PBYTJ Series HF RFID Embedded Reader User Manual

- Before you use this product, please carefully read this manual and properly keep it for future reference.
- As our products continue improving, they may be changed without advanced notice.
- The contents of this manual have been carefully checked. For any printing error or misunderstanding content, please contact us as soon as possible.

Version: V1.00

Contents

1. Product Overview

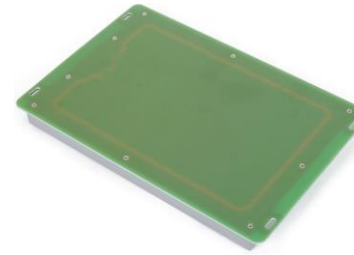
1.1. Product Introduction

This product is a super anti-interference ability reading and writing device designed for self-service kiosk, book sorting machine, production line and other fields. The whole series adopts metal shielding design which will not be affected by the bottom and surrounding metal environment.

1.2. Product Features

- RF Power: 0.25~1.5W(adjustable);
- Metal shielding design, can be embedded in the environment of five-sided metal, the performance is not affected;
- All-in-one design, integrated with read/write module and antenna
- Fast anti-collision processing algorithm; reading speed is up to 50pcs / sec;
- Communication Interface: RS232
- Support noise detection, be able to detect whether the environment has interference;
- Power Supply: Above DC 12V / 1A;
- Support host and scan working modes, being set by software tool.

1.3. Product Models



PBYTJ311

PBYTJ160

1.4. Product Parameters

Table 1 Description of main technical parameters of the product

Parameters / Models	PBYTJ311	PBYTJ160
Working Frequency	13.56MHZ	
Support Protocols	ISO/IEC 15693 and ISO/IEC 18000-3M1	
RF Power	0.25~1.5W (adjustable)	
Recognition Distance	36 cm	16cm
Communication Interface	RS232	
Working Modes	Host or Scan Mode (Set by configuration tool)	
Working Power	12V DC	
Max Power Consumption	3.5W	3.5W
Metal Shielding Design	Yes	
Noise Detection	Support	
Housing Material	PCB and Metal Plate	
Dimensions	350×230×28.5mm	160×89×21.5mm
Maximum Working Temperature	50℃	

2. Product Structure

2.1. Product Appearance

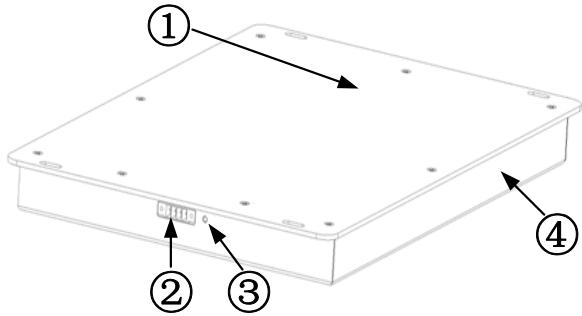


Figure 1 Product appearance description

Table 2 Product appearance description

No.	Description
①	Detection Area
②	RS232 communication and power interface
③	Indicator Light
④	Metal shielding Cover

2.2. Product Dimensions

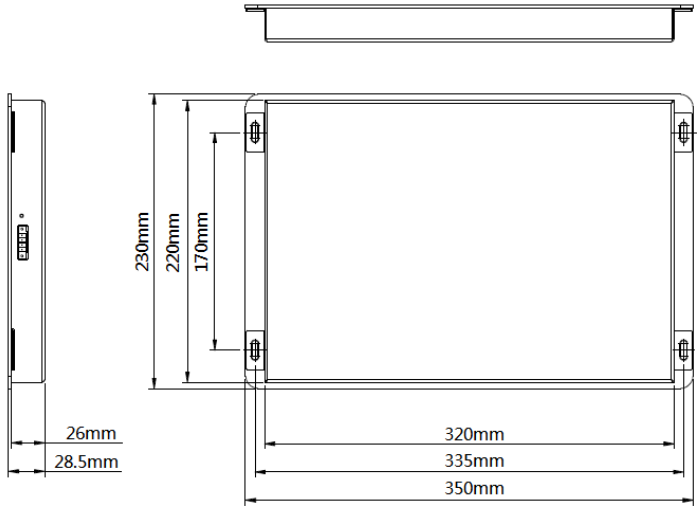


Figure 2 PBYTJ311

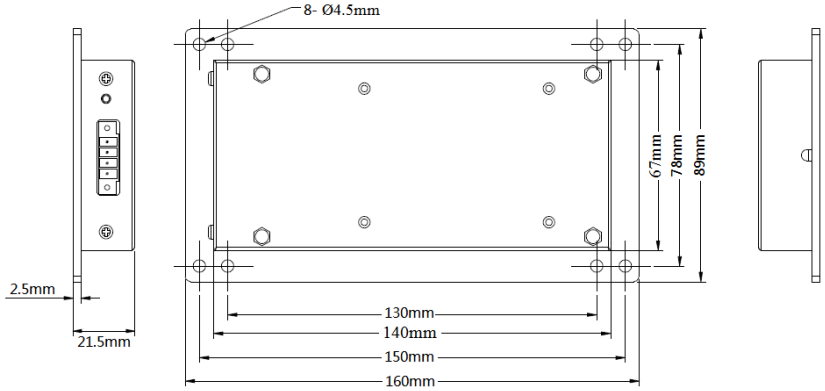


Figure 3 PBYTJ160

Chassis opening requirements of installing the detection area:

When the equipment is installed in a metal chassis, the panel above the detection area must not be a metal material panel; if a metal panel is used, it must be opened and then a non-metal panel should be added. The size of the opening should not be less than

the size of the iron cover at the bottom of the equipment. which is:

PBYTJ311 detection surface opening must be ≥ 320* 220MM.

