



RFLy-I160 UHF Integrated RFID Reader

Hardware Guide





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Chapter 1 Introduction

- ◆ RFLY-I160 UHF Integrated RFID Reader Hardware Guide is used for RFLY-I160.
- ◆ RFLY-I160 UHF Integrated RFID Reader Hardware Guide has introduced the features, specifications, installation & connection. User can complete the UHF RFID test quickly.
- ◆ Please read this document and *UHF RFID Demo Software User Manual* to set up a UHF RFID demonstration platform.
- ◆ Developer can get more information through reading the *UHF RFID API User Manual* and EPC Class1 Gen2 protocol.

1.1 Overview

RFLY-I160 UHF Integrated RFID Reader with the integrated design, built-in high performance circular polarized antenna. It has the features of long-distance and fast recognition, excellent anti-collision algorithm. And the simple installation can be used flexibly in various of RFID applications.

RFLY-I160 reader's key features as following:

- ◆ Integrated design and built-in 6dBi Panel Antenna
- ◆ EPC UHF Class1 Gen2 / ISO 18000-6C platform
- ◆ Power supply 12V DC
- ◆ Isolated interface with better anti-jamming capability
- ◆ Excellent anti-collision algorithm, and one second can identify tags 400pcs
- ◆ High RF power output, 5~30dBm adjustable.
- ◆ Network port, RS232, RS485 (Optional) and GPIO communication interfaces
- ◆ Frequency: 840MHz-960MHz. One of the following: China1, Europe, Korea, USA, China2, Japan
902.75 MHz~927.25MHz for USA

1.2 Technical Parameter

1.2.1 Electrical Parameter

Parameter	Description
Protocol	EPC UHF Class1 Gen2, ISO 18000-6C
RF Power	1dB Step, 5-30dBm
Power consumption	<10W (PWR OUT is unused)
Operating Frequency	840MHz-960MHz. One of the following: China1, Europe, Korea, USA, China2, Japan. 902.75 MHz~927.25MHz for USA
Power Voltage	12V DC
Frequency Modes	Fixed Frequency or FHSS
Reading Modes	Active and triggered
Communications	TCP/IP (RJ-45), Isolated RS232 and RS485 (GX16-9 interface, RS485 Optional)
GPIO	GX12-7 interface, 1 input / 1 output, optically isolated, compatible with 5 ~ 24VDC level (500mA capacity)
Antenna Gain	6dBi Panel Antenna
Read Rate	≥400pcs/s
Read Range	Up to 8 meters(Different tag or antenna have different read distance)
Frequency Hopping	50 Channels
Bandwidth	250KHz
Frequency Hopping Speed	≤2s
Frequency Stability	±10ppm (-25℃~ +40℃); ±20ppm (-40℃~ +60℃)
Firmware Upgrade	Support

Tab.1-2-1 Electrical parameter

1.2.2 Physical Parameter

Parameter	Description
Colour	White; Silver
Enclosure	Aluminum +PC
Dimension	129mm*129mm*53mm
Weight	520g

Tab. 1-2-2 Physical parameter

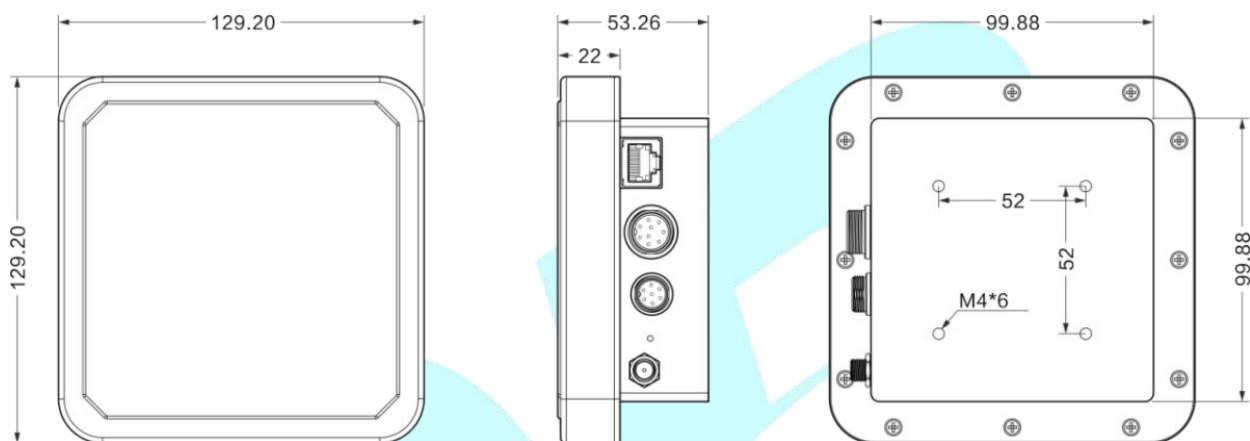


Fig.1-2-1 Outline Drawing of RFLy-I160 (Unit: mm)

