Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

EWD95M-433Nxx(xxx) User Manual

433Mhz Data Transceiver Unit



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1. Product Overview

1.1 Product Introduction



EWD95M-433Nxx(xxx) is wireless data transmission radio station based on narrowband transmission technology. It has the characteristics of half-duplex, integrated transceiver, transparent transmission, etc. It works in the 425~450.5MHz frequency band (default 433MHz). It supports interoperability with our company's E30 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 .

The radio has a software FEC forward error correction algorithm, which has high coding efficiency and strong error correction capability. In the case of sudden interference, it can actively correct the interfered data packets, greatly improving reliability and transmission distance. In the absence of FEC, such data packets can only be discarded. The radio has data encryption and compression functions. The data transmitted by the radio in the air is random. Through strict encryption and decryption algorithms, data interception becomes meaningless. The data compression function has the probability of reducing transmission time, reducing the probability of interference, and improving reliability and transmission efficiency.

As a communication medium, 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

★ Support fixed-point transmission/broadcast transmission/channel monitoring ;
★ Ultra-small size, 80*28*28.5mm, easy and quick to install;
★ Under ideal conditions, the communication distance can reach 2.5km ;
★ The subpacket length is fixed at 58 bytes;
★ Adopt flame-retardant plastic shell and guide rail installation structure, which is convenient and efficient to install;
★ 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;
★ The transmission power is 20dBm and supports multi-level adjustment. All technical indicators meet industrial standards.
★ Supports data transmission rates of 1k to 25kbps ;
★ Support Modbus protocol transmission;
★ Support FEC forward error correction to effectively improve communication stability;
★ Working temperature range: -40℃～+85℃, adaptable to various harsh working environments, a true industrial-grade product;
★ Multiple protection functions such as 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.;
★ 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.

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1.3 Quick Start

① You need to prepare two sets of DTU debugging components, including EWD95M -433 N xx(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.

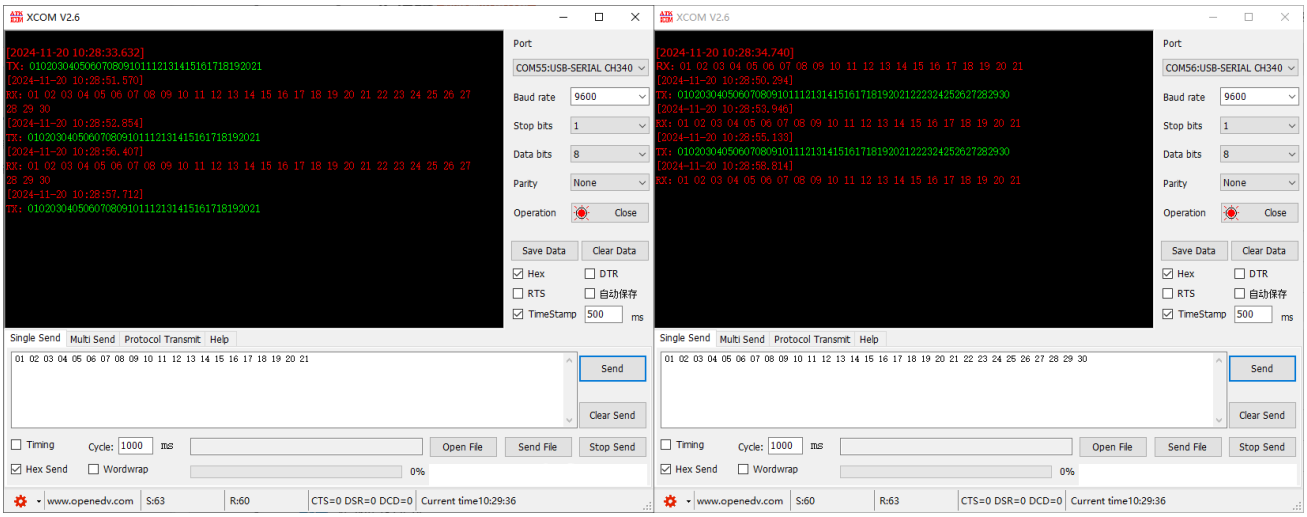
② First, install the antenna for the DTU . Then power on the DTU through the power adapter and connect the cables, TX A+ to A/T, RX B- to B/R.



③ Finally, connect the computer to the two DTUs 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 normal mode.



