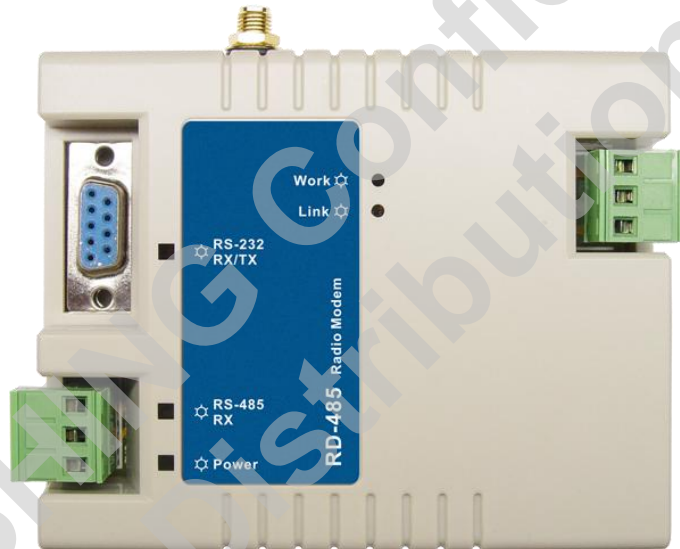

 868~ 928MHz Wireless Modem Controller System

**Version History**

Version	Date	Changes
V1.01	Jan.15, 2008	1 st . Edition
V1.02	Aug.20,2008	2 nd . Edition
V1.03	Oct.27,2008	3 rd . Edition
V1.04	Jan.16, 2009	4 th Edition

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Important Event

- This product is in general use for the equipment on the premise of the development, design, manufacture. Do not use that require high security purposes, such as machinery or medical, aviation equipment, machinery and transport-related deaths are directly or indirectly related to the system.
- This product should be in this brochure by the instructions of the types and rated voltage power under the current proper use. If violation of this statement by the safety records of the supply operation, I am afraid our company cannot afford any of the responsibility.
- Do not self-decomposition, alteration, repair of the products also will cause fire, electric shock, fault, and dangerous. In addition, their decomposition, alteration, repair the product, failure is not within the scope of warranty.
- The products are not waterproof, so please do not use and touch water. Take off and on also please note. Rain, spray, drinks, steam, sweat may be a failure.
- Use of this product, please be sure to use according to the statement recorded by the use of methods to operate. Please do not violate particular attention to the matter reminded to use.
- Please respect this statement recorded by the note. When consumers in contravention of this statement recorded note of the operation, I am afraid our company could not shoulder any responsibility.
- Products are defective, the Company will be responsible for free to amend the flaws, or to the same flawless product or its equivalent products in exchange. However, the Company does not assume based on the requirements of the flaw and loss responsibility.
- The Company reserves the right to retain without notice to users of the cases, the product of hardware / software (version upgrade) is with the right to edit.

Declaration

This product provides different frequency for user selection to meet different telecommunication regulation and FCC/CE on different countries.

Warranty

The warranty time is within one year from purchased date. The warranty scope are used in normal situation and none vandalism. (Some function harmful out of warranty scope and Vandalism are Un-warranty).

Un-warranty Scope Description

- Because the natural disaster, accident or human factor to cause the bad damage.
- Violate the product instruction manual to cause the damage of the products.
- The improper assemble causes damage.
- The products used the unsanctioned accessory to cause damaged.
- Overstep the allowed used environment to cause the products damaged.

Contact Us

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Introduce

RD-485 is for a two-way wireless data transmission products and work for the 868~ 928MHz frequency, mainly to provide wireless half duplex RF transceiver. RD-485 provide a RS232 (TTL level) and RS485 interface (TTL level), as long as the user interface in support of the application of internal and RS485 or RS232 communications, will be the standard serial interface for wireless data transmission. There are several transfer modes as following:

- Broadcasting mode: a transmitter can be connected with all distances in the launch of the RD-485.
- Point-to-point transmission mode: through the instructions set, it will send the information required to specify the ID on the RD-485.

In this paper, a detailed description of RD-485 wireless two-way RF transceiver related hardware interface and instructions for use. RD-485 as a complete collection of RF circuit, particularly suited for wireless products, such as monitoring, scheduling, data transmission, industrial control, wireless meter reading system. It can also direct as end products, information transmission, and the use of a wide range. RD-485 use TRW-V4B-D RF module, application is more light.

