HDS51

DETECTION AND SPOOFING SYSTEM

User Manual

V1.3

Reading Tips

This manual applies to the UAV radio countermeasure equipment developed and produced by the company. The manual provides comprehensive specifications, functional design, structure and specification requirements of the system, as well as installation, deployment, and operational requirements, serving as an operational guide for end users.

Symbol Legend

	Supplementary Notes: Additional explanations and annotations to the main text of the manual.
	Safety Notices: Important operational warnings and risk prevention guidelines for users.
	DANGER: Indicates imminent hazards which, if not avoided, will result in death or serious injury and major property damage.

Manual Usage Recommendations

1. Before using the product, please read this manual thoroughly. Retain this manual for future reference to address any operational inquiries.
2. All photographs, graphics, charts, and illustrations in this manual are for explanatory purposes only and may differ from the actual product. Refer to the physical product for exact specifications. The company reserves the right to update this manual due to product version upgrades or other requirements, with the latest electronic version to be distributed to users.
3. The company recommends using this manual under the guidance of qualified personnel.

Safety Notice

Before using the product, please carefully read the following precautions and operate the product correctly as required.

Installation Precautions

Environmental Requirements

Do not install or store the product in any of the following locations:

- Extreme environments: places where temperatures exceed the range of the device operating temperature or where frost may form.
- Near strong electromagnetic interference sources or equipment with large current fluctuations.
- Areas with flammable, explosive, corrosive gases or dust.
- Damp or water-exposed areas. Liquid ingress may cause electric shock or fire hazards.

Operational Guidelines

- Only qualified personnel or designated maintenance staff may open the chassis.
- All antennas must be fully connected and tightened according to the labels. Powering on the device without antennas installed is strictly prohibited.

Usage Precautions

Power and Electrical Safety

- Use only the specified AC 110 V–220 V power supply.
- Do not pull or bend the power cord. Avoid crushing or twisting it, and stop using it if damaged.
- Do not operate the equipment during thunderstorms. Avoid touching power lines or device connectors during lightning to prevent electric shock.

- Always unplug the power cord before moving the device.
- Do not touch the power plug with wet hands.
- When unplugging the power cord, hold the plug body firmly.

Operational Risk Warnings

- If abnormal conditions such as smoke, unusual noises, or burning smells occur, shut off power immediately and contact our after-sales service department.
- Do not install any software unrelated to the software platform; system issues caused by such software are not covered under warranty.
- Do not connect unauthorized USB drives or external hard drives to avoid malware infection. Do not delete server files arbitrarily, change the system time, or shut down or restart the server without authorization.
- Unauthorized personnel are prohibited from disassembling the device to avoid damaging internal components or compromising your rights. If the device malfunctions during use, contact our after-sales service department.

Regulatory Compliance

- This device may cause radio interference during operation. Users must take feasible measures to mitigate such interference.
- If suspected interference occurs with civil-aviation or military frequencies, stop using the device immediately, investigate the cause, and report the incident.

Table of Contents

1 Product Introduction

The device HDS51 is used for drone detection, identification and spoofing. It has the advantages of user-friendly and mobile compatibility, also combined with passive detection and spoofing functions. It can accurately detect, position differentiate, and defend drones in protected areas.

1.1 Main Functions

Detected Information

Accurately identify the frequency, brand, SN number, orientation, latitude and longitude, flight height and pilot position of the drone.

Defense Capability

With all-round defense, multi-target spoofing capability.

Multi-Mode Spoofing

Capable of simulating multi-standard, multi-band navigation satellites to generate valid GNSS simulation signals, increasing spoofing success rates.

Smart Spoofing

Upon detecting an intruding UAV, the system actively transmits spoofing signals to force the drone landing, or evict, ensuring the security of the protected zone.

Integrated Detection & Spoofing

Equipped with a radio detection unit, the system provides 24/7 unattended operation, enabling rapid detection, identification, and spoofing of intruding drones.

Full-Covered Drone Library

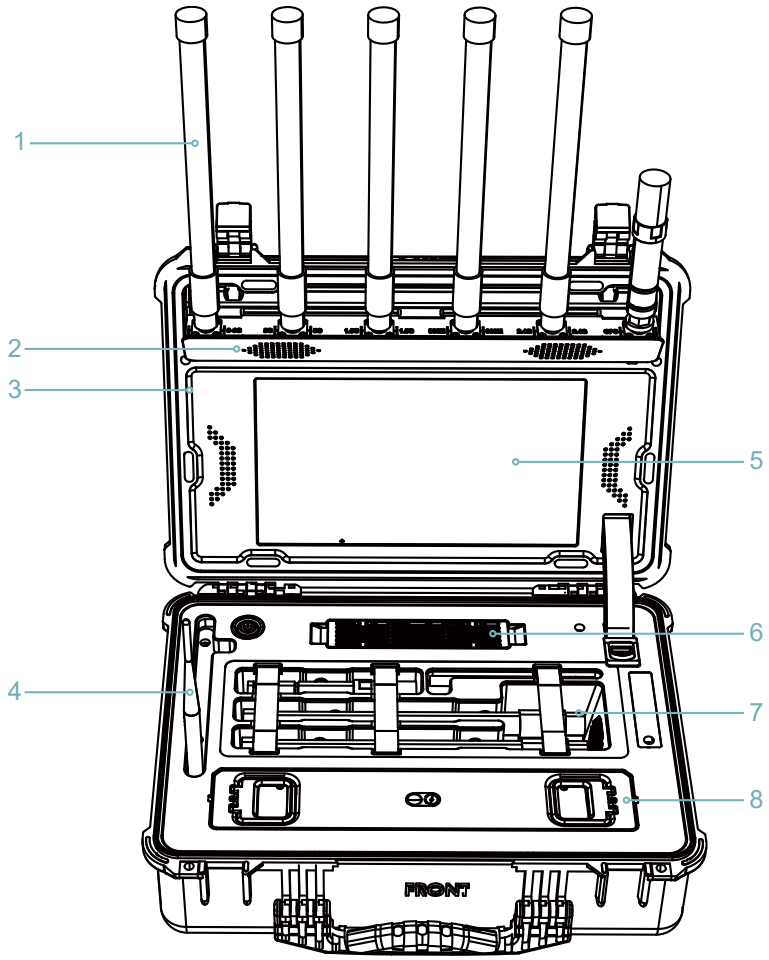
Support various types of drone brand like DJI and AUTEL, FPV drones, WIFI drones, DIY drone etc.

Rapid Development

Lightweight design, support individual carrying, no complex installation configuration.

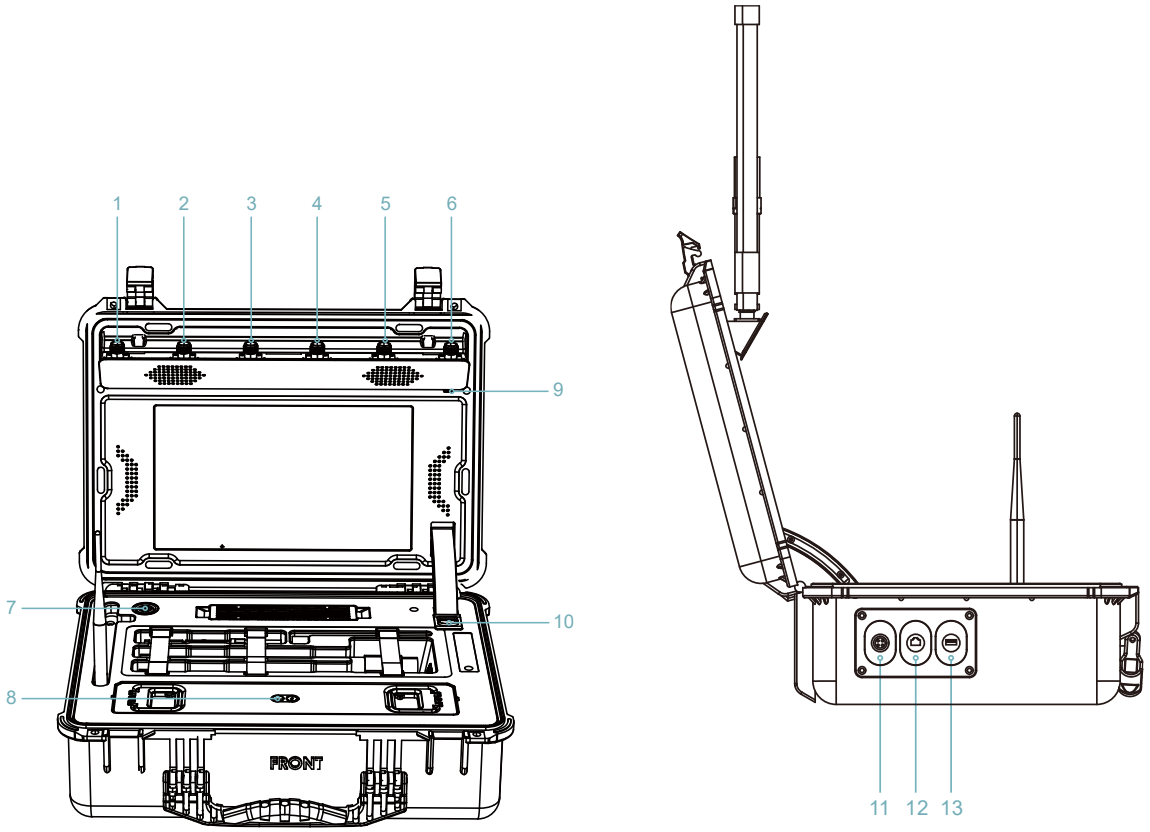
1.2 Product Appearance

The equipment appearance is shown as follows:



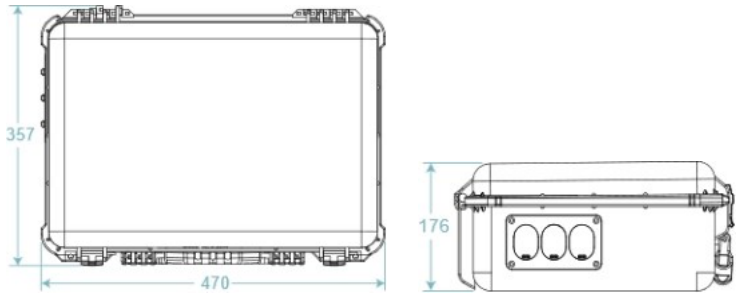
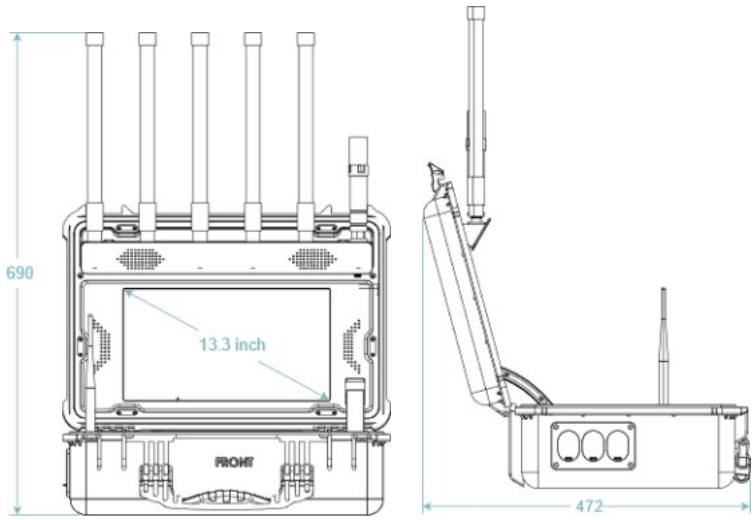
1. Antennas
2. Antenna interface base (With speaker)
3. Main unit
4. ADS-B antenna
5. Touch screen
6. Air inlet
7. Antenna & stylus storage slot (With ventilation holes)
8. Removable lithium-ion battery

1.3 Ports and Antenna Connector



1. 0-6GHz full band receiving antenna connector
2. 5G receiving antenna connector
3. 1.5G transmitting antenna connector
4. 900M receiving antenna connector
5. 2.4G receiving antenna connector
6. GPS antenna connector
7. Power On/Off button
8. Battery level button
9. Type-C port
10. Hinge lock release button
11. Power connector (AC110V～240V)
12. Ethernet port
13. USB Port

1.4 Mechanical Characteristics

Item	Specification	
Size (Closed state)		
Length	470mm	
Width	357mm	
Height	176mm	
Size (Open state)		
Length	470mm	
Width	472mm	
Height	690mm	
Screen Size		
Screen Size	13.3 inch	
Weight (With battery)		
Weight	14kg	

2 Equipment Deployment Preparation

This device adopts a portable design ideal for rapid outdoor deployment. Under compliant environmental conditions, it ensures stable operation and optimal detection performance. First check the specifications and quantity of all parts and standard parts according to the equipment delivery list, and then assemble them step by step according to the following installation steps.

2.1 Site Selection

The equipment is typically deployed outdoors. Site the equipment should pay attention to the following factors:

Visibility environment: Choose a flat, open highland or building rooftop, ensuring a 360° unobstructed view for the antenna placement.

Electromagnetic environment: Avoid electromagnetic interference zones such as microwave stations, radio transmission towers, and high-voltage power line crossings, as well as areas near glass curtain wall clusters and large metal structures (e.g., bridges, transmission towers).

Natural environment:

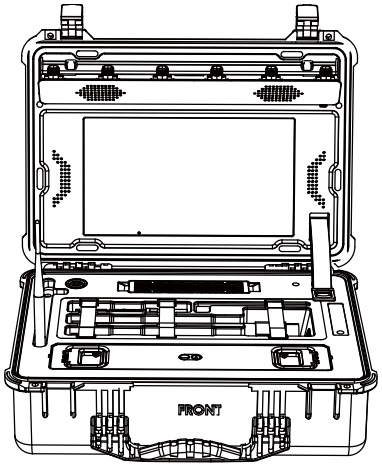
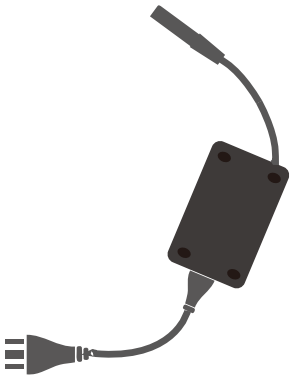
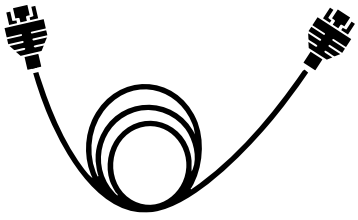
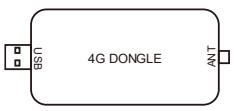
- Avoid the wind to reduce the equipment antenna wind load.
- When deploying in thunderstorm-prone areas, avoid locations susceptible to water accumulation and lightning strikes.

Electrical Environment: Avoid areas near electrified railways, base stations, or any other sources prone to signal interference.

Infrastructure: Ensure the site has mains power access and supports connection to public or dedicated communication networks.

2.2 Delivery Checklist

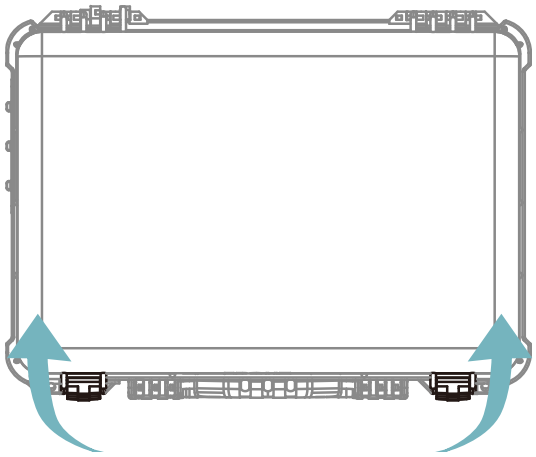
Check the specifications and quantity of all parts and standard parts according to the equipment delivery list.

Part	Quantity	Description	Diagram
Main Unit	1	Used for the detection, identification, direction finding of drone signals, and spoofing signal emission.	
Power Adapter	1	Used for charging the main unit.	
Category 6 Cable	1	Used to connect the main unit to the control terminal.	
USB 4G dongle	1	Used to connect the main unit to the network.	
USB WiFi dongle	1	Used to connect the main unit to the network.	

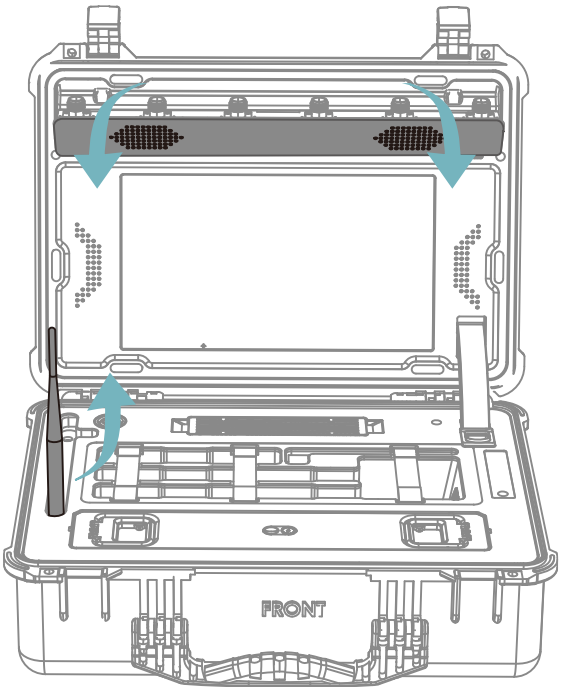
3 Deploy the Equipment

3.1 Connect Antennas

1. Release the two latches on the device and lift the lid.



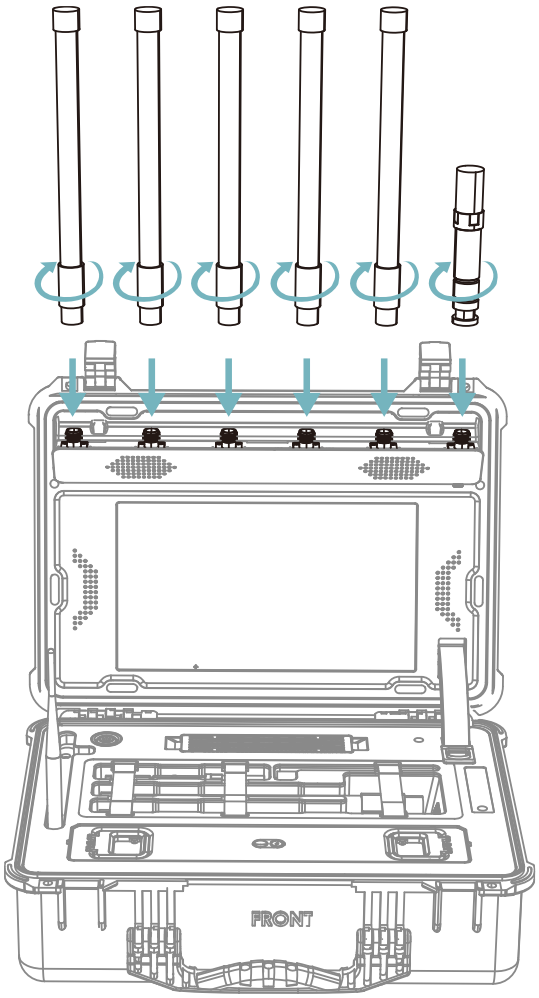
2. Raise the ADS-B antenna to the upright position.
3. Open the antenna interface base on the upper side to expose the antenna connectors.



