Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



EWD95M-433Cxx(xxx)

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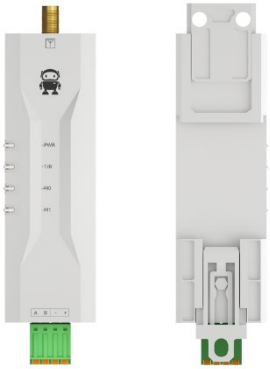
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1. Product Overview

1.1 Product Introduction



EWD95M-433Cxx(xxx) is a digital radio based on high-speed continuous transmission technology , operating in the 410~441MHz frequency band (default 433MHz) . It supports interoperability with our company's E610 series modules. The radio provides a transparent RS485/RS232 interface, adopts a plastic shell, a guide rail installation structure, and supports 5~28V (DC) wide voltage input .

In the continuous transmission mode, EWD95M-433Cxx(xxx) can perform continuous transmission at different serial port baud rates, and the receiving end data output delay is low, which is suitable for scenarios that require fast transmission of large amounts of data.

Wireless data transmission radio has a certain scope of application, just like optical fiber, microwave and open wire: it provides real-time and reliable data transmission of monitoring signals in private networks under certain special conditions. It has the characteristics of low cost, easy installation and maintenance, strong diffraction ability, flexible networking structure and long coverage. It is suitable for occasions with many dispersed points and complex geographical environment, and can be connected with data terminals such as PLC, RTU, rain gauge and liquid level meter.

1.2 Features

★ Under ideal conditions, the communication distance can reach 6km ;
★ Supports the global license-free ISM 433MHz frequency band ;
★ The transmission power is 20dBm and supports multi-level adjustment. All technical indicators meet industrial standards.
★ air transmission rate of 0.5k～470kbps ;
★ Support RSSI (normal mode) signal strength indication function, which is used to evaluate signal quality, improve communication network, and measure distance;
★ Support wireless parameter configuration, remotely configure or read radio station parameters by sending command data packets wirelessly ;
★ Supports users to set communication keys by themselves, which cannot be read, greatly improving the confidentiality of user data;
★ In general mode, it supports automatic relay networking . Multi-level relay is suitable for ultra-long-distance communication, and multiple networks can run simultaneously in the same area .
★ Working temperature range: -40℃ ～ +85℃, adaptable to various harsh working environments, a true industrial-grade product;
★ Supports fixed-point transmission, broadcast transmission, and channel monitoring;
★ Support Modbus protocol transmission;
★ Ultra-small size, 80*28*28.5mm, easy and quick to install;
★ Adopt flame-retardant plastic shell and guide rail installation structure, which is convenient and efficient to install;

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★ Use hidden buttons to switch working modes to avoid false triggering, making the equipment more reliable.

★ Simple and efficient power supply design, supports power adapter or wire pressing, supports 5~28V (DC) power supply;

★ power reverse connection protection , over connection protection, antenna surge protection , etc. greatly increase the reliability of the radio;

★ The communication port and power interface adopt isolation and high protection;

★ Powerful software functions, all parameters can be set by programming: such as power, frequency, air rate, address ID, etc.;

★ The parameters are saved when the power is off, and the radio will work according to the set parameters after power is restored;

★ Built-in watchdog and precise time layout. Once an abnormality occurs, the radio will automatically restart and continue to work according to the previous parameter settings.

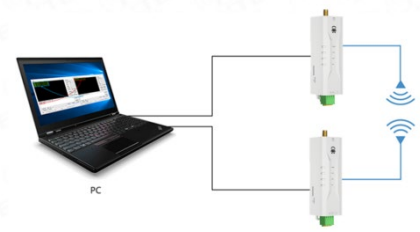
1.3 Quick Start

① You need to prepare two sets of DTU debugging components, including EWD95M -433Cxx(xxx) , antenna, DC 5V~28V power adapter, USB to RS232/RS485 (or other methods), and connecting cable (including 4PIN 3.81 Phoenix terminal male head) 2 pieces each.

② First, install the antenna for the digital radio . Then power on the DTU through the power adapter and connect the cables, TX A+ to A/T, RX B- to B/R.



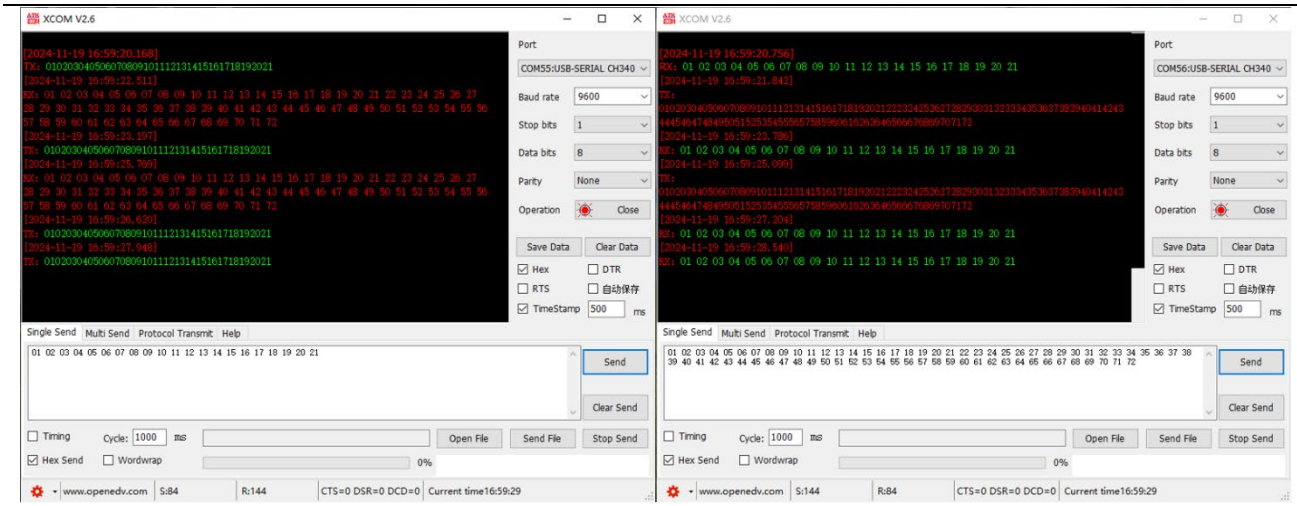
③ the two digital radios via USB to RS232/RS485 (or other methods) ;



④ Start two serial port debugging assistants, select the serial port baud rate as 9600bps (default) and 8N1, and switch DTU to continuous mode.

