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# **MS-9601H Middle Range Integrative RFID Reader**

## **User's Manual**

Dec. 16<sup>th</sup>, 2012

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## Declaration

### Disclaimer

Specifications and manuals are subject to change without notice. HANYUE GROUP assumes no liability for damage incurred directly or indirectly from errors, omissions, or discrepancies between the device and the manuals.

### Notes

Depending upon the specific model purchased the color and look of your device and accessories may not exactly match the graphics shown in this document. The screenshots and other presentations shown in this document are for reference only. They may differ from the actual screens and presentations generated by the actual product.

### Cautions

**Thank you for using MS-9601H Middle Range Integrative RFID Reader. This manual provides information about using MS-9601H Middle Range Integrative RFID Reader. Before using it for the first time, please read through the following safety instructions and keep the manual for later reference.**



#### Warning !

- ☐ **Disassembly & Reassembly**
  - Do not make any attempt to disassemble or reassemble the reader. Inner high voltage may lead to an electric shock.
- ☐ **Inner components & parts**
  - Do not ever touch inner high voltage components or parts, or an electric shock may happen.
- ☐ **Abnormal Situations**
  - Shut down the power immediately and contact the dealer as soon as possible if the reader becomes hot or begins to fume and smell. The neglect of it may cause a fire or an electric shock.
- ☐ **Foreign Body**
  - Shut down the power immediately in case a foreign body comes into the reader and contact the dealer as soon as possible.
- ☐ **Drop and Damage**
  - Shut down the power immediately if the reader drops or damages and contact the dealer as soon as possible.



#### Caution !




- ☐ Use a soft and dry lens cloth to clean the reader. Wet cloth, gasoline, diluted solution or other volatile chemicals will distort or erode the outer casing.

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## Chapter 1 Package Confirmation

Unpack the device and verify that all equipments listed below is included:

Ref	Name	Photo
1	Host	
2	User Manual CD	
3	Power Adapter	

4	Power Cable	
5.	RS232 Data Cable	
6	Multi-inter face Data Cable	
7	Holder	

Please confirm the above equipment within 5 days since you got the product. If there is any equipment missed or damaged, please contact your local dealer in the first time. You can also contact our customer service representative directly at 0086-531-66955507 or [info@hiultra.com](mailto:info@hiultra.com)

**When you contact your local dealer or our customer service representative, please present your Warranty Card" (see affix 1) as proof.**

## Chapter 2 Product Introduction

The advantages of the product are compatible with multi-protocol, integrated design, fast reading speed, multi-tag identification and waterproof. The circularly polarized antenna has no limitation for tag direction. It can be used in a variety of RFID systems.

Items	Specification
<b>Basic Parameters</b>	
Model	MS-9601H Middle Range Intergrative RFID Reader
Dimensions	240mmX240mmX30mm
Weight	1 Kg
Operating Temp	-20℃ to +80℃
Storage Temp	-40℃ to +125℃
Interface	Standard: Wiegand26, Wiegand 34, RS485, RS232, set by software Optional: WiFi, RJ45
Data Input Interface	One group Trigger Input
Indicator	Buzzer
Power Supply	DC 9V (equipped with power adaptor)
Certificates	FCC CE CCC
<b>RFID Parameters</b>	
Frequency Range	Standard ISM 902 to 928MHz and ISM 865 to 868 for option, can customized other frequencies
Protocols	ISO18000-6B, ISO18000-6C (EPC GEN2)
RF Power	0 to 20.88dBm , set by software
Antenna	Build-in 7dBi circularly polarized antenna
Read Range	>6.0m
Read Mode	Timing reading , triggering reading, set by software
Reading Speed	<6ms per 64 bits, set by software

### **Features**

1. Support multi-protocols
2. Fast reading speed
3. Water-proof design
4. Anti-collision

### **Applications:**

1. Intelligent parking management: Parking management and automatic charge
2. Transport management: road, railway, container management
3. Access control: vehicle and personnel access control
4. Vehicle management: Vehicle management in customs, bridge, transportation station and so on.
5. Logistics and warehouse management: goods flow, warehouse management and the flow management for mail, parcels、luggage
6. Supply chain application: supply chain process application
7. Anti-counterfeiting detection: using the internal write protection features of tag to identify the truth from falsehood
8. Other application: club management, library management, time attendance management, repast management, pool management

### **Notes:**

Product specifications and information mentioned in this manual are subject to changes without prior notice. For the latest news and information, please go to [www.hiultra.com](http://www.hiultra.com)

## **Chapter 3 Handling Instruction**

### **3-1 Functional Description**

- 1) Arousing: The reader can only read aroused tags, to avoid interference from other tags outside systems. Therefore, information communicated between system tags and reader is reliable and correct.
- 2) Reading: Not only can read tags' ID, but also can read data in appointed memory section; Not only can read single tag data, but also can read multi-tags' data within antenna range at the same time.
- 3) Writing: It can write data into appointed memory section