4. Release the retaining straps on the antenna & stylus storage slot and remove the antennas from the slot.

5. Screw and tighten the 4 receiving antennas, 1 transmitting antenna and 1 GPS antenna onto the main unit one by one in a clockwise direction in accordance with the corresponding labels.

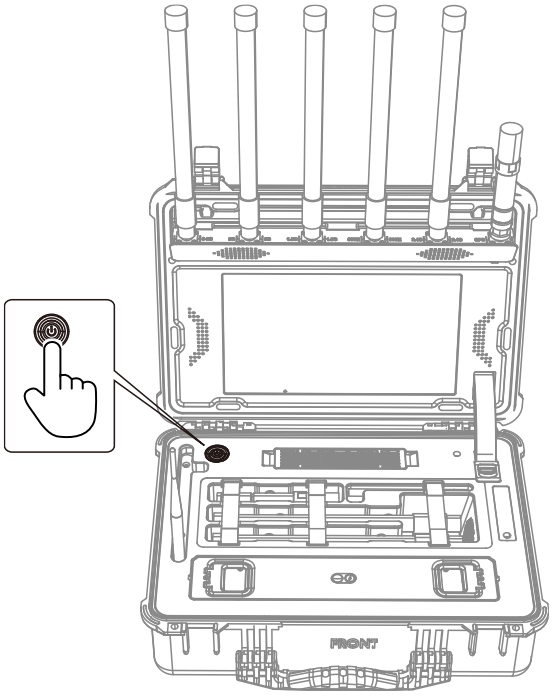
> ⚠ All antennas must be installed on the main unit according to the labeling. If any antenna is missing or damaged, do not operate the equipment; continued use will cause permanent damage.



3.2 Power On

Power On

1. After connecting the antennas, short-press the power button.



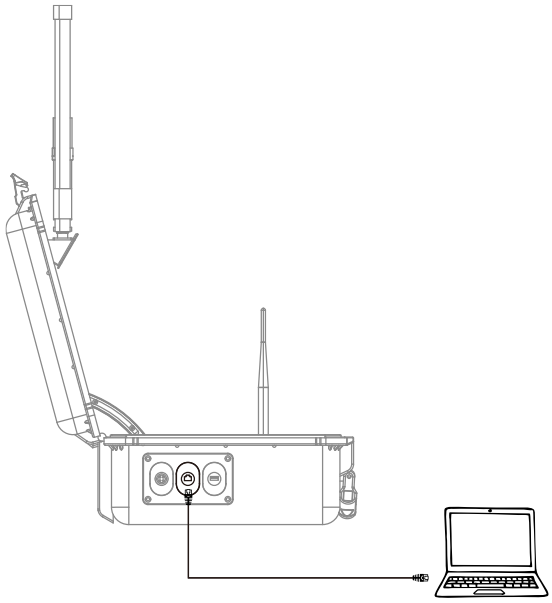
2. Upon power-up, the system interface loads.

Screen On/Off

1. When the device is on and the screen is lit, short-press the power button to turn off the screen.
2. When the screen is off, short-press the power button to turn the screen on.

3.3 Connect a Control Terminal

1. Connect a control terminal to the device's Ethernet port for accessing Drone Defense Software Platform or transferring files.

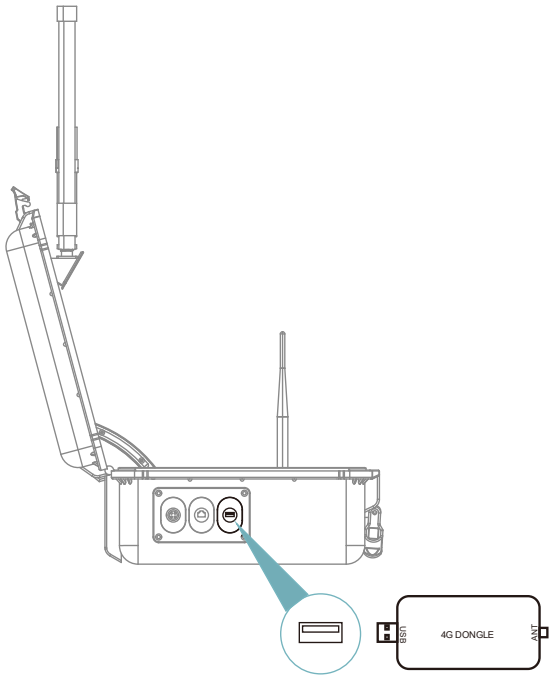


3.4 (Optional) Connect to the Network

Option 1: Use 4G Dongle

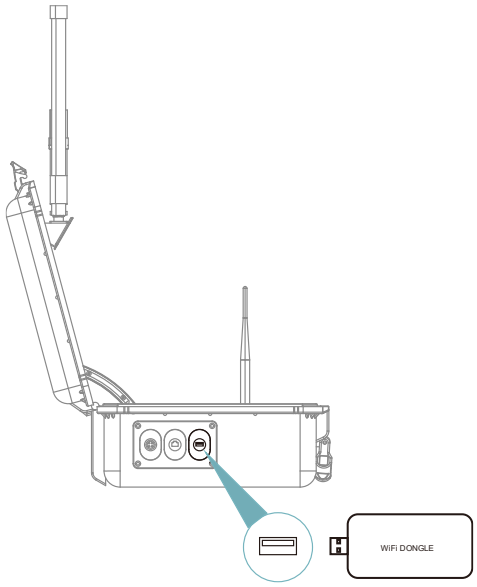
1. Prepare a data SIM card and insert it into the 4G dongle.
2. Insert 4G dongle into the USB port.

> ⚠ The 4G dongle must be connected to the provided LTE antenna.



Option 2: Use WiFi Dongle

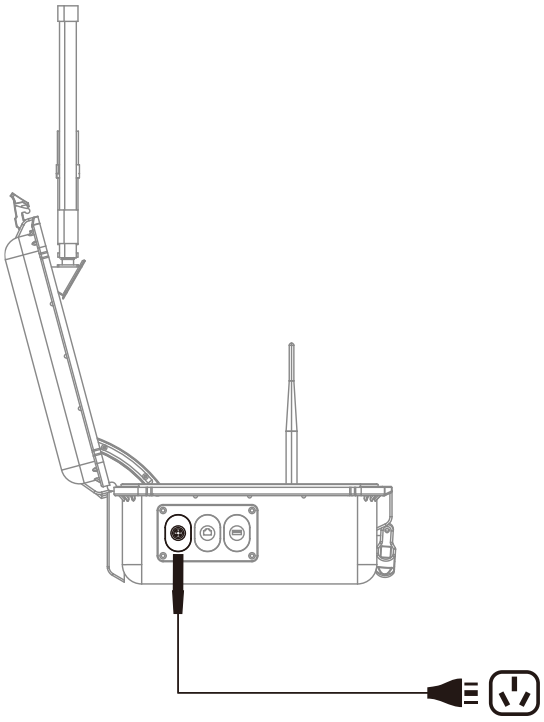
1. Insert WiFi dongle into the USB port.



2. Log in to the Drone Defense Software Platform, go to Devices > Controller > Wi-Fi Settings, and select the WiFi network to be connected.

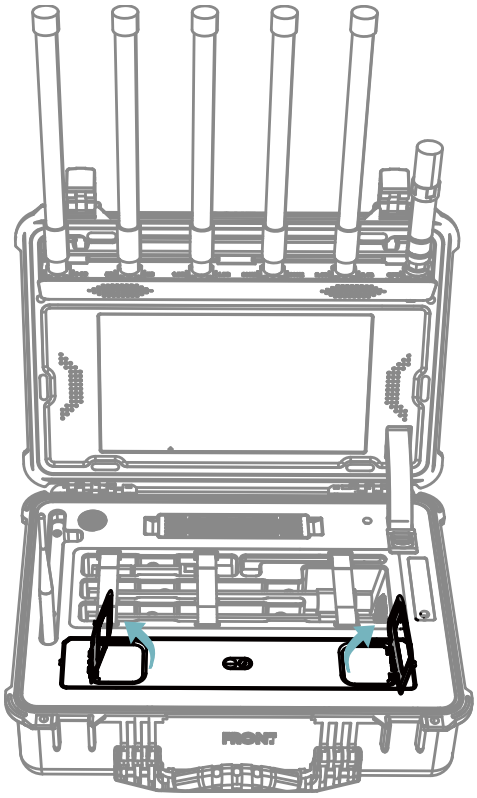
3.5 Charge

1. To check the remaining battery level, click the battery level button or view the battery icon in the software interface.
2. Connect the power adapter to the electrical outlet and the device's power connector to begin charging.

