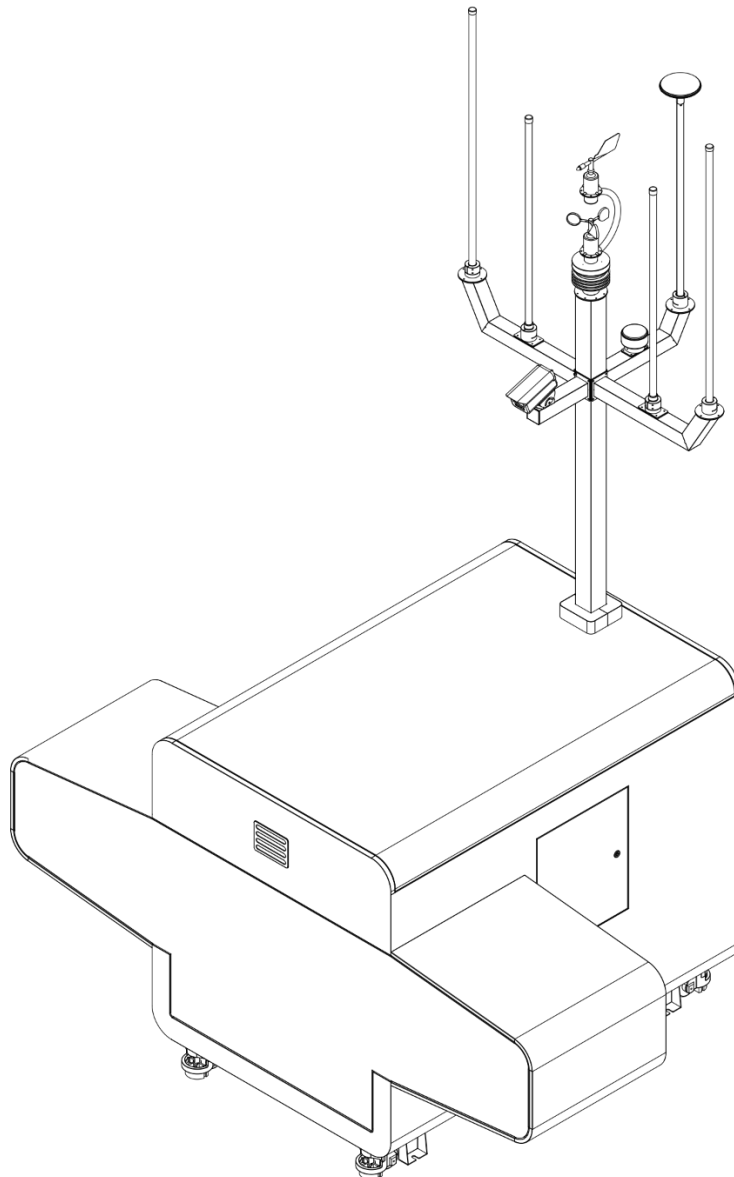


Autel Dragonfish Nest

User Manual

V1.0.2 2024.07



AUTEL
ROBOTICS

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Trademark Information

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Reading Assistance

- This manual is an electronic PDF document that supports high-resolution printing.
- If you are using a PDF reader such as Adobe Reader or Microsoft Edge to read this manual, press Ctrl+F on Windows or Command+F on Mac to search for keywords.
- View the content structure in the table of contents and click on titles to navigate to the respective pages.

Thank you for purchasing and using the Autel Dragonfish Nest (hereinafter referred to as “nest”) from Autel Robotics. Relevant user documents for this product are provided in electronic form along with the product, and download links are provided in this manual. Before using this product, please carefully read the operation steps and precautions in this manual, so that you can quickly understand the characteristics and usage methods of this product, so as to ensure safe use of the product.

	• The final interpretation right of this document and all related documents of this product belongs to Autel Robotics. • This document is subject to update without notice.
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Legend

The following symbols are used in this manual to draw the user's attention to important safety and operating information. Please be sure to follow the notes or requirements under each symbol, otherwise, it may affect the safety features of the product or cause personal injury.

Symbol	Definition
	Warning: Alerts to a potentially hazardous situation.
	Important: Reminds the user to pay attention to a point.
	Remarks: Supplementary information.
	Tips: Quick tips to get the best possible experience.

Read Before Your First Flight

To ensure safe use of the Dragonfish Nest, Autel Robotics provides you with the following documents and relevant tutorial videos. Please scan the QR codes in this manual or use the provided links to access them.

1. “Packing List”: A list of everything that should be included in the packing box.
2. “Disclaimer and Safety Operation Guidelines”: Instructions on how to operate the product safely.
3. “User Manual”: A guide for you to master the operation method of the product proficiently.
4. “Maintenance Manual”: Instructions on how to maintain the product and its accessories.
5. “Autel SkyCommand Center User Manual”: Guide users to use the platform.

We recommend that you first watch tutorial videos to know detailed procedures of nest construction and usage, and read “User Manual” to learn product information details, and safety items and construction preparation before initial construction, such as nest site selection preparation, power supply and network configuration, lightning protection grounding facilities specifications, and aircraft alternate landing points, and then read the “Disclaimer and Safety Operation Guidelines” carefully, the “Quick Start Guide” to get a basic understanding of how to

complete on-site installation, configuration and first-time flight, and the “Autel SkyCommand Center User Manual” to learn the detailed usage method of the SkyCommand Center.

Getting Tutorial videos, User Documents, and Relevant Software

You can scan the QR codes below or visit the following links to access tutorial videos and user documents or download relevant software for the Dragonfish Nest:

To watch tutorial videos, please visit:

<https://www.autelrobotics.com/videos/dragon-fish/>



To download resources, please visit:

<https://manuals.autelrobotics.com/?dir=/Autel%20Dragonfish%20Nest/Suite/>



Manual Guide

This manual contains 9 main chapters and 1 appendix. You can refer to the corresponding chapters for the desired information.

Chapter	Chapter Overview
Product Overview	This chapter introduces the main functions of the Autel Dragonfish Nest Version.
Flight Safety	This chapter introduces the flight environment, wireless communication requirements, and important flight safety features of the nest.
Nest	This chapter introduces the functions and usage of the nest's components.
Site Construction Preparation	This chapter introduces the pre-installation preparations and construction requirements for installing the Autel Dragonfish Nest.
Nest Installation and Cable Connection	This chapter presents the operation specification for installing and deploying the Autel Dragonfish Nest.

Aircraft Preparation	This chapter describes the inspection items required for the Dragon Fish aircraft.
Nest Configuration	This chapter shows you how to configure the Autel Dragonfish Nest to ensure that the Autel SkyCommand Center can access the device normally.
Flight Operation Test	This chapter demonstrates how to control the Autel Dragonfish Nest to carry out automatic flight operations through the Autel SkyCommand Center.
Updates and Troubleshooting	This chapter shows you how to update and upgrade the device and troubleshoot through the Autel SkyCommand Center.
Appendix A	This chapter provides the technical specifications of the nest.

Disclaimer

To ensure the safe and successful operation of this product, please read and fully understand all user documents listed above and strictly follow the operating instructions and steps described in this manual. Store the aircraft and its accessories out of the reach of children and pets. If you do not abide by the Safety Operation Guidelines, Autel Robotics shall not be responsible for any product damage or personal and property loss during use, and shall not provide any warranty service. Never modify the product using any incompatible component or in any way that does not conform to the official instructions of Autel Robotics. Please make sure that the operations you perform do not endanger the personal or property safety of yourself or those around you. By starting to use this product, you agree that you have read and accepted all terms related to this product. You undertake to be responsible for your own actions and all consequences arising therefrom. You undertake to use this product only for legitimate purposes and agree to these terms and any relevant policies or guidelines that Autel Robotics may establish.

Important

- When unboxing the product for the first time, carefully check the aircraft and other accessories included in the packing box according to the "Packing List".
- The content of this manual will be updated from time to time based on the function updates of the product.
- Please be aware that in the absence of flight logs from the Autel Voyager App, Autel Robotics may not be able to analyze the causes of product damage or accidents and provide after-sales service.

Warning

- Using this product involves certain safety risks. Do not allow minors to operate the product.

End Use Statement

This product may be subject to export control laws in China, U.S, EU or other countries, which

can only be authorized for civil (not military) use in sale, export or domestic transfer. Users need to confirm the product will not be used in the following situations, otherwise he or she will assume all losses caused by usage in such situations and legal responsibility on their own:

1. any military end use;
2. used for nuclear weapons, biological or chemical weapons or missiles that carry those weapons;
3. export or re-export or transfer it to any entity or person sanctioned by China, U.S, EU or any other government with jurisdiction;
4. export, re-export or transfer it to Cuba, Iran, North Korea, Syria, Crimea, Sevastopol and other areas under embargo;
5. any device or equipment that supports monitoring purpose.

Warranty Policy

Autel Robotics guarantees users who purchase products through its official authorized channels that:

Under normal use, the Autel Robotics products you purchase will be free from material and workmanship defects during the warranty period.

If you can provide a valid purchase receipt, the warranty period of this product is calculated from the midnight of the next day after you receive the product.

If you cannot provide a valid purchase receipt, the warranty start date will be postponed by 90 days from the date of manufacture indicated by the product's serial number or as defined by Autel Robotics.

Tips

- For the after-sales policy of the product, please visit:
<https://www.autelrobotics.com/service/policy/>.

After-Sales Support

If you have any questions or concerns about our products, please contact Autel Robotics customer support:

Hotline: (844) MY AUTEL or (844) 692-88 35

Maintenance Service

If your equipment needs to be inspected or repaired, please contact Autel Robotics through the following methods:

Email after-sale@autelrobotics.com or support@autelrobotics.com.

Call Autel Robotics customer support at (844) MY AUTEL or (844) 692-88 35.

Contact dealers authorized by Autel Robotics.

Important

- All data stored on the product may be erased during the repair process. To avoid data loss, please back up important files in your aircraft or remote controller before the product is under warranty.

Company Information

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Official Website: <https://www.autelrobotics.com>

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Chapter 1 Product Overview

1.1 Introduction

Autel Dragonfish Nest (hereinafter referred to as “Nest”) is an unattended operation platform for Autel Dragonfish Standard series aircrafts. The nest is small and light, highly reliable and easy to deploy. The nest is integrated with surveillance camera, weather sensors, image transmission antenna, 4G antenna, RTK antenna, and UPS power, featuring aircraft auto storage, remote communication, data storage/transmission, and intelligent analysis. It has built-in air conditioning system, which can cool down the smart battery and adjust the temperature inside the nest.

The nest has great environment adaptability with an IP54 protection rating (referring to IEC 60529 standards), which can be used in environment from -35°C to 50°C.

When the nest is used with Autel SkyCommand Center, it can realize the automatic inspection task process of the aircraft, including remote flight mission issuance, automatic aircraft launch and recovery, autonomous battery swap and charging, safe landing and takeoff of the aircraft, automatic execution of flight missions, and flight data upload, to realize the intelligent and unmanned operation of the aircraft, liberate manpower, and improve work efficiency. It is suitable for power inspection, oil pipeline inspection, water body monitoring, border patrol, and forestry monitoring, to meet the diverse application needs of the industry.

Tips

- Please note that the working temperature of the aircraft is -20°C to 50°C and that of the nest is -35°C to 50°C. Please use the aircraft and the nest in the suitable environment.
- The protection level of the nest is not permanent and may experience varying degrees of failure as components age and wear. Regular maintenance of the aircraft is required according to requirements in “Maintenance Manual”.

Warning

- Within available communication distance range, multiple nests can be deployed to achieve long-distance takeoff and landing mission.
- By deploying multiple Dragonfish Repeaters to form mesh network along the planned flight routes, the flight operation range can be significantly expanded. For details, please refer to “Autel Dragonfish Repeater User Manual”.

1.2 Auto Operation Procedures

The operation procedures of the Nest and the Autel SkyCommand Center are as follows:

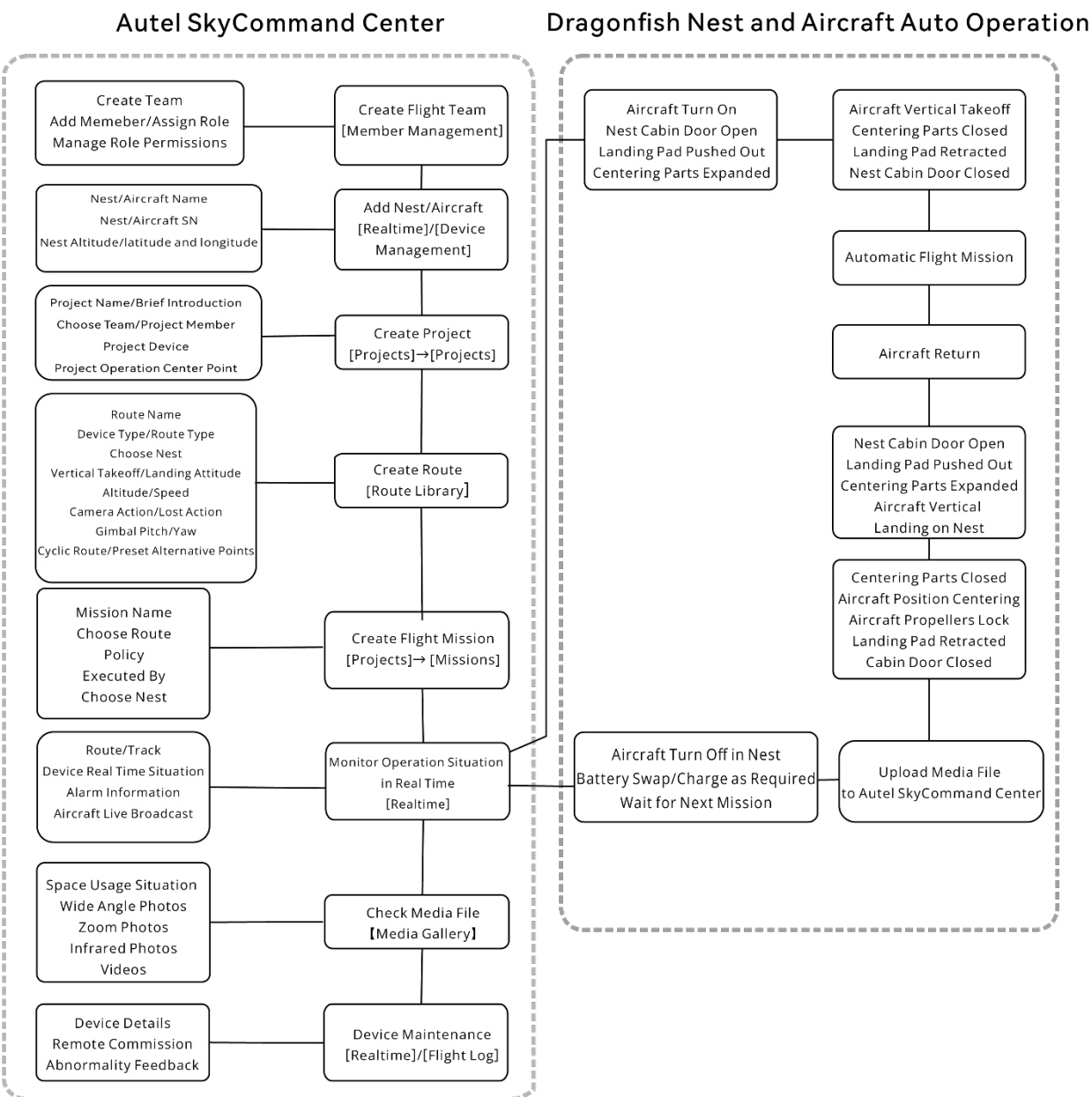


Fig 1-1 Auto Operation Procedures Map

 **Tips**

- For details about how to use Autel SkyCommand Center, please download and read “Autel SkyCommand Center User Manual” to learn much more details about more interface functions.

1.3 Product Acceptance Checklist

When the nest is transported for long distance, the nest will be packaged with fumigation-free plywood, while the pole and other accessories will be packaged with corrugated cartons.

! Important

- Upon receiving the product, please inspect the nest's wood box and other accessories cartons in their entirety. Meanwhile, save the unboxing video for potential logistics damage claims.

Table 1-1 Autel Dragonfish Nest Standard Packing List

No.	Item	Spec	Quantity	Note
1	Autel Dragonfish Nest Body	/	1	/
2	Pole	/	1	/
3	Image Transmission Antenna + Crossarm	/	2	/
4	Image transmission antenna extension cable	3 m	1	Two N-type male connectors, 1/2 feeder
5	Adapter cable for image transmission antenna extension	20 cm	2	N-type female to SMA male
6	RTK antenna + Crossarm	/	1	/
7	RTK antenna extension cable	4 m	1	TMC male connector at both ends
8	Adapter cable for RTK antenna extension	20 cm	1	TNC female connector to SMA male connector
9	4G antenna	/	2	/
10	4G antenna extension cable	10 m	2	/
11	Adapter for 4G antenna extension cable	/	2	SMA external screw threads to internal thread
12	Outside monitoring camera	Full color bullet camera	1	/

13	Mounting bracket for monitoring camera		1	/
14	Monitoring camera Crossarm		1	/
15	DC power cable		1	Used for outside monitoring cameras
16	Cat5e stranded oxygen-free copper Ethernet cable	5 m	2	Used for outside monitoring cameras
17	Cat5e stranded oxygen-free copper Ethernet cable	1.5 m	1	Used for image transmission board
18	Weather Station		1	Includes instrument shelter
19	Anemometer		1	
20	Wind vane		1	/
21	Piezoelectric rain gauge sensor		1	/
22	485 communication power supply cable (1 to 2)	5 m	1	Used for piezoelectric rain gauge sensor/weather station/wind vane/anemometer
23	Foldable antenna		5	Installed on the image transmission board
24	4G mobile phone cloud intelligent switch		1	Used to control the power supply of the board for image transmission
25	Antenna extension cable for intelligent switch		1	
26	Intelligent switch antenna		1	
27	Power cord with plug for machine nest	3 m	1	Used to power the nest
28	Triangle key		3	To nest maintenance door
29	Dry powder fire extinguisher ball	1.3 kg	1	Does not include bracket

30	Universal joint bracket		1	
31	Nest foundation plate		4	
32	M4x12 Allen socket combination screw		18	Used for image transmission board/anemometer/wind vane/Piezoelectric rain gauge sensor installation
33	M5x12 Allen socket combination screw		19	Used for crossarm and universal joint installation
34	M8x20 Allen socket combination screw		8	Used for nest foundation plate installation
35	M8x25 round screw		4	Used for pole installation
36	M4 lock nut		4	Used for wind vane installation
37	M6x12 cross combination screw		2	Used for outside monitoring camera installation
38	M10 x 100 Expansion Bolt		4	Used for nest installation

Tips

- After unboxing the product, please check whether the items inside the packaging box are the same with the checklist. If there is any item missing or defective, please contact Autel Robotics in time.

Chapter 2 Flight Safety

After the first unboxing, please scan the QR code to obtain the latest version of the manual. Please read and understand the entire manual carefully to ensure the safe and correct use of the aircraft.

Before engaging in actual outdoor flights, it is essential to undergo relevant basic flight training (such as watching instructional videos, receiving guidance from professionals, etc.) to familiarize oneself with the functions and characteristics of the aircraft and remote controller.

Prior to flight, please familiarize yourself with all local laws and regulations concerning civilian unmanned aerial vehicles. Choose an appropriate flight environment, set a reasonable flight altitude, and conduct legal flights in accordance with relevant flight requirements and restrictions. Using the aircraft in unsuitable flight environments may pose legal risks.

Before flight, be sure to read the “Disclaimer and Safety Operation Guidelines” to understand relevant safety precautions.

Tips

- For details about how to use the aircraft, the RC and the smart battery, please download and read “Autel Dragonfish Standard Aircraft (Nest Version) Flight Manual”.

2.1 Legal Use Notice

Upon the initial unboxing, please adhere to the legal requirements of the country or region where you are currently located and complete the real-name registration of the aircraft.

2.1.1 Chinese Mainland

- According to the requirements of the Civil Aviation Administration of China's “Management Regulations for the Real-Name Registration of Civil Unmanned Aerial Vehicles,” owners of civilian aircrafts must register their real names on the “Comprehensive Management Platform for Civil Unmanned Aerial Vehicles” (<https://uom.caac.gov.cn>) after purchase and affix the QR code registration mark on the aircraft. Failure to register with real names and affix the registration mark may result in penalties imposed by regulatory authorities.
- The dragonfish standard series aircraft is a light unmanned aircraft, and the operation of this product by individuals under the age of 18 is prohibited by Autel Robotics. The pilots are required to obtain an UAV operation license according to the requirements of the Civil Aviation Administration. Application website: <https://uom.caac.gov.cn>.
- It is recommended to read the “Interim Regulations on the Management of Unmanned Aerial Vehicle Flights” for more detailed regulatory requirements before conducting flights.

2.1.2 The U.S.

- Before using a aircraft, please complete the real-name registration on the FAA website (<https://faaaircraftzone-access.faa.gov/#/>) (registrants must be 13 years old or above). Failure to do so may result in regulatory and criminal penalties.
- The Federal Aviation Administration (FAA) in the United States may impose civil fines of up to \$27,500. Criminal penalties may include fines of up to \$250,000 and/or a maximum of three years in prison.

2.1.3 Canada

- Drone pilots must be 14 or older and always carry a valid aircraft pilot certificate while operating their aircraft. A valid aircraft pilot certificate is a printed or electronic document issued by Transport Canada. No other form of certification will be accepted. For details about how to get an aircraft pilot certificate in Canada, refer to the following link:
<https://tc.canada.ca/en/aviation/aircraft-safety/aircraft-pilot-licensing/getting-aircraft-pilot-certificate>
- Before flight, please register your aircraft through the following portal:
<https://tc.canada.ca/en/aviation/aircraft-safety/aircraft-management-portal>
- You can only fly Dragonfish series aircrafts in following operating environments:
 1. In controlled airspace. For details about the controlled airspace, please refer to relevant Canadian law:
<https://tc.canada.ca/en/aviation/aircraft-safety/learn-rules-you-fly-your-aircraft/choosing-right-aircraft>
 2. Near people. For details about flying an aircraft near people, please refer to relevant law:
<https://tc.canada.ca/en/aviation/aircraft-safety/learn-rules-you-fly-your-aircraft/choosing-right-aircraft>
- Violation of relevant laws and regulations may incur penalty of up to 3000 dollars (for person) or 15000 dollars (for company) or jail time.

Warning
● Please do not fly over people, which may cause physical damage to people around.

2.1.4 The EU

- Drone operators/owners must register with the National Aviation Authority (NAA) of the Member State where they reside. (<https://www.easa.europa.eu/en/domains/civil-aircrafts/naa>).
- This product is not a toy and should not be used by children under the age of 16.

- In the EU region, the dragonfish series aircraft belongs to the category of Level C3 UAV. When in use, it must comply with the operational restrictions of the A3 subcategory, specifically in urban environments:
 1. Flying over non-involved persons is not allowed.
 2. Maintain a horizontal distance of 150 meters from uninvolved people.
 3. Maintain flight altitude below 120 meters above ground level.
- Drone operators are required to obtain “Proof of Completion of Online Training” in the open subcategory A1/A3.
 1. Complete online training.
 2. Pass online theory exam.
- Before using this product, click the following link to learn the detailed information on safety operation limitations about EASA Class 3 aircrafts:
(<https://www.easa.europa.eu/document-library/general-publications/aircrafts-information-notices>)

Important

- According to the relevant laws and regulations in the EU, the dragonfish series aircraft is equipped with sensors (gimbal cameras) that can detect personal data. Users are required to register in compliance with the laws and regulations when using the aircraft.
- After registration, users should input the operator registration number in the Autel Voyager Application and activate the DRI system.

2.1.5 Other countries and regions

Before flying, please consult local legal professionals or aviation authorities to obtain information on laws, regulations, and policies regarding civilian unmanned aerial vehicles. Follow the relevant guidelines to undergo legal registration.

2.2 Flight Operation Regulations

Before flying, it is crucial to understand and adhere to the following flight operation regulations. Violating these regulations may lead to severe consequences or even legal consequences.

- Operating the aircraft while under the influence of alcohol, drugs, medication-induced impairment, dizziness, fatigue, nausea, or any other compromised physical or mental condition is strictly prohibited.
- Avoid flying near manned aircraft and ensure that the aircraft's flight does not impact larger manned aircraft on their flight paths. Remain vigilant, steer clear of other aircraft, and land immediately if necessary.
- Do not fly in areas prohibited by local regulations without obtaining authorized permits. Prohibited areas may include airports, borderlines, major cities and densely populated areas, large event venues, emergency situations (such as forest fires), and sensitive building facilities

zones (such as nuclear power plants, power stations, hydroelectric plants, prisons, traffic arteries, government buildings, and military facilities).

- Prohibit the use of the aircraft at large event venues, including but not limited to sports stadiums and concerts.
- Avoid flying in airspace exceeding the regulated altitude.
- Do not use the aircraft to carry any illegal hazardous materials.
- Ensure a clear understanding of the type of flight activity (e.g., recreational, official, or business). Obtain permits from relevant authorities before flying. If necessary, consult with local legal professionals for detailed definitions and explanations of flight activity types.
- When using the aircraft for filming, respect the privacy of others. It is strictly forbidden to use this product for any unauthorized surveillance activities, including but not limited to monitoring of individuals, groups, events, performances, exhibitions, or buildings.
- Please note that recording or photographing others, groups, events, performances, exhibitions, etc., without legal authorization may violate copyright, privacy rights, or other lawful rights of others. Therefore, it is essential to thoroughly understand and comply with local laws and regulations before use.
- Please note that using cameras to film or photograph individuals, groups, events, performances, exhibitions, or buildings without authorization may infringe upon copyrights, privacy rights, or other legal rights of others. Therefore, it is essential to familiarize yourself with and comply with local laws and regulations before using the aircraft.

2.3 Flight Environment Requirements

- Do not fly in severe weather conditions such as strong winds, snow, rain, heavy fog, dust storms, extreme cold, or extreme heat. The aircraft has a maximum wind resistance of 12 meters per second.
- The performance of the aircraft's smart battery is subject to ambient temperature and air density. Please use the aircraft within the temperature range of -20°C to +50°C. When flying in a low temperature environment, ensure that the fuselage of the aircraft is free of snow and the blades are not frozen.
- Ensure the aircraft takes off from and lands on open, unobstructed, and flat ground. Keep a safe distance from crowds, surrounding buildings, trees, etc., and control the aircraft within visible range to ensure flight safety.
- Fly at an altitude below 6000 meters.
- Due to poor lighting conditions, GNSS signal loss, narrow spaces, etc., some functions of the aircraft may be restricted. Always be aware of the surrounding environment and maintain safe control of the aircraft.
- For night flights, turn on the strobe and make sure that the Aux Light is enabled during landing for flight safety.
- Do not take off from or land in flammable and explosive environments.
- Do not take off from or land on sandy surfaces to prevent sand particles from affecting the motor service life.

- When using the aircraft in disaster-stricken areas after events such as fires, explosions, lightning, storms, tornadoes, heavy rain, floods, earthquakes, sandstorms, etc., pay special attention to the safety of takeoff and landing points and changes in the surrounding environment. Prioritize personal safety.
- Keep the aircraft away from steel structures, iron ore mines, etc., to avoid interfering with the compass of the aircraft.