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⑥ The working mode can be switched by pressing the Mode button. The M0 indicator light and the M1 indicator light are used to indicate different working modes. Press and hold the Mode button for 1 second. The indicator light changes to indicate a mode switch. The details of the mode switch are shown in the table below:

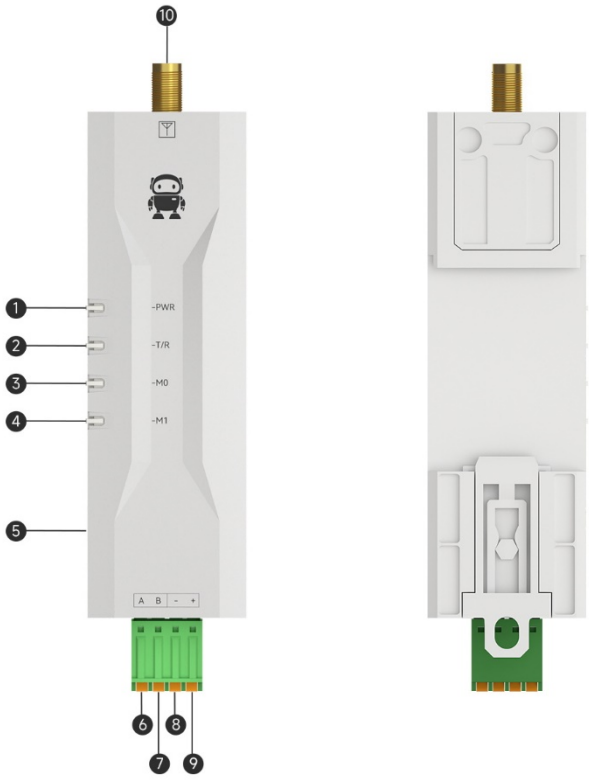
Serial number	category	M1	M0	Notes
Mode 0	Continuous Mode	Lights out	Lights out	The radio will automatically calculate the required air transmission rate based on the user-configured serial port baud rate, and the user only needs to continuously input data .
Mode 1	General Mode	Lights out	Lights on	The radio internally implements the air transmission rate configured by the user and transmits packets in 55-byte packets.
Mode 2	Configuration Mode	Lights on	Lights out	Users can access the registers through the serial port to control the working status of the radio . The baud rate is 9600
Mode 3	Standby mode	Lights on	Lights on	Enter standby mode

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1.4 Description of each part

1.4.1 RS485 interface



Serial number	name	Function	illustrate
1	PWR	Power indicator	Lights up when the power is on.
2	T/R	Send/Receive Indicator	The flashing light is red when sending data and green when receiving data.
3	MO	Mode indicator	Working mode indicator light.
4	M1	Mode indicator	Working mode indicator light.
5	Mode	Mode switch button	Working mode switching control.
6	A	RS485 Signal A	RS485 Signal A
7	B	RS485 signal B	RS485 signal B
8	-	GND	Negative power supply
9	+	VCC	Power positive (DC 5~28V)
10	ANT	RF Interface	SMA-K, external threaded inner hole.

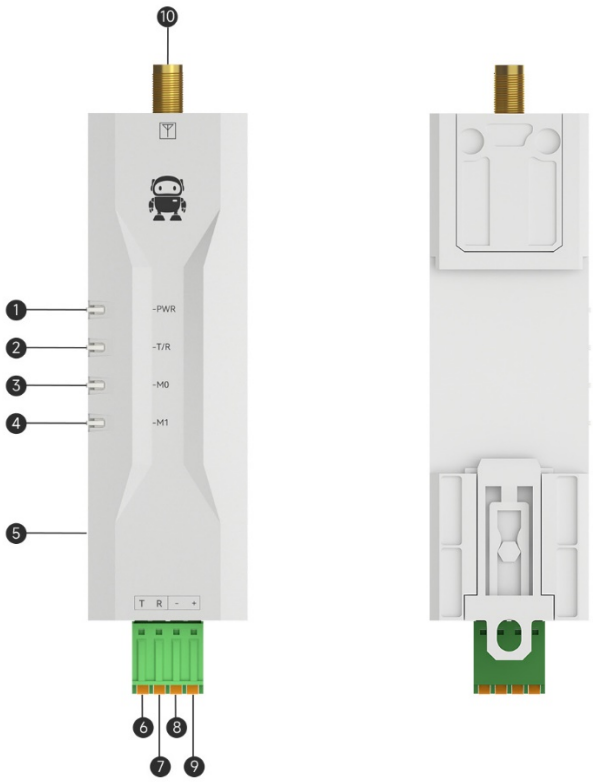
★ Note: If communication is not smooth when the radio is connected to multiple devices, but not when connected to a single device, try connecting a 120Ω resistor in parallel between the 485_A terminal and the 485_B terminal.

★ EWD95M-433Cxx(xxx) can be powered by 5~28V (DC) power supply, and the wiring port adopts 4pin 3.81 terminal block connection.

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1.4.2 RS232 interface



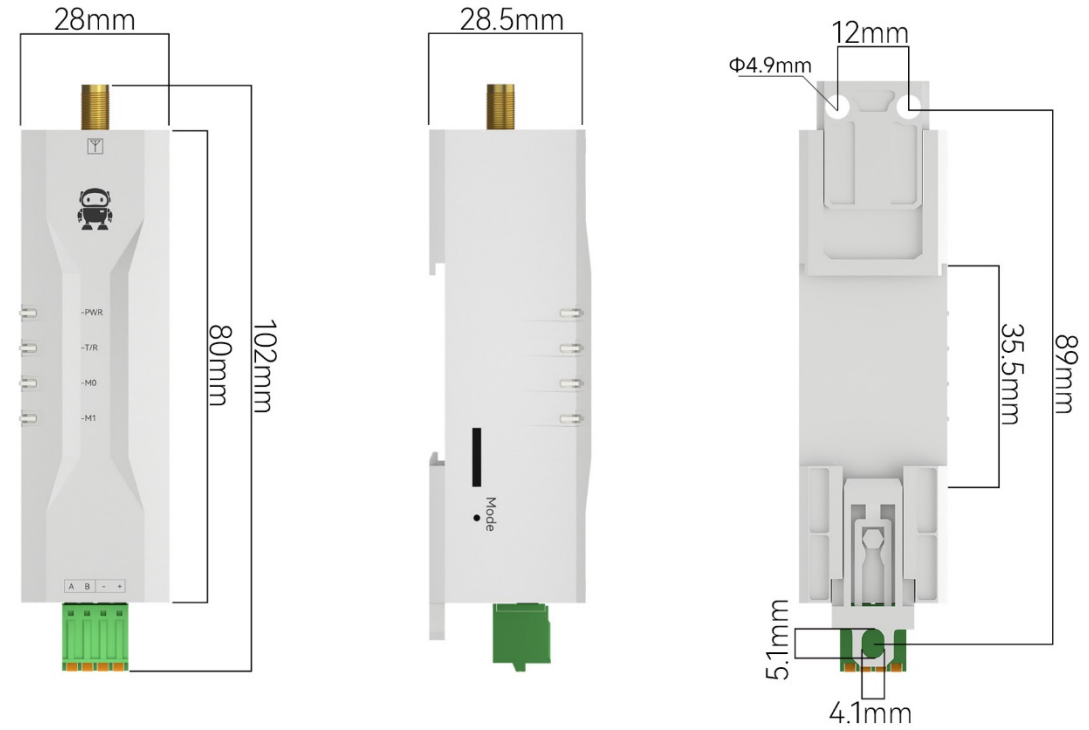
Serial number	name	Function	illustrate
1	PWR	Power indicator	Lights up when the power is on.
2	T/R	Send/Receive Indicator	The flashing light is red when sending data and green when receiving data.
3	MO	Mode indicator	Working mode indicator light.
4	M1	Mode indicator	Working mode indicator light.
5	Mode	Mode switch button	Working mode switching control.
6	T	RS232 bus TX interface	The RS232 interface TX interface is connected to the device RX interface
7	R	RS232 bus RX interface	The RS232 interface RX interface is connected to the device TX interface
8	-	VCC	Negative power supply
9	+	GND	Power positive (DC 5~28V)
10	ANT	RF Interface	SMA-K, external threaded inner hole.