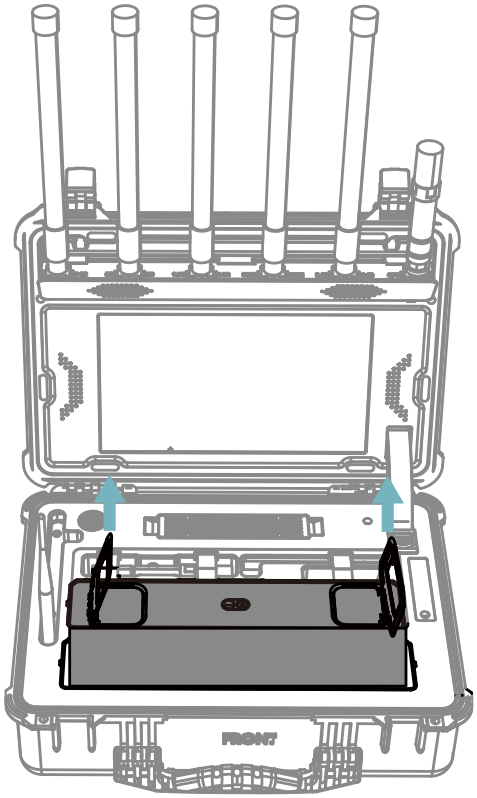


3.6 Remove the Battery

1. Lift the battery by its handles on both sides.



2. Pull the handles upward to remove the battery.



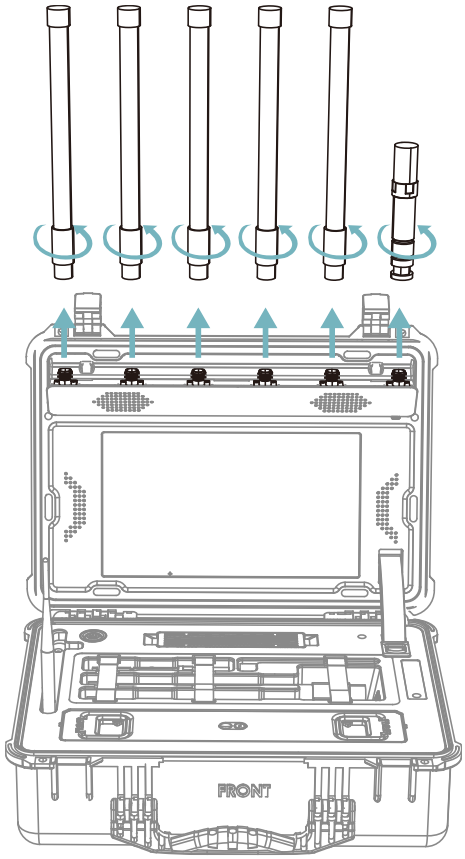
3.7 Power Off

1. When the device is on, power off the device.

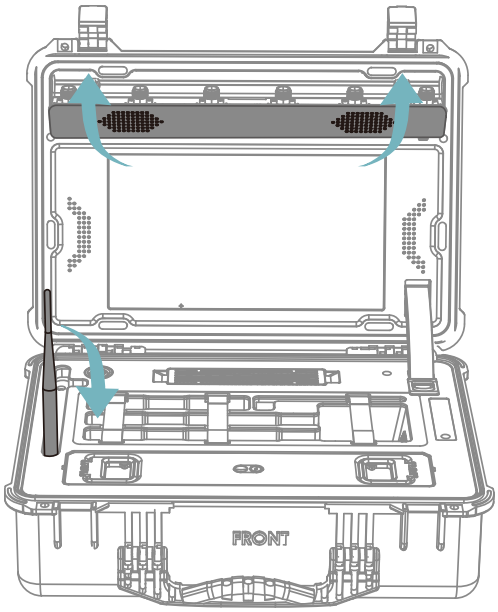
   a) Long-press the power button. When the shutdown prompt appears, click **Confirm** to power off.

   b) Long-press and hold the power button until the device powers off.

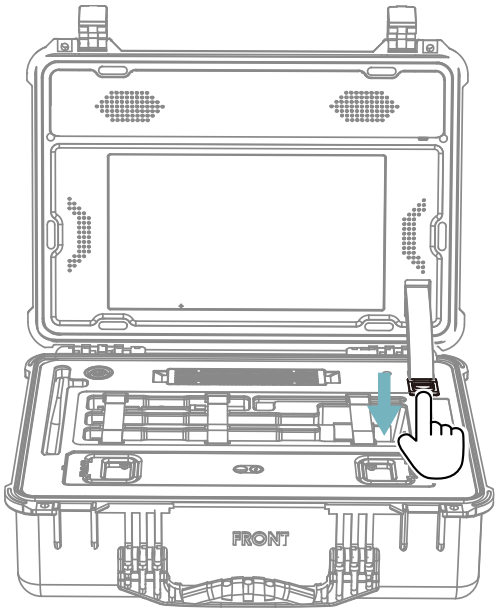
2. After shutdown, detach the antennas, return them to the antenna & stylus storage slot, and close the antenna interface base.



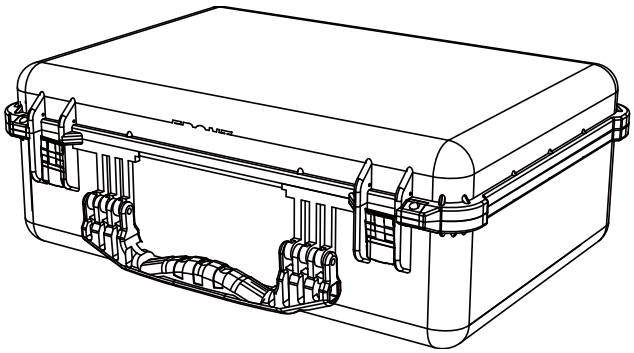
3. Lower the ADS-B antenna to its stowed position.



4. Slide the hinge lock release button downward and close the device.



5. Fasten the two latches on the device.



4 Drone Defense Software Platform

Drone defense software platform, which integrates situational awareness, information display, decision-making assistance, command and control. It supports browser access and control of other devices on the LAN, and supports multi-screen and multi-device monitoring.

4.1 Log in to the System

This login procedure applies when accessing the Drone defense software platform via a control terminal. If operating the device directly through the touch screen display, no login is required and the system automatically enters the main interface after power-on.

Configure the Network

Before logging into the system, it is necessary to configure the network settings of the drone defense software platform. The IP address should be set within the 192.168.100.x subnet, which is the same subnet as the default access IP of the system: 192.168.100.100.

1. Configure the IP subnet to 192.168.100.x according to the system platform, e.g., Windows, Linux, or macOS.

	Avoid setting the IP address to 192.168.100.100, as this will cause a conflict.

Log in to the System

1. Open a browser and enter the device's IP address https://192.168.100.100 to access the login page.

	Google Chrome is recommended for use.

2. Enter the system account and password, drag the verification slider to verify, and then click the “Sign in” to enter the main interface of the system.

Account:	admin
Password:	lzno1

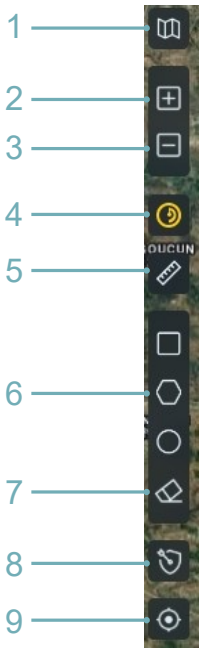
4.2 Main Interface

The main interface is distributed in three functional areas.

1. Operation menu area
2. Information display area
3. Function display area

Operation Menu Area

The operation menu area includes options such as map mode switch and defense-zone settings.



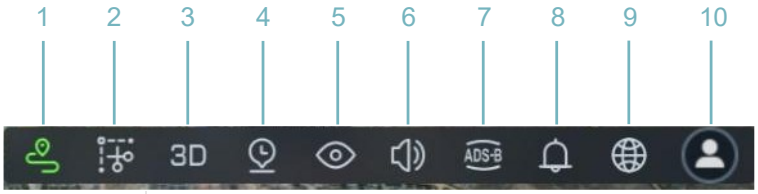
1 Map mode switch	Switch between Google satellite and Google vector.
2 Zoom In	Zoom In the map.
3 Zoom Out	Zoom Out the map.
4 Set Center Point	Sets the center point coordinates for networking. Not applicable for single-device operation.
5 Measuring Distance	Measure the distance and angle between two points on the map, allowing for the measurement of distances and angles between multiple endpoint positions and a starting point.
6 Draw Rectangle / Polygons / Circle (The defense zone or warning zone)	Set Defense Zone/Warning Zone on the Map. **Defense Zone:** Once set, the defense zone appears as a red inner circle. If a drone enters this zone, it will be highlighted in orange, and audible/visual alarms will activate. **Warning Zone:** Once set, the warning zone appears as a blue inner circle. If a drone enters this zone, it will be highlighted in orange, and audible/visual alarms will activate. Unauthorized drones entering the warning zone will trigger continuous alerts while their position and flight path are monitored.

	The minimum allowable area for drawing defense/warning zones is 100 square meters.
7 Eraser Defense Zone	Delete the defense zone or warning zone drawn on the map.
8 Locate the air defense zone	If the device moves too far and loses the defense/warning zone, perform rapid repositioning.
9 Return to center	Return to the center point.