Function Block Diagram

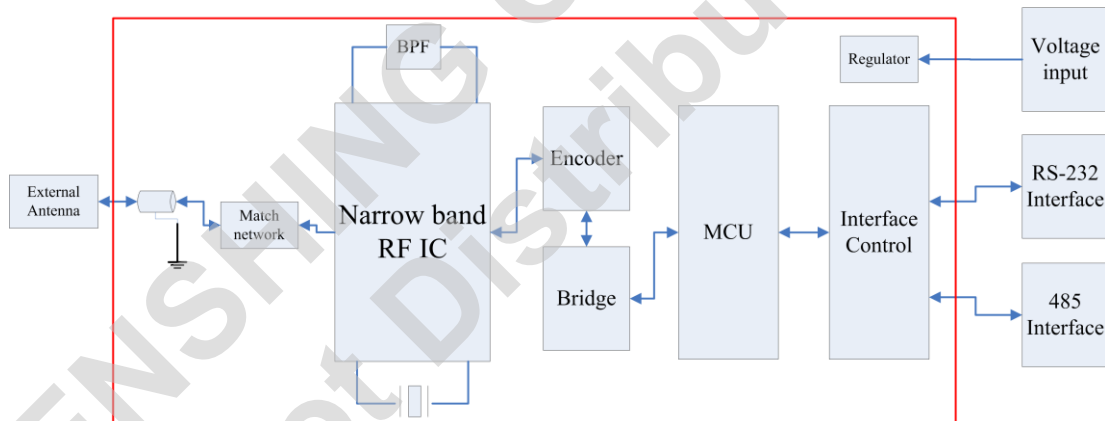


Chart 1 RD-485 function block diagram

RD-485 sets a complete circuit and RF transceiver interface, Figure 1 is for the RD-485 features diagram. The main components include: MCU processor, RF circuits, memory, and power and system connector. It can be an external antenna. Besides, the system connector can connect an external power supply, serial interface, RS485 interface. In Figure 1, red box for the RD-485 within the various components of the motherboard, but the red line is for the external interface. RD-485 motherboard completed a wireless data transmission of all the features, including RF norms and RF data encryption, such as radio frequency calibration instructions. There is also: RS232 interface and RS485 interface, LED indicator light. And followings will be briefed on the motherboard and external interfaces, and other parts of the function.

Feature Brief

- MCU Processor

MCU processor is to complete all the RD-485 signal processing functions, including information on the RF transceiver; LED light's instructions, the key judgment, RS232/RS485 data processing.

- RF Circuit

Radio frequency circuit is to provide a 868~928 MHz transceiver channels, including the reception circuit, firing circuit, Synthesis circuit.

- Memory

Main memory used is to store the current operating frequency and RF transmission rate.

- Power Circuit

It can be AC or DC input.

Connection Plan



Indication Position	Item	Description
1	AC/DC Input	Outer Power Input
2	RS232	RS232 (TTL Level)
3	RS485	RS485 (CMOS Level)
4	Antenna	Antenna input position
5	Settings Button	Within the parameters of Laws
6	Track	Put into the alum. Track position

