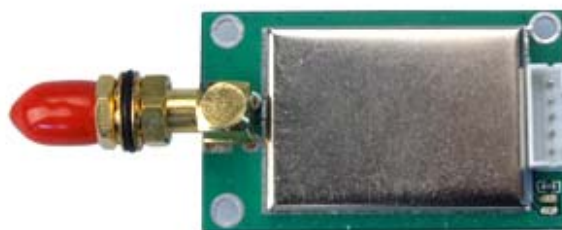


# HR-1002 Mini Power Wireless Module

## User's Manual



**Antury :: Industria Electronica**

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### HR-1002 Feature:

#### 1. Low power transmission

The transmission power is 100mW (20dB), Receiving sensitivity: -110dbm  
Size: 38mm\*25mm\*6mm.

#### 2. Low power consumption

Receiving current<11mA, transmission current<100mA, sleeping current (the user should asked for it before order ) <15uA.

#### 3. ISM frequency band, not requiring on application of frequency point

Carrier frequency: 866MHz, also capable of 433/915MHz.

#### 4. Interface

HR-1002 supply TTL, RS232, RS485, user can choose any one of them before shipped.

#### 5. High anti-jamming and low BER (Bit error Rate)

Based on the FSK modulation mode, it adopts the efficient communication protocol. The actual bit error rate of  $10^{-5} \sim 10^{-6}$  can be achieved when channel bit error rate is  $10^{-2}$ .

## 6. Long transmission distance

Within the range of visibility, when the antenna height is greater than 1m, the reliable transmission distance is:  $BER=10^{-3}/1200\text{bps} > 500\text{m}$ ,  $(BER=10^{-3}/9600\text{bps}) > 200\text{m}$

## 7. Transparent data transmission

Transparent data interface is offered, which can be fit for nonstandard user protocol. Any false data generated in the air can be filtrated automatically (What has been received is exactly what has been transmitted). Receiving and dispatching switching time  $< 10\text{ms}$ .

## 8. Multi-channels and Multi-speeds

HR-1002 module provides 8 channels to meet many kinds of communication combination mode of the users. HR-1002 Module can provide many kinds of correspondence baudrate such as 1200bps, 2400bps, 4800bps, 9600bps, 19200bps and so on.

The wireless transmission speed and the connection baudrate are proportional, to satisfies the customer equipment of different baudrate.

## 9. High speed wireless communication and Large data buffer

When the RF baudrate is bigger than the COM baudrate , may transmit infinitely data continuously, and when the RF baudrate is smaller than or was equal to the COM baudrate ,may transmit 255 bytes data.

## 10. Intelligent data control and the user doesn't need to prepare excessive programs

Even for semi duplex communication, the user doesn't need to prepare excessive programs, only receiving/transmitting the data from the interface. HR-1002 will automatically complete the other operations, such as transmission/receiving conversion in the air, control, etc.

## 11. High reliability, small and light

Single chip radio-frequency integrated circuit and single chip MCU are used for lessened peripheral circuits, high reliability, and low failure rate, size: 47mm\*33mm\*14mm

## 12. Watchdog monitor

Watchdog monitors the inner function, so it can change the traditional product structure and improve the product reliability.

## 13. Matched antenna

There are many antenna configuration, according to the user's site supporting different antennas, to achieve the best results

## Application Scope of HR-1002

- \* Water, Electricity, Gas Meter AMR Automatic Meter Reading
- \* Wireless alarm and security systems
- \* Home automation
- \* Low power telemetry
- \* Wireless conference voting system;
- \* Sports training & competition;
- \* Wireless dishes ordering;
- \* Wireless POS, PDA wireless smart terminal;
- \* Electronic bus station and intelligent traffic;
- \* RF transmitter Wireless electronic display screen and queuing machine;

- \* Wireless telemetry Charging for parking, parking lot;
- \* Wireless modem Automobile inspection and four-wheel orientation;
- \* Wireless sensor Industrial wireless remote control and air conditioning remote controller;
- \* Observation and predication of oil well and hydrological information;
- \* Point to multi-point wireless network, wireless on-the-spot bus and automatic data collection system;

## Application Method of HR-1002

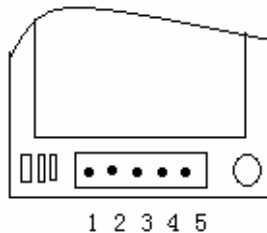
### 1.Power source choice:

The HR-1002 is direct-current power supply, the voltage is +4.5V to 5.5V, the typical voltage is +5V, the electric current is bigger than 150mA. The user need to order if they use 3V Power supply.

