Newland AIDC

SCANNING MADE SIMPLE

URF520

SOLEA

UHF Devices

Version: V1.1.0

User Guide

Disclaimer

Please read the manual carefully before using the product and operate it according to the manual. It is advised that you keep this manual for future reference.

Do not disassemble the device or remove the seal label from the device; doing so will void the product warranty provided by Newland Europe BV.

All pictures in this manual are for reference only, and the actual product may differ.

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Revision History

Version	Description	Date
V1.0	Initial Release.	2026-01-18
V1.1	Remove the description about EasySet; Add the description about NSet;	2026-06-28

Contents

Chapter 1 About This Guide

Introduction

This guide provides instructions for programming and operating the NLS-URF520 RFID reader (hereinafter referred to as **"the URF520"** or **"the Reader"**).

Documentation Set

The documentation set for the **URF520** includes:

- ***NLS-URF520 Fixed RFID Reader Quick Start:*** Describes how to get the NLS-URF520 up and running.
- ***NLS-URF520 Fixed RFID Reader User Guide:*** Describes how to program and use the NLS-URF520.

Chapter Descriptions

Chapter 1 About This Guide	Provides a general description of this manual.
Chapter 2 Hardware	Provides information on the hardware of the URF520.
Chapter 3 Software	Provides information on the software of the URF520.
Chapter 4 Maintenance & Troubleshooting	Provides troubleshooting solutions for issues that might occur when using the URF520.
Chapter 5 Transportation & Storage	Provides packaging list and transportation & storage requirements.

More Information

For more product and support information, please visit our website: http://www.newlandaidc.com.

Chapter 2 Hardware

Introduction

NLS-URF520 is the first UHF RFID fixed reader developed by Newland Auto-ID, featuring a four-channel module using Impinj E710 chip (the device is compatible with an eight-channel module version). It supports multiple communication interfaces and methods and can be paired with various antenna specifications. With outstanding and stable performance, it boasts a sleek and industrial-style appearance. Its RFID reading capabilities provide real-time, seamless tag detection for large-scale deployments in applications such as warehouse management and asset tracking.

Specification

The URF520 Specification

Parameters	Descriptions
Physical	
Dimensions	227 × 166 × 42mm (without bracket)
Weight	1.5kg
Structural Material	Full metal housing made of aluminum alloy
LED Indicator	Red and green LEDs for antenna, power, RF operation, and data communication statuses
Mounting	Rear-fixed bracket for installation.
Environmental	
Operating Temperature	-20℃ to 60℃ (-4°F to 140°F）
Storage Temperature	-40℃ to 85℃ (-40°F to 185°F)
Operating Humidity	5% to 95% (non-condensing)
Storing Humidity	20% to 93% (non-condensing)
Vibration and Shock Standard	Meet GB/T34996
Sealing	IP53
Communication	
Communication Protocol	RS232,RS485,TCP/IP
Communication Interface	DB9，RJ45，USB（Type-B）
GPIO	4-way optocoupler isolation input, 4-way relay output
Power Supply	9-24V DC, power consumption of 10.5W, comes with a standard 12V/3A power adapter. PoE, PoE+ (compatible with IEEE 802.3af or IEEE 802.3at).
Antenna Interface	4 TNC Interface
RF Protocol	
Air Protocol	ISO 18000-6C（EPC Class1 Gen2）
RF Performance	
RF Frequency Bands	865~868MHz，902~928MHz，920~925MHz （Europe, North America, China）
Output Power	5~33dBm，±1dBm adjustable
Receiver Sensitivity	<-84dBm
Reading Rate	>900 tags/sec
Reading Range	>14M (Outdoor open space) (use 8dBi antenna, ALN9740)
Software and Firmware Management	
Testing tool	NSet (Windows program）

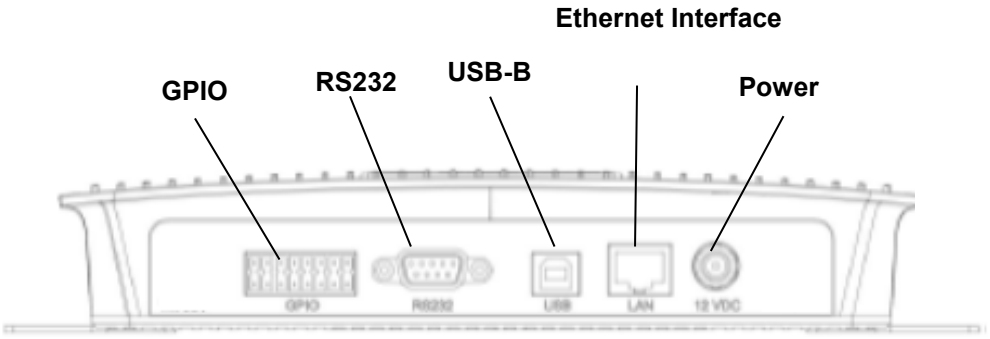
SDK & API	SDK development kit for Android and Windows, supporting C/C++, Python, Java, and Android.
Middleware	Complementary middleware platform that supports deployment on Linux and Windows.

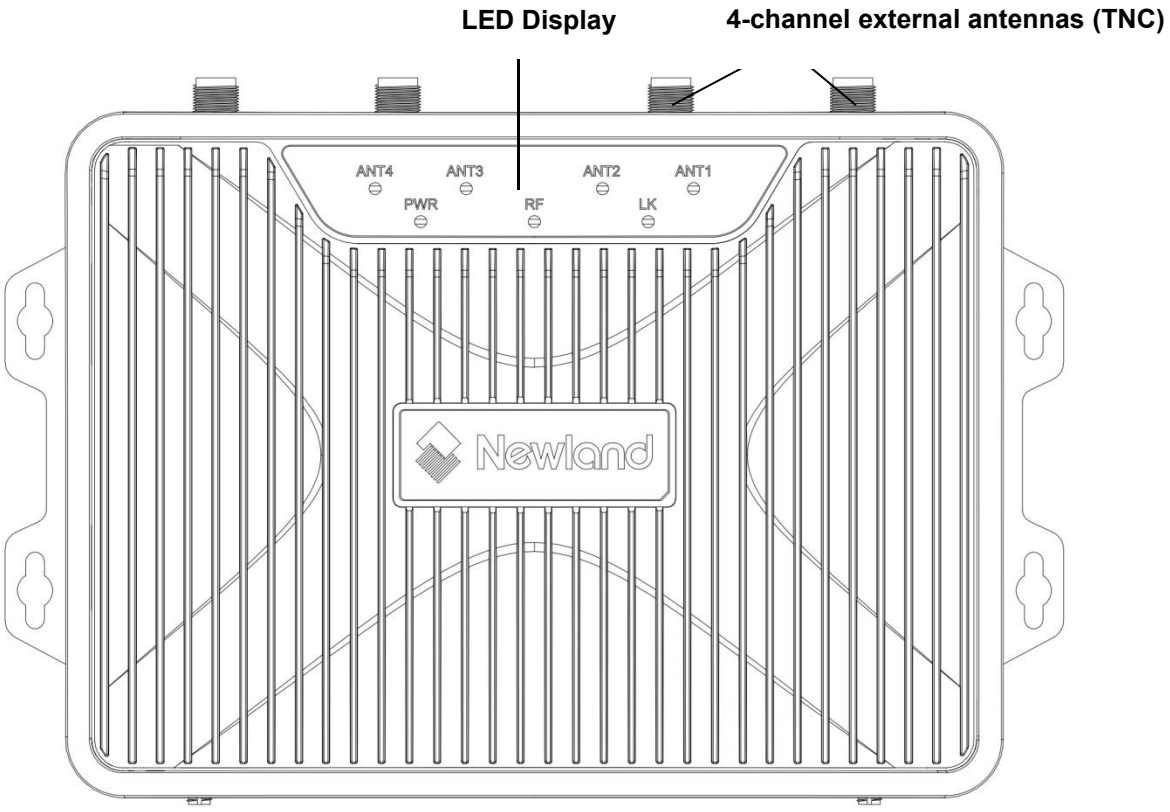
NLS-URF520 Device List

Standard Configuration:

- NLS-URF520 fixed RFID reader (1 unit)
- 12V, 3A power adapter, power cable (1 set)
- NSet software
- Fixed ear-hanging bracket (rear installation) (1 pair)

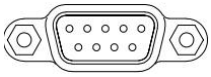
The URF520 Appearance



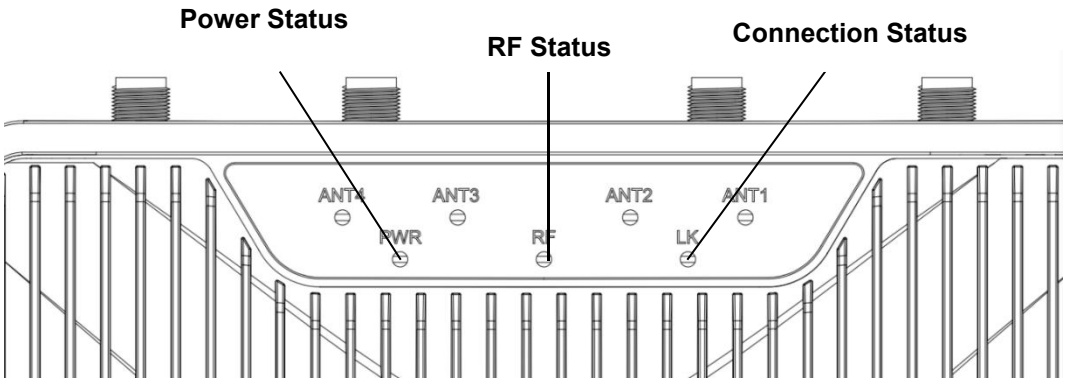


Note: Please use the cables and components that are provided with the NLS-URF520 reader or those supported/recommended by Newland. Using other cables and components may potentially affect the device's performance and damage the reader

Rear Panel Parameters

Interface Identifications	Interface	Description
	Antenna Interface (Reverse TNC	Supports a maximum of 4 external antennas
	GPIO	4 inputs, 4 outputs
	RS232	Used for serial communication and debugging via RS232
	RS485	GPIO expansion for RS485 interface, used for serial communication
	USB	USB Type-B port for U-port client communication
	RJ45	Supports 10/100M network communication and can be used for PoE/PoE+ power supply
	DC Power	Used for connecting an external DC adapter, standard 12V, 3A.

LED Indicator



LED	Function	LED Color/Status	Description
ANT1~ANT4	Antenna	Off Steady Green	Antennas 1~4 not connected Antennas 1~4 connected
PWR	Power	Off Steady Red	Power off Power on
RF	RF Function	Off Steady Green Flashing Green	Reader module not connected/unrecognized Reader module enabled Performing RF tag reading
LK	Connection	Off Flashing Green	No data communication Establishing device data communication

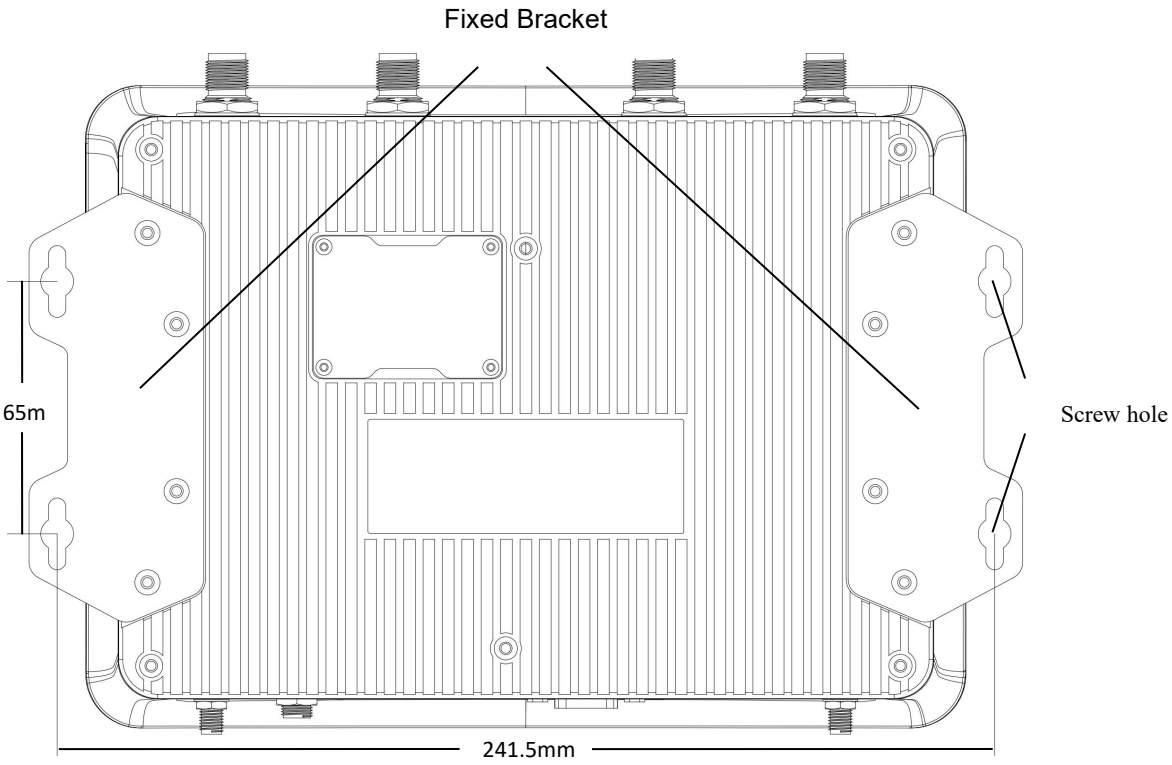
Device Installation & Removal

When using the URF520 fixed RFID reader for installation, please consider the following guidelines:

1. Install the URF520 fixed RFID reader indoors (With an IP53S rating, it can handle challenging indoor conditions, including dust and humidity.). To ensure long-term operation and extend the device's lifespan, avoid direct sunlight, high humidity, and extreme temperature environments within its operational range. Choose a stable installation environment.
2. Install the URF520 fixed RFID reader in a location free from electromagnetic interference. Sources of interference may include generators, pumps, converters, uninterruptible power supplies, AC switch relays, dimmers, and computer CTR terminals, and etc.
3. Make sure the required system level performance considers cable losses between the reader and external antennas.
4. Ensure that the device's power supply is functioning correctly.
5. Install the device based on the dimensions of the provided fixed bracket. It's recommended to mount it on a flat surface with a minimum area of 242×66mm, considering the URF520's size and standard bracket. This advice is applicable to both horizontal and vertical surfaces.
6. To ensure stability and protect against interference, impacts, or damage, it's advisable to mount the reader on a robust structure such as a wall, ceiling, or shelf. Make sure to maintain a minimum gap of 45mm on both the front and rear sides, considering the thickness of the URF520 device.
7. When performing horizontal or vertical installations, use a level for precise measurements.

Diagram of URF520 Back Structure and Bracket

The URF520 includes a set of standard brackets for installation on both the left and right sides. Each bracket features two screw holes for secure attachment of the reader. You can install it directly to surfaces like the ceiling, wall, or vehicle post using screws, or incorporate it with other adaptable bracket components. It is advisable to install it on a surface capable of supporting a weight of up to 1.5kg, taking into account the weight of the URF520 device.



When installing the device, consider the different types of surfaces and use the appropriate screws and washers as follows:

（1） Concrete Wall Installation:

For mounting on hollow concrete block walls, use concrete sleeve anchors with M4 screws and flat washers.

（2） Wood or Metal Wall Installation:

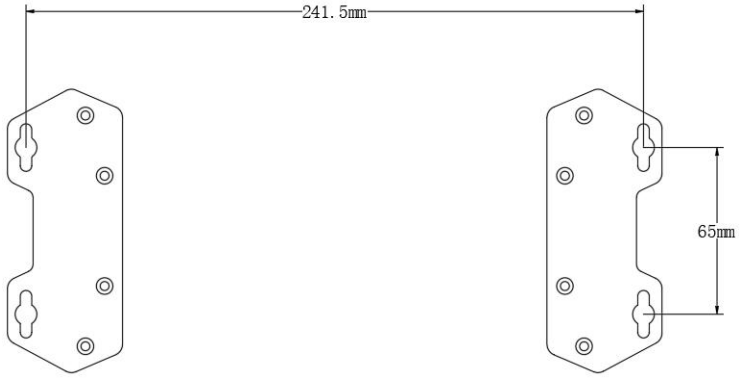
To install on wooden or sheet metal walls, use M4 wood screws or M4 sheet metal screws with washers.

（3） Drywall (Gypsum Board) Installation:

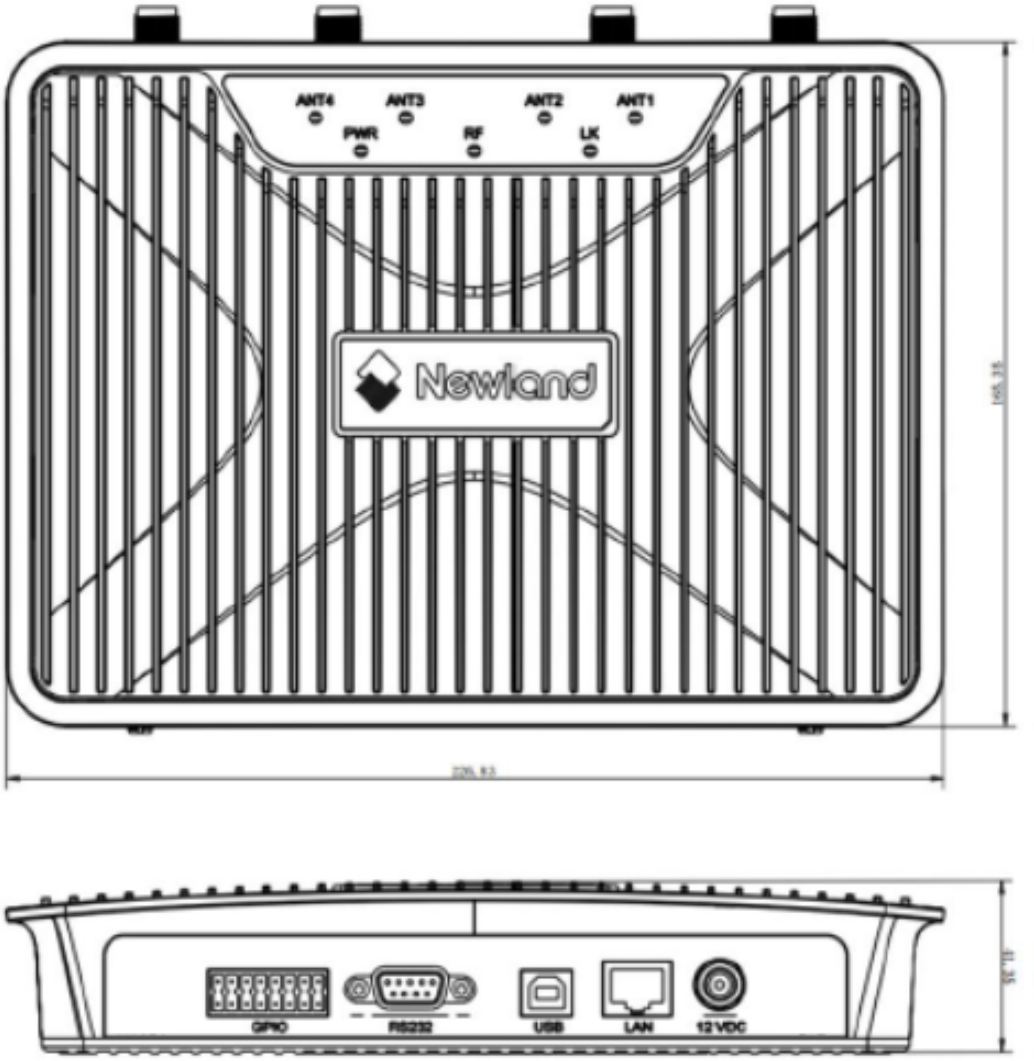
When mounting on drywall, use M4 bolts or M4 drywall anchors.

（4） Installation on Metal Surfaces of Mobile Handling Equipment (e.g., Forklifts):

Secure the URF520 to metal poles using either method (2) or bracket clamps. We recommend M4 sheet metal screws with washers and stainless steel bracket clamps. The actual bracket dimensions are illustrated in the diagram below.



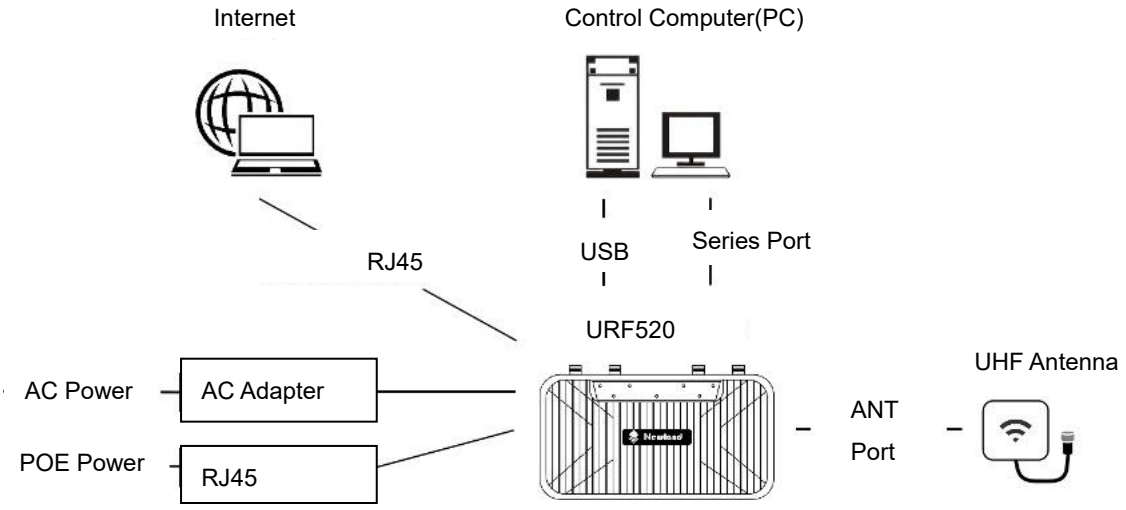
URF520 Dimensional Diagram (without Bracket)



Device Connection

Illustration of Device Connection to the Host

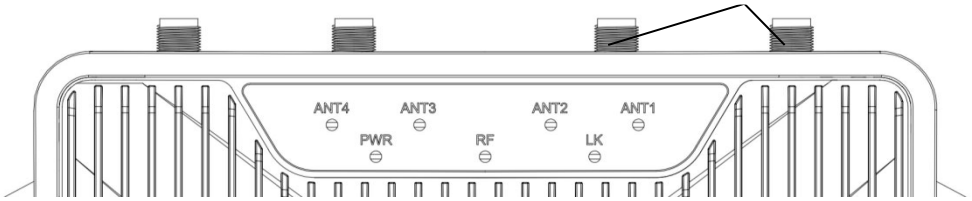
The connection for the NLS-URF520 is as shown below, primarily involving the reader, PC, and antenna.



The URF520 supports wired communication through serial ports (RS232 or RS485), USB2.0, or RJ45 for data transfer with an industrial control computer (PC).

External Antenna

4-channel external antennas (TNC)



URF520	China, Europe	North America, India	Others
Maximum RF Output Power	33dBm	33dBm	According to local regulations
Minimum RF Output Power	5dBm		
Power Adjustment	±1dB		

1. Connect the antenna”s TNC connector to the device”s antenna port for each antenna.
2. Secure the cable with metal straps to prevent bending.
3. Link the antenna to the antenna port using a feed line.
4. Antennas and feed lines can be customized based on actual needs
5. In the case of the four-channel version, it offers four external antenna interfaces.

Communication and Power

URF520 uses standard Ethernet port communication and can be powered through PoE or PoE+ to connect to the host or network. Both the Ethernet communication and power supply use a direct connection method, with a recommended cable length not exceeding 80 meters.

Ethernet/PoE Communication

When the NLS-URF520 communicates with the host via an Ethernet port, it allows access to the administrator console for changing reader settings and controlling the reader. While using wired Ethernet for data communication, you can also power the URF520 using an AC power source or through Ethernet cables (PoE, PoE+).

Ethernet Communication, External Power Supply

1. Requires Ethernet cables, power cables, and a power adapter.
2. Connect one end of the Ethernet cable to the LAN interface on the URF520 and the other end to the LAN interface on the control host.
3. Connect the URF520”s DC power interface and an external power source using a power adapter and power cable.
4. Secure the reader”s power interface and check the LED power status indicator to confirm successful power connection.
5. Use a web browser on a connected host to verify successful Ethernet communication with the URF520.
6. Log in to the NSet or RFID middleware management platform.