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:

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Serial number	category	M1	M0	Notes
Mode 0	General Mode	Off	Off	Serial port is open, wireless is open, transparent transmission , the receiver must be mode 0, 1
Mode 1	Wake-up mode	Off	On	The serial port is on, the wireless is on; the only difference from mode 0 is that before the data packet is transmitted, a wake-up code is automatically added to wake up the receiver working in mode 2. The receiver can be mode 0 , 1, or 2
Mode 2	Power saving mode	On	Off	The serial port reception is closed, the wireless is in the air wake-up mode, after receiving the wireless data, the serial port is opened to send the data. The transmitter must be in mode 1 , and it cannot be transmitted in this mode
Mode 3	Configuration Mode	On	On	Enter the configuration mode to read and set parameters

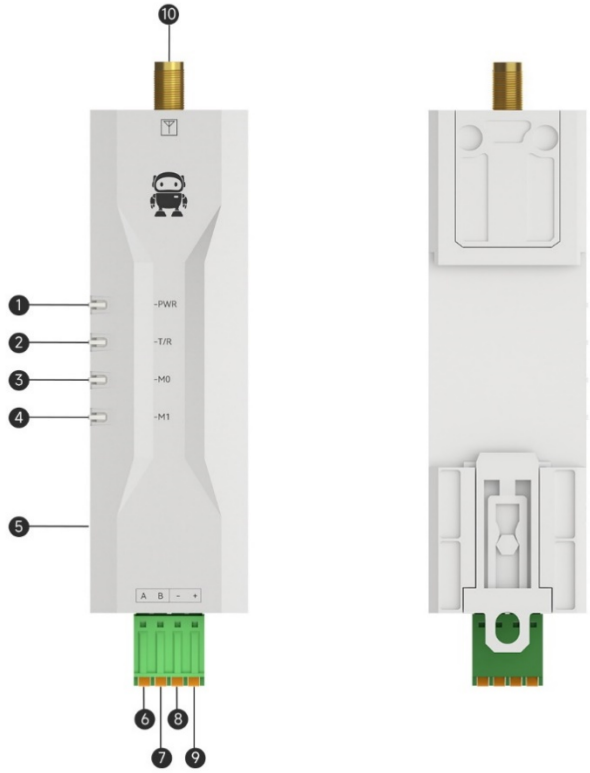
Note: The radio has a power-off saving mode function. Users need to switch to the corresponding mode according to the M1 and M0 indicator lights (effective immediately).

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1.4 Ports and Functions

1.4.1 RS485 interface



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.

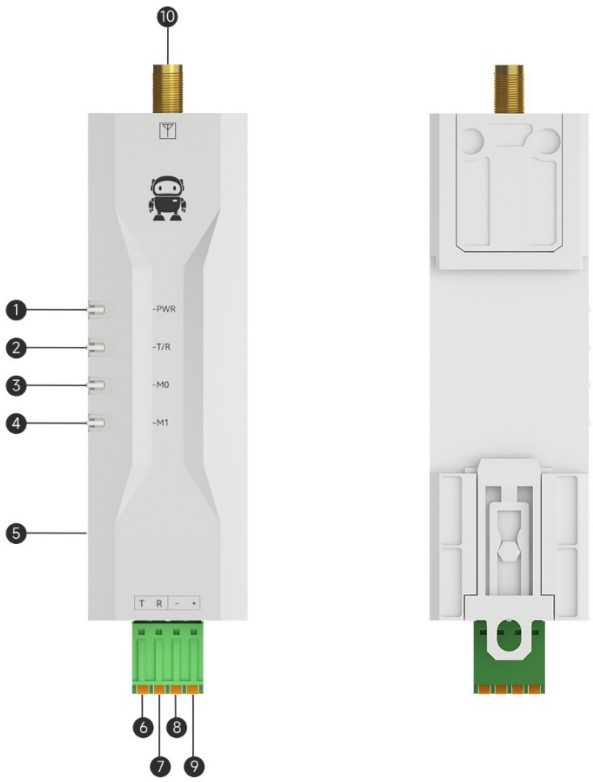
★ Note: If communication is not smooth when connecting the radio to multiple devices, but not when connecting to a single device, try connecting a 120Ω resistor in parallel between the 485_A terminal and the 485_B terminal.

★ EWD95M-433Nxx(xxx) can be powered by 5~28V (DC) power supply, and the wiring port is connected by terminal block.