The power source can share a power supply with other equipment, but must choose the power source with good ripple coefficient, and we suggest don't use the switching power supply, if must use, please note mutual disturbance between the turn-on frequency of the switching power supply and the broadcasting station frequency. In order to prevent the breakdown of static electricity or the strong electric, when the system equipment been used, then needs to earth it reliably, at the same time must isolate the city electricity completely.

### 2.The definition of HR-1002 Interface

The gap between pins is 2.0mm



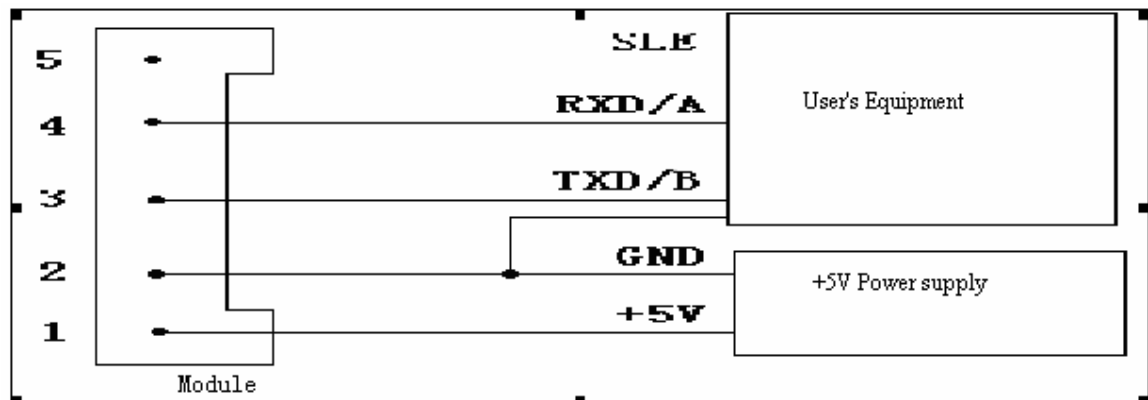
HR-1002 supply TTL, RS232 and RS485 interface, user can choose interface freely before shipped, the user interface under the standard disposition, which is plastic plug, the gap faces below , from left to right, is 1,2,3,4,5.

The definition of each pin are as follows:

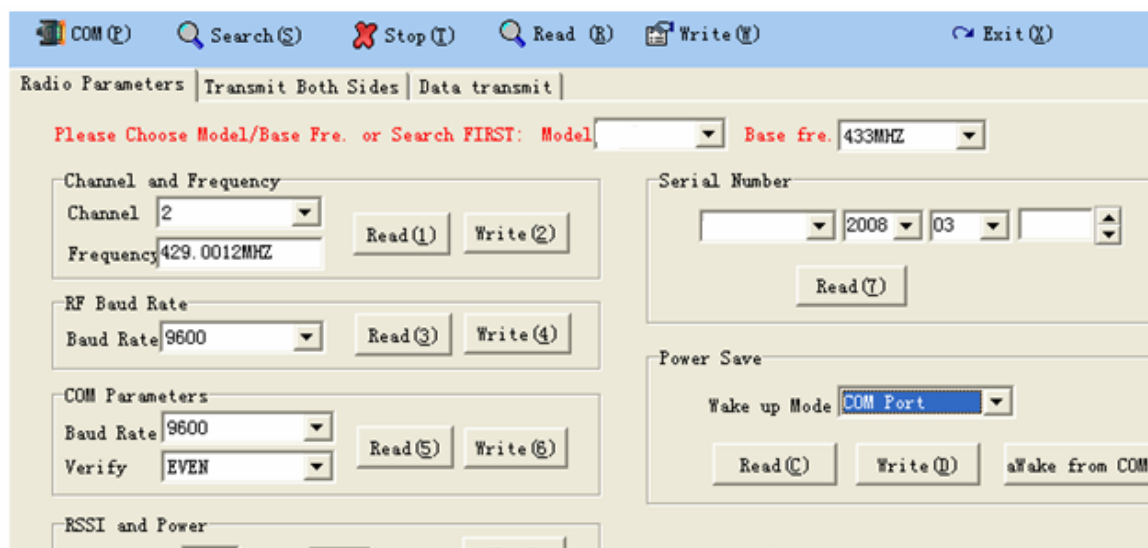
| Pin | Pin Definition    | Specifiation               | User terminal     | Note                           |
|-----|-------------------|----------------------------|-------------------|--------------------------------|
| 1   | VCC               | +5±0.5V                    | +5V               | TTL 3V The user need to choose |
| 2   | GND               | Power source teminal place | DGND/AGND         |                                |
| 3   | RXD/<br>RS-485(B) | Serial data receiving end  | TXD/<br>RS-485(B) | Use sending                    |
| 4   | TXD/<br>RS-485(A) | Serial data sending end    | RXD/<br>RS-485(A) | Use receiving                  |

|   |     |                         |  |                                          |
|---|-----|-------------------------|--|------------------------------------------|
| 5 | SLE | Sleep control input end |  | User can choose sleeping function or not |
|---|-----|-------------------------|--|------------------------------------------|

Demonstration of HR-1002 connecting Equipment of User



### 3. Using testing software to check and set parameters



- HR-1002 connect computer, link with power, choose needed interface.
- Radio test, when testing radio (software can indicate successful test ), then single data can be read or set
- When you choose your needed data, need to set, after finished setting, continue to read, and check the data of module whether you need.

