H converts to 10000D , which is 10.000mA (ideal value) .

6.3.2 "03" read multiple registers

Use command 03 to read register values, for example, to read the analog input values of channels 1 and 2 of the device (ideal values 10 mA and 20 mA) :

01	03	00 11	00 02	94 0 E
Device ModBus address	Read Command	Start reading register address	Read register length	CRC checksum

After sending the above command to the device via E90-DTU, the device will return the following values:

01	03	04	27 10	4E 20	C5 3A
Device ModBus address	Read Command	Read returns the number of bytes	Reading the return value	Reading the return value	CRC checksum

The above 0x2710H converts to 10000D , which is 10.000mA (ideal value) ; 0x4e20H converts to 20000D, which is 20.000mA (ideal value) .

6.3.3 "06" writes a register

Use the 06 command to write a single command, for example, to change the device address to 2:

01	0 6	00 51	00 0 2	59 DA
Device ModBus address	Write Command	Write to 40081 register	Write the value 2 to 40081.	CRC checksum

After sending the above command to the device via E90-DTU, the device will return the following values:

01	0 6	00 51	00 0 2	59 DA
Device ModBus address	Write Command	Write to the 40081 register	Write the value 2 to 40081.	CRC checksum

If the modification is successful, the device address will be changed to 2.

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Chapter 9 Precautions for use

1. Please keep the warranty card of this device properly. The warranty card contains the factory number of the device (and important technical parameters), which is of great reference value for users' future maintenance and new equipment.
2. During the warranty period, if the radio is damaged due to the quality of the product itself and not caused by human damage or natural disasters such as lightning strikes, it will enjoy free warranty. Users are requested not to repair it by themselves. If there is any problem, please contact our company. provides first-class after-sales service.
3. Do not operate this radio in flammable places (such as coal mines) or near explosive and dangerous objects (such as detonators).
4. 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.
5. 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.
6. Do not allow the digital radio to continuously operate at full load, otherwise the transmitter may burn out.
7. 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.
8. 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.
9. 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.
10. If the measured communication distance is not ideal, it is recommended to analyze and improve the communication distance based on the antenna quality and antenna installation method. You can also contact support@cdebyte.com for help .
11. 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 10 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.
3. 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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Chapter 11 Revision History

Version	Revision Date	Revision Notes	Maintainer
1. 4	2025-05-06	Modified Versions	huaa

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