2.4 Wireless Communication Requirements

- Stay away from areas with strong electromagnetic interference, such as radar stations, microwave stations, mobile communication base stations, aircraft interference devices, etc., and maintain a distance of at least 200 meters.
- Exercise caution when flying near electromagnetic interference sources and continuously monitor and assess the stability of the remote controller's video transmission signal and image. Common sources of electromagnetic interference include, but are not limited to, high-voltage transmission lines, high-voltage substations, mobile communication base stations, and TV broadcast signal towers. If significant interference occurs in these places during flight operations, the aircraft may not be able to fly normally, so return and landing should be done promptly.
- Choose open and spacious areas or high grounds for flying. Tall mountains, rocks, urban structures, and forests may obstruct the GNSS signal and the aircraft's video transmission signal.
- It is recommended to turn off unnecessary Wi-Fi and Bluetooth devices in the vicinity to avoid interference with the remote controller signal.

2.5 Declaration of Maximum Take-off Mass

During flight operations, make sure that the actual take-off mass of the aircraft does not exceed the maximum take-off mass (MTOM) declared for the aircraft. Exceeding this limit can lead to safety accidents. For detailed data, please refer to "Autel Dragonfish Standard Aircraft (Nest Version) Flight Manual".

The actual take-off mass of the aircraft consists of the aircraft's mass and the mount mass. Before adding any mount, make sure that the mount mass is within a reasonable range.



Remarks

- The aircraft's mass comprises the mass of the fuselage, gimbal camera, propellers, and smart battery.
- Payloads include functional module mounts and material mounts, among others. When users add payloads to the aircraft, it is essential to reevaluate the actual takeoff weight of the aircraft through weighing.
- The payload weight should adhere to the following rule: $\text{Payload Maximum Weight} \leq \text{Maximum Takeoff Weight} - \text{Aircraft Weight}$.

2.6 Flight Limitation and Lifting

Important

- To ensure flight safety, during flight, please strictly comply with local laws and regulations, and plan the flight airspace carefully. Do not enter restricted airspace without permissions.
- In flight operation, aircraft weight (including payload) cannot exceed the maximum takeoff mass (MTOM).

2.6.1 Creating a geofence and unlocking a no-fly zone

To ensure the safe and legal operation of the Dragonfish series aircraft, Autel robotics has developed a geofencing system. This system allows for relevant constraints and limitations on the flight airspace of the aircraft during the flight. The geofencing system consists of two parts: Customized Electronic Fence and National No-Fly Zones.

- The Customized Electronic Fence enables users to add circular (or polygonal) no-fly zones or geofences. This ensures that the aircraft is restricted to the safe flight area planned by the electronic fence during the flight, providing users with customized flight safety assurance.
- The National No-Fly Zones ensure that the aircraft does not inadvertently enter flight-restricted areas specified by the laws and regulations of the country or region during the flight.

The geofencing system supports the unlocking of no-fly zones. If users need to carry out flight missions in restricted areas, the aircraft can have its flight restrictions lifted for the duration of the authorized unlock. The system does not guarantee full compliance with local legal requirements and regulations. Users are responsible for consulting and understanding local laws, regulations, and regulatory requirements before each flight to ensure their own flight safety.

The Dragonfish Standard aircraft's flight control system is equipped with a geofencing system. Before each flight, it is important to ensure that the remote controller can connect to the internet to automatically update legally restricted no-fly zone information and synchronize it with the aircraft. During the flight, relevant flight space restrictions will be displayed synchronously on the Autel Voyager Application to ensure the safe and legal operation of the aircraft.

Warning

- The current electronic fence function does not support restricting the altitude of the aircraft. Before flying, users are advised to independently ensure that they are operating

within the legally authorized safe flying altitude.

 Tips

- Due to inherent delays in information retrieval, the no-fly zone information in the geofencing system may not necessarily align completely with the latest local laws and regulations. All information should be considered in accordance with local laws and regulations.
- For temporary airspace restrictions, users are strongly advised to synchronize the no-fly zone information when flying in the relevant areas.
- For information on the update mechanism of the electronic fence, please refer to mechanism part of this section.

2.6.2 Restricted Zones

The geofencing system offers three different types of airspace restrictions: no-fly zones, customized geographical fences, and authorized zones. The Autel Voyager Application will provide different prompts based on the specific type of restriction in each area.

Table 2-1 Flight Restrictions of Restricted Zones

Restricted area	Flight restriction instructions
No-Fly Zones	Divided into national no-fly zones and custom no-fly zones. ● National no-fly zones: Built into the geofencing system at the factory, regularly updated. ● Custom no-fly zones: Added to the geofencing system by users themselves. Flight restrictions: If the aircraft is on the ground in the current area, it cannot take off; if the aircraft is in the air in the current area, it can only move outward at low speed until leaving the current area, and it cannot fly inward into the central area of that zone. If the aircraft is in the no-fly zone, the RC will prompt an alert “The aircraft is in the no-fly zone”.
Geofence	Added to the geofencing system by users themselves. Flight restriction: The aircraft can fly within any geofence area but cannot fly outside that range.
Authorized zone	After users apply for the lifting of the ban (by signing a liability waiver or obtaining an official airspace authorization document), the aircraft can legally operate within the restricted no-fly zone during the specified period of validity.

 Remarks

- If an aircraft is simultaneously subject to restrictions from multiple electronic fences, the priority of different types of electronic fences is as follows: No-fly zones > Customized geographical fences, Customized geographical fences > Authorized zones, Authorized zones > No-fly zones. In other words, within a customized geographical fence, the priority of no-fly zones is higher than that of the customized geographical fence. The aircraft cannot enter the no-fly zones within the customized geographical fence. Authorized zones can be used to eliminate no-fly zone restrictions within their coverage, but customized geographical fences within the authorized zone still take effect. The aircraft cannot fly out of the customized geographical fences within the authorized zone.

When the aircraft is flying in the air, it possesses a certain initial velocity. To prevent the aircraft from entering restricted areas (before being authorized) and flying outside the geofence area and the authorized zone, the geofencing system has set up a 300-meter buffer zones outside the edge of the restricted area and inside the edge of the geofence and the authorized zone.

Table 2-2 Flight buffer Zone Description

Buffer Zone Type	Buffer Zone Description
Buffer Zone for No-Fly Zones	When an unauthorized aircraft approaches within a range of 300 meters near the edge of a no-fly zone, the remote controller will issue an alert "The aircraft is close to the no-fly zone". When the distance is reduced to a range of 200 meters, the speed of the aircraft will be restricted. ● If the aircraft is on the ground, it will be prohibited from taking off. ● If the aircraft is in the air, it can only move slowly outward within the buffer zone of the no-fly zone until it exits the buffer zone. It cannot fly inward into the no-fly zone.
Buffer Zone for Geofences	When an aircraft approaches within a range of 300 meters near the edge of the geofence, the remote controller will issue an alert "The aircraft is close to the edge of the geo-fence". When the distance is reduced to a range of 200 meters, the speed of the aircraft will be restricted. ● If the aircraft is on the ground, it will be prohibited from taking off. ● If the aircraft is in the air, it can only move slowly inward within the buffer zone of the geofence until it enters the geofence area. It cannot fly outward to leave the geofence.
Outside the Geofence*	When the aircraft is located outside the geofence, the remote controller will issue an alert "The aircraft is out of the geo-fence". ● If the aircraft is on the ground, it will be prohibited from taking off.

	● If the aircraft is in the air, there are no speed restrictions, and the aircraft can re-enter the geofence area.
Buffer Zone for Authorized Zones	The buffer zone of an authorized zone only exists in an authorized zone and a no-fly zone and their intersection areas nearby. When the aircraft approaches within a range of 300 meters near the edge of the authorized zone from the inside, the remote controller will issue an alert "The aircraft is close to the edge of the authorized zone". When the distance is reduced to a range of 200 meters, the speed of the aircraft will be restricted. ● If the aircraft is on the ground, it will be prohibited from taking off. ● If the aircraft is in the air, it can only move slowly inward within the buffer zone of the authorized zone until it enters the authorized zone. It cannot fly outward to leave the authorized zone.

 Remarks
● In the absence of GNSS signals, when the aircraft unlocked enters the no-fly zone by accident, it will automatically return after gaining GNSS signal.

2.6.3 Unlocking national no-fly zones

Depending on the country or region in which the aircraft is located, there are two different methods for lifting statutory National No-Fly Zones:

➤ Lifting by Signing a Liability Waiver

In certain countries and regions where it is permitted by applicable laws and regulations (e.g., the United States), users can lift national no-fly zone restrictions by signing a liability waiver on the remote controller when the aircraft or the flight route is close to national no-fly zones. Users can sign the waiver before takeoff to lift the national no-fly zone, or they can do so during the flight when the aircraft approaches a national no-fly zone, prompted by the remote controller.

 Remarks
● If using the method of signing a disclaimer during the aircraft's flight process for clearance, the aircraft will still be subject to national no-fly zone restrictions until clearance is obtained. ● The clearance obtained by signing the disclaimer applies only to the current power-on cycle of the aircraft. When the aircraft is restarted, it will once again be subject to national no-fly zone restrictions. ● Users can also enable the 'Flight allowed in no-fly zones' feature in the 'Safety' section of the remote controller settings (not available in China). After signing the disclaimer and obtaining clearance for national no-fly zones, the aircraft will remain cleared throughout the duration of this feature being enabled.

➤ Lifting by obtaining official airspace authorization

In some countries and regions where strict airspace approvals are required (such as mainland China), if users need to operate their aircraft within national no-fly zones, they must provide valid airspace authorization documents approved by the local aviation authority to request the lifting of the aircraft's restrictions. If the approval is granted, the remote controller will update the aircraft based on its serial number to authorize it for operation within national no-fly zones. The materials required for applying for the lifting of restrictions are as follows:

1. Applicant's personal information and contact details.
2. Approval Document: Scanned or imaged valid approval document from the local authorities (e.g., local public security bureau, aviation management department, or any relevant organization/agency) regarding the flight application.
3. Authorization Area: A cylindrical region containing the following information:
 - Name of the authorization area.
 - Coordinates of the center point of the flight airspace plan (latitude and longitude with six decimal places).
 - Radius of the flight airspace plan (in meters with two decimal places).
 - Flight altitude (in meters with two decimal places).
4. Authorization Date: To be filled in by the user based on the valid approval document, ideally down to the day/hour/second.
5. Aircraft S/N Serial Number: Multiple serial numbers can be applied for at once.

Remarks

- Before creating a flight mission, please adhere to local regulations concerning aircrafts and obtain the necessary airspace authorization, if required.
- After submitting the lifting request, it will be reviewed within 24 hours, and the lifting will be completed within 48 hours. Please plan your flight schedule in advance accordingly.

2.7 Route Flight Test Checklist

Before installing the nest, please conduct on-site manual flight test in the installation site in advance, to ensure flight airspace safety and normal communication without interference.

After installing the nest and creating or modifying a route, please conduct on-site flight test to ensure the nest and the aircraft can work properly.

After installing the nest, please conduct following operations:

1. In Autel SkyCommand Center, add the nest, the aircraft and the repeater base station, and conduct network settings, image upstreaming, RTK calibration, nest backup setting, and complete the nest and the aircraft matching connection.
2. In Autel SkyCommand Center, set RTK, vertical takeoff and landing altitude/flight altitude, gimbal parameters and loss of connection actions.

2.7.1 Aircraft Inspection

- Ensure that the structural condition of the aircraft is normal and there are no damages such as cracks or deformations on the fuselage.
- Ensure that the surface of the aircraft is free from stains and the paint layer is free from peeling, while there must be no water stains inside the fuselage.
- Ensure that there are no foreign objects in the battery compartment of the aircraft and at the interface, the battery is properly installed, fully charged, and the unlock button is in the locked position.
- Ensure that the front and rear propellers of the aircraft are correctly installed in position, firmly attached to the motor without any shaking, and that the fastening screws are not missing.
- Ensure that the surface of the aircraft motor is clean without stains, rotates smoothly without any sticking, and there is no dirt on the surface.
- Ensure that the appearance of the propellers of the aircraft is intact without any obvious deformations, damages, breaks, or delamination of the structure, and the surface is clean without stains.
- Ensure that the wings and tail of the aircraft are firmly locked to the fuselage, the RTK module receives data normally, and the appearance of the pitot tube is normal.
- Ensure that the gimbal camera and the gimbal interface of the aircraft body are in the locked position.
- Ensure that the surface of the gimbal camera's lens is free from foreign objects, dirt, or fingerprints.
- Ensure that the three-axis movement of the gimbal camera is in normal condition.
- Ensure that the gimbal camera has been inserted into the microSD card and the rubber protective cover at the card slot is tightly closed, otherwise, it will affect the product's protective performance.
- Ensure that the legs of the aircraft are firmly installed without any looseness or displacement.
- Ensure that the cooling holes at the bottom of the aircraft body are not blocked, and the surface of the ultrasonic sensors is clean without any stains.

2.7.2 Nest Inspection

- Ensure that the weather station, anemometer, wind vane, and piezoelectric rain gauge on the nest are free from dirt or foreign objects.
- Ensure that there are no obstacles within at least 3 meters of the opening direction of the nest door, otherwise, it will affect the opening of the door and the push-out of the landing pad.
- Ensure that the surface of the nest landing pad is free from foreign objects and dirt.
- Ensure that the Emergency stop button of the nest is in the released state.
- Ensure that the external power supply of the nest is normal and the network connection is normal.

2.7.3 Autel SkyCommand Center Inspection

- Before carrying out a flight operation, open the Autel SkyCommand Center for the following checks:
 1. Ensure that the nest is in the "available" state and the aircraft is inside the nest chamber with the status as "closed" or "available".
 2. Ensure that the wind speed, ambient temperature, and rainfall at the nest installation site are within the safe takeoff range.
 3. Open the on-site surveillance camera of the nest to confirm that there are no foreign objects or snow/ice accumulation on the surface of the nest and its surrounding areas.
- Ensure that the firmware of the nest and the aircraft has been updated to the latest version, the network connection of the nest is normal.
- Ensure that the RTK of the nest has been calibrated, the storage capacity of the nest and the aircraft is normal, and the search star signal is good.
- Ensure that a backup landing point has been set.
- Ensure that the created route is outside the no-fly zone or in a legally authorized flight airspace, and that the takeoff point, altitude type, and flight altitude are reasonably set.
- During the route test flight, pay attention to the basic parameters of the flight mission, such as flight altitude, flight speed, and aircraft battery level, to ensure that the route can complete the flight operation normally.
- If multiple aircraft are operating simultaneously, please plan the airspace flight reasonably to avoid mid-air collisions and potential severe safety accidents.

Warning

- It is recommended to connect the remote controller when testing the takeoff and landing of the aircraft using the nest, so that the aircraft can be taken over manually in case of emergency.
- To ensure the accuracy of the flight operation, when importing KML through the Autel SkyCommand Center, make sure that the RTK signal source used by the KML matches the one used by the nest during position calibration. Otherwise, there may be a deviation between the actual flight path of the aircraft and the route, which could cause the aircraft to crash.
- Before carrying out the flight operation, ensure that a backup landing point has been set within 50 meters of the nest. If the aircraft cannot land in the nest, it will land at the backup landing point. Mark the backup landing point clearly and ensure that there are no obstacles within a radius of 3 meters of the backup landing point.
- When multiple aircraft are flying simultaneously in the same area, please maintain an appropriate distance in the air to avoid safety accidents.

Important

- When there is alert notification in Autel SkyCommand Center, please follow the guidance to conduct remote debugging and troubleshooting in time.
- After creating a mission in Autel SkyCommand Center, users should determine whether it is suitable for flight execution according to the weather environment around the nest and device status. To ensure safe flight of the aircraft, mission execution is prohibited in following situations:
 1. Wind speed is above 8m/s.
 2. The rainfall exceeds 2.5mm/h.
 3. The environment temperature around the nest is below -20°C or higher than 50°C.
 4. The emergency stop button is pressed.
 5. The power supply is disconnected.
 6. The smart battery level of the aircraft is below 30%.
 7. The aircraft RTK fails to converge.
 8. The satellite positioning signal of the aircraft is poor.

Chapter 3 Nest

The nest is mainly composed of components such as a power distribution box, a hatch door, environmental sensors, a landing pad, a communication system, an air conditioning system, a UPS module, and an image transmission board.

3.1 Nest Components

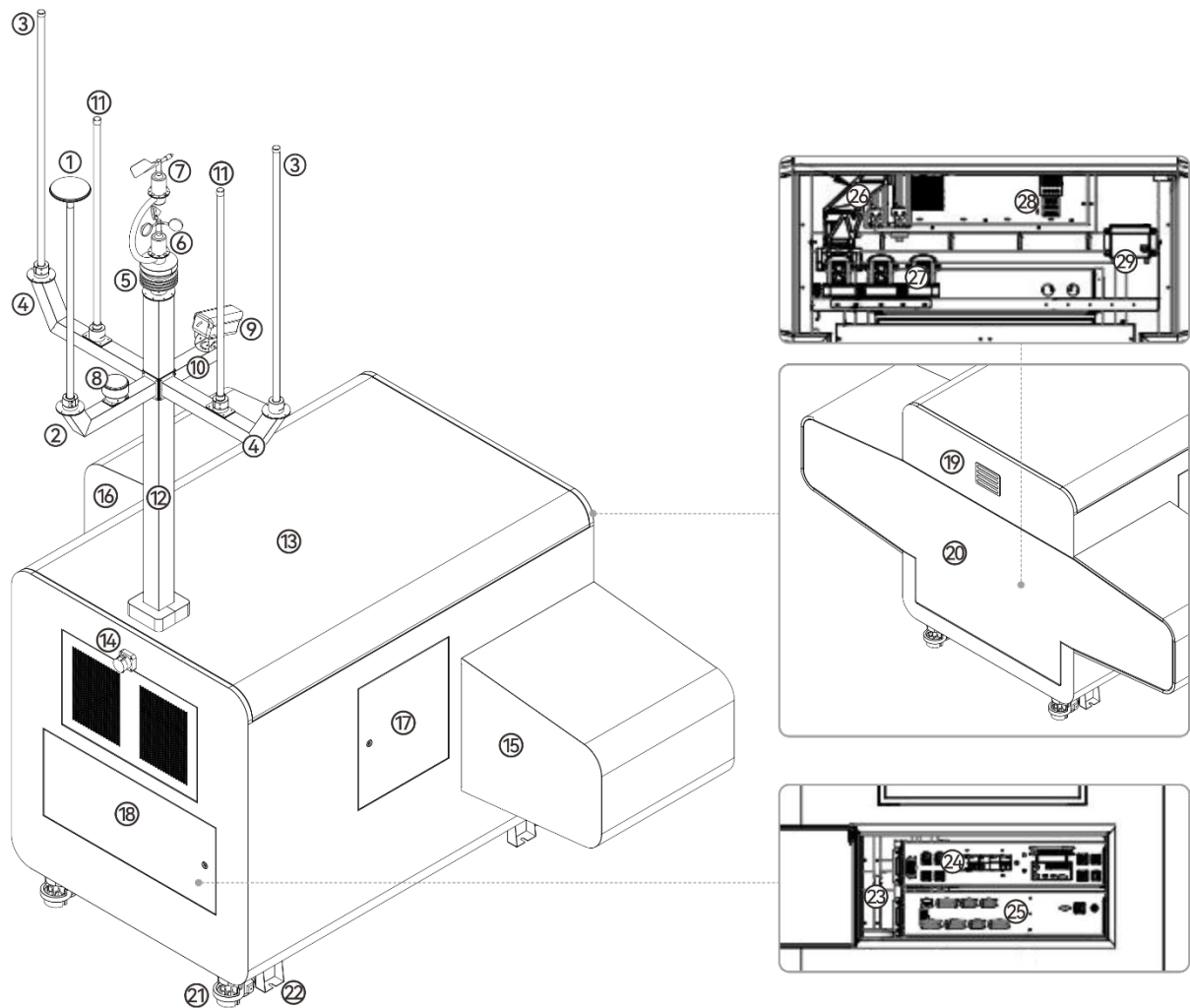


Fig 3-1 Nest Components

Table 3-1 Nest Components Description

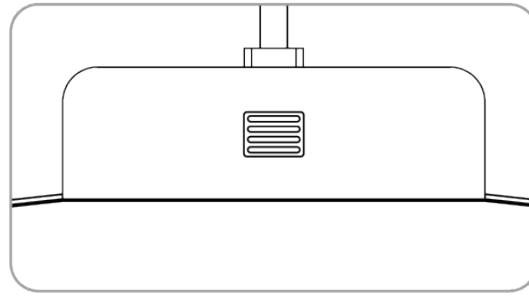
No	Name	No	Name
1	RTK antenna	2	RTK antenna crossarm

3	Image transmission antenna	4	Map transmission antenna crossarm
5	Weather station*	6	Anemometer*
7	Wind Vane*	8	Piezoelectric rainfall sensor
9	Outside monitoring camera	10	Monitoring camera crossarm
11	4G antenna	12	Pole
13	Nest top cover	14	Emergency stop button
15	Right side cover	16	Left side cover
17	Right side landing pad maintenance door	18	Electric cabinet maintenance door
19	Nest LED status light	20	Nest hatch
21	Wheel	22	Nest foundation plate
23	UPS spare power supply (inside the power distribution box)	24	Power distribution box (inside the electrical cabinet)
25	Main control box (inside the power distribution box)	26	Mechanical arm battery replacement component (inside the nest)
27	Smart battery slot charging component (inside the nest)	28	Air conditioning system (inside the nest)
29	Auxiliary heater (inside the nest)		

3.2 Nest LED Indicator

When the nest is working, you can tell the nest's working status by checking the display status of the nest LED indicator.

The nest LED indicator has two color status: red and blue as follows:

**Fig 3-2 Nest LED Indicator****Table 3-2 Nest LED Indicator Description**

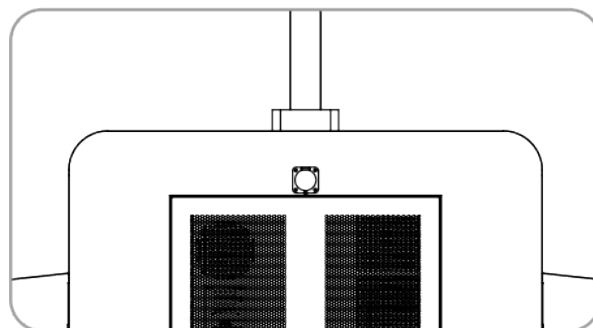
Status	Blue	Red
Solid On	The nest is standing by	Execution Procedures Error
Flashing	Executing Commands	Emergency Stop button is pressed or alarm

3.3 Emergency Stop Button

The power distribution box of the nest is equipped with an emergency stop button at its upper side. When carrying out equipment maintenance and debugging, if an emergency occurs, you can press the emergency stop button to stop the movement of the movement mechanism of the nest, ensuring personal safety and equipment safety. After pressing the emergency stop button, the LED status light of the nest will turn red and flash.

If the motor of the aircraft has not been started, after pressing the emergency stop button, the nest will not be able to perform the flight mission.

After the aircraft takes off, if you press the emergency stop button, the aircraft will land at the backup landing site after completing the flight mission.

**Fig 3-3 Emergency Stop Button**

💡 Tips

- After pressing the emergency stop button, you need pull the button out or turn it clockwise to release the emergency stop button, and then continue to do other operations (such as restoring the movement structure).
- After the emergency stop button is pressed, only movement structure is stopped, but the nest main control is still in the powered working state.
- After troubleshooting, please release the emergency stop button and reset the nest's movement structure through Autel SkyCommand Center.

3.4 Hatch Door

The nest uses a stepper motor + gearbox to drive the hatch door opened and closed. This can effectively prevent foreign matter from falling, snow, and ice accumulated on the top, as well as reduce the landing height of the aircraft, allowing it to land more stably within the windbreak net.

The sealing of the hatch door is achieved through the tight fit between the door and the sealing strip.

During equipment commissioning, users can open or close the hatch door through the Autel SkyCommand Center to check the status of the nest's landing pad and the aircraft.

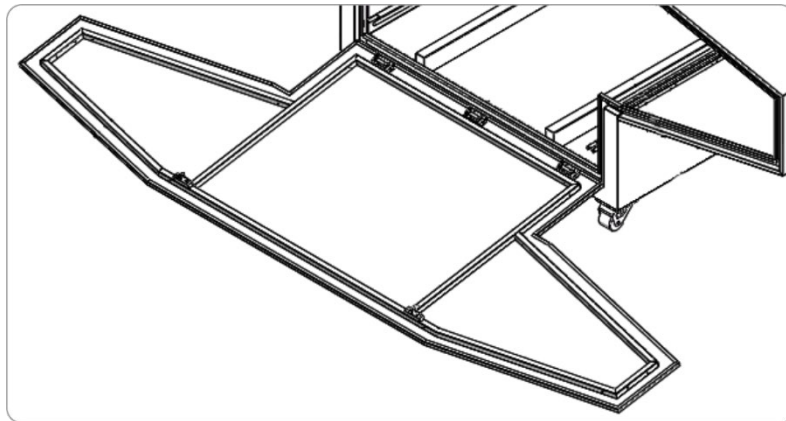


Fig 3-4 Hatch door

⚠ Warning

- The hatch door is a non-load-bearing structure. Please do not press the hatch door hard or place heavy objects on it to avoid damaging the hatch door or causing personal injury due to heavy objects slipping off.
- Before opening the hatch door, make sure the emergency stop button is in the released state. If it is pressed, you need to pull it outwards or rotate it clockwise to release the Emergency stop button before performing other operations.

- When opening or closing the hatch door, keep a suitable distance from the moving mechanism of the nest to avoid causing personal injury. If necessary, you can press the Emergency stop button to stop the movement of the mechanism.
- Before performing a flight mission, make sure there are no foreign objects or snow or ice on the surface of the nest.

3.5 Landing Pad

When the aircraft is stored in the nest, it is on the landing pad.

Usually after completing flight mission, the aircraft will automatically land on the landing pad, and will be pushed to the center by the centering rod in the landing pad and then the landing pad carrying the aircraft will return to the nest cabin.

Tips

- When the nest is in abnormal situations (such as power off or emergency stop, the aircraft will land in the set backup landing site.