Ethernet Communication, PoE or PoE+ Power

1. PoE installation options allow the URF520 to perform data communication and receive power over the same Ethernet cable.
2. Insert the connector of RJ45 Ethernet cable into the LAN interface of the URF520.
3. Connect the other end of the cable to an Ethernet network (PoE or PoE+).
4. Verify the power status of the reader.
5. Use a web browser on a connected host to check if Ethernet communication with the URF520 is successful.
6. Log in to the RFID middleware management platform or test platform.

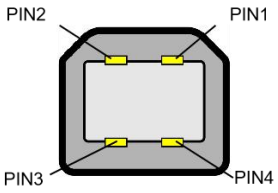
Ethernet Interface (RJ45) Description

The Ethernet/PoE connector is a standard RJ45 port that adheres to the IEEE 802.3af and IEEE 802.3at device power supply specifications.

USB Data Communication

The URF520 features a USB Type-B interface, allowing data communication with a host (industrial computer) through a USB connection. Insert a USB cable into the USB port on the URF520, and connect the other end of the cable to the USB port on the host computer. For the initial connection, it’s necessary to install the specific drivers to correctly recognize the USB communication device. The USB cable uses a direct connection method, and it is recommended to keep the length under 5 meters.

USB Interface Description

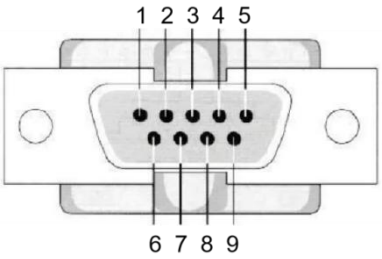


Number	PIN Name	Direction	Description
Pin1	5.0V_USB	I	5V USB Cable
Pin2	USB_DN	I/O	Reversed data
Pin3	USB_DP	I/O	Forward data
Pin4	GND	-	Ground

Serial Data Communication

The URF520 is equipped with a standard RS232 serial port (DB9 interface specification) for data communication with a computer host (industrial computer). It is a plug-and-play interface, and Windows systems will automatically detect the serial port driver. The serial cable used is a direct connection type and it is recommended to keep its length under 10 meters.

Serial Interface Description

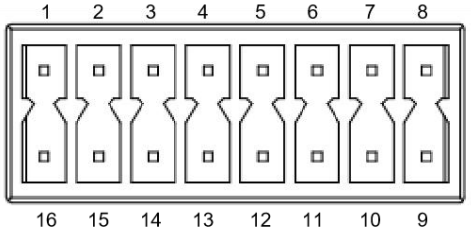


Number	PIN Name	Description
Pin1	NC	-
Pin2	RXD	Receiving Data
Pin3	TXD	Transmitting Data
Pin4	NC	-
Pin5	GND	Ground
Pin6	NC	-
Pin7	NC	-
Pin8	NC	-
Pin9	NC	-

GPIO Interface Connection

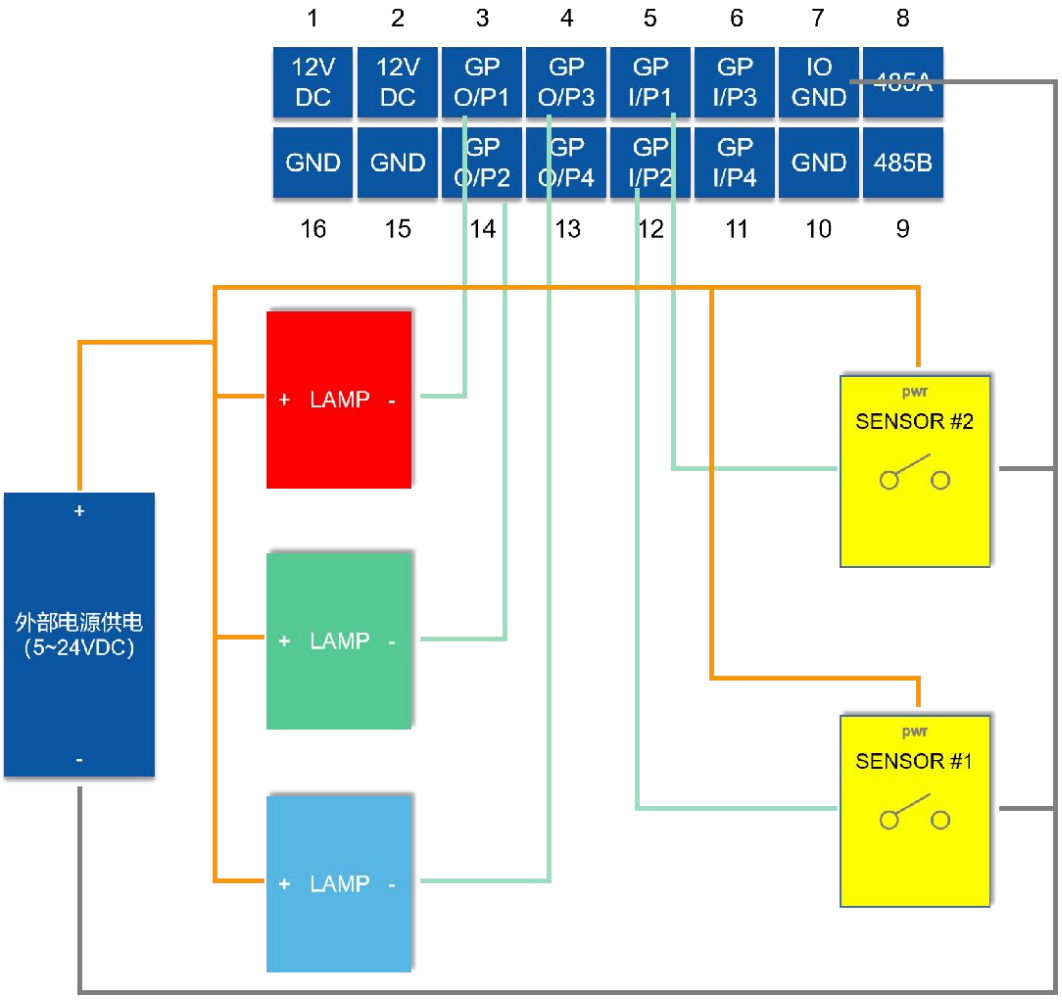
This pluggable terminal block allows individual wire connections. A single connector accommodates the input and output of external sensors and signal devices, along with +12 VDC power pins. While the GPIO interface is electrically isolated from the URF520 reader's enclosure ground, it shares a common ground with the 24 VDC external power supply.

GPIO Interface Connection

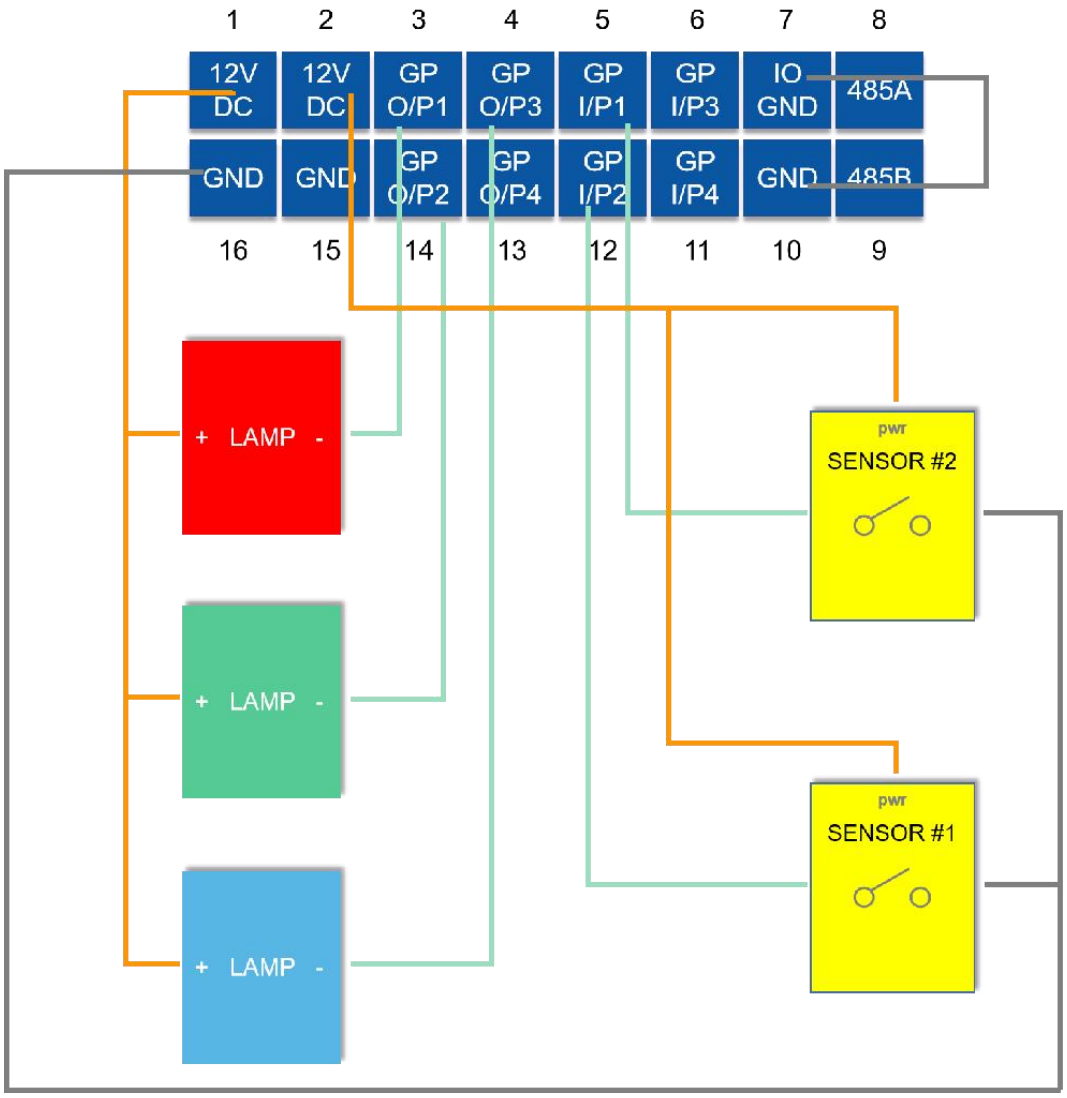


Number	PIN Name	Direction	Description
1	12V DC	Output	12V DC Power Supply
2	12V DC	Output	12V DC Power Supply
3	GPO1	Output	Signal Output
4	GPO3	Output	Signal Output
5	GPI1	Input	Signal Input
6	GPI3	Input	Signal Input
7	IOGND	-	Input-Output Ground
8	485A	-	DATA+, RS485 Expansion Slot
9	485B	-	DATA-, RS485 Expansion Slot
10	GND	-	System Ground
11	GPI4	Input	Signal Input
12	GPI2	Input	Signal Input
13	GPO4	Output	Signal Output
14	GPO2	Output	Signal Output
15	GND	-	System Ground
16	GND	-	System Ground
Note: There are a total of 16 GPIO pins, including 4 input pins, 4 output optocouplers, 2 used for RS485 expansion, 4 ground pins, and 2 for internal power supply.			

External Power Supply, Isolation Solution.



Internal Power Supply, Non-isolation Solution.



Chapter 3 Software

About NSet

The NSet Setup Tool is a user interface client application developed by Fujian Newland Auto-ID Technology Co., Ltd. It is designed to simplify the initial setup and parameter adjustments for the fixed ultra-high frequency RFID readers produced by the company.

The NSet is a common platform across all models. It is installed in and runs on Windows-based PCs (usually laptops), and connection takes place through several different interface. After installing NSet, please ensure that communication through the firewall is permitted.