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1.4.2 RS232 interface



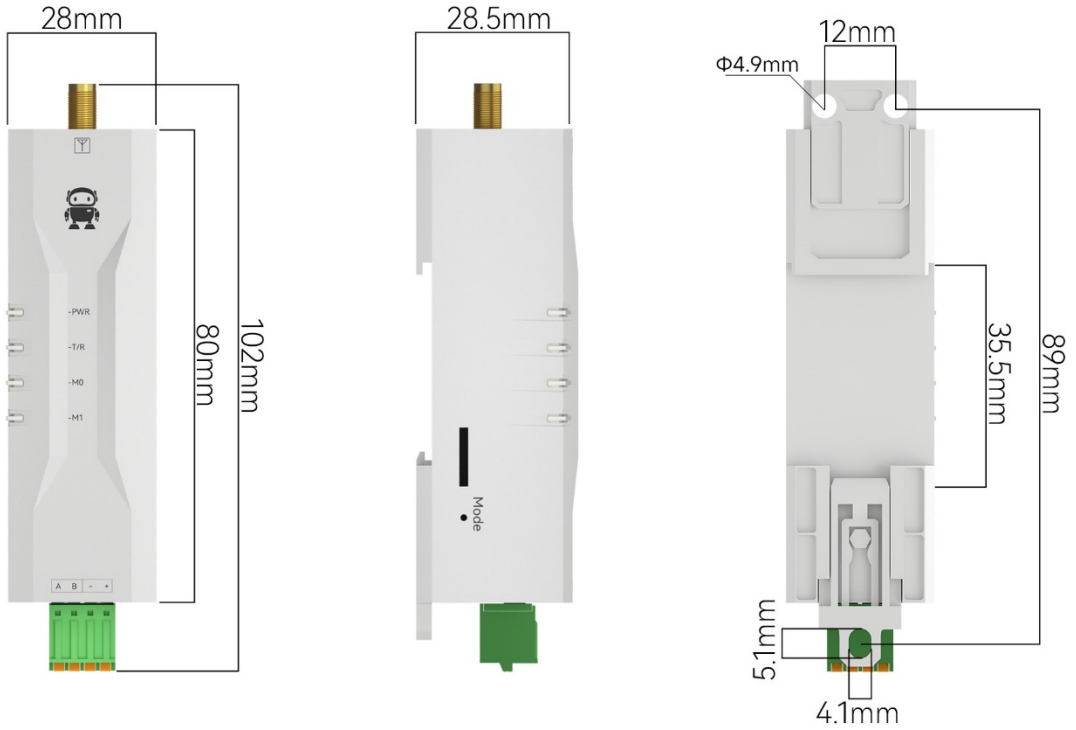
Serial number	name	Function	illustrate
1	PWR	Power indicator	Lights up when the power is on.
2	T/R	Send/Receive Indicator	The flashing light is red when sending data and green when receiving data.
3	MO	Mode indicator	Working mode indicator light.
4	M1	Mode indicator	Working mode indicator light.
5	Mode	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.

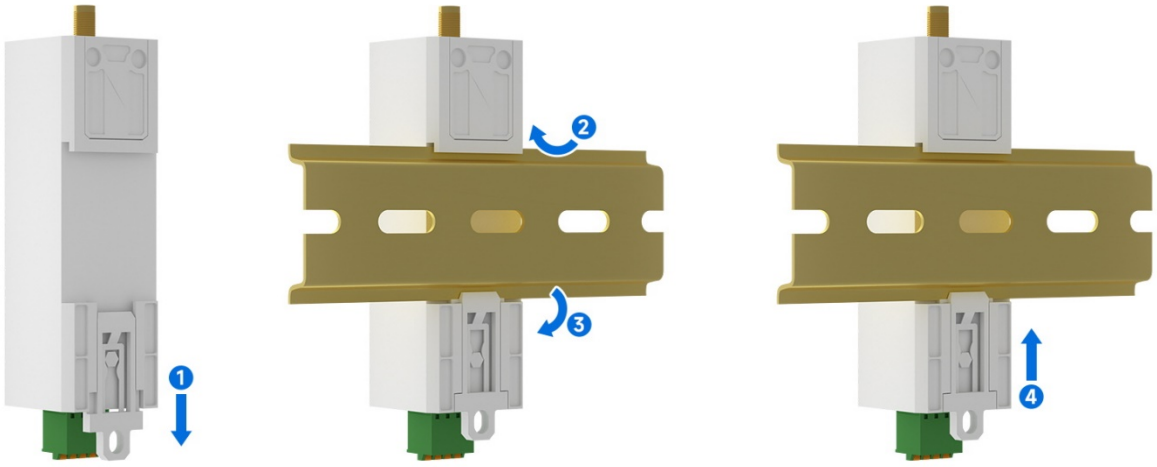
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1.5 Installation dimensions





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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）	The DC version 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: 1200～115200
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-433N20(xxx)	433M	425～ 450.5	0.1M	256

★ 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-433N20(xxx)	20dBm	17dBm	14dBm	10dBm

★ 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-433N20(xxx)	1k	8	1, 2, 5, 8, 10, 15, 20, 25