PBYTJ160 detection surface opening must be ≥ 140* 67MM.

3. Interface Description

The communication interface (RS232) and power interface (DC 12V/1A) of this product use 3.81 terminal blocks (4 Pin), sharing the same ground line, as shown below:

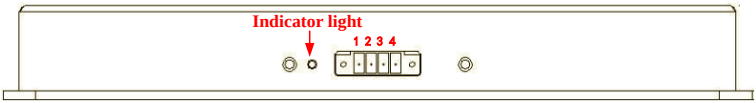


Figure 4 Communication interface

Pin definition as below：

Table 3 Pin definition

Interface	Pin	Definition
Power	Pin1	VCC
	Pin2	GND
RS232	Pin2	GND
	Pin3	TX
	Pin4	RX

This product is equipped with "RS232+ power supply" combination connector, as shown below:

Figure 5 RS232 connector（left）/ DC 2.1 connector（right）

The RS232 connector is a standard DB9 female, as shown below

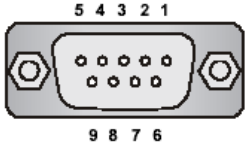


Figure 6 DB9 connector

- **Parameters Description of RS232 communication interface:**

  Baud rate: 38400

  Data bit: 8

  Parity: even parity

  Stop bit: 1

  Default address: 1

- **Definition of interface pin (as shown in the below sheet):**

Table 4 RS232 interface pin definition description

Pin	Signal	Description
1	NC	Reserved
2	TXD	RS232 data output
3	RXD	RS232 data input
4	NC	Reserved
5	GND	Ground
6	NC	Reserved
7	NC	Reserved
8	NC	Reserved
9	NC	Reserved

Remarks: If the user's computer does not have RS232 serial port, you can choose our USB to RS232 converter (non-standard products, must be purchased separately), after installing the USB driver, you can use the reader through the connected computer USB interface.

4. Device Connection

Before using the product, use the “RS232+ power supply” combination cable as shown below. Connect the communication cable to the computer first, then plug in the power cable, as shown below:

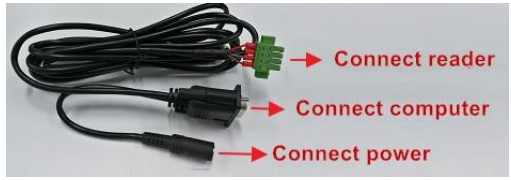


Figure 7 Connection Description

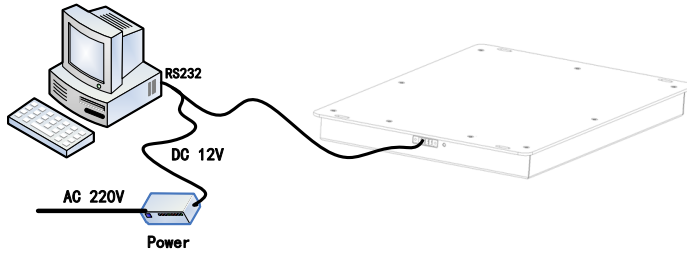


Figure 8 Connection diagram

5. Description of Indicator Light

Figure 9 Product working indicator

Table 5 Product working indicator status and description

Indicator Status	Function Description
Flashing red light	The device is powered on normally.
Green light	The device detected a RFID tag or card

6. Configuration tool instructions

After the device is connected, use the device indicator status to ensure that the power is on, and then open the configuration tool: R-Tool, as

shown in the figure below:

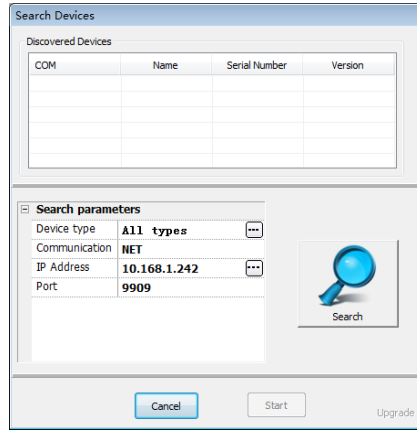


Figure 10 R-Tool connection interface

Choose "COM" from [Communication] under [Search parameters]. Choose "All" for [COM name], set [Baud rate] as 38400, set [Frame] as 8E1, and set [address] as 255，and then click the search button to search for the device. After the device is found, the device information will be automatically displayed in the "Discovered Devices" list, as shown in the figure below:

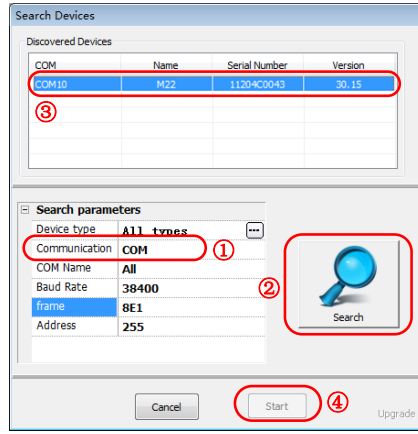


Figure 11 Operation steps when use RS232 interface connection

As shown in the picture above (Step 4), click the “Start” button to enter the main interface of the configuration software.

