Invengo

User's Manual
XC-RF812 Reader

Thank you for using Invengo's RFID products!

We are glad that you've chosen XC-RF812 UHF RFID reader.

We hope our product will make your daily tasks at work easier!

Foreword

This manual applies to the XC-RF812 reader.

This manual provides information on product application, maintenance, repair and other features for users and maintenance personnel of the products.

Current version of this manual is V1.1, with revision record as follows:

9 June 2014	**V1.0**
10 March 2016	**V1.1**
10 May 2016	**V1.2**

Main content

Safety Instructions

⚠ **Warning sign**

Improper handling may cause damage to health.

Improper handling may result in equipment damage.

ℹ **Notification sign**

If ignored, it may result in unsuccessful operation.

If ignored, it may result in undesired effect.

Content

1 Product Overview

1.1 Introduction

The XC-RF812-type reader is a high performance UHF reader with a built-in antenna. The reader supports ISO18000-6C/6B standards, operates at frequency of 902-928MHz, and offers excellent protection and write performance, simple and elegant design, and ease to use.

Figure 1-1 XC-RF812 reader

The XC-RF812 reader supports ISO18000-6C / 6B compliant tags and performs wireless communication with tags via antenna to achieve read and write data operation on to tags.

1.2 Application scope

The XC-RF812 is a high performance UHF reader, supporting ISO18000-6C / 6B compliant tags manufactured by different vendors. The reader has a built-in antenna, and a compact appearance.

The reader can meet a variety of application needs, especially in the residential parking management.

1.3 Model description

The XC-RF812 reader is an UHF reader integrated with a high-performance near-field UHF antenna.

1.4 Operating conditions

An RFID data collection system is comprised of reader, tags, antenna, computer and reader interface software.

Before using the XC-RF812 reader, check RFID data collection system is complete, and connection between the various components is reliable.

1.5 Operating Environment

- Temperature range; -20 ^{o}C to + 60 ^{o}C

- Relative humidity: 5% to 95% RH (+ 25 ^{o}C)

- Power supply: Power adapter (standard) or other power supply options(5V to 6V / 2A)

  Power adapter technical specifications are as follows:

  - Material code 1080200010
  - AC input 100 to 240V, 50 to 60Hz;
  - DC output 5V / 4A MAX
  - Operating temperature 0 oC to + 40 oC
  - Storage temperature -20 oC to + 60 oC

1.6 Safety and protective measures

Any radio transmitting equipment, including this equipment, may cause interference with medical equipment that is not properly protected. Should any problem occur, in respect of the aforementioned, please consult your medical equipment manufacturer. The operation of this equipment may also cause interference with other electronic devices.

2 Performance Parameters

2.1 Features

- RF Air Interface: EPC global UHF Class 1 Gen 2 / ISO 18000-6C / 6B
- Tag data filter
- Maintenance: remote maintenance and upgrade
- Operating modes: fixed frequency / hopping
- Network Protocol: DHCP, HTTP, and SSH

2.2 Technical parameters

- Operating frequency:

  US: 902.75MHz ~ 927.25MHz

  EU: 865.7MHz ~ 867.5MHz

  AU: 920MHz ~ 926MHz

  RW: 902MHz ~ 928MHz, 915.4MHz ~ 919MHz
- RF output power: 24dBm ± 1.0dB (maximum output power)
- Frequency stability: less than ± 10ppm
- Read range: 0 to 6cm (tag and user environment-dependent)
- Power: Power adapter: AC input 100-240V, 50-60Hz; DC output 5V ± 0.3V / 4A; other power supply option: (5V to 6V / 2A)
- Network interface communication rate: 10M / 100M adaptive
- Serial communication rate: 115200bps (default), 19200 bps, and 9600bps

3 Dimensions and Weight
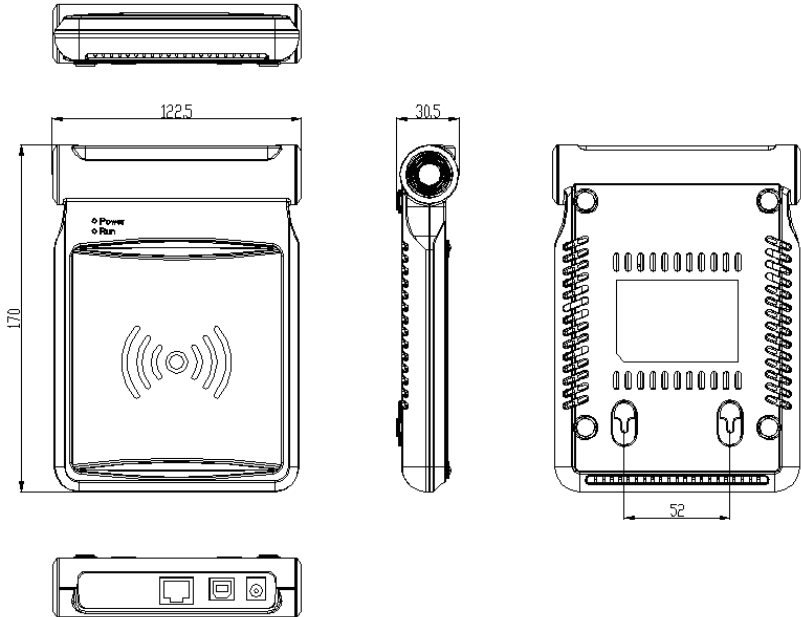
3.1 Dimensions

Figure 3-1 XC-RF812

XC-RF812 reader dimensions:

- Metric   170.0mm x122.5mm x 30.5mm(Not inclusive of accessories)
- Imperial   6.69in x4.82 in x 1.20 in

3.2 Weight

XC-RF812 reader weight:

- Metric   Approximately 0.5kg (Not inclusive of accessories)
- Imperial   Approximately 1.10 lb

4 Structural Features and Working Principals

4.1 Overall structure and working principals

The XC-RF812 reader comprises antenna modules, RF modules, baseband unit, power supply unit and chassis components.

An RFID application environment consists of the XC-RF812 reader, tag, and PC machine (PC). The baseband unit controlled by PC machine sends commands to the RF unit. The RF unit sends the responding command according to tag types. The tags receives command and returns responding messages which will be amplified and modulated by the reception circuit and sent to the decoding unit of baseband unit. The decoded data is sent to PC via communication interface on the baseband unit.

The baseband unit performs tag data decoding and communication with the PC.

4.2 Bottom panel description

This section details the interfaces of the device and the LED indicators' features.

4.2.1 Panel
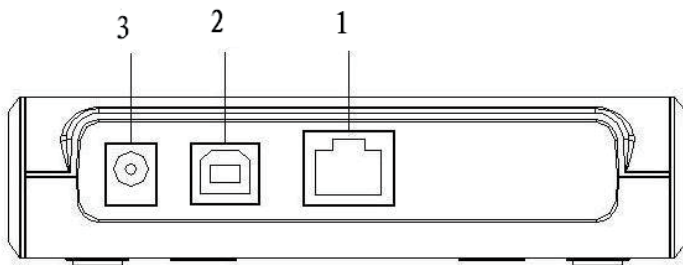
Figure 4-1 XC-RF812 Panel

Interface description is as follows:

1 - Ethernet interface

2 - USB interface (virtual serial interface)

3 - Power supply connector

(1) network interface, RJ45 network interface socket, 10M/100M adaptive communication rate.

(2) ladder-USB interface

(3) DC power jack, φ 5 pin DC power socket, use output 5V/4A power adapter power supply.

4.2.2 LED panel
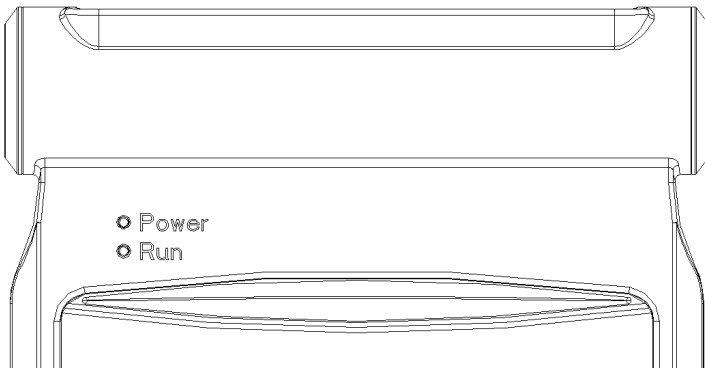
Figure 4-2 XC-RF812 LED panel

For the LEDs' definitions, see Table 4-1 :

Table 4-1 LED definitions

Number	Name	Definitions
POWER	Power/LED	After applying power to XC-RF812, this LED turns green.
RUN	System running LED	Flashing green LED indicates that the system is running.

4.3 PC and API requirements

This section describes the requirements of PC hardware and APIs.

4.3.1 PC

The minimum hardware configuration requirements for a host computer:

● CPU: Pentium 4, frequency: 1.7GHz or higher

● Memory: 512M Byte

● Hard drive: 20G

● RS-232 interface or 10M/100M network interface

Host computer operating system requirements:

Windows 2000 Service Pack 3; Windows Server 2003; Windows XP Service
Pack 2;Windows 7 ;Windows 8

4.3.2 API

● .NET API, VC, and JAVA dynamic link library

● RFID Reader Demo

For more information, see Programmer's Reference Manual and RFID
Reader Demo User's Guide

5 Installation and Troubleshooting

Please read and understand this chapter before installing the XC-RF812.

5.1 Installation tips

In order to ensure your personal and property, the following preparations are required before installing XC-RF812.

This product uses DC + 5V / 4A DC power supply. Carefully check voltage range before installing the XC-RF812!

The installation location should be free from rain, moisture and sunlight, and is well ventilated.

Check the USB cable or network cable connection is good.

Any radio transmission equipment, including the XC-RF812, may cause disturbance to the performance of medical devices that have no proper protection. Please consult the manufacturers of relevant medical devices to avoid such event. This equipment may also cause disturbance to other electronic equipment while it is in operation.

5.2 Installation conditions

Before installing the XC-RF812 reader, please carefully check the product is in good condition, and the accessories are complete. Please check the product and its accessories according to the packing list. Please contact us immediately if there is any discrepancy or damage.

