Wireless Data Transceiver

E90-DTU

User Manual

1.Introduction

1.1. Brief introduction

E90-DTU series are wireless data transceivers of 868M/915MHz with standard RS232/RS485 connectors. They are half-duplex TX & RX modems with GFSK modulation, which largely lower frequency bandwidth thus enable its strong anti-interference ability. Transparent transmission mode is available. Voltage supply ranges from 10V to 28V, convenient for users to install and debug.

E90-DTU features FEC algorism, which enables higher coding efficiency and correction ability. The interfered data packets will be corrected proactively upon sudden interference, which significantly improves reliability and communication distance. Without FEC, the interfered data packet will be dropped. The transceivers feature data encryption and compression. The data transmitted in air features randomness, the rigorous algorism makes data interception meaningless. The data compression function has possibility to reduce the data transmission time, which in turn reduces the possibility of being interfered, thus improves the reliability and communication efficiency.

As a communication media, similar as optical fiber, microwave and cable, the wireless data transceiver can be applied in specific scope: it provides real-time and reliable data transmission of specific network monitor signal under some special conditions, it features cost-efficiency, easy installation, simple maintenance, super diffraction ability, flexible networking structure, large area covering and so on. It is suitable for multiple points under complex environment, and it is applicable for connecting with PLC, RTU, hyetometer, level gauge and so on.

E90-DTU series strictly follow FCC, CE, CCC standards, and meet various certification requirements and can be applied all over the world.

1.2. Features

★ All core components are originally imported, our transceiver modems have much advanced functions with smaller size and lower cost.

★ TX power100mW, all technical parameters meet European industrial standards.

★ Temperature compensators are adopted to make the frequency stability better than ±1.5PPM.

★ Operation temperature range: -40C° ~ +85C°, applicable for various harsh environment, it is real industrial grade products.

★ Aluminum alloy case, compact size, great heat dispersion; good shielding, prime electromagnetic compatibility and strong anti-interference.

★ Power reverse & overload protection and antenna surge protection functions significantly improve the reliability.

★ Parameters can be configured by programming, such as TX power, frequency point, air data rate, address and so on.

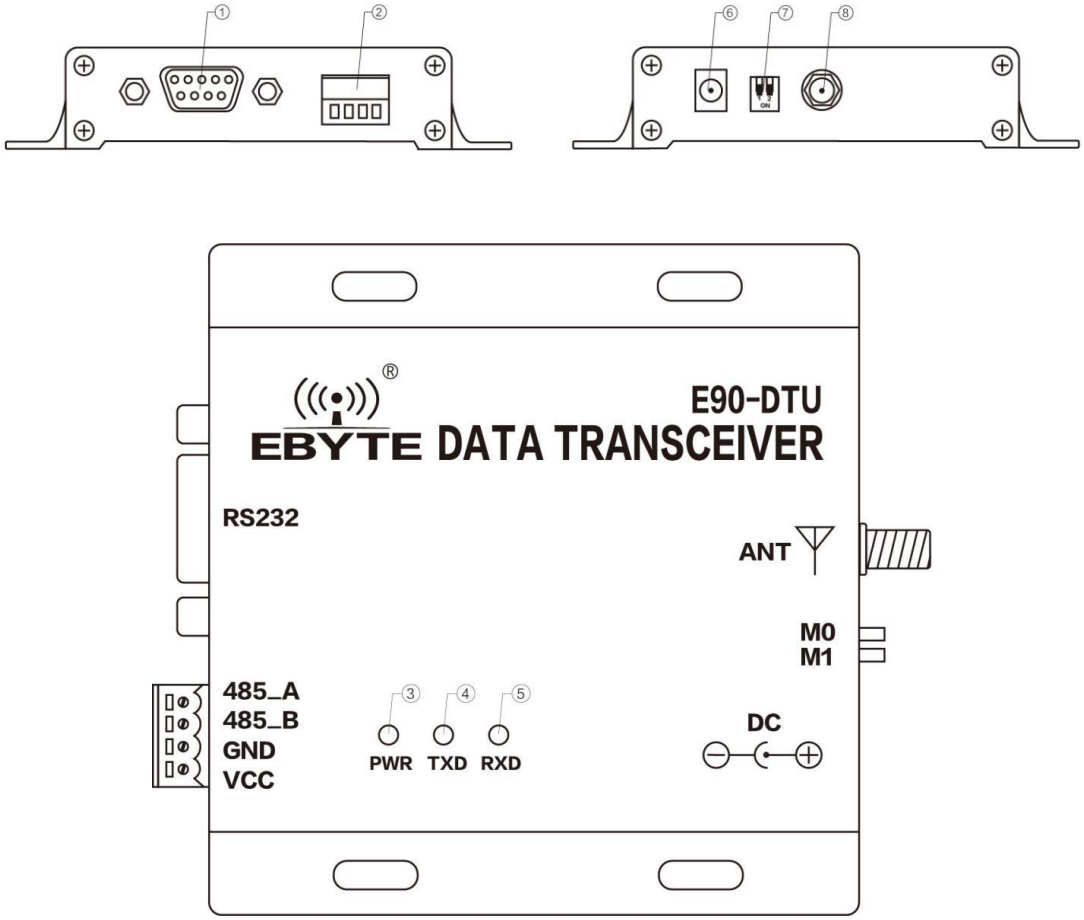
★ Ultra-low power consumption, standby current is only 50mA (even lower under power-saving and sleep modes).