★ 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	Transmitting current mA			Receive current mA		
	5V	12V	28V	5V	12V	28V
EWD95M-433N20(xxx)	102.3	50.5	25.6	22.0	12.7	5.7

★ 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

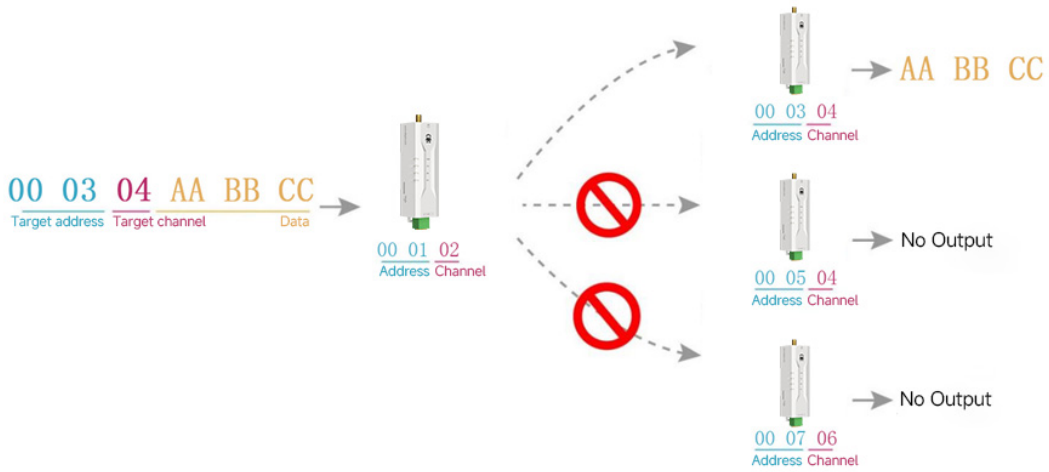
Model Specifications	Cache size	Subcontracting
EWD95M-433N20(xxx)	512 bytes	Maximum length of a single transmission 58 bytes

★ Notice:

1. If the data received by the radio at a single time is larger than the capacity of a single packet, the excess data will be automatically allocated to the second transmission until the transmission is completed;
2. The amount of data received by the radio at one time cannot be larger than the buffer capacity.

3. Detailed explanation of functions

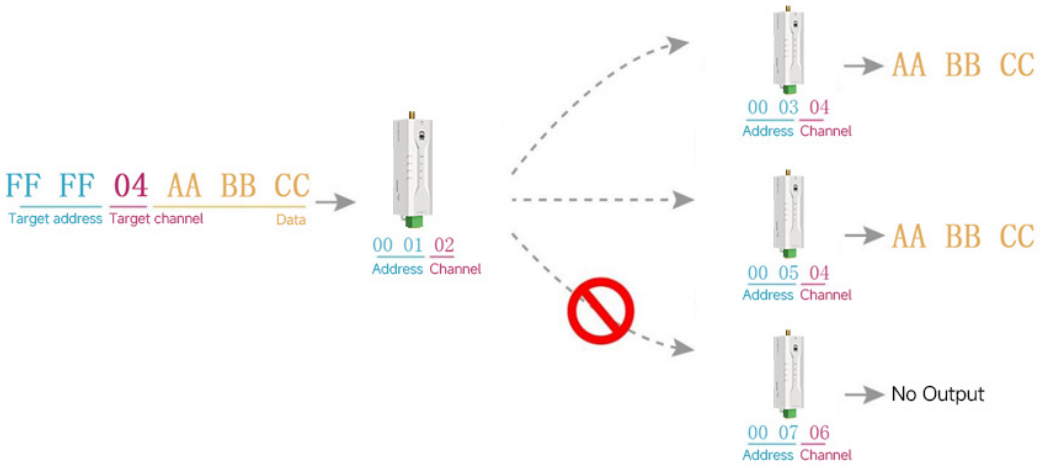
3.1 Fixed-point transmission (hexadecimal)



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3.2 Broadcast transmission (hexadecimal)



3.3 Broadcast Address

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

3.5 DTU reset

- After the radio is powered on, it will immediately perform a hardware self-check and set the working mode according to the user parameters ;

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4. Working Mode

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

Serial number	category	M1	M0	Notes
Mode 0	General Mode	Off	Off	Serial port is open, wireless is open, transparent transmission , the receiver must be mode 0, 1
Mode 1	Wake-up mode	Off	On	The serial port is on, the wireless is on; the only difference from mode 0 is that before the data packet is transmitted, a wake-up code is automatically added to wake up the receiver working in mode 2. The receiver can be mode 0 , 1, or 2
Mode 2	Power saving mode	On	Off	The serial port reception is closed, the wireless is in the air wake-up mode, after receiving the wireless data, the serial port is opened to send the data. The transmitter must be in mode 1 , and it cannot be transmitted in this mode
Mode 3	Configuration Mode	On	On	Enter the configuration mode to read and set parameters

Note: If there is no low power consumption requirement, you do not need to worry about the WOR mode (mode 1).