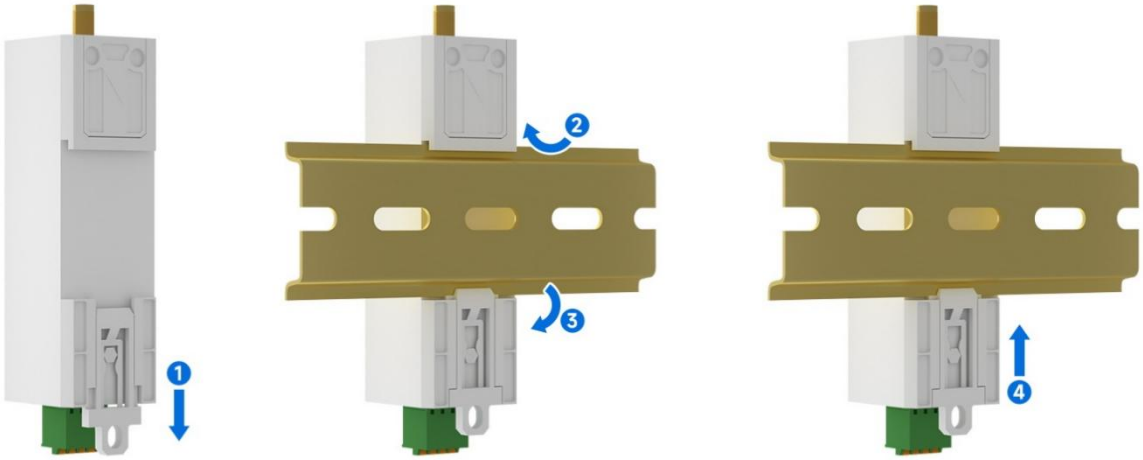
★ EWD95M-433Cxx(xxx) can be powered by 5~28V (DC) power supply, and the wiring port adopts 4pin 3.81 terminal block connection.

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1.5 Installation dimensions





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2. Technical indicators

2.1 Model Specifications

Model Specifications	Operating frequency	Transmit power	Reference distance	Air speed	Technical characteristics
	Hz	dBm	km	bps	
EWD95M-400SL22(485)	410.125～493.125 M	22	5	2.4k~62.5k	New generation LoRa spread spectrum technology
EWD95M-400SL22(232)					
EWD95M-433GF20(485)	410～450M	20	3.5	2.4～500k	GFSK modulation technology
EWD95M-433GF20(232)					
EWD95M-433N20(485)	425～450.5M	20	2.5	1~25k	Wireless narrowband technology
EWD95M-433N20(232)					
EWD95M-400GL20(485)	410.125～493.125M	20	5	2.4 ~ 62.5k	ChirpIoT Spread Spectrum Technology
EWD95M-400GL20(232)					
EWD95M-433C20(485)	410～441M	20	6	0.5 ~ 470k	High-speed continuous transmission technology
EWD95M-433C20(232)					
EWD95M-2G4H20(485)	2.4～2.518G	20	2.5	250k～2M	Automatic frequency hopping technology
EWD95M-2G4H20(232)					
EWD95M-2G4H27(485)	2.4～2.518G	27	5	250k～2M	Automatic frequency hopping technology
EWD95M-2G4H27(232)					
EWD95M-400LN22 (485)	410～510M	22	5.6	Adaptive	LORAWAN Protocol
EWD95M-400LN22 (232)					
EWD95M-900LN22 (485)	850～930M	22	5.6	Adaptive	LORAWAN Protocol
EWD95M-900LN22 (232)					
EWD95M-400NW22(485)	410.125～509.125M	22	2.5	7～62.5k	LoRa Mesh Protocol
EWD95M-400NW22(232)					
EWD95M-900NW22(485)	850.125～929.125M	22	2.5	7～62.5k	LoRa Mesh Protocol
EWD95M-900NW22(232)					

★ Note: Sunny weather, open environment without obstructions, 12V/1A power supply, 5dBi suction cup antenna, antenna height 2 meters from the ground, use factory default parameters.

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2.2 General Specifications

Serial number	project	Specification	illustrate
1	Product size	80*28*28.5 mm	See installation dimensions for details
2	Product Weight	32 g	Weight tolerance 2g
3	Operating temperature	-40℃～+85℃	Industrial Grade
4	Voltage range	5～28V（DC）	It is recommended to use 12V or 24V
5	Communication interface	RS485/RS232	RS485 or RS232, choose one , please refer to the product label
6	Baud rate	Factory default 9600	Baud rate range: 2400～230400
7	Address code	Factory default 0	A total of 65536 address codes can be set

2.3 Frequency range and number of channels

Model Specifications	Default frequency	Frequency range	Channel spacing	Number of channels
	Hz	Hz	Hz	
EWD95M-433C20 (xxx)	433M	410～441M	0.5M	62

★ Note: When using multiple groups of data radios for one-to-one communication in the same area, it is recommended that the channel spacing of each group of data radios be set to more than 2MHz.

2.4 Transmit Power Level

Model Specifications	0 (factory default)	1	2	3
EWD95M-433C20 (xxx)	20dBm	17dBm	14dBm	11dBm

★ Note: The lower the transmit power, the shorter the transmission distance, but the operating current does not decrease in the same proportion. It is recommended to use the maximum transmit power.