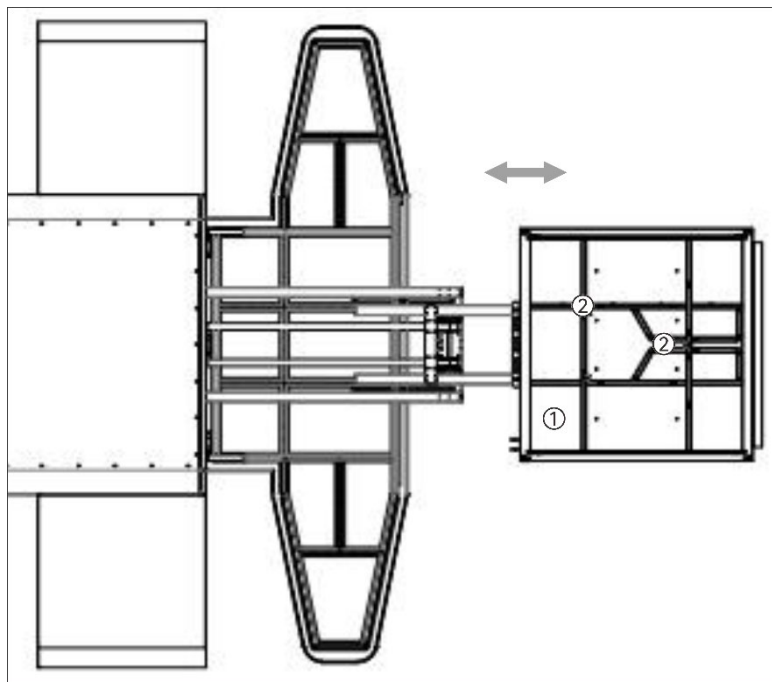


Fig 3-5 Landing Pad

Table 3-3 Landing Pad Description

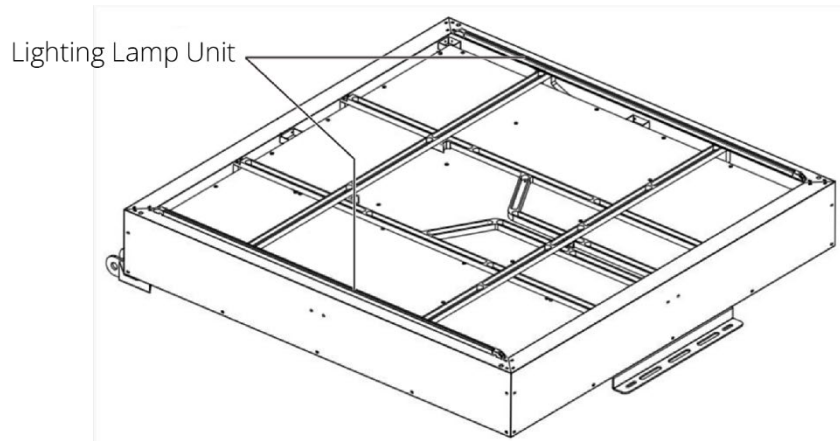
No	Name	Description
1	Landing Pad	Used for storing the aircraft. After the hatch door opens, the three-stage simultaneous belt telescopic arm extends out of the nest. Before the hatch door closes, the three-stage simultaneous belt telescopic arm is retracted into the nest.
2	Centering Rods	Composed of a centering X rod and a centering Y rod. After the aircraft lands on the landing pad, it is centered and fixed in position on the pad.

! Important

- In normal operation, after the nest hatch door is opened, please make sure there is no object hindering within 3 meters in the direction in which the hatch door is closed, so as to avoid damage to landing pad or telescopic arm structure.
- When manually debugging the nest, before closing the hatch door, please make sure the aircraft on the landing pad has been already centered and fixed, so as to avoid damage caused by aircraft colliding the nest due to location deviation.

3.6 Landing Pad Lighting Lamp

The lighting lamps of the landing pad are located on both sides of the pad, mainly for illuminating the QR code on the pad to assist the aircraft in making a precision landing. When the center rods of the nest are opened and the nest is preparing to take off or preparation for the propeller rotating, the white LED lighting turns on and illuminates the pad, providing reliable lighting for the aircraft to land. When the center rods return to their center position, the lighting lamps are immediately turned off to prevent insects from entering the nest through the drainage slot due to their phototaxis.

**Fig 3-6 Lighting Lamp Unit**

Remarks

- Lighting lamps can be turned on or off in the Autel SkyCommand Center.
- When the nest hatch door is closed, if you need to check the landing pad in the nest through the surveillance camera inside the nest, you can turn on the lighting lamp manually.

3.7 Sensors

The nest integrates a variety of sensors that can obtain various environmental information such as wind speed, wind direction, rainfall, temperature and humidity, flooding, and real-time display to ensure the safe operation of the nest. Inside the nest, there is a water immersion sensor, a smoke sensor, a temperature and humidity sensor, a fire extinguisher ball, and in-cabin monitoring camera, while outside the nest, there is weather station, anemometer, wind vane, and outside monitoring camera.

■ Weather Station, Anemometer, and Wind Vane

The weather station, anemometer, and wind vane are located on the pole of the nest in a tower structure distribution, which can measure the wind speed, wind direction, temperature, humidity and other environmental factors outside the nest, providing a basis for the aircraft to perform flight missions.

■ Piezoelectric Rainfall Recorder

The piezoelectric rainfall recorder is located on the square tube of the RTK antenna outside the nest, which can measure the rainfall situation outside the nest, providing a basis for the aircraft to perform flight missions.

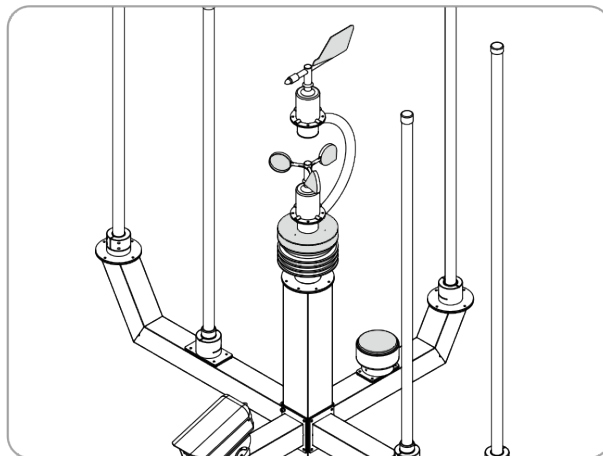


Fig 3-7 Weather station, wind vane, anemometer and piezoelectric rainfall recorder

 Warning

- When temperature outside the nest is less than -20°C or exceeds 50°C, please do not perform flight missions.
- When the rainfall exceeds 2.5mm/h, please do not perform flight missions.
- When there is a sudden wind with a speed of 8m/s or above within half an hour outside the nest, please do not perform flight tasks.
- When the wind direction is opposite to the direction of the aircraft taking off and landing, be cautious during takeoff and landing to avoid the aircraft being suddenly affected by the crosswind and colliding with the pole of the nest. For the safety of takeoff and landing, it is necessary to build a windbreak net around the nest as required.

 Important

- Please clean and maintain these sensors regularly to avoid detection errors that may affect flight safety.
- In case any of these sensors are found to be damaged, please stop issuing flight missions and repair or replace them in time.

■ Smoke Sensor

The smoke sensor is located below the top cover of the nest (inside the cabin), used to detect whether there is any battery catching fire; if any, it will prompt alarm in Autel SkyCommand Center.

 Remarks

- In case of a fire in the nest, the fire will be extinguished with a fire extinguishing ball to reduce losses. When installing the smoke sensor, please make sure that the fire extinguisher ball is already equipped in the cabin.
- Please check the fire extinguisher ball regularly to ensure that it is within the valid period; if it fails, replace it with a new one in time.

■ Temperature and Humidity Sensor Inside the Cabin

The temperature and humidity sensor (inside the cabin) is used to monitor the environmental temperature and humidity sensor inside the nest in real time, and to assist AC system and auxiliary heater to dynamically adjust environmental temperature and humidity inside the cabin.

■ Water Immersion Sensor

The water immersion sensor is installed at the bottom (inside) of the shell at the lower side of the nest's landing pad, used to detect whether there is water immersion inside the nest. If there is water immersion alarm in the Autel SkyCommand Center, please clean the water inside the

nest on site in time, and check whether the nest can work properly. If there is still any problem, please turn off the power switch of the nest and contact Autel Robotics in time.

■ Surveillance Cameras

Surveillance cameras are installed both inside the nest and outside the nest. The inside one is used to monitor the situation in the landing pad inside the nest and the outside one is used to check the environment around the nest.

Tips

- After installing and configuring the nest, you can remotely check the surveillance display of the nest surveillance cameras in Autel SkyCommand Center.

3.8 UPS Backup Power Supply

The nest has built-in UPS backup power supply (a black box at the left side of the power distribution box, outputting power with 4 lead-acid battery in series), which can last for around 50 minutes after being fully charged (power consumption of about 400 W).

When the mains electricity is supplying normally, the nest and the UPS backup power supply are supplied by mains electricity; when the mains electricity is disconnected abruptly, the UPS backup power supply will supply the nest immediately so as to ensure the proper operation of the nest in such case.

Remarks

- Under different scenarios, the operation time of the UPS backup power supply may change.
- When only UPS backup power supply is used, the charging function of the smart battery slot, air conditioning system and auxiliary heater of the nest will not work, and it will automatically resume after the mains power is connected.
- When the nest is powered by UPS backup power supply, if a flight mission is being performed, the aircraft should be controlled to return as soon as possible.

3.9 Power Distribution Box and Main Control Box

The nest uses a modular design, with the main control box and power distribution box separately packaged. In the event of a failure, the corresponding module can be replaced to reduce troubleshooting time and improve the availability of the entire system.

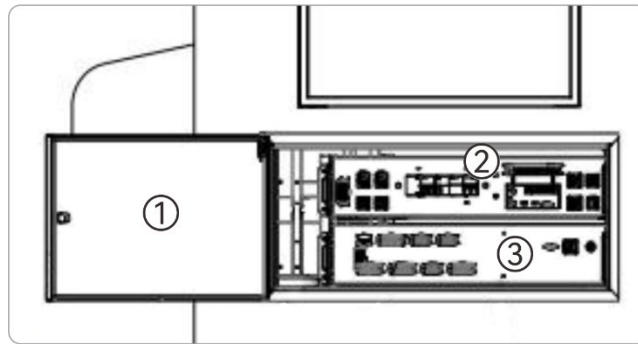


Fig 3-8 Inside the Electric Cabinet

Table 3-4 Inside the Electric Cabinet Description

No	Name	Description
1	Electric Cabinet Maintenance Door	Located at back of the nest, protecting the electrical equipment inside the nest.
2	Power Distribution Box	Supplies power for each equipment of the nest.
3	Main Control Box	Control each movement structure of the nest to move in an organized manner.

! Important

- After the nest is installed and powered on, if there are no special circumstances, non-professional maintenance personnel should not open the electrical cabinet maintenance door.
- After opening the power distribution box for related operations, be sure to close the power distribution box maintenance door in time before leaving the site.
- Do not put sundries in the power distribution box of the nest to ensure that it is clean and tidy.
- After the power distribution box is opened, do not press the power distribution box maintenance door hard or hang heavy objects on it to avoid structural deformation.

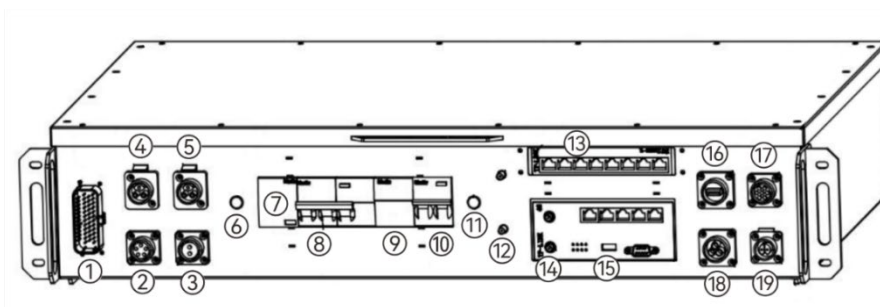
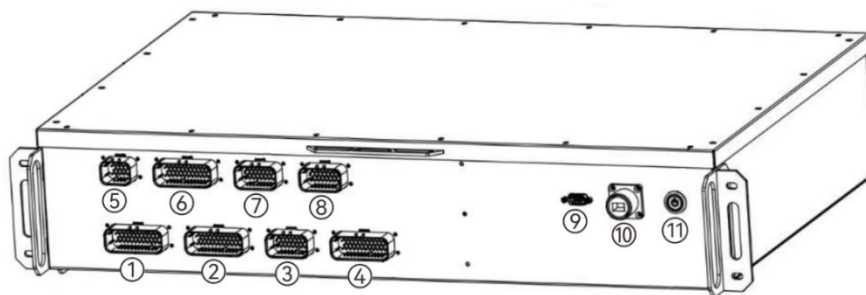


Fig 3-9 Power Distribution Panel

Table 3-5 Power Distribution Panel Description

No	Components	No	Components
1	Mechanical Arm Z Interface	2	UPS Input & Output Power Interface
3	Battery Slot Charging Power Interface	4	Main Power Input Interface
5	AUX Heater Power Interface	6	Main Power Indicator light
7	Surge Protection Module	8	Main Power Switch
9	Under & Over-Voltage Protection Module	10	Air Conditioning Power Switch
11	Air Conditioning Power Indicator	12	Wi-Fi Antenna Interface
13	Industrial Switch	14	4G Antenna Interface
15	Industrial Router	16	USB Fast Charging Interface
17	Main Control Box Power Interface	18	Air Conditioning Power Interface
19	Image Transmission Board Power Interface		

**Fig 3-10 Main Control Box Panel****Table 3-6 Main Control Box Panel**

No	Components	No	Components
1	Mechanical Arm X-Axis wiring Interface	2	Mechanical Arm Z-Axis wiring Interface
3	Mechanical Arm Y-Axis wiring Interface	4	Power and Sensor wiring Interface
5	Left Framework wiring Interface	6	Platform wiring Interface

7	Slide Rail wiring Interface	8	Right Framework wiring Interface
9	UPS Communication Interface	10	Ethernet Interface
11	Power Button		

3.10 Image Transmission Board

The image transmission board is installed near the inside of the maintenance door of the right landing pad of the nest, and it integrates an RTK module and an image transmission module. It has the following functions:

- Image transmission link: supports five-frequency connection, and is connected to the two image transmission antennas on the pole of the nest through an antenna extension line to achieve super-long signal coverage.
- RTK positioning: supports receiving mainstream GNSS signals, and is connected to the RTK antenna on the pole of the nest through an antenna extension line to achieve centimeter-level positioning accuracy.
- Extended display: supports connecting to a portable extended screen and mouse, which is convenient for local viewing of the nest status and related debugging settings.
- To ensure that the aircraft can fly accurately along the route, it is necessary to ensure that the nest is calibrated with RTK before the first flight operation.

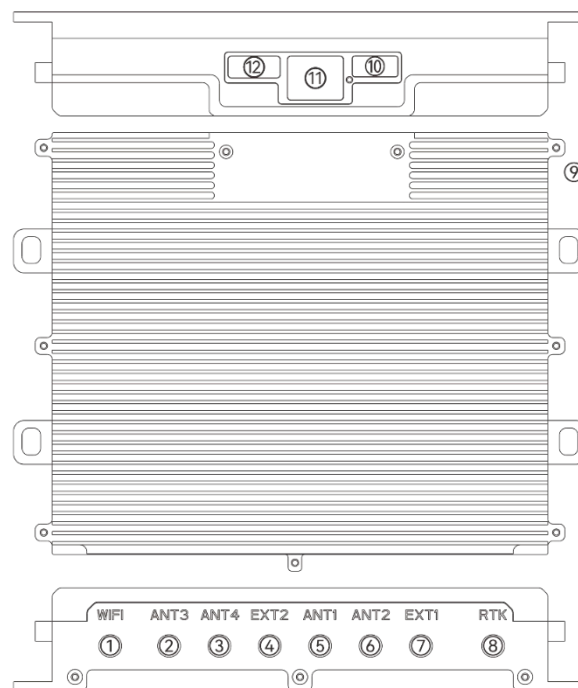


Fig 3-11 Image Transmission Board

Table 3-7 Image Transmission Board Interface Description

No	Name	Description
1	WIFI	Wi-Fi Foldable Antenna Interface.
2	ANT3	Image Transmission Foldable Antenna Interface.
3	ANT4	Image Transmission Foldable Antenna Interface.
4	EXT2	Image Transmission Antenna Feeder Interface, connected to the image transmission antenna on the pole through an antenna extension line.
5	ANT1	Image Transmission Foldable Antenna Interface.
6	ANT2	Image Transmission Foldable Antenna Interface.
7	EXT1	Image Transmission Antenna Feeder Interface, connected to the image transmission antenna on the pole through an antenna extension line.
8	RTK	RTK Antenna Feeder Interface, connected to the RTK antenna on the pole through an antenna extension line.
9	Power Supply Port	Power supply port of the image transmission board, connected to the 24V DC power supply cable of the nest distribution box.
10	USB Type-A Port	A mouse device can be connected during the nest settings.
11	RJ45 Network Port	Connected to the LAN port of the industrial router in the nest distribution box through a network cable.
12	HDMI Interface	A portable display can be connected during the nest settings.

** Remarks**

- When connecting the image transmission antenna, there is no order for EXT1 and EXT2, and any of the two image transmission antenna feeders on the pole can be connected.
- Before connecting the power supply end of the image transmission board to the power distribution box of the nest, it is necessary to connect it to the control end of the 4G mobile phone cloud intelligent switch so that the power supply of the image transmission board can be controlled remotely.

** Important**

- After the nest is installed, it can be RTK calibrated through the Autel SkyCommand Center.

- After the nest's RTK is calibrated, if the nest does not move for the second time, it is not necessary to calibrate again; if it is relocated, the position of the nest needs to be recalibrated.

3.11 Air Conditioning System

Air conditioning system and auxiliary heater are used to control the temperature inside the nest by cooling down or heating up or dehumidifying the nest. The temperature control system can adjust the temperature and humidity inside the nest automatically, providing suitable storage environment for the aircraft and smart batteries.

After the aircraft completes mission and lands on the landing pad, and the hatch door is closed, the temperature control system will start to work; when the hatch door opens, the temperature control system will turn off automatically.

Tips

- In high temperature, the auxiliary heat will not work; in low temperature, AC system and auxiliary heater will work together, reducing the temperature rise time inside the nest.

Remarks

- The auxiliary heater is provided with its own physical temperature control switch, independent from the air conditioning system.
- When the power supply of the nest is normal, the auxiliary heater will maintain normal working status. The temperature adjustment range is 0°C~60°C by means of temperature graduated knob. When the temperature set on the physical switch on the auxiliary heater is lower than the set temperature, the auxiliary heater will automatically operate to heat up, drawing air from the bottom and blowing hot air upward. The hysteresis of the auxiliary heater is about 3~5°C. It is recommended to set the auxiliary heater to 0~5°C.

3.12 Network Connection Method

The nest supports a gigabit wired network connection via a network cable; or connects to a 4G wireless network through an industrial router, and the user can configure the network type according to the actual situation of the nest installation location.

When the nest is connected to both a wired network and a 4G wireless network at the same time, it prefers to use the wired network; when the wired network is disconnected, the nest automatically switches to the 4G wireless network.

 Tips

- Users need to consult the local operator to apply for a 4G network package, and this function may not be supported in some regions or countries.
- The industrial route is in the power distribution box and supports nano-SIM card
- When the nest is connected to wired network, the network plug should insert into the WLAN port of the industrial route.

3.13 Protection Level

The nest has been tested in a controlled laboratory environment and can achieve an IP54 protection class according to IEC 60529 standard. The protection class is not permanent and may decrease due to long-term use and wear, please perform regular maintenance. Under the following conditions, the nest will not have an IP54 protection class:

- The power distribution box maintenance door or the landing pad maintenance door is not closed or tightly closed.
- The hatch door is not closed or tightly closed.
- The body structure is damaged, such as cracked housing or failed seals.

 Tips

- In outdoor environments, the appearance color of the nest may change due to long-term exposure to sunlight or rain, but this phenomenon does not affect the protective performance of the nest.

3.14 Transportation and Temporary Storage

3.14.1 Nest Moving

As the nest weights about 900 kilograms, nest moving should be assumed by professionally trained personal with profession tools (such as forklift, hoister and van), Do not manually move the nest since it may cause personal damage.

Before moving the nest, please make sure the nest has been packaged and protected so as to avoid scratch on the surface of the nest. Do not bump or drop it, otherwise the equipment may be damaged.

 Remarks

- If the ground is confirmed to be flat and firm enough (such as hard concrete), short distance movement can be carried out with the help of the wheels at the bottom of the nest, otherwise manual handling is not recommended.

■ Forklift handling

When moving the nest with a forklift, the nest support brackets should be placed smoothly on the two forklift arms, and the gravity center of the nest should be distributed in the center of the forklift to prevent it from overturning.

! Important

- When using a forklift for transportation, make sure that the road surface is smooth so that the nest will not tip over due to bumps.
- When placing the nest on the forklift, make sure that the antenna covers on both sides of the nest are facing out, that is, the nest support brackets are placed in a cross shape with the forklift arms.

■ Hoisting the Nest

If you need to hoist the nest (such as rooftop installation), it is recommended to use the basket installation first (it requires the lifting company to prepare in advance); if the basket cannot be used, you can use sheer lifting, and when using the sheer lifting, be sure to choose the appropriate lifting point position (the stress points of the nest are on the handle and the support brackets), and wear the rigging reasonably. A trial lift should be carried out before the official hoisting.

⚠ Warning

- Personnel engaged in hoisting work must be trained professionally and qualified before taking up their positions.
- Hoisting tools must be inspected to ensure compliance with standard specifications and service life, and can be used only if they are complete.
- During hoisting, it is strictly prohibited to walk or stay under the boom or hoisting objects; it is strictly prohibited to stand within the range of falling, rolling, and swinging directions of hoisting objects

3.14.2 Temporary Storage

If the nest cannot be put into use immediately, the following requirements must be met during temporary storage:

- Store in a dry, rainproof, fireproof, and non-corrosive environment.
- Avoid water immersion and animal damage during nest storage.
- Nest packaging boxes should be in good condition and checked regularly.
- The built-in spare battery of the nest needs to be charged for at least 4 hours every 3 months.
- Do not tilt or invert the packaging box for storage, and do not place items on the packaging box.
- If the nest packaging is removed and not put into use, it needs to be stored for a second time. Please put the nest into the original packaging box for storage, and take moisture-proof measures.

■ Charging the Lead-acid battery

If you need to charge the lead-acid battery, you can follow the steps below:

1. Remove the outer box of the nest body packaging to expose the nest; take out the 3-meter nest power cable from the packaging box.
2. Insert one end of the power cable with the aviation plug into the main power Input Interface of the power distribution box, making sure it is firmly locked; connect the end of with three-pin plug with the mains electricity.
3. Make sure the cable of UPS backup power supply is firmly connected with UPS input and output power port, press and hold the “ON” switch on the UPS backup power supply until you hear a beep and release it, turn on the main power switch on the distribution box by pushing it upward. After the main power indicator light turns on, you can start charging the lead-acid battery.

Tip

- The charging temperature of the lead acid battery is -20°C to +40°C, beyond which it cannot be charged.

Warning

- This operation must be carried out by personnel with a low-voltage electrician operation certificate.
- Be sure to ensure that the phase sequence of the live line, neutral line, and ground line is correctly connected, and the neutral line and live line cannot be reversed.

Chapter 4 Construction Preparation

4.1 Construction Safety

When installing, operating, maintaining and rematching the equipment, please make sure to follow the relevant safety precautions and equipment labels to ensure the safety of people and equipment.

4.1.1 Operator Certification

- The installation, commissioning, maintenance, fault handling and repair of the nest must be completed by Autel Robotics authorized technicians who meet local regulations.
- Personnel responsible for installing and maintaining the nest must first undergo strict training to understand various safety precautions and grasp correct operation methods, locate potential sources of risk in the process of installing, commissioning and maintaining the nest and understand the disposal plan.
- Only those holding the Low Voltage Electrical Work Special Operation License issued by the Ministry of Emergency Management can perform high-voltage electrical operations.
- Only those holding the High-altitude Work Special Operation License issued by the Ministry of Emergency Management can perform high-altitude operations.
- Only those holding the Welding Work Special Operation License issued by the Ministry of Emergency Management can perform welding operations.

4.1.2 Personal Protection

- During the construction process, be sure to use tools that are of good quality and reliable, and insulate the handle of the tool or replace it with an insulating tool to avoid electrocution.
- Please follow the corresponding operating regulations when using power tools to ensure personal safety.
- Special personal protective equipment must be worn during the installation, commissioning and maintenance process, such as wearing safety helmets, wearing goggles, wearing insulating gloves, wearing insulating shoes, etc.
- When carrying out dusty work such as drilling, chiseling, and welding, wear dust masks and goggles to avoid dust entering the respiratory tract or falling into the eyes.
- It is strictly prohibited to wear conductive objects (such as watches, rings, necklaces, etc.) to install, commission and maintain the nest to avoid electric shock burns.

4.1.3 Safety Operation Guidelines

- The installation, commissioning and maintenance must be carried out in accordance with the steps specified in this manual.
- It is strictly prohibited to install, commission and maintain the nest during adverse weather such as thunderstorms, snowfall, and gales above grade 5, including but not limited to handling the nest, installing the nest, connecting cables, working at high altitudes outdoors, etc.
- When handling heavy objects such as the nest, professional tools must be used and load-bearing measures must be taken to avoid being crushed or sprained by heavy objects; when using lifting methods, personal safety must be taken into consideration.
- The nest must be strictly grounded. When installing the nest, the grounding wire must be installed first, and then other cables; when removing the nest, other cables must be removed first, and finally the grounding wire.
- It is forbidden to operate the nest without grounding.
- It is forbidden to destroy the grounding wire.
- Do not operate with an electrical current. Before installing or removing the power cord, the upper-level power switch must be disconnected first, and then the multimeter or test pen must be used to measure the voltage at the end of the power cord.
- Before touching any conductor surface or terminal, use a multimeter to measure the voltage at the contact point to confirm that there is no danger of electric shock.
- In case of fire, please leave the building or nest area immediately and call the fire department in time. Under no circumstances, it is strictly prohibited to enter the burning building or nest area again.
- Be sure to stay away from the operating nest to avoid being pinched by the moving mechanism of the nest or being injured by the propeller blades of the aircraft.

4.2 Environmental Survey

Please select a suitable installation location for the nest before formal construction. An unqualified location may cause the nest to be unusable, reduce its operating stability, shorten its lifespan, fail to meet expectations, and even pose a safety hazard, resulting in property damage and personal injury.

4.2.1 Environmental Requirements

The following requirements should be followed for the selection and installation of the engine pod:

- The altitude of the installation location should not exceed 6000 meters, and the annual temperature distribution should be within $-35^{\circ}\text{C}\sim+50^{\circ}\text{C}$.
- The annual gust wind speed at the installation location should not exceed 8 meters/second, and the air flow should be stable. Do not choose windward and leeward locations.

- Avoid installing in places with obvious biological destructive factors, such as termites, rodent damage, bird colonies, and large predators.
- Avoid installing in low-lying areas while ensuring that there are unobstructed drainage conditions around.
- Avoid installing in lightning-prone areas, areas with heavy cloud and rain, areas with fog accumulation.
- Avoid installing in areas prone to geological disasters or areas with a history of such disasters, such as land subsidence, mudslides, landslides, snow accumulation, sandstorms, etc.
- Avoid installing in the downwind of chemical plants, septic tanks, or in coastal areas less than 500 meters from the coastline to prevent chemical gas or salt spray from corroding the engine pod.
- Avoid installing in positions with flashing lights and uncontrolled intense light sources, as strong reflections may interfere with the gimbal camera of the aircraft and affect the safety during landing.
- It is strictly prohibited to install near hazards without permission, such as gas stations, oil depots, dangerous chemical warehouses, etc.
- It is strictly prohibited to install in places with flammable materials, such as clutter accumulation areas, seasonal poplar and willow areas, dead wood forests, dry grasslands, vines, etc.
- It is strictly prohibited to install on the surface of moving platforms, such as moving cars, ships, etc.
- The installation location should be as far away as possible from sites with strong electromagnetic wave interference, such as radar stations, microwave stations, mobile phone communication base stations, and aircraft interference equipment, and maintain a distance of more than 300 meters.
- The installation location should be as far away as possible from iron ore and large steel structures to avoid interference with the aircraft compass.
- The installation location should be as far away as possible from strong vibration sources and noise areas to avoid interference with the environmental sensors of the engine pod and to avoid reducing the service life of the whole machine.
- The installation location should consider future environmental changes and avoid areas with large-scale construction plans or significant seasonal environmental changes (including but not limited to vegetation growth, new buildings, bridges, communication base stations, high-voltage towers, etc.). If there are any changes, a new survey and selection of the site is required.
- The installation location should consider the availability of nearby power supply, wired network access points, or 4G base stations.
- Consider whether the nearby airspace is located near a no-fly zone or a no-fly zone. If so, apply for flight airspace lifting authorization from the local aviation authorities in advance and contact Autel Robotics to lift the aircraft ban.