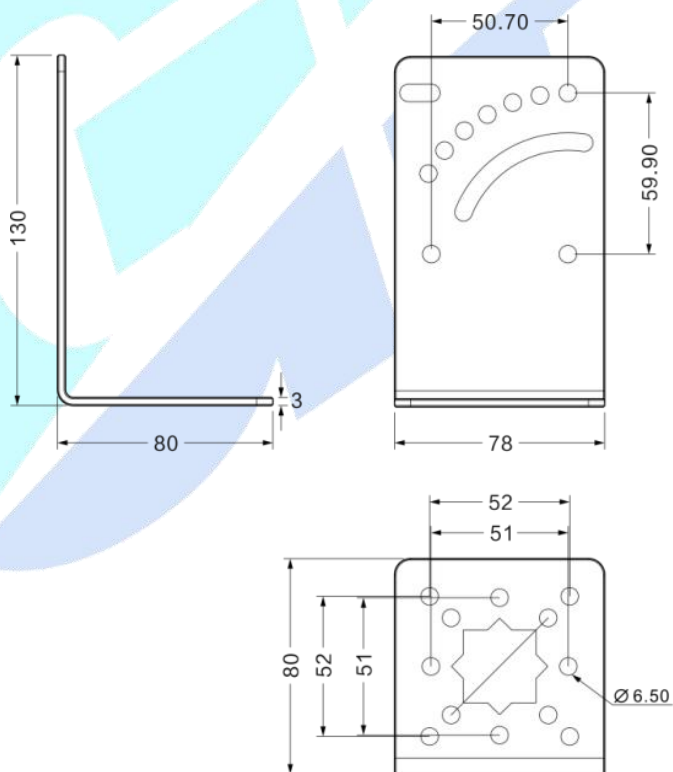


Fig.1-2-2 Outline Drawing of bracket (Non-standard) (Unit: mm)

1.2.3 Environmental Parameter

Parameter	Description
Operating Temperature	-30℃ ~ +60℃
Storage Temperature	-30℃ ~ +85℃
Humidity	5-95%RH (Non-condensing)
IP level	IP54
Usage	Indoor

Tab.1-2-3 Environmental parameter

1.3 Interfaces

RFly-I160 Reader has various of interfaces as following:

- ◆ 12VDC power interface (recommended 12V / 4A)
- ◆ 1 digital input & 1 digital output optical isolation GPIO, compatible with 5 ~ 24VDC level
- ◆ RS232 serial interface
- ◆ RS485 serial interface (optional)
- ◆ TCP/IP network port
- ◆ 6dBi Panel Antenna

RFly-I160 interface diagram shown as below.

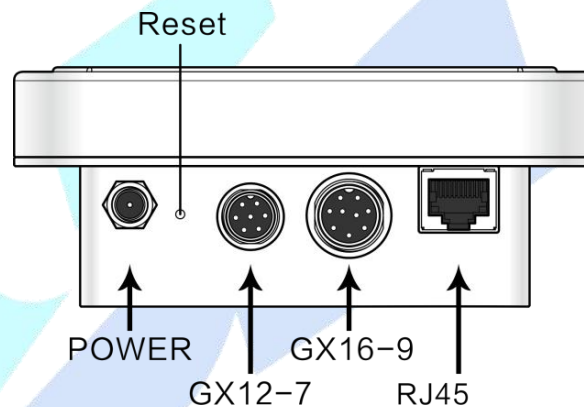


Fig.1-3-1 Interfaces diagram

Attention: The following RFU Pins are used for reserving function extensions. If connected other lines to the pin, the device may be damaged.

1.3.1 Power supply

Two ways of power supply.

- ◆12 VDC power supply. Recommended 12VDC/4A original power adapter.