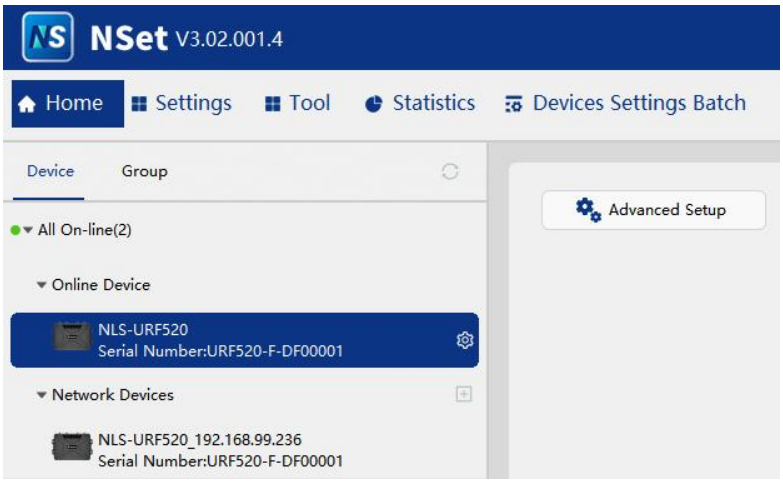
Configuration

Device Connection

NSet will automatically display all connected devices, the devices connected by Ethernet are unified into a list of "Network Devices", and the rest (RS232、RS485、USB CDC) are listed as "Online Device".

If you find that any device is not displayed in the "All On-line" Column, please click "  " at the top right to refresh and try again;

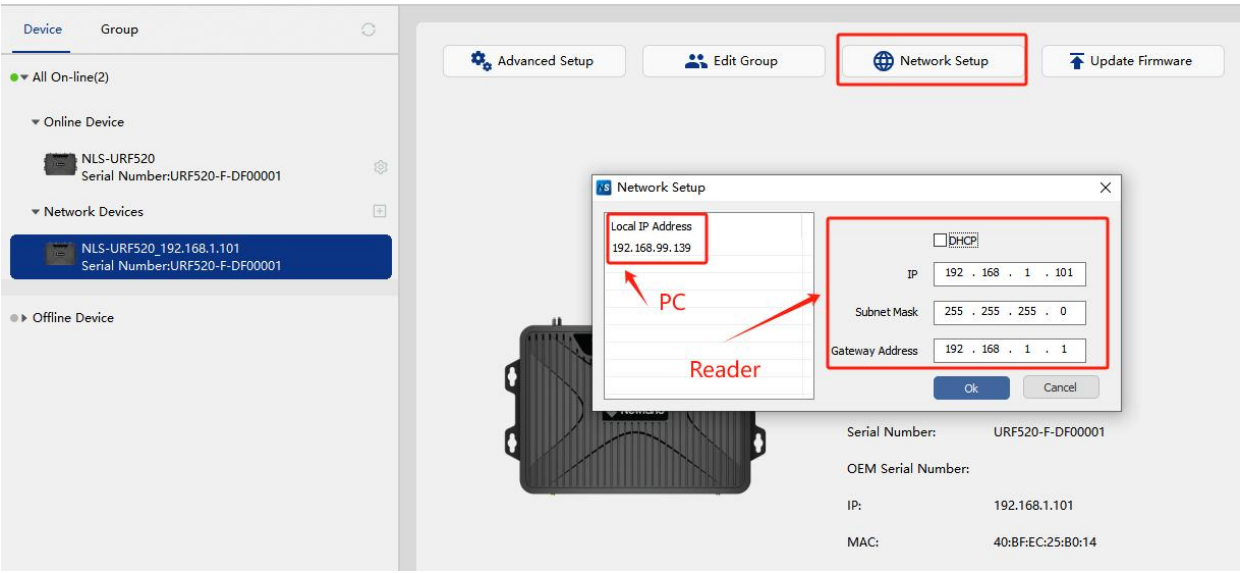
Devices connected via Ethernet must be directly connected to the PC or be on the same local network segment as the PC in order to be detected by NSet's UDP broadcast.



For readers connected via RS232, RS485, or USB CDC, you can directly double-click on the selected reader to access the "Advanced Setup" interface.

For Ethernet-connected readers, the reader functions as a TCP server, while the NSet software acts as the TCP client to initiate the connection. Before proceeding, ensure that the reader's IP address is configured (default: 192.168.1.101). Select the device and click "Network Setup" to open the network configuration interface.

If the reader is directly connected to a PC, DHCP cannot be utilized, and the reader's IP address must be set within the same subnet as the PC. However, if the reader is connected to the PC via a router, you can either enable DHCP (dynamic IP) or manually assign a static IP address to the reader. Please note that any changes to the reader’s IP address will automatically restart the device. After the device restarts, simply double-click the selected reader to access the "Advanced Setup" interface.

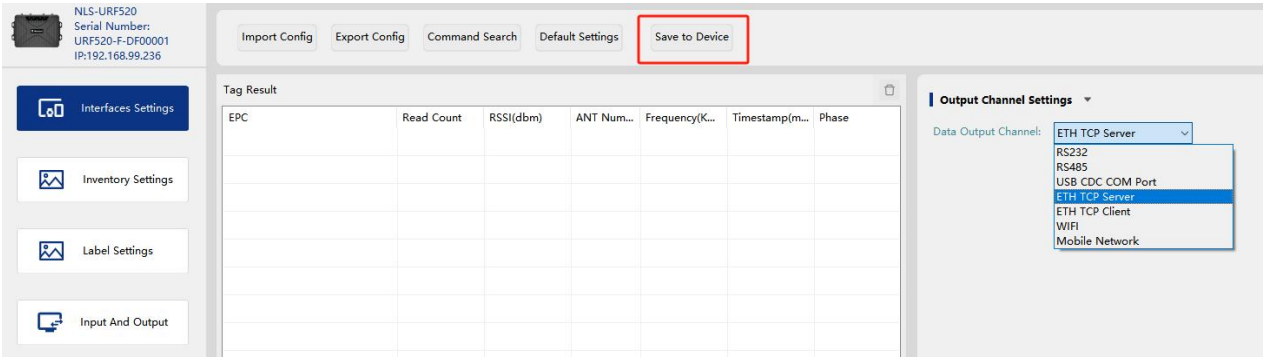


Data Communication

Data Output Channel Settings

"Data Output Channel" refers to the communication channel through which the reader transmits inventory tag data. This channel should be configured according to the actual needs.

Note: After modifying the parameters (including subsequent commands), please click the "Save to Device" button to ensure that the updated parameters are applied to the reader.

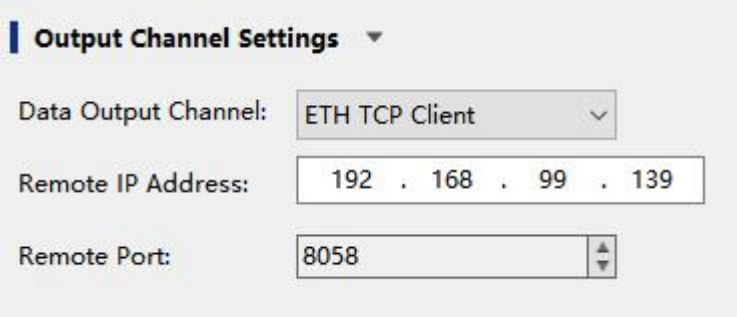


The URF520 device supports multiple communication channels, including RS232, RS485, USB CDC, Ethernet TCP Server, Ethernet TCP Client, Wi-Fi, and Mobile Networks (4G). The tag data will only be transmitted through one selected channel at a time.

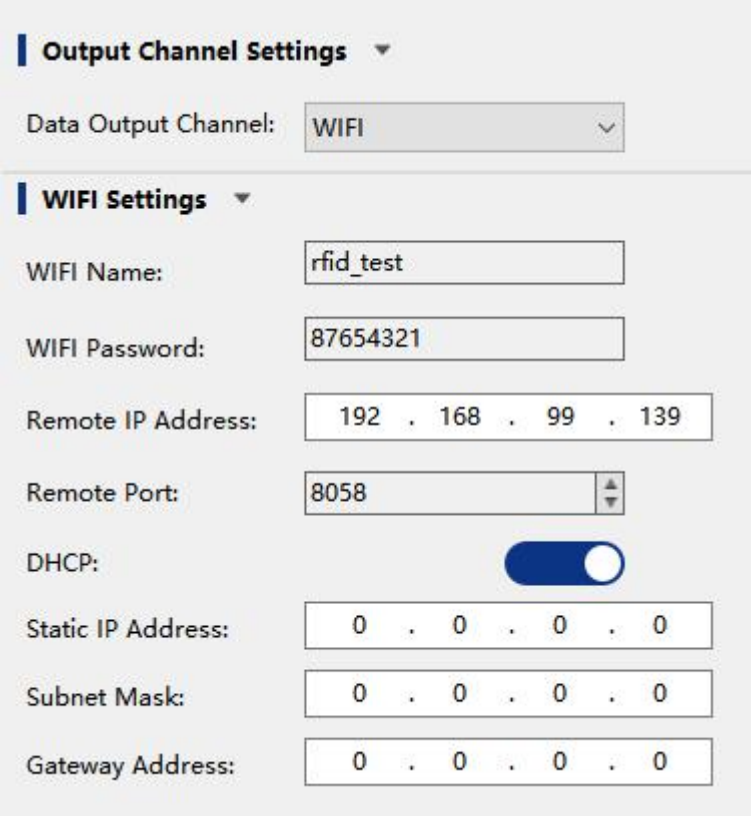
When using NSet to connect to the device via Ethernet, the “Ethernet TCP Server” channel must be selected. NSet does not support connecting to the device via the Ethernet TCP Client, Wi-Fi, or mobile network channels. To view the tag data output through these channels, third-party network debugging tools should be used.

In the “Ethernet TCP Server” mode, the RFID device functions as a TCP server with a default remote port of 8058, and only one Ethernet TCP client connection is supported at a time. If third-party network debugging tool is being used as a client to connect to the RFID device, the NSet Ethernet connection must be disconnected.

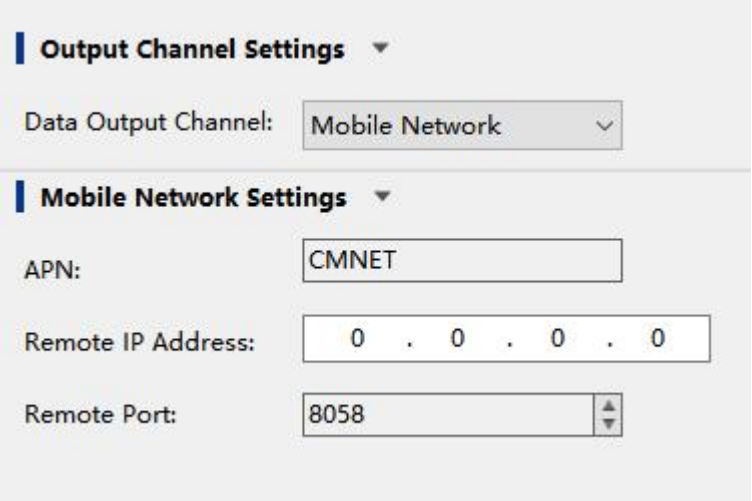
In the “Ethernet TCP Client” mode, the RFID device functions as a TCP client and connects to a TCP server via the Ethernet network. The remote IP address and remote port must be configured accordingly.



In the “Wi-Fi” mode, the RFID device functions as a TCP client, connecting to a TCP server via a Wi-Fi network. To configure this, the Wi-Fi Name, Wi-Fi password, remote IP address, and remote port must be set. By default, the Wi-Fi network uses DHCP to assign an IP address. If necessary, DHCP can be disabled, and a static IP address can be used instead.



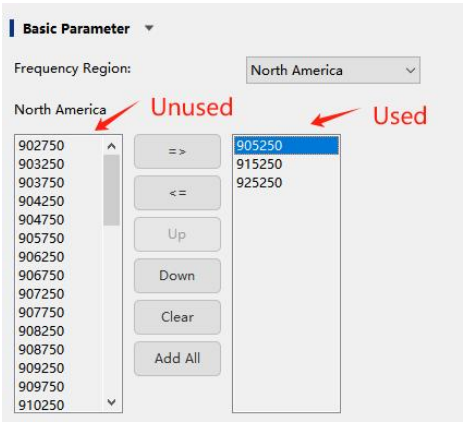
In the "Mobile Network" mode, the RFID device functions as a TCP client and connects to the TCP server through a 4G mobile network. To configure this connection, you must set the Access Point Name (APN), the remote IP address, and the remote port.



Inventory Settings

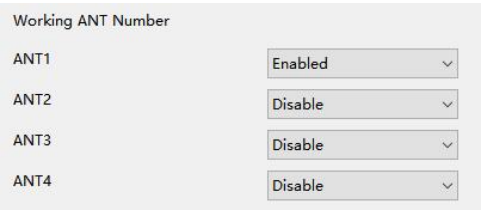
Frequency Region and Frequency Hopping

The reader should set to the appropriate radio frequency band in accordance with local regulatory requirements. The URF520 supports multiple regions, including North America, China, Europe, and a full-frequency range mode. Each region is associated with a specific set of frequency hopping points. Users can select the appropriate region and customize frequency hopping points as needed (by default, all frequency hopping points within the selected region are enabled).