 Tip

- The maximum takeoff altitude of Dragonfish Vertical fixed-wing aircraft is 6000 meters.

- The operating temperature range of the nest is -35°C~+50°C. When the temperature exceeds this range, the nest will not work properly.
- The maximum wind resistance of Dragonfish Vertical fixed-wing aircraft during takeoff and landing is 8 meters/second.

4.2.2 Signal Quality Requirements

To ensure great signal quality and operating stability of the nest's built-in RTK module and, when choosing the nest installation site, make sure there is no obvious signal obstruction within the range of 15° from the ground elevation angle. It is recommended that the nest be installed in an open area or on a roof top.

If there is an obstacle, the minimum distance as required between the open area and the obstacle needs to meet the following requirements:

$$D \geq h/0.268$$

D; the minimum horizontal distance between the installation site and the obstacle;

h: the relative height of the obstacle to the installation site.

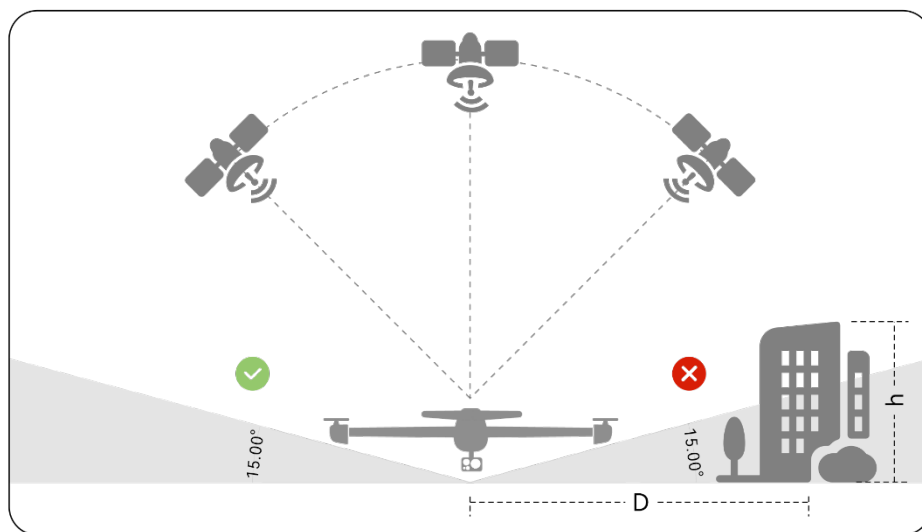


Fig 4-1 Distribution requirements on obstacles around the installation site

To ensure the aircraft image transmission system and GNSS system work properly and avoid multipath affect interference, the nest should be installed away from reflectors, such as glass curtain wall of the building, tinned roofing, large solar panels, and metal billboards.

Tip

- The ground altitude angle (satellite pitch angle) is controlled by the system algorithm, and the nest filters out satellite signals within 15° of the ground altitude angle by default.

- The height of the obstacle and the actual distance between the obstacle and the nest installation site can be measured by manipulating the aircraft to fly.

4.2.3 Aircraft Test Evaluation

Tip

- Before choosing the site, you should check whether the site is in the no-fly zone by using the Autel Voyager Application to control the aircraft. Otherwise the flight operation will be affected. As the aircraft cannot take off in a no-fly zone, it is required to enable “Allowing Take Off in No-fly zone” and sign disclaimer for lifting or obtain flight approval in the area from relevant departments, and contact the Autel Robotics to apply for lifting.

■ GNSS Signal Quality Check

Place the aircraft in the planned installation site and collect GNSS signal quality data in different time sessions. The procedures are as follows:

1. Turn on the aircraft and the RC, and ensure they are matched in frequency.
2. Open Autel Voyager Application, and check the GNSS signal icon in the status notification bar.

Tip

- If the GNSS signal status is strong in different time sessions, the GNSS signal quality in the planned installation site meet the requirements.

■ Route Flight Test

Before confirming the installation site, it is required to conduct route flight test near the site, to simulate and evaluate the automatic flight operation capability (including image transmission signal, operating time, and RTK signal anti-interference).

1. Prepare a Dragonfish Vertical Fixed-Wing aircraft, plan flight mission according to the installation site, and set relevant route mission in the Autel Voyager Application in the RC.
2. The aircraft takes off from the installation site, and record the image transmission signal quality and flight endurance.

Tip

- The maximum operating radius of the nest is 17 kilometers. When choosing the site, please ensure the planned operation area is within this range.

4.3 Ground Conditions Survey

To facilitate the construction later, after completing the ground conditions survey, please fill out survey results, including nest installation site, installation method, installation direction, and a list of tools needed.

It is recommended that the installation site and backup landing position of the nest should be marked vividly.

4.3.1 Ground Requirements

- The ground bearing capacity must be ≥ 400 kilograms per square meter.
- The total area of the installation site is required to be at least 6 meters multiplying 9 meters. The ground needs to be concrete-hardened. Reserve at least 0.9 meters for movement space at the left and right sides of the nest area (including the nest installation area, the telescopic area of the landing pad, and the backup landing area), and at least 0.75 meters for movement space at the front and back sides, which is convenient for the push-out of the nest landing pad and the safe landing of the aircraft, and is also convenient for installation and maintenance by professional personnel.
- The nest installation site must not be located in a low-lying area, and there must be a good drainage system around it, which is not easy to accumulate water.

Warning

- If it is required to deploy a repeater in the nest installation site, the total area of the installation site is at least 8 meters multiplying 9 meters.
- If the nest is installed on roof, the roof bearing capacity must be taken into consideration, and at the same time, it is required to prevent the wall from blocking the RTK signal and image transmission signal, if necessary, the height of the base can be increased.
- Do not install the nest on the ground where there is underground facility below.
- Make sure there is no blocking above the installation site, otherwise the aircraft flight safety will be compromised.
- There is no large scale blocking at the nest installation site radius of around 10 meters.

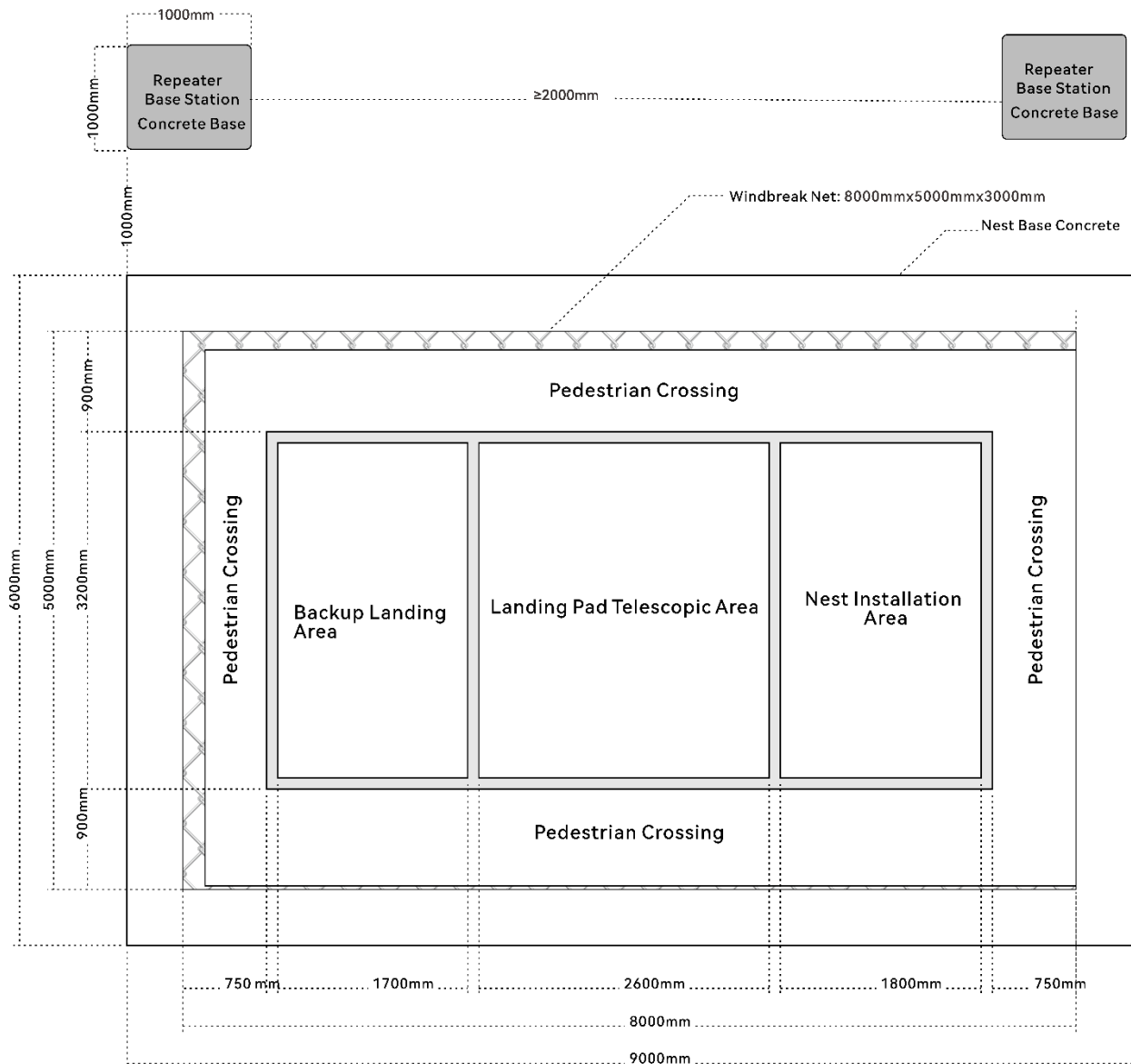


Fig 4-2 Minimum Requirements on Nest Installation Site

4.3.2 Nest Installation Method

The nest should be installed to meet the requirements of wind resistance and waterproof flooding. It is recommended to install it with a concrete base, which can raise the nest, solve the issue of ground settlement or water accumulation, and is firm, reliable, and can effectively meet the fixed needs of windy weather.

■ Applicable Locations

1. Ground without hardened concrete, such as fields, woodlands and grasslands.
2. Ground with hardened concrete and large slopes or unevenness.
3. Ground with a loading capacity requirement, such as on top of buildings.

■ Concrete Requirements

1. The concrete base size is recommended to be 9000 mm x 6000mm x 300 mm.

Tip

- The base should be at least 300 mm higher than the ground. Users can, according to the water drainage around the nest installation site, determine actual base height (it should be 100 mm or more higher than the highest recorded water level in the installation site).

2. The concrete base should be established using C25 concrete, with a single-layer two-way reinforcement and $\Phi 4@150$ mm mesh inside. Make sure the reinforcement is wrapped with a concrete protection layer larger than 25mm. C5 concrete mix ration (cement/sand/gravel/water): 1/1.42/3.17/0.44.
3. When pouring concrete, pre-embed four M10x100 bolts for installing the nest supporting bracket, or drill and tap expansion bolts after the concrete hardens (the distribution gap among the four expansion bolts is 985mm x 1489mm).
4. Lightning protection grounding preparation: The exposed part uses 50mm x 5mm galvanized flat steel, and the flat steel is connected to the nest with flexible copper core cables (the flat steel needs to be drilled in advance to lock the copper core cables with bolts); the buried part uses 50mm x 50mm x 5mm galvanized angle steel, and the buried depth is at least 1.6 meters.
5. To facilitate construction, the piping of the concrete base can be prefabricated in advance or installed with exposed pipes later.

Tip

- For overall construction dimension requirements, please refer to "[4.3.1 Ground Requirements](#)" in this chapter.
- After the construction, the concrete base needs to be maintained for 7 days to allow complete hardening.
- When prefabricated in advance, the expansion bolts need to be embedded in the concrete base about 100mm.
- The protective conduit buried near the nest should be exposed at least 50 mm from the concrete base. For details, please refer to "[4.6.2 Power Cable Requirements](#)" in this chapter.
- In areas prone to typhoons, users also need to pre-embed 3 expansion screws for hoisting rings in the concrete base, as shown in the figure below. Before the arrival of windy weather, the nest needs to be fixed in advance with ropes passed through the hoisting rings.

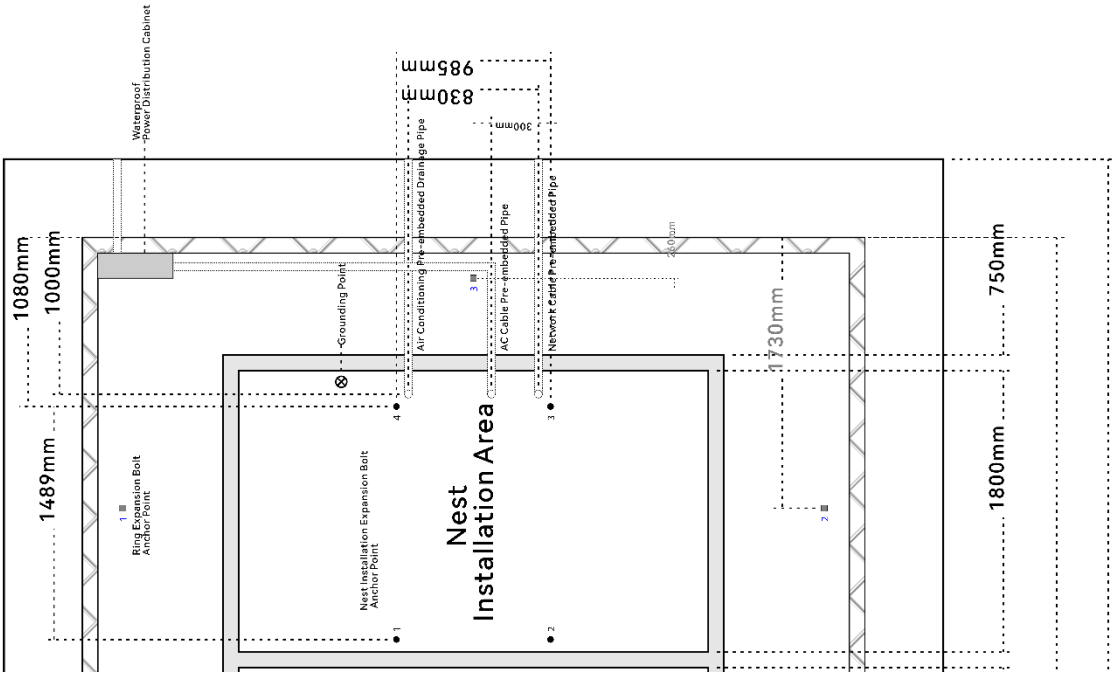


Fig 4-3 Nest Concrete Base Construction Diagram

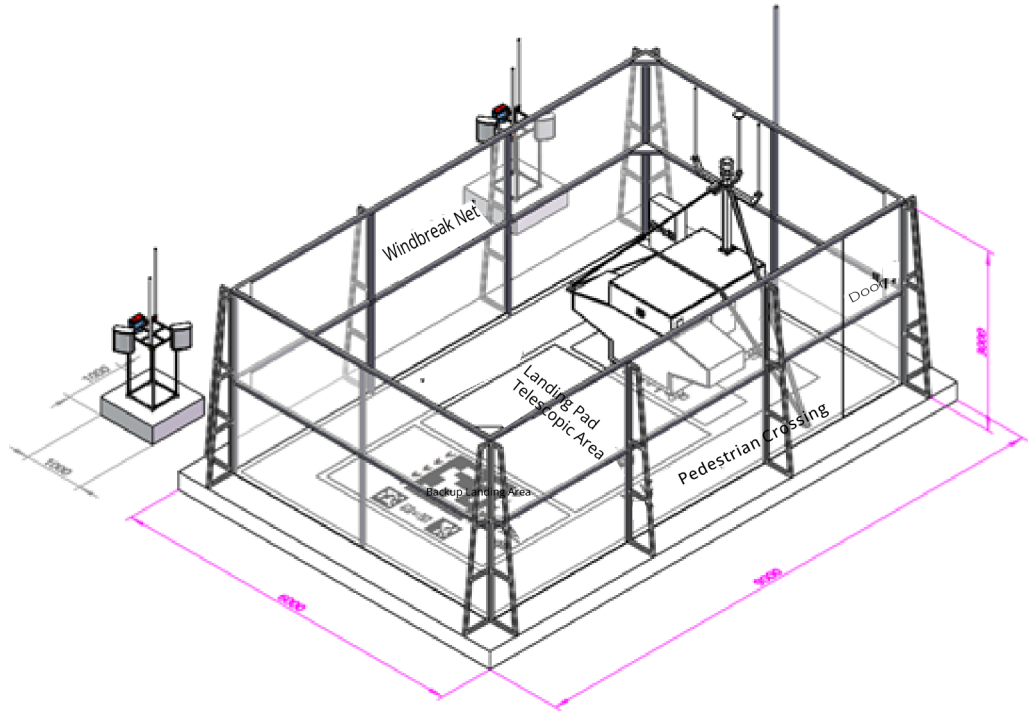


Fig 4-4 Overall Construction

■ Construction on Non-Hardened Concrete Ground

1. Press down the soil to ensure a stable foundation and dig a 150mm-thick rectangular soil trough.
2. Add a 150mm-thick gravel layer (3:7 grade gravel and sand with a gravel particle size of 5-40mm) in the soil trough, and using C25 concrete (150mm x 150mm) to press the edges of the gravel layer.
3. Cast C25 concrete on top of the gravel layer.
4. Smooth the C25 concrete surface, make sure horizontal degree per meter $\leq 5\text{mm}$, full length $\leq 10\text{mm}$; vertical degree per meter $\leq 5\text{mm}$, full length $\leq 10\text{mm}$.
5. Install the earth-termination system for lightning protection.

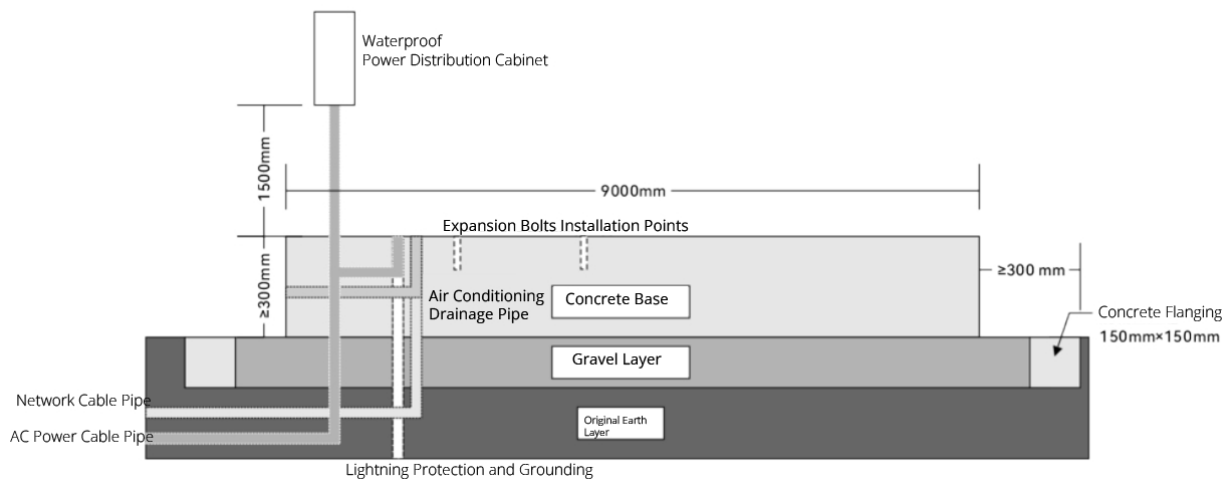


Fig 4-5 Non-Hardened Concrete Ground Construction Diagram

■ Construction on Ground with Hardened Concrete but large slopes or unevenness

1. First, chisel the original concrete base.
2. Then cast the C25 concrete.
3. Smooth the concrete surface, with a horizontal tolerance of $\leq 5\text{mm}$ per meter and a total length tolerance of $\leq 10\text{mm}$; and a vertical tolerance of $\leq 5\text{mm}$ per meter and a total length tolerance of $\leq 10\text{mm}$.
4. Install the earth-termination system for lightning protection.

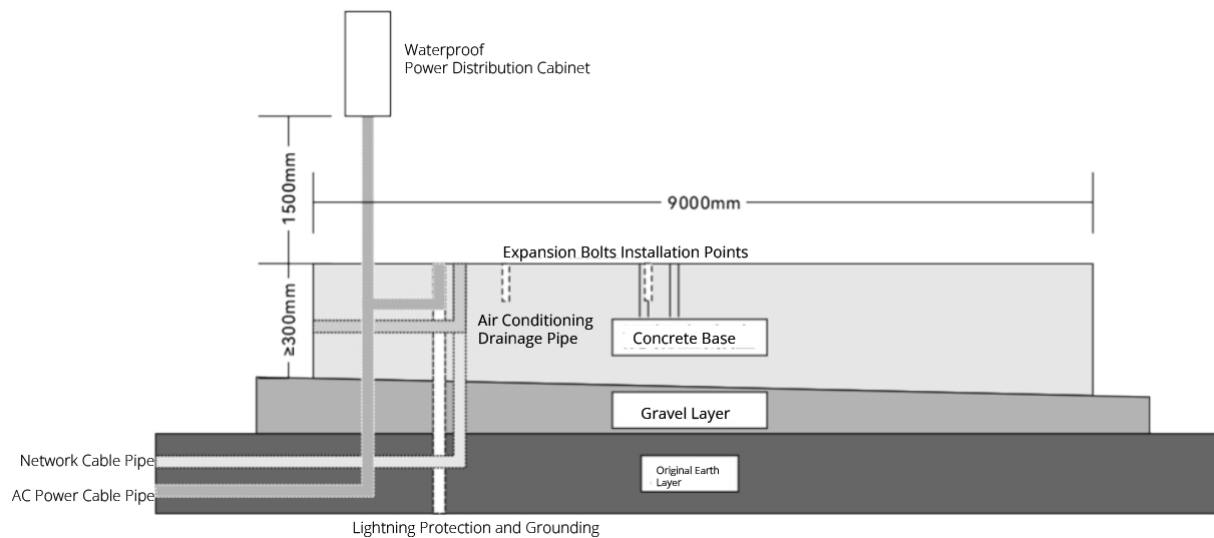


Fig 4-6 Diagram of Construction on Ground with Hardened Concrete but large slopes or unevenness

Tip

- Before construction, the Air conditioning drainage pipe should be pre-installed simultaneously.
- If concealed piping is used for installation, the earth electrode, network cable piping, and AC piping should be pre-installed simultaneously before construction.
- A waterproof distribution box should be provided at the installation location of the nest to facilitate on-site power supply during construction. The waterproof power distribution box needs to be prepared by the user.
- When installing the AC piping, please refer to the installation position of the waterproof power distribution box for the piping layout.
- Please note that the AC piping on the side near the waterproof power distribution box is recommended to be exposed about 1.5 meters from the concrete base.

■ Construction on Ground with Loading Capacity Requirement

1. Cast two long concrete C25 concrete mounds and three square C25 concrete mounds to fix the nest.
2. Cast a square C25 concrete pier 1800mm x 1800mm as a landing area.
3. Smooth the concrete, with a horizontal tolerance of $\leq 5\text{mm}$ per meter and a total length tolerance of $\leq 10\text{mm}$; and a vertical tolerance of $\leq 5\text{mm}$ per meter and a total length tolerance of $\leq 10\text{mm}$.
4. Install the earth-termination system for lightning protection grounding. The space between the two long concrete mounds can be used for piping and wiring of the nest.

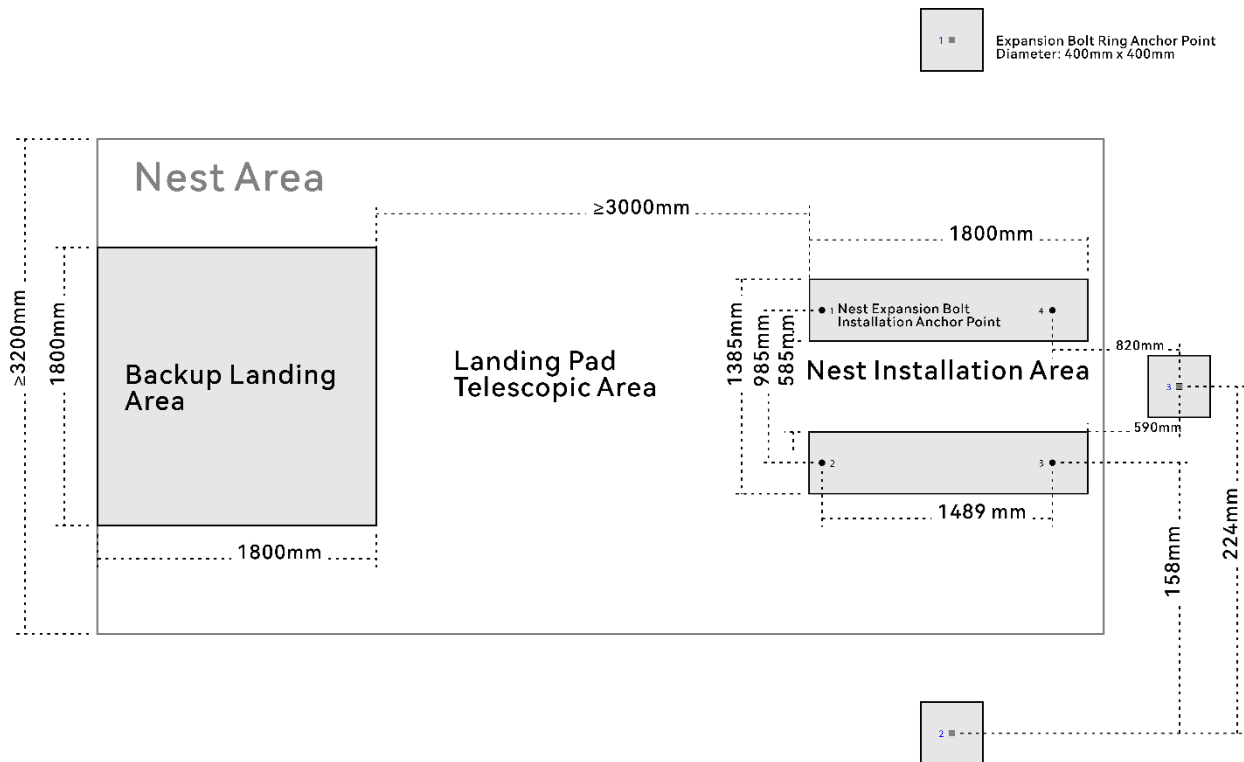


Fig 4-7 Diagram of Construction on Ground with Loading Capacity Requirement

Tip

- If you consider installing it on the roof of a building, the available area of the roof should be at least 15m x 15m, and it must be equipped with lightning protection device and grounding device.
- When the concrete mount is installed on the roof, if the drainage is smooth, its height can be reduced, but it must exceed 150mm.
- When installing the nest on the roof, make sure to install a reinforced windbreak around the outside of the nest within its radius of 1 meter.