Information Display Area

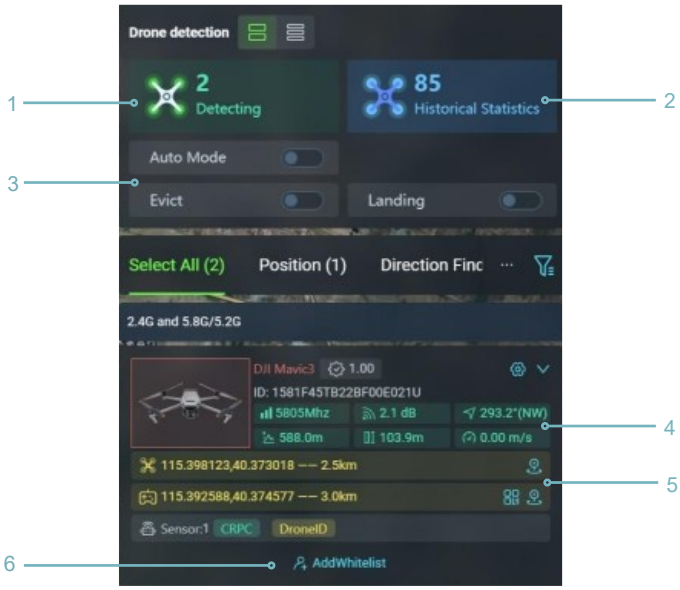
The information display area includes options such as hiding/displaying the menu bar of the main interface, volume, notification switch, language switch, system logon/logoff and other operations.

In addition, this area is mainly responsible for the real-time detection information display and control functions of drones, which can display the number of current detection and historical detection drones, as well as the detailed information of currently detected drones.



1 Show/Hide trajectory	Hide or show the trajectory.
2 Display/Hide Past Flight Trails / Drone Trace Cut Off	Display of hide past flight trails.
3 3D Map	Switch between 3D map view and 2D map view.
4 Historical Drones Detection Setting	Display the historical drone-detection locations on the map and marked with yellow. The date range can be configured by start time and end time.
5 Hide/Show panel	Hide or show the detection area, function area, and map area of the interface.
6 Sound settings	Adjust the alarm volume.

7	ADS-B	Used to receive civil aviation signals transmitted by aircraft, including flight route and schedule information.
8	Notifications	Display device status notifications.
9	Change language	Change system language.
10	Account login	Account login/logout.



1 Currently Detected Drones

2 Cumulative number of drones detected

3 Function Toggle	Toggle the button to activate the corresponding drone defense function.
4 Drone Current Status	Displays detected drone information including reference distance and position.
5 Drone / Pilot Location	Click the corresponding button to navigate to the current location of the drone/pilot.
6 AddWhitelist	Click to add the selected drone to the whitelist; whitelisted drones entering the defense zone will not trigger alerts

Function Display Area

The function display area includes options such as checking the events, checking the whitelist, checking the statistic, checking the device status and other operations.

Click the button  to expand the function display area menu. Click the same button again to hide the menu.

1	Events	The Drone Events list shows drone details such as type, ID, detection time, duration, and frequency. It supports sorting, time-based expansion, history replay, export drone events, clear drone events on the main screen.
2	Advanced	Includes the unknown UAV WiFi detection, Custom Detectors, Custom Models module.
3	Black/White	Drones added to the blacklist will be flagged with an alert once they enter the defense zone. Drones on the whitelist will not trigger any alarm when they enter defense zone. Whitelist/Blacklist import/export formats: UTF-8 and XLSX. View the exported files in the browser's Downloads list.
4	Statistics	The Drone Statistical Report includes Incidents/Drones, Most Seen Drone Brands, Common UAV, Incident Trends and Critical Incidents. It supports date range configured by start time and end time, and export PDF of the statistics.
5	Devices	The device management window displays the operational status information of controller, engine, sensors and defender. ● Controller: Display the information such as operation status, and detection bands.

		• Engine: Display the information such as operation status, GPU and CPU information, and version. • Sensors: Display the information such as operation status, detection bands, and version of the two sensors. • Spoofer: Display the information such as operation status, faults, and version.
6	Networking	Display the networking information such as Node ID, and Node name.  The Networking function icon appears when the site is a Networking Master.
7	Version	Display the version information of UI version, cm, engine, sensor, defender.
8	Settings	Modify passwords and do user management, such as add, edit and delete.
9	Function display area	The functional display area primarily shows the Spectrum, Incident Trends, and Most Seen Drone Brands. The spectrum feature visualizes signals currently detected by the device as a spectrum.

4.3 Check Detection Information

In Information Display Area, it displays the position and direction of the drone. Additionally, the drone model, electronic ID and approximate location information are marked on the electronic map in the main interface.

Add to/Delete from Whitelist

Drones added to the whitelist will not trigger any alarm when they entering the defense zone.

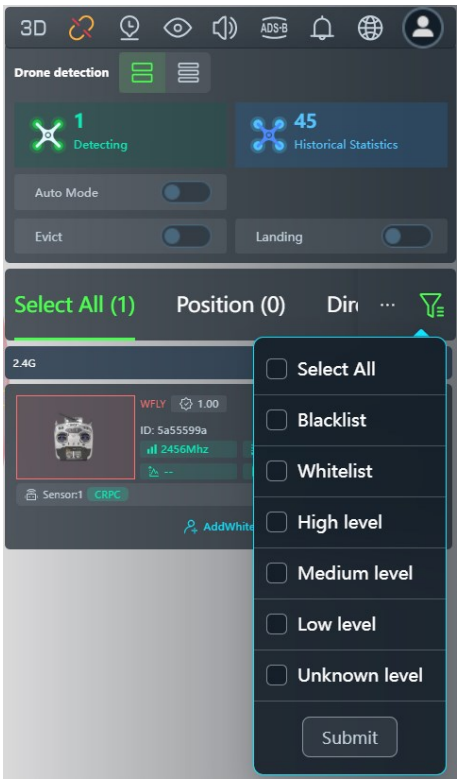
1. Select a drone.
   a) Click **AddWhitelist** button to add the drone to whitelist.
   b) Click **DeleteWhitelist** button to delete the drone from whitelist.

Set Drone Profile

1. Select a drone. Click  button and select **Profile**.
2. On the Drone Profile Setting page, configure the Custom alias, Effective scope, Drone Link ID, and Drone Description.

Filter the Drone List

1. Click  button to pop-up the filter items.



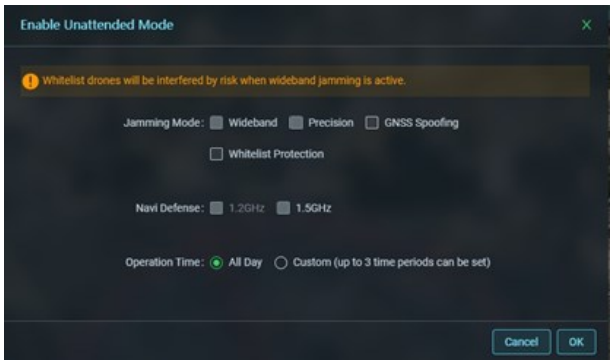
2. Tick the filter criteria and the system displays the drone list accordingly.

4.4 Enable Unattended Function

In unattended mode, the system automatically identifies and filters drones on the whitelist upon detection. For blacklisted drones, it initiates spoofing. The countermeasures will automatically cease once the alarm is no longer triggered.

1. In Information Display Area, toggle the switch of **Auto Mode** to enter the Autonomous Defense Option Confirm page.

2. In the page, set Jamming Mode, Navi Defense, and Operation time.

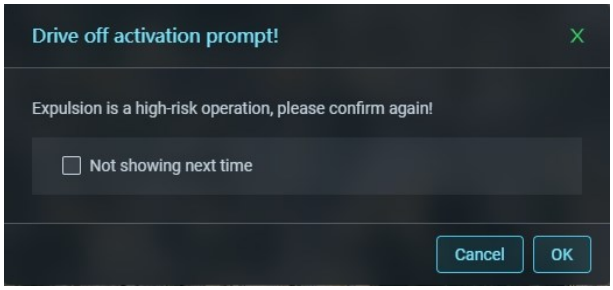


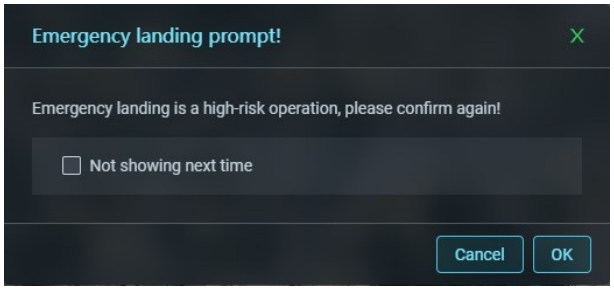
3. Click **OK** button to enable unattended function.