6.1. Configuration Parameters

6.1.1. System Basic

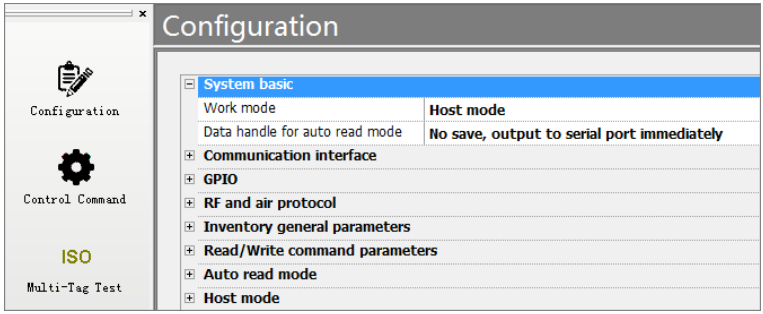


Figure 12 Configuration interface for system basic

- **Work mode:** the system work mode can be set to "Host mode" and "Auto read mode", which will take effect immediately after setting:

  A. Host mode: in this mode, after the device starts, it is in a passive state. It responds to and returns results by receiving commands from the host.

  B. Auto read mode: in this mode, it will actively take inventory of the electronic tags in the sensing area according to the actively read configuration parameters.

- **Data handle for auto read mode:** There is only default option currently, which is " No save, output to serial port immediately"。

6.1.2. Communication Interface

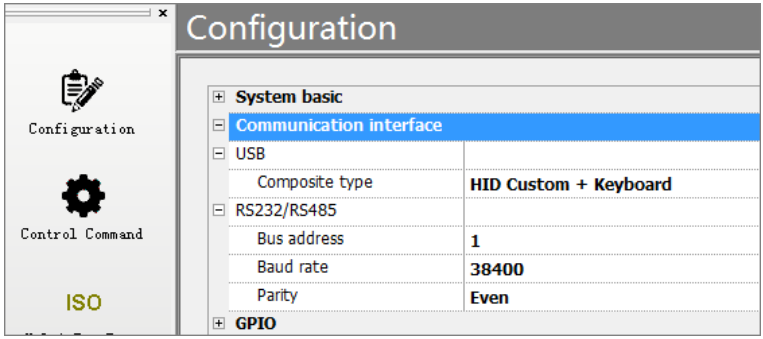


Figure 13 Configuration interface for Communication interface

- **USB：**

  A. HID Custom + Keyboard: HID custom interface + keyboard emulation output;

  B. HID Custom + VCP: HID custom interface + virtual serial port；

  Note:

  Keyboard emulation output: it is available in auto read mode;

  Virtual serial port: need to install the driver.

- **RS232/RS485：** it needs to be powered on again to take effect after setting. (Note: this parameter is shared with RS485 interface)

  Bus address: this parameter is mainly used on the RS485 bus, the value range is 1-255.

  Baud rate: serial communication rate, the default setting is 38400;

  Parity: None, Odd, Even, the default setting is even.

6.1.3. GPIO

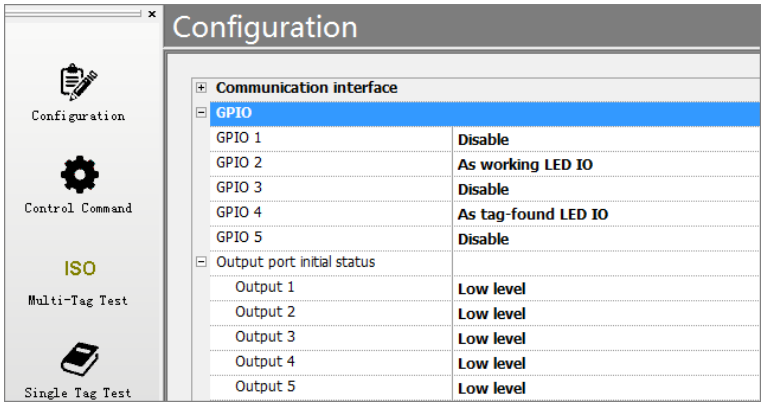


Figure 14 Configuration interface for GPIO

- **GPIO x：** define the functions of the four GPIOs, it need to be powered on again to take effect;

  ① Disabled: Don't use this GPIO.

  ② As input x: After the setting takes effect, you can get the Input Status command to read the current level status of the GPIO.

  ③ As output x: After the setting takes effect, you can use the output control command to make the GPIO output high or low levels.

④ As working LED IO: This GPIO is configured with the same function as the work indicator.

⑤ As tag-found LED IO: The GPIO is configured to output a high level when the tag is found during the inventory process.

⑥ As error LED IO: The GPIO is configured as an error indicator function.

- **Output port initial status:** it needs to be powered on again to take effect.

  Output x: the default setting is low level. After the device is powered on, the default state of the output port is low level.