4.1 Normal Mode (Mode 0)

type	When the M0 indicator light is off , the M1 indicator light is off , and the radio operates in mode 0
Transmitting	The radio receives user data from the serial port. The length of the wireless data packet transmitted by the radio is 58 bytes. When the amount of data input by the user reaches 58 bytes, the radio will start wireless transmission, and the user can continue to input the data to be transmitted; when the bytes that the user needs to transmit are less than 58 bytes, the radio waits for 3 bytes. If there is no user data to continue input, it is considered that the data is terminated. At this time, the radio will send all data packets wirelessly. Data packets sent through mode 0 can only be received by receiving radios in mode 0 and mode 1.
Receiving	The radio keeps the wireless receiving function on and can receive data packets from mode 0 and mode 1.

4.2 Wake-up Mode (Mode 1)

type	When the M0 indicator light is on and the M1 indicator light is off , the radio operates in Mode 1.
Transmitting	The conditions for the radio to start transmitting data packets are the same as those in mode 0; the only difference is that the radio will automatically add a wake-up code before each data packet, and the length of the wake-up code depends on the wake-up time set in the user parameters; the purpose of the wake-up code is to wake up the receiving radio working in mode 2; therefore, data transmitted in mode 1 can be received by modes 0, 1, and 2.
Receiving	can be received normally , and the receiving function is equivalent to mode 0

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4.3 Power saving Mode (Mode 2)

type	When the M0 indicator light is off and the M1 indicator light is on, the radio operates in Mode 2.
Transmitting	The radio is in sleep mode, the serial port is closed, and cannot receive serial data from the outside, so this mode does not have the wireless transmission function.
Receiving	In mode 2, the transmitter must work in mode 1; monitor the wake-up code regularly. Once a valid wake-up code is received, the radio will continue to be in the receiving state and wait for the entire valid data packet to be received; the radio continues to enter the "sleep-listen" working state (polling); by setting different wake-up times, the radio has different receiving response delays (up to 2s) and average power consumption (minimum 30uA); users need to find a balance between communication delay time and average power consumption.

4.4 Configuration Mode (Mode 3)

type	When the M0 indicator light is on and the M1 indicator light is on , the radio operates in mode 3.
Transmitting	Unable to transmit wireless data
Receiving	Unable to transmit wireless data
Configuration	Configuration mode can be used to set radio parameters. Use serial port 9600 and 8N1 to set radio working parameters through specific command formats.

5. Register read and write control

5.1 Instruction Format

In configuration mode (mode 3: M0=1, M1=1), the supported command list is as follows (when setting, only 9600, 8N1 format is supported):

Serial number	Instruction Format	Detailed description
1	C0+ Operating Parameters	Send C0+5 bytes of working parameters in hexadecimal format, a total of 6 bytes, must be sent continuously (save when power is off)
2	C1 C1 C1	Send three C1s in hexadecimal format and the radio returns the saved parameters. They must be sent continuously.
3	C2+ Operating Parameters	Send C2+5 bytes of working parameters in hexadecimal format , a total of 6 bytes, must be sent continuously (not saved when power is off)
4	C3 C3 C3	Send three C3s in hexadecimal format, and the radio returns version information. These must be sent consecutively.
5	C4 C4 C4	Send three C4s in hexadecimal format and the radio will generate a reset. This must be sent continuously.

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5.2 Factory default parameters

model	Factory default parameter value: C0 00 00 18 50 44						
Radio Model	frequency	address	Channel	Air speed	Baud rate	Serial port format	Transmit power
EWD95M-433N20(xxx)	433MHz	0x0000	0x50	1kbps	9600	8N1	100mW

5.3 Working parameter reading

Instruction Format	Detailed description
C1 C1 C1	In configuration mode (M0=1, M1=1), send a command (HEX format) to the radio serial port: C1 C1 C1, the radio will return the current configuration parameters, for example: C0 00 00 1A 17 44.

5.4 Version number reading

Instruction Format	Detailed description
C3 C3 C3	In configuration mode (M0=1, M1=1), send a command (HEX format) to the radio serial port: C3 C3 C3, the radio will return the current configuration parameters, for example: C3 30 xx yy; the second byte represents the frequency, if it is 30, then 433MHz is applicable frequency; if it is 50, then 170MHz is applicable frequency; if it is 35, then 490MHz is applicable frequency; if it is 54, then 780MHz is applicable frequency; if it is 53, then 868MHz is applicable frequency; if it is 36, then 915MHz is applicable frequency; xx is the version number, yy refers to other features of the radio.