2.5 Air Speed Class

Model Specifications	Default air rate	Number of levels	Air speed rating
	bps		kbps
EWD95M-433C20 (xxx)	0.5k	17	0.5, 1.5, 3.5, 5.5 , 6.5, 11 , 1 3 , 21, 26, 42, 51, 82, 76, 125, 160, 410, 470,

★ Note: The higher the airspeed setting, the faster the transmission rate and the shorter the transmission distance; therefore, if the rate meets the use requirements, it is recommended that the airspeed be as low as possible.

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2.6 Current parameters

Model Specifications	Emission current mA			Receive current mA		
	5V	12V	2 4V	5V	12V	24V
EWD95M-433 C20(xxx)	122.8	63.0	34.2	42.9	22.1	13.6

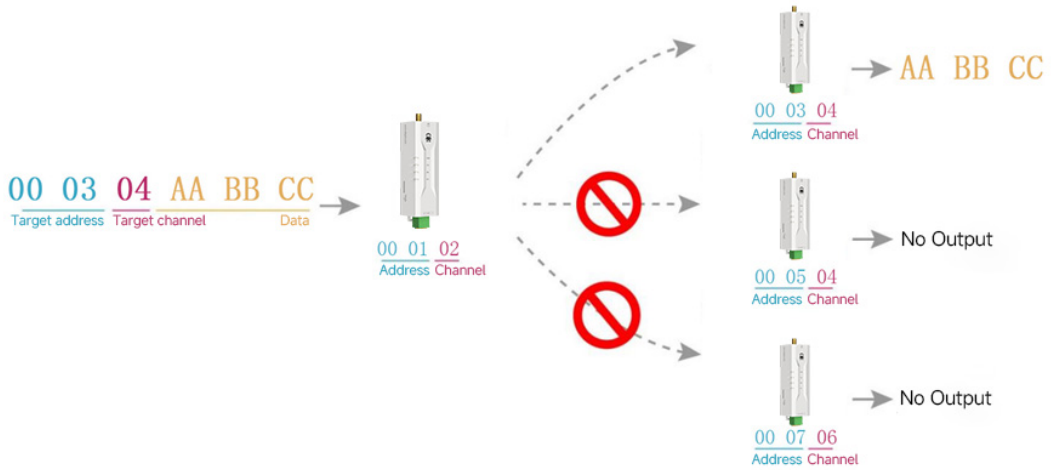
★ Note: When the output power is set to the maximum, it is recommended to retain more than 50% current margin when selecting the power supply, which is conducive to the long-term and stable operation of the radio.

2.7 Sending and receiving length and subcontracting method

Model Specifications	Cache size	Subcontracting
EWD95M-433 C20 (xxx)	4096 bytes (normal mode)	In normal mode, user data will be sent one by one in 55-byte packets by default.

3. Detailed explanation of functions

3.1 Fixed-point transmission (hexadecimal)

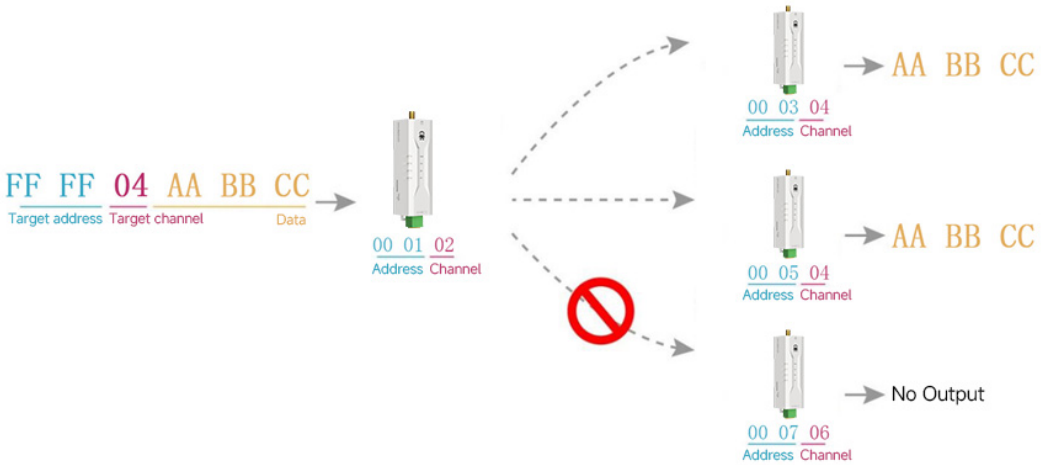


It is recommended to use it in normal mode.

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3.2 Broadcast transmission (hexadecimal)



It is recommended to use it in normal mode.

3.3 Broadcast Address

- For example: Set the address of radio station A to 0xFFFF and the channel to 0x04.
- When station A is used as a transmitter (same mode, transparent transmission), all receiving stations under channel 0x04 can receive the data, thus achieving the purpose of broadcasting.

3.4 Listening Address

- For example: Set the address of radio station A to 0xFFFF and the channel to 0x04.
- When radio station A is used as a receiver, it can receive all data under channel 0x04 to achieve the purpose of monitoring.

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4. Working Mode

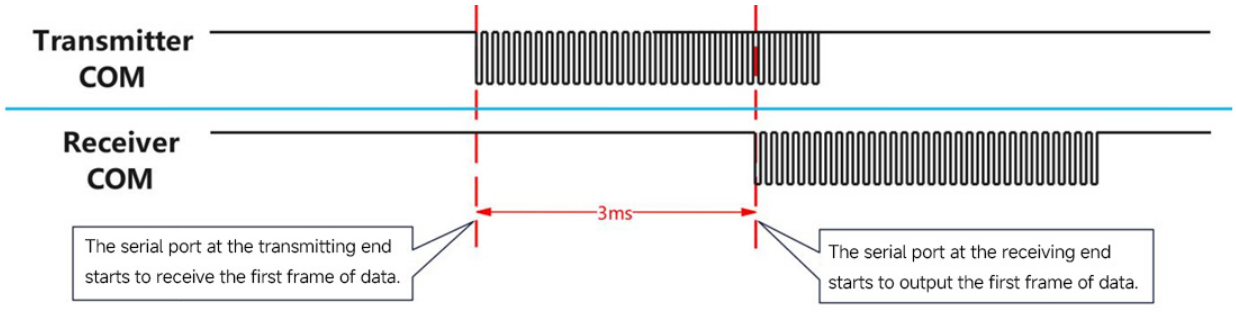
EWD95M-433Cxx(xxx) has four working modes. The default setting of the radio is continuous mode (mode 0) when it leaves the factory.