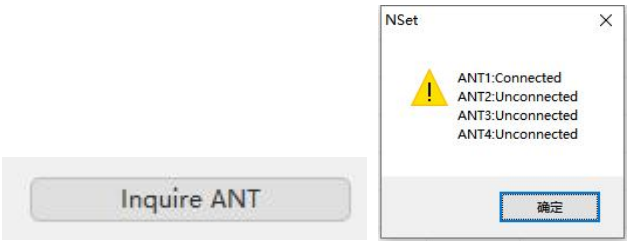
Working Antenna Number

The "Working ANT Number" specifies the antenna(s) used by the reader during inventory operations. At least one antenna must be enabled. When multiple antennas are enabled, the device will automatically alternate between them during inventory. The activation status of each antenna corresponds to the antenna's LED indicator, with the LED illuminated for active antennas. long-time operation of an antenna port without a connected antenna may result in damage to the port.



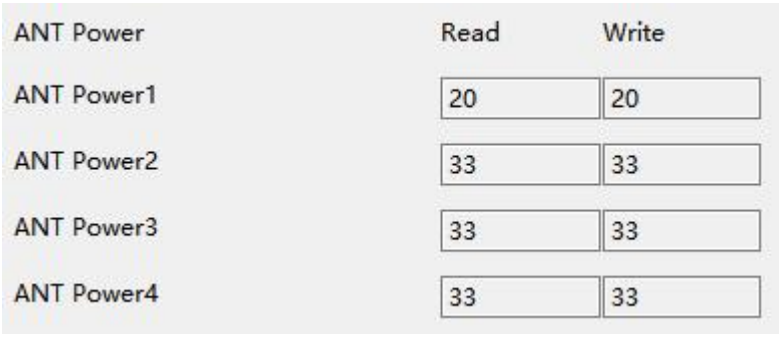
Inquire Antenna Connection

The "Inquire ANT" function allows users to verify if the RFID antenna is properly connected to the reader's antenna port. Upon clicking the "Inquire ANT" button, the system will automatically display the connection results.



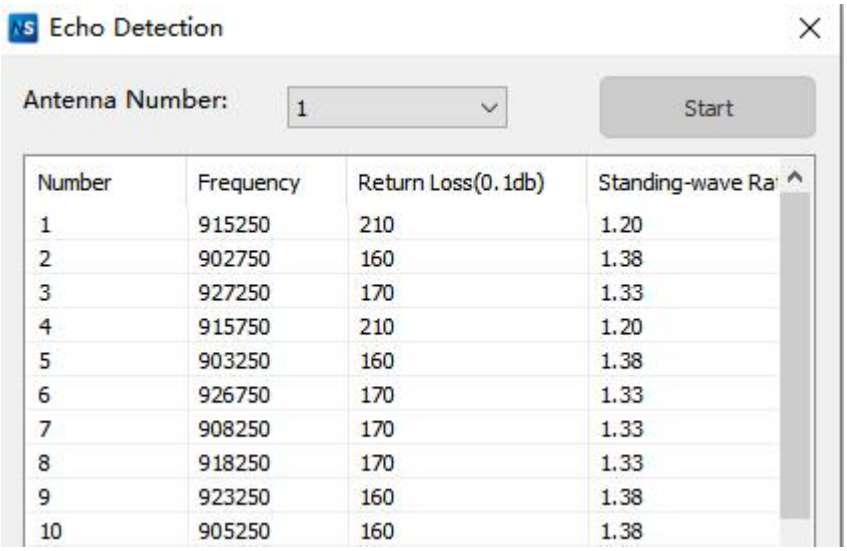
Antenna Power

The "ANT Power" setting adjusts the power output of the antenna port during "Read" and "Write" operations. "Read" refers to the power used when inventorying tags, while "Write" refers to the power used for tag operations such as reading, writing, locking, or killing.



Echo Detection

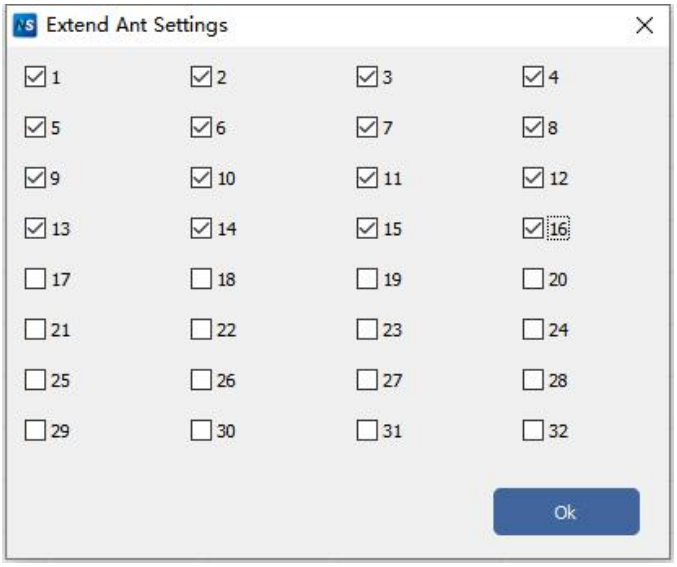
"Echo Detection" measures the return loss at the reader’s antenna port. A higher return loss (with a standing wave ratio approaching 1) indicates better impedance matching of the antenna port. To initiate the test, click the “Echo Detection" button to open the detection interface, select the antenna number to be tested, and then click "Start".



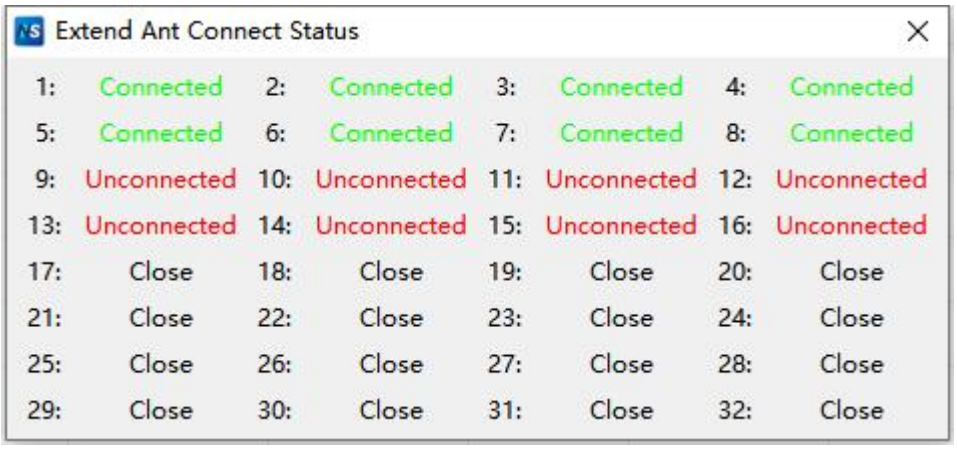
Antenna Extension

"Extend Ant" enables the URF520 to connect to an external NLS-AHUB (fixed RFID hub) to expand up to 32 antennas when the built-in antenna ports are insufficient for the application.
"Switch Time" sets the duration each antenna in the NLS-AHUB remains active for inventory operations before automatically switching to the next antenna.

"Extended Antenna Selection" allows users to enable specific antennas on the NLS-AHUB based on actual application needs. Clicking the "Extended Antenna Selection" button opens the "Extend Ant Settings" interface, where users can select the antennas to activate and then click "Ok" to apply the settings.

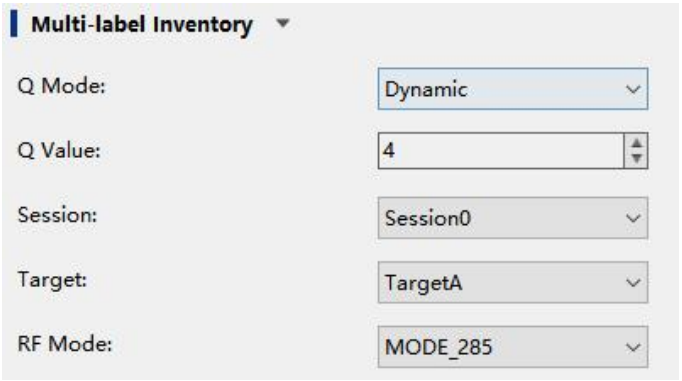


"Connect Query" is used to check the antenna connection status of the NLS-AHUB. After clicking the "Connec Query" button, the "Extend Antenna Connect Status" interface will automatically pop up. If “Close" is displayed, it means that the corresponding antenna is not activated and will not be tested.



Multi-Tag Inventory (Gen2 Parameters)

To optimize performance during multi-tag inventory operations, the reader utilizes several key parameters from the Gen2 protocol during communication with the tags. The most important parameters include Q Mode, Q Value, Session, Target, and RF Mode. Correctly configuring these parameters ensures efficient and reliable multi-tag reading in high-density environments.



Q Value & Q Mode

The Q value (where Q stands for Query) is a critical parameter in the UHF RFID protocol. The Q value determines the inventory rate of the entire reading system. A higher Q value theoretically allows more tags to be inventoried, but if the tag population is small, an overly large Q value can reduce efficiency. Generally, the Q value should be set based on the expected number of tags, roughly equal to 2^Q. If the number of tags is unknown, the default value of 4 is recommended.

- Dynamic Q Mode: In this mode, the reader automatically adjusts the Q value based on the results of each inventory round, making it suitable for most application scenarios.
- Static Q Mode: In this mode, the Q value remains fixed during each inventory round. For instance, in single-tag scenarios, a Q value of 0 delivers the highest efficiency.

Session

The "Session" parameter defines the conditions for transitioning tag states, aiming to ensure the completion of inventory for all tags within a designated area. Different inventory methods are used based on various application scenarios, with the appropriate Session being selected accordingly. Each tag has four session layers, with two states: A and B. Tags default to state A and transition to state B after being inventoried, reverting back to state A either when they leave the radiation zone or after a set period. (Note: Response time and session length depend on the tag chip type.)
The transition mechanisms of different Sessions directly impact the efficiency of tag inventory:

1. **Session 0 (S0)**: In scenarios requiring rapid reading, such as high-speed automated production lines or applications involving individual or small numbers of tags, use the S0 mode. Tags immediately revert to state A once they leave the radiation zone.
2. **Session 1 (S1)**: For multi-tag scenarios of a specific batch size, such as inventory management for clothing boxes, small shelves, or smart book cabinets, use the S1 mode. Regardless of whether the tags remain in the radiation zone, their state reverts to A after 500ms to 5s (depending on the tag chip).
3. **Session 2 (S2) and Session 3 (S3)**: In cases involving large, dense quantities of tags, such as warehouse management, use the S2 or S3 mode. Tags revert to state A only after being outside the radiation zone for more than 2 seconds (depending on the tag chip).

Target

"Target" refer to configuring the states of tags for inventory operations.

- Target A: The reader inventories only tags in state A and transitions them to state B.
- Target B: The reader inventories only tags in state B and transitions them to state A.
- Target AB: The reader first inventories tags in state A, transitions them to state B, and then inventories tags in state B, transitioning them back to state A. This cycle repeats continuously.

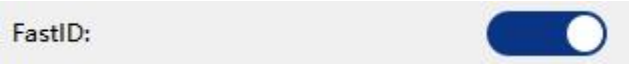
For fast inventory, Target A is recommended. For thorough inventorying of multiple tags, Target AB is preferred.

Radio Frequency Mode

The "RF Mode" determines the speed and sensitivity of tag inventory. Faster modes allow for inventorying more tags in a given time, while higher sensitivity modes make it easier to inventory tags in challenging environments. From "MODE_103" to "MODE_285", inventory speed decreases, but sensitivity increases.

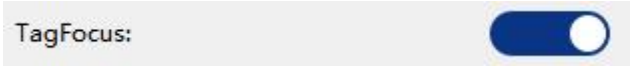
FastID

When the FastID feature is enabled, the reader will directly retrieve both the EPC and TID from tags during inventory operations. This functionality requires support for FastID technology on the tag chip.