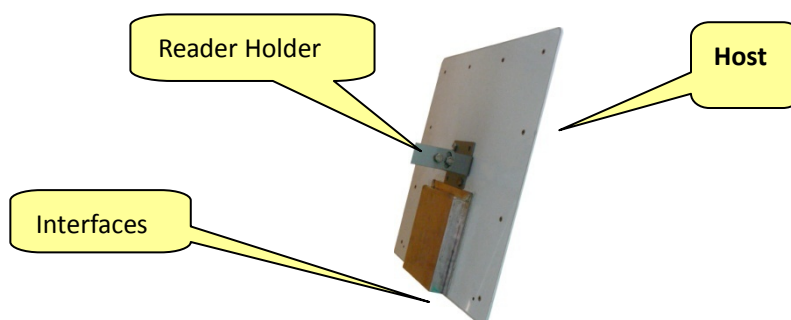
### **3-2 Communication**

- 1) Interface: It can directly connect with control facility with standard RS232, RS485, weigand26 or weigand34 interfaces.
- 2) Data Communication: Connect with controller or PC via standard communication interface for data communication. SDK is offered for further development.



## Chapter 4 Identifying Hardware Components

### 4-1 Hardware Components



Pic. 4-1

### 4-2 Interfaces Description

#### The Hookup of MS-9601H

Interface	Power		RS232			RS485		Trigger		Wiegand		
Color	Red	Black	White	Purple	Gray	Brown	Yellow	Orange	Green	Blue	Pink	Green
Define	+9V	GNE	TX	RX	GND	A+	B-	TRIGGER	GND	DATA0	DATA1	GND

#### 4-2-1 RS232

RS232 interface is mainly used for communication between reader and controller/ PC.

Data format: 8 data bits, one start bit, one stop bit, no check bit

Baud rate is selectable from: 9600,19200,38400,57600 and 115200.

RS232 interface supports second programming function for the reader parameter configuration, demo, and all serial communication.

#### 4-2-2 RJ45

RJ45 interface is mainly used for communication between reader and switchboard/concentrator.

It can also be used for connection between reader and PC.

The communication protocol is same as RS232

#### 4-2-3 RS485

RS485 interface is mainly used for communication between reader and PC via RS232 and RS485 transformer.

RS485 interface supports all functions that RS232 supported. Meantime, it is also worked as tag data output interface.

There are three methods to upload data tag:

Active Transmit: Immediately transmit data to PC/Controller when reader reading tag data.

Passive Transmit: Do not transmit any tag data until receive system uploading command.

Responding Transmit: Transmit tag data every 10 seconds since reader finished reading until receive

system's response command

**RS485 interface transmitting data format:**

SOF	Add	Add	Antenna	Tags data	EOF	Check
0x02	High byte	Low byte	1 byte	8 byte (ASCII)	0x03	1 byte

The check method is XOR all bytes.

**System uploading Command format**

SOF	Identify	Module	Add	Command	EOF
0x09	0x5B	1byte	1byte	0x83	0x0D

**System response command format:**

SOF	Identify	Module	Add	Command	EOF
0x09	0x5B	1byte	1byte	0x82	0x0D

**4-2-4 Wiegand**

Reader offers one weigand interface. Weigand 26 and weigand 34 are selectable.

**Wiegand26 data format**

P0	12 beginning bits	12 ending bits	P1
----	-------------------	----------------	----

P0 stands for even parity check for 12 beginning bits

P1 stands for odd check for 12 ending bits

**Wiegand34 data format**

P0	16 beginning bits	16 ending bits	P1
----	-------------------	----------------	----

P0 stands for even parity check for 16 beginning bits

P1 stands for odd check for 16 ending bits

There are three cables for weigand interface: one "0" cable, one "1" cable and one ground cable. The typical data format is as follows; however, the data format is settable according to controller requirement.



Pic.4-2

In order to improve data transition reliability, the reader offers multi-time output function. The transition time is selectable from 1 to 3. The t transition interval is settable in configuration software.

## Chapter 5 Basic Skills

### 5-1 Tag operation

#### 5-1-1 ISO18000-6B Tags:

Multi-tags identification: searching all tags in reading range, and read tag's 8 bytes UID

Multi-tags reading: Searching all tags in reading range, and read 8 bytes data from appointed start address.

Single-tag writing: Write 1 byte data into tag's appointed address.

Lock single-tag: Lock tag appointed address' data. When the address is locked, the locked data is not amendable.

Lock tag Inquiry: Inquiry tag appointed address's locking state

#### 5-1-2 EPC GEN2 (ISO18000-6C) Tags

Multi-tags identification: searching all tags in reading range, and read tags 96 bits EPC( the longest length of EPC is 256 bits, presently the system support reading 96 bits)

Initialize a single tag: Definite EPC length of tag, usually 96 bits.