★ Embedded watch-dog and precise time layout, modem will restart automatically upon abnormal situation and work with previous parameters.

★ The transceivers adopt original Silicon Labs SI4463/SI4438/SI4464 chips, customers highly comment the products because of the super reliability.

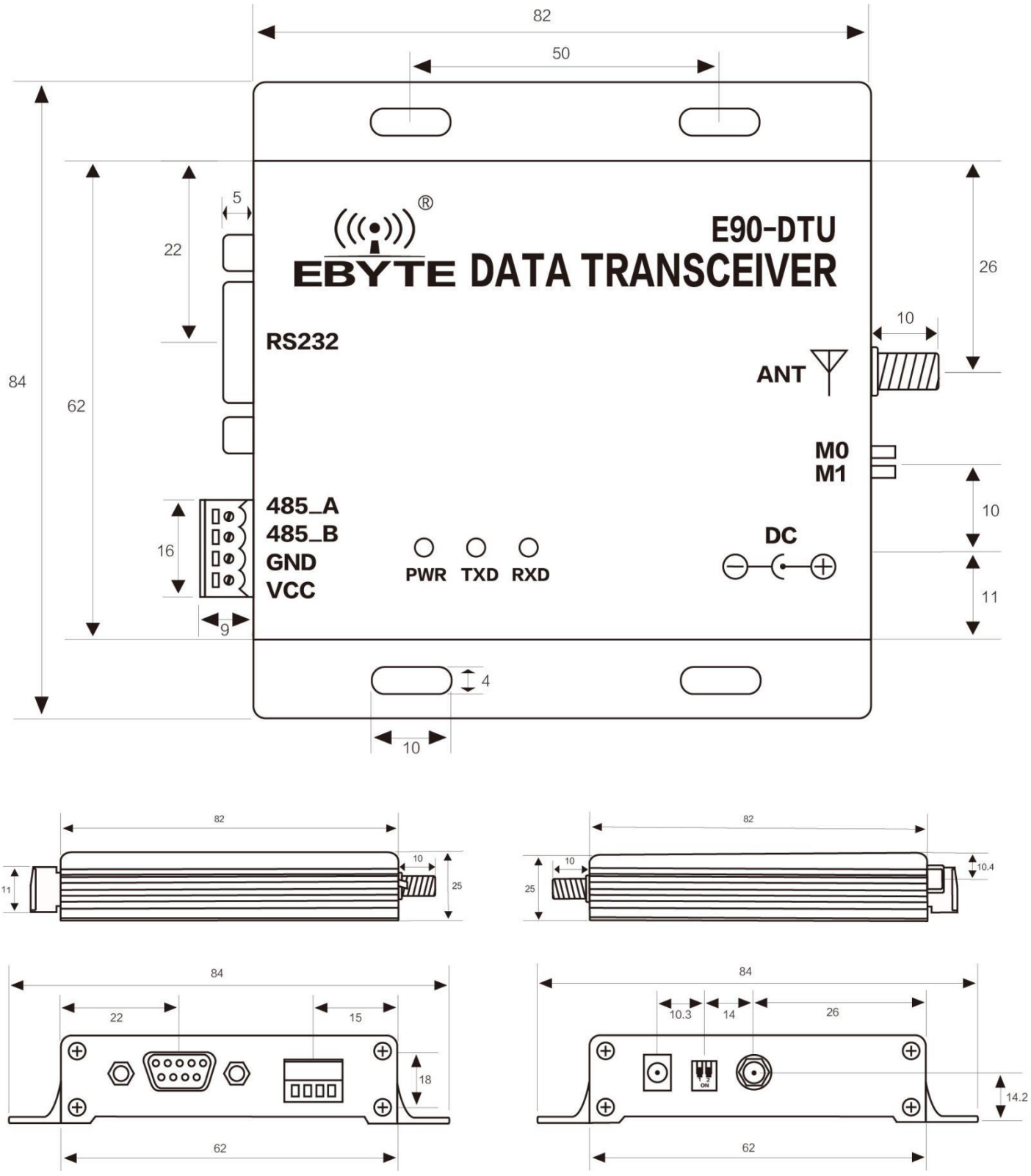
2. Dimension

2.1 Description



Pin NO.	Name	Function	Description
1	DB-9 female socket	RS-232	Standard RS-232 interface
2	3.81 terminal	RS-485、power interface	Standard RS-485 interface and pressure line power interface
3	PWR-LED	Power LED	Red, lit when the power is on
4	TXD-LED	Transmit LED	Yellow, blinks when sending data
5	RXD-LED	Receive LED	Yellow, blinks when sending data