In addition, check whether the installation meets the following conditions:

● Complying with workplace standards;

● The accessories are complete and meet required standards.

5.2.1 Connecting the XC-RF812

Connect the reader to the PC.

Connect the XC-RF812 reader to the PC with a network cable or a USB cable. The PC IP address and reader IP address must be in one network segment (default

192.168.0.210) to create network connection. Check the USB driver is installed to use USB connectivity.

5.2.2 Apply power to the XC-RF812

Apply power to the XC-RF812 reader by following steps:

- Check that the AC input voltage and operating frequency to meet the requirements: AC 100-240V input, 50-60Hz;
- Check the adapter output voltage is 5V / 2A;
- Check the power supply connection are correct and secure;
- After applying power to the reader, wait about 10 seconds. The power / work LED will is flashing, and the reader will play two sounds. The reader will enter initialization state, and the system enters standby mode when initialization process is completed.

> After booting the system, the XC-RF812 reader, by default, is in standby mode. The reader does not transmit power in the initialization and standby mode (RF power amplifier is turned off), and only operates after receiving "read tag" command from the PC or "open amplifier" command.

5.3 Troubleshooting

This section describes troubleshooting common problems, in particular, the general problems occur when the installation is not correct, and explains how to correct it.

Troubleshooting common issues:

- Reader does not respond
  - Power indicator LED is on → check the relevant cable connections, and check the corresponding items in accordance with the state of the relevant LED indicators;
  - Network communication status → check the connection IP is correct; check if there is an IP address conflict;
- Read / write tag error
  - Check the reader type on application software is configured correctly;
  - Check if reader and tag is compatible;
  - Check tag placement, and if tag is present is reader field;

○ Check if there exists electromagnetic interference;

○ Check tag access password is required, and if the password is correct;

○ Check if tag is damaged.

5.4 Acceptance

Acceptance criteria are given mainly from two aspects: structure and properties.

5.4.1 Structure acceptance

Check if the installation meets installation standards, and if the equipment connection is secure.

● Check if the reader is firmly fixed.

● Check if the screws are tightened.

For additional information see Installation Notes!

5.4.2 Performance Acceptance

Check if the reader operates properly mainly from the following two aspects:

● check if the reader is working properly.

● check if the read range meets the requirements.

6 Operating RFID Demo

6.1 Preparation before operating RFID Demo

User can use Demo software to operate the XC-RF812 reader, including system control, parameter setting, parameter query, communication mode selection, and read and write RF tag operation. One CD-ROM which comes with shipment provides .NET Demo, .NET APIs, and C ++ APIs for users' secondary development.

6.2 Demo software application environment

● Software

Windows 2000 Service Pack 3; Windows Server 2003; Windows XP Service Pack 2; Windows 7; VISTA system

● Hardware

Minimum P4 / 1.7GHz PC CPU, 512M or above memory, and 20G hard drive

6.3 Installing RFID Demo

● RFID Demo V1.2 or higher version

Note: The Windows version RFID Demo is described in this section.

Double-click on   .

setup.exe

If .NET Framework 2.0 is not installed, the program will automatically prompt installation, as shown below:
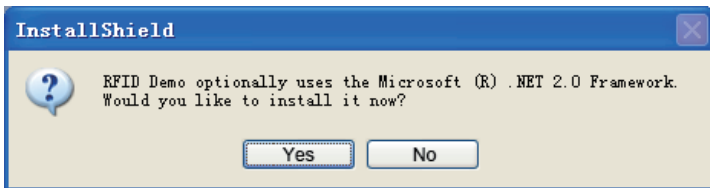

Figure 6-2
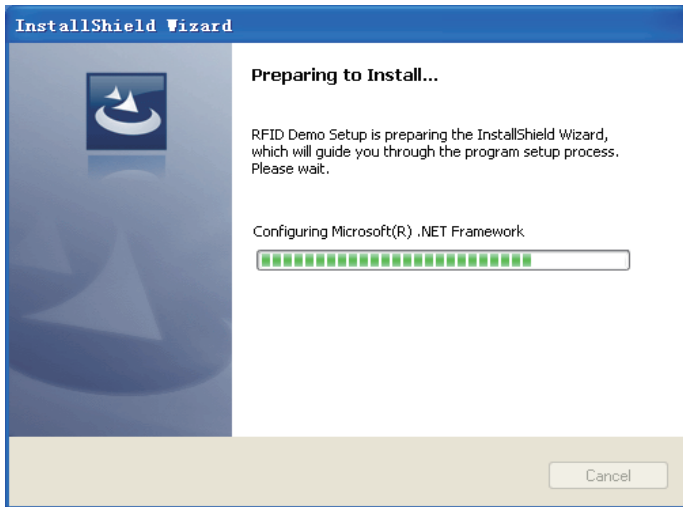
Select "Yes" to install .NET Framework 2.0:

Figure 6-3

When the .NET Framework 2.0 installation is complete, the program enters "Ready to Install" phase (if.NET Framework 2.0 is installed, the program directly enters this phase). It takes a few seconds to finish, and then enters the "Installationshield Wizard" screen, as shown below:
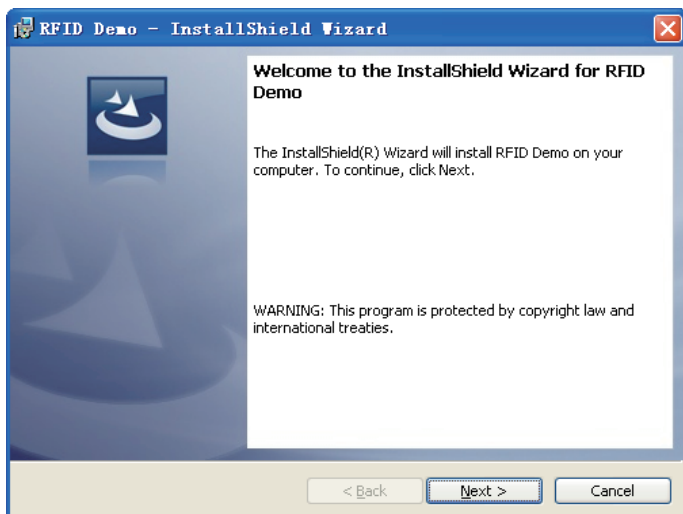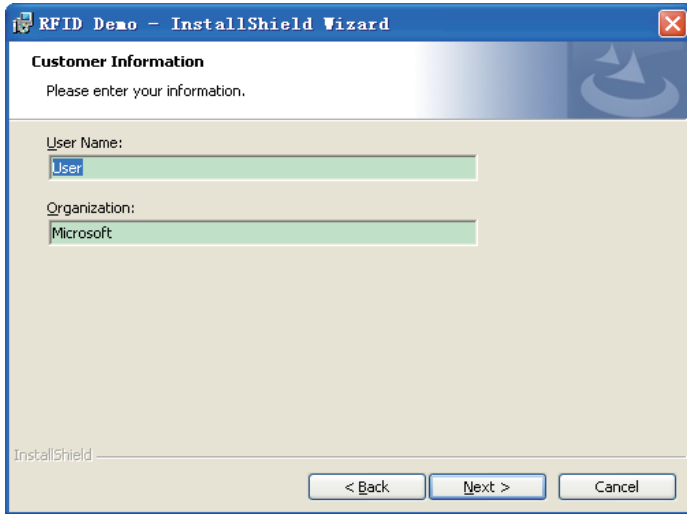

Figure 6-4

Click "Next":

Figure 6-5

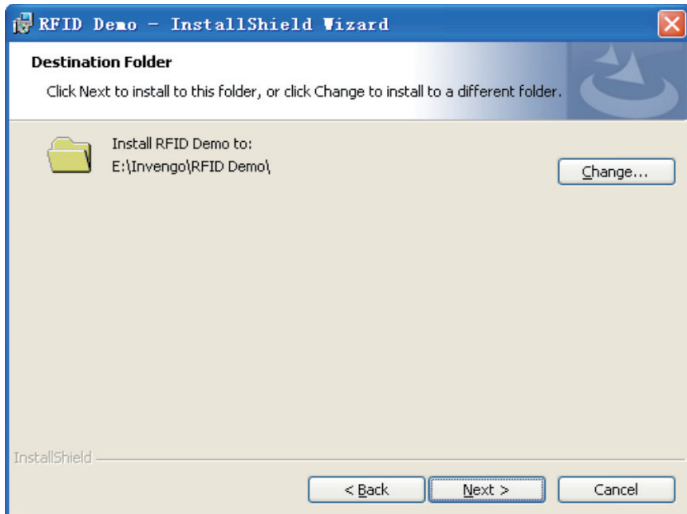Enter user name and organization, and click on "Next":

Figure 6-6

The default installation directory is: "E: \ Invengo \ RFID Demo \". If required, click on the button "Change" to select a directory, and then click "Next":
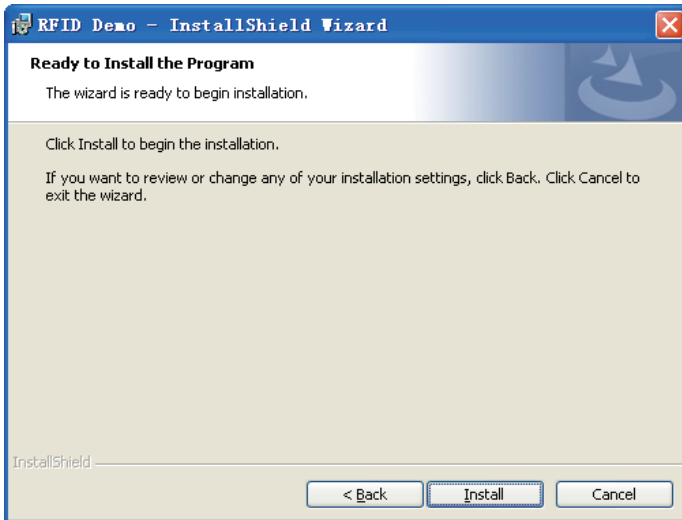
Figure 6-7