6.1.4. RF And Air Protocol

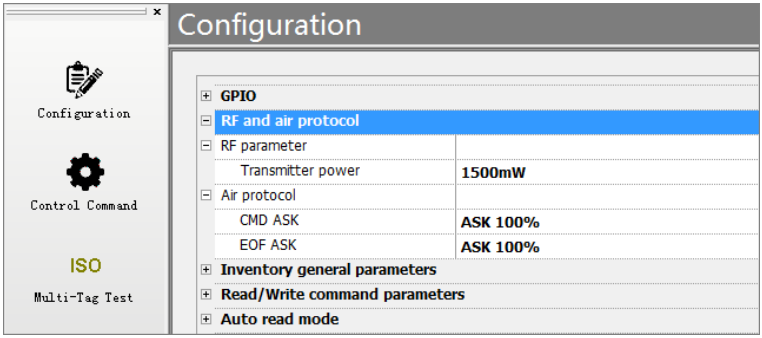


Figure 15 Configuration interface for RF and air protocol

- **RF parameter:**

  Transmitter power: 250mW - 1500mW, the default setting is 1500mW.

- **Air protocol:**

CMD ASK: set whether the communication frame of ISO15693 protocol adopts 100% or 10% modulation;

EOF ASK: when using 16 slot counts, whether the EOF of the switching time slot is 100% or 10% modulation.

6.1.5. Inventory General Parameters

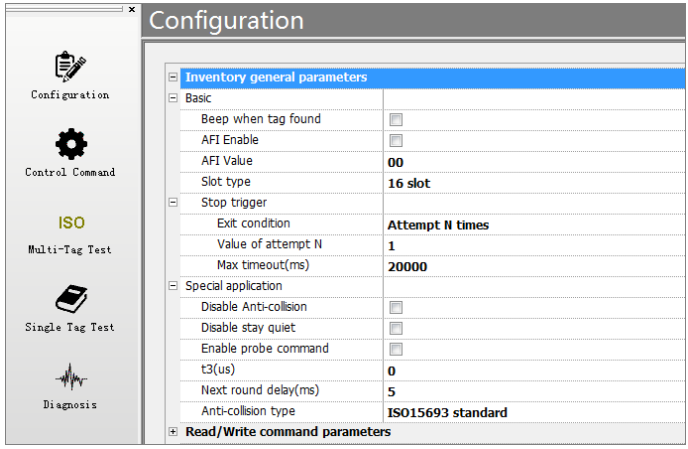


Figure 16 Configuration interface for inventory general parameters

- **Basic:**

① Beep when tag found: if this option is checked, the buzzer will sound when a tag is detected.

② AFI Enable: if this option is checked, the AFI value of the comparison tag required during the inventory process can be filled in the following AFI parameters;

③ AFI Value: this parameter is valid only if the" AFI Enable" option is checked;

④ Slot type:

1 Slot: suitable for inventory within 8 tags;

16 Slot: when the number of tags is more than 8, it is more appropriate to use 16 slots than 1 slot;

⑤ Stop trigger: the trigger condition for the inventory stop.

Exit condition: when the inventory command is executed on an antenna, set the conditions for inventory stop;

A. Attempt N times;

B. Max timeout;

Value of attempt N: this parameter is only valid when "Exit condition" is selected as A;

Max timeout: the maximum time to read a card on an antenna;

- **Special application:**

① Disable Anti-collision:

Disable anti-collision doesn't mean reading only one tag. If it is an inventory of 1 slot, it can read up to 2 tags after turning off this function. If it is an inventory of 16 slots, turning off this function can read up to 16 tags.

② Disable stay quiet:

If the feature is checked, it will not sleep after the tag inventory.

③ Enable probe command: the speed can be increased in the case of multiple antennas.

④ t3(us) : the default value of this time is 0. Changing this time will affect the time of inventory.

⑤ Next round delay(ms): next round delay(ms) time of regenerate the response.

⑥ Anti-collision type:

A. ISO15693 standard

B. ICODE SLI Persistent

6.1.6. Read/Write Command Parameters

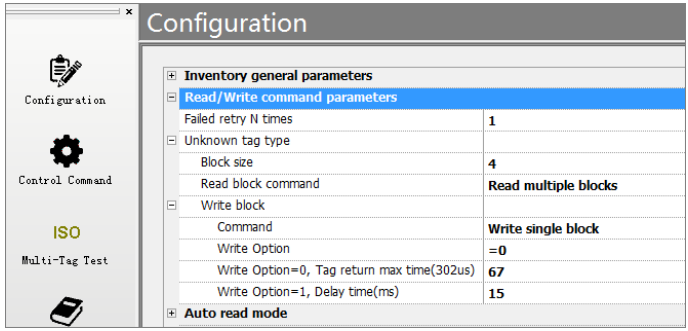


Figure 17 Configuration interface for Read/Write command parameters

- **Failed retry N times:**

For example, the read data block command is likely to fail in a disturbed environment, the anti-jamming capability can be enhanced by trying multiple times.

- **Unidentified tag type:**（The following configuration requires professional knowledge）

① Block size: the number of bytes per block, NXP ICODE SLI series chips are 4 bytes per block;

② Read block command: for unrecognized tags, we do not know whether it supports reading single block and reading multiple blocks, if both are supported, then choose to " Read multiple blocks";

③ Write block:

Command：for unrecognized tags, we don't know whether it supports writing single block and writing multiple blocks, if both are supported, then choose to "Write multiple blocks".