6	DC power interface	Power interface	In-line round hole, outer diameter 5.5mm, diameter 2.5mm
7	DIP switch	Dip switch	Controlled by working mode
8	Antenna interface	SMA-K interface	external thread, 10mm, 50Ωcharacteristic impedance

2.2. Dimension of type A

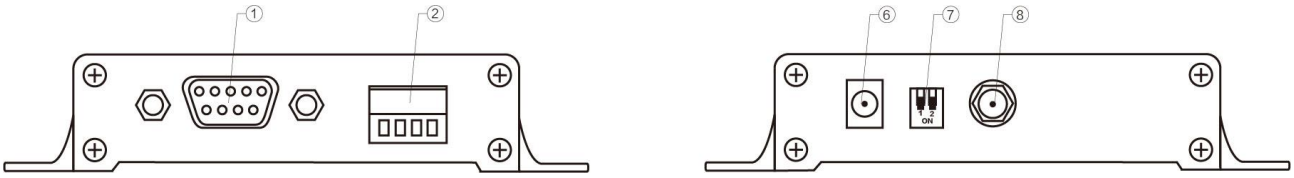


★Note：Type A is for 2W specification，including：

E90-DTU（868M20） E90-DTU（915M20）

3. Interface definition

3.1. Power interface



Users can choose ⑥ DC power interface,using the power adapter supply with the interface of the 5.5mm outer diameter , 2.5mm diameter ;

Also choose the VCC and GND terminal power supply, only choose any one of the power supply is OK;