4.5 Spoof Drone

1. In Information Display Area, toggle the switch of **Evict** or **Landing** to interfere with the drone.

2. Read the notice and click **OK** button to confirm.

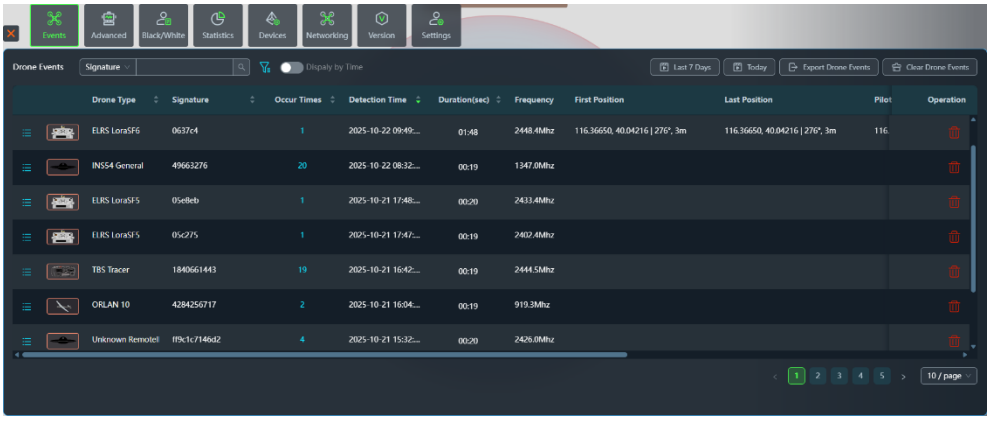




4.6 Check the Events

1. In Function Display area, click **Events**, view the drone events.

> This feature allows one-click expand/collapse of the “Incident Trends” panel on the main interface.



2. Click **Export Drone Events** button to export drone events.

4.7 Mark Danger WiFi Drones

The device can display the drone-like WiFi signals detected in the current environment and allow users to mark them.

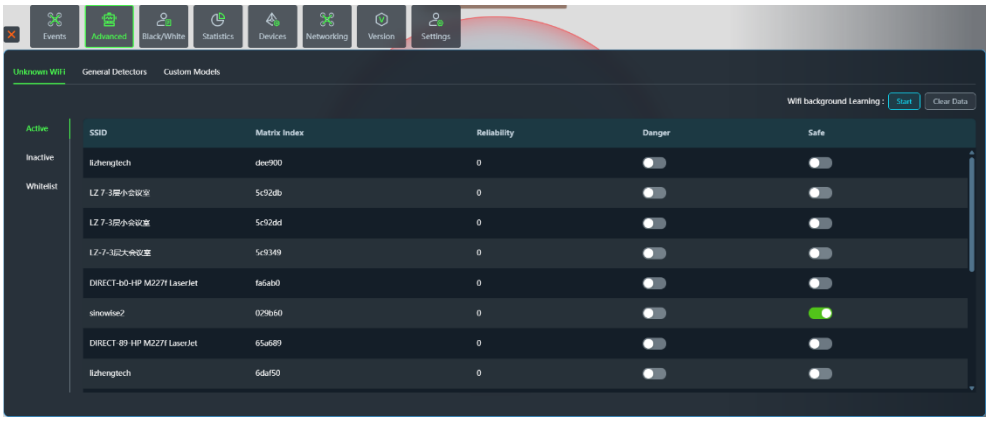
Start WiFi Background Learning

1. In Function Display area, click **Advanced**.
2. Click **Start** button to start Wifi background learning.

3. Click **Stop** button to stop this process.

Mark Danger WiFi Drones

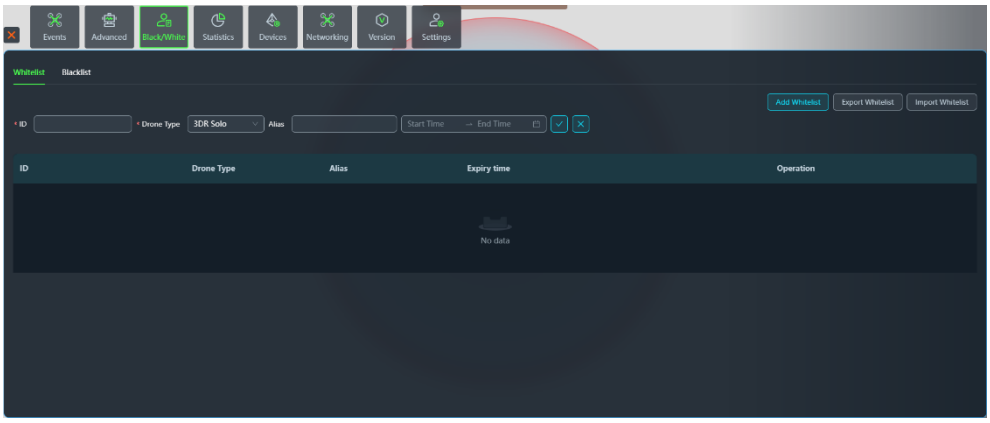
1. In Function Display area, click **Advanced**.
2. Select Unknown WiFi panel to enter the WiFi list.



3. Mark the WiFi signal.
   a) Users may mark an identified non-drone WiFi signal (e.g., a common wireless hotspot) as “Safe.” Once marked, the system will ignore this signal and not trigger alarms.
   b) If a WiFi signal is confirmed to originate from a drone, users can mark it as “Danger”. After marking, the system will trigger an alarm whenever this signal is detected.

4.8 Manage the Whitelist/Blacklist

Drones added to the blacklist will trigger visual alerts when entering the defense zone, while whitelisted drones will not trigger any alarm when they appear.



Export Whitelist/Blacklist

1. In Function Display area, click **Black/White**.
2. Click **Export Whitelist/Blacklist** button to export whitelist or blacklist file.

Import Whitelist/Blacklist

1. In Function Display area, click **Black/White**.
2. Click **Import Whitelist/Blacklist** button to import whitelist or blacklist file. The UTF-8 and XLSX formats are supported.

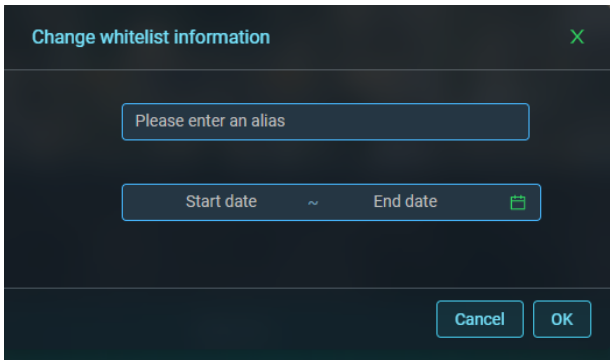
Add Whitelist/Blacklist

1. In Function Display area, click **Black/White**.
2. Click **Add Whitelist/Add Blacklist** button, enter the ID, Drone Type, Alias, set Effective time, then click  to add.

Update Whitelist/Blacklist

1. In Function Display area, click **Black/White**.
2. Select a list formation to be updated, click  button, update information.

a) For whitelist, update alias, and effective time range.



b) For blacklist, update alias.

Delete Whitelist/Blacklist

1. In Function Display area, click **Black/White**.
2. Select a whitelist or blacklist to be deleted, click button and information will be deleted directly.

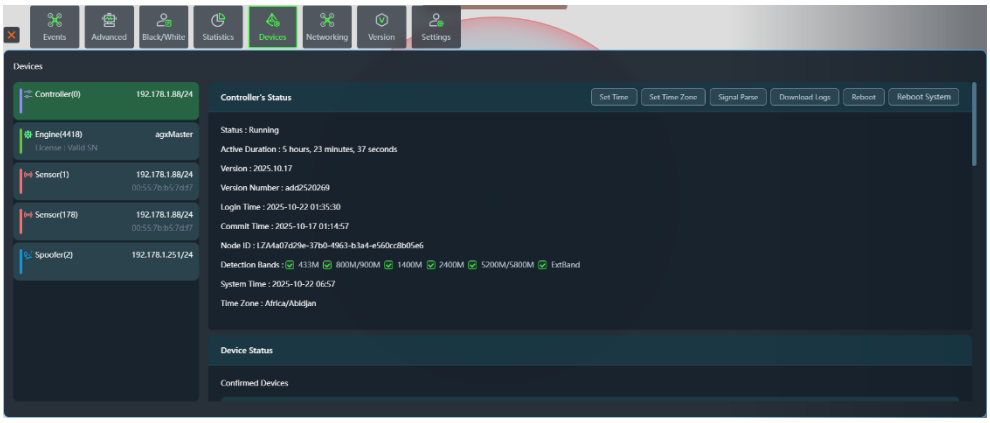
4.9 Check the Statistic Report

1. In Function Display area, click **Statistics**. View the drone event statistics report.

2. Click **Export PDF**, set the time range and export the statistical report in PDF format.

4.10 Check the Device Status

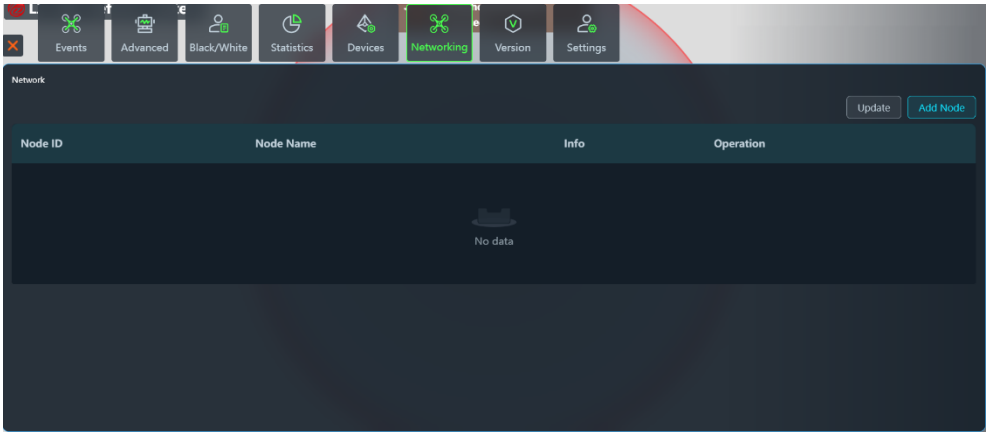
1. In Function Display area, click **Devices**. View the information of Controller, Engine, Sensors and Defender.



