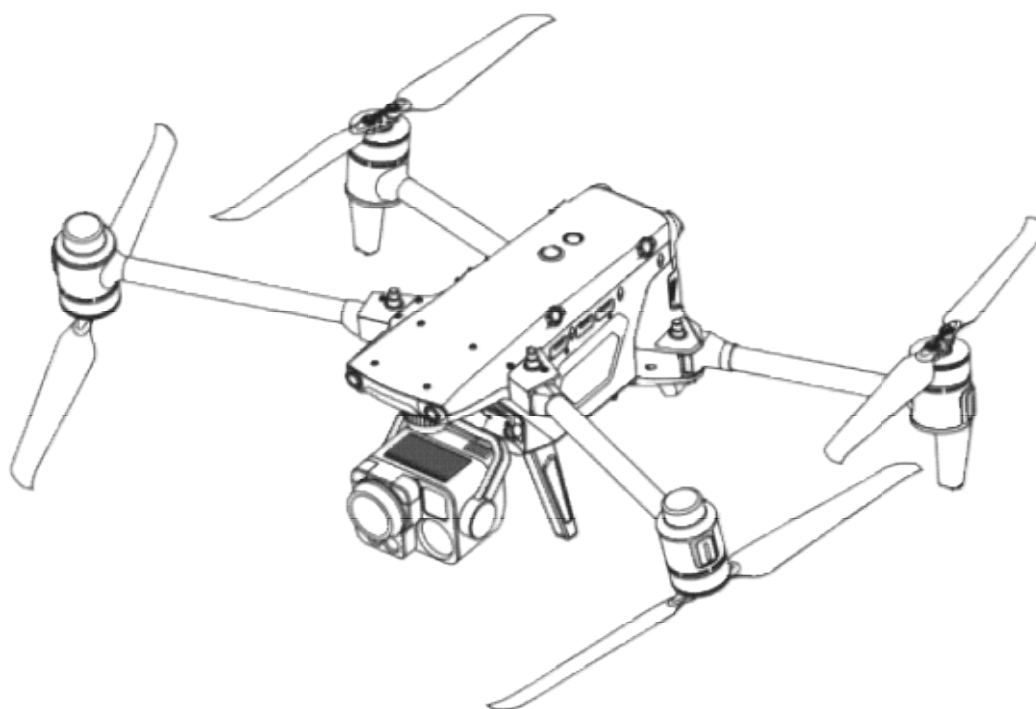


Autel Alpha

Aircraft

User Manual

V1.0 2023.11



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 Alpha aircraft (hereinafter referred to as "aircraft") from Autel Robotics. Relevant user documents for this product are provided in electronic and print 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.

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.

ReadBeforeYourFirstFlight

To ensure safe use of the Autel Alpha aircraft, 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. "Battery Safety Operation Guidelines": Basic knowledge and safe handling of smart batteries.
4. "Quick Start Guide": Basic knowledge of operating the product.
5. "User Manual": A guide for you to master the operation method of the product proficiently.
6. "Maintenance Manual": Instructions on how to maintain the aircraft and its accessories.

We recommend that you first check the completeness of the items in the packing box according to the "Packing List", then read the "Disclaimer and Safety Operation Guidelines" carefully, and then watch the tutorial videos and read the "Quick Start Guide" to get a basic understanding of how to use the product.

Before your first flight, please read the "Battery Safety Operation Guidelines" and "User Manual" carefully to get a more detailed understanding of how to use the product.

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 Autel Alpha aircraft:

To watch tutorial videos, please visit:

<https://www.autelrobotics.com/videos/autel-alpha/>.



To download resources, please visit:

<https://manuals.autelrobotics.com/?dir=/Autel%20Alpha/Aircraft/>.



Manual Guide

This manual contains 7 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 Alpha aircraft.
Flight Safety	This chapter introduces the flight environment, wireless communication requirements, and important flight safety features of the aircraft.
Aircraft	This chapter introduces the functions and usage of various components of the Autel Alpha aircraft.
Remote Controller	This chapter introduces the functions of the Autel Smart Controller V3, including how to use the controller to operate the aircraft.
Smart Battery	This chapter introduces how to use, store, and maintain the smart battery of the aircraft.
Autel Enterprise App	This chapter introduces the interfaces and functions of the Autel Enterprise App.
Firmware Updates and Maintenance	This chapter introduces how to perform firmware updates and routine maintenance for the aircraft.
Appendix	This chapter provides technical specifications for the Autel Alpha aircraft and its accessories.

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 Enterprise App, Autel Robotics may not be able to analyze the causes of product damage or accidents and provide after-sales service.

Warning

- Using the Autel Alpha aircraft of Autel Robotics involves certain safety risks. Do not allow minors to operate the aircraft.
- The operation of this aircraft requires obtaining flight certifications in accordance with the relevant local laws and registrations of the country or region where it is being operated.

WarrantyPolicy

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.

Tip

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

After-SalesSupport

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

MaintenanceService

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.

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Chapter 1 Product Overview

1.1 Introduction

The Autel Alpha aircraft is a small drone, equipped with an industry-leading high-performance processing chip, has powerful autonomous flight and self-organizing network mission capabilities, is integrated with a visual sensing system and a millimeter-wave radar sensing system, and has an omnidirectional obstacle avoidance system. With an excellent power management system, the aircraft can reach a flight time of up to 40 minutes. Also, it utilizes a three-axis stabilized gimbal, allowing you to view observed videos and data from different lenses in real time through the Autel Enterprise App.

The Autel Alpha aircraft adopts a foldable arm design and can hold its propellers for easy storage and transportation. The top of the aircraft is equipped with 4 interfaces, allowing you to add different industry-specific mounts on the top, bottom, left and right side of the aircraft to meet various operational needs.

The Autel Alpha aircraft comes with a built-in ADS-B receiver, which can detect the status of manned aircraft and provide alerts on the Autel Enterprise App. This allows for quick and safe operation, thereby avoiding potential collisions. The top and bottom of the aircraft are equipped with high-intensity strobes for indicating the aircraft's position in the air, while the bottom is equipped with auxiliary lights to improve visual positioning performance in weak light conditions, thus enhancing flight safety during landing.

The Autel Smart Controller V3 (hereinafter referred to as "remote controller") adopts the Autel SkyLink 2.0 Image Transmission solution, has strong anti-interference capabilities, and can achieve stable transmission of HD videos to the display screen of the Remote Controller. The remote controller is equipped with multiple function buttons, enabling quick aircraft control and camera operation.

The remote controller features a 7.9-inch 2048×1536 high-brightness touchscreen with a maximum brightness of 2000 nits. It adopts a customized Android system that supports the installation of third-party apps and offers functions such as satellite-based positioning, Wi-Fi, Bluetooth, and HDMI output. Moreover, it supports the PD65 fast charging protocol, allowing it to operate up to 4.0 hours on a full charge.

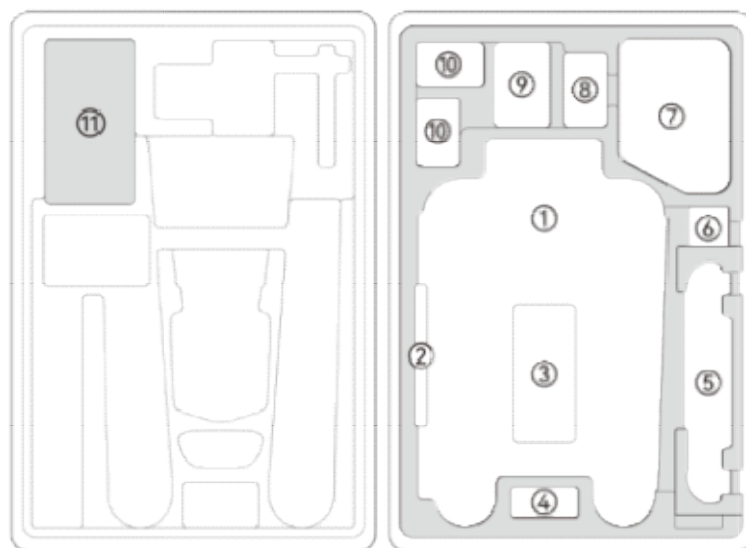
Tip

- The visual sensing system and millimeter-wave radar sensing system have limitations in usage environments and regions. Please read the "Disclaimer and Safety Operation Guidelines" to learn about relevant safety precautions.
- The flight time of the aircraft is measured in a laboratory environment (The aircraft flies at a constant speed of 10 meters per second in a light breeze environment) and is for reference only. The actual flight time may vary depending on factors such as environmental conditions and flight mode.
- The 4.0-hour operating time of the remote controller is measured with the screen brightness set to 50% and is for reference only. The operating time may vary in different scenarios.

Warning

- If multiple aircraft are flying in an area at the same time, please keep an appropriate air distance to avoid any accidents.

1.2 What's In The Rugged Case



No.	Item	Note
1	Aircraft	Includes propellers. When storing it, please fold the arms and hold the propellers.
2	Document Bag	Includes "Quick Start Guide" "Manuel" and a camera lens cleaning cloth.
3	Clean Kit	Including 6 dampeners, lens cleaner, soft brush.
4	Spare propellers for front arms	Spare propellers (CW×1 and CCW×1)
5	Remote Controller	Comes with 1 Autel Smart Controller V3.
6	AC Power Cable	For battery charging.
7	Gimbal Camera	Comes with a L35T gimbal camera.
8	Battery Charger	/
9	Dust Blower, screw fastening glue, and spare propellers for front arms	Comes with a dust blower, screw fastening glue, spare propellers (CW×1 and CCW×1). For store battery charger output cable.
10	Smart Battery	Comes with 2 batteries as standard.
11	Accessory Area	Includes a remote controller charger, a C-to-C charging cable, a C-to-A data cable, a remote controller lanyard, maintenance screwdrivers (×2) and spare sticks (×2).

Important

- Upon receiving the product, please inspect the rugged case in its entirety and confirm that its outer packaging is intact, with no signs of unpacking. Meanwhile, save the unboxing video for potential logistics damage claims.

1.3 Product Acceptance Checklist

After unboxing the product, please check whether the actual items match the items described in the following packing list and carefully inspect the appearance of the aircraft and all accessories. If anything missing or damage is found, please contact Autel Robotics After-Sales Support or authorized dealers promptly.

Table 1-1 Packing List

No.	Item	Model/Specification	Quantity	Note
1	Aircraft	MDH	1	Includes 4 propellers.
2	Gimbal Camera	DG-L35T	1	
3	Dampener		6	
4	Gimbal Protective Cover		1	
5	Lens Cleaner		1	
6	Soft Brush		1	
7	Dust Blower		1	
8	Gimbal Interface Cover		2	On the aircraft and gimbal camera separately.
9	Smart Battery	MDH_10000_23700	2	
10	Remote Controller	RCPad	1	Autel Smart Controller V3 comes with 2 command sticks and 2 antennas.
11	Battery Charger	DF-CHARGER	1	
12	AC Power Cable		1	Used with the battery charger.
13	Remote Controller Charger	GaN-001US	1	
14	C-to-C Charging Cable		1	Used with the remote controller charger.
15	C-to-A Data Cable		1	
16	CW Spare Propeller		2	
17	CCW Spare		2	

	Propeller			
18	Spare Stick		2	
19	Remote Controller Lanyard		1	
20	Maintenance Screwdriver		2	
21	Screw Fastening Glue		1	For replacing propellers.
22	Quick Start Guide		1	Placed in the document bag.
23	User Manual		1	Placed in the document bag.
24	Lens Cleaning Cloth		1	Placed in the document bag.
25	Product Certification		1	

1.4 UAS Introduction

Before first flight, please perform a comprehensive inspection of the UAS to ensure that all components meet the following requirements. A complete UAS consists of two parts: the aircraft and the remote controller. The relevant requirements and explanations are as follows :

■ Aircraft Components And Payload

Please be noted that a complete aircraft includes the aircraft body, gimbal camera, propellers, and the battery. Any damage or missing of these components may result in a malfunction. The RTK module is an optional accessory for enhancing aircraft positioning accuracy.

Table 1-2 Autel Alpha Component List

Item	Product Info	Manufacturer	Note
Autel Alpha Aircraft	Max. weight: 6250 g Max. Dimension: 1206×982×272 mm EAN: 6924991126140 UPC: 889520206143	Autel Robotics	Includes propellers, battery, and an L35T Gimbal.
MDH_10000_23700Smart Battery	Max. weight: 988 g Max. Dimension: 200×76.8×50 mm EAN: 6924991126201 UPC: 889520206204	Autel Robotics	Included
CW/CCW Propeller	Max. weight: 55 g Max. Dimension: 19 inches EAN: 6924991125297 UPC: 889520205290	Autel Robotics	Included
Payload DG-L35T	Max. weight: 910 g	Autel Robotics	Included

Max. Dimension:
 7144.7×133.3×158.4 mm
 EAN: 6924991126195
 UPC: 8889520206198

■ Remote Controller Components & The App

A complete remote controller includes the controller body (equipped with a functional touchscreen and buttons), joysticks, and antennas. Any damage or missing of these components may result in a malfunction. The Autel Enterprise App, serving as the flight application software that controls the aircraft, should be maintained to ensure comprehensive control over the UAS.

Table 1-3 Remote Controller Components List

Item	Product Info	Operating System	Manufacturer	Note
Autel Smart Controller V3	Max. weight: 1194 g Max. Dimension: 269×302×87 mm EAN: 6924991129011 UPC: 889520209014	Android 11	Autel Robotics	Includes command sticks and antennas.

Table 1-4 Firmware and Software version explanation

No.	Item	Release Version	Note	Release Date
1	Image Transmission	V1.6.0.13	/	23Q3
2	Remote Controller	V6.0.4.3	/	23Q3
3	Android System	V1.6.0.13	Based on Android 11	23Q3
4	Autel Enterprise	1.4.5	Flight Control Software	23Q3



Tip

- The above information is for reference only. Both the remote controller and the aircraft have been upgraded to the latest versions before shipment. Users can use accordingly.
- When the remote controller and the aircraft are frequency-paired and the remote controller is connected to the internet, Autel Enterprise App will automatically check for firmware updates. More instructions, see "[7.1 Aircraft and Remote Controller Firmware Updates](#)" in the Chapter 7.
- When there's any prompt for updates, please follow the instructions to update accordingly to address any issues and to enjoy the new features. Users also have the option to temporarily pause updates; however, this won't affect the existing functions.

Table 1-5 List of Pre-installed Apps on the Remote Controller

NO.	Pre-installed App	Software Version	Note
1	Autel Enterprise	1.4.5	Flight Control Software
2	Files	11	System Software

3	Gallery	1.1.40030	System Software
4	Chrome	68.0.3440.70	System Software
5	Settings	11	System Software
6	Maxitools	2.45	System Software
7	Google Pinyin Input	4.5.2.193126728-arm64-v8a	System Software
8	Android Keyboard (AOSP)	11	System Software

 Tip

- The pre-installed Apps mentioned are the basic application for the remote controller. Users also have the option to install third-party software if desired.

Chapter 2 Flight Safety

When unboxing the product for the first time, please scan the QR code provided in the "Quick Start Guide" to access the electronic version of this manual, and then carefully read and understand the contents of this manual, so as to ensure safe and proper use of the aircraft.

Before operating any actual flight, be sure to first carry out relevant basic flight training (such as watching tutorial videos and receiving guidance from a professional) and be familiar with the functions and characteristics of the aircraft and the remote controller.

Before the flight, please understand all the local laws and regulations regarding civil unmanned aerial vehicles (UAVs) in advance, and according to the local flight requirements and restrictions, select an appropriate flight environment and set a reasonable flight altitude for legal flights. There may be legal risks when using an aircraft in an unsuitable flight environment.

Before flying, be sure to read the "Disclaimer and Safety Operation Guidelines" to understand all safety precautions.

2.1 Legal Use Notice

When unboxing the product for the first time, please comply with your local regulations in accordance with the laws and regulations of the following countries and regions to complete the real-name registration of the aircraft.

2.1.1 China Mainland

- According to the "Regulations on Real-name Registration of Civil Unmanned Aerial Vehicles" issued by the Civil Aviation Administration of China (CAAC), upon purchasing a civil drone, the owner must register the drone on the "Civil UAV Comprehensive Management Platform" (<https://uom.caac.gov.cn>) in real name and paste the QR code registration mark on the drone. Those who fail to implement real-name registration and paste registration marks will be punished by the regulatory authorities in accordance with relevant regulations.
- The Autel Alpha aircraft is a small unmanned drone. Autel Robotics prohibits youth under the age of 18 from operating this aircraft. Drone operators should obtain a drone pilot license as required by the CAAC via uom.caac.gov.cn.
- We recommend that you read the "Interim Regulations on the Management of Unmanned Aircraft Flights" before flying to learn more about the regulations.

Important

- According to the regulations outlined in the "Civil Unmanned Aerial Vehicle System Safety Requirements" in Chinese mainland, users are required to input their real-name registration number in the Autel Enterprise App after registration. Additionally, users should enable the DRI system and the Civil Aviation Administration's flight dynamic data reporting function. For more details, see "[2.14 Direct Remote Identification](#)" in this Chapter and "[6.5.8 More](#)" in Chapter 6.

2.1.2 The U.S.

- Before using a drone, the owner of the drone must register the drone on the FAA website (<https://faadroneszone-access.faa.gov/#/>) in real name (Registrants must be 13 years of age or

older). Failure to register an unmanned aircraft that is required to be registered may result in regulatory and criminal penalties.

- The Federal Aviation Administration (FAA) may assess civil penalties up to \$27,500. Criminal penalties include fines of up to \$250,000 and/or imprisonment for up to three years.

2.1.3 The EU

- Drone operators/owners must register with the National Aviation Authority (NAA) of the Member State in which they reside. (<https://www.easa.europa.eu/en/domains/civil-drones/naa>).
- This product is not a toy and should not be used by children under the age of 16.
- In the EU, the Autel Alpha aircraft is a drone classified as C3. When using the aircraft, you must comply with the following operational limitations in subcategory A3 in an urban environment:
 1. Must not overfly uninvolved people.
 2. Maintain a horizontal distance of 150m from uninvolved people and urban areas.
 3. Maintain flight altitude below 120m above ground level. This flight altitude is controlled and restricted by GPS positioning.
- Remote pilot should obtain a 'Proof of completion for online training' for A1/A3 'open' subcategory by:
 1. Completing the online training.
 2. Passing the online theoretical exam.

Important

- According to the relevant laws and regulations in the EU, the Autel Alpha 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, please enter the operator registration number in the Autel Enterprise App and activate the DRI system. For more information, see "[2.14 Direct Remote Identification](#)" in this chapter.

2.1.4 Other Countries and Regions

Before flying, consult local legal professionals or aviation authorities to learn about local laws, regulations, and policies regarding civil UAVs and follow relevant guidelines for legal registration.

2.2 Flight Operation Guidelines

Before flying, be sure to understand and adhere to the following flight operation guidelines to avoid serious consequences and legal violations:

- Do not operate the aircraft while under the influence of alcohol, drugs, medication, dizziness, fatigue, or nausea, or in any other poor physical or mental conditions.
- Do not fly near manned aircraft, and make sure that the aircraft does not interfere with large manned aircraft in the same flight path when flying. Keep vigilant at all times and avoid other aircraft. Land immediately if necessary.
- Do not fly in areas prohibited by local regulations without authorization. The prohibited areas may include airports, borders, major cities, densely populated areas, large event sites, emergencies (e.g., forest fires), and sensitive building facilities (e.g., nuclear power plants, power stations, hydroelectric power stations, prisons, traffic arteries, government buildings, and military facilities).
- Do not use the aircraft at large event sites, including but not limited to sports arenas and concerts.
- Do not fly in airspace above the altitude limit specified in regulations.

- Do not use the aircraft to carry any illegal or hazardous goods.
- Be aware of the flight activity category (e.g., recreational, official, or commercial). Before flying, be sure to obtain the necessary permits from relevant authorities. If necessary, consult local legal professionals for a detailed explanation of flight activity categories.
- When using the aircraft for filming or photography, respect the privacy rights of others. Do not use the aircraft for unauthorized surveillance activities, including but not limited to monitoring individuals, groups, events, performances, exhibitions, or buildings.
- 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 during take-off and landing.
- Make sure that the aircraft takes off from and lands on open, unblocked, and flat ground, away from crowds, nearby buildings, trees, etc., and within a visual line of sight for flight safety.
- Fly at an altitude below 4500 meters.
- Due to insufficient lighting conditions, no GNSS signal, and narrow space, some functions may be limited. Always pay attention to the surrounding environment of the aircraft and maintain control of the aircraft at all times.
- When flying at night, 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 on moving surfaces such as moving vehicles or boats.
- Do not take off from or land on sandy surfaces to prevent sand particles from affecting the motor service life.
- 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 $+50^{\circ}\text{C}$.
- When using the aircraft in post-disaster scenarios such as fires, explosions, lightning, storms, tornadoes, heavy rain, floods, earthquakes, and dust storms, pay special attention to the safety of take-off and landing points and changes in the surrounding environment and 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

- Keep the aircraft at least 200 meters away from areas with strong electromagnetic interference, such as radar stations, microwave stations, mobile communication base stations, and drone interference equipment.
- When flying near sources of electromagnetic interference, exercise caution and continuously observe and assess the stability of image transmission signals and videos of the remote controller. Common sources of electromagnetic interference include but are not limited to high-voltage power lines, high-voltage substations, mobile communication base stations, and television broadcasting signal towers. If the aircraft encounters significant signal interference when flying near these locations, it may not be able to work normally. In this case, please return to the home point for landing as soon as possible.
- Fly in open, unblocked areas or highlands. Tall mountains, rocks, urban buildings, and forests may block the GNSS signal and image transmission signals of the aircraft.

- It is recommended to turn off unnecessary Wi-Fi and Bluetooth devices in the vicinity to avoid interference with the signals of the remote controller.

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, see Appendix A "A.1 Aircraft".

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.