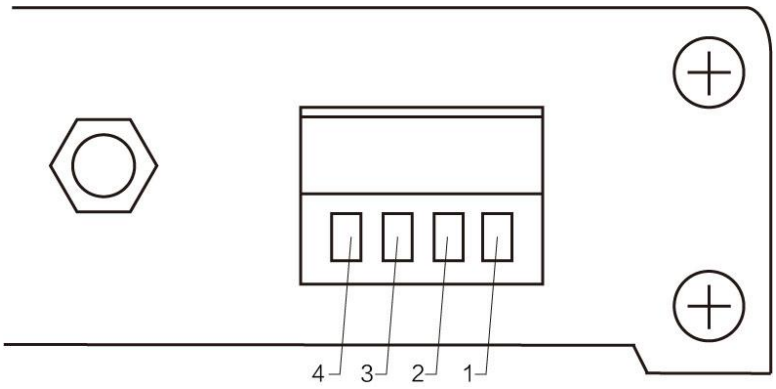
E90-DTU can use 10 ~ 28V DC power supply, but it is recommended to use 12V or 24V DC power supply.

3.2. RS232 interface

The E90-DTU can be connected to the device via RS-232 using the standard DB-9 interface.

3.3. RS485 interface

E90-DTU can connect the 485_A terminal and 485_B terminal with the device RS-485 A terminal and B terminal.



Pin NO.	Definition	Function	Description
1	VCC	Pressure line power interface, positive	10 ~ 28V DC, recommended 12V or 24V
2	GND	Pressure line power interface, negative	The power supply negative pole is connected to the system ground and the housing
3	485_B	RS-485 interface, interface B	The RS-485 interface B is connected to the device interface B
4	485_A	RS-485 interface, interface A	The RS-485 interface A is connected to the device interface A

★ Note: The transceiver will be poor communication when connecting multiple devices , while connecting a single device is not, please try to parallel connect 120Ω resistor between 485_A terminal and 485_B.

4. Technical specification

4.1. Model specification

Model	Frequency	TX power	Distance	Features	Recommended applications
	MHz	W	km		
E90-DTU（868M20）	868	0.1	2	North America band, FEC, Stable performance	Applicable for living, industrial areas and open mountain area with a few obstacles
E90-DTU（915M20）	907-922.5	0.1	2	European band， FEC, Stable performance	Applicable for living, industrial areas and open mountain area with a few obstacles

★ Note: Test conditions: clear weather, open area, no blockage, 12V1A power, 5dBi gain sucker antenna, 2 meters above ground, default parameters

4.2. General parameters

Model	Size	Weight	Temperature	Impedance	Voltage	Interface	Baud rate	Address code
E90-DTU（868M20）	82 * 62 * 25mm	131g±3g	-40 ~ 85C°	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E90-DTU（915M20）	82 * 62 * 25mm	131g±3g	-40 ~ 85C°	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0

★ Notes: Operating temperature: it is recommended to be lower than 70C°. Antenna impedance: standard 50Ω characteristic impedance. Voltage: higher than max value will damage the transceiver. Communication interface: standard DB9 hole/3.81 terminal. Baud rate: 1200~115200. Address: 65536 addresses.

4.3. Frequency and Channel

Model	Default Frequency	Frequency Band	Channel Interval	Channel
	MHz	MHz	MHz	
E90-DTU（868M20）	868	855~880.5	0.1	256，half duplex
E90-DTU（915M20）	907-922.5	900~925.5	0.1	31 ，half duplex

★ Notes: When multiple pairs work in same area, please set at least 2MHz channel interval between each pair to avoid interference.

4.4. Transmitting power

Model	10mw	25mW	50mW	64mW	100mW	125mW	250mW	500mW	5W
E90-DTU（868M20）	√	√	√		√				
E90-DTU（915M20）	√	√	√		√				

★ Notes: The lower the TX power, the shorter the communication distance. The current will not decrease at equal scale. Max power is recommended.