Serial number	category	M1	M0	Notes
Mode 0	Continuous Mode	Lights out	Lights out	The radio will automatically calculate the required air transmission rate based on the user-configured serial port baud rate, and the user can continuously input data.
Mode 1	General Mode	Lights out	Lights on	The radio will execute the air transmission rate configured by the user. It will be transmitted in packets of 55 bytes per packet. Generally transparent transmission
Mode 2	Configuration Mode	Lights on	Lights out	The user accesses the register through the serial port to control the working status of the radio. The baud rate must be 9600.
Mode 3	Standby mode	Lights on	Lights on	The device enters standby mode

4.1 Continuous Mode (Mode 0)

type	When the M0 indicator light is off , the M1 indicator light is off , and the radio operates in mode 0
emission	The air rate required for continuous transmission is automatically calculated based on the serial port baud rate configured by the user; the user can input data through the serial port and the radio will start wireless transmission.
take over	In the non-transmitting state, data can be received normally.

In the continuous transmission mode, the intuitive experience brought is that users do not need to wait for all data to be packaged before transmitting the data, but the radio starts transmitting from the first frame of data until the data that the user needs to transmit is completed. This saves the time of data packaging and subpackaging, and greatly shortens the data delay time.



Schematic Diagram of Data Delay (when the serial port baud rate is 115,200 and 22 bytes are transmitted)

Data delay diagram (when the serial port baud rate is 115200 and 22 bytes are sent)

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The continuous transmission mode is divided into two continuous transmission strategies: "distance priority" and "speed priority" for users to choose from. The default is distance priority . From the reference data in the table below, we can see that when the serial port baud rate is higher and the amount of data sent is smaller, the difference in data delay between the two strategies is not obvious. However, once the data reaches thousands of bytes, the problem of data delay will become prominent .

UART Baud Rate	Even pass strategy	Data extension time(ms)		
		1 Byte	22 Byte	55 Byte
2400	Distance first	77.634	213.094	417.224
	Speed first	57.267	161.193	161.233
4800	Distance first	41.396	111.04	216.195
	Speed first	29.028	81.043	81.043
9600	Distance first	21.024	55.926	108.611
	Speed first	15.274	41.675	41.651
19200	Distance first	10.853	28.355	54.736
	Speed first	7.973	21.199	21.211
38400	Distance first	6.16	15.031	28.083
	Speed first	4.701	11.085	11.08
57600	Distance first	4.392	10.352	19.101
	Speed first	3.373	7.569	7.583
115200	Distance first	2.478	5.364	9.89
	Speed first	1.867	3.874	3.89

* There will be some errors in the experimental test data, please refer to the actual test of the actual object*

4.2 Normal Mode (Mode 1)

Type	**When the M0 indicator light is on and the M1 indicator light is off , the radio operates in Mode 1.**
emission	Use the air rate configured by the user and transmit in packets of 55 bytes per packet; The user can input data through the serial port, and the radio will start wireless transmission.
take over	In the non-transmitting state, data can be received normally.

4.3 Configuration Mode (Mode 2)

Type	**When the M0 indicator light is off and the M1 indicator light is on, the radio operates in Mode 2.**
emission	Only remote configuration commands can be sent.
take over	Only remote configuration command responses are received.
Configuration	Users can access registers to configure the radio operating status

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4.4 Standby Mode (Mode 3)

Type	When the M0 indicator light is on and the M1 indicator light is on , the radio operates in mode 3.
emission	Unable to transmit wireless data
take over	Unable to transmit wireless data

5. Register read and write control

5.1 Instruction Format

In configuration mode (mode 2: M1 light off , M0 light on), the supported command list is as follows (**when setting, only 9600, 8N1 format is supported**):

Serial number	Instruction Format	Detailed description
1	Setting Registers	Instruction: C0+starting address+length+parameter Response: C1+starting address+length+parameters Example 1: Configure the channel to 0x09 Instruction start address length parameter Send: C0 05 01 09 Return: C1 05 01 09 Example 2: Configure the radio address (0x1234), network address (0x00), serial port (9600 8N1), and airspeed (2.4 K) at the same time Send: C0 00 04 12 34 00 6 0 Return: C1 00 04 12 34 00 6 0
2	Read Register	Instruction: C1+starting address+length Response: C1+starting address+length+parameters Example 1: Reading a channel Instruction start address length parameter Send: C1 05 01 Return: C1 05 01 09 Example 2: Read the radio address, network address, serial port, and airspeed simultaneously Send: C1 00 04 Return: C1 00 04 12 34 00 6 0
3	Setting up temporary registers	Instruction: C2 + starting address + length + parameter Response: C1 + start address + length + parameter Example 1: Configure the channel to 0x09 Instruction start address length parameter Send: C2 05 01 09 Return: C1 05 01 09

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		Example 2: Configure the radio address (0x1234), network address (0x00), serial port (9600 8N1), and airspeed (2.4 K) at the same time Send: C2 00 04 12 34 00 6 0 Return: C1 00 04 12 34 00 6 0
4	Wireless Configuration	Command: CF CF + General Instructions Response: CF CF + General Response Example 1: The wireless configuration channel is 0x09 Wireless command header command start address length parameter Send: CF CF C0 05 01 09 Return: CF CF C1 05 01 09 Example 2: Wireless configuration of radio address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (2.4 K) Send: CF CF C0 00 04 12 34 00 6 0 Return: CF CF C1 00 04 12 34 00 6 0
5	Format Error	Format Error Response FF FF FF / " =ERR "

5.2 Register Description

<table>
<tr><th>Serial number</th><th>Read and Write</th><th>name</th><th colspan="5">describe</th><th>Remark</th></tr>
<tr><td>00H</td><td>Read/ Write</td><td>ADDH</td><td colspan="5">ADDH (default 0)</td><td rowspan="2">Radio address high byte and low byte ;
Note: When the radio address is equal to FFFF, it can be used as a broadcast and monitoring address, that is, the radio will not perform address filtering at this time</td></tr>
<tr><td>01H</td><td>Read/ Write</td><td>ADDL</td><td colspan="5">ADDL (default 0)</td></tr>
<tr><td>02H</td><td>Read/ Write</td><td>NETID</td><td colspan="5">NETID (default 0)</td><td>Network address, used to distinguish networks ;
When communicating with each other, they should be set to the same.</td></tr>
<tr><td rowspan="9">03H</td><td rowspan="9">Read/ Write</td><td rowspan="9">REG0</td><td>7</td><td>6</td><td>5</td><td>UART serial port rate (bps)</td><td rowspan="9">In general transmission mode, the serial port baud rates and verification methods of two devices communicating with each other can be different. It is generally recommended that the baud rates of both communicating parties be the same.
The serial port baud rates of two radios communicating with each other in continuous transmission mode must be the same.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>The serial port baud rate is 2400</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>The serial port baud rate is 4800</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>The serial port baud rate is 9600 (default)</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>The serial port baud rate is 19200</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>The serial port baud rate is 38400</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>The serial port baud rate is 57600</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>The serial port baud rate is 115200</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>The serial port baud rate is 230400</td></tr>
</table>