TagFocus

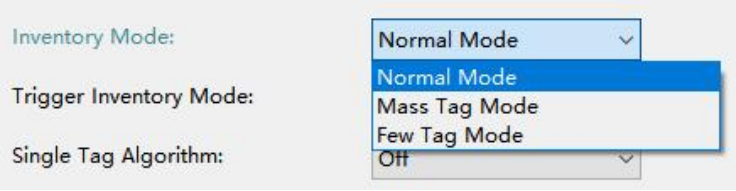
When the TagFocus feature is enabled and the reader is operating in Session 1, tags with weaker signal strength will have more opportunities to communicate with the reader, thereby enhancing multi-tag inventory efficiency. This functionality requires the tag chip to support the TagFocus feature.



Inventory Mode

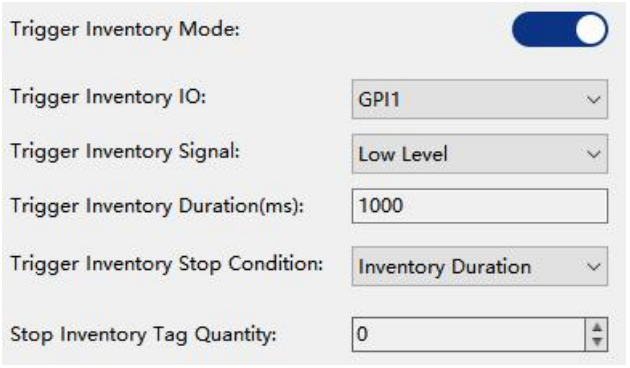
The reader offers three inventory modes to meet different application scenarios.

Normal Mode: In this mode, the reader performs inventory based on the configured Gen2 parameters.
Mass Tag Mode and **Few Tag Mode**: In these modes, Gen2 parameter configurations are ignored, and the reader handles the inventory process autonomously. However, **tag filtering** and **embedded read command** functionalities are not supported.
Mass Tag Mode is ideal for environments with a large number of tags or hard-to-read tags.
Few Tag Mode is suitable for scenarios with fewer, easy-to-read tags.



Trigger Inventory Mode

"Trigger Inventory Mode" allows the reader to start the inventory process based on changes in the input IO signals, with the inventory stopping when specified conditions are met.



"**Trigger Inventory Mode**": Enable or disable the trigger inventory mode.
"**Trigger Inventory IO**" and "**Trigger Inventory Signal**" specify which input IO and signal type initiate the inventory process.
"**Trigger Inventory Stop Conditions**" define the criteria for stopping the inventory process:

"**Inventory Duration**": The reader stops inventory when the time set in "Trigger Inventory Duration" is reached.

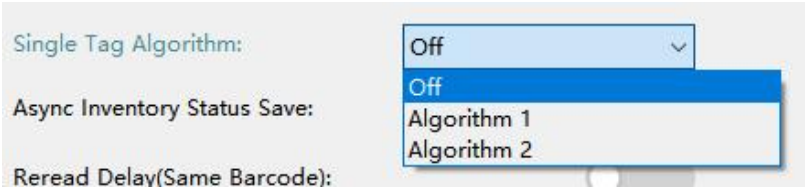
"**IO Signal**": The inventory process stops when the input IO signal is opposite to the "Trigger Inventory Signal."

"**Tag Quantity**": The inventory stops once the number of tags read reaches the value specified in "Stop Inventory Tag Quantity."

"**Any Condition**": The inventory will stop if any of the conditions—"Inventory Duration," "IO Signal," or "Tag Quantity"—are met.

Single Tag Algorithm

The "Single Tag Algorithm" is designed for use in triggered or synchronized inventory operations. Upon completion of the inventory process, the algorithm selects a unique tag for reporting. "Algorithm 1" reports the latest tag, while "Algorithm 2" is reserved for customization based on specific application needs.

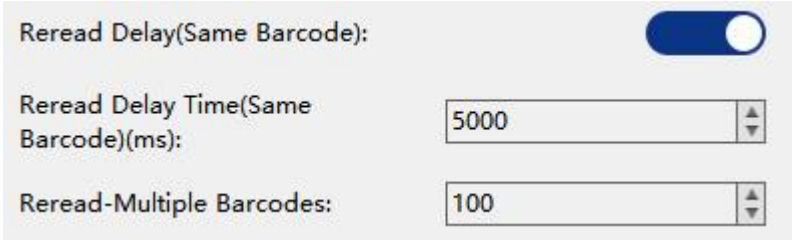


Asynchronous Inventory Status Save

When the "Asynchronous Inventory Status Save" feature is enabled, the reader's asynchronous inventory status is saved to Flash memory. After a reboot, the device resumes the previous inventory status. This feature is ideal for scenarios that require continuous, uninterrupted asynchronous inventory operations.

Reread Delay

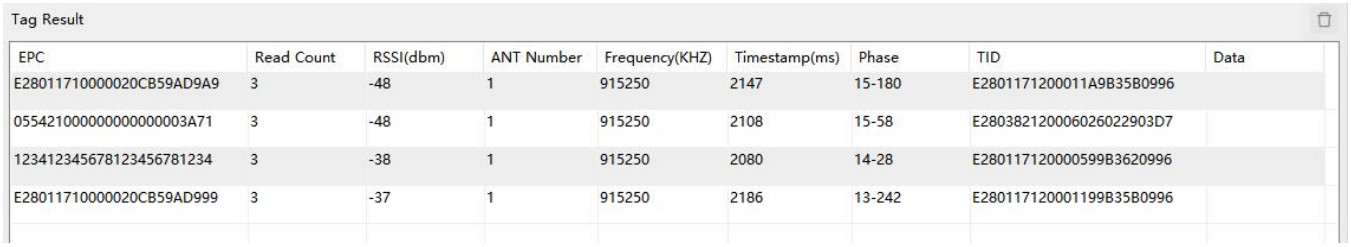
"Reread Delay": Enables or disables the reread delay function.
"Reread Delay Time": After a tag is inventoried and reported, if the same tag is re-inventoried within the specified delay time, it will be discarded.
"Reread-Multiple Barcodes": Defines the maximum number of tags that can be stored in the reread buffer. Once this number is reached, any newly inventoried tags will be discarded.



Tag Settings

Tag Metadata

"Tag Metadata" refers to the information displayed in the NSet results column after the URF520 reads tag content. This information includes details such as the tag's RSSI, antenna number, frequency, and others.



Tag Memory Bank

Tag operations such as reading, writing, locking, and filtering all involve the RFID chip's memory banks. Here's a brief introduction to these memory banks. The internal memory structure of UHF RFID tags is generally divided into four regions: Reserved, EPC (Electronic Product Code), TID (Tag Identification), and User. Each memory bank can be in one of four states: locked, unlocked, permanently locked, or permanently unlocked. Once a memory bank is permanently locked or unlocked, further locking operations are no longer possible.

Reserved Bank: Also known as the password bank, it contains two 32-bit passwords: **the Kill Password** and **the Access Password**. The Kill Password is located at bit address 0 in the Reserved memory, while the Access Password is at bit address 32. The Access Password is used to issue locking commands for specific memory areas, enabling read and write operations on those locked areas. The Kill Password is used to execute the kill command, which permanently deactivates the tag. By default, the Reserved bank is in an unlocked state. The read/write operations are outlined in the table below.

Reserved Bank	Locked	Unlocked	Permanently Locked	Permanently Unlocked
With Access Password	Read/Write	X	Not read or write	X
Without Access Password	Not read or write	Read/Write	Not read or write	Read/Write

The EPC memory is divided into three main sections:

- **CRC16 Checksum (Starting Address: 0 bit)**: This 16-bit section verifies the integrity of the EPC data received by the reader during communication.
- **PC (Protocol Control) (Starting Address: 16 bit)**: This 16-bit section contains protocol control information. The upper 5 bits of the PC define the length of the EPC code, measured in words (1 word = 16 bits). For example, a hexadecimal PC value of 3000 corresponds to an upper 5-bit value of 00110, or 6 in decimal, indicating an EPC code length of 6 words (96 bits).
- **EPC Code (Starting Address: 32 bit)**: This section stores the actual EPC code of the RFID tag, commonly returned during inventory.

By default, the EPC memory bank is unlocked. The following table outlines the available read/write operations for the EPC memory.

EPC Bank	Locked	Unlocked	Permanently Locked	Permanently Unlocked
With Access Password	Read/Write	X	Read/Not Write	X
Without Access Password	Read/Not Write	Read/Write	Read/Not Write	Read/Write

TID Bank

The TID bank begins at the starting address of 0 (bit) and stores the unique identifier of the tag's chip, which cannot be modified. The typical length of this area is 96 bits. By default, the TID bank is permanently locked, meaning it is always readable but not writable.

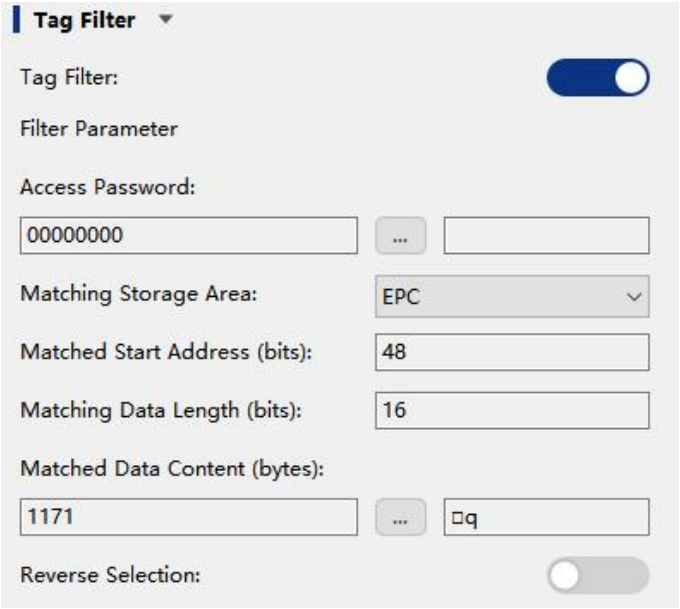
User Bank

The User bank starts at the 0 (bit) address and is available for user-defined data, with the length determined by the tag's chip. Some RFID tags do not have a User bank. By default, the User bank is unlocked, with read and write operations as described in the table below:

User Bank	Locked	Unlocked	Permanently Locked	Permanently Unlocked
With Access Password	Read/Write	X	Read/Not Write	X
Without Access Password	Read/Not Write	Read/Write	Read/Not Write	Read/Write

Tag Filter

When the "Tag Filter" feature is enabled, the reader will only inventory and return tags that meet the specified filtering rules. The parameters used for filtering include "Access Password", "Matching Storage Area", "Matching Start Address (bit)", "Matching Data Length (bit)", and "Matching Data Content (byte)". If necessary, the "Reverse Selection" option can also be activated, allowing the reader to inventory only the tags that do not meet the filtering criteria.



Example: Prior to enabling the filtering function, the reader inventories four tags. If you only want to inventory and return tags whose EPC contains the string "1171" starting from the 5th character, you can enable the tag filtering function and adjust the filtering parameters as follows:

Access Password: Enter the default value "00000000".
Matching Storage Area: Select "EPC".
Matching Start Address (bits): Enter "48". The match starts from the 5th character, and the first 4 characters occupy 4 bits each (as each hexadecimal character represents 4 bits). Since the EPC data begins at bit 32, the starting address is calculated as 4 × 4 bits + 32 = 48 bits.
Matching Data Length (bits): Enter "16". The target string "1171" consists of 4 hexadecimal characters, and 4 × 4 bits = 16 bits.
Matching Data Content (bytes): Enter "1171" as the matching data.
Save the updated configuration and re-inventory the tags, the reader will only return the tag contains "1171".