4.11 Manage Nodes

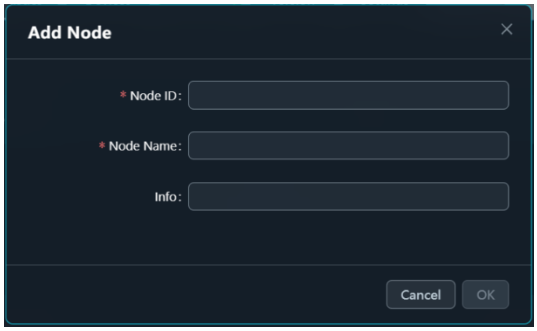
Manage the nodes under Networking function.

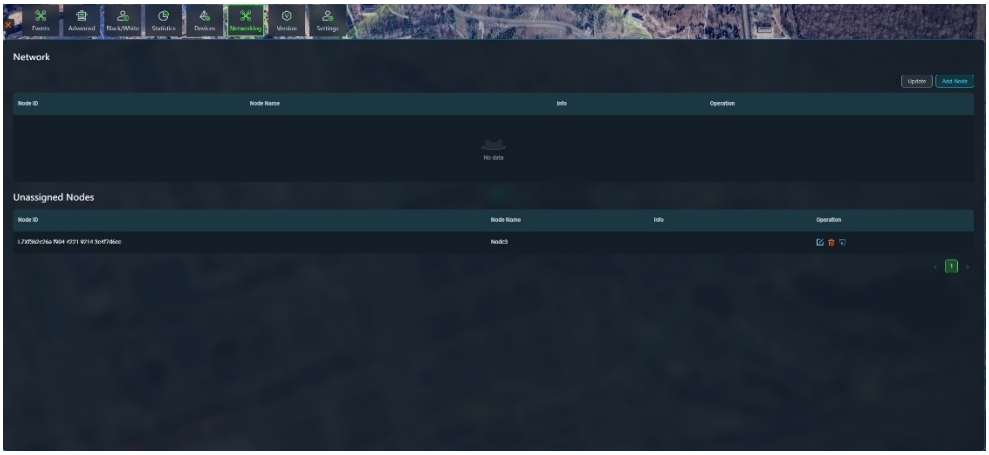
The Networking function icon appears when the site is a Networking Master.



Add Node

1. In Function Display area, click **Networking**.
2. Click **Add Node** button, enter the new node's ID, name and information, then click "OK". The new node appears under Unassigned Nodes.





3. Click  button to move in the node to the networking.

Update Node

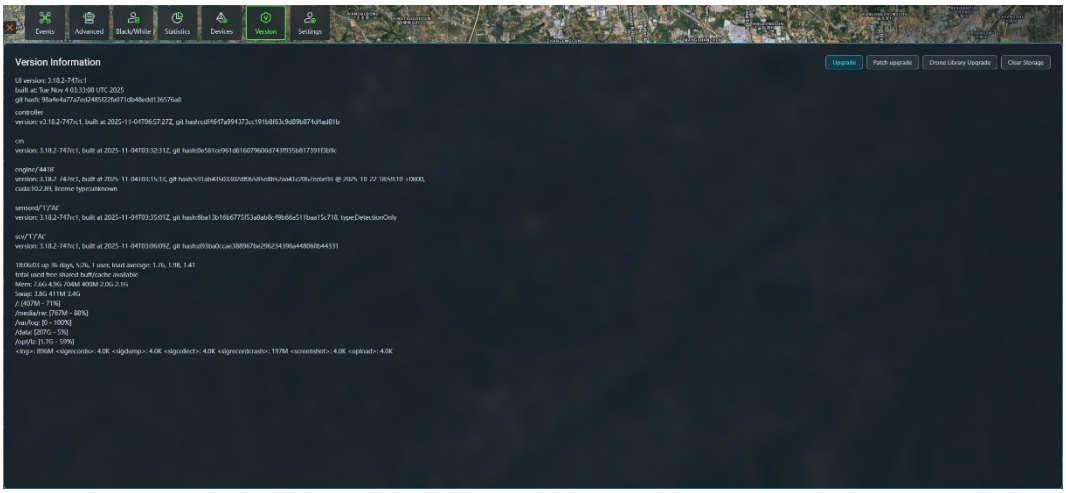
1. In Function Display area, click **Networking**.
2. Select a node, and click  button to update its Node Name or information.

Delete Node

1. In Function Display area, click **Networking**.
2. Select a node, and click  button to delete this node.

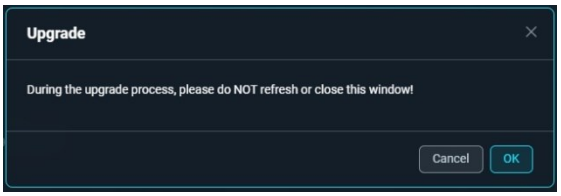
4.12 Check Version

In Function Display area, click **Version** to display the information of UI version, cm, engine, sensor.

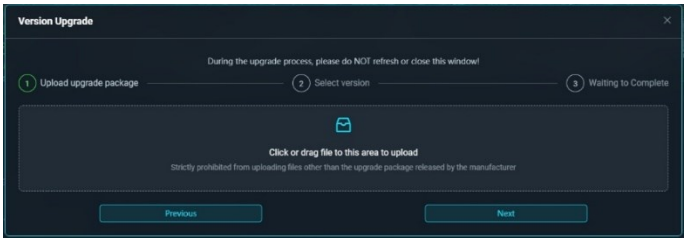


Upgrade Software Version

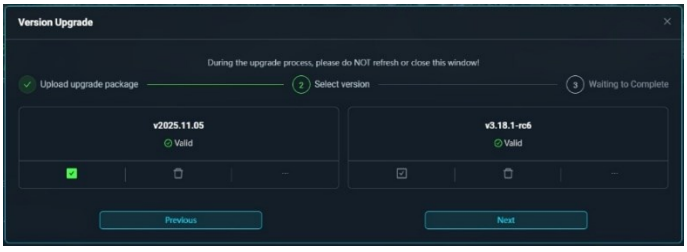
1. Click **Upgrade** button.



2. Click **OK** in the popup.

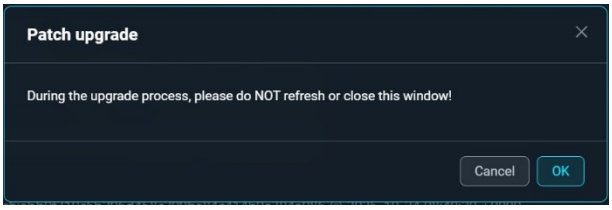


3. Select version to upgrade:
   a) Upload an upgrade package.
   b) Click **Next** button to select a valid software version.