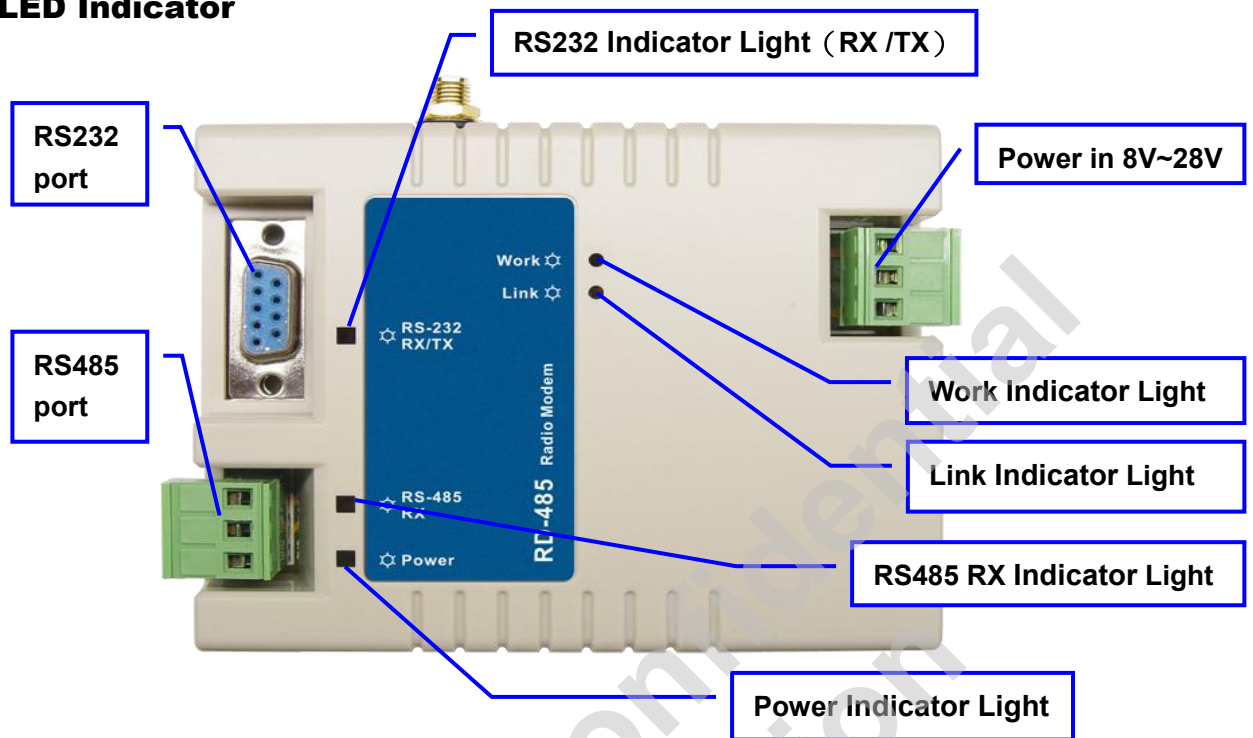
Electric Characteristic

Item	Specification	Remark
Voltage Range	AC : 9~30V ; DC : 8V~28V	
Frequency Range	868~928MHz	
Output Power	10mW	
Antenna	1/4λ wire antenna	Gain of 2.14 dBi or less
Antenna Power	Within 8 (+20%~-50%)	Contact (50 Ω)
Modulation System	Binary FSK	
Oscillation System	PLL synthesizer system	
Radio Communication Speed	1200~250K bps	
Number of Channels	4800	Channel span 12.5KHz
Receiver Sensitivity	-112dBm(1200bps)	Packet error rate 1% (253 bytes/1 packet)
Working Temperature	-10°C ~+70°C	
Storage Temperature	-30°C ~+95°C	
Consumption Current	31mA I/O Port Open 5mA I/O Port Close	Sleep Mode (Operating Voltage 15V)
Consumption Current	51mA I/O Port Open 25mA I/O Port Close	Standby Mode (Operating Voltage 15V)
Consumption Current	55mA	RF Operating Mode (Operating Voltage 15V)
Weight	140g	
Interface	RS232/RS485	

UART Interface Specification

Item	Specification
Communication Method	Serial communication (RS232 C format)
Synchronization	Start-stop (asynchronous)
Data Speed	1,2K/ 2,4K/ 4,8K/ 9,6K/ 19,2K/ 38,4K/ 56K/115.2Kbps
Other Parameters	Data length 8 bits, no parity, stop bits 1 or 2

LED Indicator



Every Light Function Description

- Power supply indicator:

When the light turns on the power and it is representative of electricity.

- RS232 light (RX/TX):

RX indicator light will extinguish 1 time when RS232 received data; TX indicator light will flash 1 time when RS232 or RS485 transmitted data.

- RS485 RX indicator:

When RS485 receipt of data, RS485 RX indicator will light that flashes for 1 time.

- Work light:

It will keep flash during normal work.

It will not flash during data sending or data receiving in the process.

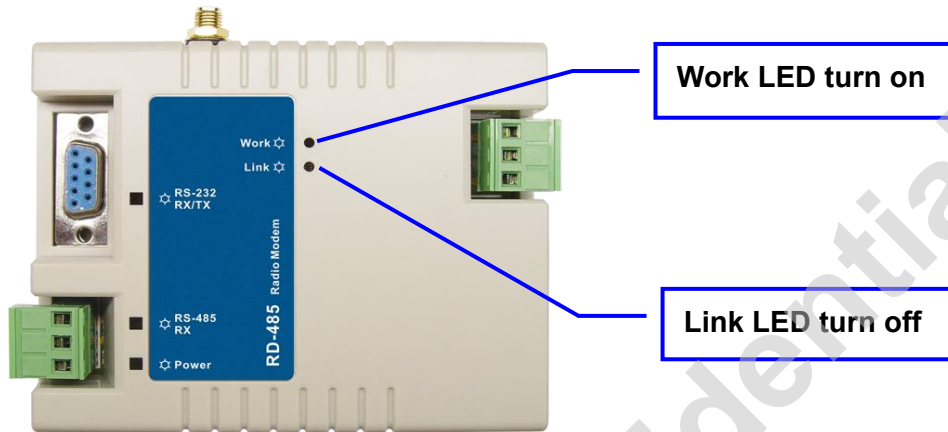
It will keep flash after finished whole works. (if message is wrong, it will flash for 3 seconds.)