Note

- The aircraft's mass comprises the mass of the fuselage, gimbal camera, propellers, and smart battery. Different models of gimbal cameras may have varying masses. If you change the gimbal camera to a different model, re-weigh the aircraft to determine its mass.
- Mounts consist of functional module mounts and physical mounts. When adding mounts to the aircraft, always re-weigh the actual take-off mass of the aircraft.
- The mount mass should satisfy: $\text{Maximum Mount Mass} \leq \text{MTOM} - \text{Aircraft's Mass}$.

2.6 Obstacle Avoidance System

2.6.1 Introduction to Visual Sensing System and Millimeter-Wave Radar Sensing System

The aircraft adopts a dual-sensing system design of "Visual Sensing System + Millimeter-Wave Radar Sensing System". The integration of these two systems provides excellent omnidirectional obstacle avoidance performance and ensures precise positioning and safe flight of the aircraft.

The visual sensing system is an image positioning system that uses visual image ranging to sense obstacles and obtain aircraft position information. The visual sensing system of the aircraft is located on the front, rear, upper left, upper right, and bottom of the fuselage. The aircraft uses a "double fisheye lens" structure to achieve omnidirectional visual obstacle avoidance.

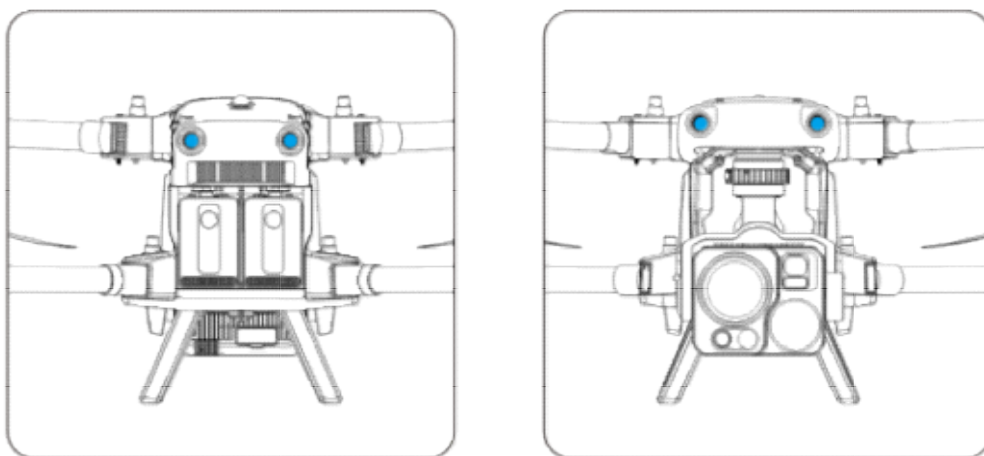


Fig 2-1 Front and rear visual lens modules of the aircraft

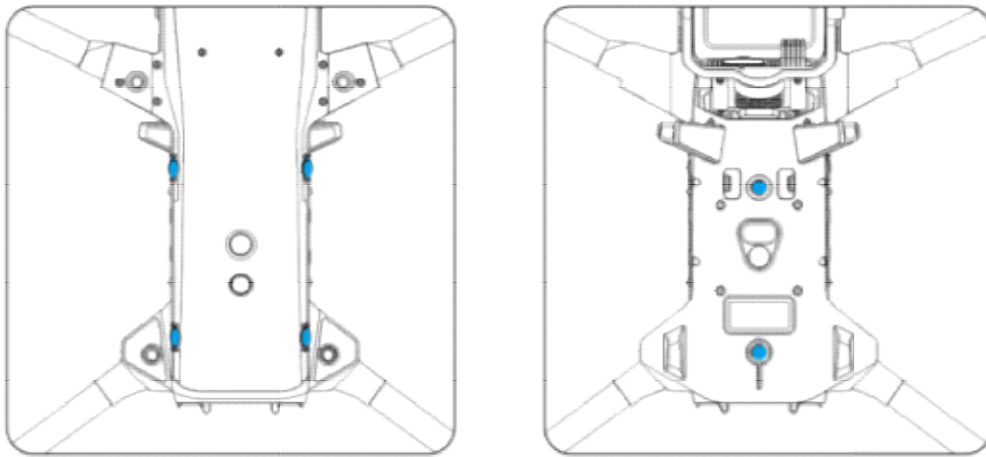


Fig 2-2 Upper left, upper right, and bottom visual lens modules of the aircraft

Warning

- Do not block the lenses of the visual sensing system during flight, as it will affect the visual obstacle avoidance performance of the aircraft, potentially leading to flight accidents.

The millimeter-wave radar sensing system senses the distances and positions of obstacles by emitting electromagnetic waves. According to the regulations of different countries and regions, the millimeter-wave radar sensing system of the aircraft can either integrate four 60 GHz millimeter-wave radars inside the fuselage in six directions (front, rear, left, right top, and bottom) or integrate a 24 GHz millimeter-wave radar under the fuselage for sensing.

Note

- For detail frequency bands and Effective Isotropic Radiated Power (EIRP) data of the millimeter-wave radar, see Appendix A "[A.1 Aircraft](#)".
- For the six millimeter-wave radars used in the Autel Alpha aircraft, the front, rear, left, right and top millimeter-wave radars use the 60 GHz frequency band, while the frequency band used for the bottom millimeter-wave radar depends on local regulations.

2.6.2 Observation Range

■ Observation Range of Visual Sensing System

By using fisheye lenses, the visual sensing system achieves a 360° field of view (FOV) in both horizontal and vertical directions, allowing for 720° all-around observation.

Important

- The visual obstacle avoidance performance of the visual sensing system is not 100% reliable, as the system may be affected by ambient lighting and object surface texture. When the visual obstacle avoidance system is enabled during flight, always pay attention to the image transmission screen in the Autel Enterprise App.

■ Observation Range of Millimeter-wave Radar Sensing System

Note

- Please be aware that millimeter-wave radars of different frequency bands may have varying observation performance.

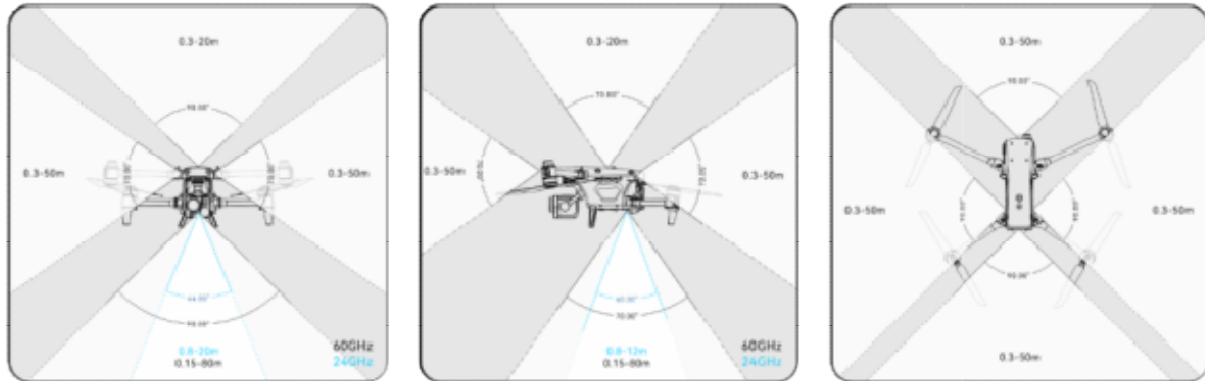


Fig 2-3 Observation Range of Millimeter-wave Radars

Warning

- The obstacle avoidance distance of the millimeter-wave radar sensing system varies with the obstacle's ability to reflect electromagnetic waves and its surface size.
- The gray area represents the blind spot of a millimeter-wave radar, where the radar cannot detect obstacles.

■ Observation Range of Radar and Visual Sensing Systems

With the integration of radar and visual sensing systems, the aircraft achieves 720° omnidirectional obstacle avoidance and supports nighttime obstacle avoidance.

Note

- If the aircraft uses a 60 GHz bottom millimeter-wave radar, it supports nighttime obstacle avoidance by millimeter-wave radars.
- If the aircraft uses a 24 GHz bottom millimeter-wave radar, the front, rear, left, right and top millimeter-wave radars are disabled by default. The aircraft does not support nighttime obstacle avoidance by millimeter-wave radars and only supports visual obstacle avoidance in good lighting conditions. Additionally, it uses the bottom millimeter-wave radar only for assisted landing.

2.6.3 Visual Positioning Function

The aircraft supports the visual positioning function even without GNSS signals. It means that the aircraft can provide flight positioning capability in case of poor or no GNSS signal to ensure flight safety.

When there is GNSS positioning information, the visual positioning function supplements the aircraft's position information, enhancing positioning accuracy.

When there is no GNSS signal and the environment and height cannot meet the visual sensing system, that is, when there is no GNSS signal and visual positioning failure at the same time, the ATTI mode will be activated.

** Warning**

- If you do not have extensive flight experience, do not fly the aircraft beyond your visual line of sight.
- When the aircraft relies on visual positioning to fly, please do not approach mirror reflection areas such as water or snow. When the GNSS signal is poor, please make sure that the aircraft flies in a well-lit environment and over object surfaces with clear texture.

** Tip**

In the event of GNSS signal loss or weakening during flight, the remote controller will display the following warning prompts:

- If the takeoff point is inaccurate: The Autel Enterprise App will display a warning saying "GNSS signal is weak, home point may have deviation." with a corresponding verbal warning.
- If GNSS signal is weak: The Autel Enterprise App will show a warning saying "GNSS signal is weak, please fly away from buildings." with a corresponding verbal warning.
- If GNSS is being spoofed: The Autel Enterprise App will display a warning saying "Aircraft is being subjected to GNSS spoofing." with a corresponding verbal warning.
- If the aircraft is in ATTI mode, the Autel Enterprise App will show a warning saying "No GNSS and visual positioning, please be cautious." with a corresponding verbal warning.
- If GNSS is manually turned off and aircraft positioning is available, the Autel Enterprise App will show a warning saying "GNSS is turned off, visual positioning signal is normal/weak, please fly with caution." with a corresponding verbal warning.
- If GNSS is manually turned off and aircraft positioning is lost, the Autel Enterprise App will display a warning saying "No GNSS and visual positioning, please be cautious." with a corresponding verbal warning.

2.6.4 Visual Obstacle Avoidance Function

The visual obstacle avoidance function is suitable for scenarios where the aircraft flies in a well-lit environment and encounters obstacles that are not too sparse during the flight, such as sparse fine wire meshes or small branches at the outer edges of trees. Additionally, due to inertia, the aircraft needs to brake at an effective distance under control. The flight control system limits the aircraft's attitude angle to no more than 30° and the maximum flight speed to less than 15 meters per second during deceleration. For more information, see in Chapter 6.

** Warning**

- The obstacle avoidance function of the aircraft cannot be enabled in Ludicrous mode.

2.6.5 Precautions for Using Obstacle Avoidance Systems

The measurement accuracy of the visual sensing system is easily affected by factors such as light intensity and object surface texture. Exercise caution when using the visual sensing system in the following scenarios:

- Flying over pure-colored surfaces (e.g., pure white, pure black, pure red, and pure green) and low-texture surfaces.
- Flying over surfaces with strong reflections.

- Flying over moving objects (e.g., crowds, swaying reeds, bushes, and grasses).
- Flying over water surfaces or transparent object surfaces.
- Flying in environments with rapid and intense changes in lighting or direct exposure to strong light sources.
- Flying over extremely dim (with light intensity of less than 15 lux) or extremely bright object surfaces.
- Flying over small obstacles (e.g., iron wires, electric wires, and tree branches).
- Lenses contamination (e.g., water droplets and fingerprints).
- Flying in low-visibility conditions (e.g., heavy fog and heavy snow).
- Flying at an altitude below 2 meters with a very fast flight speed.

The millimeter-wave radar sensing system operates as an auxiliary enhancement system for visual obstacle avoidance and can work continuously throughout the day.

Note

- Please be noted that when flying in low-light conditions (such as at night), the aircraft's visual perception system is affected, so the obstacle avoidance is not working.
- If you need to fly in low-light conditions (such as at night), please confirm that the aircraft is 60 GHz version with downward millimeter-wave radar (aircraft with the 24 GHz version of downward radar does not have nighttime millimeter-wave obstacle avoidance capability). Additionally, please operate cautiously in nighttime flights, as in the nighttime obstacle avoidance is not 100% functional. It is recommended to fly in open areas.

2.7 Auto-return

The aircraft is equipped with an auto-return function. When the GNSS signal is good, once the auto-return condition is triggered, the aircraft automatically returns to the home point and lands to avoid possible accidents.

The aircraft provides three methods of activating the auto-return function: manual auto-return activation, low battery auto-return activation, and behavior-based auto-return activation.

Note

- Home point: the landing point of the aircraft during an auto-return flight. In the Autel Enterprise App, you can set the home point of the aircraft as "Aircraft" or "RC". For more information, see in Chapter 6.
- If no home point is set in the Autel Enterprise App, the take-off point is used as the home point.
- During an auto-return, the control function of the remote controller for the aircraft is disabled. In this case, you can quickly press the pause button "" on the remote controller or long press it for two seconds to pause or exit the auto-return function and regain control of the aircraft. For more information, see "[4.11.2 Take-off/Return-to-Home Button and Pause Button](#)" in Chapter 4.

Warning

- When the GNSS signal is poor, the auto-return function cannot be activated.
- If the obstacle avoidance system is disabled during an auto-return flight, the aircraft will not be able to automatically avoid obstacles.

- If the home point of an auto-return flight is not suitable for the aircraft to land (such as uneven grounds and crowds), please exit the auto-return function first, and then manually assume control to land.

2.7.1 Manual Auto-return Activation

During the flight, you can long press the return-to-home button “” on the remote controller for 2 seconds to manually activate the auto-return function.

2.7.2 Low Battery Auto-return Activation

During the flight, to prevent unnecessary risks caused by insufficient power of the smart battery, the aircraft will automatically check whether the current battery level is sufficient based on the aircraft's current position.

If the current battery level is only enough to complete the return journey, the Autel Enterprise App will prompt a warning saying “The remaining battery is only enough for Return to Home. The aircraft will Return to Home in 6s.” to remind users to decide if to execute low battery auto-return. If you choose to execute it or don't take any action within 6 seconds, the aircraft will initiate low battery auto-return after 6 seconds.

If you cancel the execution and continue flying with a low battery level, when the battery level is only enough for landing, the aircraft will activate a critically low battery landing. This landing process cannot be canceled, and you will lose control of the aircraft in this process.



Tip

- The low battery auto-return and critically low battery landing mentioned here have no direct relation with the low battery warning and critically low battery warning set in the Autel Enterprise App.



Warning

- When the low battery auto-return is triggered in the aircraft, the auto-return process should not be canceled. Otherwise, the aircraft may be unable to return to the home point due to insufficient power.
- Try not to let the aircraft enter the critically low battery landing process. Once the critically low battery landing process is initiated, regardless of whether the landing point meets safe landing standards, the aircraft will forcibly land, which may lead to aircraft damage.
- When the Autel Enterprise App displays a warning alert, it should be processed according to the corresponding references immediately.

2.7.3 Behavior-based Auto-return Activation

During a flight mission, if "Finish Action" is set to "Auto RTH", the aircraft will activate auto-return after completing the mission; if "Signal Loss Action" is set to "Auto RTH", when the remote controller disconnects from the aircraft for 4 seconds, the aircraft will activate auto-return. For more information, see in Chapter 6.

During the flight, if "Lost Action" is set to "Return to Home", when the remote controller disconnects from the aircraft for 4 seconds, the Autel Enterprise App will display a warning saying "Aircraft disconnected." and the aircraft will activate auto-return. For more information, see in Chapter 6.

Tip

- In the Autel Enterprise App, "Lost Action" is set to "Return to Home" by default.
- Within 4 seconds of the remote controller disconnecting from the aircraft, the aircraft will continuously decelerate and attempt to reconnect the remote controller. If the reconnection is not successful within 4 seconds, the aircraft will activate the lost action auto-return.
- During the lost action auto-return process, even if the aircraft resumes connection with the remote controller, the aircraft will continue to execute auto-return.

2.7.4 Auto-return Mechanism

Table 2-1 Auto-return Mechanism

Aircraft distance when the return mechanism is triggered	Return-to-Home Mechanism
Distance from the home point $\leq$ 10 meters	The aircraft returns to the home point at the current altitude.
10 meters < Distance from the home point $\leq$ 25 meters	If the current flight altitude is lower than 20 meters, the aircraft ascends to the altitude of 20 meters and returns to the home point. If the current flight altitude is higher than 20 meters, the aircraft returns to the home point at the current altitude.
25 meters < Distance from the home point $\leq$ 50 meters	If the current flight altitude is lower than 30 meters, the aircraft ascends to the altitude of 30 meters and returns to the home point. If the current flight altitude is higher than 30 meters, the aircraft returns to the home point at the current altitude.
Distance from the home point > 50 meters	If the flight altitude is lower than the set RTH altitude, the aircraft ascends to the RTH altitude. If the flight altitude is higher than the set RTH altitude, the aircraft returns to the home point at the current altitude.

Note

- Home point: the point where the aircraft will return and land during an auto-return.
- Aircraft distance refers to the horizontal distance from the current aircraft to the home point.

2.7.5 Auto-return Obstacle Avoidance Process

When the obstacle avoidance system is enabled and the visual sensing system is in appropriate lighting conditions, the aircraft will achieve obstacle avoidance during the return process. The specific situations are as follows:

- During manual flight, in case of a lost action auto-return, low battery auto-return, or manual activation of auto-return, when an obstacle is detected in front of the aircraft, the aircraft will automatically brake within the set brake distance and automatically ascend to avoid the obstacle until it can safely fly over it.
- During flight missions, the obstacle avoidance mode is set to "Bypass". In the case of a lost action auto-return, low battery auto-return, or mission completion auto-return, when an obstacle is detected in front of the aircraft, the aircraft will automatically brake within the set brake distance and autonomously choose a random direction from the left, right, or upward directions to bypass the obstacle.

Important

- During the obstacle avoidance process, if the aircraft's ascent altitude reaches the maximum altitude limit and obstacle avoidance is not yet achieved, the aircraft will hover in place until a critically low battery landing is triggered. In this case, please manually take control of the aircraft in advance.
- When the obstacle avoidance mode is set to "Bypass", the aircraft will prioritize planning to bypass the obstacle from the left or right direction. If neither left nor right directions are feasible, it will choose to bypass the obstacle from above.
- During flight missions, if the obstacle avoidance mode is set to "Off", the aircraft will not have obstacle avoidance capabilities.

2.7.6 Landing Protection Function

When the landing protection function is enabled, the aircraft will assess whether the ground conditions are suitable for landing before landing. For more information, see in Chapter 6.

During the auto-return process, when the aircraft reaches above the home point and the landing protection function is enabled, the aircraft will execute the following strategies:

1. If the landing protection function detects that the ground is suitable for landing, the aircraft will land directly.
2. If the landing protection function detects that the ground is not suitable for landing (e.g., uneven ground or water below), the aircraft will keep hovering, send a prompt in the Autel Enterprise App, and wait for you to take action. In this case, the aircraft will start descending only when a critically low battery landing is triggered, and you cannot cancel this process.
3. If the landing protection function cannot detect ground conditions, the aircraft will descend to an altitude of 1.2 meter above the ground and enter the assisted landing process.

Note

- Assisted landing: During the landing process, when the aircraft reaches an altitude of 1.2 meter above the ground, it will automatically descend slowly and you do not need to lower the throttle stick.
- Before entering the assisted landing process, make sure that the landing point is suitable for the aircraft to land.

2.8 Rebuilding the C2 Link

To ensure the safety and controllability of flight behaviors, the Autel Alpha aircraft will stay in reconnection status and constantly attempt to reestablish a connection with the ground control

station (remote controller) after losing the C2 link. In practice, this process is divided into the following stages:

- Within the first 4 seconds after the link is disconnected, the aircraft will automatically decelerate and attempt to restore the C2 link. If the connection is restored within 4 seconds, the remote controller regains control of the aircraft.
- If the link is not restored within 4 seconds, the aircraft will automatically trigger the lost action. At this point, the aircraft will automatically execute relevant flight control actions according to the set lost actions.
- During the execution of a lost action, the aircraft will continue its attempts to restore the C2 link. When the aircraft successfully restores the C2 link with the remote controller, the remote controller still cannot control the flight of the aircraft. To make the remote controller regain control of the aircraft, you must long press the pause button “⏸” on the remote controller for 2 seconds to exit the lost action.



Tip

- During the flight, as long as the aircraft and the remote controller can communicate normally, the C2 link will remain active.
- If there are decoding errors that persist for a certain duration, leading to communication failure, the C2 link will be disconnected, and the aircraft will enter the reconnection status.
- The lost actions of the Autel Alpha aircraft include RTH, hover, and land.
- If Autel Alpha aircraft lost connection with C2 link, the Autel Enterprise App will display a warning saying “Aircraft disconnected.” with a corresponding verbal warning.

2.9 Flight Restrictions and Unlocking Restricted Zones



Important

- Before flying, always carefully plan out the airspace in which you intend to fly in accordance with local laws and regulations.

2.9.1 Geofencing System

Autel Robotics has developed a geofencing system for its aircraft to ensure safe and legal flights. This system can provide real-time updates on airspace restriction information worldwide. In different restricted zones, the flight functions of the aircraft are subject to varying degrees of restrictions. The geofencing system also supports the function of unlocking restricted zones. If you need to perform a flight mission in a specific restricted zone, you need to obtain legal authorization for unlocking the restricted zone, and then the relevant flight restriction of the aircraft will be unlocked within the authorization validity period.

The geofencing system does not strictly follow local laws and regulations. Before each flight, you should consult and understand local laws, regulations, and regulatory requirements to ensure flight safety.