**Note: 1.Two or multi modules can communicate, the frequency and baud rate must be same of all modules**

**2.Modules and user equipment can communicate, the parameters of modules and user equipment must be same.**

The following table is HR-1002 module 1-8 channel frequency parameter:

| Num Channel | Frequency       | Num Channel | Frequency       |
|-------------|-----------------|-------------|-----------------|
| 1           | 428.0028MH<br>Z | 5           | 432.1500MH<br>Z |
| 2           | 429.0012MH<br>Z | 6           | 431.4588MH<br>Z |
| 3           | 433.3020MH<br>Z | 7           | 430.0764MH<br>Z |
| 4           | 433.9164MH<br>Z | 8           | 433.5308MH<br>Z |

#### 4 Sleep function;

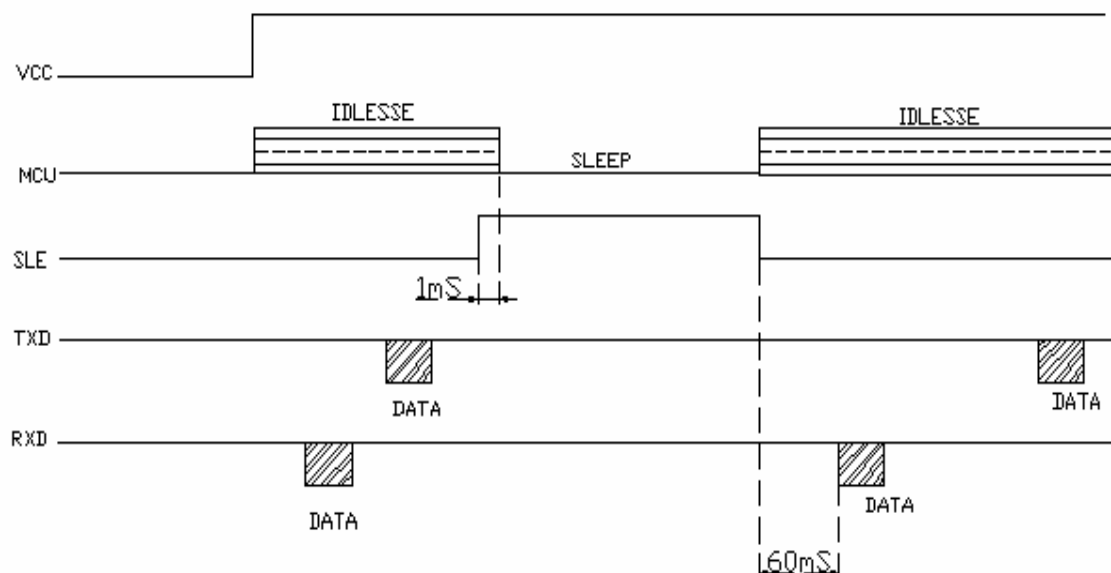
HR-1002 consists of sleeping and awoken editions, sleeping edition is current 10uA, HR-1002 sleeping function is hardware wake, hardware wake via pin5 input high level into sleeping, input low level into wake

If the HR-1002 module taking sleeping function, but user does not to use sleeping function, user can make pin5 of HR-1002 connect ground.

#### The detailed drawing as follow:

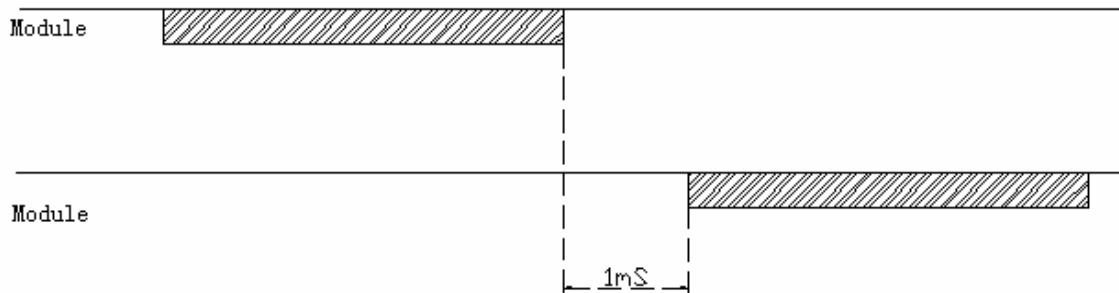
The working state of module convert to sleeping state, need to convert SLE pin low level to high level, when the module is not working, MCU about 1ms will be into sleeping state, when HR-1002 is transmitting and receiving, HR-1002 will be into sleeping after completing data transmitting and receiving.