5.5 Reset Instructions

Instruction Format	Detailed description
C4 C4 C4	In configuration mode (M0=1, M1=1), send a command (HEX format) to the radio serial port: C4 C4 C4, the radio will reset once; during the reset process, the radio will perform a self-check, and after the reset is completed, the radio will start to work normally. At this time, you can switch modes or initiate the next command.

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5.6 Register Commands

Serial number	name	describe				Remark
0	HEAD	Fixed 0xC0 or 0xC2, indicating that this frame data is a control command				Must be 0xC0 or C2 C0: The set parameters will be saved when the power is off ; C2: The set parameters will not be saved when the power is off.
1	ADDH	Radio address high byte (default 00H)				00H-FFH
2	ADDL	Radio address low byte (default 00H)				00H-FFH
3	SPED	7	6	Serial port check digit		The serial port modes of the communicating parties can be different .
		0	0	8N1 (default)		
		0	1	8O1		
		1	0	8E1		
		1	1	8N1 (equivalent to 00)		
		5	4	3	TTL serial port rate (bps)	The baud rates of the two communicating parties can be different ; The serial port baud rate has nothing to do with the wireless transmission parameters and does not affect the wireless transceiver characteristics.
		0	0	0	The serial port baud rate is 1200	
		0	0	1	The serial port baud rate is 2400	
		0	1	0	The serial port baud rate is 4800	
		0	1	1	The serial port baud rate is 9600 (default)	
		1	0	0	The serial port baud rate is 19200	
		1	0	1	The serial port baud rate is 38400	
		1	1	0	The serial port baud rate is 57600	
		1	1	1	The serial port baud rate is 115200	
		2	1	0	Wireless air rate (bps)	The lower the air rate, the longer the distance, the stronger the anti-interference performance and the longer the transmission time. The wireless transmission rate over the air must be the same between the two communicating parties.
		0	0	0	The air rate is 1k (default)	
		0	0	1	The air speed is 2k	
		0	1	0	Air speed is 5k	
		0	1	1	The air rate is 8k	
		1	0	0	Air rate is 10k	
		1	0	1	Air speed is 15k	
		1	1	0	Air speed is 20k	
		1	1	1	Air speed is 25k	

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<table>
<tr><td rowspan="2">4</td><td rowspan="2">CHAN</td><td colspan="4">Communication channel (0 ~ 255), default 80 (0x 50), 433M Hz</td><td rowspan="2">0x 00- 0x F F , corresponding to 425 ~ 450.5MHz</td></tr>
<tr><td colspan="4">Frequency calculation formula: 425M+CHAN*0.1M</td></tr>
<tr><td rowspan="20">5</td><td rowspan="20">OPTION</td><td>7</td><td colspan="3">Fixed-point transmission enable bit (similar to MODBUS)</td><td rowspan="3">When it is 1, the first 3 bytes of each user data frame are used as high and low addresses and channels. When transmitting, the radio changes its own address and channel, and restores the original settings after completion.</td></tr>
<tr><td>0</td><td colspan="3">Transparent transmission mode</td></tr>
<tr><td>1</td><td colspan="3">Fixed-point transmission mode</td></tr>
<tr><td>6</td><td colspan="3">IO driver mode (default 1)</td><td rowspan="3">This bit is used to enable the internal pull-up resistor of the radio. The open-drain mode has a stronger level adaptability, and an external pull-up resistor may be required in some cases.</td></tr>
<tr><td>1</td><td colspan="3">TXD push-pull output, RXD pull-up input</td></tr>
<tr><td>0</td><td colspan="3">TXD open circuit output, RXD open circuit input</td></tr>
<tr><td>5</td><td>4</td><td>3</td><td>Wireless wake-up time</td><td rowspan="10">When both the transmitting and receiving radios are working in mode 0, the delay time is invalid and can be any value ;
The transmitter works in mode 1 and will continue to transmit the call code for the corresponding time ;
The receiver works in mode 2. This time refers to the receiver's monitoring interval (wireless wake-up). It can only receive data from the transmitter working in mode 1.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>250ms (default)</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>500ms</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>750ms</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1000ms</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1250ms</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1500ms</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1750ms</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>2000ms</td></tr>
<tr><td>2</td><td colspan="3">FEC Switch</td><td rowspan="3">After turning off FEC, the actual data transmission rate increases, but the anti-interference ability decreases. The distance is slightly closer, so please choose according to the actual application ; both communicating parties must turn it on or off.</td></tr>
<tr><td>0</td><td colspan="3">Disable FEC</td></tr>
<tr><td>1</td><td colspan="3">Enable FEC error correction (default)</td></tr>
<tr><td>1</td><td>0</td><td colspan="2">Transmit power (approximate)</td><td rowspan="5">The external power supply must provide a current output capability of more than 250mA and ensure that the power ripple is less than 100mV ;
It is not recommended to use a lower power transmission because its power utilization efficiency is not high.</td></tr>
<tr><td>0</td><td>0</td><td colspan="2">20dBm (default)</td></tr>
<tr><td>0</td><td>1</td><td colspan="2">17dBm</td></tr>
<tr><td>1</td><td>0</td><td colspan="2">14dBm</td></tr>
<tr><td>1</td><td>1</td><td colspan="2">10dBm</td></tr>
</table>