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<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>Air rate (bps)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>3.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>5.5K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>6.5K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>11K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>13K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>21K</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>26K</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>42K</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>51K</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>82K</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>76K</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>125K</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>160K</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>410K</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>470K</td></tr>
<tr><td>1</td><td>X</td><td>X</td><td>X</td><td>X</td><td>470K</td></tr>
</table>
</td><td>*Applicable only to general transmission mode, users need to select the wireless transmission rate;
* In continuous transmission mode, this configuration parameter is invalid and is automatically calculated by the radio.</td></tr>
<tr><td rowspan="2">0
4H</td><td rowspan="2">Read/
Write</td><td rowspan="2">REG1</td><td>
<table>
<tr><td>7</td><td>6</td><td>Serial port check digit</td></tr>
<tr><td>0</td><td>0</td><td>8N1 (default)</td></tr>
<tr><td>0</td><td>1</td><td>8 01</td></tr>
<tr><td>1</td><td>0</td><td>8 E1</td></tr>
<tr><td>1</td><td>1</td><td>8N1 (equivalent to 00)</td></tr>
</table>
</td><td>Radio serial port verification type</td></tr>
<tr><td>
<table>
<tr><td>5</td><td>Channel RSSI Enable</td></tr>
<tr><td>0</td><td>Off (default)</td></tr>
<tr><td>1</td><td>Enable</td></tr>
</table>
</td><td>*Applicable only to general transmission mode;
*After enabling, you can send the command "C0 C1 C2 C3" instruction reads registers: Register [0x00]: Current environment noise RSSI [0]; Register [0x01]: RSSI of the last received data [1];
*Conversion formula: dBm = RSSI/2-154;
*Instruction format analysis: Send: C0 C1 C2 C3+starting address+read length; Return: C1+address+read length+read valid value; [Example 1]:
Send C0 C1 C2 C3 00 01,
Return C1 00 01 RSSI[0];
Example 2:
Send C0 C1 C2 C3 00 02,</td></tr>
</table>

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<table>
<tr><td rowspan="11"></td><td rowspan="11"></td><td rowspan="11"></td><td></td><td colspan="2"></td><td>Return to C1 00 02 RSSI[0] RSSI[1];
【Special Note】
The address can only start from 0x00. If you need to read RSSI[1], you can only refer to [Example 2] to execute; if the radio has never received data, the default value of RSSI[1] is 0x00.</td></tr>
<tr><td>4</td><td>3</td><td>reserve</td><td></td></tr>
<tr><td>2</td><td colspan="2">Policy type in continuous transmission mode</td><td rowspan="3">After speed priority is turned on, the data output delay of the receiving end will be reduced by about 60%, but it will affect the receiving distance. For example, in the 115200 baud rate continuous transmission mode, the receiving end can output the first frame of data from the sending end after 3ms.
At 230400 baud rate, only distance priority is supported .</td></tr>
<tr><td>0</td><td colspan="2">Distance priority (default)</td></tr>
<tr><td>1</td><td colspan="2">Speed First</td></tr>
<tr><td>1</td><td>0</td><td>Transmit power</td><td rowspan="6">The relationship between power and current is nonlinear. When the power is at maximum, the power efficiency is the highest .

The current does not decrease in the same proportion as the power decreases.</td></tr>
<tr><td>0</td><td>0</td><td>20d B m (default)</td></tr>
<tr><td>0</td><td>1</td><td>17d B m</td></tr>
<tr><td>1</td><td>0</td><td>14d B m</td></tr>
<tr><td>1</td><td>1</td><td>11d B m</td></tr>
<tr><td>0
5H</td><td>Read/
Write</td><td>REG2</td><td colspan="3">Channel control (CH)
0-62 represent a total of 62 channels</td><td>*Actual frequency = 410MHz+CH*0.5MHz, default 433MHz = [0x2E].
*Value range: 410MHz~441MHz, [0x00]~[0x3E].</td></tr>
<tr><td rowspan="11">0
6H</td><td rowspan="11">Read/
Write</td><td rowspan="11">REG3</td><td>7</td><td colspan="2">Received data packet RSSI</td><td rowspan="3">*Applicable only to general transmission mode;
*After being enabled, when the radio receives wireless data and outputs it through the serial port TXD, it will be followed by an RSSI strength byte to indicate the signal strength when the data is received;
*Conversion formula: dBm = RSSI/2-154.</td></tr>
<tr><td>0</td><td colspan="2">Off (default)</td></tr>
<tr><td>1</td><td colspan="2">Open</td></tr>
<tr><td>6</td><td colspan="2">Transmission method</td><td rowspan="3">*Applicable only to general transmission mode;
*During fixed-point transmission, the radio will identify the first three bytes of the serial port data as: address high + address low + channel, and use it as the wireless transmission target.</td></tr>
<tr><td>0</td><td colspan="2">Transparent transmission (default)</td></tr>
<tr><td>1</td><td colspan="2">Fixed-point transmission</td></tr>
<tr><td>5</td><td colspan="2">Relay function</td><td rowspan="3">*Applicable only to general transmission mode;
*After the relay function is enabled, if the destination address is not the radio itself, the radio will initiate a forwarding;
*To prevent data from being sent back,</td></tr>
<tr><td>0</td><td colspan="2">Off (default)</td></tr>
<tr><td>1</td><td colspan="2">Open</td></tr>
</table>

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									it is recommended to use it in conjunction with fixed-point mode; that is, the target address is different from the source address.
			4	3	2	1	0	reserve	
07H	Write	CRYPT_H	Key high byte (default 0)						Write only, read returns 0 ; Used for encryption to prevent wireless data in the air from being intercepted by similar radio stations ; The radio station will use these two bytes as calculation factors to transform and encrypt the wireless signal in the air.
08H	Write	CRYPT_L	Key low byte (default 0)						

5.3 Factory default parameters

model	**Factory default parameter values**						
Radio Model	frequency	address	Channel	Air speed	Baud rate	Serial port format	Transmit power
EWD95M-433C20 (xxx)	433MHz	0x0000	0x 2E	0.5 kbps	9600	8N1	20dBm

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6. Use of relay networking mode