Tag Result

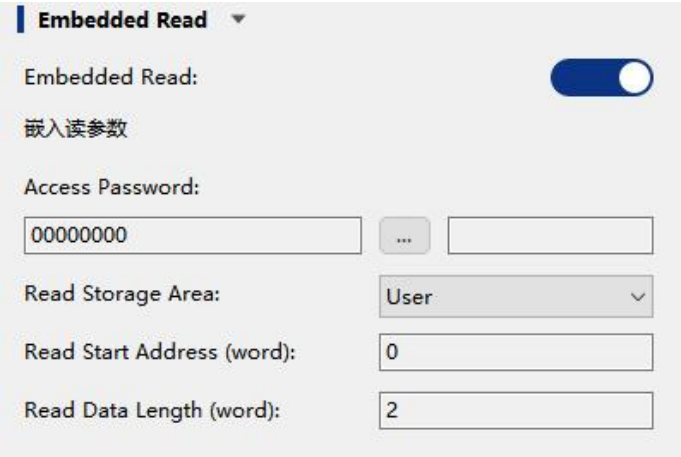
EPC	Read Count
E28011710000020CB59AD9A9	2
055421000000000000003A71	3
123412345678123456781234	3
E28011710000020CB59AD999	3

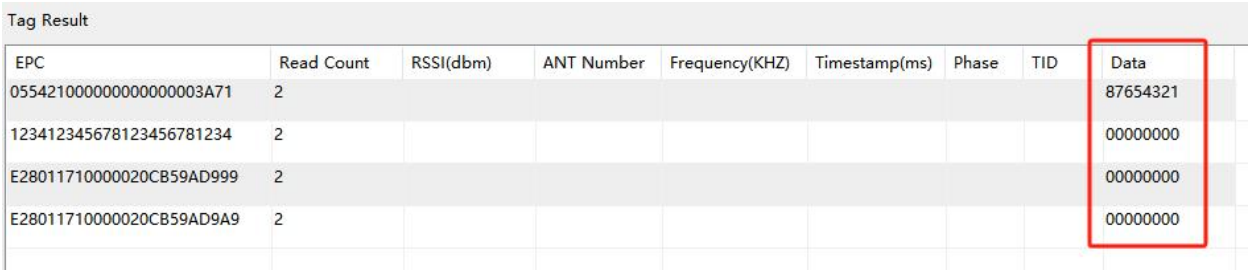
Tag Result

EPC	Read Count
E28011710000020CB59AD9A9	3
E28011710000020CB59AD999	3

Embedded Read

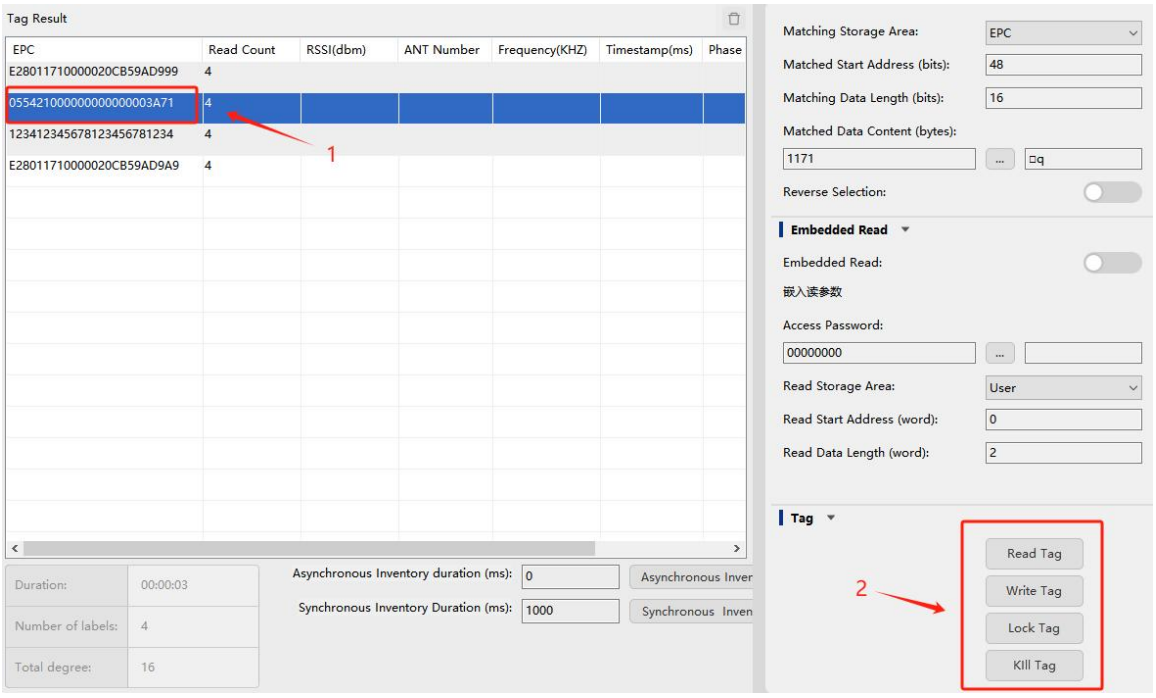
When the 'Embedded Read' feature is enabled, the reader will not only inventory and return the tag's EPC but also retrieve additional data based on the parameters specified in "Embedded Read".





Tag Operations

Users can perform four types of operations on tags: read, write, lock, and kill. First, select the tag to be operated on, and then click the desired operation.

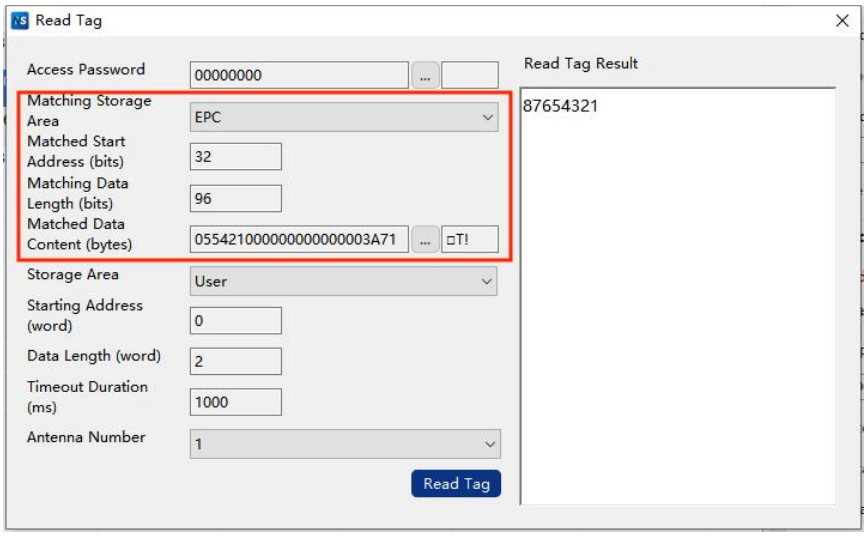


The "**Read Tag**" function reads a specified length of data from a designated memory bank within a single RFID tag. First, select the tag and open the read interface. Relevant tag parameters (Inside the red box) will auto-fill; if not, manual input is required.

Example: To read 2 words (4 bytes) of data from the user memory bank starting at address 0 for tag 055421000000000000003A71, follow these steps:

1. Set the "Access Password" to the default value of 00000000.
2. Select "User" in the "Storage Area".
3. Enter 0 in the "Starting Address".
4. Set the "Data Length" to 2.
5. Set the "Timeout Duration" to the default value of 1000 ms
6. Select the appropriate "Antenna Number" based on the actual condition.
7. Click the "Read Tag" button to execute the read operation.

The read results will be shown as below.

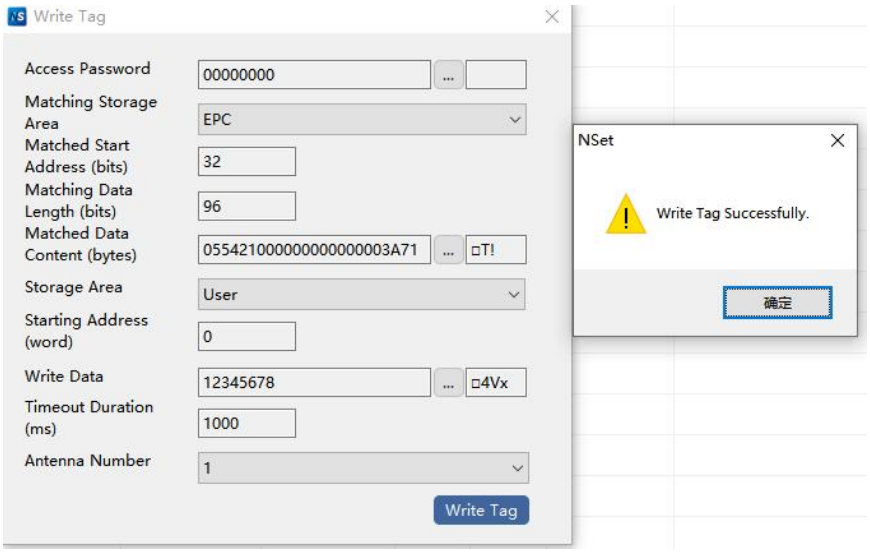


The "**Write Tag**" function writes data to a specific address within a tag's memory bank. The data length should be specified in words (2 bytes per word).

Example: To write the data "12345678" to address 0 in the User memory bank of tag 055421000000000000003A71, follow these steps:

1. Ensure the User memory bank is unlocked. If unlocked, use the default "Access Password" of 00000000; if locked, enter the correct access password.
2. Select "User" in the "Storage Area".
3. Enter "0" in the "Starting Address".
4. Input "12345678" in the "Write Data" field.
5. Click the "Write Tag" button to execute the write operation.

The write results will be displayed upon completion."

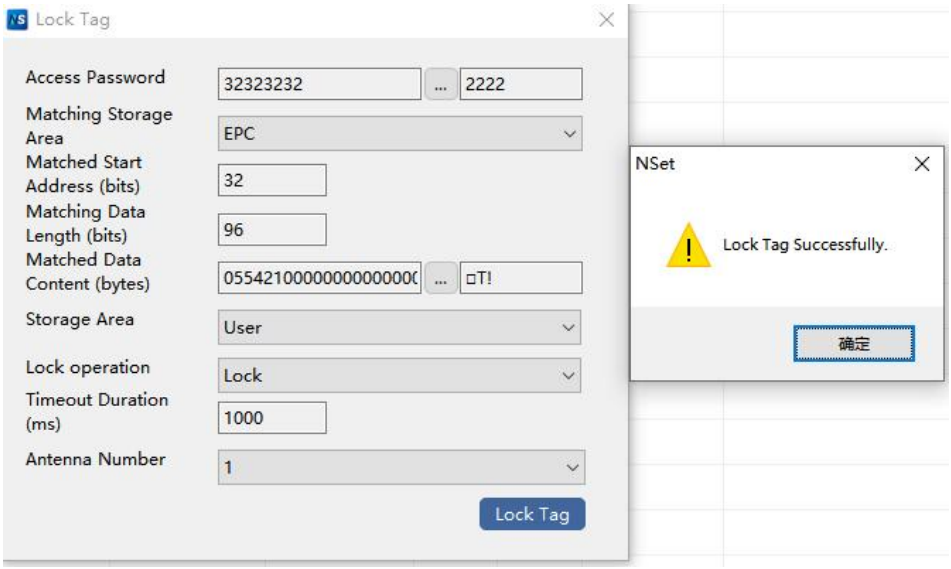


The “**Lock Tag** “function locks a specified memory bank within a tag. Before initiating the lock operation, update the access password in the Reserved memory bank, then use the modified password to complete the lock.

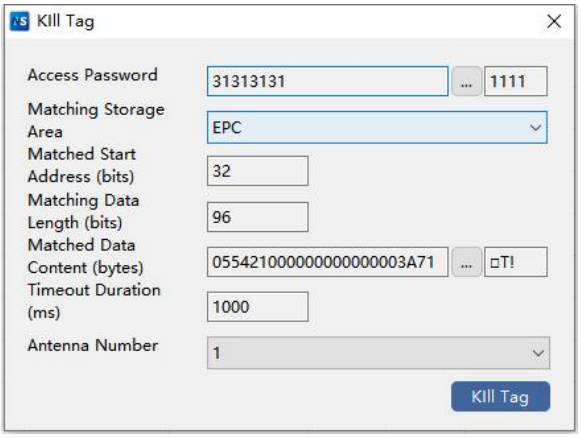
Example: To lock the User memory bank of tag 0554210000000000000003A71 with access password 32323232, follow these steps:

1. Enter "32323232" in the "Access Password" field.
2. Select "User" in the "Storage Area".
3. Click the "Lock Tag" button to initiate the lock operation.

The results of the lock operation will display upon completion.



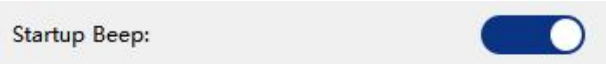
The "**Kill Tag**" function permanently disables a tag. Before initiating the kill operation, update the kill password in the Reserved memory bank, then use this modified password to execute the kill. Once completed, the tag will no longer be detectable by the reader.