Example (the meaning of the byte "SPED" in sequence number 3):

The binary bits of the byte	7	6	5	4	3	2	1	0
Specific value (user configuration)	0	0	0	1	1	0	0	0
Representative significance	Serial port check digit 8N1		The serial port baud rate is 9600			The air rate is 1k		
Corresponding hexadecimal	1			8				

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8. Configuration Software.

- The figure below shows the configuration software for EWD95M-433Nxx(xxx) . Users can switch to configuration mode by pressing the MODE button to 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: 0～255

  Network ID: 0-255

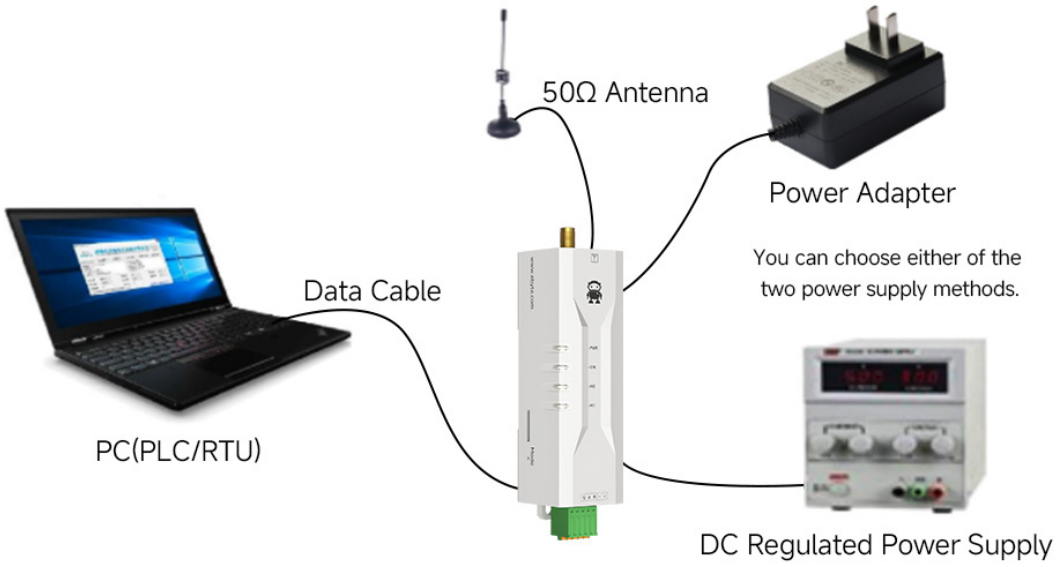
  Key: 0-65535

- 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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9. Configure the DTU



Working Mode	M1	M0	Notes
Configuration Mode	On	On	Enter the configuration mode to read and set parameters

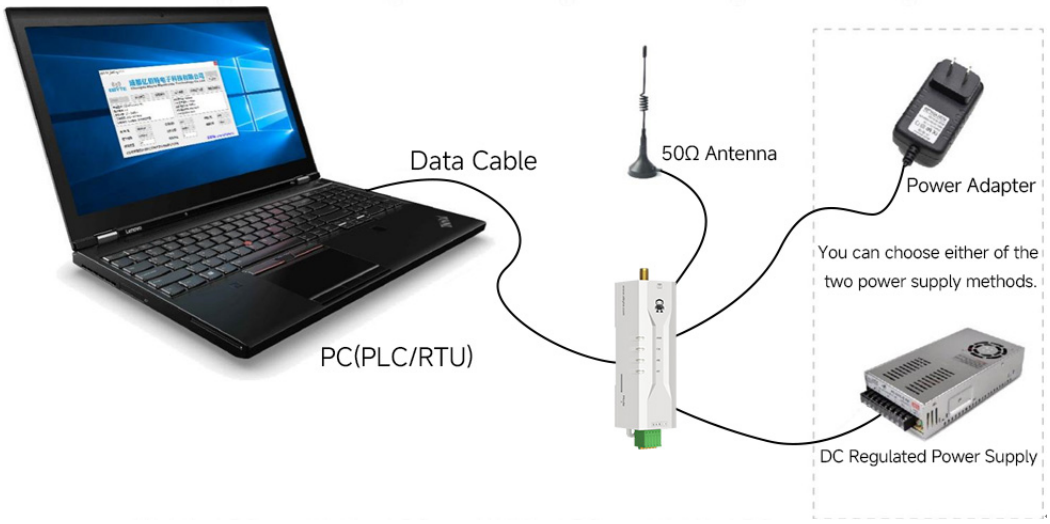
1、 Programming can only be performed in specific working modes (see the table above). If programming fails, please confirm whether the radio working mode is correct.