- Link indicator:

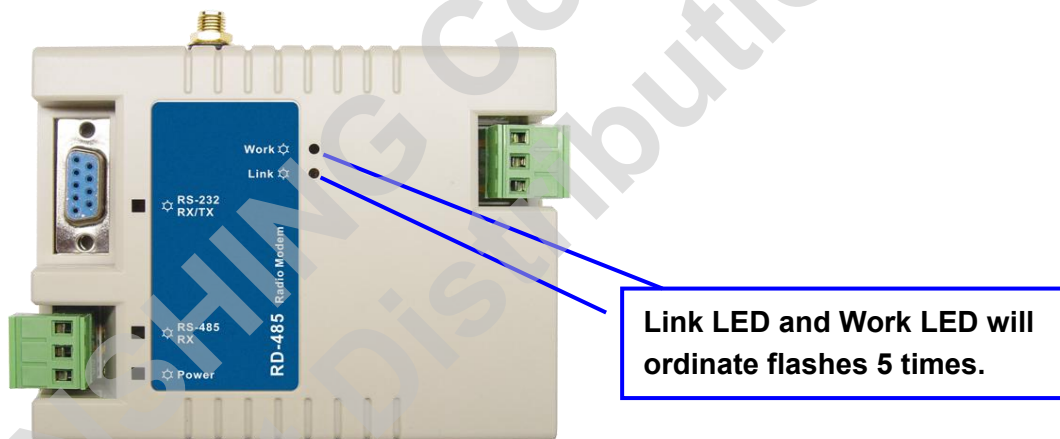
If received data during normal status, Link LED lights will be bright for 30 seconds.

Further Description

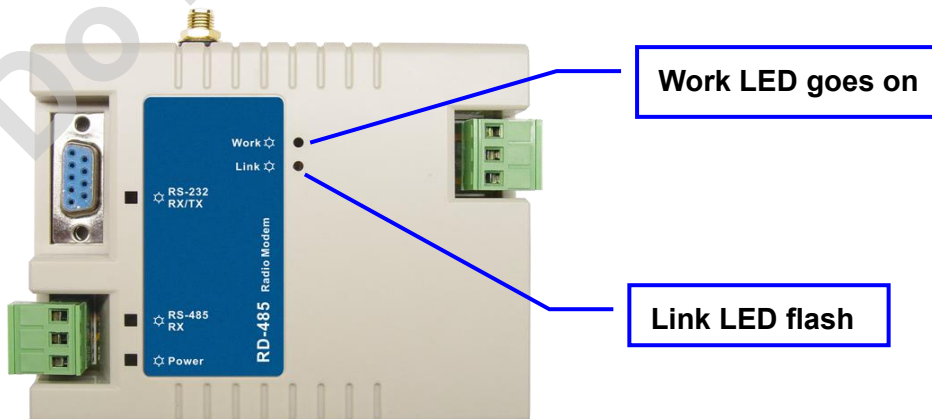
- Set into the model: Link LED lights extinguished, Work LED lights will be flashing.



- After set complete: Link LED and Work LED lights will be flashing alternately for 5 times.



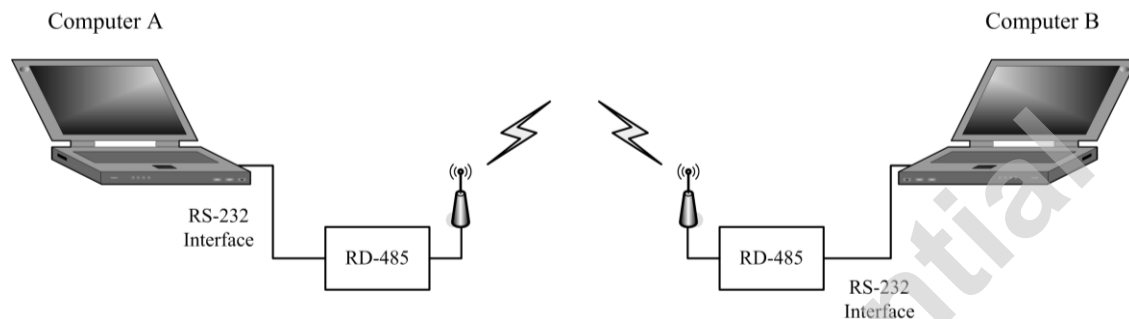
- Link LED lights flashing, Work LED light goes on: a representative of the frequency effect is working now.