The flight control system of the Autel Alpha aircraft is pre-configured with the geofencing system. Before each flight, make sure that the remote controller can connect to the Internet to automatically update airspace restriction information and synchronously upload it to the aircraft. During the flight, relevant airspace restriction information will be synchronously displayed in the Autel Enterprise App to ensure the safe and legal flight of the aircraft.



Tip

- Due to information lag, the airspace restriction information provided by the geofencing system may not always be completely consistent with the latest local laws and regulations. All information is subject to local laws and regulations.
- For temporary airspace restrictions, Autel Robotics can obtain the relevant regulatory announcements in a timely manner and synchronously upload the relevant airspace restriction information to the geofencing system. When you take flight actions in relevant zones, be sure to synchronize and update flight airspace restriction information.
- The geofencing system serves as a backend service, and Autel Robotics does not provide customer-side access ports. Autel Robotics is responsible for all updates to the system.

2.9.2 Restricted Zones

The geofencing system divides airspace restrictions into four categories: no-fly zones, restricted altitude zones, caution zones, and unlocked zones. The Autel Enterprise App will provide different prompts based on the specific zone.

Table 2-2 Flight Restrictions of Restricted Zones

Restricted Zones	Flight Restriction Description
No-Fly Zones (appear in red on the map)	No-fly zones are divided into permanent no-fly zones and temporary no-fly zones. ● Permanent no-fly zones: The zones are pre-configured in the geofencing system at the factory and are regularly updated. ● Temporary no-fly zones: The zones are added by Autel Robotics in the geofencing system backend. Update method: After the remote controller is connected to the Internet, it will automatically retrieve update information related to no-fly zones and push it to the aircraft. Flight restrictions: Aircraft cannot take off or fly in no-fly zones. If you obtain authorization from relevant authorities to fly in a no-fly zone, contact Autel Robotics to request for unlocking the zone.
Restricted Altitude Zones (appear in grey on the map)	Restricted altitude zones are pre-configured in the geofencing system at the factory and are regularly updated. Update method: After the remote controller is connected to the Internet, it will automatically retrieve update information related to restricted altitude zones and push it to the aircraft. Flight restrictions: When flying in a restricted altitude zone, an aircraft should have its altitude limit no greater than the maximum altitude allowed within the restricted altitude zone.
Caution Zones (appear in yellow on the map)	Restricted altitude zones are pre-configured in the geofencing system at the factory and are regularly updated. Update method: After the remote controller is connected to the Internet, it will automatically retrieve update information related to caution zones and push it to the aircraft. Flight restrictions: In a caution zone, an aircraft can fly unrestrictedly (relevant flights must comply with local regulations), and the remote controller will receive corresponding warning messages.
Unlocked Zones (appear in blue on the map)	If you unlock a no-fly zone with a valid permit, you can legally fly the aircraft within the validity period in the unlocked zone.

 Tip

In the Autel Enterprise App, if you click on a restricted zone on the map, the following geofencing information will be displayed for this zone:

- No-fly Zone: zone name, zone level (no-fly zone), region (prefecture-level city), and no-fly time (visible only for temporary no-fly zones).
- Restricted altitude zone: zone name, zone level (restricted altitude zone), altitude limit (AGL), and region (prefecture-level city).
- Caution zone: zone name, zone level (caution zone), altitude limit (AGL), and region (prefecture-level city).
- Unlocked zone: zone name, zone level (unlocked zone), altitude limit (AGL), region (prefecture-level city), and validity period.

An aircraft in flight has a specific initial velocity. To prevent the aircraft from accidentally entering no-fly zones (before unlocking) and restricted altitude zones, a 50-meter buffer zone is set beyond the boundaries of these zones in the geofencing system.

Table 2-3 Buffer Zone Details

Buffer Zone Type	Buffer Zone Details
Buffer zones of no-fly zones	When an aircraft flies from the outside toward a no-fly zone while the aircraft is still locked from the zone, the Autel Enterprise App will display a warning alert of flight risks. When the aircraft approaches the buffer zone boundary, it will automatically start to decelerate and eventually brake and hover within the buffer zone.
Buffer zones of restricted altitude zones	When an aircraft flies from the outside toward a restricted altitude zone: If the altitude of the aircraft is not greater than the maximum altitude allowed within the restricted altitude zone, the aircraft can directly fly into the restricted altitude zone. Once inside, the flight altitude is subject to the altitude limit of the restricted altitude zone. If the altitude of the aircraft is greater than the maximum altitude allowed within the restricted altitude zone, when the aircraft approaches the buffer zone boundary, it will automatically start to decelerate and eventually brake and hover within the buffer zone.

 Note

- When there is a GNSS signal, if an aircraft accidentally enters a no-fly zone while the aircraft is still locked from the zone, the aircraft will automatically land upon regaining the GNSS signal. During the landing process, the throttle stick will not work, but you can control the horizontal movement of the aircraft.
- When there is no GNSS signal, if an aircraft accidentally enters a restricted altitude zone, the aircraft will automatically descend to the altitude limit upon regaining the GNSS signal. During the descending process, the throttle stick will not work, but you can control the horizontal movement of the aircraft.
- When an aircraft is hovering in the buffer zone, you can control the aircraft to exit the buffer zone along the normal direction of the boundary.

For flights in an unlocked zone, if an aircraft is within the authorized airspace and validity period specified in the permit, the aircraft can fly normally in the zone. Once the aircraft flies beyond the authorized airspace or reaches the validity period, the aircraft will comply with the airspace restrictions of the current area.

2.9.3 Unlocking No-Fly Zones

To apply for unlocking a specific airspace within a no-fly zone, prepare the following information in advance according to your flight plan:

1. Identity and contact information of the applicant.
2. Unlock permit: a scanned copy or image of the valid permit for the flight application issued by local authorities (local public security bureau, aviation management department, or any other relevant organization/agency).
3. Unlocked zone: a cylindrical area. It includes the following information:
 - Name of the unlocked zone.
 - Coordinates of the center point of the flight airspace plane (latitude and longitude, with 6 decimal places).
 - Radius of the flight airspace plane (in meters, with 2 decimal places).
 - Flight altitude (in meters, with 2 decimal places).
4. Unlock date: Enter the unlock date according to the valid permit. The date is recommended to be accurate to day/hour/second.
5. Aircraft S/N (Serial number): Multiple serial numbers can be applied at once.
6. Autel account of UAS operator: Multiple accounts can be applied at once.

Log in to the official website of Autel Robotics at www.autelrobotics.com/service/noflight/, enter the relevant information, and complete the waiver application.

After the unlocking application is approved, you will obtain an unlock permit. The permit contains the aircraft serial number, UAS operator account, and unlocked zone (including the validity period).

Tip

- After the waiver application is submitted, it will be approved within 24 hours, and unlocking will be completed within 48 hours. Please make a reasonable flight plan in advance.

2.10 Altitude and Distance Limits

The altitude limit is the maximum flight altitude of the aircraft, while the distance limit is the maximum radius (distance from the take-off point) that the aircraft can fly.

You can set altitude and distance limits in the Autel Enterprise App to ensure the safe flight of the aircraft. For more information, see in Chapter 6.

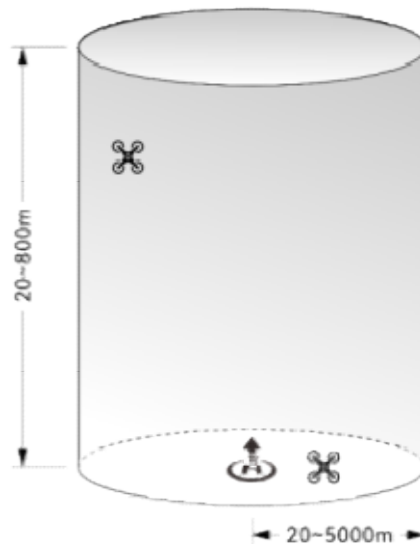


Fig 2-4 Diagram of altitude and distance limits

Tip

- In the Autel Enterprise App, the altitude limit should be set between 20 meters and 800 meters, and the distance limit should be set between 20 meters and 5000 meters. During actual flights, the maximum altitude limit should be set no greater than the maximum altitude specified by local laws and regulations.
- When setting the maximum altitude limit, consider the reasonableness of the RTH altitude, which should not exceed the maximum altitude limit.
- The RTH altitude should be set higher than the altitude of the highest obstacle in the flight area.

2.11 Aircraft Calibration

2.11.1 Compass Calibration

The compass (magnetometer) has been calibrated at the factory, and no user calibration is required under normal conditions.

If the Autel Enterprise App prompts that the compass displays an error message, the flight direction of the aircraft is inconsistent with the control input direction of the remote controller, or the flight location deviates too much from the calibration location, please follow the steps below to calibrate it.

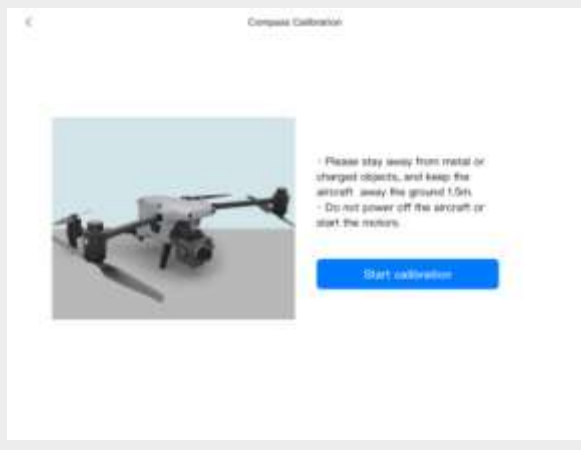
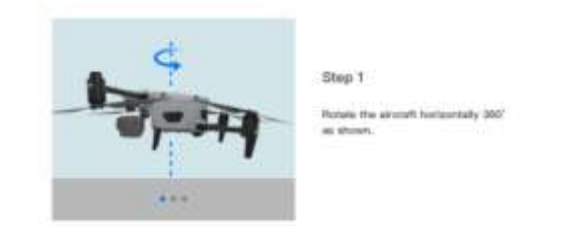
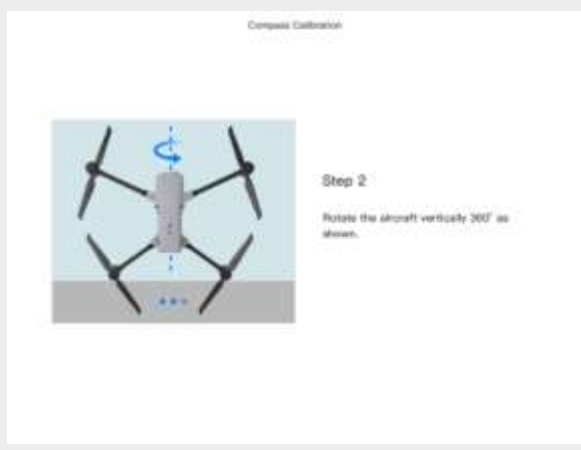
Important

- The compass is very easy to be affected by electromagnetic interference. Electromagnetic interference may lead to compass errors and degradation in flight quality.
- Please choose an open outdoor area for calibration.
- During calibration, please stay away from areas with a strong magnetic field or large metal objects, such as magnetic ore mines, parking lots, construction areas with underground reinforcing steel bars, underground areas, or locations near overhead power transmission lines.
- During calibration, do not carry ferromagnetic materials or metal objects on your person, such as mobile phones and watches.
- During the calibration process, please stay away from charged objects and make the aircraft fly

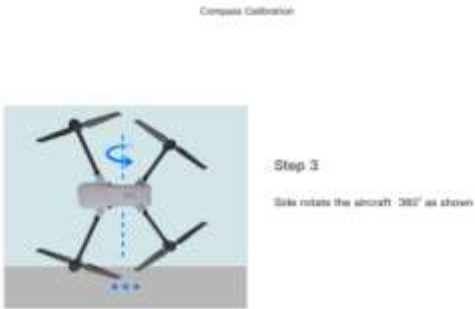
1.5 meters above the ground.

- During the calibration process, please do not turn off the power of the aircraft or start the motors.

Table 2-4 Compass Calibration

Step	Operation	Diagram
1	After turning on the aircraft and the remote controller, click "⚙️" > "⚙️" > "📍" > "Compass Calibration" > "Start Calibration" in the main interface of the Autel Enterprise App. When the calibration process begins, the rear arm light of the aircraft turns yellow and blinks.	
2	Hold the aircraft to keep it in a horizontal direction. Rotate the aircraft 360° horizontally until the rear arm light of the aircraft turns green and blinks.	
3	Hold the aircraft to keep it in a vertical direction with the nose up. Rotate the aircraft 360° horizontally until the rear arm light of the aircraft turns green and blinks.	

- 4
- Hold the aircraft to keep it with the nose to the left and the side down.
Rotate the aircraft 360° horizontally until the rear arm light of the aircraft turns green and is always on.



 Tip

- Please perform the calibration steps according to the tips shown in the compass calibration interface of the Autel Enterprise App.
- If the calibration fails, the rear arm light of the aircraft will turn red and is always on, and the above steps should be repeated at this time.
- If the compass still cannot work properly after the calibration, fly the aircraft to other places and calibrate the compass again.

2.11.2 IMU Calibration

The IMU (Inertial Measurement Unit) of the aircraft has been calibrated at the factory, and no user calibration is required under normal conditions.
If the acceleration and angular velocity of the aircraft are abnormal, please follow the steps below to calibrate it.

 Important

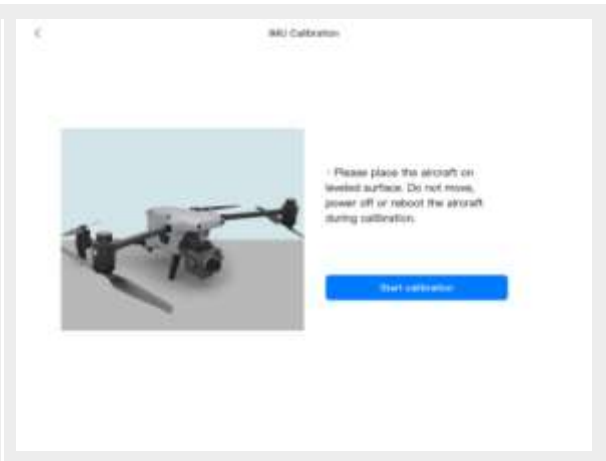
- Please place the aircraft according to the tips shown in the IMU calibration interface of the Autel Enterprise App, and keep the aircraft in a static state.
- Please place the aircraft on flat ground, and do not move, shut down, or restart the aircraft during the calibration process.
- During IMU calibration, the gimbal will not work.

Table 2-5 IMU Calibration

Step	Operation	Diagram
------	-----------	---------

1

After turning on the aircraft and the remote controller, click "⚙️" > "⚙️" > "🔧" > "IMU Calibration" > "Start Calibration" in the main interface of the Autel Enterprise App. When the calibration process begins, the rear arm light of the aircraft turns yellow and blinks.



2

Fold up the arms and place the aircraft flat on the ground until the rear arm light of the aircraft turns green and blinks.



3

Turn the aircraft over 180° and lay the aircraft facing up until the rear arm light of the aircraft turns green and blinks. Please pay attention to protecting the upward-looking camera lens.



4

Put the left side of the aircraft flat on the ground until the rear arm light of the aircraft turns green and blinks.



5	Put the right side of the aircraft flat on the ground until the rear arm light of the aircraft turns green and blinks.	
6	Fold the arms, turn the aircraft nose up, and lay it on the leveled surface until the rear arm light of the aircraft turns green and is always on. Be careful not to bump the rear camera lens.	

 Tip

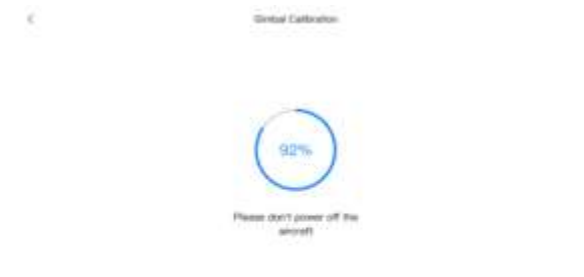
- If the calibration fails, the rear arm light of the aircraft will turn red and is always on, and the above steps should be repeated at this time.

2.11.3 Gimbal Calibration

The gimbal of the aircraft has been calibrated at the factory, and no user calibration is required under normal conditions.
If the rotation angle of the gimbal is abnormal, please follow the steps below to calibrate it.

Table 2-6 Gimbal Calibration

Step	Operation	Diagram
------	-----------	---------

1	Place the aircraft on a flat ground. After turning on the aircraft and the remote controller, keep the aircraft in a static state. In the main interface of the Autel Enterprise App, click "⚙️" > "⚙️" > "📷" > "Gimbal Calibration" > "Start Calibration".	
2	Wait for the calibration progress bar to reach 100%. When "Calibration Successful" is displayed on the screen, the gimbal is successfully calibrated.	

2.12 Emergency Stop Propellers During Flight

During flight, if the motors of the aircraft experience power damage or failure (e.g., damaged or missing propellers and motor failure) that makes the aircraft out of control, you can enable the "Emergency Stop Propellers During Flight" function. At the same time, you need to manipulate the dual command sticks on the remote controller inward or outward to forcibly stop propeller rotation and allow the aircraft to descend freely for an emergency landing. This can reduce the potential damage to property and harm to ground personnel caused by aircraft malfunctions.

In the event of an aircraft malfunction, you should first attempt to manipulate the command sticks to move the aircraft away from crowds or buildings and lower the altitude and horizontal speed of the aircraft before enabling the emergency propeller stop function. For how to enable this function, see in Chapter 6.

❗ Important

- If you stop the propellers when the aircraft has an initial velocity, the aircraft will fall along a parabolic trajectory. If the trajectory is unpredictable, do not stop the propellers.
- After completing an emergency landing, contact Autel Robotics promptly for a power system inspection and maintenance.

2.13 Mid-flight Sensing

Automatic Dependent Surveillance-Broadcast (ADS-B) is a manned aircraft monitoring technology that allows a manned aircraft to determine its position using satellite navigation systems and broadcast the information regularly, making the aircraft trackable. Other aircraft can receive the information to achieve attitude awareness and autonomous avoidance.

The Autel Alpha aircraft is equipped with ADS-B receivers that can receive flight information broadcast by ADS-B transmitters that support the 1090ES and UAT standards within a range of 10 kilometers. By analyzing the received flight information, the position, altitude, course, and speed of the manned aircraft will be obtained, and the obtained information will be compared with the current position, altitude, course, and speed information of the aircraft. The Autel Enterprise App will provide real-time risk warnings, reminding users to plan flight paths rationally and pay attention to avoidance.

Important

- The aircraft has been pre-configured with the ADS-B receiver hardware at the factory. The mid-flight sensing function will be available in subsequent versions. Please update the aircraft firmware in a timely manner.
- Operation path: Click " > " > " > "Safety" > "Receive ADS-B" in the main interface of the Autel Enterprise App, and follow the on-screen instructions to perform relevant operations. For more information, see in Chapter 6.

2.14 Direct Remote Identification

The Direct Remote Identification (DRI) system allows for uploading the registration number (Remote ID) of a UAS operator to the system. During flight, it can actively broadcast some non-sensitive data to mobile devices within its broadcast range in real time via an open, documented transmission protocol. The non-sensitive data includes the registration number of the operator, the unique serial number, timestamp, geographical location, altitude above ground level or take-off point, route measured clockwise from true north, and ground speed of the unmanned aircraft, and the geographical location of the operator (if available, otherwise the geographical location of the take-off point). This system not only effectively controls potential risks to public safety posed by unmanned aircraft during flight but also provides effective information and data tools for unmanned aircraft flight regulation.

The Autel Alpha aircraft supports the DRI system and uses Wi-Fi for broadcasting. To enable the DRI system, configure it in the Autel Enterprise App.

Tip

- Operation path: On the main interface of the Autel Enterprise App, click " > " > " > "Safety" > "Remote ID", and follow the on-screen instructions to perform relevant operations. For more information, see in Chapter 6.

2.15 Standard Flight Operation Process

2.15.1 Pre-Flight Checklist

Before each flight, please follow the steps below to perform a comprehensive pre-flight check to ensure flight safety:

- Make sure that the batteries of the aircraft and remote controller are fully charged, and the two batteries of the aircraft is installed in place, with the battery unlock lever in a lock state.
- Make sure that the propellers of the aircraft are installed properly, tightly without damage or deformation, the motor and propellers are clean and free of foreign objects, and the propellers and arms are fully extended.
- Make sure that the microSD card is inserted into the gimbal, and that the rubber protective cover on the microSD card slot is closed firmly. Otherwise, the protection performance of the gimbal will be affected.
- Make sure the gimbal camera is well mounted on the aircraft and the gimbal unlock button is aligned with the lock symbol on the gimbal connector.
- Make sure that gimbal protective cover has been removed, the vision cameras of the aircraft, the lens of the gimbal, and the lens of the auxiliary light are free from foreign objects, dirt, or fingerprints, and are not blocked by loads or other accessories on the fuselage.
- Make sure that the three-axis movement of the gimbal is in a normal state.
- Make sure that the rubber protective cover on the fuselage is closed firmly. Otherwise, the protection performance of the aircraft will be affected.
- Make sure that the antenna of the remote control is unfolded.
- Place the aircraft in an open and flat area outdoors and make sure that there are no obstacles, buildings, trees, etc. around. You should stand at least 10 meters away from the tail of the aircraft when operating.
- Make sure that after the aircraft is powered on, the aircraft and the remote controller are connected, and the aircraft motors, gimbal, and camera are working normally.
- Make sure that the aircraft, remote controller, etc. have been upgraded to the latest version as prompted.
- Make sure that all warnings and errors displayed on the Autel Enterprise App are handled.
- Enter the Autel Enterprise App setting page to set the flight control parameters, obstacle avoidance system, stick mode, and other related flight safety parameters, and be familiar with the flight operation, so as to ensure that the parameter settings meet your own needs and guarantee flight safety.
- If multiple aircraft are flying at the same time, please keep an appropriate air distance to avoid any accidents.