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

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10. Connection diagram in testing and actual application



11. Related Products

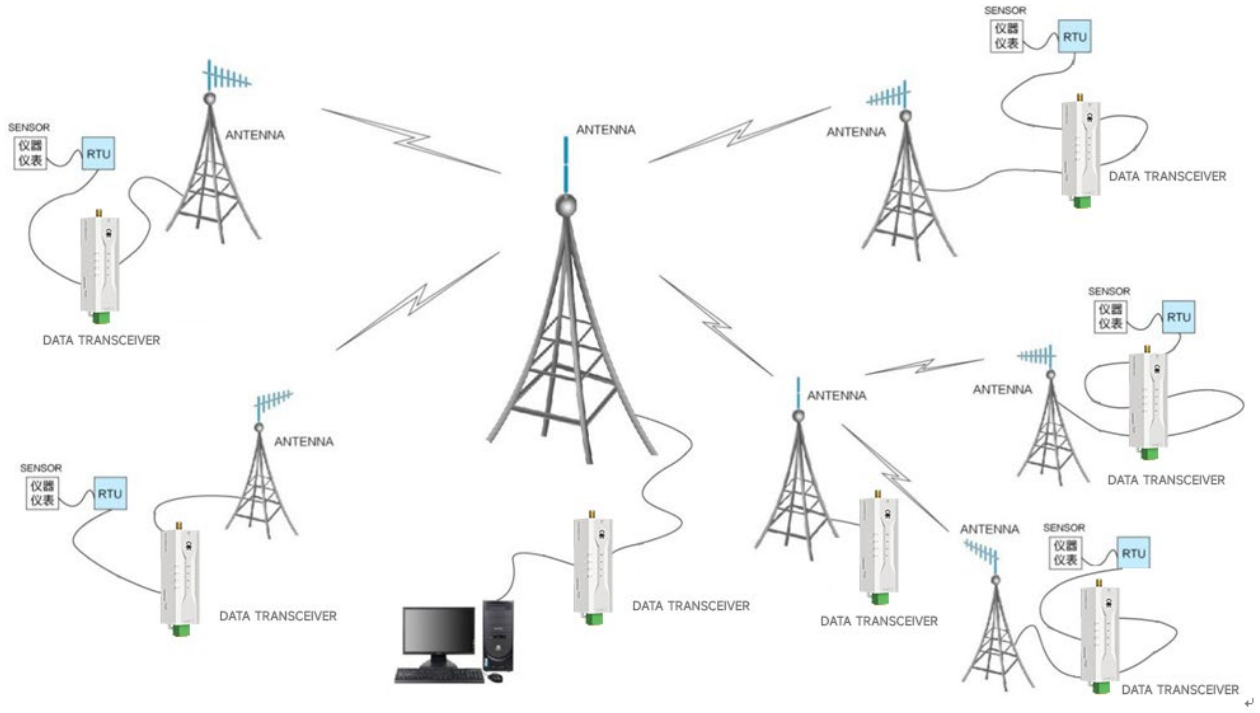
Product Model	Interface Type	Operating frequency MHz	TX Power dBm	Ideal range Km	Features
E90-DTU(900L20)-V8	RS232 RS485	862～930	20	3	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L37)-V8	RS232 RS485	410～441	37	20	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L20)-V8	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. Application Scenario

Ebyte DTU 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:



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13. 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 DTU.
3. Do not use the device in an environment that exceeds the environmental characteristics of the DTU, such as high temperature, humidity, low temperature, strong electromagnetic field, or dusty environment.
4. Do not allow the DTU to continuously operate at full load, otherwise the transmitter may burn out.
5. The ground wire of the DTU 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 DTU, 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 based on the antenna quality and antenna installation method. You can also contact support@cdebyte.com for help.
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.

Important Notice

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.

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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

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