Click "Install":
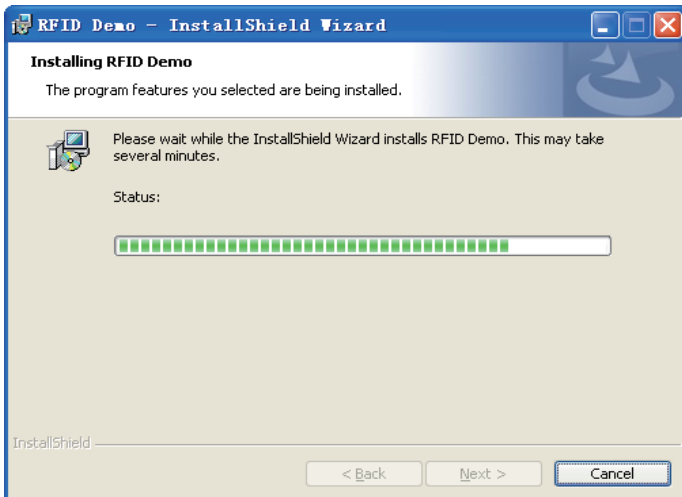
Figure 6-8

After being installed, the screen appears as follows:
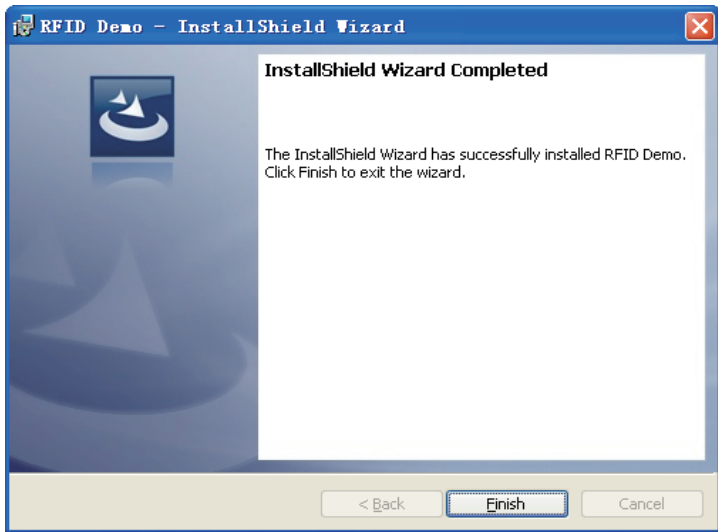
Figure 6-9

Click "Finish" to Complete software installation, and a desktop shortcut of "RFID Demo" appears.

6.4 Demo Software Operation

6.4.1 Start screen

1. Start the software, and you can establish a network port or a USB connection. If the equipment's IP address is uncertain, you can use the device's USB interface to establish a connection. Before using USB communication, you need to install the corresponding driver "linux-cdc-acm.inf". After the installation is complete, you can navigate "My Computer -> Properties -> Hardware -> Device Manager -> Ports " to view the virtual serial ports, and select the corresponding serial port connection as shown in Figure below:

Figure 6-10

2. The default entry is "Demo mode when the network or serial port connection is established. The screen appears as below:
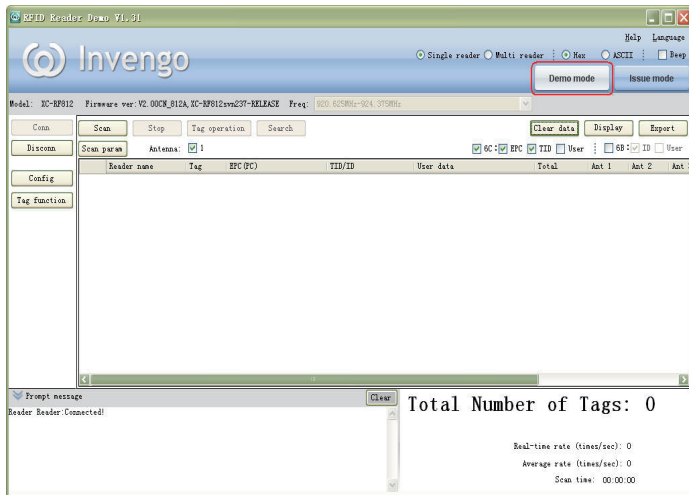
Figure 6-11

The main interface is divided into upper, middle, and lower sections.

(1) Upper section: it displays software name, and company Logo, and includes two buttons used to switch between Demo mode and Issue mode.

(2) Central section: reader configuration is on the left of Central section; operation result is shown on the right Central section.

(3) Lower section: the left part shows running messages, for example, whether the reader is connected successfully; the right part shows statistics and displays the current read operation status.

6.4.2 Reader Configuration

On the "Reader Config" screen, user can set reader configuration parameters, such as communication parameters (reader address, and baud rate), RFID parameters (RF port power adjustment), and intelligent sleep mode, and perform some basic tests.