2.15.2 Basic Flight Process

The aircraft provides three command stick modes: Mode 1, Mode 2, and Mode 3. Each mode controls the aircraft differently. The default mode is Mode 2. You can switch the mode in the Autel Enterprise App according to your control habit (For how to switch the mode, see in Chapter 6). The following is the basic operation of aircraft flight:

1. Please refer to "[2.15.1 Pre-Flight Checklist](#)" to complete the preparations before flight.
 - Place the aircraft in an open and flat area outdoors and make sure that there are no obstacles, buildings, trees, etc. around.
 - Press and hold the battery power button for 2 seconds to turn on the power of the aircraft, and wait for the rear arm light to turn green and blinks slowly (indicating that the current status is normal).
 - Long press the power button of the remote controller for 3 seconds to turn on the remote controller.

- Stand at least 10 meters away from the rear arms of the aircraft.
- 2. Please refer to "[4.10.3 Starting/Stopping the Aircraft Motor](#)" in Chapter 4 to use the remote controller to start the aircraft and take off.
- 3. Please refer to "[4.10.1 Stick Modes](#)" and "[4.10.2 Setting Stick Mode](#)" in Chapter 4 to control the aircraft carefully.
- 4. Please refer to "[4.10.3 Starting/Stopping the Aircraft Motor](#)" in Chapter 4 to land the aircraft, and then turn off the motors.

Chapter 3 Aircraft

3.1 Aircraft Activation

When unboxing the product for the first time, you need to activate the Autel Alpha aircraft before using it. By default, the aircraft is pre-paired with the remote controller at the factory. After turning on the aircraft and the remote controller, you will see an activation prompt in the Autel Enterprise App. Please follow the steps in the Autel Enterprise App to activate the aircraft.

Important

- Make sure that the remote controller is connected to the Internet before starting the activation process. Otherwise, activation may fail.
- If activation fails, please contact Autel Robotics After-Sales Support for assistance.
- For how to pair the aircraft with the remote controller, see "[4.9 Frequency Pairing With the Remote Controller](#)" in Chapter 4.

3.2 Aircraft Components

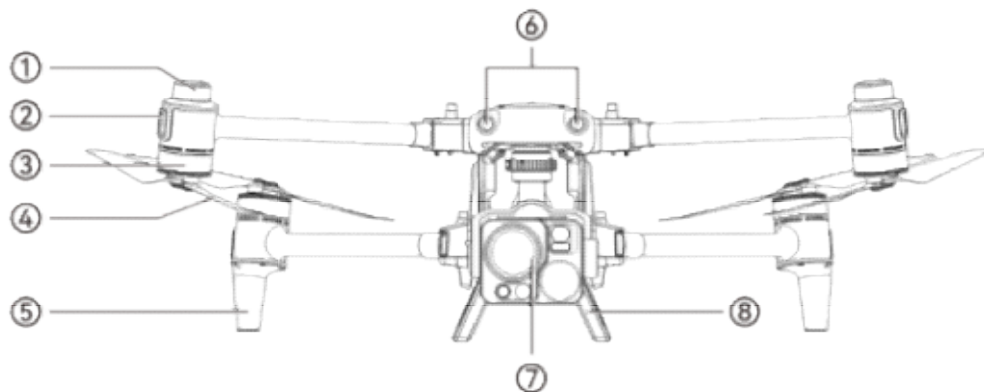


Fig 3-1 Aircraft Front View

No.	Name	Description
1	RTK Antenna	Used to realize centimeter level accurate positioning.
2	Front Arm Light	Used to identify the nose direction of the aircraft.
3	Motor	Used to drive the propeller to rotate.
4	Propeller	Rotates in the air to generate thrust to propel the aircraft forward.
5	Rear Landing Gear	Used to support the aircraft to avoid damage to the bottom of the fuselage. (with built-in image transmission antenna)
6	Forward Visual	Used to sense the obstacles ahead and avoid the aircraft from colliding

	Sensing System	with them.
7	Gimbal Camera	Integrates multiple sensors for stable shooting or measurements during flight.
8	Front Support Legs	Used to support the aircraft to avoid damage to the bottom of the fuselage.

Table 3-1 Aircraft Front View Details

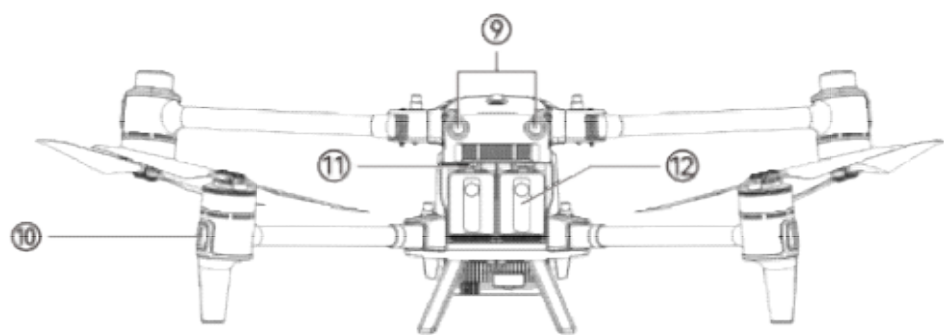
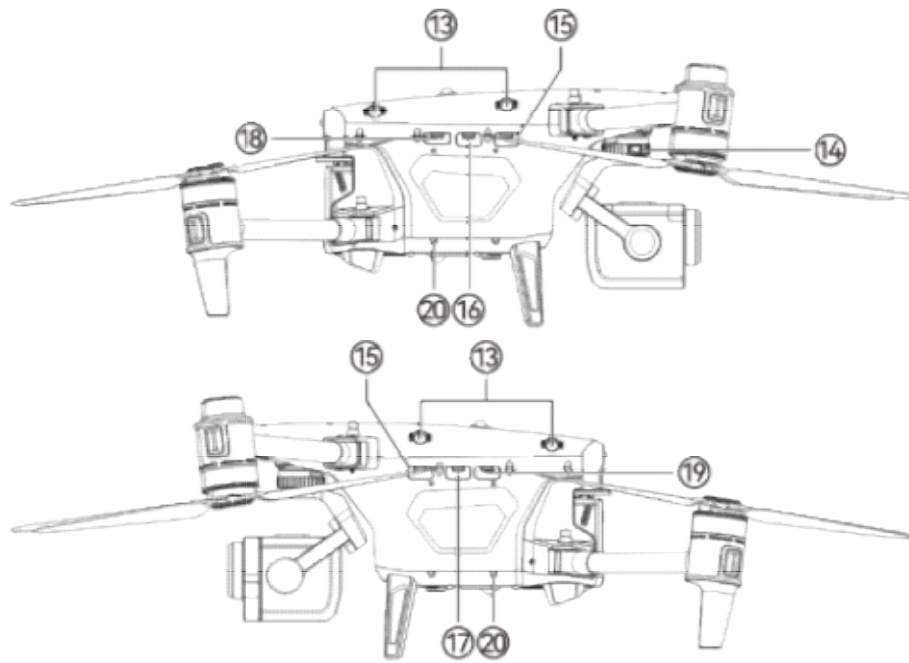


Fig 3-2 Aircraft Rear View

Table 3-2 Aircraft Rear View Details

No.	Name	Description
9	Rear Visual Sensing System	Used to sense the obstacles in the rear and avoid the aircraft from colliding with them.
10	Rear Arm Light	Used to display the current flight status of the aircraft.
11	Battery Unlock Lever	Move the battery unlock levers outward to unlock the battery and take out the smart batteries from the compartment.
12	Smart Battery	Used to provide energy for aircraft operation.

**Fig 3-3 Aircraft Side View****Table 3-3 Aircraft Side View Details**

No.	Name	Description
13	Side Visual Sensing System	Used to sense the obstacles in the left and right sides and avoid the aircraft from colliding with them.
14	Gimbal Interface	Used to connect to the gimbal camera.
15	P-Port	PSDK Interface. Additional mounts can be added to the aircraft fuselage through the extension interface, such as speakers, spotlights, and RTK modules.
16	P-Port	PSDK Interface. Additional mounts can be added to the aircraft fuselage through the extension interface, such as speakers, spotlights, and RTK modules. When gimbal is mounted, please connect the gimbal with aircraft via this interface.
17	O-Port	OSDK interface. The OSDK interface supports the integration of additional high-bandwidth computing unit devices. This interface also allows the connection of PSDK devices using USB.
18	WLAN Interface	Pre-set interface, if the purchased drone version is equipped with relevant hardware, users can insert a mobile data card (nano-SIM card) to provide internet access for the drone. The integrated SD card slot here is not available for the moment, please do not use it.
19	DEBUG	Used to connect to a computer for firmware updates or debugging.
20	Side Expansion Mounting Holes	Located on both sides of the fuselage, 4 screw holes (with a space of 64×94 mm, for M3×6 screw) to secure additional external devices.

Note: Current drone version is not supported for WLAN, please do not insert SIM card. Any query, please contact Autel Robotics for detail information.

 **Warning**

- The interfaces of the aircraft cannot be used for charging. For how to charge the aircraft, see in Chapter 5.
- There are rubber protective covers on the interfaces on both sides of the fuselage. Please make sure that the rubber protective covers are securely closed during flight.

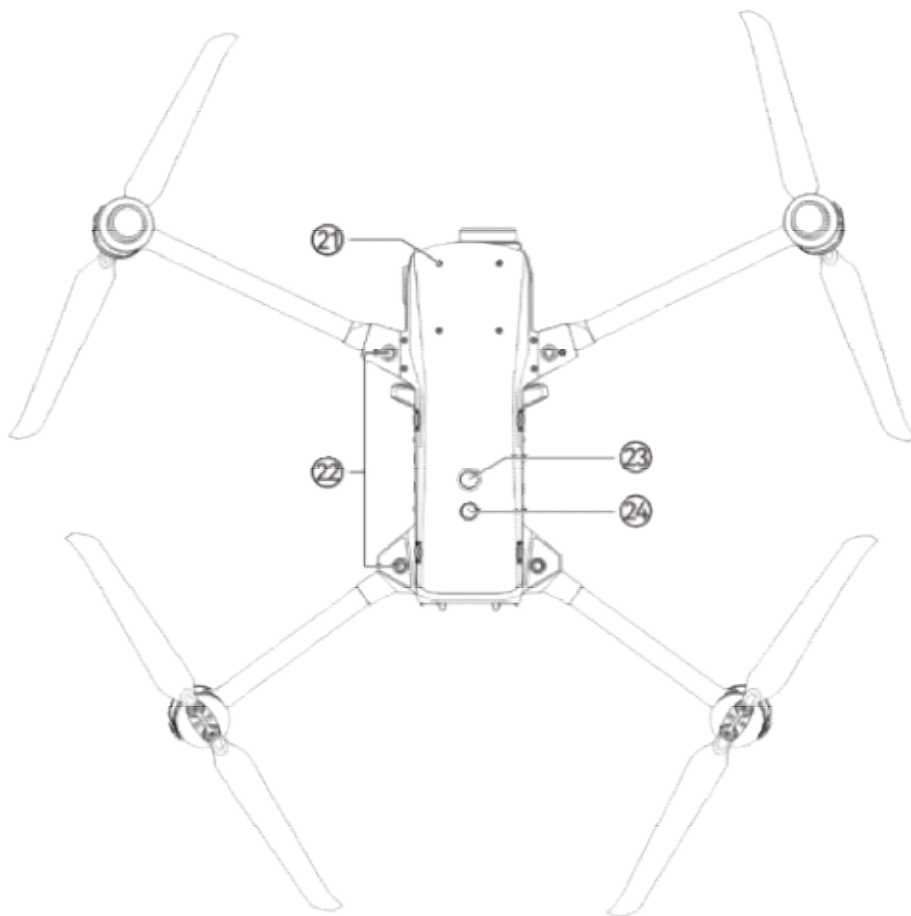


Fig 3-4 Aircraft Top-Down View

Table 3-4 Aircraft Top-Down View Details

No.	Name	Description
21	Top/Bottom Expansion Mounting Holes	Located on top and bottom side of the fuselage, 4 screw holes (with a space of 64×94 mm, for M3×6 screw) to secure additional external devices.

22	Arm Locking Button	After the drone arms are fully extended, the arm locking button will pop up. To fold the arms, press and hold the arm locking button first, then fold the arms for storage.
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23	Top Strobe	Emits high-intensity strobe lights to indicate the position of the aircraft at night to avoid air traffic accidents.
24	Power button	Press and hold the power button for 2 seconds to start the aircraft. Quickly press the power button twice to enter pairing mode.

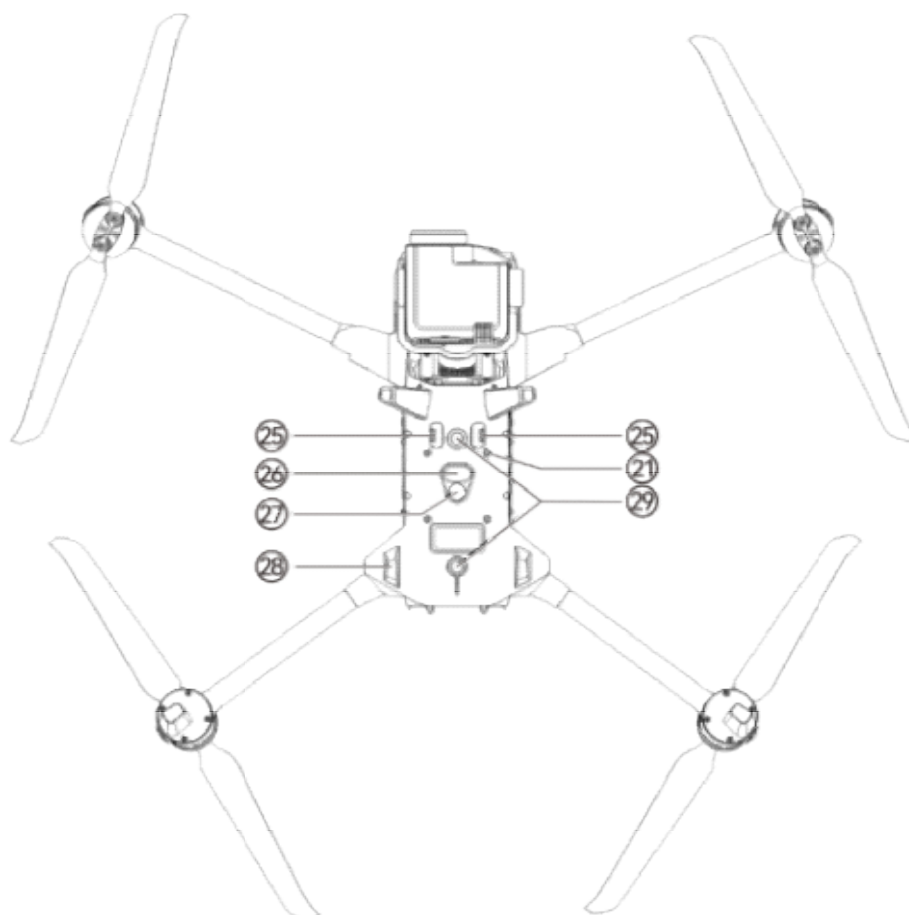


Fig 3-5 Aircraft Bottom-Up View

Table 3-5 Aircraft Bottom-Up View Details

No.	Name	Description
25	Test Interface	Invalid for the moment, please do not connect to any devices.
26	Auxiliary Light	An LED auxiliary light. It is used to enhance the ambient brightness of the landing area during the landing process, improve downward visual sensing performance, and ensure the safe landing of the aircraft.
27	Bottom Strobe	Emits high-intensity strobe lights to indicate the position of the aircraft at night to avoid air traffic accidents.
28	Rear Support Legs	After the drone is folded, used to support the aircraft to avoid damage to the bottom of the fuselage.
29	Downward Visual Sensing System	Used to sense obstacles below, and to the left and right of the aircraft and avoid collisions.

** Warning**

- Do not disassemble the components that have been installed at the factory (except for the components explicitly permitted in the description in this manual), otherwise, the product warranty will be void.
- Please prevent the 6 millimeter-wave radars inside the fuselage from being blocked by foreign objects. The six millimeter-wave radars are located in the middle of the forward visual sensing system, the rear visual sensing system, the side of the top shell (near Aux light), the bottom of the side visual sensing system, and near the fisheye lens at the bottom shell of the fuselage, respectively.

3.3 Preparation Of Aircraft

3.3.1 Replacing Propellers

Propellers are wearable parts that require regular maintenance and replacement to ensure the safe flight of the aircraft. The propellers are installed in the aircraft by default at the factory, and reinstallation is not required. If the propellers are damaged (e.g., broken or damaged blades), please replace them with new ones before a flight.

** Tip**

- Aircraft propellers are wearable parts. If needed, please purchase them from Autel Robotics.
- The difference of propeller is marked on the blade. You can check the silk print on the blade near the propeller center shaft.
- Autel Robotics provides four spare propellers for each aircraft. Please refer to the "Packing List" and packaging for details.

The propellers of the Autel Alpha aircraft are divided into CCW (identified by a double half-circle on the blade) and CW (identified by a single half-circle on the blade). Before installing the propellers, make sure that the silk marking on the propeller matches the one on the motor.

** Warning**

- Please use the propellers provided by Autel Robotics. Do not mix propellers of different models.
- Propeller edges are sharp. When replacing propellers, it is recommended to wear protective gloves.
- Before replacing the propellers, be sure to turn off the power of the aircraft, remove the gimbal camera and battery, and unfold the front and rear arms of the aircraft to ensure that the arms are in a locked state (a "click" sound is heard when locked, and the arm lock button is popped up).
- The four propellers of the aircraft have different structures. When installing the propellers, please refer to the picture below and distinguish the propellers on different arm motors to avoid mis-installation, which may lead to flight accidents.

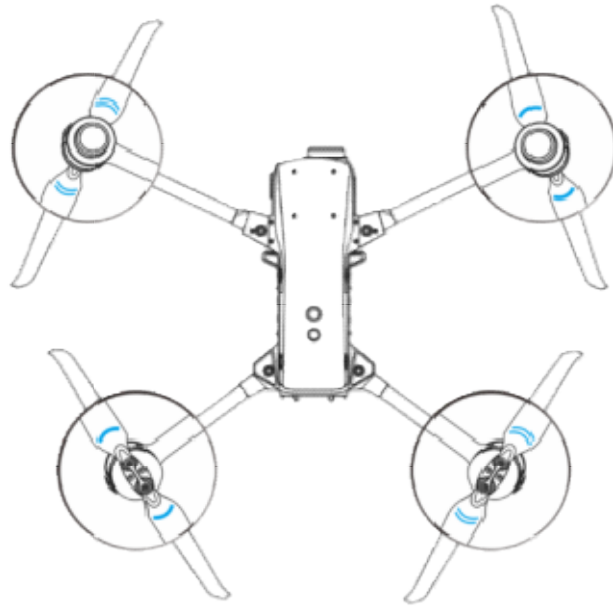


Fig 3-6 Aircraft Propeller Mounting Layout
(silk printings are oriented toward the top of the fuselage)

■ Replacing The Propellers On Rear Arms

1. Before replacement, confirm that the propellers have the same half-circle markings as the motors.
2. Prepare a heat gun and adjust the temperature to 150°C. Hold the heat gun close (about 5 cm away) to the two fastening screws at the connection between the propeller clamp and the motor. Heat the screw for 2 minutes until the screw fixing glue softens.
3. Use the screwdriver to unscrew the 2 fixing screws.
4. Remove and replace the entire propeller module, ensuring that the screw holes of the propeller clamp matches the screw holes on the motor.
5. Apply glue on the new screws, and screw down to tighten the propeller clamp.
6. After replacement, check again that the propellers matches the corresponding motors.

■ Replacing The Propellers On Front Arms

1. Flip the aircraft and place it on a level surface. Please protect the rear lens from any scratches or damage.
2. Before replacement, confirm that the propellers have the same half-circle markings as the motors.
3. Hold the heat gun close (about 5 cm away) to the two fastening screws at the connection between the propeller clamp and the motor. Heat the screw for 2 minutes until the screw fixing glue softens.
4. Use the screwdriver to unscrew the 2 fixing screws.
5. Remove and replace the entire propeller module, ensuring that the screw holes of the propeller clamp matches the screw holes on the motor.
6. When installing these front arm propellers, please place the propeller with silk print facing downward (towards the top of the fuselage).
7. Apply glue on the new screws, and screw down to tighten the propeller clamp.
8. After replacement, check again that the propellers matches the corresponding motors.

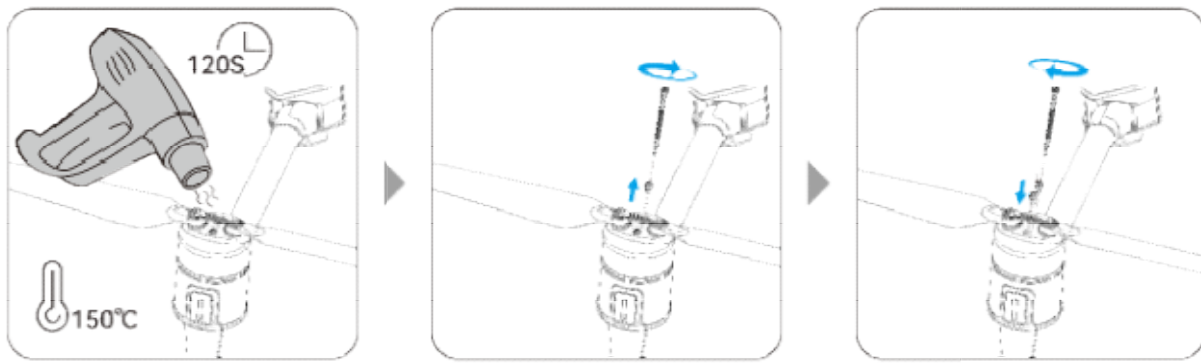


Fig 3-7 Install the Propellers

Warning

- The propellers can rotate at a maximum speed of 6000 RPM. Please operate with caution.
- Before each flight, make sure that all propellers are in good condition. If there are aged, damaged, or deformed propellers, please replace them before the flight.
- Before each flight, make sure that all propellers are mounted correctly and securely.
- Stay away from rotating propellers or motors to avoid injuries.
- Before testing the aircraft on the ground, make sure that the propellers are removed.