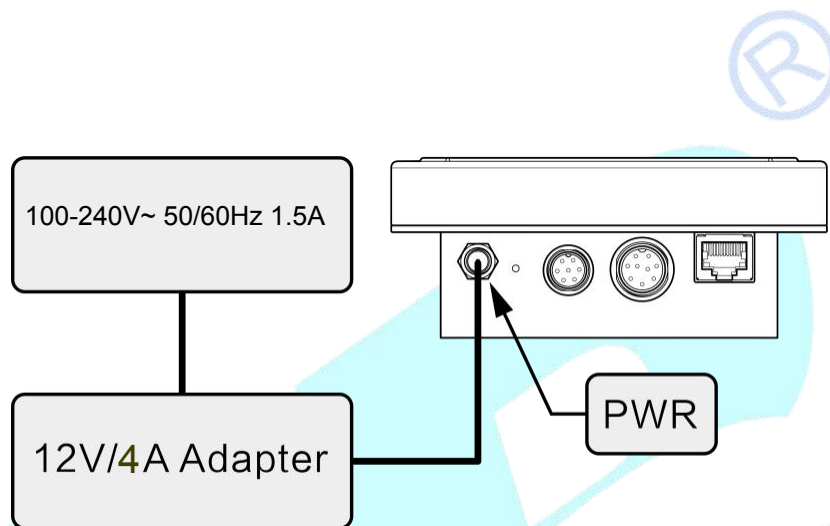


Fig.1-3-2 Diagram of adaptor power supply

1.3.2 Serial interface

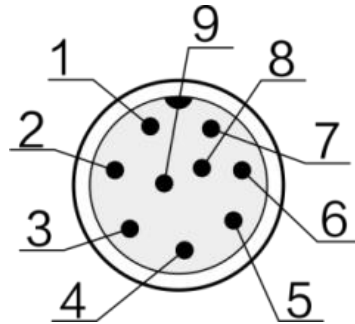


Fig.1-3-4 GX16-9 interface

GX16-9 interface	
PIN NO.	Function: Isolated RS232 (RS485 Optional)
PIN 1	SGND, Isolated Ground
PIN 2	RS232TXD
PIN 3	RS232RXD
PIN 4	RFU (Reserved for Future Use)
PIN 5	RFU
PIN 6	485B (Option)
PIN 7	485A (Option)
PIN 8	RFU
PIN 9	RFU

Tab.1-3-1 PIN of GX16-9 interface

1.3.3 TCP/IP Network port

RFly-I160 supports TCP/IP communication

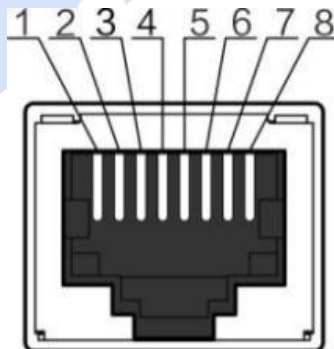


Fig.1-3-5 Diagram of network port

TCP/IP Network Port	
PIN NO.	Functions: TCP/IP Network Communication
PIN 1	TX+
PIN 2	TX-
PIN 3	RX+
PIN 4	POE V+
PIN 5	POE V+
PIN 6	RX-
PIN 7	POE V-
PIN 8	POE V-

Tab.1-3-2 Network port pins

1.3.4 GPIO Interface

RFly-I160 reader has 1 digital input and 1 digital output (Max.500mA) optically isolated GPIO interface. It can compatible with 5~24V level.