Single-tag writing: Write data into tag's EPC area, one block (16 bits) once.

Lock single-tag: Lock tag's EPC area. The locked data is not amendable after locked.

Kill single-tag Inquiry: Kill tag. Tag is not usable after be killed.

### 5-2 Work Mode

#### 5-2-1 COMMAND:

In this work mode, reader is worked under the control of PC or other controller. Reader can communicate with PC or Controller via RS232, RS485 or RJ45. This work mode supports all functions in second programming.

#### 5-2-2 TIMING READ:

Reader automatically reads cards every certain interval (the Timing Read interval is settable). Read data are upload via appointed communication interface. In this work mode, it only supports "Read-Only" operation for tags.

#### 5-2-3 TRIGGER READ:

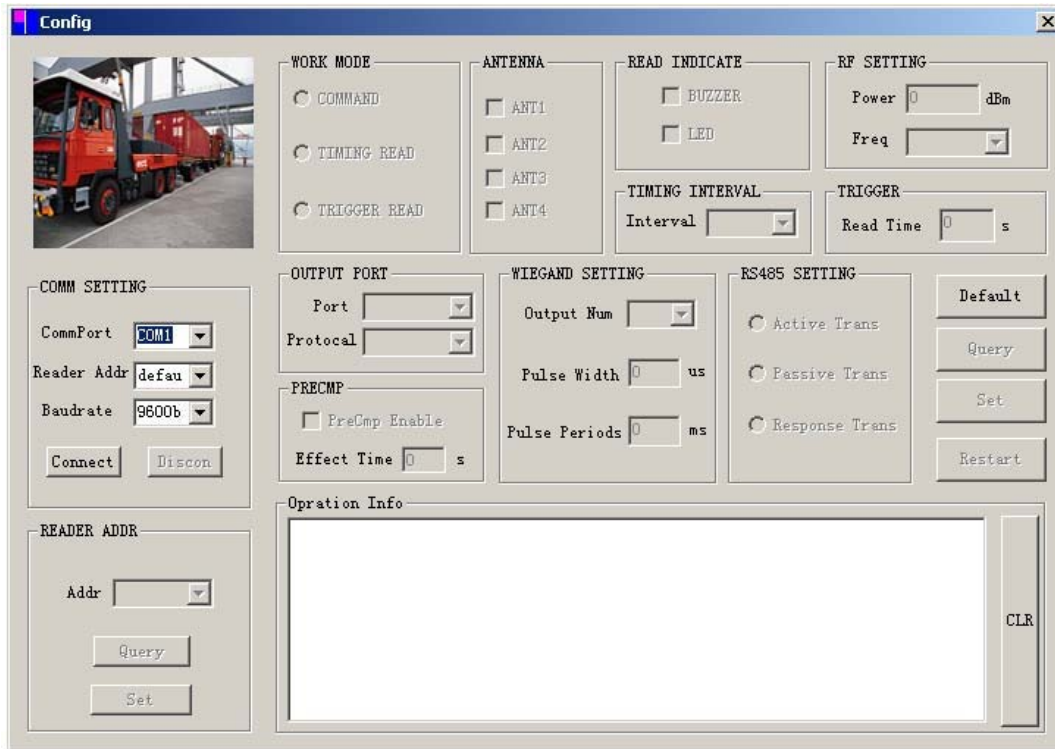
When input low level into trigger input port, reader starts reading tag periodicity, and automatically stops tag reading after a certain time.

### 5-3 Border Identification:

Border Identification is designed for reducing redundant data when reader uploading data. Under this function, when reader reading the same tags several times, it only upload the tag data once. Effective time is selectable in Border identification function. Namely, if same tag data have been read twice and the reading interval is exceeding the effective time; the system won't operate border identification. User can use this function according to detailed requirements.

## Chapter 6 Demo Fitting

The company offers Config. exe program for reader operation parameter configuration. Double click to open it:



Pic. 6-1

### 6-1 Communication Setting

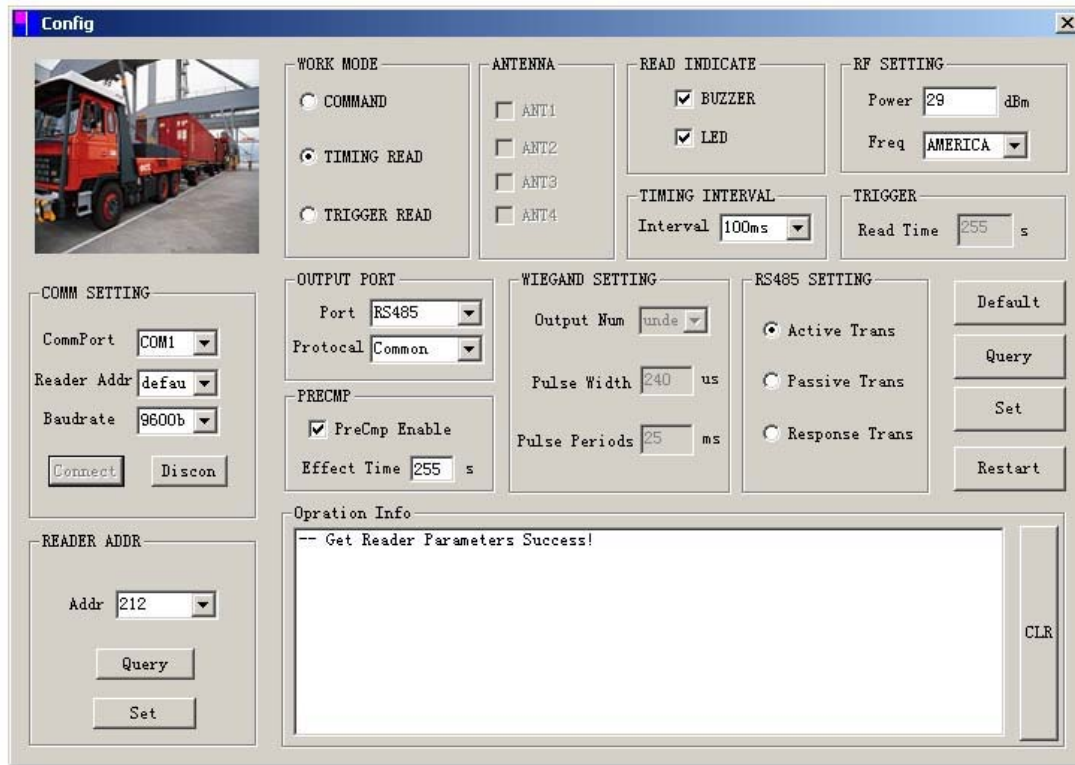


Pic. 6-2

In "COMM SETTING" bar, there are three parameters: "CommPort" (Communication Port), "Reader Addr" (Reader Address) and "Baudrate" (Baud Rate).

Reader Address is selectable from "default" and 1 to 240. "default" is effective for any reader. If selecting from 1 to 240, the reader can only communicate with PC/Controller when right reader address selected. Select right baud rate and click "connect" button for communication between reader and PC or Controller.

System will automatically display reader's current operational parameter if the program had successfully connected with reader:



Pic. 6-3

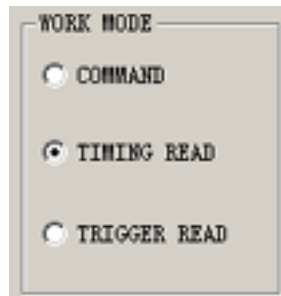
## 6-2 Reader Address Setting



Pic. 6-4

Select new reader address in "READER ADDR" bar and click "Set" to finish. The new address will be valid since reset the reader.

## 6-3 Work Mode Selection



Pic. 6-5

Three work modes are selectable: "COMMAND", "TIMING READ" and "TRIGGER READ".

In "COMMAND", "RF SETTING" bar and "ANTENNA" are still settable, other parameters will turn dimmed.

In "TIMING READ", "RF SETTING" bar, "TIMMING INTERVAL" bar and "COMM SETTING" bar are still settable, other parameters will turn dimmed.

In "TRIGGER READ", "RF SETTING" bar, "TIMMING INTERVAL" bar, "COMM SETTING" bar and "TRIGGER" bar are still settable, other parameters will turn dimmed.

## 6-4 Radio Frequency Setting



Pic. 6-6

In "RF SETTING" bar, Power is adjustable from 0 to 30 dBm. Frequency is selectable from "AMERICA" (902MHz~925MHz) and "CHINA" (920MHz~925MHz). For other frequencies, please inform our salesman when placing order. We can customize for you.

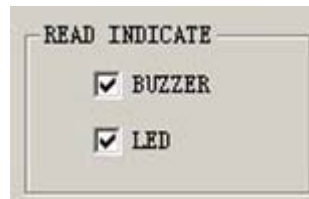
## 6-5 Antenna Setting



Pic. 6-7

Antenna is selectable when using multi-port reader. Select relevant antenna to operate.

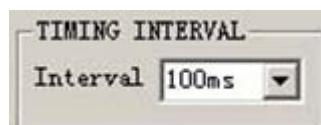
## 6-6 Read Indicate Setting



Pic. 6-8

In "READ INDICATE" bar, there are two indicate parameter selectable: "BUZZER" and "LED".