4.5. Air data rate

Model	Default air data rate	Level	Alr data rate
	Kbps		kbps
E90-DTU（868M20）	1	8	1、2、5、8、10、15、20、25
E90-DTU（915M20）	1	8	1、2、5、8、10、15、20、25

★ Notes: The higher the air rate, the quicker the transmission and the shorter the distance. So lower air rate is recommended.

4.6. Current value

Model	Transmitting current mA		Stand-by current mA	
	12V DC	24V DC	12V DC	24V DC
E90-DTU（868M20）	93	62	18	25
E90-DTU（915M20）	89	60	16	22

★ Notes: At least 50% current allowance is recommended when selecting power source in order to ensure long-term stable operation.

4.7. TX/RX length and sub-packing

Model	Buffer	Sub-packing
E90-DTU（868M20）	512 bytes	Auto sub-packing 58 bytes
E90-DTU（915M20）	512 bytes	Auto sub-packing 58 bytes

★ Notes

1. If single data packet is beyond allowed volume (100 bytes), the exceeded data will be left to the second transmission until it is sent completely.
2. The single RX data packet should not exceed the flash volume.

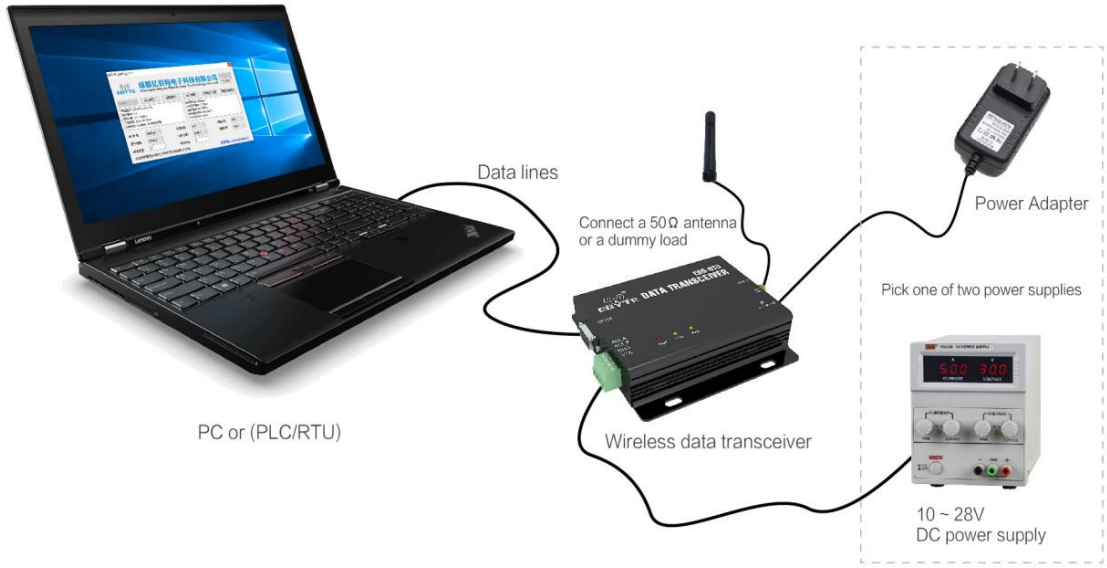
5. Operation Modes

E90-DTU transceivers have four operation modes. Please configure to general mode (M0) if no harsh low consumption required.

The transceivers are set to general mode (M0) by default.

	Mode	M1	M0	Notes
Mode 0	Common mode	On	On	Serial port open, RF on, transparent transmission
Mode 1	Wake-up mode	On	Off	Wake-on-air TX mode, data packet includes wake-up codes
Mode 2	Power-saving mode	Off	On	Wake-up RX mode, saving RX power, TX not allowed
Mode 3	Sleep mode	Off	Off	In sleep mode, configuration commands allowed