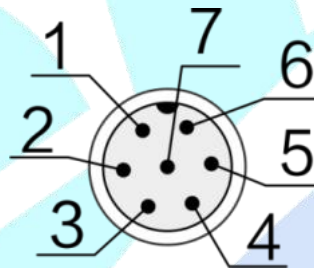


Fig.1-3-6 GX12-7 interface

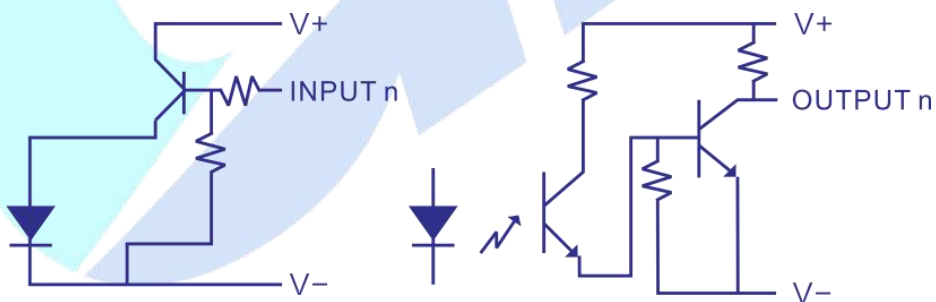


Fig.1-3-7 GPIO schematic diagram

GPIO Ports		
PIN NO.	Definition	Details
PIN 1	OPT VCC	5 ~ 24V Optical isolation power input
PIN 2	OPT GND	Optical isolation ground
PIN 3	GPO	General purpose output port, compatible with 5 ~ 24V level. Low-level Max current is 500mA, but high-level output without this drive capability.
PIN 4	GPI	General purpose input port, compatible with 5 ~ 24V level.
PIN 5	PWR OUT	Power output :Output Voltage≈PWR voltage - 0.5V. Maximum output power : 18W (Depending on the rated power of adapter).Maximum output current : 750mA
PIN 6	GND	Ground
PIN 7	RFU	RFU

Tab.1-3-2 GPIO Pins

1.3.5 LED Indicators

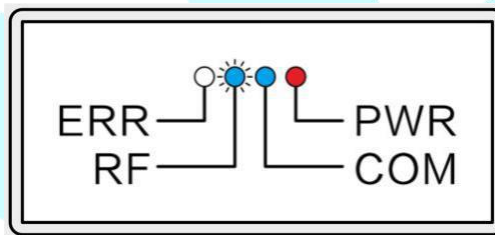


Fig.1-3-8 Diagram of LED indicators

LED Indicators	
Indicator	Details
PWR	LED red: power is applied to the reader
COM	LED blue: the reader is connected to the communication port
RF	LED flash: the reader is receiving data from a tag
ERR	LED red: the communication error

Tab.1-3-3 LED Indicators

1.3.6 Buzzer indicator

Buzzer	
Alarm tone	Details
Continuous ringing	Device starts normally
2 short, 1 long	Network error
2 short, 2 long	RF module error
2 short, 1long; or 2 short 2 long	Both network and module error

Tab.1-3-4 Buzzer indicator

Chapter 2 Installation and Connection

2.1 Installation preparation

Before installing the test platform, you need to prepare the following components:

- ◆One (1) RFLy-I160 reader
- ◆One (1) RFLy-I160 fixed bracket
- ◆One (1) 12V/4A adaptor
- ◆One (1) Communication cable (GX16-9 switch to DB9, or Network cable)
- ◆A few EPC C1G2/ISO 18000-6C UHF tags
- ◆One (1) WINXP or higher operating system PC computer

Before connecting, whether install the bracket will according to actual needs. Please install it in the reliable place.Detail installation shown as below.