The reader must be properly connected before you begin to configure the reader. Click on the "Reader Config", and screen appears.
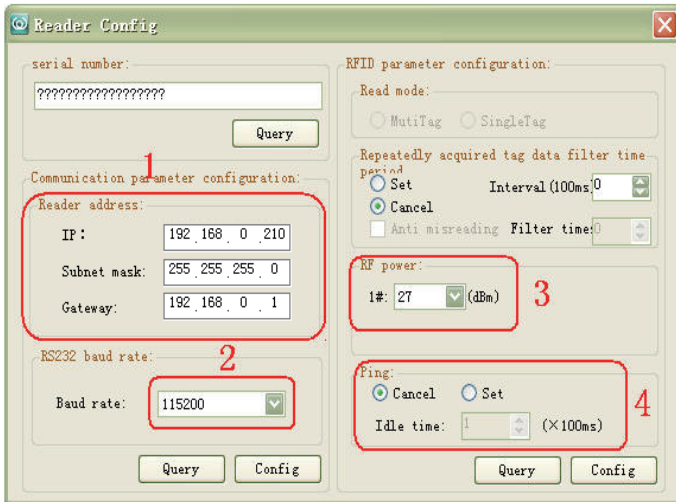
Figure 6-12

1, Reader address setting, and query

First, connect the reader to the host computer via USB connection, and click the pop-up "reader configuration" dialog box on "Reader Config", as shown in "1" of Figure 6-12". Input reader IP information, including IP address, subnet mask, and gateway. Click on the "Config". Click on the "Query" to get network information.

2, Serial port baud rate setting, and query

As shown in "2" of Figure 6-12", click on the drop-down box to select the required parameter of "baud rate (115200bps, 19200bps, and 9600bps)", and then click on the "Config". Click on the "Query" to get baud rate (information.

3, RF port power settings, and query

As shown in "3" of Figure 6-12", click on the drop-down box to select the

required parameter of "Power adjustment" (9 to 30dbm), and then click on the "Config". Click on the "Query" to get power adjustment information.

6.4.3 Scan configuration

Scan configuration setting mainly includes read mode. Click the "Scan param" in Figure 6-13. The "Scan Config" dialog box appears.
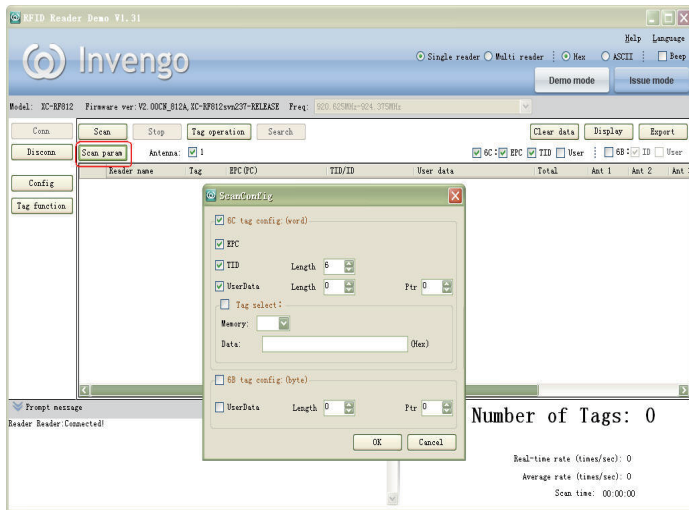
Figure 6-13

1, 6C tag read configuration (double-byte)

EPC: Check the EPC to read the adaptive length of EPC number.

TID: Check the TID, and you can set the length of data to read.

UserData: Check the UserData, and you can set the length of data to be read

2, Tag filter

Check tag filter. In the drop-down box, select the EPC or TID. Fill in the data of which the tag to be filtered. And the tag with specified data content can be acquired in the next read operation.

3, 6B tag configuration

UserData: check UserData, you can set the length of the parameter to be read and the starting address.

6.4.4 Issue mode configuration

1, Click "Issue mode" on the main screen, as shown in Figure 6-14.
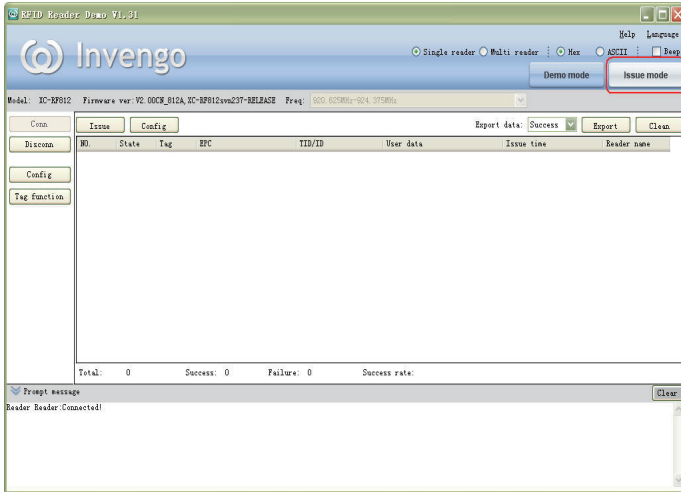
Figure 6-14