Application

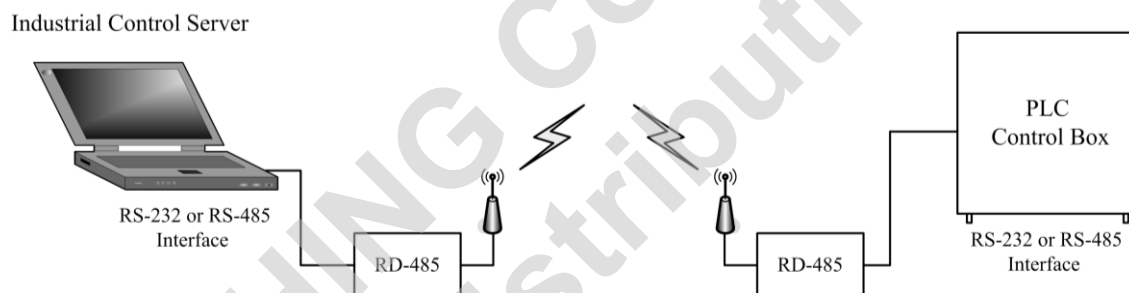
- Example 1

Computer through the RS232 interface link to RD-485, can be small and remote data transmission network functions.



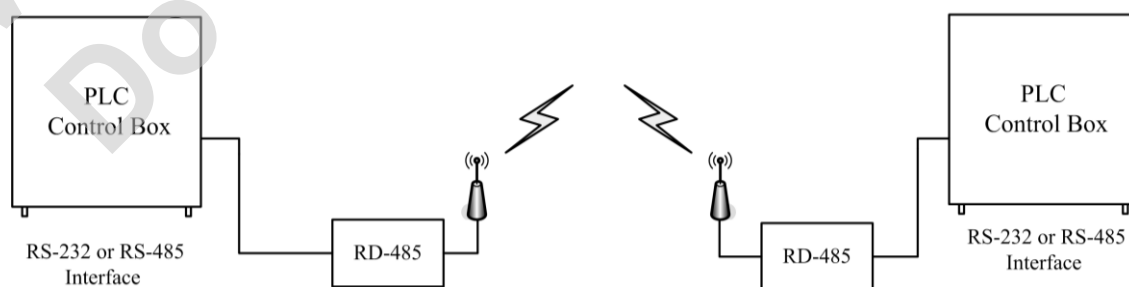
- Example 2

Computer and industrial control through RS232/RS485 interface link to RD-485, and it can be remote-control and data monitoring functions.



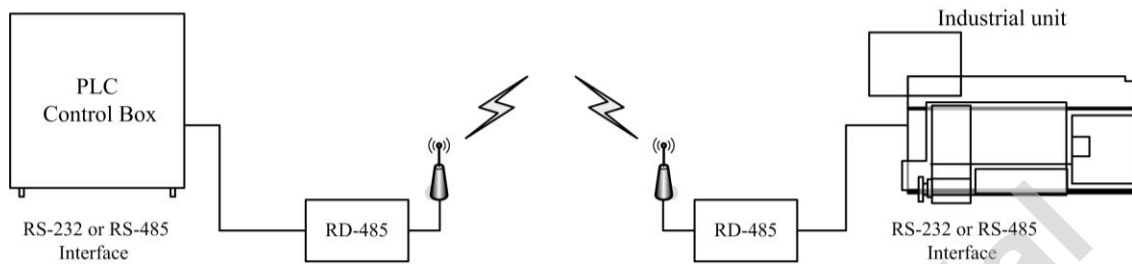
- Example 3

Industrial control through RS232/RS485 interface and link to RD-485, it can be remote data transmission and monitoring functions.



- Example 4

Industrial control me through RS232/RS485 interface and link to RD-485, it can be remote controlled industrial control equipment.

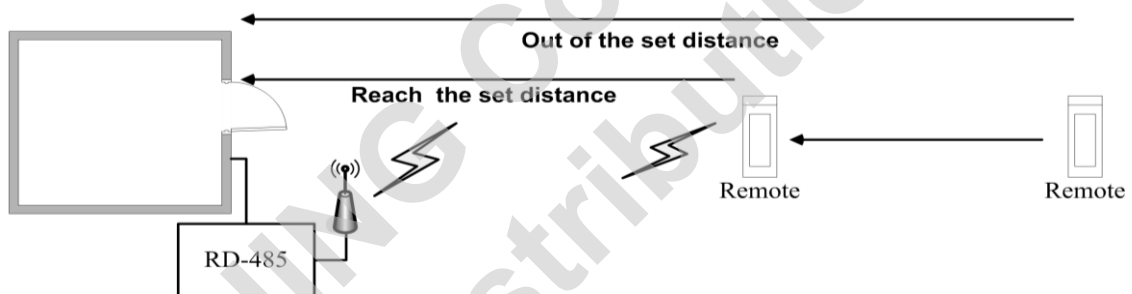


- Example 5

Access control management system through the RS232/RS485 interface also link to RD-485.