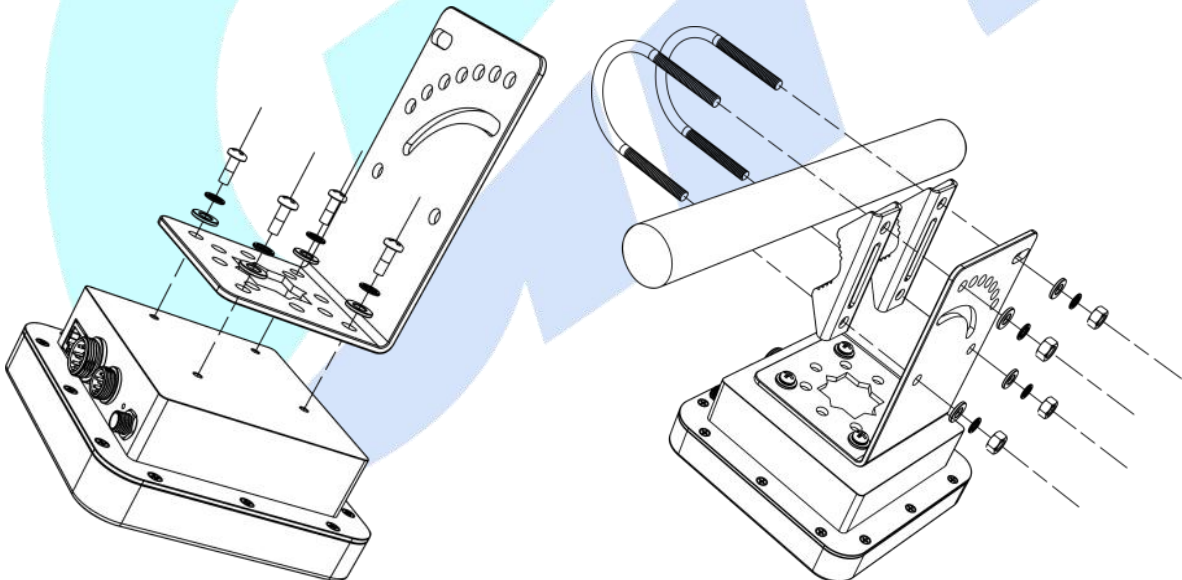


Fig.2-1-1 Diagram of fixed and installation

2.2 Hardware Connection

2.2.1 Communication cable connection

In order to improve the reliability of equipment connection, the serial port should be GX16-9 interface, and GPIO should be GX12-7 interface. In order to test convenience, device equipped with a 2-meter GX16-9 switch to DB9-F cable, or GX12-7 switch to cold-pressed terminal cable. Users can extend the cable by themselves according to the actual application.

Reader's support TCP/IP, RS232, RS485 (optional). User connect the communication cable according requirement.

2.2.2 Adaptor connection

The device can be powered after confirming the correct connection. User through the buzzer tone can identify whether the equipment power and communicate normally. If powered normally, user can connect the software date through the Demo Software Client, and start the test and evaluation.

2.3 Software connection

Through the PC client Demo software, user can set-up the serial port or TCP / IP communication connection .

2.3.1 Serial connection

Opening the Demo software, if it is based on serial connection, the Demo software will automatically identify the available PC port number, then click the port number drop-down box to choose one. Shown as below.

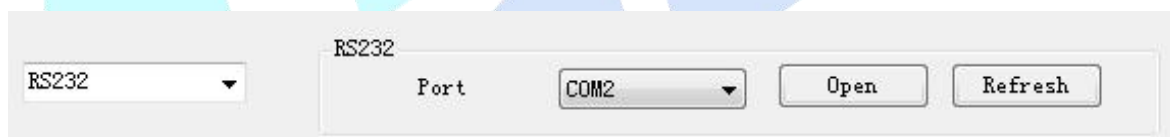
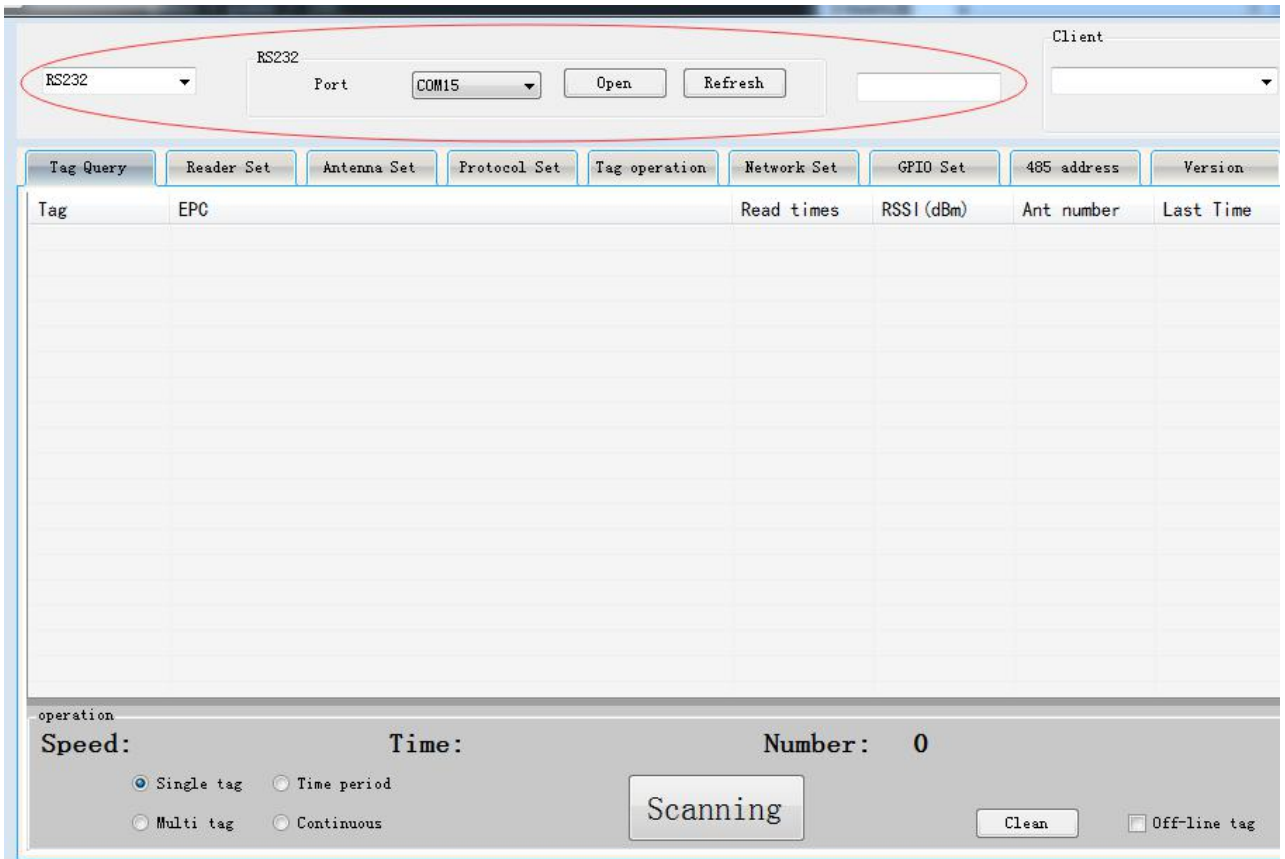