6.1.7. Auto Read Mode

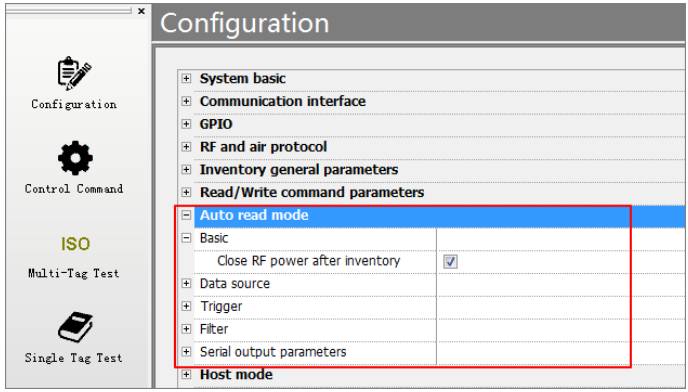
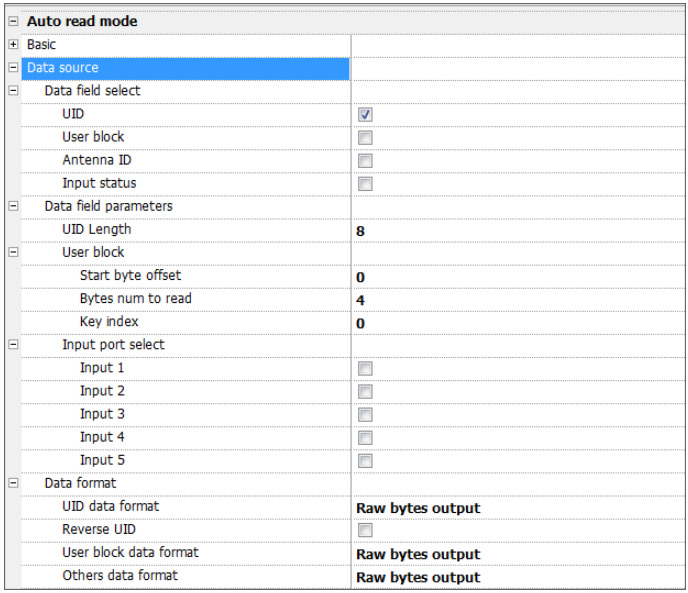


Figure 18 Configuration interface for auto read mode

- **Basic:**

Close RF power after inventory: if this parameter is checked, RF will be turned off automatically after an inventory process is completed.

- **Data source:**



Auto read mode	
Basic	
Data source	
Data field select	
UID	☑
User block	☐
Antenna ID	☐
Input status	☐
Data field parameters	
UID Length	**8**
User block	
Start byte offset	**0**
Bytes num to read	**4**
Key index	**0**
Input port select	
Input 1	☐
Input 2	☐
Input 3	☐
Input 4	☐
Input 5	☐
Data format	
UID data format	**Raw bytes output**
Reverse UID	☐
User block data format	**Raw bytes output**
Others data format	**Raw bytes output**

Figure 19 Configuration interface for data source

① Data field select:

UID: whether to output the 64-bit unique serial number of the discovered tag;

User block: whether to output the data block content of the discovered tag;

Antenna ID: whether to output the antenna ID of the tag;

Input status: whether to output the status of the input port;

② Data field parameters:

- UID Length:

  The default is to output all 8 bytes. This parameter is valid when the UID of the "Data field select" is ticked;

- User block:

  Start byte offset: The offset is calculated by bytes. Take the tag of ICODE SLI as an example, if the offset byte=5, then it starts to read at the first byte of the first data block, if the offset byte=3, then it starts to read at the third byte of the 0th data block;

  Bytes num to read: Starting from the offset byte, read N bytes;

  Key index: reserve;

- Input port select:

  Input x: checking indicates that the state of the port is to be read, but the "Input status" in the "Data field select" must be checked firstly.

③ Data format:

- UID data format:

  A. Raw bytes output: without any conversion, directly output 64-bit data stream;

  B. Hex string output: each byte outputs 2 hexadecimal characters;

  C. Lower 3 bytes integer character output: the lower 3 bytes of the serial number are converted into a decimal string;

  D. Lower 4 bytes integer character output: the lower 4 bytes of the serial number are converted into a decimal string;

  E. Wiegand type 1 output: the lower 3 bytes of the serial number are converted into the format output of the micro tillage controller;

  F. Wiegand type 2 output: the lower 3 bytes of the serial number are converted into fixed-length format output of the micro tillage controller;

  Micro tillage controller format output instructions:

  For example, the serial number is E004040001020304, take out 02h and convert it to a decimal string 2, then convert 0304h to a decimal string 772. If there are not enough 5 digits, fill in zeros before 00772, and finally add 2 and 00772 to output 200772; if It is a fixed-length 8-bit, that is, 200772 is not 8-bit enough, then the front is padded with zeros to get 00200772.

- Reverse UID:

  The byte order of the serial number is reversed.

  For example, if the serial number is E004040001020304, the reversed number is 04030201000404E0;

- User block data format:

  A. Raw bytes output: output in raw bytes, which is ASCII;

  B. Hex string output;

- Others data format:

  A. Raw bytes output;

  B. Hex string output.

- **Trigger:**

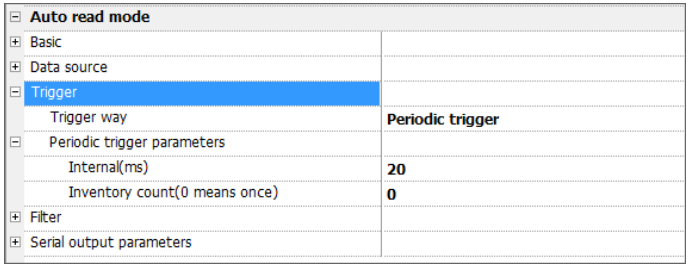


Figure 20 Configuration interface for trigger

① Trigger way:

Periodic trigger, trigger reading data every N milliseconds;

② Periodic trigger parameters:

Internal(ms): trigger with an interval of N milliseconds;

Inventory count(0 means once): how many times to inventory after triggering.