2, Enter issue mode screen, and click the "Config" button, a pop-up configuration dialog box appears as shown in Figure 6-15.
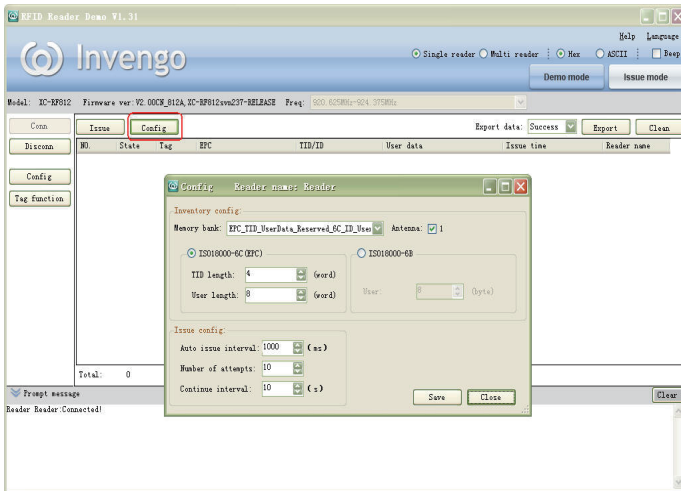
Figure 6-15

"Config" screen is described as follows:

- Scan memory bank: Set the memory bank to be read

- Antenna: Select the corresponding antenna

- TID length (6C): Set the TID length

- User length (6C): Set the length of user memory bank of 6C tags

- User length (6B): Set the length of the user memory bank of 6B tags

- Automatically issuing interval: interval time for issue operation

- Attempts of issue operation: set the number of attempts to performs issue operation after a failed issue operation

3, Once configured, click on the "Issue" button, and a pop-up dialog box appears as shown in Figure 6-16.

Figure 6-16

The Issue screen includes "General" and "Advanced (6C)" modes. The "General" mode includes "EPC, UserData and reserved block".

- **EPC**

Block write, and block length: Set block write for specific tags, and set block length.

Fixed beginning: Set the initial fixed data to be written.

Step: Set interval time of write data .

Fixed ending: Set a fixed data to be written on a tag memory bank.

Locking: Encrypt written data operation.

Get Data: Get the written tag data source.

- ● **UserData:**

Block write, and block length: Set block write on specific tags, and set block length.

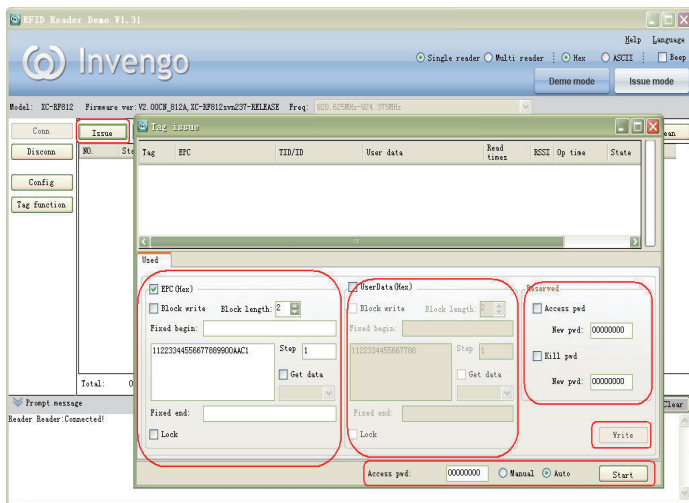Fixed beginning: Set the initial fixed data to be written.

Step: Set interval time of write data operation.

Fixed ending: Set a fixed data to be written on a tag memory bank.

Locking: Encrypt the written data.

Get Data: Get the written tag data source.

- ● **Reserved block:**

Set Access Password: Password is required to access tag memory.

Set Kill Password: Password is required for kill tag operation.

6.4.5 Issue tag operation

When issue mode configuration as shown in Figure 6.4.4 is complete, user can perform issue operations which include "General" and "Advance" modes. Two issue modes including "manual" and "automatic" are described as follows:

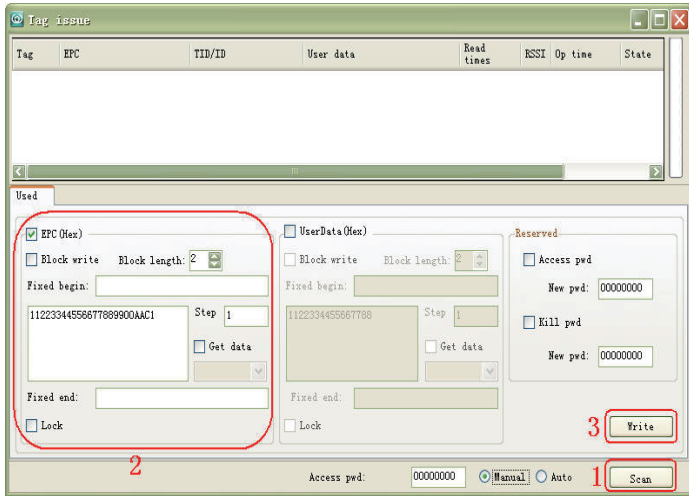- ● Manual: 1 - Click "Scan" -> "Stop Scan" -> 2 – write data on EPC memory block -> 3 – Click "Write"