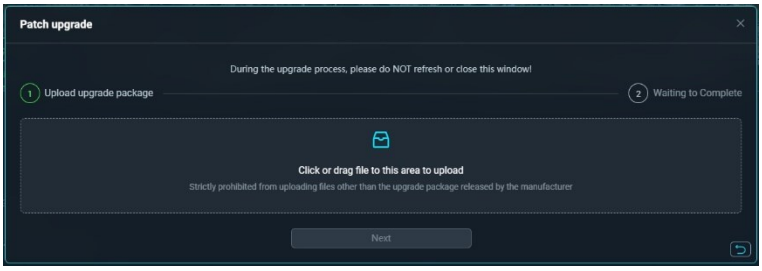


Upgrade Patch

1. Click **Patch Upgrade** button.

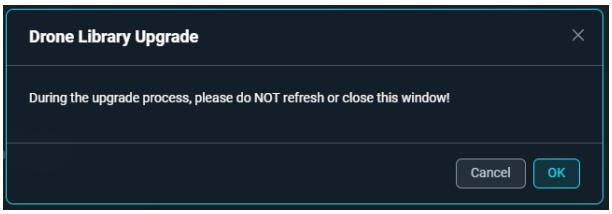


2. Click **OK** in the popup to upload an upgrade package.

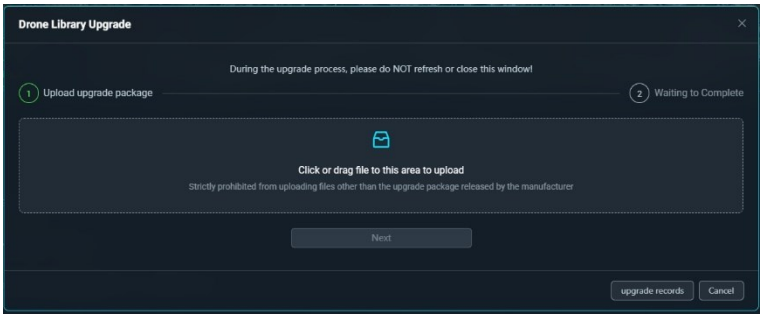


Upgrade Drone Library

1. Click **Drone Library Upgrade** button.

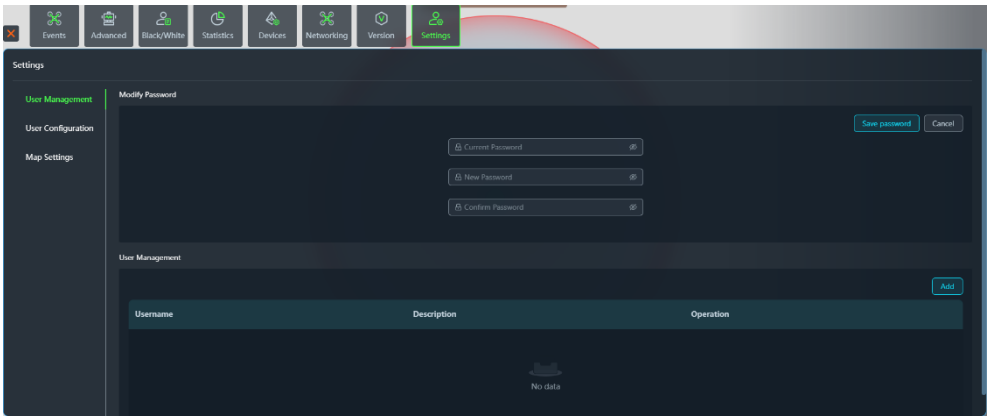


2. Click **OK** in the popup to upload an upgrade package.



4.13 Change Password

1. In Function Display area, click **Settings**.



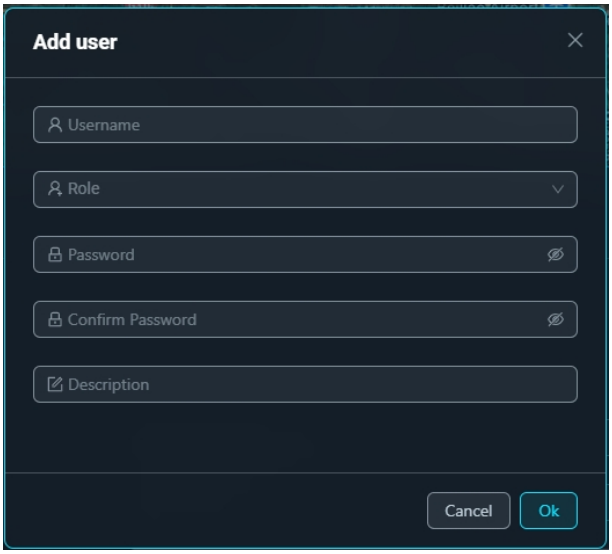
2. Enter the current password and the new password, then click **Save Password** button to set the new password.

4.14 Manage Users

This functionality is restricted to Admin accounts for user management. Normal accounts do not have these permissions.

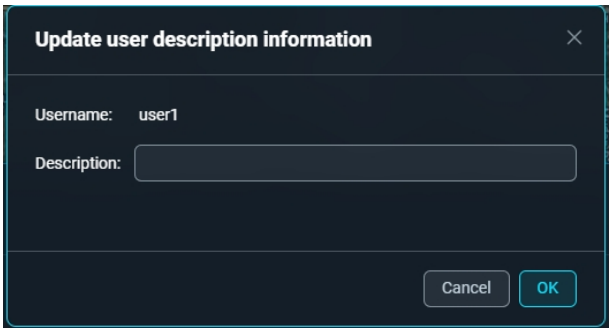
Add Users

1. In Function Display area, click **Settings**.
2. Click **User Management**.
3. Click **Add** button, enter the new user's username, role, password, and description information, then click "OK" to add the new user.



Update User Description Information

1. Select a user to be updated, click **Update** button, update the user's description information.

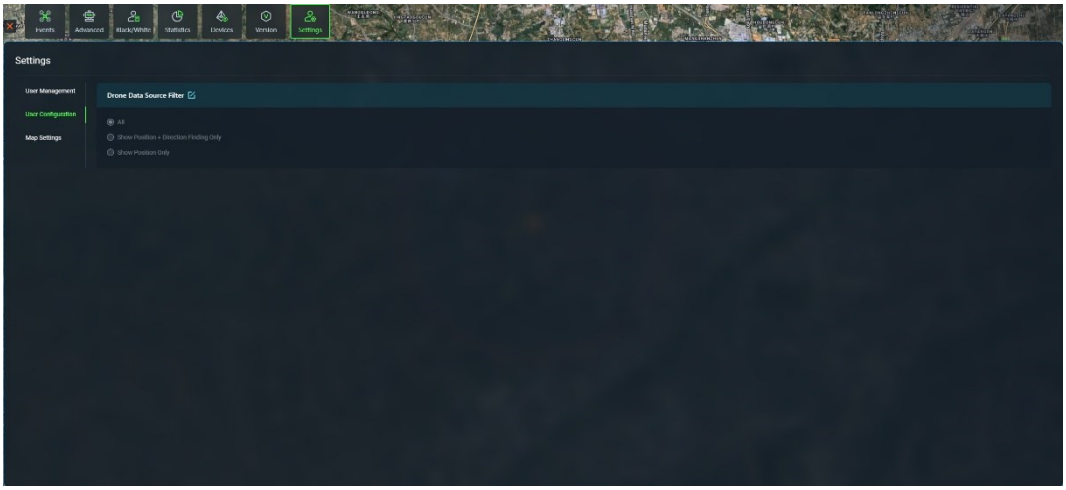


Delete User

1. Select a user to be deleted, click **Delete** button, click **Confirm** to delete the user.

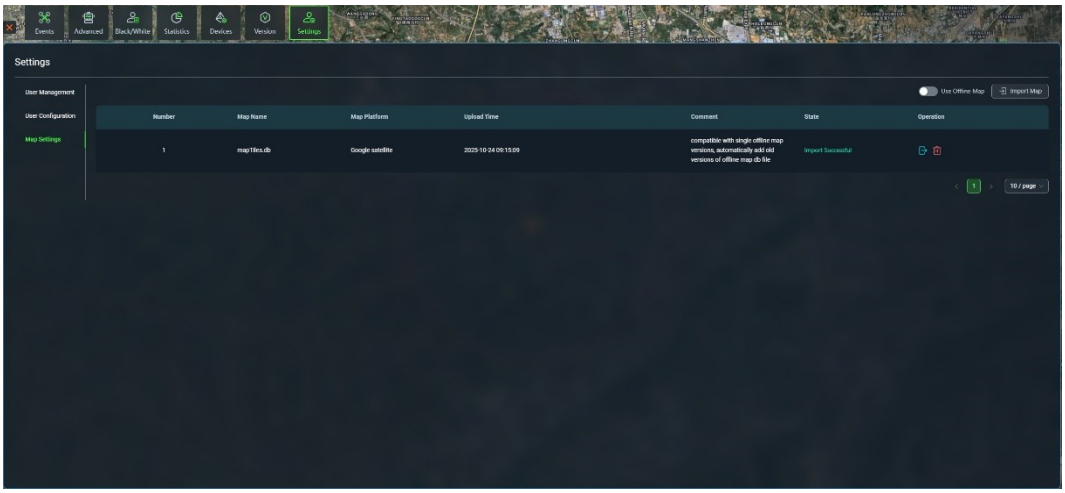
4.15 Configure User

1. In Function Display area, click **Settings**.
2. Click **User Configuration**.
3. Click  icon to select drone data source.



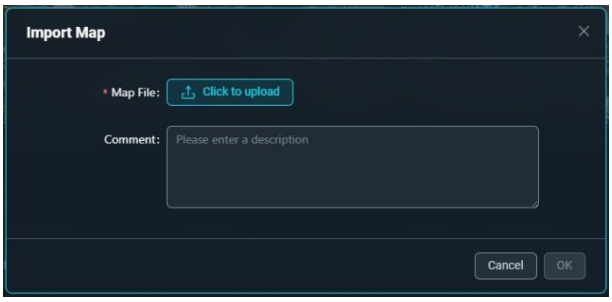
4.16 Manage Maps

The map can be downloaded or imported under Settings.



Import Map

1. In Function Display area, click **Settings**.
2. Click **Map Settings**.
3. Click **Import Map** button.



4. Upload the map file in local directory.

Download Map

1. Click  icon to download the map to local directory.

Delete Map

1. Click  icon to delete the map.

5 Equipment Maintenance

To ensure stable operation of the equipment, please comply with the following maintenance specifications.

5.1 Routine Maintenance

Maintenance Type	Maintenance Method
Interface protection	Seal unused interfaces with protective covers.
Cable maintenance	● Do not replace antennas without authorization after deployment. ● Ensure cables and interfaces are fully engaged and securely locked. ● Immediately replace any feeder/power/Ethernet cables with damaged jackets or exposed wires. ● Ensure plug pins are not bent or damaged.
Power inspection	Verify that the device is powered normally.

5.2 Basic Troubleshooting

Fault Type	Troubleshooting Method
Power-related fault	● Restart the power switch, boot the server, and launch the related services. ● Power off the device, wait for 30 seconds, and then restart it.
Network disconnection	● Use the *ping* command to test connectivity between the device and the server. ● Unplug and reconnect the network cable, then verify that the port indicator light is on and stable.
System Process	Log in to the "Device" interface to check the process status of the

Exception	controller, engine, and sensors.

If the issue persists, contact our technical support team.

Unauthorized personnel or non-designated maintenance personnel are prohibited from disassembling the chassis.

6 Packaging, Transportation and Storage

The equipment shall comply with the following requirements for packaging, transportation, and storage:

6.1 Packaging

The packing boxes shall be moisture-proof and shock-proof, and contain the following items:

- Delivery list
- Product Inspection Certificate
- User manual.

6.2 Transportation

In the process of transportation, avoid throwing, sun and rain, avoid mixing corrosive substances.

6.3 Storage

The storage shall meet the following requirements:

- Products should be stored in a cool, ventilated, dry warehouse.
- Do not put together with oil, away from heat sources.
- Stacking should be 20cm from the ground and 20cm from the wall.