- **Filter:**

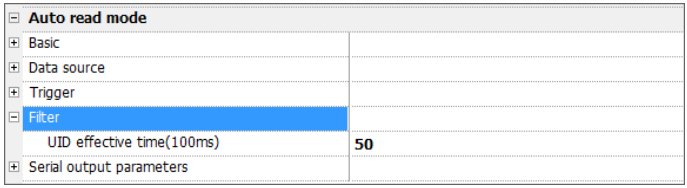


Figure 21 Configuration interface for filter

UID effective time(100ms): It only outputs once when reading the same tag within the valid time.

- **Serial output parameters:**

⊟ Auto read mode	
⊞ Basic	
⊞ Data source	
⊞ Trigger	
⊟ Filter	
UID effective time(100ms)	
⊟ Serial output parameters	
Output port select	**RS232**
⊟ Data frame definition	
⊟ Frame option	
Enable header	☐
Enable separator	☐
Enable Terminator	☐
separator	**System separator**
Terminator	**System terminator**
System separator	**, 0x2C**
Custom separator	**00**
System terminator	**Enter and New line 0x0D+0x0A**
⊟ Custom header	
Length	**1**
Byte 1	**00**
Byte 2	**00**
Byte 3	**00**
Byte 4	**00**
⊟ Custom terminator	
Length	**1**
Byte 1	**00**
Byte 2	**00**
Byte 3	**00**

Figure 22 Configuration interface for serial output parameters

① Output port select:

A. None: read-only does not output any data;

B. RS232: output data through RS232 interface;

C. HID Custom: output data through the HID Custom interface. If use this interface output, the USB interface must be enabled;

D. HID Keyboard：The output characters are output in the form of keyboard emulation, without any software support. It outputs at the place where the cursor of the operating system stops. If use this interface, the USB interface must be enabled, and the USB multiplexing type is USB Custom + Keyboard ;

② Data frame definition：

Frame option: frame header + data field + separator + data field + Terminator;

- ✓ Enable header: whether to output the frame header byte;
- ✓ Enable separator: when the output data contains multiple fields, if the item is checked, the fields are separated by a separator, such as the comma separator "E004050102030405, 01";
- ✓ Enable Terminator: whether to output the terminator;
- ✓ Separator: whether to use the system separator or the custom separator;
- ✓ Terminator: whether to use the system terminator or the custom terminator.

System separator: System separator selection.

Custom separator: custom separator, can be set to any value.

System terminator: system terminator selection.

Custom header: up to 4 bytes of frame header data can be defined.

Custom terminator: up to 3 bytes of terminator data can be defined.

6.1.8. Host Mode

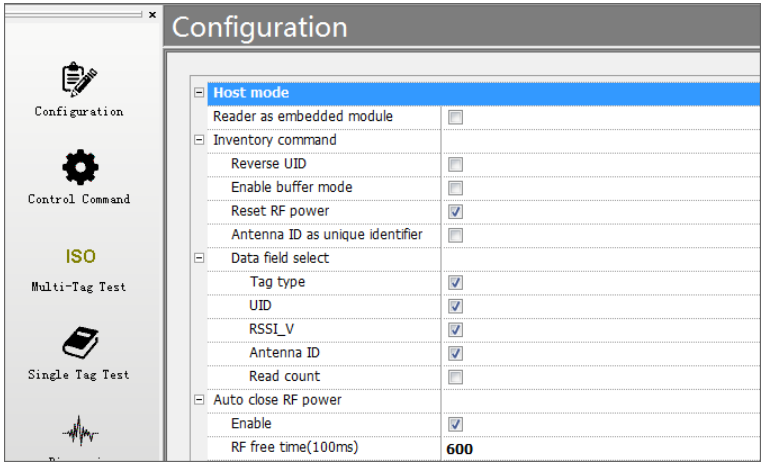


Figure 23 Configuration interface for host mode

- **Reader as embedded module:**

  When checked, the reader is used as an embedded submodule.

- **Inventory command:**

① Reverse UID: the sequence number contained in the data packet of the inventory command is reversed;

② Enable buffer mode: If checked, the buffer mode is used; if not checked, the asynchronous output mode is used.

Buffer mode: buffer the read tags in the memory of the reader, and output them after the inventory is finished.

Asynchronous output mode: it will be output a data packet with a serial number when a tag is read every time, the end package is output after the inventory is completed.

③ Reset RF power:

Whether to reset the RF power before the inventory command. If it is not reset, then the next inventory will not be able to inventory to the dormant tag.

④ Antenna ID as unique identifier: this parameter only applies to buffer mode.