Repeater Concrete Base Construction

If it is necessary to install repeater near the nest, the concrete installation base should meet the requirement of 1000mm x 1000mm x 300mm, and the distance between adjacent two repeater installation bases should be at least 2000mm. When pouring, the bracket of the base should be embedded in the concrete base and kept perpendicular to the base.

Tip

- It is suggested that the base should be at least 300mm higher than that of the ground, and the users can determine the actual height of the base according to the drainage situation around the installation site (it should be more than 100mm higher than the historical highest water level of the installation site).

- The concrete base of the repeater should be at least 1m away from the concrete base of the nest.

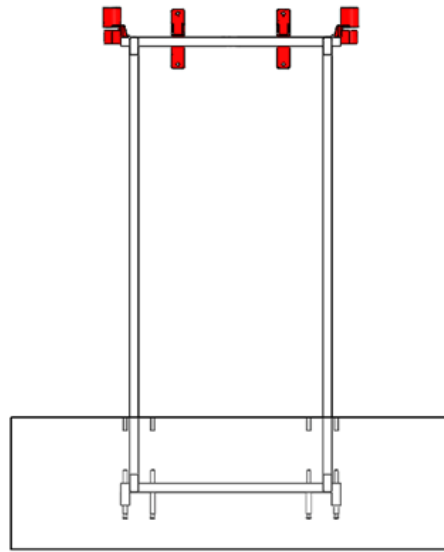


Fig 4-8 Repeater Concrete Base Construction

4.4 Backup Landing Point Requirement

When a fault occurs in the nest or the aircraft, or the aircraft, affected by severe weather, cannot land at the nest, a backup landing site needs to be set up near the nest. The construction requirements for the backup landing site are provided in "4.3.1 Ground Requirements" of this chapter. If more space for activities is needed, users can also build separate backup landing sites according to the following requirements.

The backup landing site should meet the following requirements:

1. The backup landing site should be flat enough and free from environmental factors (such as vibration, strong light, flooding, subsidence, etc.).
2. There should be no obstacles to block the aircraft during landing at the backup landing site, and no debris within 1 meter of the backup landing site.
3. It is recommended to set up the backup landing site in the open space near the nest, and it should be at the same height and within 3-50 meters of the nest.

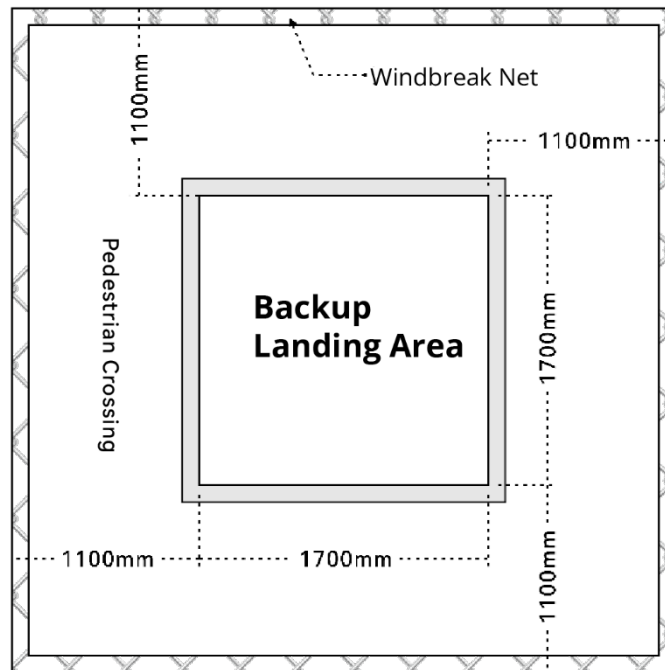


Fig 4-9 (Independent) Backup Landing Point Construction Requirements

! Important

- The backup landing site should be paved with a precision landing QR code, and the QR code surface should be clean and free from damage and stains.
- The backup landing site should be away from the personnel activity area to avoid causing personal injury during the landing of the aircraft at the backup landing site.
- If the backup landing site is located on the roof, it should be avoided near the edge of the building to prevent falls.
- It is also required to build a concrete base for the backup landing site, and for the relevant requirements, please refer to the construction requirements of the concrete base for the nest. In construction of a separate backup landing site, a windbreak net should also be built around the backup landing site, and a personnel access door should be reserved.

4.5 Lightning Protection and Grounding Requirements

4.5.1 Lightning Protection Device

Lightning protection devices mainly consist of grounding devices, down-conductors, and air-terminals (such as lightning rods, lightning belts, and lightning meshes). When lightning directly strikes an air-terminal, the lightning current is quickly dissipated to the ground through the down-conductor and grounding device.

The protection range of the air-terminal can be calculated using the rolling sphere method. The rolling sphere method assumes that there is a sphere with a radius of hr on the surface of the

site, which can roll on other metal objects that provide lightning shielding, such as lightning mast, shielded wire, and site metal fence, and is supported by them. If the equipment is completely within the sphere, it will not be directly impacted by lightning.

For the simple case where there is only one lightning rod on a flat surface, the maximum safe distance between the computer nest and the lightning rod can be calculated by the following formula:

$$R_x = \sqrt{H(2Hr - H)} - \sqrt{Hx(2Hr - Hx)}$$

The variables in the formula are as follows:

- R_x : The maximum horizontal distance between the installation position of the computer nest and the lightning rod.
- H_x : The height of the upper surface of the computer nest (antenna top) above the ground.
- H : The height of the lightning rod.
- H_r : The radius of the hypothetical sphere, which depends on the total lightning density and the standard given in the following table.

Table 4-1 Reference Table for Sphere Radius

Building lightning protection category	Rolling sphere radius
First category of lightning protection buildings	30 meters
Second category of lightning protection buildings	45 meters
Third category of lightning protection buildings	60 meters

! Important

- If the nest cannot be protected by nearby lightning rod, you should designate qualified personnel to design lightning protection device.

4.5.2 Grounding Device

The grounding device is an important part of the lightning protection device, and its function is to dissipate the lightning current to the ground. Use a ground resistance meter to measure the ground resistance of the nest which should be less than 10Ω . Once the distance between the grounding device and the installation position of the nest is greater than 1 meter, a $40\text{mm} \times 4\text{mm}$ flat steel should be used to extend the earth electrode to within 1 meter near the nest. If there is no existing grounding device, an earth electrode needs to be designed and installed.

■ Requirements for fabrication and installation of earth electrode

- To make a vertical earth electrode, galvanized steel, copper, copper coated steel or other new types of earth electrode with a length of 1.5-2 meters should be used.

Tip

- Length of vertical earth electrode can be determined according to the soil quality and geographical conditions of the buried grounding grid.
- The distance between multiple vertical grounding bodies should not be less than 5 meters. The specific number depends on the size of the grounding grid and the geographical environment. Vertical grounding bodies should be buried at the connection of the four corners of the grounding grid.
- During fabrication, one end of the angle steel should be processed into a pointed shape, which is generally fabricated by oblique cutting.
- Depth of earth electrode, generally, it should not be less than 0.7 meters (distance from the top of the earth electrode to the ground). In cold areas, the earth electrode should be buried below the frost layer. In areas with more thin gravel soil, the depth of the earth electrode should be determined according to the specific situation.

Tip

- When using a ground resistance meter, please follow the instructions of the instrument. Before measurement, clear short circuit of the instrument.
- In areas with high soil resistivity: When the ground resistance value of the grounding grid is difficult to meet the requirements of the nest, an extended radiation-shaped earth electrode can be adopted, or liquid long-acting resistance reducers, dedicated grounding rods, and external grounding can be used.
- On the premise that the ground resistance is less than 10Ω , the lightning protection grounding device can be shared with other grounding devices.

■ Earth electrode Specification Requirements

When the earth electrode adopts hot-dip galvanized steel, its length needed depends on requirements on site. Its specification requirements are as follows:

Table 4-2 Earth electrode Specification

Earth electrode Type	Specification
Steel Pipe	Thickness no less than 3.5 mm
Angle Steel	No less than 50 mm × 50 mm × 5 mm
Flat Steel	No Less than 40 mm × 4 mm

Round Steel

Diameter no less than 10 mm

4.6 Power Supply and Power Cable Requirements

4.6.1 Power Supply Requirements

To meet the power supply requirements that ensure safe and stable operation of the nest, the external AC (mains electricity) should comply with following conditions:

- 1. The electrical connection should comply with local laws and regulations.
- 2. The power supply at the installation position of the nest should be long-term and stable without frequent power outage.
- 3. Voltage and frequency of the mains electricity meet the nest operation requirements.

Table 4-3 Power Supply Requirements

Power Supply Type	Single Phase AC
Voltage	220v
Frequency	50Hz
Power	16A

 **Tip**

- If 110V AC power supply is required, an additional transformer module needs to be installed.
- To facilitate on-site construction and commissioning for power supply, a waterproof power distribution box should be provided at the installation site, which needs to be equipped with a separate 2P 16A leakage protector, a 40kA surge protector, and a multi-hole socket.

4.6.2 Power Cable Requirements

Cables that connect the nest and the external AC need to be paved through protective cable pipes, which can be pre-embed under the base of the nest or through exposed pipe laying in later stage.

■ Connection Method

Overall connection method is as follows:

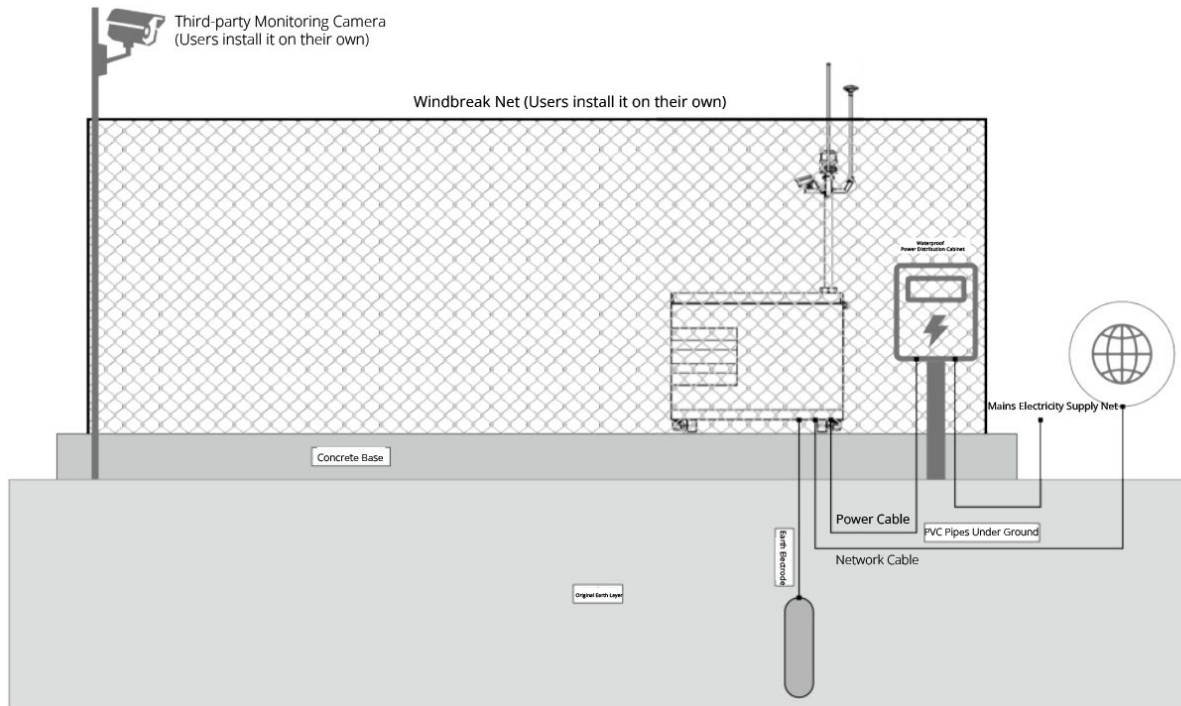


Fig 4-10 Overall Connection

■ Power Cable Requirements

1. At the end of the cable near the waterproof power distribution box, a needle-shaped terminal needs to be crimped so that it can be tightened to the leakage protector of the waterproof distribution box (which needs to be purchased and installed by yourself). The other end needs to be locked to a waterproof power plug that matches the main power input interface of the nest's power distribution box to avoid poor contact and heat accumulation.

💡 Tip

- There is a 3-meter nest power cable (with waterproof power plug) in the nest kit, which is only used for temporary debugging and power supply. In official use, please disassemble the water-proof power plug (aviation plug) of the power cable, and connect the mains electricity power supply cable pre-embedded outside according to the sequence in the ["5.5.5 Connect the Power Cable"](#) in Chapter 5.

2. When leading out the power cable from the base of the nest, reserve at least 2-meter length for later construction.
3. When leading out the power cable from the water-proof power distribution box, reserve at least 1-meter length for later cable connection in the water-proof cabinet.
4. To ensure long-term stable power supply, the power cable length and cross-sectional area should meet the following requirements:

Table 4-4 Power Cable Specification

Power Cable Length	Cross-Sectional Area
<100 m	2.5mm ² three-core outdoor sheathed copper core cable
100-200 m	4.0mm ² three-core outdoor sheathed copper core cable
>200 m	6.0mm ² three-core outdoor sheathed copper core cable

■ Protective Pipe Laying Requirement

1. It requires the use of PVC pipes for laying and buried treatment. If buried treatment is not possible (e.g. when installing the nest on the top of a building), then galvanized steel pipes should be used for laying and firmly attached to the ground, and the steel pipes need to be well grounded.
2. The inner diameter of the protective conduit should be at least 1.5 times the outer diameter of the cable (including the protective layer) to facilitate the embedding of the wiring.
3. When laying the cable, it is necessary to ensure that there are no joints in the protective conduit; the joint of the conduit needs to be waterproofed, and the end of the conduit after the cable is led out needs to be sealed with sealant.
4. Power cables and network cables cannot be laid in the same protective conduit; different conduit should be used for separate laying, and the distance should be at least 30mm (the designed conduit spacing in this manual is 300mm). During laying, it should be kept away from water pipes, heating pipes, gas pipes, etc.
5. At least 50mm should be reserved for the part where the protective conduit leads out of the nest base.

4.7 Waterproof Power Distribution Box

The relevant description of waterproof power distribution box is as follows:

■ Installation Requirements

1. The power distribution box should be securely fixed at a height of 1500mm above the ground, refer to "[4.3.2 Nest Installation Method](#)" in this chapter.
2. The power distribution box should be installed on the side of the electrical cabinet of the nest for easy wiring and debugging.
3. The power distribution box should be installed close to the windbreak net to avoid affecting the flight of the aircraft.

4. The incoming and outgoing wires of the power distribution box need to be protected by a protective conduit and buried. The connection between the protective conduit and the power distribution box needs to be properly sealed and waterproofed.
5. The ground wire of the socket in the power distribution box and the ground wire of the power supply line of the nest should be properly connected to the housing of the power distribution box (if it is a metal housing) and connected to the ground.

■ Recommended Electrical Equipment

To ensure electricity safety, following equipment can be installed in the power distribution box:

Table 4-5 Recommended Power Distribution Equipment List

Name	Usage
Waterproof Power Distribution Box	Contains various electrical components and provides waterproof protection.
Ground Bus Bar	Connect the earth wires of the lead-in cable, the socket, the lead-out cable and the enclosure of the waterproof distribution box if the waterproof distribution box is made of metal.
C16 Leakage Protector	Connect to the nest to provide power.
40kA Surge Protector	Protect the main power supply of the nest.
C10 Leakage Protector	Connect to the socket in the distribution box to provide power.
10A 5- Hole Guide Socket	Supply power to other on-site equipment (such as remote controls, impact drills, laptops, etc.).

Warning

- Personnel who conduct this operation is required to hold a Low-voltage Electrical Special Work License for this operation.
- (Before wiring the waterproof distribution box, make sure that the mains input is in power-off state.
- Before operation, use a multimeter or test pen for power measurement at the end of the cable. Do not work with power.

Remarks

- To ensure normal construction process, it is recommended to install waterproof power

distribution box in advance before the construction of the concrete base.

4.8 Network Requirements

To enable the normal use of the nest for automated operations, the nest needs to be connected to a network, which can be connected through a wired or 4G wireless network. It is also possible to use a 4G wireless network as a backup for the wired network. When both networks are connected, the wired network will be used first. For details, please refer to "[3.12 Network Connection Method](#)" in chapter 3.

4.8.1 Wired Network Connection

■ Construction Requirements

- It is recommended to use Cat6A and above shielded twisted pair as the network connection cable.
- Outdoor cables need to be laid within PVC protective pipes and buried underground. If burial is not possible, galvanized steel pipes are recommended to be fastened to the ground and well grounded. During construction, the laying of network cables should be done well to facilitate the quick installation of equipment after it arrives.
- Power lines and network cables should be laid in separate pipes, and the lines and routes should avoid being close to water pipes, heating pipes, and gas pipes.
- Choose the appropriate connection scheme according to the distance between the user's machine room and the nest.

■ When the cabling distance is less than 80 meters

To ensure stable data transmission and meet lightning protection requirements, a signal surge protector needs to be installed at the lead-out position of the user's machine room to protect the user's network equipment from lightning damage. The following are the installation steps:

1. Use Cat5e and above Shielded twisted pair and crimp shielded crystal head.
2. Install the surge protector on the grounding rail to ensure reliable contact, and connect the yellow/green ground wire to the grounding point properly.
3. Connect the "IN" end of the surge protector to the nest through a twisted pair; connect the "OUT" end of the surge protector to network devices such as switches and routers. Do not reverse the connection, otherwise, the surge protector will be damaged and cannot provide surge protection.

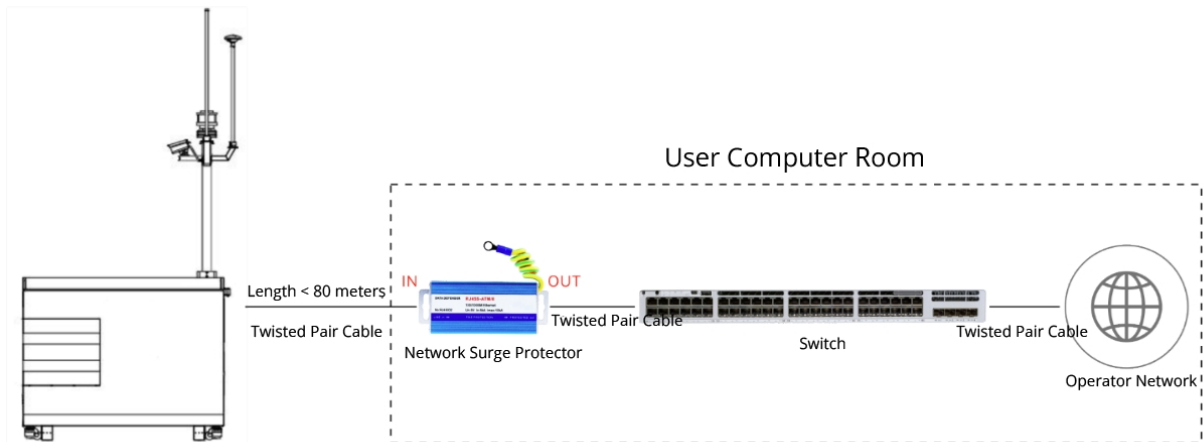


Fig 4-11 Wired Network Connection (<80 meters)

■ When the cabling distance is more than 80 meters

It is recommended to use the optical fiber solution and install a fiber optic transceiver.

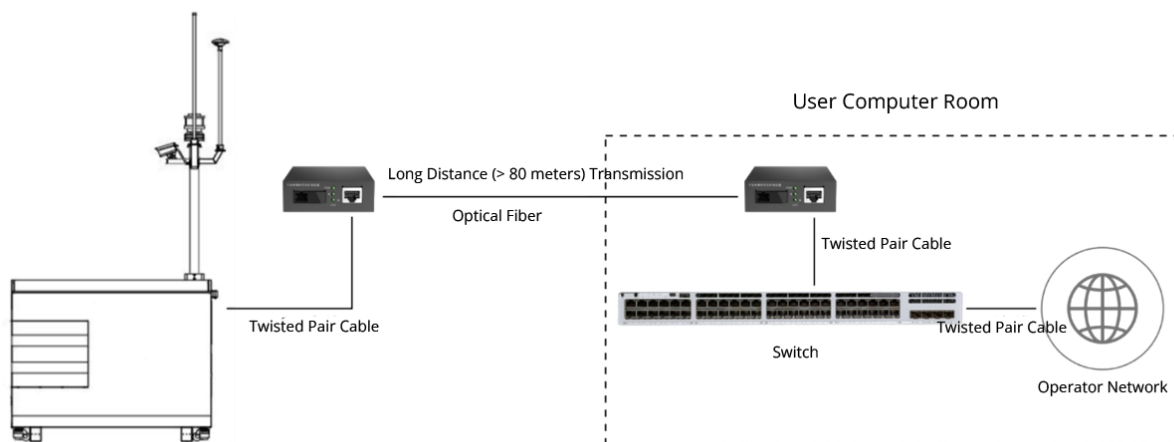


Fig 4-12 Wired Network Connection (> 80 meters)

💡 Tip

- It is recommended to use a gigabit network with an upload bandwidth greater than 10Mbps. It is suggested to use a bandwidth greater than 40Mbps for a better user experience (You can use a laptop to connect to the network port via an Ethernet cable and measure the speed using a speed measurement website).

- Please be careful when choosing the fiber optic transceiver that meets the transmission distance requirement. If its transmission distance is not compatible with that of the device, the network may be unstable or even lost.

4.8.2 Wireless Network Connection

When wired network cannot be used in the nest installation site, you can connect the nest to wireless network by inserting a nano-SIM card into the industrial router in the nest power distribution box. The detailed requirements are as follows:

1. Ensure there is operator's 4G network coverage near the nest installation site.
2. Choose suitable data traffic package in advance according to operation requirement and frequency times.

Tip

- Use mobile application to test the network speed to ensure the upload bandwidth is greater than 10Mbps and the operator selected when testing should be the one which will be used for nest in the future.
- Autel Robotics does not support SIM card and data traffic service. Please go to the local operator business store and consult and register for IOT traffic package.

4.9 Other Tools

4.9.1 Windbreak Net

The windbreak net with size of 8000 mm x 5000 mm x 3000 mm should be installed around the nest, which is fixed by pre-buried expansion bolts. It can reduce the wind speed and ensure the safety of the nest. For details, please refer to "[4.3.1 Ground Requirements](#)" in chapter 4.

Tip

- Users should purchase the windbreak net on their own since Autel Robotics does not provide it.
- Windbreak net should be installed firmly to avoid tipping. A movable door should be kept for repair and maintenance.
- It is recommended to use the windbreak net made of non-metal materials, such as plastic steel as this type of material has the lowest impact on image transmission signal and RTK signal.

4.9.2 Third-Party Surveillance Camera

If users need security surveillance camera, they can decide to install extra third-party surveillance camera near the nest on their own.

Remarks
● Surveillance camera equipped by the nest can only cover the extension range of the nest landing pad. Users can, based on the actual protective facility construction situation, decide to install third-party surveillance camera on their own. ● If users need the third-party surveillance camera, it is recommended to install the third-party surveillance camera at one corner within the windbreak net and the height of the pole where the surveillance camera is installed should not be more than 3 meters. ● Users should purchase third-party surveillance camera on their own as Autel Robotics does not provide it.

Chapter 5 Nest Installation and Cable Connection

Before installation, please check against “[1.3 Product Acceptance List](#)” in chapter 1. If there is any abnormal item or item missing or inconsistent model, please keep a record and contact the device carrier and Autel Robotics in time.

5.1 User-Prepared Tools and Items

	Hammer Drill (drill diameter Φ 12mm)		Laptop
	Claw Hammer		Digital Level (optional)
	Wire Strippers		Multimeter(optional)
	Diagonal Cutting Plier		Electroprobe
	Steel Blade Measuring Tape (optional)		Forklift (optional)
	Wire Ferrule Crimping Pliers		Grounding Resistance Meter(optional)
	Shielded Pass-Through Connector		Screwdriver (optional)
	Electrical Tape		Metal Gasket (optional)

Fig 5-1 Tools and Items

** Warning**

- Please entrust Autel Robotics or authorized service provider for installation. Installation on your own may bring product safety usage risk. Please contact the Autel Robotics to obtain relevant technical support.
- Operators should read this manual carefully and must store, move, install and use the nest according to relevant operation instructions. Product damage due to Failing to obey the instructions is not covered in warranty.

5.2 Unboxing Inspection

When the nest is packed before leaving the factory, its hatch door is open; after long-distance transportation, please conduct relevant inspections on its components:

1. Unpackage the nest and ensure that its appearance is normal, with no scratches, deformations, or bumps on the surface.
2. Use the included triangle key to open the maintenance door of the landing pad and electrical cabinet, and use an external light source to check the inside of the nest. Ensure that the internal components are not deformed, loose, or fallen off, and pay particular attention to the landing pad and the robotic arm battery swap components.
3. Compare the item list with the actual shipment list to check if all items are included.
4. After inspection, please close the maintenance door of the landing pad and store the other items in an orderly manner.

** Tip**

- Please keep the corresponding packaging box. If the nest needs to be relocated or transported again, it needs to be placed in the packaging box for protection.

5.3 Nest Installation

5.3.1 Confirm the Installation Position and Orientation

Before selecting a site for the nest or installing it, the following factors should be considered comprehensively:

- If there is a long-term strong wind in a single direction (not exceeding 8 meters/second) at the installation site, the weather monitoring pole should not be installed downwind to prevent the aircraft from being too close to the weather monitoring pole during takeoff and landing in a windy environment.

- Surveillance cameras should avoid direct sunlight, as backlighting will affect the image quality and surveillance camera lifespan of Autel SkyCommand Center.
- Please ensure that there is no debris accumulation at least 3 meters in the opening direction of the nest, and do not obstruct the rotation and opening of the hatch door.
- Ensure that there are no objects within 3 meters near the nest that resemble the shape or visual identification of the landing pad, in order to avoid false detection when the aircraft lands.

5.3.2 Install the Expansion Bolts

During the construction phase, concrete horizontal bases need to be made in advance at the installation site.

1. Mark the bolt drilling points on the concrete horizontal base according to the final determined installation direction of the nest, and the spacing is shown in the figure.
2. Align a hammer drill (drill bit diameter: 12mm) with the perforation point, keep the drill perpendicular to the horizontal base, and drill four mounting holes at least 80mm deep in sequence.
3. Slightly tighten the 4 M10 × 100 expansion bolts packed in the weather monitoring pole packaging box into nuts and put them vertically into the installation holes; use a claw hammer to tap them until the expansion tubes are inserted into the installation hole, and then unscrew the nut, spring washer and flat pad.