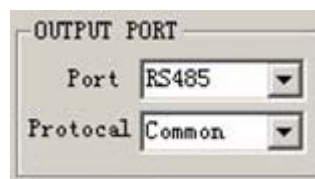
## 6-7 Timing Interval Setting



Pic. 6-9

In "TIMING INTERVAL" bar, Timing Read interval and Border Identification interval is settable. The "TIMING INTERVAL" is selectable from 10ms~1000ms. Please select 0ms when not need this function.

## 6-8 Communication Port Parameter Settings

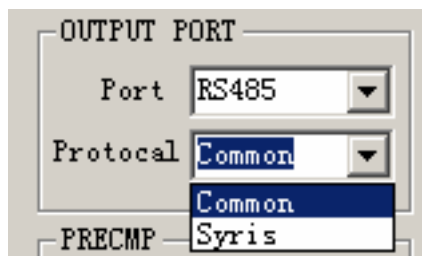


Pic. 6-10

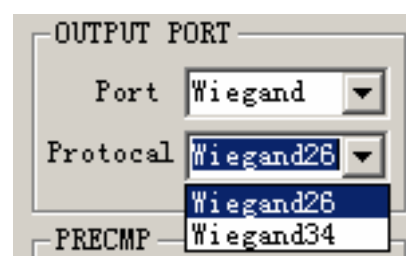
In "OUTPUT PORT" bar, there are two parameters: "Port" and "Protocol"

When select "RS485" port, "Common" and "Syris" protocols are selectable. The "Common" protocol data format is same as the data format listed in 4-2-3. As for "Syris" protocol, please refer to relevant information of Syris controller.

When select "Wiegand" port, "Wiegand26" and "Wiegand34" protocols are selectable.

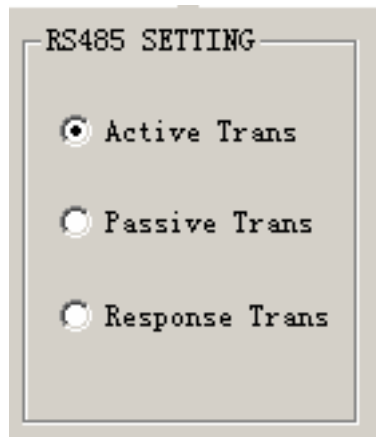


Pic. 6-11



Pic.6-12

## 6-9 RS485 Setting

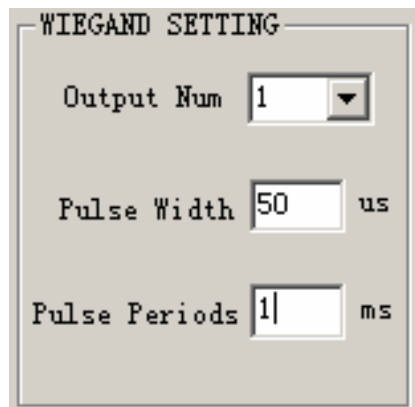


Pic. 6-13

“Active Trans”, “Passive Trans” and “Response Trans” are selectable under RS485 port. The transmission rate for RS485 port is 9600bps.

When selecting “Syris” protocol, please select “Passive Trans” under “RS485 SETTING”. The transmission rate for “Syris” protocol is 19200bps.

## 6-10 Weigand Setting



Pic. 6-14

“Output Num”, “Pulse Width” and “Pulse Periods” are settable under “WIEGAND SETTING”.

Pulse Width stands for low pulse width; Pulse Periods stands for time for one data.



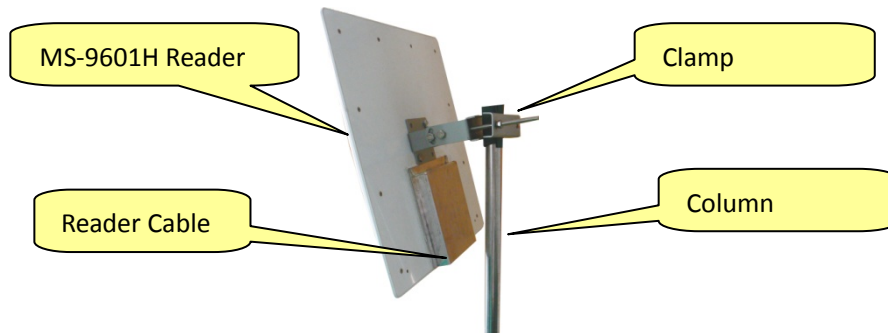
Pic. 6-15

After setting all parameters, click “Set” button, these parameters will be valid since reset the reader. Click “Restart” button to reset the reader.