Collocate with the our TX-800 remote controller, you can set distance which you want.

When remote controller close to the distance, it can be with RD-485 to identify the access control authority.



Interface Description

- Power

RD-485 can be used AC/DC on supply power. The voltage is 9V~28V. In order to guarantee the module is working normally, the DC power should have the output ability for 100mA peak current.

- Serial Interface

- RD-485 provides a standard RS232/RS485 serial interface, users can be through serial interface to send and receive information. Please refer to specific interface connection on P.5 system connection.
- Use the switch on back of the RD-485 for 1,2,3,4 (ON allocated to 1) to select the transmission rate of the number and choice RS232 or RS485 interface. Please see Table 1.

Means for switching 4	Means for switching 3	Means for switching 2	Means for switching 1	Rate	Interface
0	0	0	0	1.2Kbps	RS232
0	0	0	1	2.4Kbps	RS232
0	0	1	0	4.8Kbps	RS232
0	0	1	1	9.6Kbps	RS232
0	1	0	0	19.2Kbps	RS232
0	1	0	1	38.4Kbps	RS232
0	1	1	0	56Kbps	RS232
0	1	1	1	115.2Kbps	RS232
1	0	0	0	1.2Kbps	RS485
1	0	0	1	2.4Kbps	RS485
1	0	1	0	4.8Kbps	RS485
1	0	1	1	9.6Kbps	RS485
1	1	0	0	19.2Kbps	RS485
1	1	0	1	38.4Kbps	RS485
1	1	1	0	56Kbps	RS485
1	1	1	1	115.2Kbps	RS485

Table 1.

Setup Rate and Frequency Mode

Press the set button (SETUP KEY), RD-485 entry into set mode. Work LED lights flash, Link LED lights-out, and then PC or micro-controller may be RS485 or RS232 interface under instructions to amend RD-485 wireless transmission frequency and wireless transmission rate. After RD-485 settings will be automatically deposited, it will return to have completed at the same data, and return of a PC or microcontrollers at finally.

- Instruction Format

Frequency and wireless transmission rate of 0XABCDEFGHIJKLMN OP written instructions were 8 bytes with 16-band. If it is more than 8 bytes, less than 8 bytes or before the 2 bytes is not equivalent to 0x1234, the RD-485 are disregarded.

ABCD is fixed leader orders for its information "1234 H".

E is fixed at 0 H.

F is for the wireless transmission rate settings.

Value	0	1	2	3	4	5	6	7	8
Speed (bps)	1200	2400	4800	9600	19.2K	38.4K	76.8K	100K	250K
Remark: Wireless transmitted speed is lower, distance is more far and default rate is 9600bps.									

GHIJKL is wireless transmission frequency settings; each is based to 10KHz.

For example, 868MHz = 015310H

922.56MHz = 016860H (default rate is 925MHz)

MN is for the RD-485 of the ID number (default rate is of 0 x00).

OP is constant transmitting packet length (default rate is 0x00).If OP=00 is not constant length of packet, suggest to set 00H.

Following is Value Example

RF transmission rate of 19.2Kbps

Operating frequency is: 868.00MHz,

RD-485 ID code is 10, doesn't fix packet length.

BIT47	BIT46	BIT45	BIT44	BIT43	BIT42	BIT41	BIT40
0	0	0	1	0	0	1	0
Location information instructions A (fixed leader script)				Location information instructions B (fixed leader script)			
BIT39	BIT38	BIT37	BIT36	BIT35	BIT34	BIT33	BIT32
0	0	1	1	0	1	0	0
Location information instructions C (fixed leader script)				Location information instructions D (fixed leader script)			
BIT31	BIT30	BIT29	BIT28	BIT27	BIT26	BIT25	BIT24
0	0	0	0	0	1	0	0
E location information directive				Directive location information F (wireless transmission rate set)			
BIT23	BIT22	BIT21	BIT20	BIT19	BIT18	BIT17	BIT16
0	0	0	0	0	0	0	1
Directive location information G (frequency settings)				Command position information H (frequency settings)			
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
0	1	0	1	0	0	1	1