Fig.2-3-1 COM port selection

The serial connection prefix is "COM", and it will generate automatically through Demo software. Therefore user don't need to enter it again. Device will achieve serial connection when user select the appropriate port number and open it.

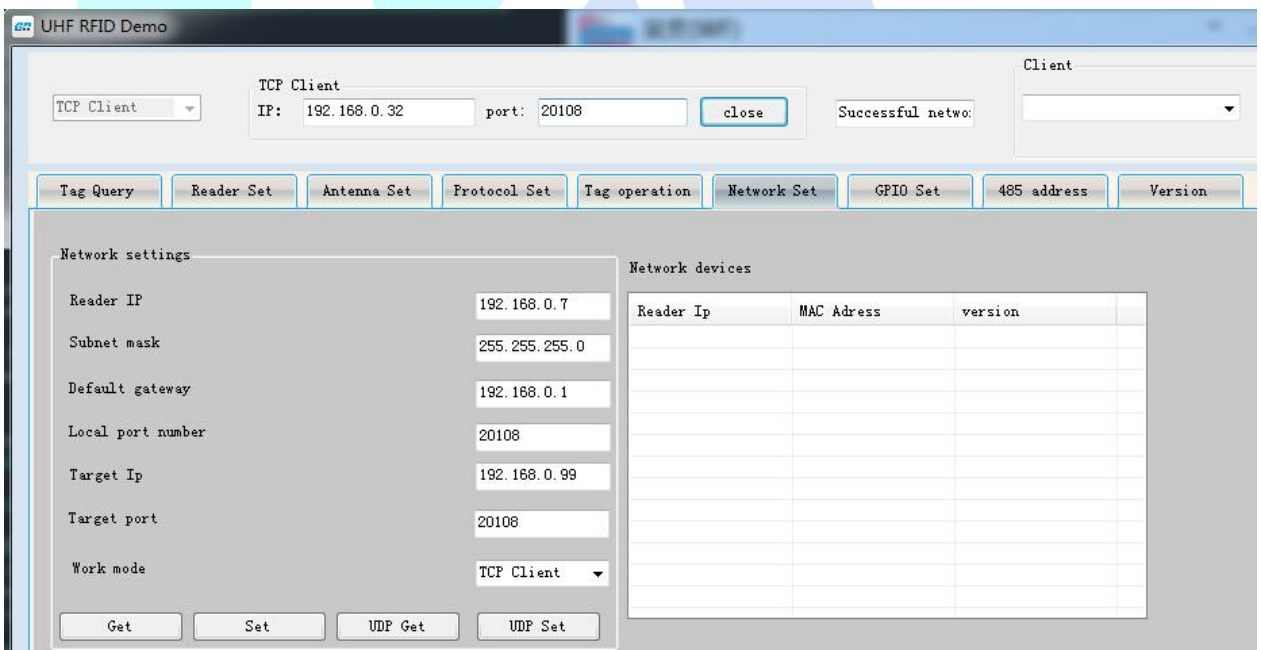


The interface shows a serial connection setup. At the top, there is a dropdown menu set to 'RS232', a 'Port' dropdown set to 'COM15', and buttons for 'Open' and 'Refresh'. A red oval highlights these fields. Below this is a 'Client' dropdown. A row of tabs includes 'Tag Query', 'Reader Set', 'Antenna Set', 'Protocol Set', 'Tag operation', 'Network Set', 'GPIO Set', '485 address', and 'Version'. The 'Tag operation' tab is active, showing a table with columns: Tag, EPC, Read times, RSSI (dBm), Ant number, and Last Time. The table is currently empty. At the bottom, there is a 'Speed:' section with radio buttons for 'Single tag' (selected), 'Time period', 'Multi tag', and 'Continuous'. There is also a 'Time:' field, a 'Number: 0' field, and a large 'Scanning' button. Other buttons include 'Clean' and 'Off-line tag'.

Fig.2-3-2 Serial connection

2.3.2 TCP/IP connection

RFly-I160 Reader supports one of the TCP Server and TCP Client network (default: TCP Server). User can search the network parameters in the LAN through "Network Set", or set network parameters.