For example: the tag E00405FF11223344 was read by antennas 1, 2 and 3:

Antenna ID as unique identifier:

Table 6 Example of inventory when setting antenna number as unique identifier

No.	Antenna ID	Tag ID
1	1	E00405FF11223344
2	2	E00405FF11223344
3	3	E00405FF11223344

Antenna ID is not used as unique identifier:

Table 7 Example of inventory when setting antenna number not used as unique identifier

No.	Antenna ID	Tag ID
1		E00405FF11223344

⑤ Data field select:

Tag type: whether the tag Data field contains the tag type field.

UID: whether the tag Data field contains the tag UID.

RSSI_V: whether the tag Data field contains RSSI field.

Antenna ID: whether the tag Data field contains antenna ID.

Read count: whether the tag Data field contains this field.

- **Auto close RF power:**

① Enable:

If it is enabled, after the RF is turned on, it will be turned off when Idle time exceeds the set time.

② RF idle time(100ms): timeout.

Note: after the "Auto close RF power" function is enabled, the operation of password authentication for the tag may cause failure.

6.2. Testing

6.2.1. Multi-tags Inventory Testing

After entering the main interface of R-Tool test software, select "ISO Multi-Tag Test" ,carry out the procedure as shown in the following figure ①, ② and ③ for tags inventory test:

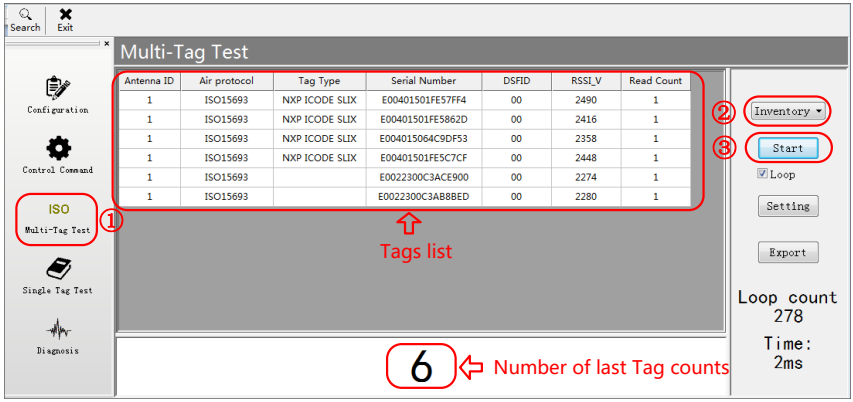


Figure 24 Multi-Tag inventory test steps

Note:

Step 1: Select the menu "ISO Multi-Tag Test" in the main interface of the software;

Step 2: Select the "Inventory" in the drop-down list above the "Start" button;

Step 3: Click the "Start" button to carry out the inventory testing.

6.2.2. Single Tag Operation Testing

After entering the main interface of R-Tool test software, select " Single Tag Test" , carry out the procedure as shown in the following figure ①,②,③,④ and ⑤ for tags test:

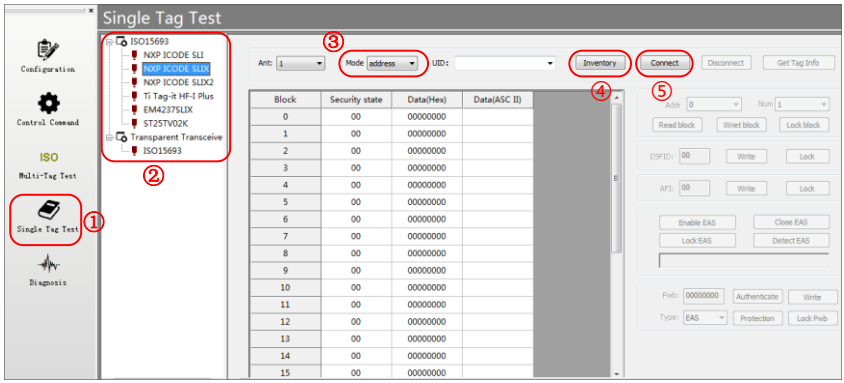


Figure 25 Single tag operation test steps

Note:

Step 1: In the software main interface, select the menu "Single Tag Test";

Step 2: In the "Single Tag Test" interface, select the type of tag to be operated;

Step 3: mode: none address, address.

1) For a single tag, select the "none address" mode.

2) For multiple tags, select the "address" mode.

Step 4: Click the "Inventory" button to display the UID list in UID drop-down box.

Step 5: 1) For a single tag: click the "Connect" button;

2) For multiple tags: in UID drop-down box, select the tags required to be operated, and then click the "Connect" button;

After the above steps, you can read and write tags, as shown below:

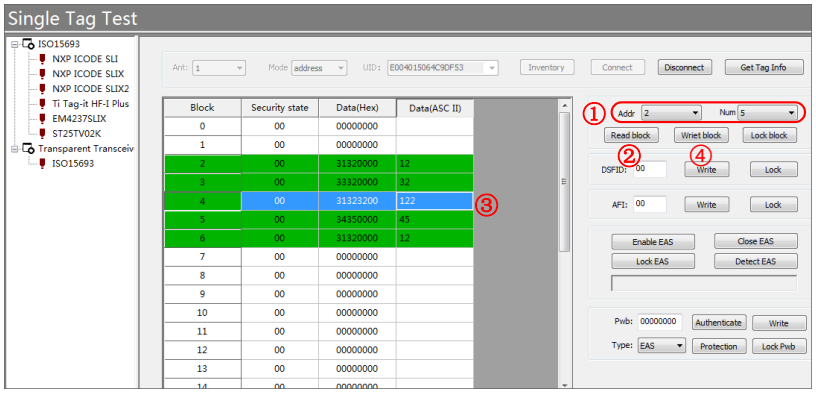


Figure 26 Single tag reading and writing steps

Steps:

1) Set the data block of the tag to be operated in the Addr drop-down box and the Num drop-down box. After setting, the operable data block is displayed in green indicating that it can be operated;

2) Click [Read Block] to read the data value of the data block selected in step 1;

3) Write the value in the line (green area) of the data block whose value should be written, and then click [Write Block];

4) After the operation is completed, click the [Disconnect] button to disconnect the tag connection.