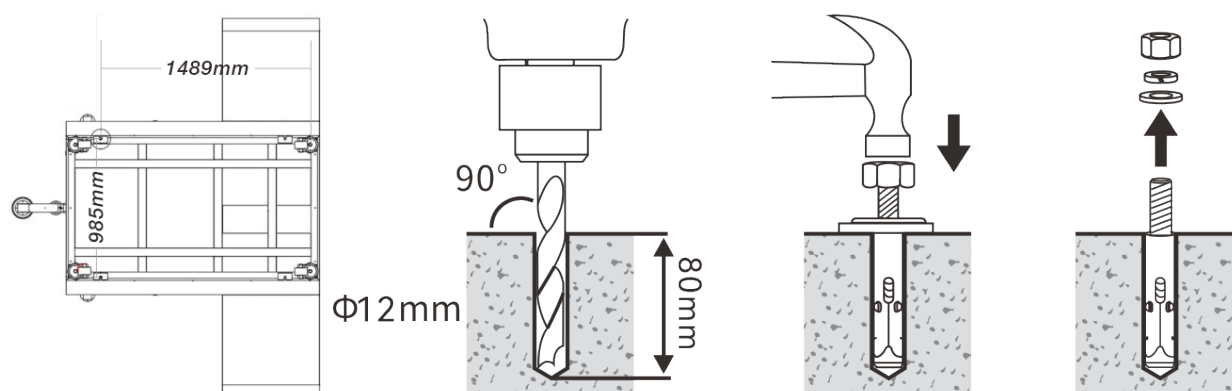


Fig 5-2 Install the Expansion Bolts

Warning

- Before drilling, it is necessary to wear protective goggles and a dust mask to prevent dust from entering the eyes or the throat.
- Please pay attention to safety when using the corresponding electrical tools.

5.3.3 Install the Nest

1. Move the nest to the corresponding installation position on the concrete base, and align the input and output holes at the bottom of the nest with the embedded protective piping. Use a 30mm open wrench to adjust the bottom wheels of the nest to the appropriate height so that the wheels are off the ground, and use four anti-slip support bases to support the weight of the entire nest.
2. Scrape off the paint layer at the outer side of the mounting hole of the nest foundation plate, and use two M8x20 Allen socket combination screws to fix each of the four nest foundation plates to the corresponding position at the bottom of the nest.
3. Adjust the height of the bottom wheels so that the wheels land, and fine-tune the position of the nest to ensure that the four expansion bolts on the concrete base just fit into the U-shaped fixing holes of the nest foundation plates.
4. Place the digital level on the top cover of the nest for measurement, adjust the height of the bottom wheels, use four anti-slip support bases to support the weight of the entire nest (the foundation plates just touch the ground), and ensure that the nest (the landing pad) is in a horizontal state. If there is a tilt, please adjust the corresponding anti-slip support base separately, and add metal washers or other hard materials under the corresponding nest fixed plate for heightening.
5. After installing the flat washers, spring washers, and nuts of the expansion bolts at each foundation plate in turn, use a socket wrench to tighten the nuts.

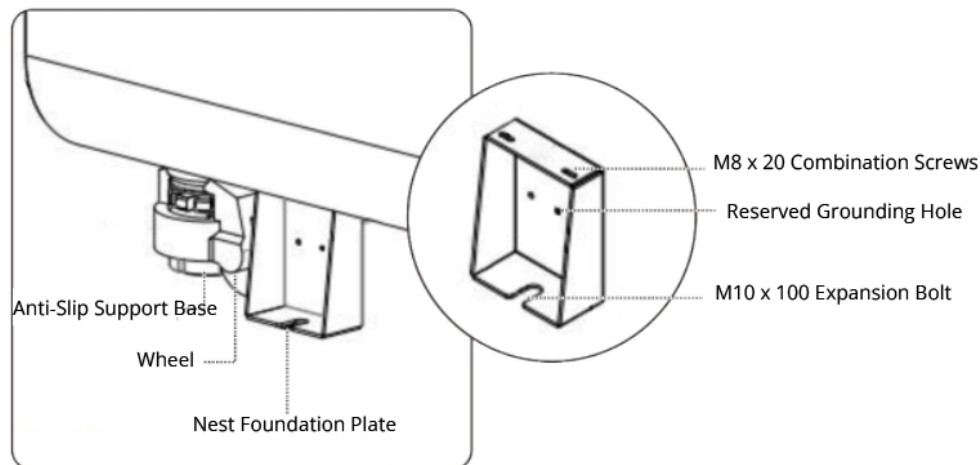


Fig 5-3 Install the Nest

Warning

- When moving or adjusting the position of the nest, do not put your hand under the foundation plates of the nest to avoid injury.
- Do not put heavy objects on the top cover of the nest.

5.4 Pole Installation

The RTK antenna, the image transmission antenna, the 4G antenna, the weather station, the anemometer, the wind vane, the piezoelectric rain gauge sensor, and the outside monitoring camera of the nest are all installed on the pole and Crossarms, and the related cables are led out from the inside of the pole to the electrical cabinet of the nest.

Warning

- Before installation, please ensure the miniature circuit breaker of the waterproof power distribution and inside the nest are OFF, and the nest is powered off.

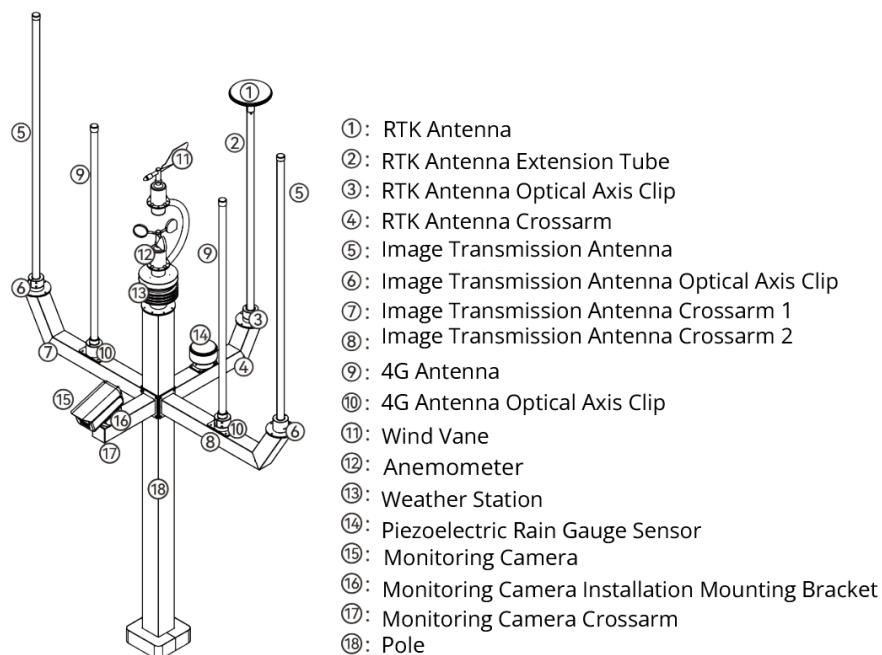


Fig 5-4 Pole Structure

5.4.1 Install the Weather Station, the Anemometer, and the Wind Vane

1. Take out the 5m long 485 communication power cable from the packaging box, and pass the end with (2) quick waterproof plugs through the bottom of the pole from the packaging box, where the quick waterproof plug of the weather station passes through to the top of the pole to be connected to the reserved plug of the weather station, while the quick waterproof plug of the piezoelectric rain gauge sensor passes through the side of the pole from the side of the pole where the Crossarms are installed.
2. Tighten the four M6 fixing screws on the side of the weather station to fix the weather station to the top of the pole.
3. Take out the anemometer from the packaging, connect and tighten the socket at the anemometer end to the plug in the weather station, and fix the anemometer as shown in Figure 5-4 using M4x12 Allen socket combination screws.

4. Take out the wind vane from the packaging, connect and tighten the socket at the wind vane end to the plug in the weather station, and fix the wind vane as shown in Figure 5-4 using M4x12 Allen socket combination screws and M4 anti-loosening nuts.
5. Adjust the orientation of the wind vane according to the installation direction of the nest so that the bottom arrow points to the north.

5.4.2 Install the Outside Monitoring Camera

1. Take out the outside monitoring camera from the packaging box, fix the monitoring camera to the monitoring camera mounting bracket with the included M6x12 cross combination screws, and fix the monitoring camera mounting bracket to the monitoring camera crossarm with three M5x12 Allen socket combination screws, and push the monitoring camera lead through the protective sleeve into the monitoring camera crossarm.
2. Take out the 5m long DC power cord and network cable for the monitoring camera from the packaging box, pass the XT30-F plug end of the power cord and the network cable together through the pole from the packaging box, and lead it out from the bottom of the pole.
3. Connect the round DC end of the power cord and the network cable connector to the lead end of the camera, and thread the excess cable back into the pole.
4. Take out four M5x12 Allen socket combination screws to fix the monitoring camera crossarm to the pole.

5.4.3 Install the Piezoelectric Rain Gauge Sensor and RTK Antenna

1. Take out the piezoelectric rain gauge sensor from the packaging box, and take another 5m long 485 communication cable. Pass the DTM plug end through the piezoelectric rain gauge sensor installation position of the RTK antenna crossarm, and then pass through the top of the pole from the crossarm, and lead it out from the bottom of the pole. The quick waterproof plug at the other end is connected to the reserved plug of the piezoelectric rain gauge sensor.
2. Take out four M5 combination hexagon socket screws to lock the piezoelectric rain gauge sensor to the piezoelectric rain gauge sensor installation position of the RTK antenna crossarm, ensuring that the excess cable is threaded back into the crossarm.
3. Take out a 4m long RTK antenna extension cable (TNC male to male) from the packaging box, pass one end of the extension cable through the RTK antenna crossarm, and then pass through the pole from the crossarm and lead it out from the bottom of the pole; the other end passes through the RTK antenna extension tube and is connected to the RTK antenna.
4. Insert the RTK antenna into the front end of the RTK antenna extension tube, and insert the tail end of the RTK antenna extension tube into the RTK antenna optical axis clip. Use a wrench to tighten the optical axis clip to fix the RTK antenna extension tube.
5. Take out the piezoelectric rain gauge sensor from the packaging box, pass the quick waterproof plug of the piezoelectric rain gauge sensor end (see [“5.4.1 Install the Weather](#)

Station, the Anemometer, and the Wind Vane”) through the RTK antenna crossarm, and then pass through the piezoelectric rain gauge sensor installation position of the RTK antenna crossarm, and connect it to the reserved plug of the piezoelectric rain gauge sensor. Use M4x12 Allen socket combination screws to fix the piezoelectric rain gauge sensor to the RTK antenna crossarm.

6. Remove four M5x12 Allen socket combination screws to fix the RTK antenna crossarm to the pole.

5.4.4 Install 4G Antenna and Image Transmission Antenna

1. Take out a 10m long 4G antenna extension cable and a 3m long image transmission antenna extension cable (N-type male with 1/2 feed line) from the packaging box, and pass one end of each of the two cables through the wire outlet hole on the sides of the pole to the bottom of the pole, and the other end passes through the image transmission antenna crossarm and comes out from the corresponding position. The 4G antenna extension cable comes out from the middle hole of the image transmission antenna crossarm, and the image transmission antenna extension cable comes out from the end of the image transmission antenna crossarm.
2. Connect the 4G antenna extension cable to the 4G antenna and tighten it, and store the excess cable in the image transmission antenna crossarm. Fix the 4G antenna to the optical axis clip in the middle of the image transmission antenna crossarm.
3. Connect the image transmission antenna extension cable to the image transmission antenna and tighten it, and store the excess cable in the image transmission antenna crossarm. Fix the image transmission antenna to the optical axis clip at the end of the image transmission antenna crossarm.
4. Use four M5x12 Allen socket combination screws to fix the image transmission antenna crossarm to the pole, as shown in Figure 5-4.
5. Take out another 4G antenna extension cable, image transmission antenna extension cable, and image transmission antenna crossarm, and repeat the above operation.

5.4.5 Install the Pole

1. Carry the assembled pole to the side of the electrical cabinet of the nest, and thread the lead wires at the bottom of the pole through the threading hole on the top cover of the nest into the inside of the nest.
2. Use four M8x25 combination hexagon socket screws to fix the pole to the top of the nest (note that the outside monitoring camera should face the direction of the take-off and landing area of the nest).
3. Tidy up the antenna extension line, power line, and network cable that have been threaded into the inside of the nest and fix them to the inner wall of the nest with zip ties.

💡 Tip

- When installing the pole on the nest, two people should work together for installation.

5.4.6 Install the Image Transmission Board

Take out the image transmission board from the packaging box, remove the screws (M4x12) on the inner side of the maintenance door of the landing pad at the image transmission board installation position, lock the image transmission board to the installation position with the removed screws, and ensure that the antenna interface end of the image transmission board faces the air conditioner side of the nest.

5.5 Cable Connection

5.5.1 Connect the Grounding Wire

1. Use a 16mm² yellow/green double-color copper core wire to make a grounding wire. Both ends of the grounding wire shall be crimped with circular junction terminals and shall not exceed 1 meter in length. The grounding wire shall be routed as short and straight as possible, and avoid coiling or tangling with the signal wires.
2. Fasten and lock the two ends of the grounding wire to the screw holes (grounding points) of the grounding angle steel of the fixed plate of the nest and the concrete base respectively through bolts.

⚠ Warning

- The nest must be grounded according to requirements
- Before installation, please ensure that the design and the construction of the grounding device meet the requirements. Use a grounding resistance meter for testing to ensure that the grounding resistance is no more than 10Ω.

5.5.2 Connect the Pole Lead-Out Cables

All lead-out cables from the pole are passed through the holes below the pole to the inside of the nest.

- **Connect the weather station, the anemometer, the wind vane and the piezoelectric rain gauge sensor**

1. Find the DTM plug wire labeled "Weather station Power and Communication Lines" in the electrical cabinet of the nest, and connect it to the DTM plug extended from the pole.

- **Connect the outside camera**

1. Find the XT30-F plug wire labeled "External Camera Power" in the electrical cabinet of the nest, and connect it to the XT30-M plug extended from the pole.
2. Insert the network cable extended from the pole into any available Ethernet port on the "Industrial Switch" in the distribution box.

- **Connect the 4G Antennas**

1. Connect the two 4G antenna extension lines (SMA internal screw inner needle) extended from the pole to the SMA socket (external screw inner needle) in the "Industrial Router" in the distribution box of the nest through the adapter (external screw inner hole to internal screw inner hole). The two antennas are not divided into primary and secondary.

- **Connect the Image Transmission Antennas**

1. Connect the two image transmission antenna extension lines (N-type male headers) extended from the pole to the two 20cm long image transmission adapters (N-type female headers to SMA male headers), and then lock them to the EXT1 and EXT2 interfaces of the image transmission board.

- **Connect the RTK Antennas**

1. Connect the RTK antenna extension line (TNC male header) extended from the weather pole to the 20cm long RTK adapter (TNC female header to SMA male header), and then lock it to the RTK interface of the image transmission board.

5.5.3 Connect the Image Transmission Board Cable

1. Take out a 2-meter network cable from the packaging box, insert one end into the network port of the image transmission board, and the other end into the LAN port of the industrial router in the distribution box of the nest.
2. Take out 5 folding antennas from the packaging box and lock them to the antenna interfaces (labeled WIFI, ANT1, ANT2, ANT3, and ANT4) of the image transmission board.
3. Connect the power supply line (24V DC power supply) pre-laid at the installation position of the image transmission board to the power supply lead of the image transmission board.
4. Make sure the other end of the power cord is plugged into the power supply interface of the image transmission board in the distribution box of the nest. Cut the inner red cable (positive cable) at the appropriate length of the power cord, strip the red cable with a wire stripper (about 1 cm), and crimp a needle-shaped junction terminal at the wire end.
5. Take out the 4G mobile cloud intelligent switch from the packaging box, lock the plug wire labeled "12V" in the electrical cabinet of the nest to the power supply end of the 4G mobile cloud intelligent switch, lock the two needle-shaped junction terminals of the power cord in

step 3 to the normally open position of the control end of the 4G mobile cloud intelligent switch, lock the 4G receiving antenna to the signal end of the 4G mobile cloud intelligent switch through the antenna extension line, and place the 4G receiving antenna outside the nest.

Warning

- When stripping the external cover of the image transmission board power cable, be careful and do not scratch the inner red cable skin (positive) and blue cable skin (negative).

5.5.4 Connect the Network

1. Reserve the appropriate length of the Cat 6e double-strand shielded (Cat 6e) network cable pre-embedded during construction, pass it through the feed hole at the bottom of the nest, use diagonal pliers to strip the outer skin of the network cable, and press it into the shielded crystal head according to the T568B wiring sequence to ensure that the shielding metal net of the network cable is connected to the metal shell of the shielded crystal head, and the PVC outer skin of the network cable is effectively pressed into the crystal head, and the inner core wire is not exposed.
2. Insert the crystal head into the WLAN port of the "industrial router" in the distribution box.

Warning

- Users need to install a network lightning protector in the computer room and ground it properly.
- The network needs to ensure a minimum upload bandwidth of 10Mbps.
- If you need to use a 4G wireless network, please remove the upper cover of the distribution box. The nano-SIM card slot is located on the side of the industrial router. After inserting the card, be sure to replace the upper cover of the distribution box.

5.5.5 Connect the Power Cable

1. (In official use) Loosen the end of the power cord with an air plug provided, remove the tail sleeve and tail nut, loosen the pre-installed cable, and remove the air plug (make sure the air plug is intact).
2. For the AC power cable close to the nest side, reserve appropriate length, pass through the power feed hole at the bottom of the nest, and then pass through the tail nut and the tail sleeve from the aviation plug in turn. Use diagonal pliers to carefully remove the cable insulation layer of about 25mm (be careful not to damage the inner cable insulation layer), use wire strippers to remove the inner cable insulation layer of about 8mm at the end,

ensure that the three inner cables are the same length, insert the needle-shaped terminals at the end of the cable, and use a crimping tool to crimp and fasten.

3. Use a 1.5mm hexagon socket screwdriver to loosen the three screw of the plastic core of the connection block, insert the cable needle-shaped terminal into the copper column hole, and lock the wire according to the wire sequence shown in the figure below. After the locking is completed, insert the plastic core into the metal housing of the air plug.
4. After fitting the tail sleeve, tighten the tail nut to ensure that the insulation layer of the power cord is completely covered by the tail nut to avoid affecting the waterproof performance. Insert the air plug into the main power input interface of the distribution box of the nest correctly.

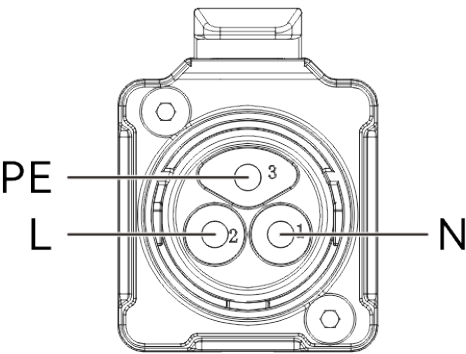


Fig 5-5 BD-24-3 Core AC Wiring Sequence (1: Neutral line, 2: Live line, 3: Ground wire)

 Warning
● Only certified electricians can carry out above-safety-voltage operations. ● Before operation, be sure to turn off the upstream power switch of the mains electricity cable and hang a No-Closing sign near the switch. ● Use a multimeter or an electro probe test pen to measure the electrical current at the end of the cable, and do not operate with electrical current.
 Remarks
● When temporary power supply is used for commissioning, users can choose to take out the standard 3m power cord from the packaging box, insert the end with the BD-24-3 core metal round male plug correctly into the main power input interface of the distribution box of the nest, and insert the other end into the three-hole socket with mains electricity.

5.6 Power On the Nest

5.6.1 Checklist Before Powering On

Before powering on the nest, please make sure to check and confirm the following items:

- Make sure the grounding wire of the nest is properly connected to the grounding point and the housing of the nest, and the screws are not loose.
- Make sure the AC power cord is not damaged, the cable plug is firmly connected, the wire sequence is correct, and the insulation and waterproof treatment meet the specifications.
- Make sure the AC power cord plug is firmly connected to the main power input interface of the nest.
- Make sure the reserved part of the AC power cord is neatly bound and not tangled with other cables.
- Make sure the inner wire sequence of the RJ45 crystal head of the wired network is correct, the shielding metal net of the network cable is connected to the shielding crystal head metal shell, and the PVC outer skin of the network cable is effectively pressed into the crystal head, and the inner core wire is not exposed.
- Make sure the crystal head of the wired network is correctly inserted into the WLAN port of the industrial router of the nest and is firmly connected.
- Make sure the crystal heads of the indoor and outside monitoring cameras are correctly inserted into the network ports of the industrial switch of the nest and are firmly connected; the power cords of the monitoring cameras are connected to the power supply wires corresponding to the labels in the electrical cabinet of the nest.
- Make sure the 485 communication power supply cables of the weather station, anemometer, wind vane, and piezoelectric rain gauge are correctly connected to the corresponding cables in the electrical cabinet of the nest.
- Make sure the network cable connected to the map transmission board is correctly inserted into the LAN port of the industrial router and is firmly connected.
- Make sure the 4G mobile cloud intelligent switch is correctly wired, and the power cord of the map transmission board can be remotely controlled to close by the 4G mobile cloud intelligent switch.
- Make sure all interfaces of the nest distribution box and main control box are correctly connected to the corresponding cables, without missing, wrong insertion, or loose.
- Make sure the nest is firmly installed without shaking, the landing pad is horizontal, and the surface is free of foreign matter and dirt.
- Make sure the weather station, anemometer, wind vane, and piezoelectric rain gauge of the nest are free of dirt or foreign matter coverage, and the wind vane is pointed in the correct direction.
- Make sure the outside monitoring camera of the nest is facing the direction of the nest landing pad and is firmly fixed.
- Make sure the electrical cabinet of the nest is clean and tidy, free of dust, dirt, or construction leftovers, and all cables have been neatly organized with zip ties.
- Make sure the Emergency stop button of the nest is in the released state.
- Make sure the packaging materials such as cartons, trays, foams, plastics, and zip ties have been removed from the nest area.
- Make sure there is no accumulation of miscellaneous items around the nest.

5.6.2 Powering On and Inspection

1. After the pre-inspection is completed and confirmed, open the watertight distribution box and turn the air switch to the ON position; use a multimeter to measure the AC voltage at the input terminal N (black probe) and input terminal L (red probe) of the leakage protector in the watertight distribution box to ensure that the voltage meets the power supply requirements (220V~).
2. Open the electrical cabinet of the machine nest, turn the air switch and air conditioning power switch in the machine nest distribution box to the ON position (push up), and observe whether the main power indicator and air conditioning power indicator are on. If the indicator is not on, check the power input end.
3. If the power light is normally on, press and hold the "ON" switch on the UPS for 5 seconds until the UPS makes a beep sound for 1 second. Then press the power switch button on the main control box, and the green light of the power button will turn on. The machine nest can be powered on; if the machine nest needs to be powered off, follow the reverse order.
4. Press the "T" button on the leakage protector to test whether the leakage protector works normally. If it works normally, the machine nest will be powered off. At this time, press the leakage protection button and turn the air switch to the ON position to restore power supply.

Chapter 6 Aircraft Preparation

6.1 Put Batteries into Smart Battery Slots

After the nest is powered off, open the nest's landing pad maintenance door and put 6 DF6_12000_2310 batteries in the smart battery slots in correction direction.

Tips

- Users can also place 4 DF6_12000_2310 batteries in the smart battery slot of the machine nest, and the remaining 2 batteries can be installed on the Dragonfish vertical take-off fixed-wing aircraft.
- When the aircraft is parked inside the machine nest, the number of batteries in the machine nest must not exceed 6.

Remarks

- The default charge range of the battery slot is 80% and 49% respectively. When the battery power is as low as 49%, it will automatically start charging, and when the battery power reaches 80%, it will automatically stop charging. Each slot has independent upper and lower limit settings.
- When the Autel SkyCommand Center issues a pre-charge command before takeoff, the machine nest will set the charge upper limit of all battery slots to 100% and enable the charging function of all battery slots.
- When the machine nest detects that the battery has been in the battery slot for more than 48 hours continuously, it will set the default charge range of the corresponding slot to 80% and 49%.
- During the battery charging process, the battery slot will obtain the communication between the charger and the battery in real time. When the communication between the battery and the charger is interrupted or the battery is removed, or the battery power reaches the upper limit, the charging will be automatically turned off.

6.2 Assembling the Aircraft

■ Install the left and right wings

Take the aircraft fuselage out of the industrial box and place it on flat ground. Then take out the left and right wings, insert the wings into both sides of the fuselage, and fasten the wing locks to ensure that the two are firmly connected. The wings cannot be pulled out.

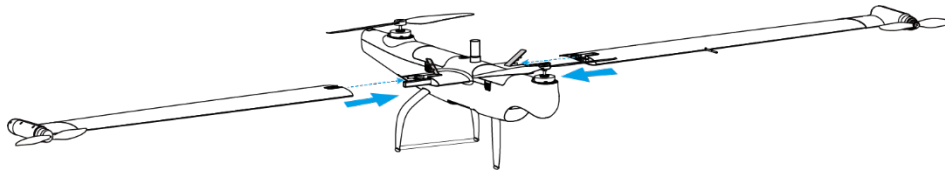


Fig 6-1 Install the wings

■ Install the rear wing

Take out the aircraft tail, remove the rubber protective cover at the tail interface, press and hold the lock button, correctly insert the tail into the interface at the rear of the aircraft fuselage, release the lock button, and ensure that the tail is firmly connected to the fuselage.

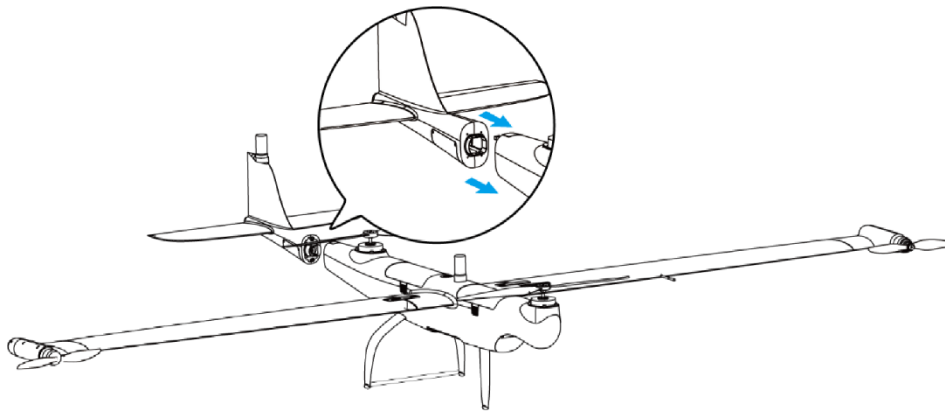


Fig 6-2 Install the rear wing

■ Install wingtip propellers*

The wingtip propellers are installed by default before shipment. Generally, users do not need to install them. If you need to replace them, please contact Autel Robotics After-Sale department.

Remarks

- The propellers on the front and rear fuselage of the aircraft are fastened with screws and are installed by default at the factory. Generally, users do not need to install them.
- If the front and rear fuselage propellers are damaged, please stop flying and contact Autel Robotics to purchase new fuselage propellers. Users can replace them with the maintenance tools provided in the kit.
- When replacing the fuselage propeller, please pay attention to the installation position of the propeller. The fuselage propeller must be installed in the correct position. The corresponding installation positions are marked on the surface of the fuselage propeller blades.