3.3.2 Fold/Unfold The Arms

Before using the aircraft, place it on a level ground. Unfold the front and rear arms. After the arms are fully unfolded, you will hear a "click" sound, indicating that the arm locking button has securely locked the arms, and the arms cannot be folded at this point.

Tip

- If the arms are not fully unfolded, the motors will not be powered, and you will see corresponding warnings in the remote controller.

Please follow below instructions to fold the arms and the propellers to store in the hard case:

1. Push the arm locking button on the rear arms to fold both rear arms towards the front of the fuselage.
2. Push the arm locking button on the front arms to fold both front arms towards the rear of the fuselage. Make ensure that the propellers are well folded.

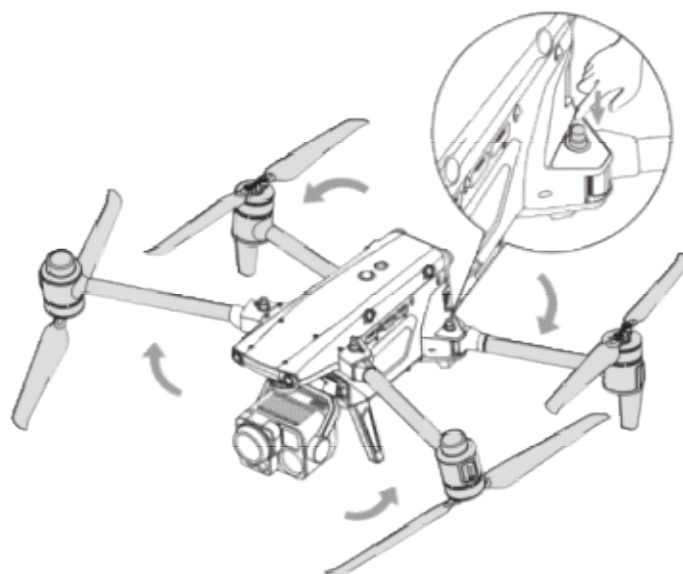


Fig 3-8 Folding The Arms

Warning

- When folding the arms, make sure the lock button on the arms are pushed down to release the arm. Forcibly folding the arms may break the arms.
- When folding the arms, fold the rear arms first, and then the front arms to avoid interference. When unfolding the arms, reverse the sequence of operations.

3.4 Arm Light

There is an LED indicator at the end of each arm of the aircraft. After the aircraft takes off, the front arm lights will blink periodically, which can help you identify the direction of the aircraft's nose; the rear arm lights will display the current flight status of the aircraft.

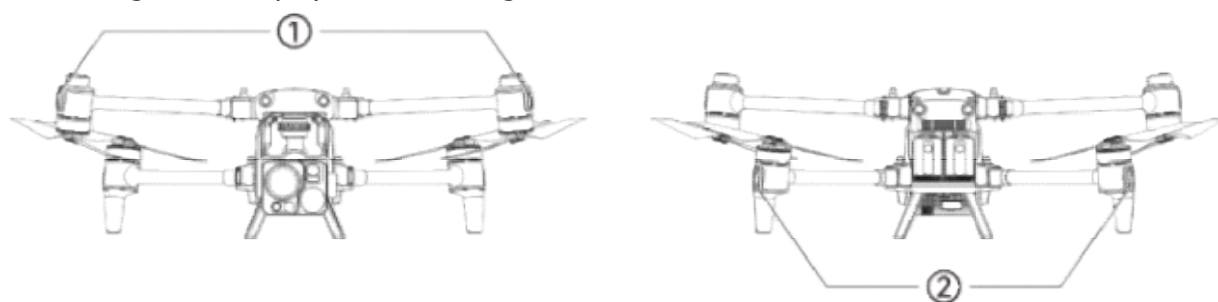


Fig 3-9 Arm Light

Table 3-6 Arm Light Details

No.	name	Description
1	Front Arm Light	Two LED indicators are located at the ends of the front arms on the left and right sides, respectively. During flight, they will blink green periodically following a pattern of (0.25s on/0.25s off/0.25s on/1.25s off) to help identify the nose direction.

- 2 Rear Arm Light Two LED indicators are located at the ends of the rear arms on the left and right sides, respectively. They are used to display the current flight status of the aircraft. During flight, they will blink alternately in a cycle of (red light on for 1s / green light on for 1s) to help identify the tail direction.

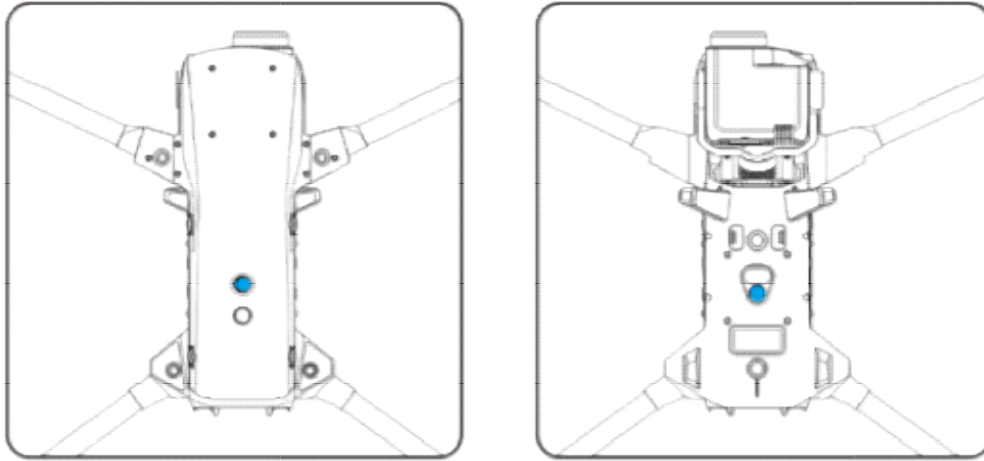
Table 3-7 Rear Arm Light Status Details

Indicator status (R: red G: green Y: yellow)	Definition
Normal	
R– Ultra-fast Blinking /Fast Blinking →Y- Fast Blinking	System Self-Test
G– Slow Blinking	Aircraft is in GNSS Mode / Visual Positioning Mode
Y– Slow Blinking	Aircraft is in ATTI mode
Calibration	
Y– Slow Blinking	Magnetometer/IMU Calibration Data Collection
G– Slow Blinking	Magnetometer/IMU Calibration Goes to the Next Step
G– Always On	Magnetometer/IMU Calibration Successful
R– Always On	Magnetometer/IMU Calibration Failed
Warning	
Y– Fast Blinking	Remote Controller Not Connected to Aircraft
R– Slow Blinking	Low battery warning/ Illegal Battery
R– Fast Blinking	Critical low battery warning
R– Always On	IMU Abnormal
RY-Alternate Slow Blinking	Magnetometer Abnormal

- Slow Blinking: blinks once every 2s (0.5s on/1.5s off).
- Fast Blinking: blinks twice per second.
- Ultra-fast blinking: blinks 5 times per second.

3.5 Strobe

The aircraft is equipped with a strobe at the top and bottom of the fuselage to help identify the aircraft when flying at night. You can manually turn the strobe on or off in the Autel Enterprise App.

**Fig 3-10 Strobe****Tip**

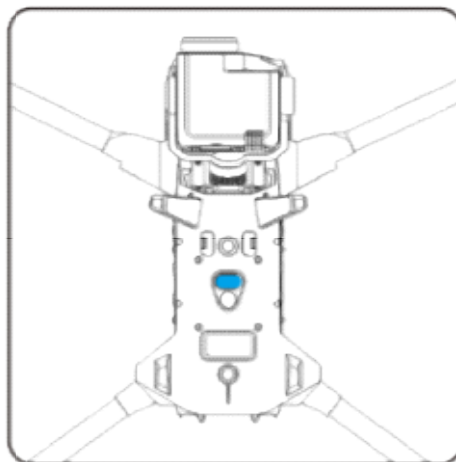
- For how to turn the strobe on or off, see in Chapter 6.

Warning

- Do not look directly at the strobe while they are on to avoid vision damage caused by strong light.

3.6 Auxiliary Bottom Light

The aircraft is equipped with auxiliary bottom lights (LED auxiliary lights) at the bottom of the fuselage. The lights are used to assist the downward visual sensing system when the aircraft is landing in weak light environments, so as to ensure better visual positioning performance and enhance the landing safety of the aircraft. You can manually turn the bottom LED auxiliary lights on or off in the Autel Enterprise App.

**Fig 3-11 Auxiliary Light****Tip**

- For how to turn the auxiliary bottom lights on or off, see in Chapter 6.

Warning

- When the auxiliary bottom lights are set to automatic mode, they will turn on automatically at an altitude of 3 meters above the ground when the aircraft is landing and the ambient light is insufficient, and they will turn off automatically after a successful landing.

3.7 Camera

The Autel Alpha aircraft is equipped with the L35T gimbal, which integrates a high-magnification zoom camera, supporting 35 time optical zoom and 560 times hybrid zoom capability. Moreover it also adopts a wide angle camera, a laser rangefinder, and an dual thermal imaging cameras and provide capabilities such as target thermal imaging, positioning, and ranging for flight operations, enhancing the flying experience in all-day operations.

3.7.1 Camera Structure

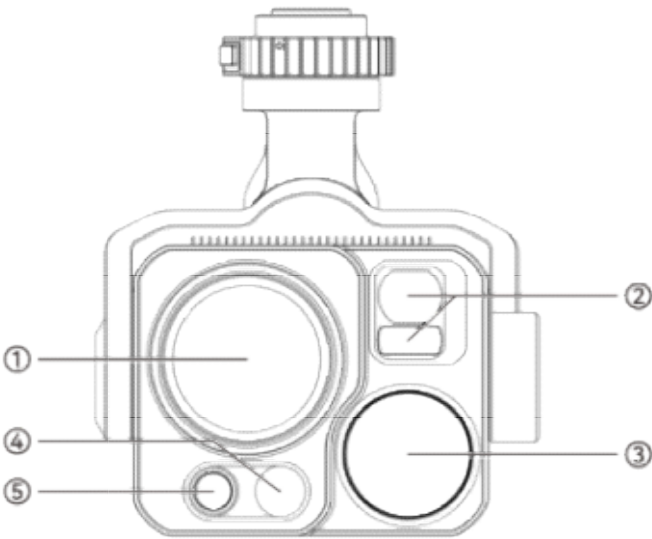


Fig 3-12 Autel Alpha DG-L35T

Table 3-8 DG-L35T Camera Details

No.	Name	Description
1	Zoom Camera	The zoom camera is used to shoot distant scenes, making the distant scenes clearer. 1/1.8" CMOS, 48 million effective pixels, 35x continuous optical zoom, and 560x hybrid zoom.
2	Laser Rangefinder	The distance is accurately determined by measuring the time from the start of the laser emission to the time when the laser is reflected from the target. Measuring range: 10-2000 meters.

3	Infrared Thermal Imaging Camera (45mm Focal Length)	The infrared thermal imaging camera is used for radiometric measurement and night vision, which can monitor the temperature distribution of the measured target in real time, so as to judge the state of the target. Measuring range: 4-50 meters. Resolution: 640*512 Radiometric temperature range: -20℃~+150℃ (high gain mode) and 0℃ ~ + 550℃ (low gain mode).
4	Wide Angle Camera	The wide angle camera is used to capture images with a larger field of view within a shorter shooting distance. 1/2" CMOS, 48 million effective pixels, and supports 8k photos.
5	Infrared Thermal Imaging Camera (13mm Focal Length)	The infrared thermal imaging camera is used for radiometric measurement and night vision, which can monitor the temperature distribution of the measured target in real time, so as to judge the state of the target. Measuring range: 1-25 meters. Resolution: 640*512 Radiometric temperature range: -20℃~+150℃ (high gain mode) and 0℃ ~ + 550℃ (low gain mode).

Warning

- Do not point the infrared thermal imaging camera at intensive energy sources such as the sun, lava, laser beams, and molten iron, to avoid damage to the infrared detector.
- The temperature of the observation target should be less than 600 ℃. Observing objects with temperatures above this limit may result in damage to the infrared detector.
- The laser rangefinder is a Class 1 laser product that emits laser radiation. Avoid direct exposure to the eyes when in use.

3.7.2 Camera Operations

■ Remote Controller Control

- Right dial wheel: Used to adjust the zoom factor of the selected camera. Turn left to reduce the zoom factor, and turn right to increase the zoom factor.
- Video recording button: Press the button to start/end video recording.
- Shooting button: Press the button to take photos.

Tip

- For the control operations of the remote controller, see "[4.1.1 Remote Controller Components](#)" in Chapter 4.

■ Autel Enterprise App Control

For the control operations and the functions related to the camera in the Autel Enterprise App, see in Chapter 6.

3.7.3 Gimbal Structure

The DG-L35T is equipped with a three-axis stabilized gimbal with a high-precision motor structure, which can ensure stable camera shooting when the aircraft is flying.

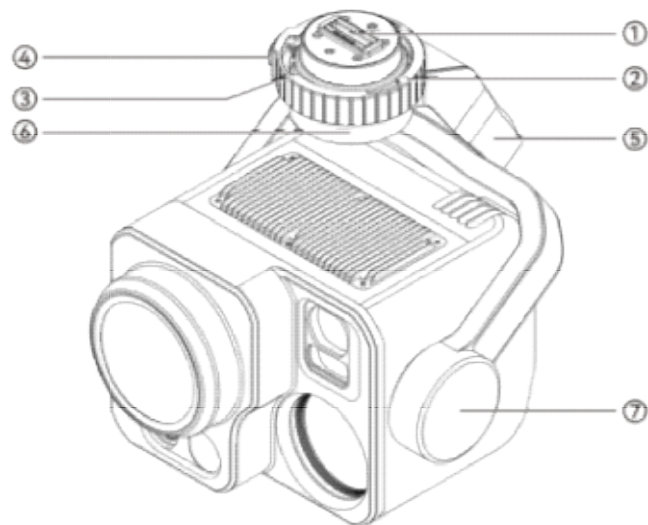


Fig 3-13 Gimbal Structure

Table 3-9 Gimbal Structure Details

No.	Name	Description
1	Connection Slot	The gimbal's connection slot is used to connect with the connector at the aircraft's gimbal interface.
2	Gimbal Lock Ring	The DG-L35T gimbal lock ring features an E-shape design for quick connection to the aircraft's gimbal interface.
3	Lock Ring Marker (Red Dot)	Used to check the installation direction of the gimbal lock ring. When installing the gimbal, rotate the marker point from aligning with the unlock indicator on the aircraft's gimbal interface to the lock indicator.
4	Gimbal lock Button	When installing or removing the gimbal camera, press and hold the gimbal lock button to ensure that the gimbal lock ring is released.
5	Roll Axis Motor	Used to control the moving range of the gimbal to roll left or right(mechanical range: -60° ~ +60°).
6	Yaw Axis Motor	Used to control the moving range of the gimbal to rotate left or right with its own axis (mechanical range: -90° ~ +90°).
7	Pitch Axis Motor	Used to control the moving range of the gimbal to rotate up or down (mechanical range: -135° ~ +45°, controllable movement range: -90° ~ +30°).

⚠ Warning

- After using the gimbal for a long time, the gimbal case may become hot due to heat dissipation, please wait until the gimbal cools down to avoid any risks of burns.

3.7.4 Gimbal Mechanical Rotation Range

The mechanical rotation ranges of the pitch, yaw, and roll axes of the gimbal are shown below.

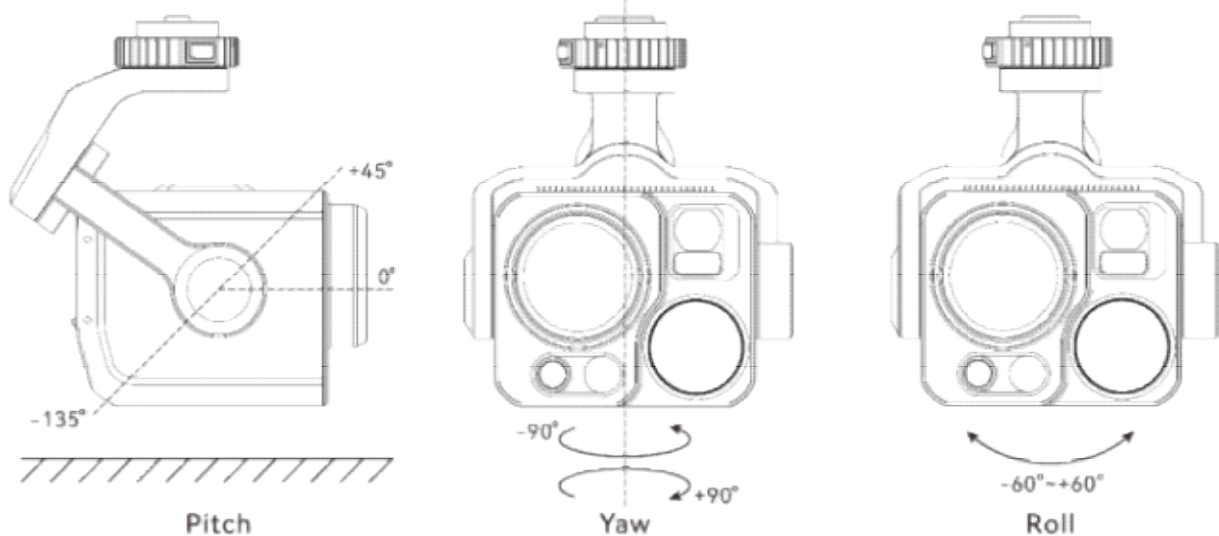


Fig 3-14 Mechanical Rotation Range of the Gimbal of the Autel Alpha Aircraft

Note

- You can control the rotation range of the gimbal pitch, ranging from -90° to 30°. For more setting details, see in Chapter 6.

3.7.5 Gimbal Operations

■ Remote Controller Control

- Left dial wheel: Used to adjust the gimbal pitch. Turn left to rotate the gimbal down, and turn right to rotate the gimbal up.
- Custom keys C1/C2: After setting the C1 or C2 key to "Gimbal Pitch Recenter/45°/Down", you can press the key to switch the gimbal angle.

Tip

- For the control operations of the remote controller, see "[4.1.1 Remote Controller Components](#)" and "[4.11.1 Custom Keys C1 and C2](#)" in Chapter 4.

■ Autel Enterprise App Control

For the gimbal control operations in the Autel Enterprise App, see in Chapter 6.

Warning

- When the aircraft is not in use, especially when the aircraft is being transferred or stored, be sure to use the protective cover of the gimbal to fix the gimbal, so as to avoid damage to the gimbal camera due to accidental rotation or bumping.
- Please remove the protective cover of the gimbal before turning on the gimbal, otherwise, it

may cause damage to the gimbal motor and circuit.

- When turning on the power switch of the aircraft, the gimbal will automatically rotate to perform self-check and calibration, please make sure there is no object near the gimbal to hinder its movement.

3.7.6 Replacing The Gimbal

The Autel Alpha aircraft has a removable gimbal design, allowing you to easily replace the gimbal to meet your flight needs in various scenarios.

Important

- Please follow the instructions below to replace the gimbal, as improper replacement may cause damage to the gimbal or poor contact with the gimbal interface.
- Do not replace the gimbal frequently. The gimbal connector is a precision element, and frequent plugging and unplugging may result in poor contact between the aircraft and the gimbal.
- Please use the gimbal model specified by Autel Robotics for replacement. Incompatible gimbals may cause damage to the aircraft.

Warning

- Do not attempt to remove or mount the gimbal when it is powered on. Wait for 15 seconds after powering off the aircraft (the internal capacitor is fully discharged) before removing or mounting the gimbal.

■ Mounting the Gimbal

1. Make sure the aircraft is powered off. Remove the protective covers on the gimbal interface and the aircraft's gimbal interface. Align the red dot on the gimbal lock ring with the red dot on the aircraft's gimbal interface.
2. Lift the gimbal camera upward, align the gimbal interface, and insert it into the aircraft's gimbal interface, ensuring a secure connection.
3. Rotate the gimbal lock ring to the direction indicated for locking "🔒" on the aircraft's gimbal interface. After the gimbal camera is locked, you will hear a click sound at the gimbal unlock button.

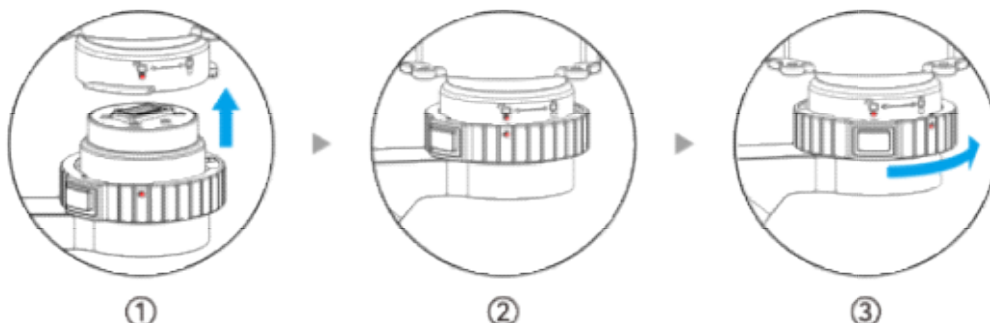


Fig 3-15 Mounting the Gimbal

Important

- After installed the gimbal camera, you can try to rotate the gimbal lock ring in the reverse

direction (do not press the gimbal unlock button). If the gimbal lock ring cannot rotate, means the gimbal is well installed.

- After installing the gimbal camera, please remove the lens cover on the gimbal camera.
- Please power on the aircraft for a self-check to ensure the gimbal camera is functioning correctly. During the self-check, the gimbal camera will automatically rotate for calibration. Please make sure there are no obstacles near the gimbal camera.