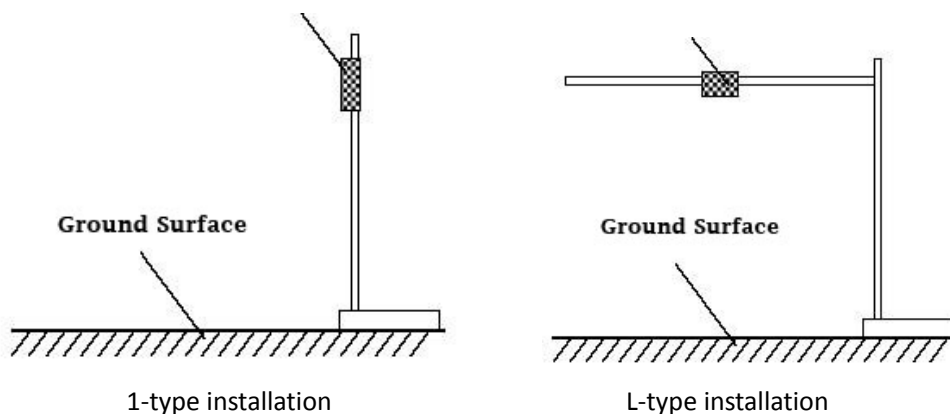
## Chapter 7 Installation

### 7-1 Installation Mode



Pic. 7-1

There are two installation methods for MS-9601H column: 1-type installation and L-type installation as below. Please select suitable installation method according to installation site situation. Generally 1-type installation has a short reading range but is easy for installation; L-type installation has a longer reading range but is difficult for installation.



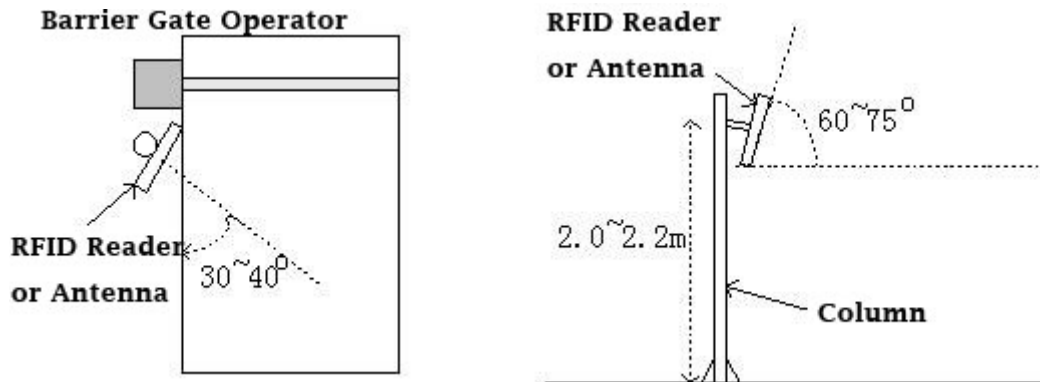
Pic. 7-2

### 7-2 RFID Reader Installation and Height Adjustment

1-type installation requires a column with 50 to 60mm diameter and 2.2m height. It is better to use stainless steel with thickness over 1.2mm. Use the fastener equipped with MS-9601H reader to fix the reader on the top of the column. Adjust the height of RFID Reader's center and vehicle lane according to parking vehicle type (Oversize vehicle or Light-duty vehicle), usually the height is around 2m (1.8m to 2.2m)

L-type installation requires an L type (or H type) poling with 60 to 80mm diameter column and 50mm to 60mm diameter rail. It is better to use 1.2mm to 2.0mm thickness stainless steel. Use the fastener equipped with MS-9601H reader to fix the reader to the middle of the rail. Adjust the height between rail and vehicle lane according to vehicle type, usually the height is around 3.5m to 4.0m

### 7-3 RFID Reader Azimuth Angle Adjustment



Pic. 7-3

Antenna depression angle: the intersection angle between the antenna and the horizontal line. This angle should be around 60° to 75°.

Antenna azimuth angle: the deviation angle between the antenna and the vehicle lane. This angle should be around 30° to 40°.

### 7-4 Site Installation Illustration

The principle of MS-9601H RFID Reader installation:

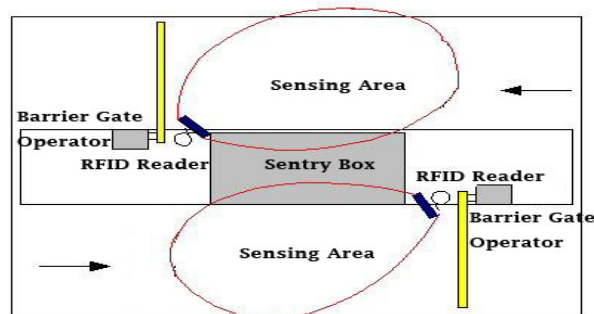
- 1) The beeline distance cannot beyond 1m between MS-9601H and brake
- 2) Make sure there is no item between the RFID reader and RFID card.
- 3) Please use UTP5e cable to connect MS-9601H RFID reader and control equipment (or PC) and make sure the distance between the RFID reader and control equipment is as short as possible.