Figure 6-17

- Automatic: Select "Auto" -> 1 – write data on EPC memory block -> 2 – Click "Start", and then put the tags on the reader field to perform write operation.
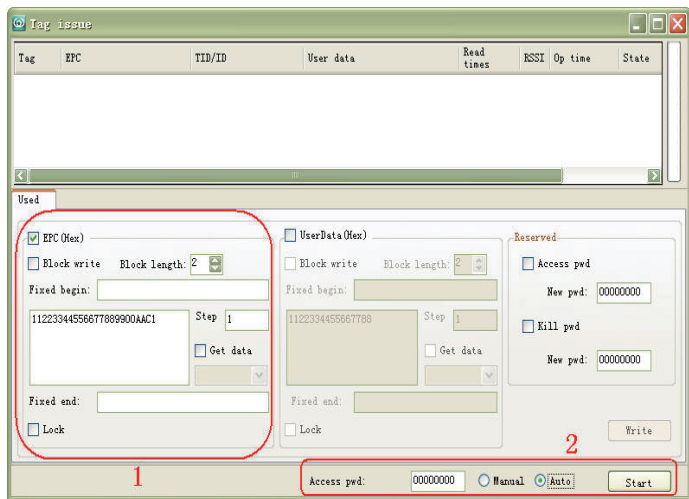

Figure 6-18

7 Routine Maintenance, FAQs and Troubleshooting

7.1 Routine maintenance

See 8.2 Storage Requirement

7.2 FAQs and troubleshooting

This section introduces solutions to some of the common problems or irregularities during the usage of the device.

- The "Power" indicator does not light up after the power supply has been switched on
    - Check if the power supply from the power adapter is working normally, check also if the AC power voltage falls between 100V and 240V
- USB port can not be connected
    - check if the virtual serial port driver is installed
    - check if a virtual serial port chosen is correct.
    - check if reader serial port baud rate is 115200bps.
- Unable to connect through Ethernet port
    - The default IP address of the reader under factory setting is: 192.168.0.210. If the host PC's IP address is in the same network segment which the reader's IP address is in, for example "192.168.0.XXX", the connection will be successful. If the user forgot about the reader's IP address, user can reconfigure the IP address of the reader that is connected to the host PC through USB serial port.
- Unable to read tag
    - Check if the serial cable or the network cable is properly connected. Any disconnection or insecure connection will cause the command from the PC not being transferred to the reader.
    - Please check if both ends of the RF connector has been tightened. Check also if the tag is damaged. If problem persists, you may need to call the Invengo service line for help.

8 Transport and storage

8.1 Transport Requirement

All Invengo Quality Checked equipments shall meet the standards specified for road, rail, sea and other transport requirements. The transport process requires attention to ensure that equipment will not be subject to violent collisions and excessive vibration, rain, erosion, chemical corrosion and harmful gases.

8.2 Storage Requirement

The long term warehouse storage environment for the XC-RF812 reader must fulfill the following conditions:

- Ambient temperature:-20°C to +60°C;

- Relative temperature:5% to 95%RH;

- No sudden temperature and humidity changes, ambient air is not harmful or composed of acidic and other corrosive gases

9 Packaging and Un-packing

9.1 Packaging

The XC-RF812 reader is packaged using cassette packaging and can be transported through large transport container.

9.2 Un-packing

In order to facilitate future storage and transport, keep the box and packaging materials.

Apart from the XC-RF812 reader, the package also contains the following accessories, as shown in the table below:

Table 9-1 Accessories checklist

No.	Item	Unit	Order Code	Remark	No.
1	Output 5V / 4A power adapter	1	Piece	1080200010	Standard
2	Three core 10A-250V-1.8m power cord	1	Piece	2200500026	Standard
3	RJ45 crossover cable -1.5m	1	Piece	2200300003	Standard
4	USB cable	1	Piece	2200300049	Standard
5	CD-ROM	1	Piece		Standard
6	Warranty Card	1	Sheet		Standard
7	Product certification	1	Sheet		Standard

Please check the product and its accessories carefully according to the packing list. Please contact us immediately if there is any discrepancy or damage.

10 After-sale Service and Contact

10.1 After-sale service

When a user encounters unsolvable problems during the device usage, please contact our customer service center.

Before the user contacts the customer service center, please prepare the following information:

10.1.1 Reader information

- reader models;
- reader serial number (on the rear panel of the reader);
- any changes made to the reader or the tag;
- installation of reader;
- reader application software;

10.1.2 Computer Information

- computer brand and model;
- computer's processing speed and available memory;
- serial port used;
- computer operating system;

10.2 Other matters

If our customer service staff has confirmed with the user to return his/her reader for maintenance, our representative will present the user with a return merchandise authorization (RMA). Please indicate the RMA no. on the exterior of the return product packaging, provide the same no. on a piece of paper and place it in the packaging. This will ensure the quick processing of the return product.

Please follow these steps when returning the reader for maintenance:

● Carefully pack the reader and its accessories into the original antistatic foam box. If the box no longer exists, please use a box with protective effect;

● Use filler to cover up the products in the box;

● Place a note written with RMA no. into the box;

● Indicate RMA no. and the word "fragile" on the exterior of the box.

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.

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

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

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

RF Exposure Statement

To maintain compliance with FCC's RF Exposure guidelines, this equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

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