■ Removing the Gimbal

1. Make sure the aircraft is powered off. Hold the gimbal camera with one hand and press the gimbal unlock button with the other hand.
2. Rotate the gimbal lock ring to the unlocking direction with the unlocking symbol "🔓" on the aircraft's gimbal interface.
3. After unlocking, the gimbal camera will release from the aircraft's gimbal interface.

⚠ Warning

- When removing the gimbal, please hold the gimbal camera to prevent it from falling and causing damage.

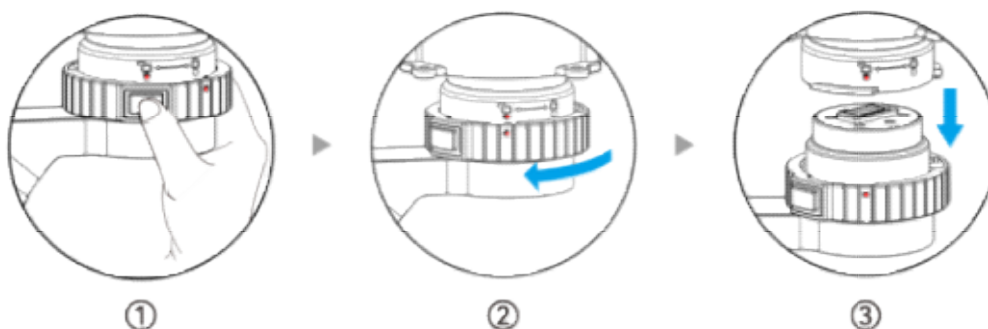


Fig 3-16 Removing the Gimbal

3.7.7 Other Functions

The DG-L35T gimbal camera supports a lens heating and defog function. When flying and shooting in environments with mist, water vapor may affect the image quality. You can improve this by clicking the "🌫" icon in the tool box on the Autel Enterprise App to activate the defog function.

After enabling the defog function, the internal heating wire of the gimbal camera will heat the camera lens for physical defogging. Simultaneously, the captured images will undergo quality improvement and enhance color contrast for a better image/video output.

💡 Tip

- For detailed introduction on operating the heating and defogging function, please refer to Chapter 6.4, "Quick Toolbar." in Chapter 6.

3.8 Flight Control System

The Autel Alpha aircraft achieves stable and convenient flight control through its built-in intelligent flight control system. The system supports a number of advanced functions, including auto-return, failsafe, visual positioning system, etc.

Table 3-10 Flight Control System

Module	Description
IMU	A three-axis gyroscope and a three-axis accelerometer measure acceleration and angular velocity.
Compass	Measures the geomagnetic field and provides reference information on the aircraft heading.
GNSS receiver	Receives global satellite navigation signals to measure longitude, latitude, and altitude.
Barometer	Measures atmospheric pressure and is used to determine the altitude of the aircraft.
Visual Sensing System	Provides the aircraft with 720° obstacle awareness around the fuselage.
Millimeter Wave Radar	Provides the aircraft with all-day and all-weather obstacle avoidance capabilities.

3.8.1 Flight Mode

Depending on the availability of GNSS signals and flight conditions, the aircraft can automatically switch between three flight modes.

Table 3-11 Flight Mode

Flight Mode	Description
GNSS Mode	GNSS mode is activated when the aircraft detects an appropriate GNSS signal. In GNSS mode, if the obstacle avoidance system is turned on, the system will provide auxiliary information to more accurately locate and avoid obstacles, provide stable and smooth flight control, and support auto-return, failsafe, and other safety functions.
Visual Positioning Mode	When the aircraft is in the visual positioning mode, and the GNSS signal detected is not strong enough to activate GNSS mode, and it meets certain environmental and altitude requirements (ensure that the surrounding environment is well-lit, the ground texture is clear, and the altitude of the aircraft must be within the observation range of the visual sensing system), the visual positioning mode will be activated.
ATTI Mode (Attitude Mode)	When there is no GNSS signal and the environment and altitude cannot meet the requirements of the visual sensing system, that is, when there is no GNSS signal and visual positioning failure at the same time, the ATTI mode will be activated. In this mode, the obstacle avoidance system is disabled, and the aircraft only controls the altitude through the barometer.

⚠ Warning

- If you have not fully mastered the flight control of the aircraft and the aircraft is in ATTI mode, please do not take off rashly.

3.8.2 Flight Modes

The aircraft has varying flight performance in different flight modes. You can set the flight mode of the aircraft in the Autel Enterprise App. For more information, see in Chapter 6.

Table 3-12 Flight Modes

Flight Modes	Description
Slow	Forward, backward, left, and right: 3 m/s; Ascend: 3 m/s; Descend: 3 m/s.
Smooth	Forward, backward, left, and right: 10 m/s; Ascend: 5 m/s; Descend: 5 m/s.
Standard	Forward and backward: 15 m/s; Left and right: 10 m/s; Ascend: 6 m/s; Descend: 6 m/s.
Ludicrous	Forward: 23 m/s; Backward: 18 m/s; Left and right: 20 m/s; Ascend: 15 m/s; Descend: 10 m/s.

⚠ Warning

- If you have not fully mastered the flight control of the aircraft, it is not recommended for you to switch to Ludicrous mode.
- When flying close to the ground, it is recommended to switch to Slow mode for safety.
- When switching to Ludicrous mode, the obstacle avoidance function of the aircraft will become unavailable, and the aircraft will not automatically avoid surrounding obstacles during flight. Please pay attention to the surrounding environment when using it, and manually control the aircraft to avoid obstacles.
- When switching to Ludicrous mode, its flight speed is greatly improved compared with Standard mode, so the braking distance in this mode will be correspondingly extended. You should maintain a braking distance of at least 50 meters when operating the aircraft in this mode to ensure personal and flight safety.

3.8.3 Intelligent Flight Function

■ Accurate Landing

The accurate landing function uses the downward binocular visual sensing system of the aircraft to record the information at its take-off point. When the aircraft is returning to the home point or landing, vision algorithms are used to calculate the distance between the aircraft and the take-off point in real time so as to make sure that the aircraft successfully lands at the take-off point.

■ Landing Protection

The landing protection function uses the downward visual sensing system of the aircraft to create a depth image, then calculate the flatness and angle of the depth image to detect whether the surface is flat enough for a safe landing.

■ Intelligent Obstacle Avoidance

The intelligent obstacle avoidance function uses the combined observation results of the visual sensing system and the forward millimeter-wave radar sensing system of the aircraft to calculate the optimal flight path, achieving obstacle avoidance in multiple directions.

3.8.4 Hot Swap Battery

The Autel Alpha aircraft supports hot-swappable batteries, which allows you to replace smart batteries without powering off the aircraft, thus avoiding waiting for rebooting. When performing a hot swap, it is recommended that the interval between changing the two batteries should be longer than 5 seconds to ensure that the new battery can be properly activated when powering on the aircraft.

Important

- The detailed introduction for battery replacement please refer to Section 5.3.1 "Installing/Removing the Smart Battery" in Chapter 5.
- It is recommended to label the batteries for better management. The two batteries used for replacement should have similar power levels and cycle counts to ensure consistent battery performance.

3.9 Installing the microSD Card

The aircraft comes with a 128 GB microSD card (pre-installed in the microSD card slot of the payload at the factory). If you want to replace it with a higher-capacity microSD card, please follow the steps below.

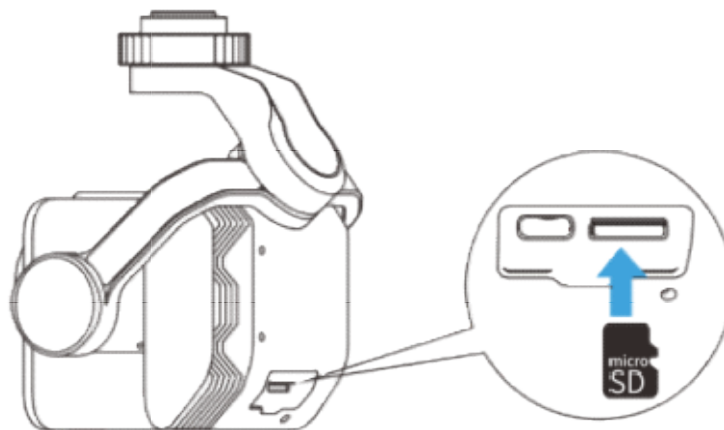


Fig 3-17 Installing the microSD Card

Tip

- If you plan to shoot high-definition videos, we recommend using a Class 10, UHS-3, or higher microSD card.

Warning

- To prevent data loss, please turn off the aircraft before removing the microSD card.

- After installing the microSD card, close the rubber protective cover over the interface area promptly to avoid affecting the protective performance of the gimbal.

3.10 Connecting to PC/MAC

To transfer photos and videos to a PC, MAC, or other devices, please use a data cable to connect to the device through the USB Type-C interface of the gimbal.

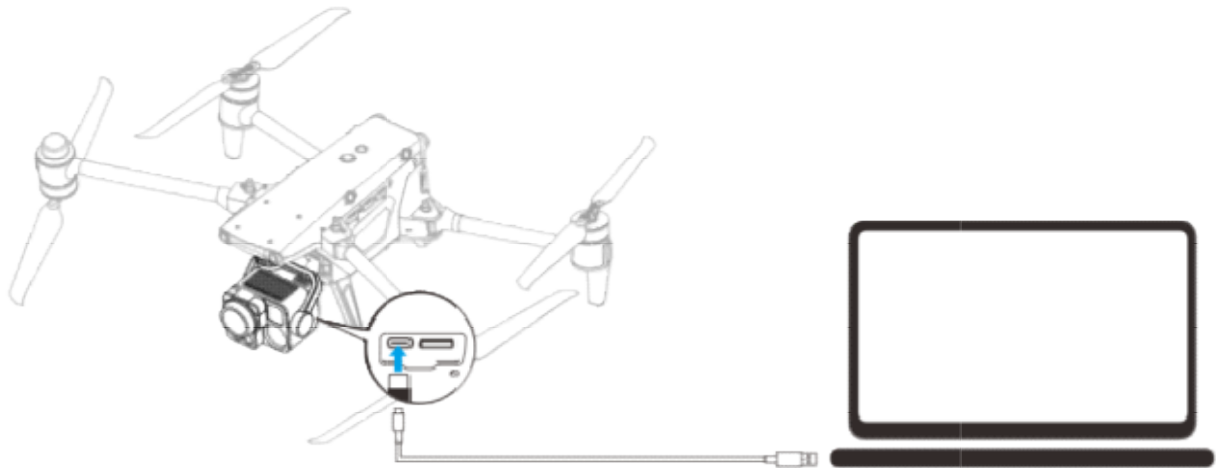


Fig 3-18 Connect to PC/MAC via Gimbal USB Type-C Interface

Warning

- When connecting the gimbal camera to a PC/Mac, please do not operate the gimbal camera through the remote controller to prevent damage.
- The gimbal camera does not support PC/Mac connection when it is not powered on.

3.11 Extension Interface

The top of the aircraft has a PSDK extension interface that uses the USB Type-C interface standard, which allows for additional functional mounts such as the RTK module.

Important

- Mounts for the Autel Alpha aircraft are sold separately. If you need a mount, contact Autel Robotics official or authorized dealers.
- Do not plug a device (like charger) that uses other USB Type-C interface standards into the extension interface, as it may damage the aircraft.
- Before flight, make sure that the external mount is securely connected to the aircraft and the fixing screws on both sides are tightened.
- Pay attention to the battery level of the aircraft during flight. Mount operations consume the battery power of the aircraft, which will reduce the flight time of the aircraft.
- After removing an external mount from the aircraft, be sure to close the rubber protective cover over the interface area. Otherwise, the protective performance of the aircraft will be affected.

For external mounts, please refer to 3.2 for more details.

 Tip

- Compatible mount list will be updated in further upgrades.

3.12 Protection Rating

Under controlled laboratory conditions, the Autel Alpha aircraft (with smart batteries installed) can achieve an IP55 protection rating following IEC 60529 standards. The protection rating is not permanent and may degrade due to long-term wear and tear.

- It is not recommended to fly in rainy conditions. In case of rain during the flight, abort the flight and return to a safe location promptly.
- Before flight, make sure that the battery connector, battery compartment interface, battery surface, and battery compartment surface are dry and water-free before inserting the battery into the aircraft fuselage.
- After completing the flight, wipe off the rainwater on the aircraft fuselage before folding and storing the aircraft to prevent water from entering the aircraft and affecting its protective performance.
- Make sure that the battery connector and surface are dry and water-free before charging the battery.
- Damage caused by immersion in liquid is not covered by the warranty.

The aircraft does not have an IP55 protection rating in the following conditions:

- The aircraft is not installed with a battery or the battery is not properly installed.
- The rubber protective cover at the interface of the fuselage or the gimbal is not properly installed.
- There are other possible damage on the fuselage, such as shell cracks or waterproof adhesive failure.

 Note

- Please strictly comply with the usage environment restrictions of the aircraft. Using the aircraft beyond specified conditions may lead to aircraft damage or safety incidents.

3.13 Noise

The Autel Alpha aircraft will generate a certain level of noise during operation. You should understand local noise pollution prevention regulations in advance and set an appropriate flight altitude or safe distance to ensure that it does not disturb other individuals, groups, or organizations.

■ A-weighted sound power level

The Autel Alpha aircraft has passed sound power test conducted by relevant third-party testing organizations with qualification. The results comply with the regulations concerning unmanned aerial vehicles in the European Union.



Fig 3-19 A-weighted sound power level of the Autel Alpha

■ A-weighted sound pressure level

Measurement results for the Autel Alpha aircraft, in accordance with the requirements of GB 42590-2023 in Chinese mainland, are provided below:

Table 3-13 Noise Measurements Results (normalized to 1 m from the aircraft)

Observation Points	Hover	Fly (1 m/s)
Ground Measure Point (Below)		
Side Measure Point (Horizontal Plane)		

Note: The measurement environment is a fully anechoic chamber.

Tip

- Before flight, please make sure to verify the noise restrictions in the flying area in advance to avoid any violation of local regulations regarding aircraft noise.

3.14 Autel SkyLink Image Transmission Function

The Autel Alpha aircraft is equipped with Autel SkyLink 3.0 image transmission technology and has 4 image transmission antennas, with 2 channels of transmitting signals and 4 channels of receiving signals, so that the communication distance between the aircraft and the remote controller can reach up to 20 kilometers.

- It supports adaptive frequency hopping transmission of multiple frequency bands, selects the optimal channel according to the electromagnetic interference situation, and has strong anti-interference ability.
- The quality of real-time transmission reaches 1080p/60fps, and it has a high transmission bit rate of 64Mbps and low-latency transmission characteristics.
- The whole link data storage adopts the AES-128 encryption method to ensure that the communication data between end-to-end cannot be monitored.

Note

- The transmission data is based on the remote controller and comes from test data, and the test

environment and conditions are different, and the data may be different.

- The transmission range is for reference only. During use, please pay close attention to the quality of the image transmission signal. When the image transmission signal is weak, reduce the flight radius in a timely manner. For more information, see in Chapter 6.
- Please note that the maximum communication distance of the included remote controller is 15 kilometers. To achieve a 20-kilometer communication distance with the aircraft, a ground device with stronger communication capabilities is required.

■ Information Of Image Transmission Frequency Bands for Aircraft

The image transmission frequency bands of the Autel Alpha comply with regulatory requirements worldwide. The relevant certified frequency bands are listed in the table below.

In actual use, after power-on and paired the aircraft and the remote controller, the Autel Enterprise App in the remote controller will automatically determine the location based on the GNSS information received by the aircraft. It will then automatically select the radio communication frequency band that complies with local regulations for the specific country or region.

Tip

- After the aircraft is paired with the remote controller, the frequency bands between them will be automatically controlled by the Autel Enterprise App based on the geographical information of the aircraft. This is to ensure compliance with local regulations regarding frequency bands.
- Users can also manually select a legal video transmission frequency band. For detailed instructions, see “[6.5.4 Image Transmission Settings](#)” in Chapter 6.
- Before flight, please ensure that the aircraft receives a strong GNSS signal after powering on. This allows the Autel Enterprise App to receive the proper communication frequency band.
- When users adopt visual positioning mode (such as in scenarios without GNSS signals), the wireless communication frequency band between the aircraft and remote controller will default to the band used in the previous flight. In this case, it is advisable to power on the aircraft in an area with a strong GNSS signal, then start flight in the actual operational area.

Table 3-14 Autel Alpha Aircraft Global Certified Frequency Bands

Operating Frequency	Details	Certified Countries & Regions
2.4G	● BW=1.4M: 2403.5 - 2475.5 MHz ● BW=10M: 2407.5 - 2471.5 MHz ● BW=20M: 2412.5 - 2462.5 MHz	■ China Mainland ■ Taiwan, China ■ USA ■ Canada ■ EU ■ UK ■ Australia ■ Korea ■ Japan ■ Russia
5.8G	● BW=1.4M: 5728- 5847 MHz ● BW=10M: 5733- 5842 MHz ● BW=20M: 5738- 5839 MHz	■ China Mainland ■ Taiwan, China ■ USA ■ Canada ■ EU ■ UK ■ Australia

		■ Korea
5.7G	● BW=1.4M: 5652.5- 5752.5 MHz ● BW=10M: 5655- 5750 MHz ● BW=20M: 5660- 5745 MHz	■ Japan
900M	● BW=1.4M: 904- 926 MHz ● BW=10M: 909- 921 MHz ● BW=20M: 914- 916 MHz	■ USA ■ Canada
5.2G	● BW=1.4M: 5154- 5246 MHz ● BW=10M: 5157- 5243 MHz ● BW=20M: 5167 - 5233 MHz	■ USA
	● BW=10M: 5177- 5243 MHz ● BW=20M: 5187 - 5233 MHz	■ EU ■ UK

Note

- Some countries and regions have strict restrictions on the use of radio communication frequency bands. It is crucial to use them legally, and any modification of communication modules is strictly prohibited.
- In Germany there's specific requirements for the 5.2GHz frequency band. Unmanned aerial systems are only allowed to use the frequency within the range of 5170MHz to 5250MHz.
- If flying in any countries not listed in the above table, please consult the local communication management authorities to ensure that the aircraft communication frequency bands comply with local regulatory requirements.

■ Remote Control Devices

The aircraft supports pairing with the Remote Controller for remote communication control over the aircraft.

Table 3-15 Remote Control Device Support List

Control Device Information	Autel Smart Controller V3
Part Number (EAN)	6924991129011
Part Number (UPC)	889520209014
Manufacturer	Autel Robotics
Control Software	Autel Enterprise App
Software Version Requirement	V1.0.0.0 or higher
Supplementary Information	Standard configuration

Tip

- Autel Smart Controller V3 is a standard accessory in the aircraft package, and we also provide retail package to choose separately.
- We offer multiple retail versions for Autel Smart Controller V3. Only the remote controller

installed with the Autel Enterprise App supports the control of Autel Alpha aircraft. Please consult Autel Robotics when making a purchase.

- When using the above devices to remotely control the aircraft, make sure that the control software version meets the above requirements.

Chapter 4 Remote Controller

4.1 Introduction

The Autel Smart Controller V3 is installed with the Autel Enterprise App by default, allowing you to operate and set the aircraft and the gimbal camera and transmit high-definition videos from the gimbal camera in real time. It offers a maximum communication distance of 15 kilometers.


Note

- The maximum communication distance of the Autel Smart Controller V3 is measured under unblocked and interference-free conditions and is for references only.
- It supports adaptive frequency hopping transmission, selects the optimal channel according to the electromagnetic interference situation, and has strong anti-interference ability.
- The whole link data storage between the aircraft and the remote controller adopts the AES-128 encryption method to ensure end-to-end data communication security.

4.1.1 Remote Controller Components

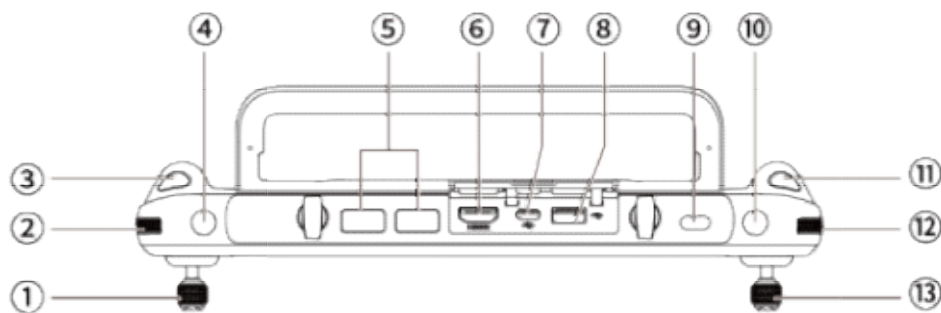


Fig 4-1 Remote Controller Top-Down View

Table 4-1 Remote Controller Top-Down View Details

No.	name	Description
1	Left Command Stick	Controls the state of motion of the aircraft. The default stick mode is Mode 2. In this mode, you can use the stick to control the ascent, descent, and heading of the aircraft. You can set the stick mode in the Autel Enterprise App. For more information, see in Chapter 6.
2	Left Dial Wheel	Turn the dial wheel to adjust the gimbal pitch.
3	Video Recording Button	Tap to start/end recording videos.
4	Key C1	Use the Autel Enterprise App to customize the key function. For more information, see in Chapter 6.

5	Air Outlet	For heat dissipation of the remote controller. When using it, please pay attention to whether there are foreign objects blocking the air outlet.
6	HDMI Interface	Outputs the live view of the remote controller to a supported display device.
7	USB Type-C Interface	Used for remote controller charging or device debugging.
8	USB Type-A Interface	Connects to an expandable 4G/5G module or external USB device for data transmission.
9	Power button	Long press for 3s to turn on/off the remote controller. When the remote controller is on, quickly press the power button to switch between Screen On and Screen Off.
10	Key C2	Use the Autel Enterprise App to customize the key function. For more information, see in Chapter 6.
11	Shooting Button	Tap to take a photo.
12	Right Dial Wheel	Turn the dial wheel to adjust the zoom factor of the camera.
13	Right Stick	Controls the state of motion of the aircraft. The default stick mode is Mode 2. In this mode, you can use the stick to control the translation of the aircraft in four directions: front/back/left/right. You can set the stick mode in the Autel Enterprise App. For more information, see in Chapter 6.