6. Connection Diagram for Configuration



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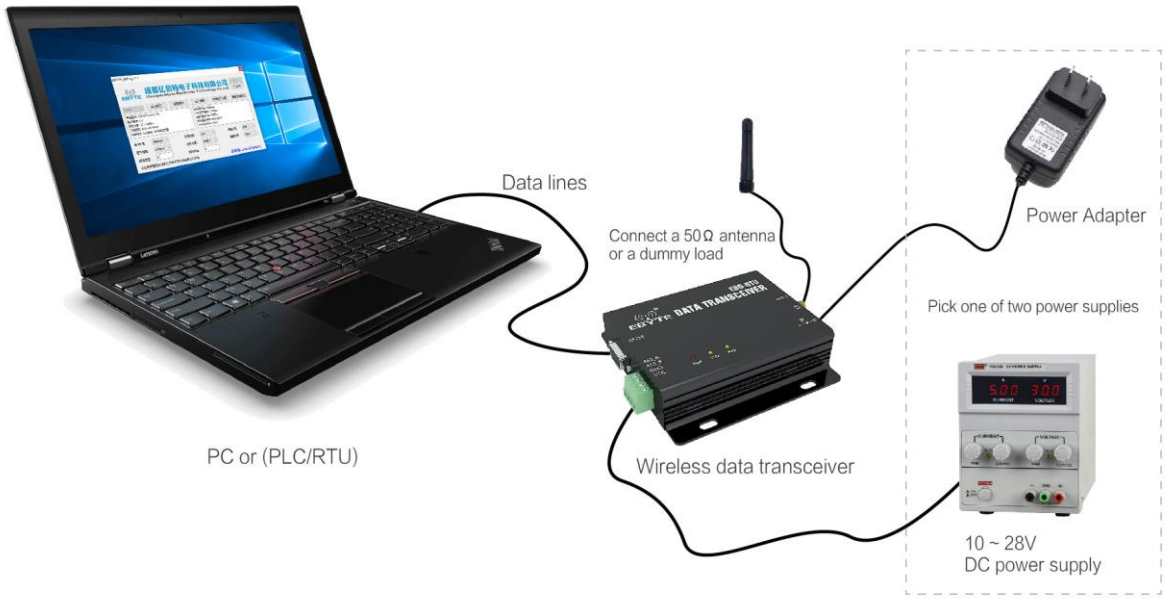
Mode 3	Sleep mode	Off	Off	In sleep mode, configuration commands allowed