Please make out installation plan according to site situation as following examples:

#### Spot Fixing Mode One:

There is a safety island in the middle of the road. Please install barrier gate operator on the safety island and the vehicle should travel at less than 10km/h when passing the reading area.

Please make sure MS-9601H RFID reader is just next to the barrier gate operator. Meantime, make sure the cards valid reading range (max line distance 0.5m to 10m) can cover the detector loop in entry or exit as below:

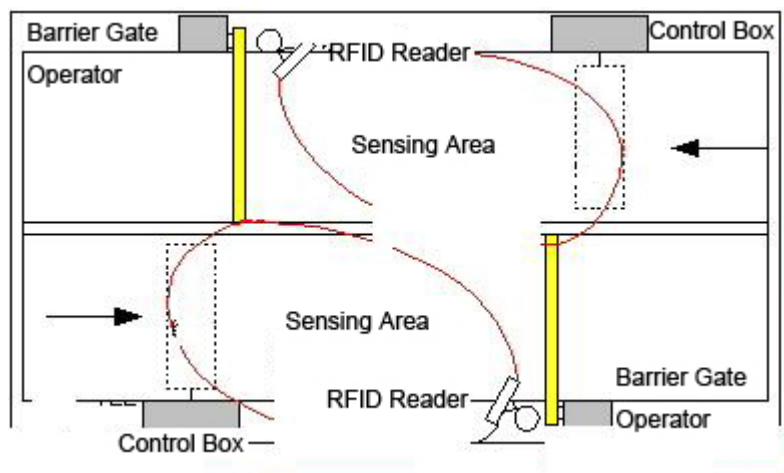


Pic. 7-4

#### Spot Fixing Mode Two:

There is no safety island in the middle of the road. Barrier gate operators are fixed on lane side and the vehicle should travel at less than 10km/h when passing the reading area.

Please make sure MS-9601H RFID reader is just next to the barrier gate operator. Meantime, make sure the cards valid reading range (max line distance 0.5m to 10m) can cover the detector loop in entry or exit as below:

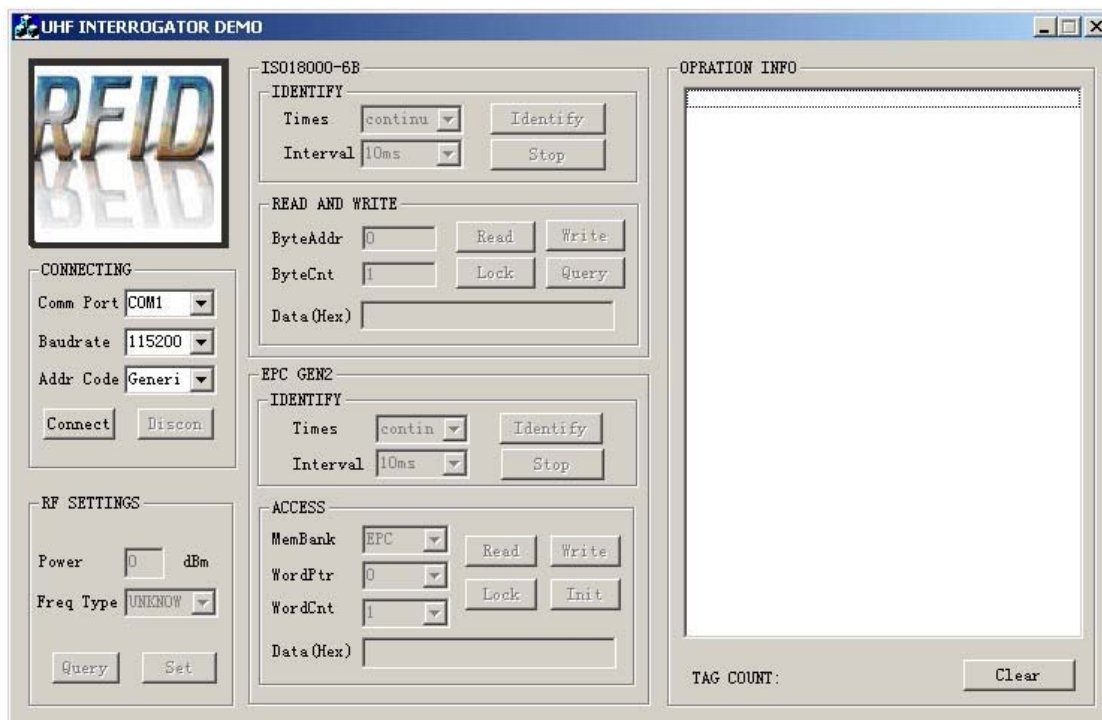


Pic. 7-5

## Chapter 8 UHF Interrogator Demo

The UHF Interrogator Demo provides operational functions related to connection, tag operation and RF parameter setting. Users can set function of the reader through this demo for second programming the reader.