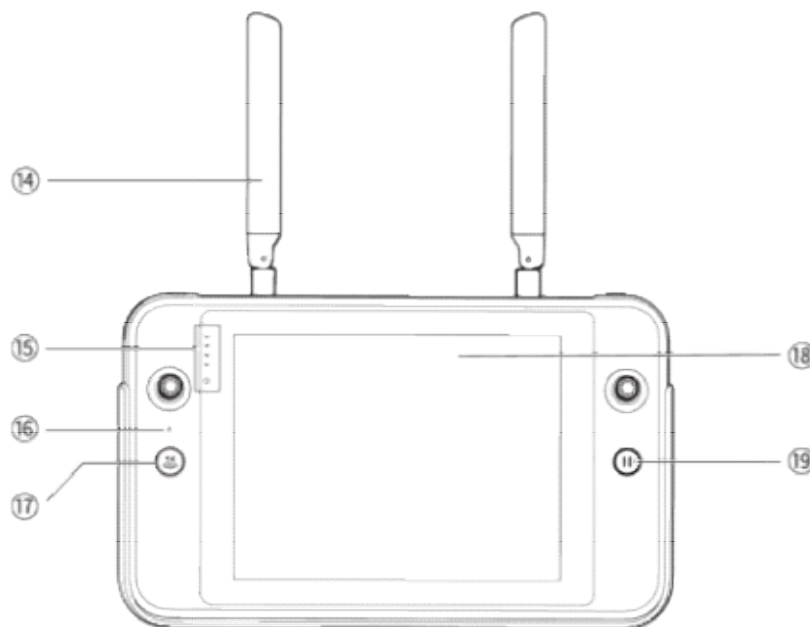


Fig 4-2 Remote Controller Front View

Table 4-2 Remote Controller Front View Details

No.	name	Description
-----	------	-------------

14	Antenna	Transmits the control signals of the remote controller and receives the image transmission information of the aircraft.
15	Battery Level Indicator	Displays the remaining battery level of the remote controller.
16	Audio Input	Receives information from an external audio source near the remote controller.
17	Take-off/Return-to-Home Button	When the aircraft is turned on but not taking off, press and hold the button for 2 seconds, and the aircraft will take off and hover at an altitude of 1.5 meters above the ground. When the aircraft is flying, press and hold the button for 2 seconds, and the aircraft will automatically begin the return-to-home process.
18	Display	Displays real-time image transmission views. with 2048×1536 resolution. Touch operation is supported.
19	Pause Button	When the aircraft is in autonomous flight mode, short press this button to control the aircraft to suspend autonomous flight and hover in place or resume autonomous flight; press and hold this button for 2 seconds to exit the autonomous flight.

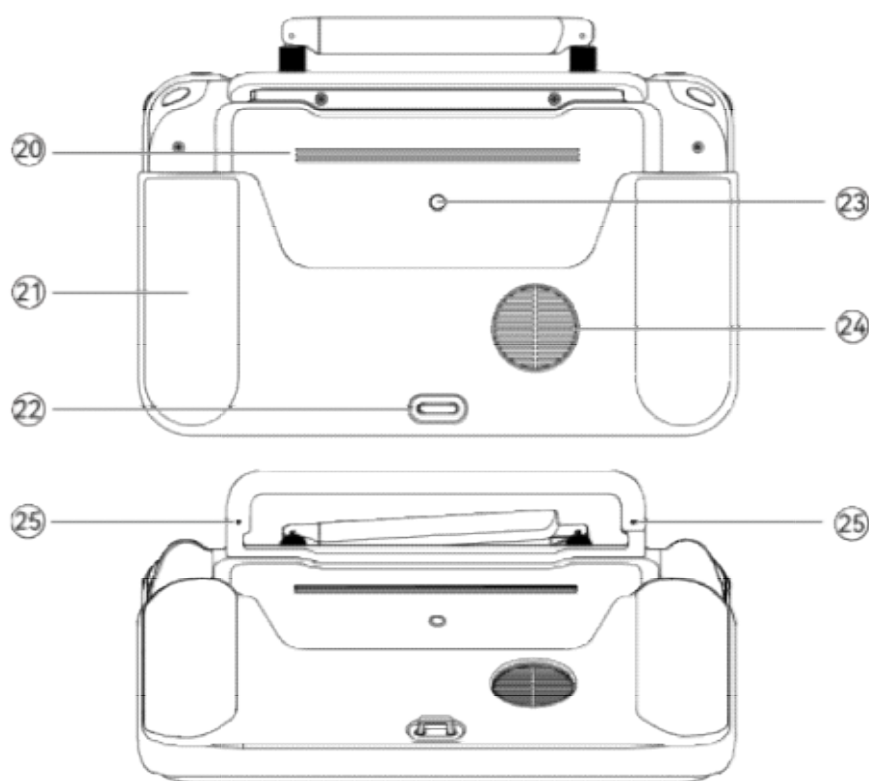


Fig 4-3 Remote Controller Rear View

Table 4-3 Remote Controller Rear View Details

No.	name	Description
20	Speaker	Plays sound to indicate the status of the aircraft.

21	Protective Cover	Optional accessory. Used to prevent external damage such as collision and abrasion of the remote controller.
22	Lower Hook	Used to connect and fix the remote controller strap.
23	Standard 1/4 interface	Used for attaching tripods.
24	Air Inlet	Used for heat dissipation of the remote controller. Please pay attention to whether there are foreign objects blocking the air inlet when using it.
25	Command Stick Storage Slot	Used to store left and right sticks.

4.1.2 Communication Frequency Bands

The image transmission frequency bands of Autel Smart Controller V3 comply with regulatory requirements worldwide. Please refer to the table below for the relevant certified frequency bands.

	Tip
● After the aircraft is paired with the remote controller, the frequency bands between them will be automatically controlled by the Autel Enterprise App based on the geographical information of the aircraft. This is to ensure compliance with local regulations regarding frequency bands. ● Users can also manually select a legal video transmission frequency band. For detailed instructions, see "6.5.4 Image Transmission Settings" in Chapter 6. ● Before flight, please ensure that the aircraft receives a strong GNSS signal after powering on. This allows the Autel Enterprise App to receive the proper communication frequency band. ● When users adopt visual positioning mode (such as in scenarios without GNSS signals), the wireless communication frequency band between the aircraft and remote controller will default to the band used in the previous flight. In this case, it is advisable to power on the aircraft in an area with a strong GNSS signal, then start flight in the actual operational area.	

Table 4-4 Global Certified Frequency Bands (Image Transmission)

Operating Frequency	Details	Certified Countries & Regions
2.4G	● BW=1.4M: 2403.5 - 2475.5 MHz ● BW=10M: 2407.5 - 2471.5 MHz ● BW=20M: 2412.5 - 2462.5 MHz	■ China Mainland ■ Taiwan ■ USA ■ Canada ■ EU ■ UK ■ Australia ■ Korea ■ Japan
5.8G	● BW=1.4M: 5728- 5847 MHz ● BW=10M: 5733- 5842 MHz	■ China Mainland ■ Taiwan

	● BW=20M: 5738- 5839 MHz	■ USA ■ Canada ■ EU ■ UK ■ Australia ■ Korea
5.7G	● BW=1.4M: 5652.5- 5752.5 MHz ● BW=10M: 5655- 5750 MHz ● BW=20M: 5660- 5745 MHz	■ Japan
900M	● BW=1.4M: 904- 926 MHz ● BW=10M: 909- 921 MHz ● BW=20M: 914- 916 MHz	■ USA ■ Canada

Table 4-5 Global Certified Frequency Bands (Wi-Fi)

Operating Frequency	Details	Certified Countries & Regions
2.4G (2400 – 2483.5 MHz)	802.11b/g/n	■ China Mainland ■ Taiwan, China ■ USA ■ Canada ■ EU ■ UK ■ Australia ■ Korea ■ Japan
5.8G (5725 – 5850 MHz)	802.11a/n/ac	■ China Mainland ■ Taiwan, China ■ USA ■ Canada ■ EU ■ UK ■ Australia ■ Korea
5.2G (5150 – 5250 MHz)	802.11a/n/ac	■ Japan

4.2 Installing the Remote Controller Lanyard

Tip

- The remote controller lanyard is an optional accessory. You can choose whether to install it as required.
- When holding the remote controller for a long time during flight operations, we recommend that you install the remote controller lanyard to effectively reduce the pressure on your hands.

■ Steps

1. Clip the two metal clips on the lanyard to the narrow positions on both sides of the metal handle at the back of the controller.
2. Open the metal button of the lanyard, bypass the lower hook at the bottom of the back of the controller, and then fasten the metal button.
3. Wear the lanyard around your neck, as shown in the figure below, and adjust it to a suitable length.

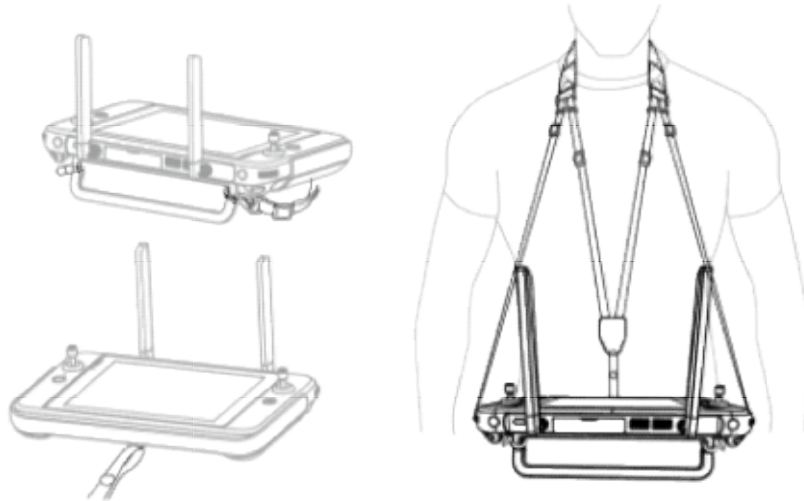


Fig 4-4 Install the Remote Controller Lanyard (As Required)

4.3 Installing/Storing Command Sticks

The Autel Smart Controller V3 features removable command sticks, which effectively reduce storage space and enable easy carrying and transportation.

■ Installing command sticks

There is a command stick storage slot above the mental handle at the back of the controller. Rotate counterclockwise to remove the two command sticks and then rotate them clockwise to install them separately on the remote controller.

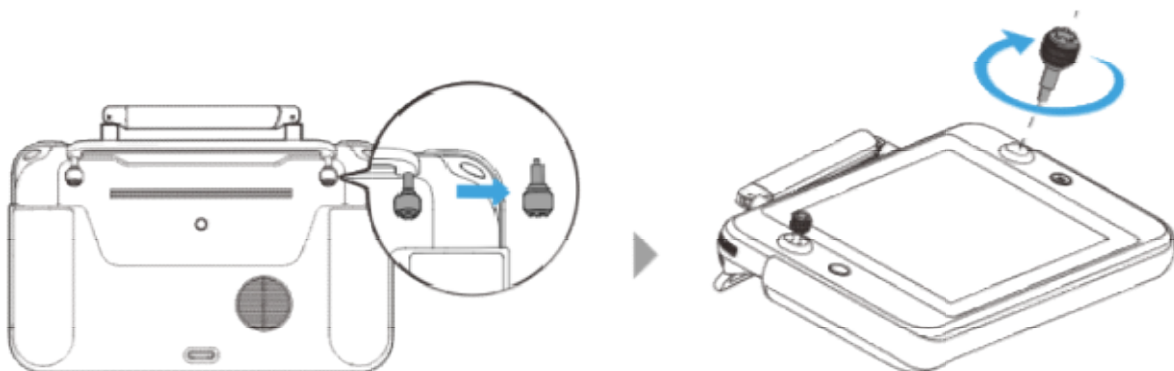


Fig 4-5 Installing command sticks

■ Storing Command sticks

Simply follow the reverse steps of the above operation.



Tip

- When the command sticks are not in use (such as during transportation and temporary aircraft standby), we recommend that you remove and store them on the metal handle. This can prevent you from accidentally touching the command sticks, causing damage to the sticks or unintended startup of the aircraft.

4.4 Turning the Remote Controller On/Off

■ Turning the Remote Controller On

Press and hold the power button at the top of the remote controller for 3 seconds until the controller emits a "beep" sound to turn it on.

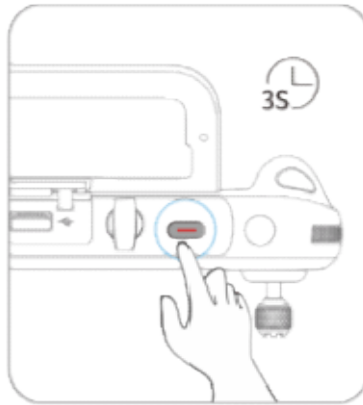


Fig 4-6 Turning the Remote Controller On

Tip

- When using a brand-new remote controller for the first time, please follow the on-screen instructions to complete the relevant setup.

■ Turning the Remote Controller Off

When the remote controller is on, press and hold the power button at the top of the remote controller until the "Off" or "Restart" icon appears at the top of the controller's screen. Clicking the "Off" icon will turn off the remote controller. Clicking the "Restart" icon will restart the remote controller.

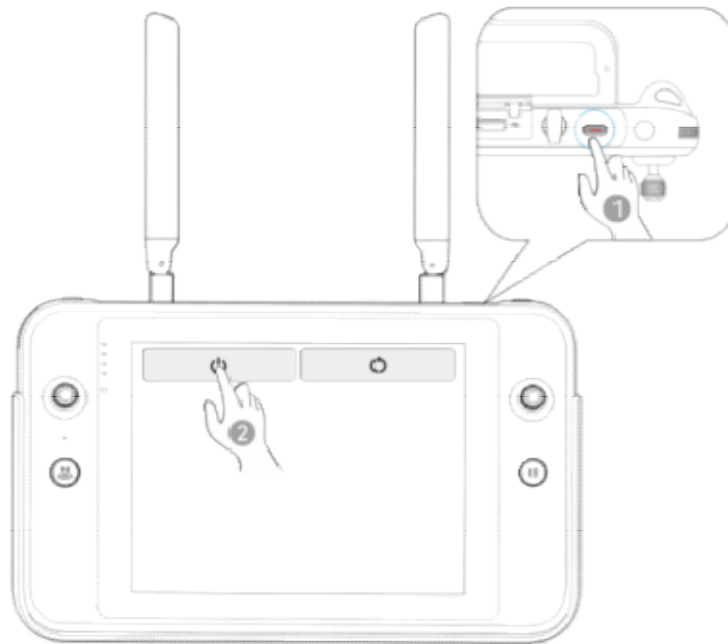


Fig 4-7 Turning the Remote Controller Off

Tip

- When the remote controller is on, you can press and hold the power button at the top of the remote controller for 6 seconds to forcibly turn it off.

4.5 Checking the Battery Level of the Remote Controller

When the remote controller is off, short press the power button of the remote controller for 1 second, and the battery level indicator will display the battery level of the remote controller.

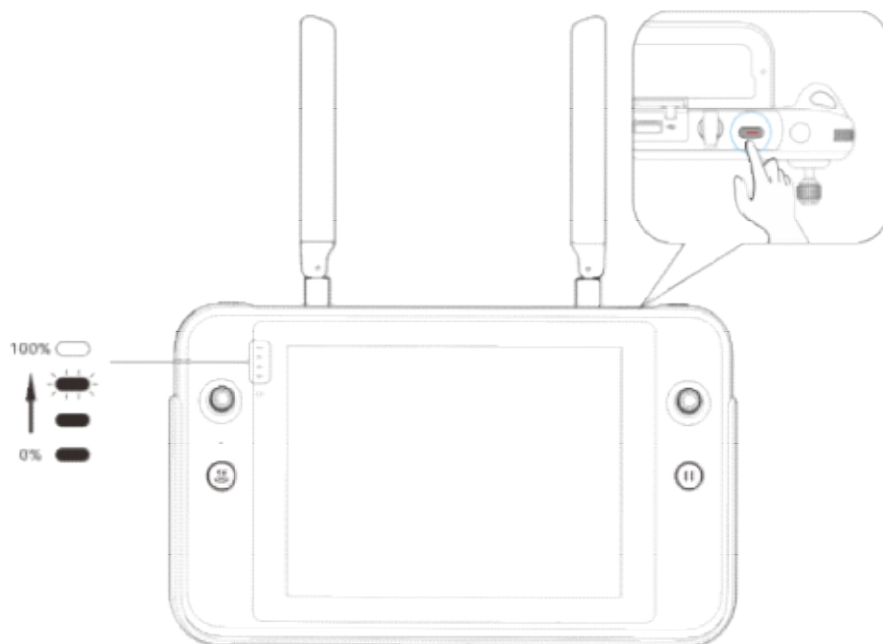


Fig 4-8 Checking the Battery Level of the Remote Controller
Table 4-6 Battery Remaining

Power Display	Definition	Power Display	Definition
	1 light always on: 0%-25% power		2 lights always on: 25%-50% power
	3 lights always on: 50%-75% power		4 lights always on: 75%-100% power

 Tip

- When the remote controller is on, you can check the current battery level of the remote controller in the following ways:
- Check it on the top status bar of the Autel Enterprise App.
 - Check it on the system status notification bar of the remote controller. In this case, you need to enable “Battery Percentage” in the “Battery” of the system settings in advance.
 - Go to the system settings of the remote controller and check the current battery level of the controller in “Battery”.

4.6 Charging the Remote Controller

Connect the output end of the official remote controller charger to the USB Type-C interface of the remote controller by using a USB C-to-A (USB C-to-C) data cable and connect the plug of the charger to an AC power supply (100-240 V~ 50/60 Hz).

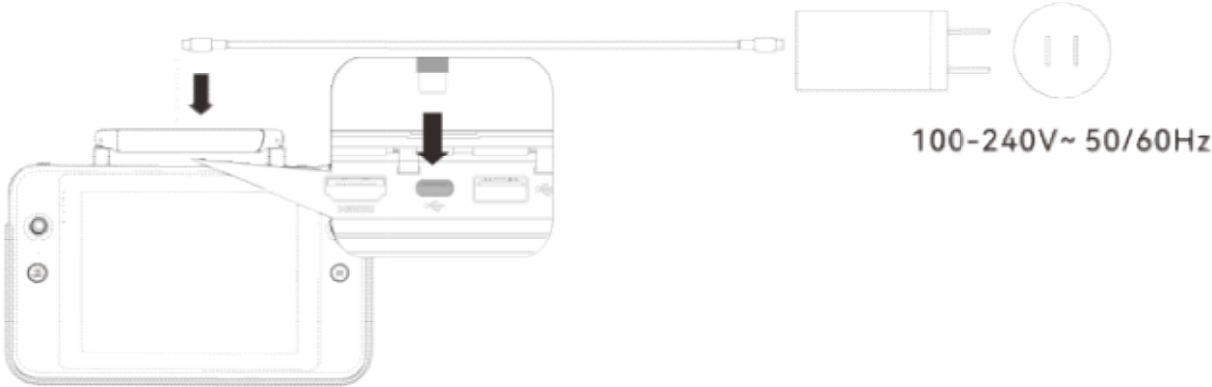


Fig 4-9 Use the remote controller charger to charge the remote controller

 Warning

- Please use the official charger provided by Autel Robotics to charge the remote controller. Using third-party chargers may damage the battery of the remote controller.
- After charging is complete, please disconnect the remote controller from the charging device promptly.

Note

- It is recommended to fully charge the remote controller battery before the aircraft takes off.
- Generally, it takes about 120 minutes to fully charge the aircraft battery, but the charging time is related to the remaining battery level.

4.7 Adjusting the Antenna Position of the Remote Controller

During flight, please extend the antenna of the remote controller and adjust it to an appropriate position. The strength of the signal received by the antenna varies depending on its position. When the angle between the antenna and the back of the remote controller is 180° or 270° , and the plane of the antenna faces the aircraft, the signal quality between the remote controller and the aircraft can reach its best state.

Important

- When you operate the aircraft, make sure that the aircraft is in the place for the best communications.
- Do not use other communication devices of the same frequency band at the same time to prevent interference with the signals of the remote controller.
- During flight, if there is a poor image transmission signal between the aircraft and the remote controller, the remote controller will provide a prompt. Please adjust the antenna orientation according to the prompt to ensure that the aircraft is in the optimal data transmission range.
- Please make sure that the antenna of the remote controller is securely fastened. If the antenna becomes loose, please rotate the antenna clockwise until it is firmly fastened.

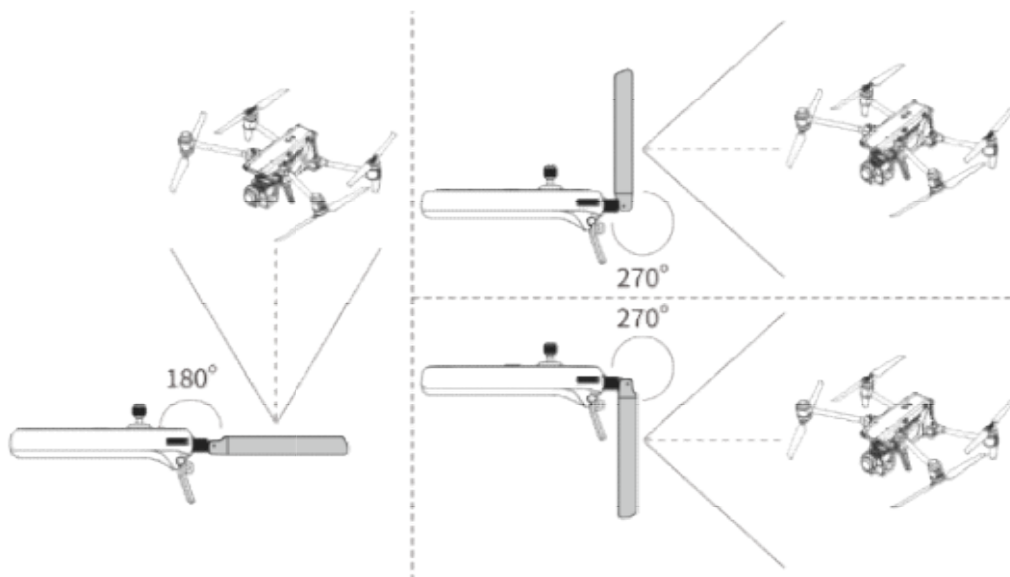


Fig 4-10 Extend the antenna

4.8 Remote Controller System Interfaces

4.8.1 Remote Controller Main Interface

After the remote controller is turned on, it enters the main interface of the Autel Enterprise App by default.