7. Diagnosis

When using the product, you may experience problems, such as it may not be able to read the tag normally, or the distance drops or intermittently when reading a single tag, unstable when reading multiple tags, the reading speed is slow or the number of changes is large, etc. .

When these problems occur, the performance and usage environment of the reader can be detected and checked according to the following.

7.1. System Error Flag

When the reader fails, you can detect it to find out the cause of the failure based on the error identification.

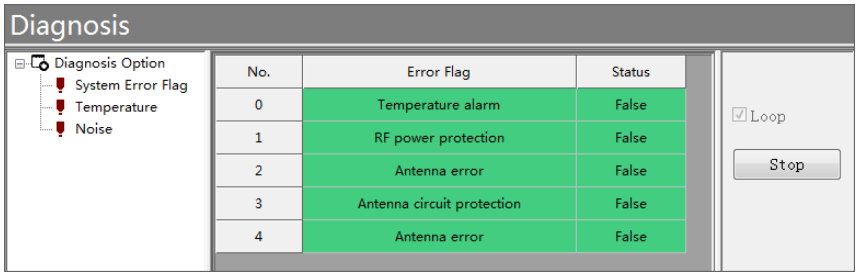


Figure 27 System error flag

Table 8 Description of system error flag

No.	Error Flag	Description
0	Temperature alarm	The operating temperature of the reader is too high.

1	RF power protection	Voltage standing wave ratio is too high
2	Antenna error	Antenna parameter configuration error or offset
3	Antenna circuit protection	The antenna interface is configured output with electricity , which is inconsistent with the actual antenna
4	RF configuration failed	RF configuration failed

7.2. Temperature

If the temperature is too high when the device is running, it will affect the work of the device. When the reader performance is unstable, you can check the temperature of the device to see whether it is caused by excessive temperature or not.

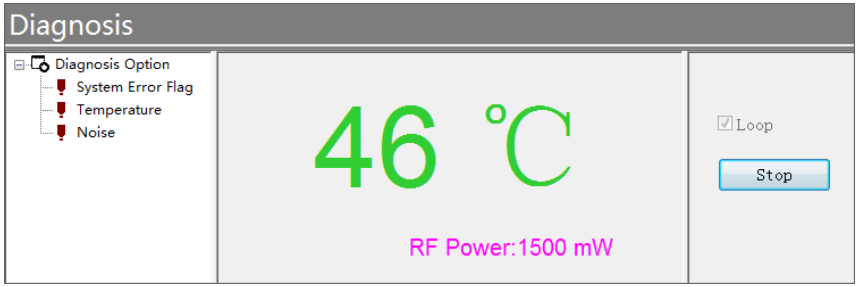


Figure 28 Temperature check

7.3. Noise

The "Noise " function can be used to detect noise on the spot, as shown below:

1. The noise waveform is normal, indicating that there is no interference signal or the interference signal is small in the environment;

2. When the noise waveform has a large square shape or a parabolic shape, it indicates that the environment has interference signals and the interference source needs to be eliminated.

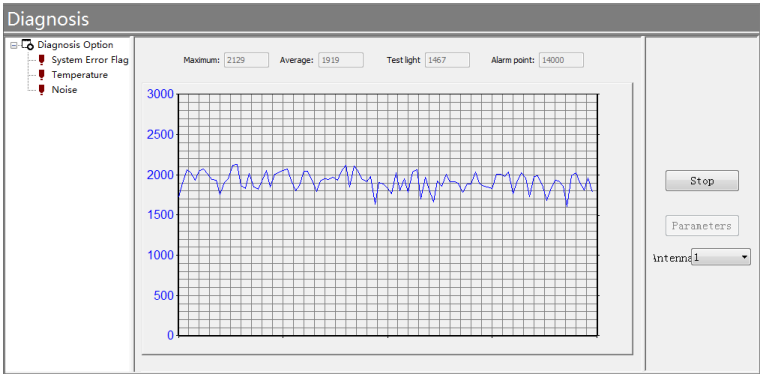


Figure 29 Noise check

- **Interference source analysis**

(1) Power adapter: laptop power supply, display power supply, LED light power supply, surveillance camera power supply, electric car charger, power supply of other electric equipment.

(2) Card reader with the same frequency band: access card reader, desktop card issuer.

(3) Motor equipment.

- **Troubleshooting**

Turn on the Noise Detection function, and switch off the power of the interference source one by one. At the same time, observe changes of the interface waveform, in order to determine the interference source.

8. Technical Support

- **Download link for development data and testing**

https://www.gzandea.com/download.php

- **Call for equipment debugging and technical support**

Mobile phone: 138 0251 4535

Fixed telephone: 020-32039552

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

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.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Guangzhou Andea Electronics Technology Co., Ltd.

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