Warning

- The maximum speed of the aircraft's fuselage propellers can reach 9,000 revolutions per minute, and the maximum speed of the wingtip propellers can reach 15,000 revolutions per minute. Please pay attention to safety when dealing with them.
- Before each flight, be sure to check that each propeller is in good condition. If it is aged,

damaged or deformed, please replace it before flying.

- Before each flight, be sure to check that each propeller is installed correctly and securely.
- Before each flight, be sure to remove the blade fixing clips from the propellers on the front and rear fuselage of the aircraft, and ensure that the motors can rotate normally without any lag or abnormal noise.
- Please use propellers provided by Autel Robotics. Propellers of different models cannot be mixed.
- Before replacing the propeller, make sure the power of the aircraft is turned off.
- The edges of the propeller are sharp, so it is recommended to wear protective gloves when replacing the propeller.
- Do not get close to or touch the rotating propeller or motor to avoid injuries.
- Before conducting ground testing of the aircraft, make sure the propellers have been removed.

■ Install the gimbal camera

1. Make sure the aircraft is powered off, and remove the protective covers from the gimbal interface of the gimbal camera and the gimbal interface of the aircraft. Align the red dot on the gimbal lock ring with the red dot on the gimbal interface on the aircraft body.
2. Hold the gimbal camera upward, align the gimbal interface and insert it into the gimbal interface on the body, ensuring that the two are well connected.
3. Rotate the gimbal lock ring according to the locking direction of the gimbal interface on the fuselage until the red dot on the gimbal lock ring aligns with the lock mark on the gimbal interface on the fuselage. After the gimbal camera is locked, you will hear a click from the gimbal unlock button.

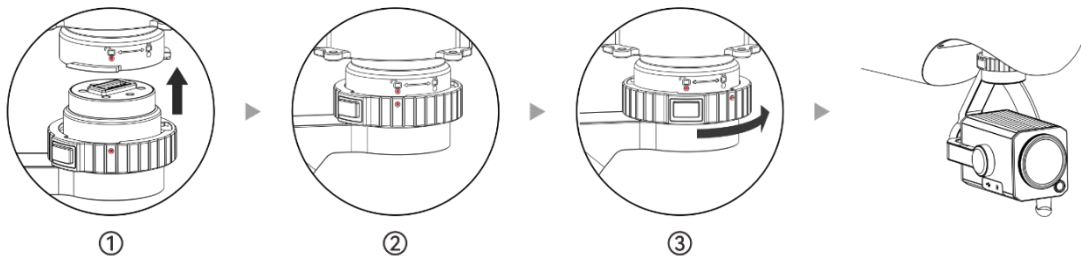


Fig 6-3 Install a gimbal camera on the aircraft

If you need to remove the gimbal camera, please press the unlock button on the gimbal and follow the step above in reverse.

! Important

- Please follow the steps above to replace the gimbal. Otherwise the gimbal camera interface will be damaged or there will be poor connection.
- Do not replace the gimbal frequently. Frequent removing and inserting might lead to poor connection between the aircraft and the gimbal camera.

- Please use the gimbal camera model designated by the Autel Robotics for replacement. Incompatible gimbal camera will damage the aircraft,

⚠ Warning

- It is prohibited to install or remove the gimbal camera with power on, and the gimbal camera can only be installed or removed 15 seconds after the power of the aircraft is turned off.

■ Install the smart battery

1. According to the requirements in “[6.1 Put Batteries into Smart Battery Slots](#)”, place two batteries in the aircraft. Ensure the batteries are placed firmly in the fuselage and cannot be removed directly.

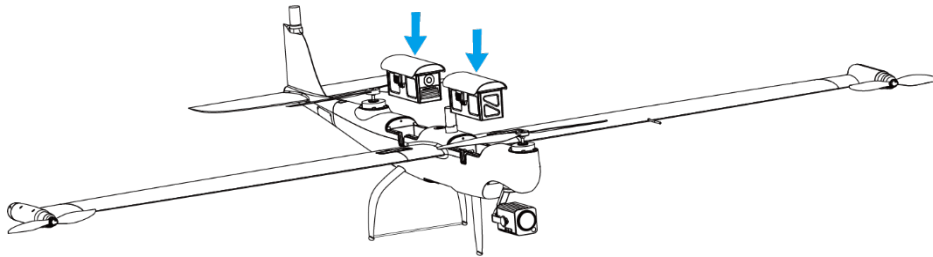


Fig 6-4 Install the Smart Battery

When installing the aircraft for the first time, inspect the whole aircraft before placing it in the nest. For details, please refer to “[2.7.1 Aircraft Inspection](#)”.

Chapter 7 Nest Configuration

After nest installation and cable connection, it is required to configure and local debug the nest in the installation site before using the nest in the Autel SkyCommand Center.

7.1 Log in to Autel SkyCommand Center

1. Enter the Autel SkyCommand Center Visit Address in the browser on the computer, and log in to the corresponding account to enter the Autel SkyCommand Center interface.

Remarks

Autel SkyCommand Center Supports public cloud deployment and private cloud deployment which provide basic same function experience but only differ in the account management system. Users can choose the deployment solution based on their actual needs:

- In public cloud deployment, the address of the Autel SkyCommand Center is: <https://eaglesnest.autelrobotics.cn/>
- In this manual, the private deployment is used as default one. Users should contact the service deployment personnel or Autel Robotics for the Autel SkyCommand Center address. In this manual, the following reference address is used for description and introduction.

Tips

- When choosing public cloud deployment, users can self-register for a Autel Robotics unified account to visit the Autel SkyCommand Center.
- When choosing private deployment, please contact Autel Robotics to obtain the organization's super administrator account and password of Autel SkyCommand Center. The super administrator can create administrator accounts and ordinary member accounts in the organization; different accounts have different operation permissions in the Autel SkyCommand Center, and this manual assumes that the administrator account is used for operation introduction.
- When choosing private deployment, please ensure that the computer, the nest, and the server deploying the Autel SkyCommand Center are in the same local area network so that relevant services can be accessed normally.

7.2 Add Aircraft in Autel SkyCommand Center

1. In the "Realtime" column of the Autel SkyCommand Center, click the "Add Aircraft" icon, and enter relevant information in the pop-up Add Aircraft interface to complete the addition of

the aircraft; or in the "Device Management" column of the Autel SkyCommand Center, click the "Add Drone" icon in the "Aircraft" sub-page, and enter relevant information in the pop-up Add Aircraft interface to complete the addition of the aircraft.

Fig 7-1 Add Aircraft in Autel SkyCommand Center

Tips

- After logging in to the Autel SkyCommand Center for the first time, please create a team, add members, and assign roles in the "Members" column first.
- The serial number of the aircraft can be found in the flight control log; it can also be found by matching the remote controller with the aircraft and checking in the Autel Voyager App of the remote control under "Settings->About->Aircraft Serial Number".

7.3 Add Nest in Autel SkyCommand Center

1. In the "Realtime" column of the Autel SkyCommand Center, click the "Add Nest" icon, and enter relevant information in the pop-up Add Nest interface to complete the addition of the nest; or in the "Device Management" column of the Autel SkyCommand Center, click the "Add Nest" icon in the "Nest" sub-page, and enter relevant information in the pop-up Add Nest interface to complete the addition of the nest.

The screenshot shows a dark-themed 'Add Nest' dialog box. At the top, there's a title bar with 'Add Nest' and a close button. Below it, the form is organized into sections. The first section has two input fields: '*Name' with a character count of 0/32 and '*Serial Number' with 0/50. The second section is '*Password Settings' with a 0/6 character count. The third section has three inputs: 'Safety Altitude' (a numeric field with '100'), 'Lng' (a text field with 'Please enter longitude coordinate'), and 'Lat' (a text field with 'Please enter latitude coordinates'). The fourth section is 'Description' with a large text area. At the bottom right, there are 'Cancel' and 'Save setting' buttons.

Fig 7-2 Add Nest in Autel SkyCommand Center

Tips

- The serial number of the nest has been burned into the nest transmission board in advance, please contact Autel Robotics for it; or after the nest image transmission board is connected to the portable display and mouse, you can also click the "Ⓐ" icon at the upper right corner of the interface to view the serial number of the nest.
- When setting the login password of the nest, please be sure to make relevant records to avoid forgetting the password, and it is recommended to set it to 123456.
- Users can use aircraft with an RTK module to confirm the accuracy of the nest coordinates and obtain the latitude and longitude information (real coordinates) of the nest: fly the aircraft to the top of the nest RTK antenna, and take a photo of the coordinate information displayed in the remote controller with a mobile phone and enter it into the input field of the above page.

2. In the "Device Management" column of the Autel SkyCommand Center, select the corresponding nest, click "Calibration->RTK Settings" in the RTK position, and enter the latitude and longitude and absolute altitude data of the nest in the pop-up RTK settings page.

7.4 Add Repeater Base Station in Autel SkyCommand Center

1. In the "Device Management" column of the Autel SkyCommand Center, click the "Add Base Station" icon in the sub-page of "Base Station", and enter relevant information in the pop-up Add Base Station page to complete the addition of the base station.

Add Base Station

*

Name

Enter a name.

0 / 64

*

SN

Enter an SN.

*

Tower No.

Enter a tower number.

Cancel

Save

Fig 7-3 Add Base Station in Autel SkyCommand Center

 Tips

- Please contact Autel Robotics to obtain the serial number of the base station.
- Please fill in the tower number according to the actual situation, and do not fill it in randomly.
- You can also select the "Batch Import" operation in the "Base Station" subpage to import Excel files for batch addition of repeater base stations.

7.5 Set Nest Network

1. Connect your computer to the industrial switch network port (or LAN port of industrial router) of the power distribution box of the gimbal mount through a network cable. Open your browser and enter 192.168.10.1 to log in to the management page of the industrial router.
2. After logging in, please set the Wi-Fi name and password. It is recommended to name the Wi-Fi name after the deployment location, and the default password is Autel123!
3. Use your phone to try to connect to this Wi-Fi to check if you can connect to the network normally.

 Important

- Before setting the nest network, please ensure the nest has been connected to network cable or 4G nano-SIM card normally.
- The default login account of the new nest's router is admin and the password is admin12345678; Users can also contact Autel Robotics to obtain default login account

and password.

7.6 Nest Log in to Autel SkyCommand Center

1. After connecting the nest image transmission board to portable display screen and mouse, click the “” icon at the upper right corner of the display screen.
2. In the prompted nest login interface, enter the domain name of the Autel SkyCommand Center and the nest login password, Netty Port and Rtc Port is “8090” and “8989” (or port 18090 and 18989), click “Confirm” and wait for 1 second until successful login is prompted.

 **Remarks**

- Please refer to "7.1 Log in to Autel SkyCommand Center" in this chapter for the domain name of the Autel SkyCommand Center; refer to "7.3 Add Nest in Autel SkyCommand Center" in this chapter for the login password of the nest.
- For reference only, the domain name: eaglesnest.autelrobotics.cn; the password: 123456.
- The following are the prerequisites for successful login to the nest:
 1. The nest is successfully connected to the network and has obtained an automatic IP address, such as 192.168.1.100.
 2. The nest serial number (serial number format: NFxxxxxxxxxx) has been added in advance in the Autel SkyCommand Center.

3. In the "Device Management" column of the Autel SkyCommand Center, click the "View" icon under the alternate landing point in the "Nest" subpage, and enter the relevant information in the pop-up Add Alternate Landing Point page to complete the addition of the alternate landing point.

Add Alternate Point ?

×

The alternate point must be within 50 m from the field around the destination nest.

*Longitude

114.3952493

*Latitude

22.6160214

*Altitude

26.5

Cancel

Save

Fig 7-4 Add alternate point for the nest

 Tips

- The alternate point must be within 50 m from the nest. Otherwise it cannot be saved.
- When the aircraft cannot land in the nest as there is device error or abnormal weather, it will automatically land in the alternate point.

7.7 Set Aircraft Image RTMP Upstreaming

1. After attaching a portable monitor and mouse to the nest image transmission board, use the mouse to select the settings icon at the lower right corner of the monitor's interface, enter the RTMP address in the pop-up interface, and turn on the RTMP switch.

 Remarks

- In private deployment, RTMP address can be set according to following rule:
1. For example, the domain of the Autel SkyCommand Center is [10.138.223.226](#), with netty port: 18090 and Rtc Port 18989, then the RTMP address can be set as [rtmp://10.138.223.227:11935/live/JDxxxxxxxxxx](#), JDxxxxxxxxxx refers to the serial number of the aircraft.

 Tips

- After configuring the RTMP streaming, you can check if the streaming is successful by following these methods:
1. When the aircraft is online in the Autel SkyCommand Center, you can view the aircraft image in the Autel SkyCommand Center.
2. Enter the above RTMP address in the VLC player on your computer (connected to the same network) to view the aircraft image normally.

7.8 Set Surveillance Camera RTMP Upstreaming

 Remarks

- The login account of the nest surveillance camera management interface is admin, with admin password of dev123456. Please contact Autel Robotics to confirm the account and the password.

7.8.1 Configure the surveillance camera inside the cabin

Connect the computer with the network cable to the network port of the industrial switcher (or LAN port of the industrial router) in the nest power distribution box, enter 192.168.10.4 in the browser to enter the inside surveillance camera configuration interface. Detailed configuration operations are as follows:

1. Click Network->Advance Configuration->RTMP.
2. Choose to enable the server address and set rtmp://10.138.223.227:11935/NFxxxxxxxx/nest_in.
3. Click on "Video/Audio" -> "Video" to make relevant settings. Please set the parameters as follows.
4. Set the exposure as 1/50; set the time font color to yellow; Set the fill light mode to manual fill light and the brightness to 15.

7.8.2 Configure the surveillance camera outside the cabin

Connect the network cable to the network port of the industrial switcher (or LAN port of the industrial router) in the nest power distribution box, enter 192.168.10.4 in the browser to enter the inside surveillance camera configuration interface. Detailed configuration operations are as follows:

1. Click Network->Advance Configuration->RTMP.
2. Choose to enable the server address and set rtmp://10.138.223.227:11935/NFxxxxxxxx/nest_out.
3. Click on "Video/Audio" -> "Video" to make relevant settings. Please set the parameters as follows.
4. Set the exposure to 1/50; time font color is as the default.

Tips

- [NFxxxxxxxx](#) in the RTMP address above is the nest's serial number. When configuring it, please change it to actual nest SN.
- After configuring the RTMP streaming, you can check if the streaming is successful by following these methods:
 1. Check the inside and outside surveillance camera images in Autel SkyCommand Center.
 2. Enter the above RTMP address in the VLC player on your computer (connected to the same network) to view the aircraft image normally.

7.9 Set the AC parameters of the nest

7.9.1 Temperature Setting

Connect the computer with the network cable to the network port of the industrial switcher (or LAN port of the industrial router) in the nest power distribution box, open the “Nest debugging application”, set the

 Tips

- Nest debugging application is a designated commission software. Please contact Autel Robotics to obtain it.

7.9.2 Humidity Setting

After the AC is turned on, press and hold “” below the AC display panel inside the nest to enter the AC setting mode. Switch setting code to F07 and set the humidity to 40.

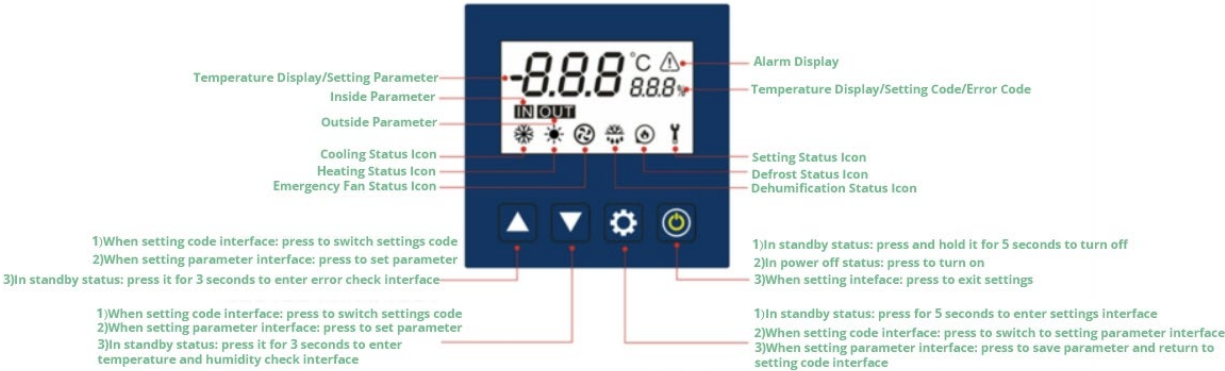


Fig 7-5 Function Description of the AC display Panel

 Tips

- After setting parameters in AC setting mode, wait for a while before the interface restores to the default display interface.
- After completing setting, observe whether the AC dehumidification status icon is highlighted when the humidity display value is more than 60% and check return air temperature.

7.9.3 Other Settings

Taking the humidity setting method, you need to set three values for the AC:

1. Switch setting code to F14 and setting parameter is 02.
2. Switch setting code to F15 and setting parameter is 96.
3. Switch setting code to F16 and setting parameter is 96.

7.10 Image Transmission Matching

7.10.1 Matching Preparation

1. Before matching, please make sure that the firmware of the nest, the aircraft, and the repeater base station is the required version. If it does not meet the requirements, please upgrade the firmware of the nest, the aircraft, and the repeater base station to the required version first.
2. Connect the computer with the SecureCRT software installed to the network port of the industrial switch or the LAN port of the industrial router in the power distribution box of the nest through a network cable.
3. Right-click "This PC", click "Manage -> Device Manager -> Ports", remember the port number. Then open SecureCRT and create a quick connection:
 - Select "Serial" from the "Protocol" drop-down menu.
 - Select the port number from the "Port" drop-down menu.
 - Select "115200" from the "Baud rate" drop-down menu.
 - Click the "Connect" button to connect to the serial port of the nest.

Tips

- In first connection, the above settings are required. If the above procedures have been done, you can skip step 3.

4. After connecting the nest, enter the account **root** and password **fthuop2** for CRT login.

Tips

- When you are entering the password, characters entered will not be displayed, which is normal.

7.10.2 Starting Image Transmission Matching

Important

- Before matching, please ensure the image transmission version of the aircraft and that of the repeater base station are the same.

■ Restore the aircraft to default configuration (nest and aircraft direct connection)

1. Press and hold the matching button on the aircraft for more than 10 seconds and the aircraft will automatically restore to default configuration.

■ Restore the nest to default configuration (nest and aircraft direct connection)

Tips

- To perform this step, you need conduct CRT login with account root and password fthuop2.

1. Enter the following command in the nest CRT command line:

cd /system/bin

2. Wait for 1 second before entering the following command:

InitSetMasterDefault.sh

3. Enter following command to check the nest and the aircraft connection status:

atcmd at^dacs=?

Tips

- After entering the command and clicking Enter button, if ^DACS: 1,1", the aircraft and the nest are connected; if ^DACS: 1,0, they are disconnected.

4. If they are disconnected, please enter the command above again. If they are still disconnected, please check whether the firmware version of the aircraft or the nest is normal as required.

5. If they are connected, please ping aircraft IP:

ping 192.168.1.1

If ping is successful, the connection is normal (about 22ms delay); if not, the connection is abnormal, please check the firmware version of the aircraft or the nest is normal or not.

You may enter the following command to stop ping:

Ctrl+c

■ Nest+ Repeater Base Station + Aircraft Connection Setting (Switching from the “Nest+ Aircraft” Direct Connection)

1. Enter the following command in nest CRT command line to enter aircraft CRT command line:

telnet 192.168.1.1

Enter the account and the password and enter the following command to check IP and confirm whether it is the IP of the aircraft (192.168.1.1):

ifconfig

2. Configure the aircraft as the three-point connection mode and run the following command:

cd /system/bin

InitSetSlave1.sh

3. Enter **Ctrl+]** and Enter **e** to return to the nest CRT command line, and run the following command.

cd /system/bin

mount -o remount,rw /system

vi InitSetMaster.sh

After entering the vi editor, click “i” key in the keyboard to switch to editing mode, change the working frequency point, such as 8370; click “Esc” key in the keyboard to exit editing mode and switch command mode; in command mode, enter **:wq** to save and exit vi editor,

Remarks

- The Key to each device role contains 8 digits. Assuming that the Key to the nest M is AAAAAA, the Key to the repeater base station S0 is BBBBbbb, and the Key to the aircraft S1 is CCCCCC, the combination rules are as follows:
 1. Nest M or repeater base station M: AAAAAA BBBBbbb CCCCCC.
 2. Repeater base station S0: BBBBbbb AAAAAA CCCCCC.
 3. Aircraft S1: CCCCCC AAAAAA BBBBbbb.

4. Configure the nest as the three-point connection mode and run the following command:

InitSetMaster.sh

- Run the following command to check the nest and the repeater base station connection status:

atcmd at^dacs=?

Tips

- After entering the command and clicking Enter button, if ^DACS: 1,1", the nest and the repeater base station are connected; if ^DACS: 1,0, they are disconnected.

- If they are disconnected, please enter the command above again. If they are still disconnected, please check whether the firmware version of the nest and that of the repeater base station is normal as required, and check the working frequency point of the repeater in Autel SkyCommand Center.

- Run following command to check the aircraft and the nest connection status:

atcmd at^dacs=?

Tips

- After entering the command and clicking Enter button, if ^DACS: 1,1", the nest and the aircraft are connected; if ^DACS: 1,0, they are disconnected.

- If they are disconnected, please enter the command above again. If they are still disconnected, please check whether the firmware version of the nest and that of the aircraft is normal as required, and check the working frequency point of the repeater in Autel SkyCommand Center.

- If they are connected, please ping aircraft IP by entering the following command:

ping 192.168.1.1

If ping is successful, the connection is normal; if not, the connection is abnormal, please check the firmware version of the aircraft or the nest is normal or not.

You may enter the following command to stop ping:

Ctrl+c

■ CRT Command Reference (If there is fault, please refer to following for operation) *

- Check whether the nest and the repeater base station are connected:

atcmd at^dacs=?

- Enter the following command in the nest command line:

```
atcmd at+cfun=0
```

```
atcmd at^dlf=1,8470
```

```
atcmd at+cfun=1
```

to switch to 8470 frequency point.

- Check working frequency point:

```
atcmd at^dlf?
```

- Check repeater base station log:

```
/system/bin/elog &
```

- Clear repeater base station log:

```
pkill elog
```

- Check nest version:

```
cat version.txt
```

- Check nest and repeater base station version:

```
atcmd at^dswitch=0
```

```
telnet 192.168.1.xxx
```

```
cat version
```

- Check repeater base station frequency point command:

```
cat /data/config/upgrade.ini
```

Chapter 8 Flight Operation Test

After completing nest configuration, you can create routes and missions in Autel SkyCommand Center, issue mission to the nest to conduct flight operation test so as to ensure the nest and the aircraft can work properly.

Tips

- It is recommended to download and read “Autel SkyCommand Center User Manual” to learn usage method in details.

8.1 Nest Operation Requirements

Before conducting the test, please make sure the following requirements are meet.

8.1.1 Before Operation

- Please ensure that the grounding of the nest is good and lightning protection measures are taken.
- No heavy objects should be stacked on the top of the nest.
- No objects should be stacked within 3 meters in the direction of the door opening of the nest to avoid damage to the nest due to failure.
- Before manually placing the aircraft on the landing pad of the nest, please wipe the sand on the footrest of the tripod to avoid scratching the precision landing QR code on the landing pad.
- When manually placing the aircraft on the landing pad of the nest, please ensure that the tail of the aircraft faces the direction of the internal air conditioner of the nest, and the angle should not exceed 30 degrees to avoid failure of the homing rod to correctly guide the aircraft to the center and cause failure.
- After manually placing the aircraft on the landing pad of the nest, please ensure that the propellers of the aircraft (especially the front propellers) are stored within the landing pad to avoid collisions with the door when closing the door.
- The three-stage synchronous belt telescopic arm structure under the landing pad of the nest is equipped with a braking system. Do not manually push and stretch the telescopic arm. Forcibly opening the door manually will cause overloading and damage to the structure or braking system.
- Do not forcibly open the door manually, as this will cause damage to the door or push rod structure.

- Do not disassemble the aircraft yourself. Please disassemble the aircraft under the guidance of the technical support of Autel Robotics.

8.1.2 During Operation

- Please do not approach the nest during its operation, nor stand in front of the hatch of the nest to block the opening of the hatch, the extension, and retraction of the landing pad.
- Do not use your limbs to stop the movement of the nest. If you find any danger, please press the Emergency stop button or the power switch of the main control box in time.
- Under any normal working condition of the nest, it is prohibited to manually plug or unplug the smart battery slot in the nest or the smart battery on the aircraft. If you need to remove or insert the battery, please turn off all the power of the nest before proceeding with the operation.
- Please stay away from the nest during the takeoff and landing of the aircraft to prevent personal injury caused by the out-of-control lateral movement of the aircraft, and also to avoid the aircraft from failing to land due to avoiding obstacles.

8.1.3 After Operation

- After the nest executes the operation, please check the surveillance screen of the surveillance camera inside and outside the nest in the Autel SkyCommand Center, to ensure the aircraft is inside the nest and the nest hatch door is closed firmly.

8.2 Preparation Before Test

- After connecting the portable monitor and mouse to the transmitting board of the nest, control the nest to open the hatch and push out the landing pad through the monitor.
- Place the aircraft on the landing pad, press and hold the frequency matching button at the bottom of the battery compartment for 1 second, and turn on the 5.8G data transmission matching on the remote controller. You will hear a beep (the remote controller screen will indicate that the 5.8G frequency matching is successful) indicating a successful matching.

Tips

- As the image transmission link path does not pass through RC, RC will display "Matching" for a long time. You just need to exit the Autel Voyager App in the RC and open it again.

- After the matching is successful, insert the same amount of battery into the rear battery compartment of the aircraft and restart it.
- Click the "(i)" icon in the upper right corner of the monitor screen with the mouse to turn on the subtitles.

8.3 Manual Takeoff and Landing Test

- After the external portable display and mouse are connected to the transmitting board of the nest, click the "i" icon in the upper right corner of the display screen with the mouse.
- After the aircraft enters the FIX mode, click the "AutoCheck" button to perform the aircraft self-check. Wait for the self-check to complete, then click the "getAutoSafeResult" to verify, and then right-click the mouse to exit this page and return to the homepage.
- Open the settings of the Autel Voyager App on the remote control, select your preferred control mode in the "Remote Control->Control Mode" item (available options are Mode 1, Mode 2 and Mode 3), then switch the flight mode switch of the remote controller to the M gear, and select manual flight in the Autel Voyager App.
- Turn the left and right joysticks of the remote controller into an inner eight or outer eight shape and hold for 2 seconds to start the motor; test the various directions of takeoff and landing (vertical rise and fall, left and right translation, front and back translation, left and right heading).
- If the aircraft does not take off, click the "startAirSpeedCalibrate" button on the interface in step 2 to calibrate the airspeed meter. During calibration, the aircraft should be in the nest compartment, and make sure the air conditioner is turned off, otherwise it will affect the calibration success; after calibration, right-click the mouse to exit this page and return to the homepage, and then push out the landing pad (aircraft), repeat steps 2 and 3.