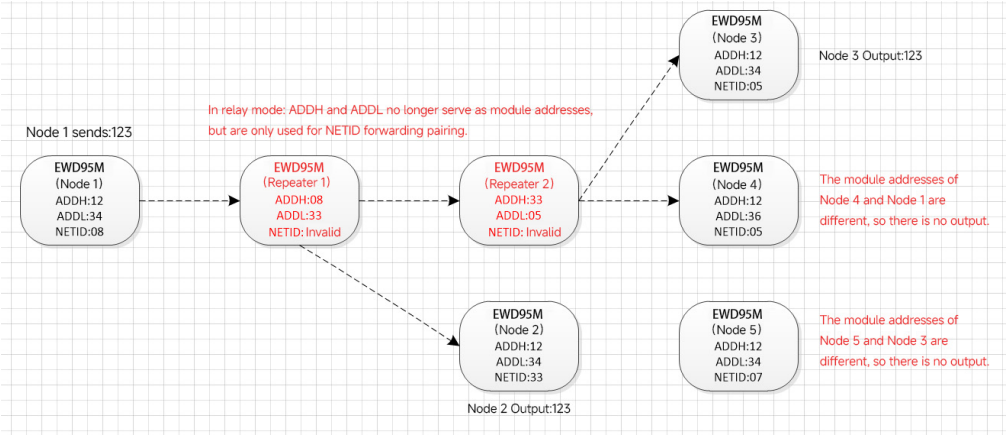
Serial number	Relay Mode Description
1	After setting the relay mode through the configuration mode, switch to the general mode and the relay starts to work. The WOR mode does not support the use of relays.
2	In repeater mode, ADDH and ADDL are no longer used as radio addresses, but are forwarded and paired with NETID. If a signal is received from one network, it is forwarded to the other network. The repeater's own network ID is invalid.
3	In repeater mode, the repeater radio cannot send or receive data and cannot perform low-power operation.
4	enters other modes from Mode 3 (Standby Mode) or during the reset process, the radio will reset the user parameters.

Relay networking rules:

1、Forwarding rules, the relay can forward data bidirectionally between two NETIDs.

2、In repeater mode, ADDH\ADDL is no longer used as the radio address, but as NETID for forwarding pairing.

As shown in the figure:



①First-level relay

"Node 1" NETID is 08.

"Node 2" NETID is 33.

The ADDH\ADDL of relay 1 are 08 and 33 respectively.

So the signal sent by node 1 (08) can be forwarded to node 2 (33)

At the same time, the addresses of node 1 and node 2 are the same, so the data sent by node 1 can be received by node 2.

② Secondary relay

The ADDH\ADDL of relay 2 are 33, 05 respectively.

So relay 2 can forward the data of relay 1 to network NETID:05.

Therefore, nodes 3 and 4 can receive data from node 1. Node 4 outputs data normally, but node 3 does not output data because its address is different from that of node 1.

③Two-way relay

As shown in the configuration figure: the data sent by node 1 can be received by nodes 2 and 4, and the data sent by nodes 2 and 4 can also be received by node 1.

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7. Host computer configuration instructions

- The figure below shows the configuration interface of the host computer for EWD95M-433Cxx(xxx) . Users need to switch the DTU to configuration mode by pressing the MODE button before they can quickly configure and read parameters on the host computer.



- In the configuration host computer, the radio address, frequency channel, network ID, and key are all displayed in decimal mode, and the value range of each parameter is:
  Network address: 0-65535
  Frequency channel: 0～62
  Network ID: 0-255
  Key: 0-65535
- When the user uses the host computer to configure the relay mode, special attention should be paid. Since the parameters in the host computer are in decimal display mode, the radio address and network ID need to be converted when filling in. For example, if the network ID input by the transmitter A is 02 and the network ID input by the receiver B is 10, when the relay R sets the radio address, the hexadecimal value 0X020A is converted to the decimal value 522 as the radio address filled in by the relay R. That is, the radio address value that the relay R needs to fill in is 522.

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8. Firmware Upgrade Instructions

EWD95M series DTU supports serial port firmware upgrade. When special after-sales support is required, you can contact us to obtain the corresponding firmware for upgrade.

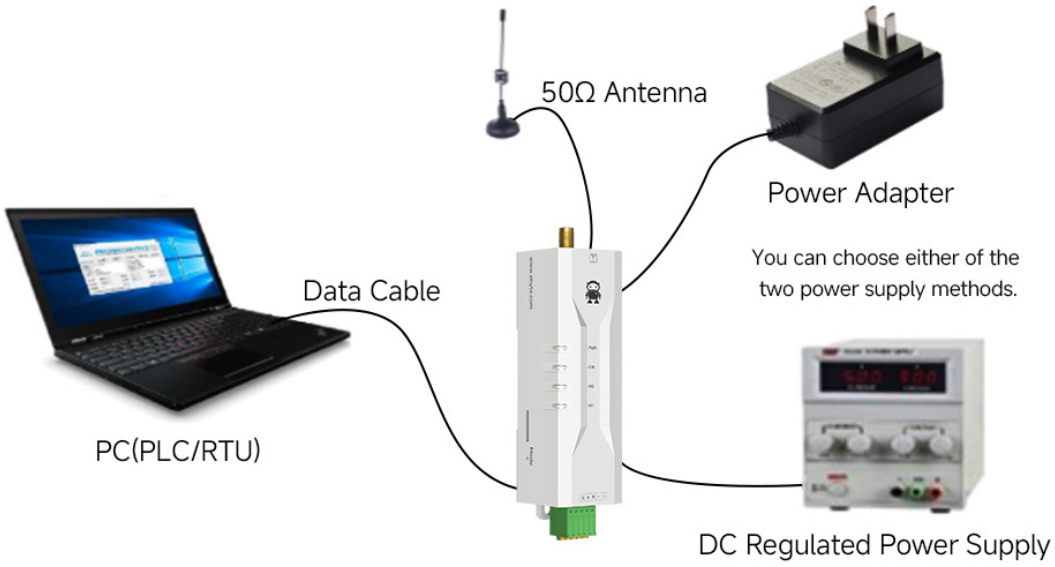
Upgrade method: Use USB to RS232/RS485 tool to connect DTU , and control M0/M1 level to enter configuration mode. Connect DTU through the host computer configuration tool provided by our official website , select IAP upgrade, click the "Open File" button to select the corresponding firmware, and then click to start downloading. When the Please Wait prompt box appears, click Confirm, wait for 5 seconds, confirm to enter the upgrade mode and start downloading. At this time , wait for the progress bar to reach 100% to complete the download . After completion, please manually close and open the serial port again to re-read the parameters.