The interface shows the 'Network Set' configuration. At the top, there is a 'TCP Client' dropdown, a 'TCP Client' section with 'IP: 192.168.0.32' and 'port: 20108', and a 'close' button. A 'Successful netwo:' label is next to a 'Client' dropdown. Below this is a row of tabs including 'Tag Query', 'Reader Set', 'Antenna Set', 'Protocol Set', 'Tag operation', 'Network Set' (active), 'GPIO Set', '485 address', and 'Version'. The 'Network Set' tab is active, showing 'Network settings' on the left and 'Network devices' on the right. The 'Network settings' section includes fields for: Reader IP (192.168.0.7), Subnet mask (255.255.255.0), Default gateway (192.168.0.1), Local port number (20108), Target Ip (192.168.0.99), Target port (20108), and Work mode (TCP Client). There are 'Get', 'Set', 'UDP Get', and 'UDP Set' buttons at the bottom. The 'Network devices' section is a table with columns: Reader Ip, MAC Adress, and version. The table is currently empty.

Fig.2-3-3 IP parameters

Before connecting, user sets the PC's IP address according to reader's IP address, so that the PC and reader are in the same LAN segment. Besides, please confirm that the PC can PING reader.

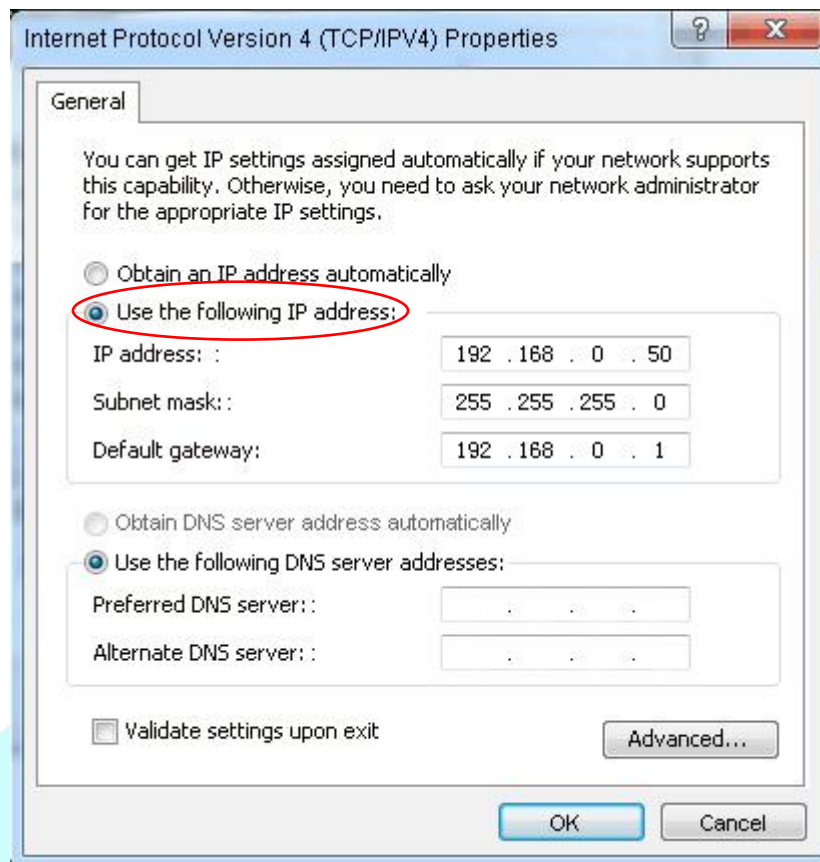


Fig.2-3-4 Internet parameters

For example: If connect to “192.168.0.7”, just enter “192.168.0.7”, then open it. Shown as below.