Input & Output

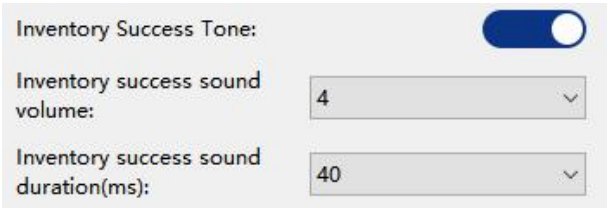
Startup Beep

When the "Startup Beep" function is enabled, the device will emit a long beep upon powering on or restarting.



Inventory Success Tone

When the "Inventory Success Tone" function is enabled, the device will emit a short beep from the buzzer each time a tag is successfully inventoried. Users can also adjust the volume and duration of the beep as needed.



IO Output

The URF520 has four output IOs (GPO1, GPO2, GPO3, and GPO4), each configurable to a high or low level.

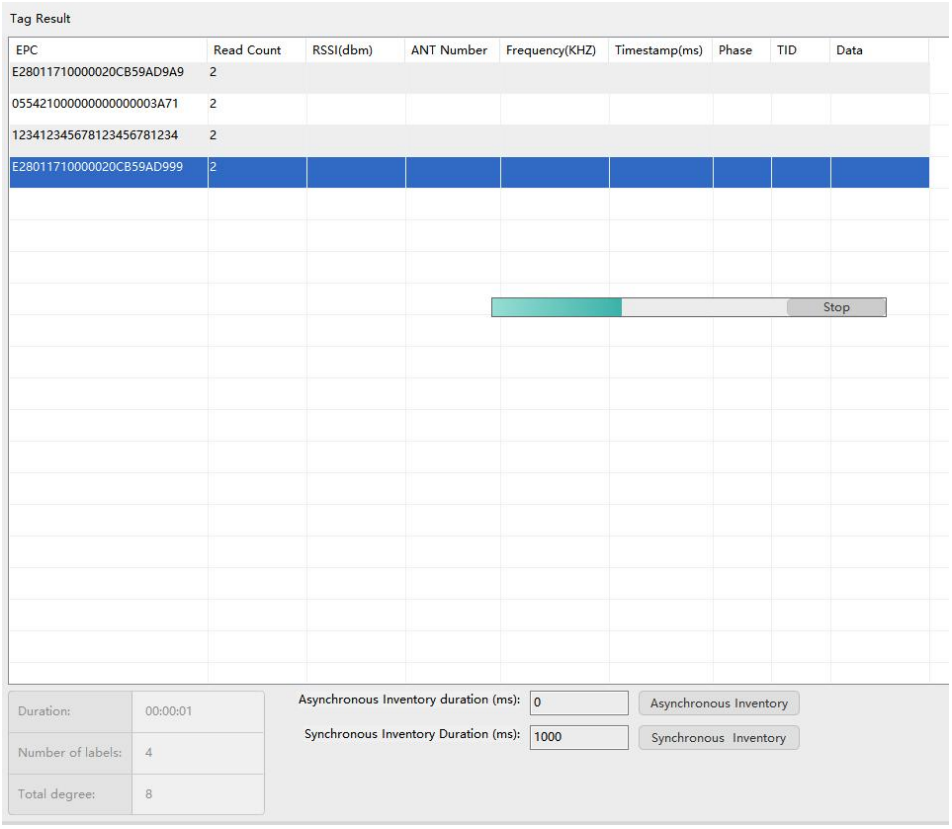
IO Input

The URF520 has four input IOs (GPI1, GPI2, GPI3, and GPI4), allowing manual checking of each input's signal level. When the “Report GPI Level" function is enabled, the device will automatically report any changes in input levels.

Asynchronous & Synchronous Inventory

Asynchronous Inventory

In asynchronous inventory mode, the reader reports detected tags in real time, with tags containing the same EPC being reported repeatedly.
When the "Asynchronous Inventory Duration" is set to 0, inventory runs continuously and must be stopped manually by clicking the stop button. When it is set to a non-zero value, such as 1000, inventory will proceed for the specified duration(1000 ms), after which NSet will automatically issue a stop command, eliminating the need for manual intervention.
Note: The "Asynchronous Inventory Duration" parameter controls the timing of the stop command issued by NSet; it is not sent to the reader itself.



Synchronous Inventory

In synchronous inventory mode, the reader stores the detected tags in its internal cache during the inventory process. Once the inventory duration exceeds the value set in the "Synchronous Inventory Duration" parameter, the reader automatically stops the inventory and reports the cached tags. Tags with the same EPC are only reported once, without duplication.

The "Synchronous Inventory Duration" parameter is sent to the reader, and the reader will automatically stop the inventory process based on this setting.

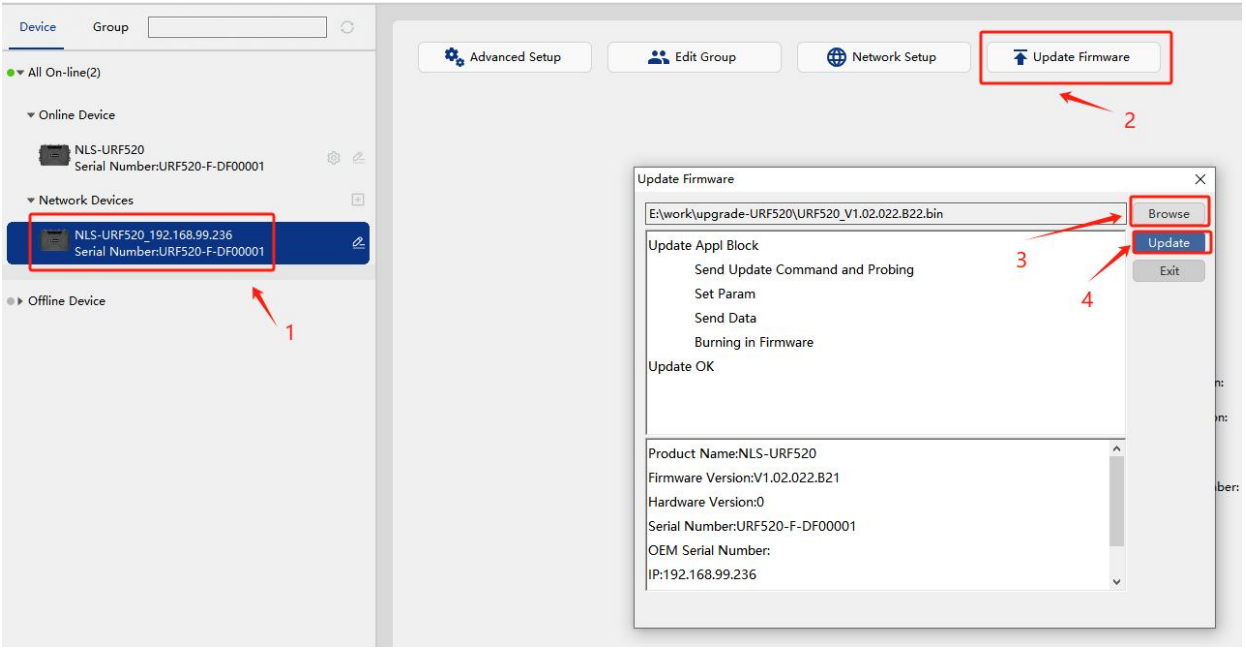
Example: If the "Synchronous Inventory Duration" is set to 10,000, clicking the "Synchronous Inventory" button will start the inventory. The reader will automatically stop after 10,000 milliseconds and report the detected tags.

Firmware Upgrade

To upgrade the firmware, follow these steps:

1. Select the device to be upgraded.
2. Click the “Upgrade Firmware " button to open the firmware upgrade interface.
3. Click "Browse" to upload the firmware file.
4. Click "Update" to begin the upgrade.

After a successful upgrade, the device will emit a long beep. Ensure the device remains powered on throughout the upgrade process to avoid interruption.



Chapter 4 Maintenance & Troubleshooting

Introduction

This chapter includes important safety and handling information and provides troubleshooting solutions for issues that might occur when using the terminal.

Routine Maintenance

Routine maintenance for the NLS-URF520 during use includes:

- ✓ Check if the RF antenna interface of the device is tightened, inspecting each connection individually.
- ✓ Examine the screws on the URF520 device and the accompanying antenna for any signs of loosening or aging.
- ✓ Inspect the RF cable connectors for any breaks in the outer shielding layer.
- ✓ Ensure a secure connection of the power cable to the reader/writer.
- ✓ Confirm the stability of the network cable connection to the reader/writer.
- ✓ Inspect the external antenna interface and the condition of the antenna for signs of aging or loosening in wireless communication.
- ✓ Tighten the reader/writer device bracket and fixing screws, examining each one.
- ✓ Check if the current operating environment falls within the applicable temperature and humidity range.

Troubleshooting

1) Power Supply System Failure:

Check if the power adapter is supplying power correctly and if the AC power voltage is within the range of 100V~240V.

Inspect the power cable for any signs of damage.

2) After Powering On, Status Indicator Lights are not On:

Verify if the communication function is working correctly. If not, contact after-sales and technical support.

If communication is normal, check if the LED light board connections is ok or not.

3) Serial Port Connection Issues:

Ensure the serial port cable is properly connected and secure.

Check if the serial port connection baud rate of the reader/writer is correct.

Verify if the selected COM port is functioning properly.

Check if the serial port cable is the standard one provided or the type recommended by the device manufacturer.

Verify if there are updates available for the serial port drivers.

4) USB Port Connection Issue:

Ensure the USB cable is properly connected and secure.

Check if the USB cable is the standard one provided or recommended by the device manufacturer.

Verify if there are updates available for the USB drivers.

5) Ethernet Port Connection Issue:

The default IP address for the URF520 is “192.168.1.101”. Confirm that the PC’s IP address and URF520’s IP address are in the same network segment (such as “192.168.1.XX”) to establish a connection.

If the URF520’s IP address is forgotten, it can be reset through other wired connection methods, such as serial port or USB.

Check if the network cable is faulty or not connected.

Examine the local network conditions.

6) Wireless Communication Failure:

Ensure that the PC and the URF520 are in the same wireless network environment, and check if their IP addresses are in the same network segment.

Inspect the local wireless network for any faults.

Check if the SIM card is faulty or not connected.

Check if the external antenna is faulty or has loose connections

7) Reader Cannot Read Tags:

Check if the antenna settings are correct.

Verify if the reader settings are accurate.

Inspect tags for damage or destruction.

Ensure that the tags are positioned within the effective reading range of the reader.

Check for electromagnetic interference between readers or other devices.

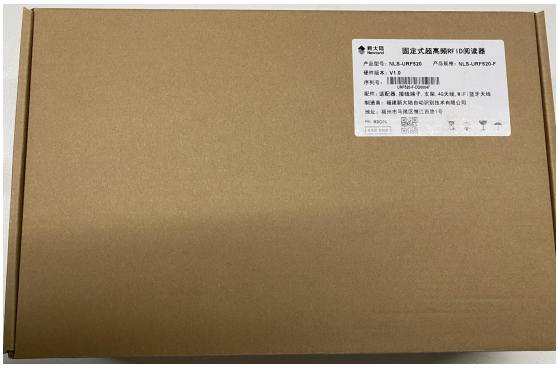
For any issues that cannot be resolved or diagnosed independently, please contact customer support promptly. Relevant technical personnel will provide assistance.

Chapter 5 Transportation & Storage

Introduction

This chapter introduces the packaging list and transportation/storage requirements for the NLS-URF520.

Packaging Box



Packing List

Serial	Name	Quantity	Unit	Remark
1	NLS-URF520 Fixed RFID Reader	1	unit	Standard
2	Power Adapter 12V/3A	1	piece	Standard
3	International AC Power Cord	1	piece	Standard
4	Wiring Socket	1	piece	Standard
5	Mounting Bracket	2	piece	Standard
6	Quick Start	1	piece	Standard
7	Product Warranty Card	1	piece	Standard

Transportation and Storage Requirements

For long-term storage, the URF520 RFID reader should meet the following conditions:

- ✓ Environmental Temperature: -40°C to 85°C
- ✓ Relative Humidity: 5% to 95% RH

During transportation, the environmental conditions should not exceed the following range:

- ✓ Drop Resistance: The packaging should conform to the adaptability of GB/T 2423.8 - 1995 Test Ed standard.
- ✓ Vibration Resistance: It should comply with the adaptability of GB/T 2423.10 - 2008 Test Fc standard.
- ✓ Shock Resistance: It should meet the requirements of GB/T 2423.5 - 1995 Test Ea standard.
- ✓ Impact Resistance: It should conform to the adaptability of GB/T 2423.6 - 1995 Test Eb standard.

SCANNING MADE SIMPLE

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