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9. Program the Radio Station



Working Mode	M1	M0	Notes
Configuration Mode	Indicator light on	Light off	The radio can only be programmed using the configuration software in the current mode

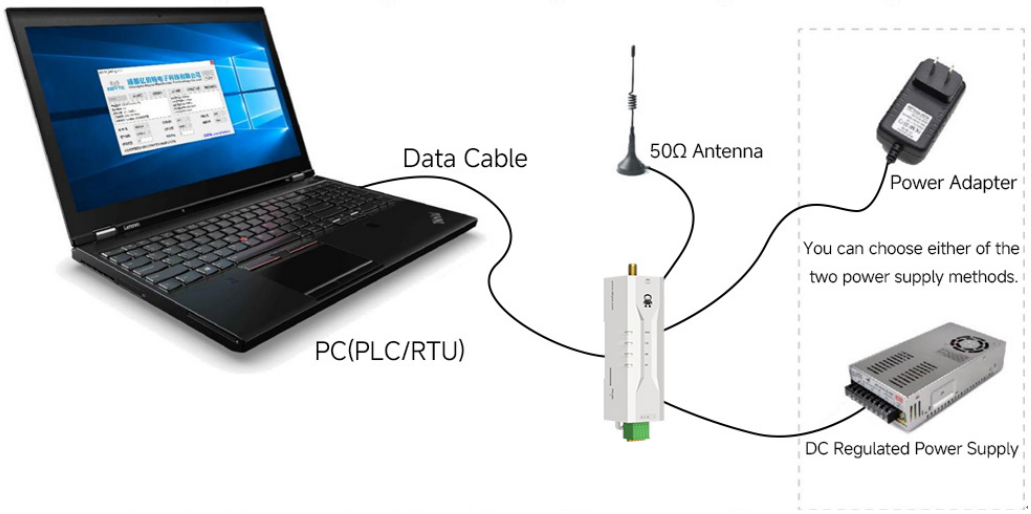
1、 Programming can only be performed in specific working modes (see the table above). If programming fails, please confirm whether the radio working mode is correct.

2、 If no complicated programming is required, just open the EWD95M-433Cxx(xxx) configuration software and modify the relevant parameters.

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10. Connection diagram in test and actual application



11. Related Products

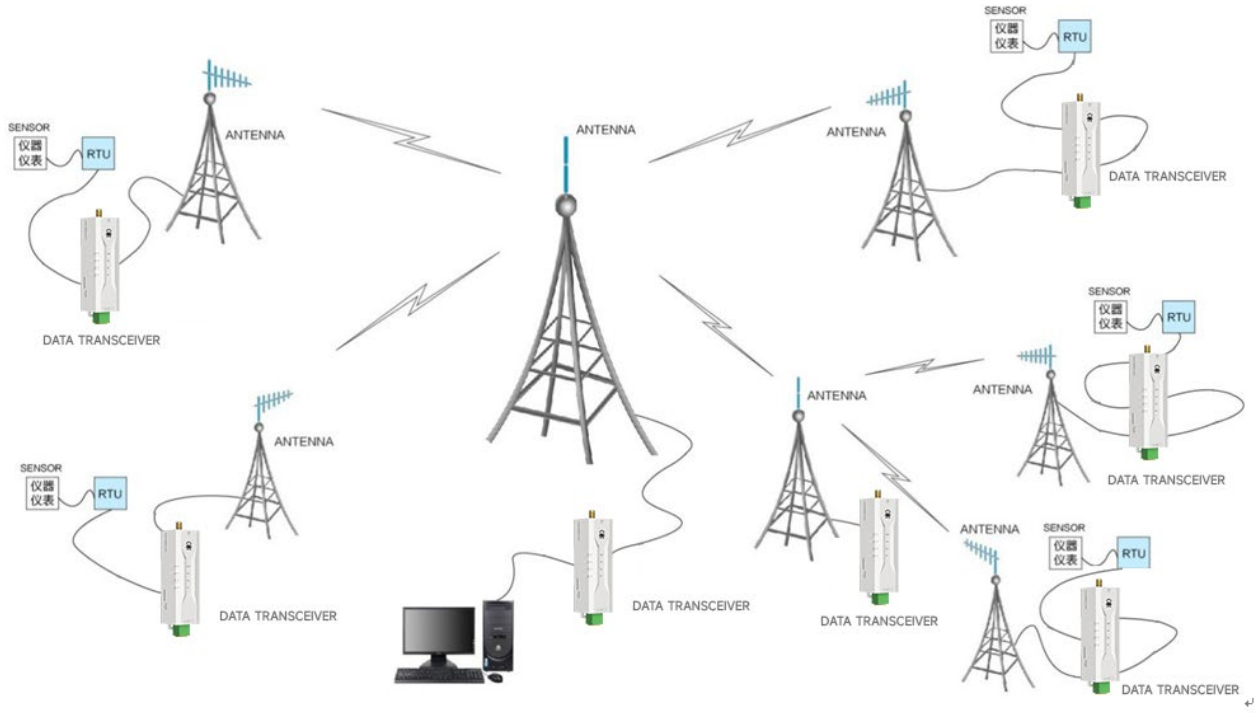
Product Model	Interface Type	Operating frequency MHz	Transmit power dBm	Communication distance km	Features
E90-DTU(900L20)-V8	RS232 RS485	862～930	20	3	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L37)-V8	RS232 RS485	410～441	37	20	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L20)-V8	RS232 RS485	410～441	20	3	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L30)-V8	RS232 RS485	410～441	30	8	LoRa spread spectrum, long-distance anti-interference
E95-DTU(433L20-485)-V8	RS485	410～441	20	3	LoRa spread spectrum, long-distance anti-interference
E95-DTU(433L30-485)-V8	RS485	410～441	30	8	LoRa spread spectrum, long-distance anti-interference
E96-DTU(433L20-485)-V8	RS485	410～441	20	3	LoRa spread spectrum, long-distance anti-interference
E96-DTU(433L30-485)-V8	RS485	410～441	30	8	LoRa spread spectrum, long-distance anti-interference
E800-DTU(400SL20-485)-V8	RS485	410～441	20	3	LoRa spread spectrum, long-distance anti-interference
E800-DTU(400SL30-485)-V8	RS485	410～441	30	8	LoRa spread spectrum, long-distance anti-interference

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12. Practical Application Fields

Ebyte digital radio is suitable for all kinds of point-to-point and point-to-multipoint wireless data transmission systems, such as smart home, Internet of Things transformation, power load monitoring, distribution network automation, hydrological and water conditions monitoring, water pipe network monitoring, urban street light monitoring, air defense alarm control, railway signal monitoring, railway water supply centralized control, oil and gas supply pipe network monitoring, GPS positioning system, remote meter reading, electronic crane scale, automatic target reporting, earthquake monitoring, fire prevention and theft prevention, environmental monitoring and other industrial automation systems, as shown in the following figure:



13. Precautions for use

- Do not operate this radio in flammable places (such as coal mines) or near explosive and dangerous objects (such as detonators) .
- 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 .
- 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.
- Do not allow the digital radio to continuously operate at full load, otherwise the transmitter may burn out.
- 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.

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- 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.
- 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.
- 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.
- 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.

14.Important Statement

- 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.

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Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2024-11-26	Initial release	Lei
1.1	2024-12-24	Modify the size description. Add a description of module interoperability.	Lei
1.2	2025-01-22	Correct the errors in the accompanying illustrations	Lei

About Us

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Technical support: support@cdebyte.com
Official website: www.ebyte.com
Company Address: Building B2, No. 199, Xiqu Avenue, West Hi-Tech Zone, Chengdu, Sichuan

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