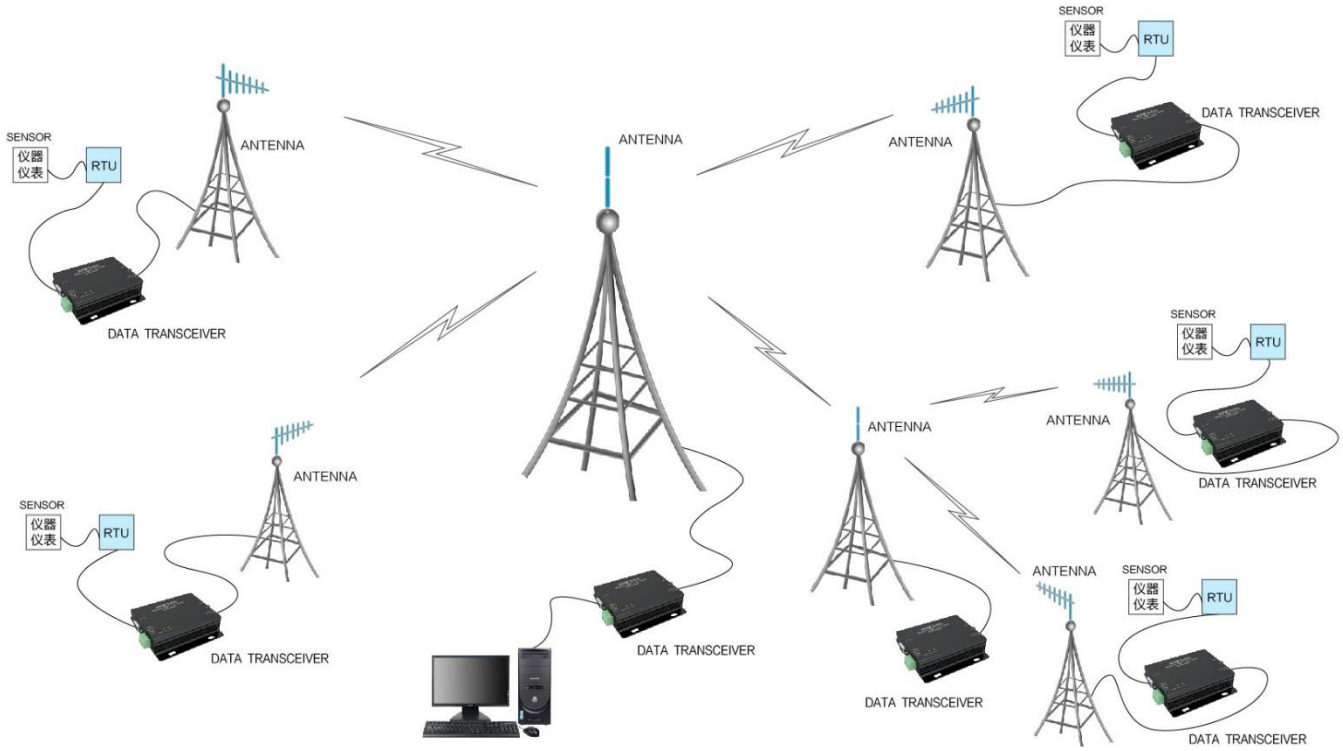
★ Notes: Configuration is allowed only under specific mode (refer to above table), please make sure the transceiver is under correct mode.

7. Connection Diagram for Testing & Operation



8. Applicable Industries

Ebyte wireless data transceiver is applicable for kinds of point-to-point, point-to-multipoint transmission systems, such as smart home, IoT upgrade, power grid load monitor, networking automation, utility water pipeline monitor, hydrology measuring, city lights monitor, air warning control, railway signal monitor, railway water supply control, oil & gas pipeline monitor, GPS positioning system, remote meter reading, electronic crane scale, automatic scoring system, earthquake reporting and so on. Please refer to below figure:



9. Important Notes

1. Please do not operate the devices at or near inflammable or explosive areas.
2. Please select stable DC power supply sources, which should have strong anti-interference ability and low ripple as well as load capacity; it is better to have overcurrent or overvoltage and lightning protection in order to ensure normal operation.
3. Please do not use the devices at environment that exceeds the limitation such as high temperature, high humidity, low temperature, strong electromagnetic or dusty environment.
4. Please do not make the devices work continuously at overload status, or it will damage the devices.
5. The ground electrode of the transceiver should be connected firmly to the external device’ s (PC, PLC, ETC.) and power source ground electrode, or it is easy to damage the communication interfaces; please do not plug on or off the serial port with power on.
6. When testing the transceivers, matched antennas or 50Ω dummy load must be connected, or it is easy to damage the devices; if antenna connected, human body should be at least 2 meters from the antenna to avoid injury, and do not touch the antenna when it is transmitting.
7. Under different environment, the communication distance will be different. Communication distance will be affected by temperature, humidity, blockage density, blockage size and electromagnetic environment; in order to have stable communication, at least 50% communication allowance is recommended to be kept.
8. If the tested communication distance is not ideal, please also consider about improving the antenna quality and antenna installation. Or please

contact support@cdebyte.com for help.

9. When selecting power source, besides keeping at least 50% current allowance, please also keep the power ripple below 100mV.

10. Important Declarations

- All rights to interpret and modify this manual belong to Ebyte.
- This manual will be updated based on the upgrade of firmware and hardware, please refer to the latest version.
- Please refer to our website for new product information.

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FCC Statement

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

RF Exposure warning:

The distance between device include antenna and user should be no less than 20 cm.