Directive location information I (frequency settings)				Directive location information J (frequency settings)			
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	0	0	1	0	0	0	0
Directive location information K (frequency settings)				Directive location information L (frequency settings)			
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	0	0	0	1	0	1	0
Directive location information M (RD-485 ID)				Directive location information N (RD-485 ID)			
0	0	0	0	0	0	0	0
Directive location information O (packet length)				Directive location information P (packet length)			

Command Communication Mode

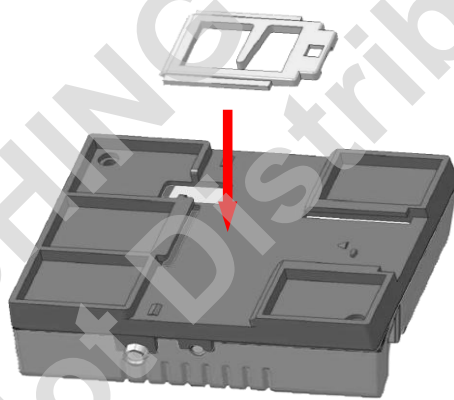
- Read equipment parameters of command:
Send value = 0x1234567868ACFD
Return value= 03 01 69 54 02 00
03=wireless transmission rate (9600 Kbps), 01 69 54= equipment frequency (925 MHz), 02 = equipment ID code (2), 00= Un-constant pack length.
- Read RSSI parameters of command:
Send value = 0 x1234567868ACFE
Return value = BC
BC = RSSI value
- Sleep Mode parameters of command:
Send value = 0 x1234567868ACFF
After the equipment sent immediately into Sleep Mode as long as the serial received information will be automatically wake-up equipment into Standby Mode.
- Point-to-point transmission mode parameters of command:
Send value = 0 x1234567868AC0000SSTTDDDDDDDDDD
SS is on behalf of the RD-485 for the ID number,
TT is on behalf of the ID number of receiver.
DDDD is on behalf of data (not set this mode, RD-485 are broadcasting operation.)

General Communication Mode

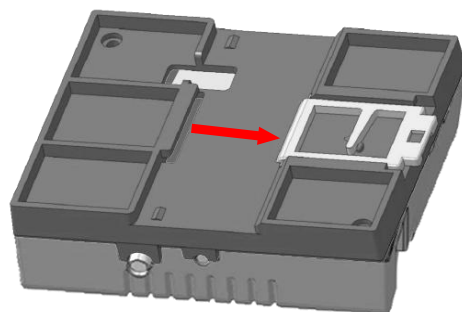
- Choice RS485 or RS232 ports to be information communication.
- Allocate to 4 Switch "ON" state, and it is the choice of RS485 port or choose RS232 ports only.
- The port set up a total of eight kinds of work rate option, please refer to P.11 Table 1. In normal working condition, it changes its means for switching the location, RD-485 will automatically update the rate set port.
- Connect the power cord and a good port and power lines.
- Press the button set into the mode of all groups within the RD-485 RF work rate and the frequency set to work, otherwise it will not be able to send information.
- After re-electricity, RD-485 will automatically call the last set of work rate and frequency, as the current work rate and frequency.
- Through the port to send data to the RD-485, its members only in the receiving group within the scope of its information can be received and transmitted through its port user group.

Installation

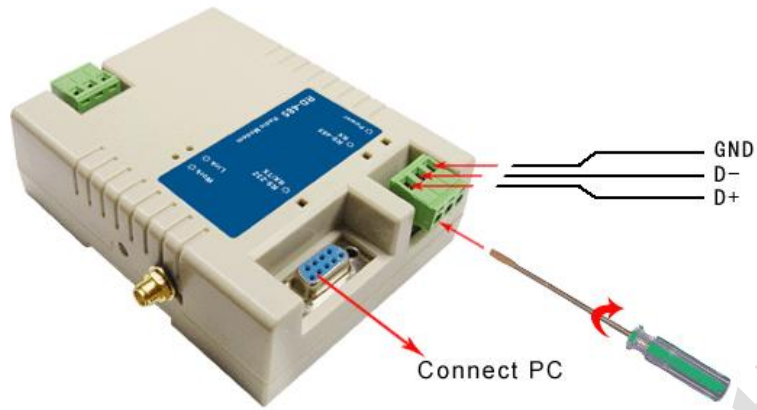
- Add to Industrial Control Box Aluminum Track
 - Step 1