Module convert sleeping state to working state, have to put SLE pin from high level to low level, MCU will work after several ms, in order to get stable data, user need to delay 60ms, then can transmit data.



## 5. Module transmitting and receiving convert

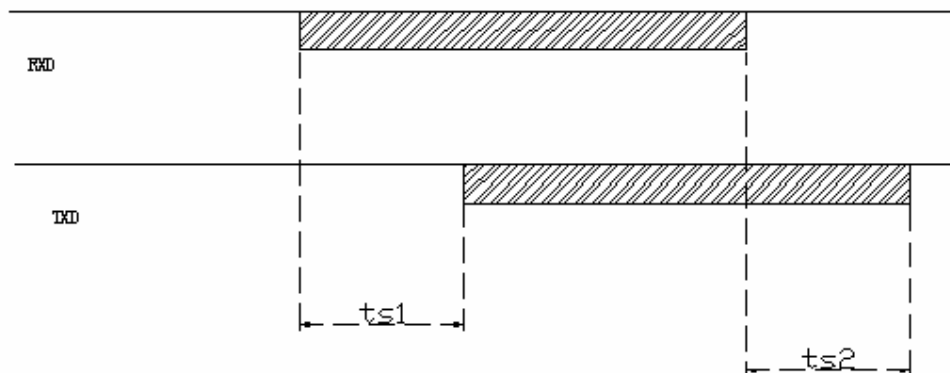
User equipment finish receiving data, and it will take 1ms to convert to transmitting data.



## 6. From A Module transmitting to B Module receiving

User have to consider the time transmitting and receiving will be delayed, we add FEC and other code rules so as to make transmission reliable, the delayed time depends on the air baud rate of two modules communicate, the following as:

| Air baud rate<br>(bps) | Time ts1<br>(ms) | Air baud rate<br>(bps) | Time ts1<br>(ms) |
|------------------------|------------------|------------------------|------------------|
| 19200                  | 17               | 2400                   | 76               |
| 9600                   | 24               | 1200                   | 152              |
| 4800                   | 43               |                        |                  |



## 7. Description normal working lights

Wireless data transmission module is a two-color work lights, transmit data at the red light , receive data at the green light.

## 8. Interoperable Model

HR-1002 module can communicate all HR-100X modules, you will only need to note:

A. Select all mutual communication module channel line, ( HR-100X modules want to communicate with HR-100X module, choose one of the channels of modules 2 4 channels).

B The air baud rates must be same



Serial parity bit: 8N1  
Air data rate: 9600bps

## HR-1002 technical direction

### The detailed technical direction

Modulation: FSK  
Working frequency: 428-434MHz  
Transmitting power: 100mW  
Receiving sensitivity: -110dBm  
Transmitting current: <100mA(100mW)  
Receiving current: <11mA  
Sleeping current: <10uA  
Channel speed rate: 1200/2400/4800/9600 Bit/s  
Interface speed rate: 1200/2400/4800/9600 Bit/s  
Interface data format: 8E1/8N1/8O1  
Working Power: TTL-DC +2.8V~+3.3V or +3.6V~+5.5V  
Working temperature: -20°C-85°C  
Working humidity: 10%-90% The relative humidity, does not have the condensation  
Outside Size: 44mm×27mm×8mm  
Inter-Communication: HR-1000/HR-1001/HR-1003/HR-1004 (only between channels 2\3\4 )

### Optional Antenna:



### Trouble and solve ways:

| NO. | Trouble                     | Trouble causes and solve ways                                                                                                                  |
|-----|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | No shine of Indicator light | a.Power Line badness touch .<br>b.Power is bad.<br>c.Power line meet in reverse, or diode of polarity protect is bad.                          |
| 2   | No transmit or No receive   | a.Radio is badness touch with PC/terminal.<br>b.Radio with TTL/RS232/RS485 not match terminal.<br>c.RX frequency and TX frequency is not same. |
| 3   | Bit error rate High         | a.antenna not match, or touch bad;<br>b.RF baud rate is not right.<br>c.Power supply ripple is too great.                                      |
| 4   | Indicator light twinkling   | a.Electromagnetism disturb in circumstance.<br>b.Same frequency disturb in the circumstance.                                                   |