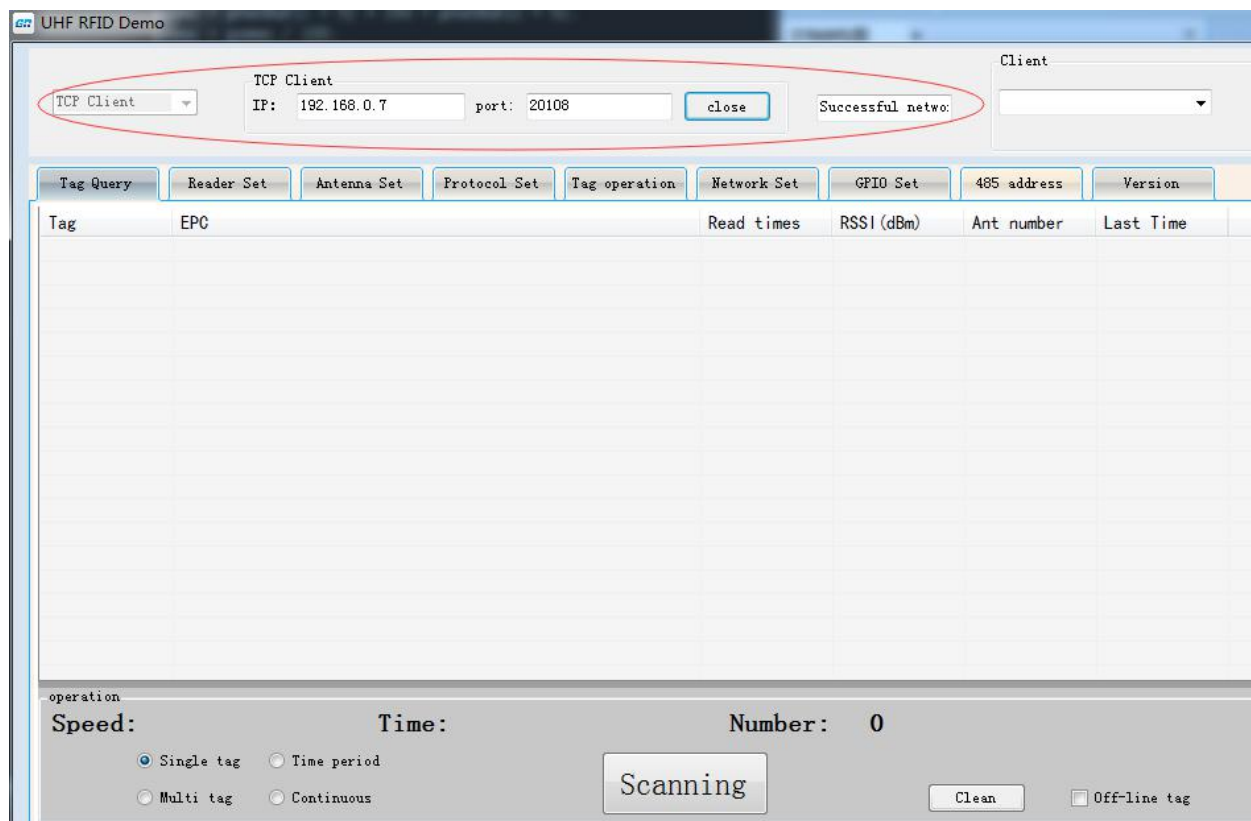


Fig.2-3-5 Network port connection

A set of UHF RFID test and evaluation platform has been completed after the hardware and software connection. Users can use the Demo software to inventory, read and write. More details of Demo software, please refer to the *UHF RFID Demo Software Manual*.



FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this 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. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

To maintain compliance with FCC's RF Exposure guidelines, The 20cm is the minimum distance that has to be maintained between your body and the device.

FCC ID: 2AR6ARFLY-I160