Remarks

- In order to prevent the landing pad from automatically retracting after the aircraft takes off manually, after the landing pad is pushed out and the centering rods are fully extended, you can press the emergency switch behind the nest to prevent the landing pad from automatically retracting.
- During the manual takeoff and landing test, the remote controller can only control the flight attitude of the aircraft in all directions, and cannot control other functions.

8.4 Automatic Flight Test

8.4.1 Create a Route

Important

- Before creating a route, please make sure the route planning area has great signal quality. Please refer to ["4.2.3 Aircraft Test Evaluation"](#).

- When creating a route, please make sure the flight operation area is not in no-fly zone or obtain no-fly zone lifting authorization from local authority in advance.

1. Enter the Autel SkyCommand Center visiting address in browser in computer, and log in to the Autel SkyCommand Center with corresponding account.

Tips

- For visiting address, please refer to “[7.1 Log in to Autel SkyCommand Center](#)” in chapter 7.

2. In “Route Library” in Autel SkyCommand Center, click “New” icon, choose “Create Route”, enter the name of the route in the prompted interface, set the device type as “Fixed-wing Aircraft”, choose the route type as required, and click “Set Route”.

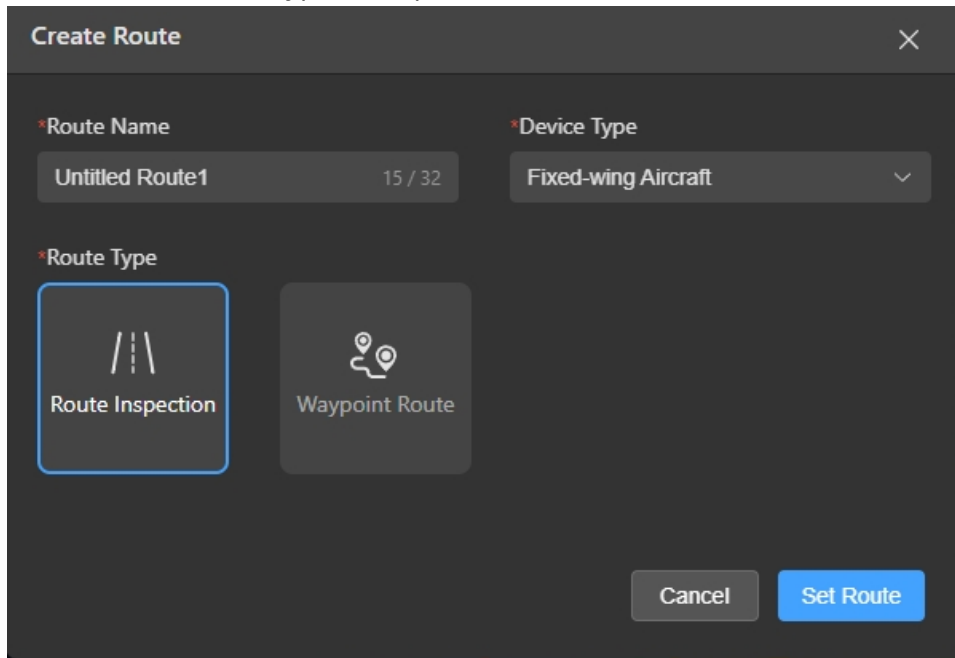


Fig 8-1 Configuring a Route

Important

- In “Route Library”, you can also choose “Import KML” to create a route. The imported file type can be .kml or .kmz.
- When importing KML, please make sure the RTK signal source that KML uses and the RTK signal source used in nest position calibration are the same. Otherwise, the actual flight trajectory differs from the route, which may lead to aircraft crash.

2. If you choose “Route Inspection” as the route type, you can create an inspection mission by importing KML file or file in json format (you can download KML template file and edit it before importing it).

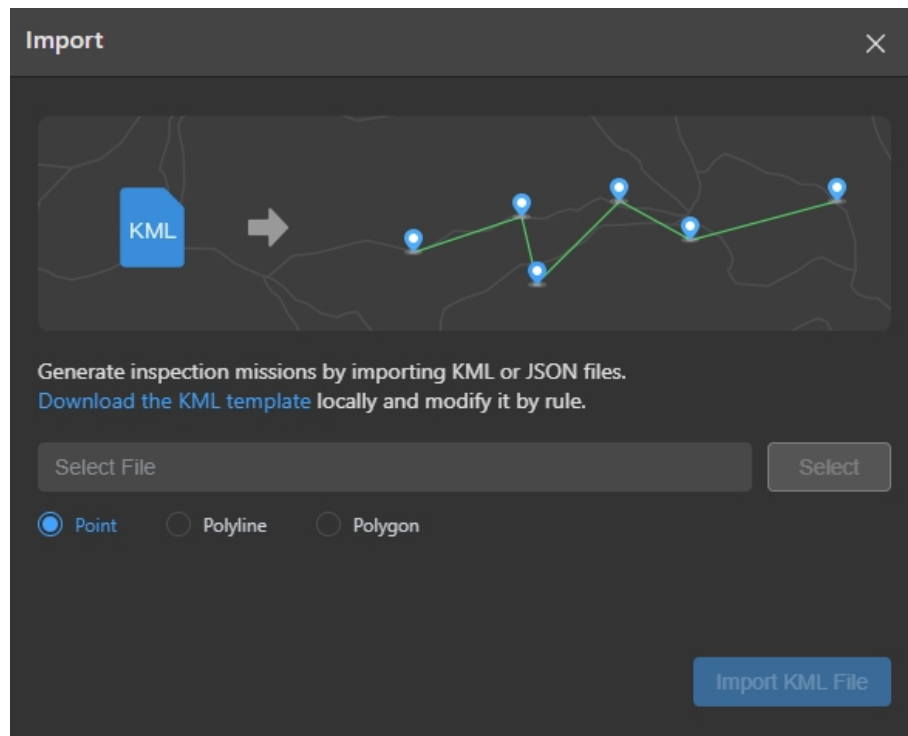


Fig 8-2 Import KML File to generate inspection mission

3. If you choose “Waypoint Route” as the route type, edit relevant parameters in the route adding interface, create the route in the map on the right, complete all settings and save and exit.

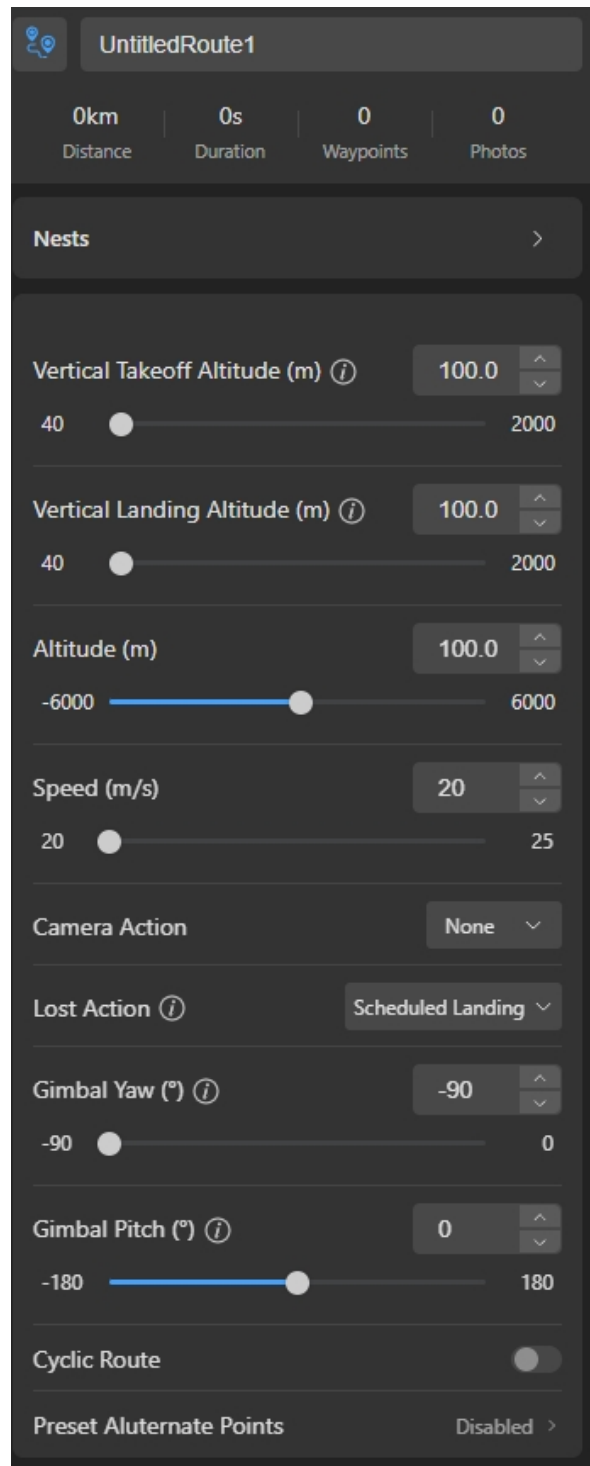


Fig 8-3 Create a waypoint mission

8.4.2 Execute the Flight Mission

1. In the "Base Station" sub-page of the "Device Management" column in the Autel SkyCommand Center, turn on the repeater base stations along the route.

2. In the "Mission" sub-page of the "Projects" column in the Autel SkyCommand Center, click the "+Missions" icon, select the created route, set the task strategy to Now, and select the execution by nest, select the added nest, set the task name, and confirm to issue the mission to the nest.

Create Mission

* Policy

Now Scheduled Periodic

* Executed By

Nest

* Nest

Select >

* Select

Example Format: Mission_001

* Mission Name

Example Format: Mission_001

Cancel Assign Mission

Fig 8-4 Create a mission

3. After the mission is started, the nest will open the hatch, push out the landing pad and expand the centering rod. After the aircraft takes off, the centering rod will close, the landing pad will automatically retract and close the hatch; the aircraft will begin to perform the route flight mission.

4. In the "Realtime" column of the Autel SkyCommand Center, click the "Control Panel" icon in the nest column to view the real-time operation status of the nest and the aircraft, and you can view real-time alarm information at the top of the interface; in the live broadcast small window

in the upper right corner, you can view the real-time live broadcast of the nest and the aircraft; in the map interface, you can view the real-time flight path information of the aircraft.

5. After the route mission is completed, the aircraft returns to the top of the nest, and the nest will open the hatch, push out the landing pad and expand the centering rod; after the aircraft lands on the landing pad of the nest, the centering rod closes, the landing pad automatically retracts and closes the hatch.

6. After the aircraft completes the flight mission and returns to the nest, in the "Media Gallery" column of the Autel SkyCommand Center, you can view the media file folder generated by the flight mission, and click to open the file folder to view the detailed media file.

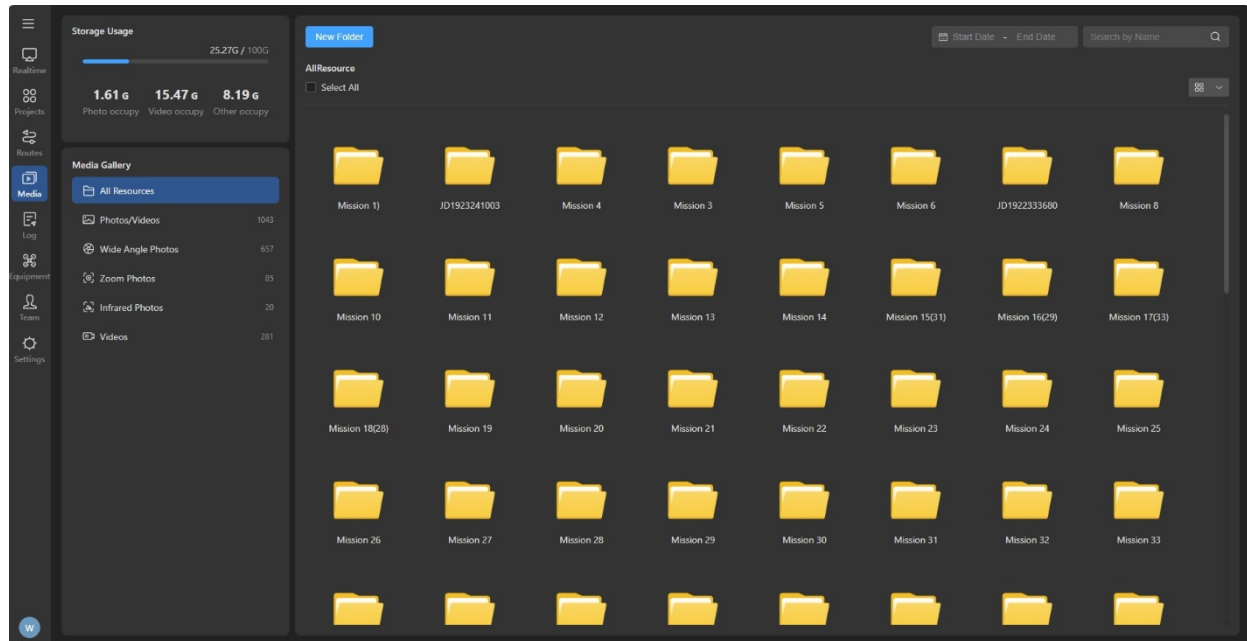


Fig 8-5 Media Gallery

! Important

- In testing, please check the nest surveillance camera image, and ensure the camera can cover the landing pad and it will not lose due to shaking.
- In flight operation testing, please conduct backup landing point and make sure the landing point setting meets the expectation.

8.5 Exit Checklist

After the automatic flight operation test is passed, before leaving the site, please make sure to check and confirm the following items:

- Confirm that there are no abnormal alarms in the Autel SkyCommand Center.
- Confirm that the weather station, anemometer, wind vane, and piezoelectric rain gauge are firmly installed. After manually adjusting the anemometer, wind vane, or gently tapping the

surface of the piezoelectric rain gauge, there are relevant data changes displayed in the Autel SkyCommand Center.

- Confirm that the RTK antenna, image transmission antenna, 4G antenna on the pole are firmly installed and the signal is received normally.
- Confirm that the folding antennas of the image transmission board in the cabin are locked and firmly connected, the feeder line of the image transmission antenna, the feeder line of the RTK antenna, and the network cable are well connected, the network cable is correctly connected to the LAN port of the industrial router in the power distribution box, and the power line of the image transmission board is well connected to the power interface of the image transmission board of the 4G mobile phone smart cloud switch and the power distribution box of the nest.
- Confirm that the line connection of the 4G mobile phone smart cloud switch is stable, the signal is received normally, and the power supply of the image transmission board can be remotely controlled on and off normally.
- Confirm that the surface of the temperature and humidity sensor in the cabin is clean and free of debris; after touching the temperature and humidity sensor with your hand, there is a corresponding data change display in the Autel SkyCommand Center.
- Ensure that the air conditioner in the cabin has been correctly set for temperature and humidity as required.
- Confirm that the inside and outside monitoring cameras are firmly locked, and the network cables of the monitoring cameras are well connected to the industrial switch in the power distribution box; in the Autel SkyCommand Center, the monitoring camera images of the inside and outside of the cabin can completely cover the landing pad and the outside of the landing pad.
- Confirm that the main power switch and air conditioning power switch on the power distribution box of the nest are turned to the ON position; the power button of the main control box is lit green.
- Confirm that there is no loose, missing, or wrong insertion of the connection between the power distribution box and the main control box in the electrical cabinet of the nest, and the industrial switch is firmly connected to the LAN port of the industrial router through the network cable.
- Confirm that the electrical cabinet of the nest is clean and free of debris, and all cables have been bound with ties.
- Confirm that there are no foreign objects or dirt on the surface of the landing pad of the nest, and the precision landing QR code has no appearance abnormality.
- Confirm that the alternate landing point has been set up, and the alternate landing QR code at the alternate landing area has no foreign objects, dirt, or appearance abnormality.
- Confirm that the smart battery slots of the nest are correctly placed with 4 intelligent batteries.

- Ensure that the structure of the aircraft is normal, there is no fracture, deformation, etc., the body is free of stains, the paint layer is not peeling, and there is no water stain inside the body.
- Ensure that the two batteries in the battery compartment of the aircraft are installed in place, the battery unlock button is in the locked state.
- Ensure that the front and rear propellers of the aircraft are firmly installed with no shaking, and there are no missing screws.
- Ensure that the motor surface of the aircraft is clean without stains, rotates smoothly, and there is no stuck phenomenon.
- Ensure that the propeller of the aircraft is in good condition, without obvious deformation, damage, fracture, delamination, etc., and the surface is clean without stains.
- Ensure that the wings and tail of the aircraft are firmly locked to the body, the RTK module receives data normally, and the pitot tube has a normal appearance.
- Ensure that the gimbal camera and the gimbal interface of the aircraft body are firmly locked, and the three-axis movement is normal.
- Ensure that the lens surface of the gimbal camera is free of foreign objects, dirt, or fingerprints.
- Ensure that the gimbal camera has been inserted into the microSD and the rubber protective cover of the card slot is tightly closed, otherwise, it will affect the product's protection performance.
- Ensure that the tripod of the aircraft is firmly installed, without loosening or displacement, and the surface is clean without foreign objects (such as sand, dust, etc.).
- Ensure that the heat dissipation holes at the bottom of the aircraft body are not blocked, and the surface of the ultrasonic sensor is clean without stains.
- Confirm that the aircraft has been correctly placed on the landing pad of the nest, the nose and tail are facing the correct direction, and the return-to-center pole of the landing pad locks the tripod of the aircraft.
- Confirm that the alternate landing test of the aircraft has been completed.
- Confirm that the doors and maintenance doors of the nest are closed tightly, and there are no foreign objects covering the four sides of the nest (especially the direction of the landing pad).
- Confirm that the flight airspace has been legally unlocked (if any).

Chapter 9 Upgrades and Troubleshooting

9.1 Equipment Upgrade

After the nest is installed and configured, log in to the cloud service and connect to the Autel SkyCommand Center. Users can update and upgrade the software versions of the nest, the aircraft inside the nest, and the repeater base station through the Autel SkyCommand Center.

1. In the "Device Management" column of the Autel SkyCommand Center, click the "Fixed-wing Aircraft Version" button in the upper right corner of the interface, and then click the "Upload Upgrade" button to upload the latest upgrade package file from the local computer disk.
2. After the upload is completed, the Autel SkyCommand Center will automatically perform verification and analysis, refresh the device firmware version information in the entire device list, and if there is an update (the firmware version information indicates "there is an update"), click "One-Click Upgrade" to push the latest upgrade package to the nest, the aircraft, and the repeater base station, and wait for the device to complete the update.

Tips

- Please note that the nest, the aircraft, or the repeater base station cannot be upgraded when offline.
- Please contact Autel Robotics in advance to obtain the upgrade package file. The Autel SkyCommand Center only supports uploading upgrade package files provided by Autel Robotics.
- Please note that the aircraft should be upgraded first, followed by the nest, and the repeater base station can be upgraded in any order. After the upgrade is complete, be sure to check the hardware version number and the single-module version number.
- The aircraft needs to modify the flight control parameters through the QG software.
- Only ZIP format upgrade package files (firmware version package [aircraft + nest] and relay upgrade package, with a size not exceeding 4GB) and APK format upgrade package files (nest App upgrade package, with a size not exceeding 200MB) are supported.
- The version of the new upgrade package cannot be latter than the version of the same type of upgrade package already uploaded.
- File naming format of upgrade package:
 1. Firmware version package: DragonFish_Relay_FW_Vx.x.x_2023xxxx.zip;
 2. Repeater upgrade package: DragonFish_RelayStation_Vx.x.x_2023xxxx.zip;
 3. Nest App upgrade package: DragonFish_Nest_Vx.x.x_2023xxxx.apk.

9.2 Nest Parts Maintenance

To ensure that the nest maintains optimal performance, all parts of the nest need to be maintained regularly. For details, please refer to the Maintenance Manual.

Table 9-1 Nest maintenance instructions

No	Parts	Quantity	Warranty Period	Maintenance Cycle	Consumerable Part
1	Power distribution box	1	1 Year	1 Year	
2	Main control box	1	1 Year	1 Year	
3	UPS backup power supply	1	1 Year	1 Year	
4	Air conditioning	1	1 Year	1 Year	
5	Auxiliary heater	1	1 Year	1 Year	
6	Weather Station	1	1 Year	1 Year	
7	Anemometer	1	1 Year	1 Year	
8	Wind vane	1	1 Year	1 Year	
9	Piezoelectric rain gauge	1	1 Year	1 Year	
10	Exterior monitoring camera	1	1 Year	1 Year	
11	Interior monitoring camera	1	1 Year	1 Year	
12	Battery slot	1	1 Year	1 Year	
13	Indicator light	1	1 Year	1 Year	
14	Lighting lamp	2	1 Year	1 Year	
15	Fine landing QR code	1	6 Months	6 Months	√
16	Emergency landing QR code	1	6 Months	6 Months	√
17	Image transmission antenna	2	1 Year	1 Year	
18	RTK antenna	1	1 Year	1 Year	

19	4G antenna	2	1 Year	1 Year	
20	Temperature and humidity sensor	1	1 Year	1 Year	
21	4G mobile phone cloud intelligent switch	1	1 Year	1 Year	

Tips

- Users can contact Autel Robotics or authorized service provider to provide relevant services. Damage caused by unauthorized disassembly and assembly will not be covered by the warranty.
- Do not modify the nest and relevant equipment randomly. Damage by such behavior is not covered by the warranty.
- Please refer to the "Maintenance Manual" for the service life cycle of each component.

9.3 Troubleshooting Guide

Tips

- The following troubleshooting measures are limited to failure factors caused by use under normal limited conditions.
- For troubleshooting measures for the aircraft, please refer to "Autel Dragonfish Standard Aircraft (Nest Version) User Manual".
- For faults caused by abnormal use, please contact Autel Robotics directly for processing.

1. Nest fails to power on:
 - Please check if the nest power supply has been disconnected (such as power failure, tripping, loose interface), and if the UPS backup power supply is depleted.
 - If it is not the above situation, please check if there is any hardware failure in the nest and contact Autel Robotics for processing.
2. Nest fails to go online in Autel SkyCommand Center:
 - Please check if the nest network is connected normally (such as network service interruption, loose network cable connection, etc.).
 - Please check if the login information of the nest is entered correctly.
 - Please confirm if the nest serial number has been successfully added in the Autel SkyCommand Center.

3. Abnormal noise or poor closure of the nest compartment door:
 - Please check if there are any debris accumulated around the compartment door or if the compartment door movement is blocked.
 - Please check if the front propeller of the aircraft in the compartment is not reset properly, causing the blade to hit the compartment door.
 - Please check if there is any fault in the stepper motor and gearbox (including loose, worn, limit abnormal, poor contact of the line, etc.). If so, please stop the operation and contact Autel Robotics for processing.
 - Please check if the door link is deformed. If so, please stop the operation and contact Autel Robotics for processing.
 - Please check if the door fixing mechanism is loose. If so, please stop the operation and contact Autel Robotics for processing.
 - If it is not the above problem, please use the external portable display connected to the image transmission board to test and calibrate the door of the nest.
4. Nest air conditioning fails to start or has abnormal temperature control:
 - Please check if the temperature and humidity sensor of the landing pad is faulty. Touch the sensor with your hand. If it is normal, the Autel SkyCommand Center will display the temperature change.
 - Please check if the compartment door is closed tightly. If the compartment door is not closed, the air conditioning cannot be started.
 - Please check if the seal ring of the compartment door is damaged. If so, it will cause air convection between the inside and outside of the compartment, resulting in low temperature control efficiency. Please contact Autel Robotics for processing.
 - If it is not the above problem, please conduct an air conditioning start test. If it cannot start normally, there may be a hardware fault and you need to contact Autel Robotics for processing.
5. The return lever or paddle lever of the nest has no response:
 - Please conduct local debugging. If the rod group cannot move normally, there may be a hardware fault and you need to contact Autel Robotics for processing. If the rod group can move normally, it may be a network connection failure.
6. The aircraft cannot change batteries or turn on:
 - Please check if the return lever of the aircraft or the nest is offset. If there is an offset, the mechanical arm charging component will not be able to align with the battery compartment of the aircraft. Please calibrate the return lever or contact Autel Robotics for processing.
 - Please check if the smart battery of the aircraft is in a low power state and replace it with a fully charged battery.
 - Please check the battery interface of the aircraft to make sure the battery interface is not damaged.
 - Please ensure that the communication between the aircraft and the nest is normal, and the boot command can be normally issued to the aircraft.

7. Smart battery fails to charge:
 - Please make sure that the smart battery is not abnormal, and the battery temperature is within the specified charging temperature range, otherwise the battery over-temperature protection will be triggered.
 - Please check the battery interface of the intelligent battery to make sure the battery interface is not damaged.
 - If it is not the above problem, please conduct a local charging test. If it cannot be charged normally, there may be a hardware fault. Please contact Autel Robotics for processing.
8. The aircraft experiences frequent abnormal disconnections during the flight mission:
 - Please confirm if there are any strong interference sources (such as signal interference devices) or other remote controllers around the nest.
9. After the motor of the aircraft is started, the aircraft cannot take off:
 - Please confirm if the aircraft/nest is in a no-fly zone, and if the aircraft has not applied for a ban, it needs to apply for airspace authorization from the local authorities and contact Autel Robotics to lift the ban on the aircraft.
 - Please check if the aircraft has sufficient power and if the environmental temperature is within the operating temperature range of the aircraft. In low power and low temperature conditions, the aircraft is prohibited from taking off.
10. The flight time of the aircraft is shortened:
 - Low ambient temperature, headwind flight, air flow disturbance and payload flight will all reduce the normal flight endurance time to a certain extent.
 - Please make sure that the cycle count of the smart battery is within 200 times. Within the useful life of the smart battery, the battery capacity will decrease normally.

Appendix A Specification

A.1 Nest

Autel Dragonfish Nest	
Nest Dimension	Door Closed (Including Wheels, excluding Weather Station): 2185×2691×1500 mm Door Opened (Including Wheels, excluding Weather Station): 4465×2691×1500 mm Door Closed (Including Wheels and Weather Station): 2185×2691×3880 mm Door Opened (Including Wheels and Weather Station): 4465×2691×3880 mm
Weight	≤590 kg
Material	304 Stainless Steel, Aluminum Alloy, Composite Materials
Protection Level	IP54
Meteorological monitoring	Wind speed, wind direction, rainfall, temperature, humidity
Video channels	Real-time images of the aircraft camera, inside and outside the nest
Power supply requirements	AC 220V 50Hz, waterproof aviation plug quick connection design *Support 110V AC input, require additional voltage transformer module
Surge protection	40kA
Electrical safety protection	Overload protection, leakage protection (30mA)
Operating power	Standard condition ≤ 300W; peak condition 2200W
Landing positioning	RTK (aircraft requires RTK), visual recognition
Charging method	Automatic battery swap
Battery quantity	6 (including the aircraft battery)
Door opening method	Side door
Communication method	Ethernet, fiber (customized), 4G, 5G (customized)

Working environment	-35°C to 50°C, < 95% RH
Working frequency	832-862MHz; 900-930MHz; 1420-1450MHz
Equivalent omnidirectional radiation power (EIRP)	832-862MHz: $\leq 33\text{dBm}$ 900-930MHz: $\leq 33\text{dBm}$ 900-930MHz: $\leq 33\text{dBm}$
Maximum Image Transmission Distance	17 kilometers
Supported aircraft model	Dragonfish Standard Aircraft (Nest Version)