- Step 2



➤ Wiring Boost



➤ Install Antenna

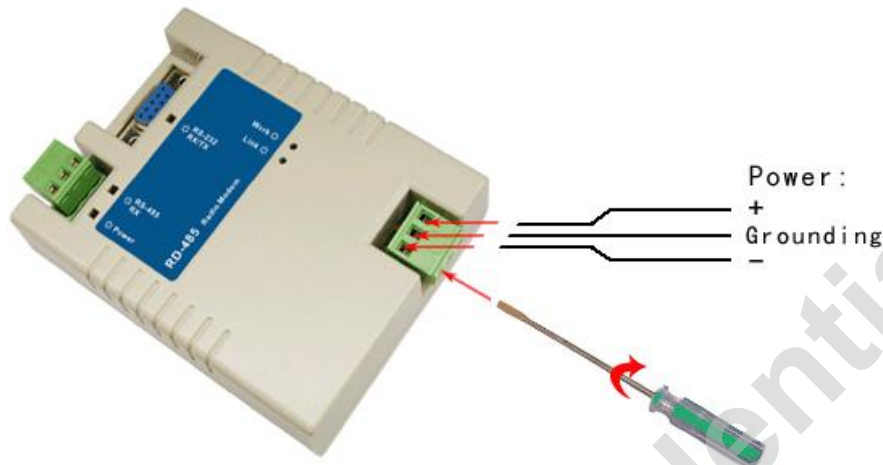
● Standard Antenna



● Sucker Antenna



➤ Connect Power



The Reason of Communication Failure

- Work LED is not bright, said the appliance or DSP processor is in question.
- Work LED is bright, please re-set the work rate and RF frequency. After set the completion, please inspect Link LED Work LED will alternately flashing lights or not. If is not flashing, it said port communication has problems.

The Reason of Communication wrong

Q: Whether RD-485 can send the information over 253bytes?

A: RD-485 does not allow information over 253bytes to send a maximum of 251 bytes.

Q: Whether or not the information at the first time with information on the second intermediate waiting for the short time interval at 8ms, and the high rate of a few interface, the wireless transmission rate set is too lower?

A: Solution: give time to wait for longer and fixed length of 251 bytes packet sent as an example interval up to 50ms.

Q: When I connect PLC, it can communication each other, but PC can communication to PC. Would you please let me know what's happen?

A: When you set link on PLC, you need to set Parity on None, also, you must to check Com Port of PLC support Parity is None.

CE Caution Note (European Union)

Symbol of  it accords with EMC regulation (89/336 / EEC) to represent this device, and the low-voltage regulation of European Union (73/23/EEC). It represents to follow the following standard regulations of European Union (The bracket is a reciprocal international standard reciprocal international standard and regulation).

- EN 60950/A11: 1997/(IEC 60950/A4: 1996),The ones that includes information science and technology of apparatus of e-commerce safe.
- EN 55024: 1998 (IEC 1000-4-2, 1000-4-3, 1000-4-4, 1000-4-5, 1000-4-6, 1000-4-8, 1000-4-11) - ' scientific and technological apparatus of information - The characteristic of interfere avoided - Restrain and test method '
- Chapter 2 -Static release (ESD) Demand
- Chapter 3 -Radiate the static field demand
- Chapter 4 -The electron is transmitted / produced and washed (EFT) fast Demand.
- Chapter 5 -surge demand
- Chapter 6 -Resistance demand caused in field of wireless frequency.
- Chapter 8 -Magnetic field demand of electric frequency.
- Chapter 11 –Shortly cut off the demand of making a variation with the voltage transiently under the voltage.

EN 55022:1998/(CISPR 22:1997) ,Class B, ' “To assess information scientific and technological apparatus wireless restriction and way of interfering with the characteristic.”

FCC Consistent Declaration (U.S.A. Only)

Attention: FCC rule regulation, modified and changed must allowed by WENSHING Electronics company, otherwise that would make you operate this apparatus invalid. This apparatus adopted test, according to chapter 15 that FCC regulation, accord with Class B digital restrictions of device. These limits are designed to provide reasonable protection, avoid to having harmful interference at home's environment.

This device may have radiated wireless frequency energy. If don't allow the instruction manual, then may will interfere wireless communication. However, there is no any way to guarantee, it will not be interfered in particular installed. If this device really causes harmful interference, (It could be confirmed by turning on or off this device.) Advise you to try to use the following ways modifying the interference situation.

- Relocation receiving antenna or altering its direction.
- Increase the distance between device and receiver.
- Please connect this device to the outlet in the circuit different from the receiver.
- The following manuals is published by Federal Communications Commission, they must be helpful to all users.
- How to Identify and Resolve Radio-TV Interference Problems. (This manual can be obtained by relevant departments of publication of the U.S. government.)
- Government Printing Office, Washington D.C., 20402. Stock No. 004-00398-5