The demo program of the reader includes two programs: "DEMO exe" and "MR915ApiV10.dll". Please put these two programs within the same folder and double click to open the demo.



Pic. 8-1

Choose COM communication port and baud rate you use;

Select right reader address;

Click "Connect" button to establish connection between demo and the reader.

After successfully connected, the success hint and the reader firmware version number will be displayed in "OPERATION INFO" bar and all functions are available for an operation now.

## Chapter 9 Second Programming

SDK based on the C language are provided for second programming. The SDK supports VC++, VB, Dephi, C+Buidar and other programming environments. Please refer to the <<NRreader SDK instruction>>.

## Chapter 10 Troubleshooting and Maintenance

This chapter provides troubleshooting solutions to common problems during RFID reader operation.

### Common Troubleshooting

Note: If encounter a problem you cannot solve, contact your dealer for assistance.

Problem	Causes	Solution
The reader fails to work.	<ol style="list-style-type: none"> <li>1. The cable is not well connected.</li> <li>2. Power adaptor damaged</li> <li>3. Positive line and cathode line of power cable were mis-connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check power cable connection</li> <li>2. Change the damaged power adaptor.</li> <li>3. Re-connect positive line and cathode line of power cable</li> </ol>
RS232 port fails to communication.	<ol style="list-style-type: none"> <li>1. The RS232 port cable is not well connected</li> <li>2. Computer RS232 port problem</li> </ol>	<ol style="list-style-type: none"> <li>1. Check RS232 port cable connection</li> <li>2. Change the damaged computer RS232 port.</li> </ol>
Weigand port fails to communication.	The weigand port cable is not well connected	Check weigand port cable connection
Reader fails to connect with network	<ol style="list-style-type: none"> <li>1. Network cable damaged</li> <li>2. Chose wrong network cable</li> </ol>	<ol style="list-style-type: none"> <li>1. Change the damaged network cable</li> <li>2. Use crossed networking cable when directly connecting the reader with PC; Use straight through cable when connecting reader with PC via router</li> </ol>
Card reading range is too short	<ol style="list-style-type: none"> <li>1. Use wrong method for holding card</li> <li>2. RF setting power is too small or too big</li> </ol>	<ol style="list-style-type: none"> <li>1. Please hold the edges of the card when reading.</li> <li>2. Adjust RF SETTING power, usually 20dBm to 30 dBm</li> </ol>

## Chapter 11 Warranty

MS-9601H Middle Range Integrative RFID Reader is warranted for a period of twelve (12) months from the date of original purchase for its hardware.

### Terms & Conditions:

- A. Warranty service is only available for products purchased from HANYUE GROUP or its authorized dealers.
- B. Please make quantity inspection and quality test of the Products within 5 (five) working days since the customer got the device and feedback the Supplier the receipt of the Products in writing in this period. In case of incompleteness or nonfunctional units of the Products found by such inspection, the claim should be put forward within this period. The Supplier shall inspect the authenticity of the claim within 10 (ten) working days and supply the missing (nonfunctional) pieces of the Products to the Buyer at its own cost within 10 (ten) working days after confirmed the claim.
- C. If such claims made over 5(five) working days from the date the Buyer receive the device, the Supplier shall inspect the authenticity of the claim within 10 (ten) working days and be responsible to supply replacement parts to the Buyer or repair the defect products for free within 10 (ten) working days after confirmed the claim. The buyer should pay other relative cost in repairing such as freight cost, and customs fees.
- D. The Products may be serviced provided it remains unmodified and is operated under normal and proper conditions, while the Buyer must present the original purchase invoice or receipt for verification when warranty service is rendered.
- E. The above warranty provisions shall not apply to the following cases, but repair service may be rendered at the Buyer's expense:
  - 1. Warranty service is expired.
  - 2. The Buyer is incapable of presenting a warranty card or the information in the warranty card is not complete or is altered
  - 3. Defects or damage caused by accident or artificial factors like unusual physical or electrical stress, water or other liquids, etc.
  - 4. Defects or damage resulted from failure to perform operator handling and scheduled maintenance instructions stated in the user's manual.
  - 5. Other defects or damage do not caused by workmanship or material.
- F. No repair service shall be applied to the following products:
  - 1. Products not made by HANYUE GROUP
  - 2. Products that have been repaired, tampered with, altered or modified without authorization from HANYUE GROUP

**Affix 1**

**Warranty Card**

Model: Serial No.: \_\_\_\_\_

Customer: \_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

Address: \_\_\_\_\_

Agent/Dealer: \_\_\_\_\_

Tel: \_\_\_\_\_ Purchase Date: \_\_\_\_\_

Stamp:

-----



**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.

**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 minimum distance 20cm between the radiator & your body