In the main interface of the Autel Enterprise App, slide down from the top of the touch screen or slide up from the bottom of the touch screen to display the system status notification bar and navigation keys, and click the "Home" button or the "Back" button to enter the "Remote Controller Main Interface". Swipe left and right on the "Remote Controller Main Interface" to switch between different screens, and enter other applications as needed.

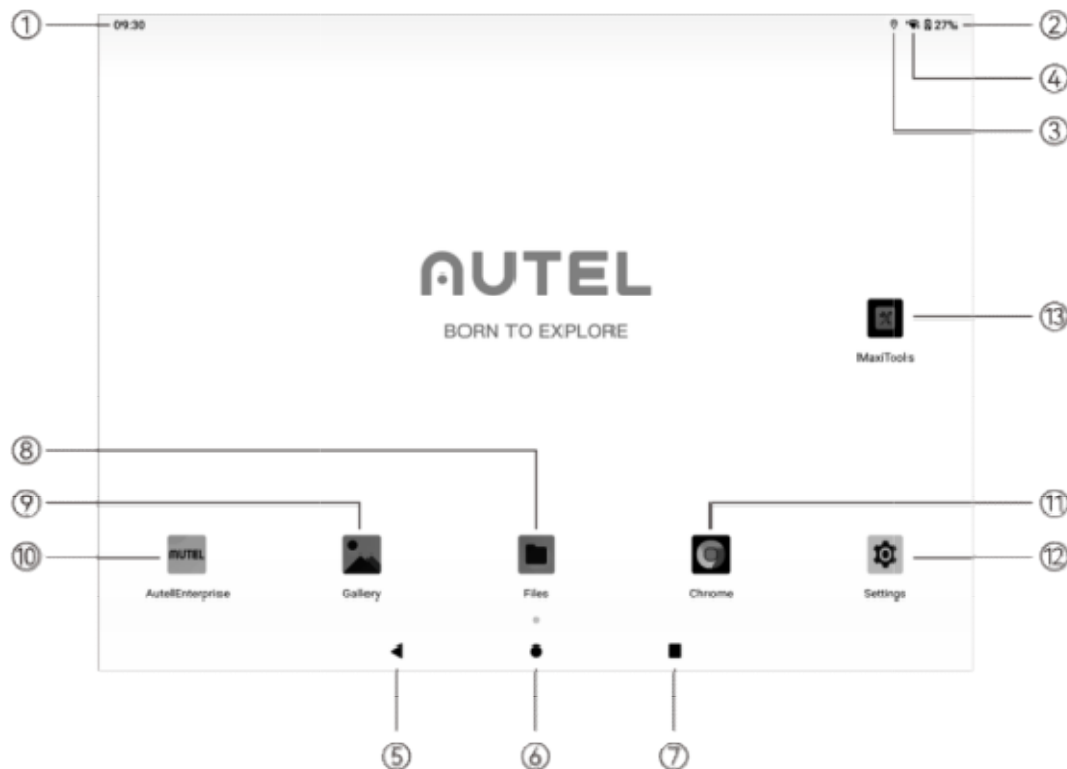


Fig 4-11 Remote Controller Main Interface

Table 4-7 Remote Controller Main Interface Details

No.	Name	Description
1	Time	Indicates the current system time.
2	Battery Status	Indicates the current battery status of the remote controller.
3	Wi-Fi Status	Indicates that Wi-Fi is currently connected. If not connected, the icon is not displayed. You can quickly turn on or off the connection to Wi-Fi by sliding down from anywhere on the "Remote Controller Interface" to enter the "Shortcut Menu".
4	Location Info	Indicates that location information is currently enabled. If not enabled, the icon is not displayed. You can click "Settings" to enter the "Location Information" interface to quickly turn on or off location information.

5	Back Button	Click the button to return to the previous page.
6	Home Button	Click the button to jump to the "Remote Controller Main Interface".
7	"Recent apps" Button	Click the button to view all background programs currently running and take screenshots. Press and hold the application to be closed and slide up to close the application. Select the interface where you want to take a screenshot, and click the "Screenshot" button to print, transfer via Bluetooth, or edit the screenshot.
8	Files	The app is installed in the system by default. Click it to manage the files saved in the current system.
9	Gallery	The app is installed in the system by default. Click it to view the images saved by the current system.
10	Autel Enterprise	Flight software. The Autel Enterprise App starts by default when the remote controller is turned on. For more information, see " Chapter 6 Autel Enterprise App ".
11	Chrome	Google Chrome. The app is installed in the system by default. When the remote controller is connected to the Internet, you can use it to browse web pages and access Internet resources.
12	Settings	The system settings app of the remote controller. Click it to enter the settings function, and you can set the network, Bluetooth, applications and notifications, battery, display, sound, storage, location information, security, language, gestures, date and time, device Name, etc.
13	Maxitools	The app is installed in the system by default. It supports the log function and can restore factory settings.

 Tip

- The remote controller supports the installation of third-party Android apps, but you need to obtain the installation packages on your own.
- The remote controller has a screen aspect ratio of 4:3, and some third-party app interfaces may encounter compatibility issues.

Table 4-8 List of Pre-installed Apps on the Remote Controller

No.	Pre-installed App	Device Compatibility	Software Version	Operating System Version
1	Files	√	11	Android 11
2	Gallery	√	1.1.40030	Android 11
3	Autel Enterprise	√	1.2.18	Android 11

4	Chrome	√	68.0.3440.70	Android 11
5	Settings	√	11	Android 11
6	Maxitools	√	2.45	Android 11
7	Google Pinyin Input	√	4.5.2.193126728-arm64-v8a	Android 11
8	Android Keyboard (AOSP)	√	11	Android 11


Tip

- Please be aware that the factory version of the Autel Enterprise App may vary depending on subsequent function upgrades.

4.8.2 Shortcut Menu

Slide down from anywhere on the "Remote Controller Interface", or slide down from the top of the screen in any app to display the system status notification bar, and then slide down again to bring up the "Shortcut Menu".

In the "Shortcut Menu", you can quickly set Wi-Fi, Bluetooth, screenshot, screen recording, airplane mode, screen brightness, and remote controller sound.

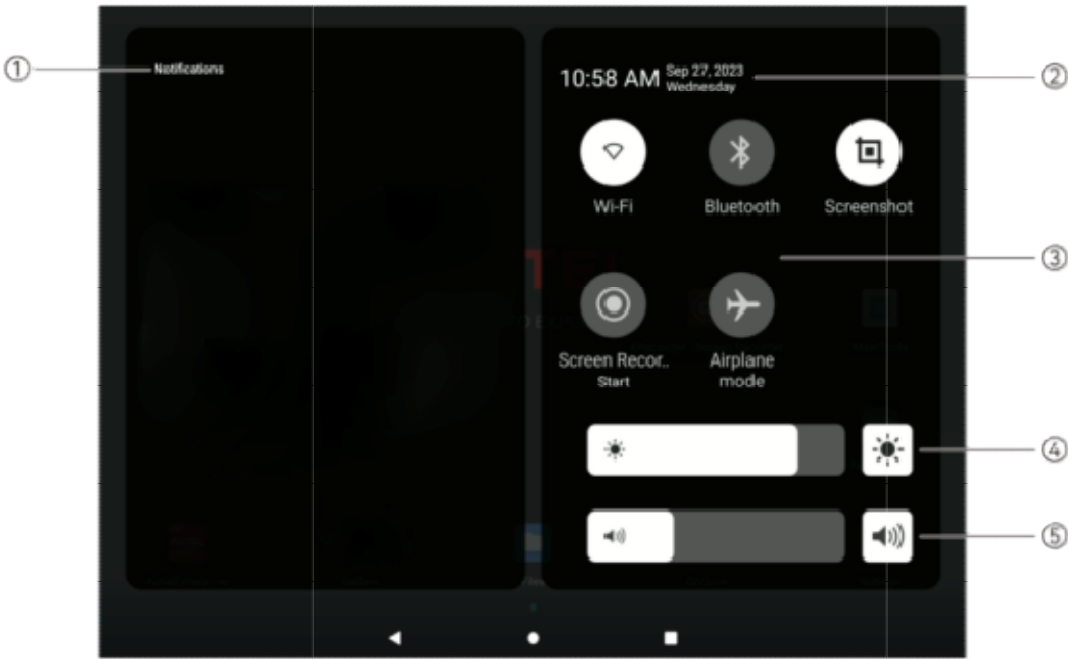


Fig 4-12 Shortcut Menu

Table 4-9 Shortcut Menu Details

No.	name	Description
1	Notification Center	Displays system or app notifications.

2	Time and Date	Displays the current system time, date, and week of the remote controller.
3	Wi-Fi	Click the "  " icon to enable or disable the Wi-Fi function. Long press it to enter WLAN settings and select the wireless network to be connected.
	Bluetooth	Click the "  " icon to enable or disable the Bluetooth function. Long press it to enter the Bluetooth settings and select the Bluetooth to be connected.
	Screenshot	Click the "  " icon to use the screenshot function, which will capture the current screen (hide the Shortcut Menu to take a screenshot).
	Screen Recorder.. Start	After clicking on the "  " icon, a dialog box will pop up, where you can choose whether to enable the functions of recording audio and displaying the touch screen position, and then click the "Start" button, wait for 3 seconds, and start screen recording. Click the icon again or tap "Screen Recorder" to turn off screen recording.
4	Airplane mode	Click the "  " icon to turn on or off the airplane mode, that is, to turn on or turn off the Wi-Fi and Bluetooth functions at the same time.
	Screen Brightness Adjustment	Drag the slider to adjust the screen brightness.
5	Volume Adjustment	Drag the slider to adjust the media volume.

4.9 Frequency Pairing With the Remote Controller

4.9.1 Using the Autel Enterprise App

Only after the remote controller and the aircraft are paired can you operate the aircraft using the remote controller.

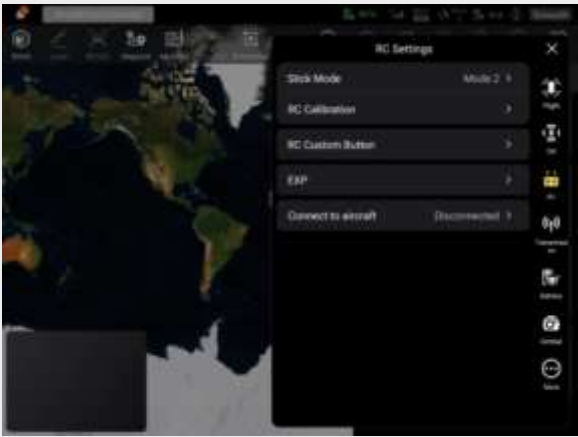
Table 4-10 Frequency Pairing Process in the Autel Enterprise App

Step	Operation	Diagram
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1

Turn on the remote controller and the aircraft.

After entering the main interface of the Autel Enterprise App, click "⚙️" in the upper-right corner, click "⚙️", select "⚙️", and then click "Connect to aircraft".



2

After a dialog box pops up, double-click on the smart battery power button on the aircraft to complete the frequency pairing process with the remote controller.



 Note

- The aircraft included in the aircraft kit is paired with the remote controller provided in the kit at the factory. No pairing is required after the aircraft is powered on. Normally, after completing the aircraft activation process, you can directly use the remote controller to operate the aircraft.
- If the aircraft and the remote controller become unpaired due to other reasons, please follow the above steps to pair the aircraft with the remote controller again.

 Important

- When pairing, please keep the remote controller and the aircraft close together, at most 50 cm apart.

4.9.2 Using Combination Keys (For Forced Frequency Pairing)

If the remote controller is turned off, you can perform forced frequency pairing. The process is as follows:

1. Press and hold the power button and the take-off/return-to-home button of the remote controller at the same time until the battery level indicators of the remote controller blink quickly, which indicates that the remote controller has entered the forced frequency pairing state.
2. Make sure that the aircraft is turned on. Double-click on the power button of the aircraft, and the front and rear arm lights of the aircraft will turn green and blink quickly.

3. When the front and rear arm lights of the aircraft and the battery level indicator of the remote controller stop blinking, it indicates that the frequency pairing is successfully done.

4.10 Selecting Stick Mode

4.10.1 Stick Modes

When using the remote controller to operate the aircraft, you need to know the current stick mode of the remote controller and fly with caution. Three stick modes are available, that is, Mode 1, Mode 2 (default), and Mode 3.

■ Mode 1

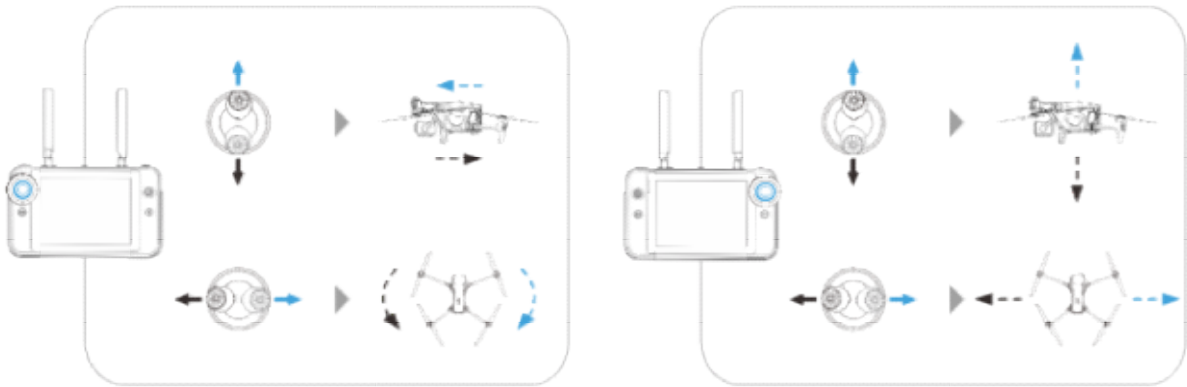


Fig 4-13 Mode 1

Table 4-11 Mode 1 Details

Stick	Move Up/Down	Move Left/Right
Left Command Stick	Controls the forward and backward movement of the aircraft	Controls the heading of the aircraft
Right Stick	Controls the ascent and descent of the aircraft	Controls the left or right movement of the aircraft

■ Mode 2

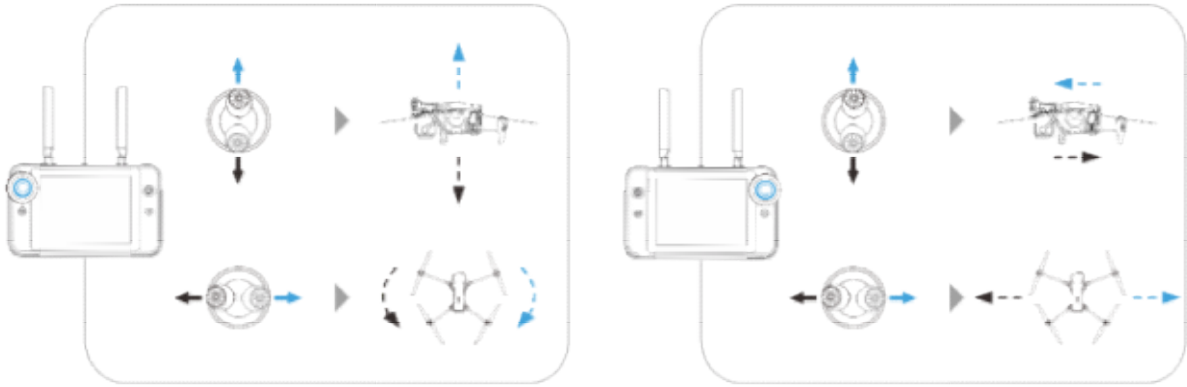


Fig 4-14 Mode 2

Table 4-12 Mode 2 Details

Stick	Move Up/Down	Move Left/Right
Left Command Stick	Controls the ascent and descent of the aircraft	Controls the heading of the aircraft
Right Stick	Controls the forward and backward movement of the aircraft	Controls the left or right movement of the aircraft

■ Mode 3

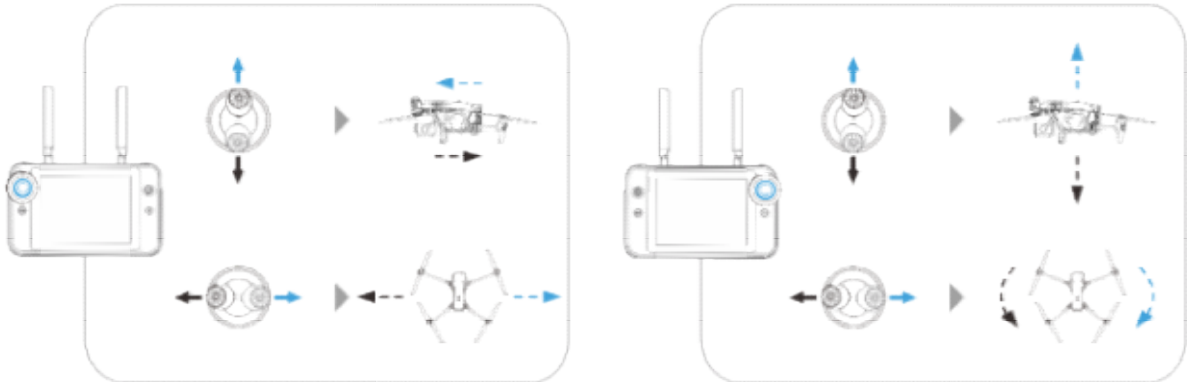


Fig 4-15 Mode 3

Table 4-13 Mode 3 Details

Stick	Move Up/Down	Move Left/Right
Left Command Stick	Controls the forward and backward movement of the aircraft	Controls the left or right movement of the aircraft
Right Stick	Controls the ascent and descent of the aircraft	Controls the heading of the aircraft

 Warning

- Do not hand over the remote controller to persons who have not learned how to use the remote controller.
- If you are operating the aircraft for the first time, please keep the force gentle when moving the command sticks until you are familiar with the operation.
- The flight speed of the aircraft is proportional to the degree of the command stick movement. When there are people or obstacles near the aircraft, please do not move the stick excessively.

4.10.2 Setting Stick Mode

You can set the stick mode according to your preference. For detailed setting instructions, see in Chapter 6. The default stick mode of the remote controller is "Mode 2".

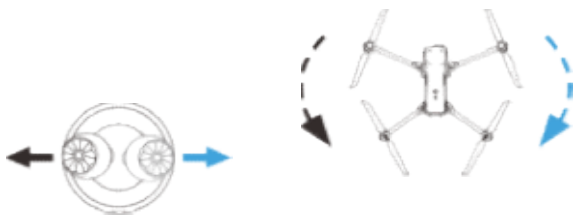
Table 4-14 Default Control Mode (Mode 2)

Mode 2	Aircraft Flight Status	Control Method
Left Command Stick		1. The up-and-down direction of the left stick is the throttle stick, which is used to control

Move Up or Down



Left Command Stick
Move Left or Right



the vertical lift of the aircraft.

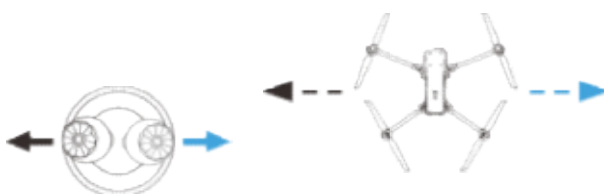
2. Push the stick up, and the aircraft will rise vertically; pull the stick down, and the aircraft will descend vertically.
3. When the stick is returned to the center, the altitude of the aircraft remains unchanged.
4. When the aircraft takes off, please push the stick up to above the center, and the aircraft can lift off the ground.

1. The left-and-right direction of the left stick is the yaw stick, which is used to control the heading of the aircraft.
2. Push the stick to the left, and the aircraft will rotate counterclockwise; push the stick to the right, and the aircraft will rotate clockwise.
3. When the stick is returned to the center, the rotational angular velocity of the aircraft is zero, and the aircraft does not rotate at this time.
4. The larger the degree of the stick movement, the greater the rotational angular velocity of the aircraft.

Right Stick
Move Up or Down



Right Stick
Move Left or Right



1. The up-and-down direction of the right stick is the pitch stick, which is used to control the flight of the aircraft in the forward and backward directions.
2. Push the stick up, and the aircraft will tilt forward and fly towards the front of the nose; pull the stick down, and the aircraft will tilt backward and fly towards the tail of the aircraft.
3. When the stick is returned to the center, the aircraft remains horizontal in the forward and backward directions.
4. The larger the degree of the stick movement, the faster the flight speed of the aircraft, and the larger the tilt angle of the aircraft.

1. The left-and-right direction of the right stick is the roll stick, which is used to control the flight of the aircraft in the left and right directions.
2. Push the stick to the left, and the aircraft will tilt to the left and fly to the left of the nose; pull the stick to the right, and the aircraft will tilt to the right and fly to the right of the nose.
3. When the stick is returned to the center, the aircraft remains horizontal in the left and -right directions.

4. The larger the degree of the stick movement, the faster the flight speed of the aircraft, and the larger the tilt angle of the aircraft.

 Note

- When controlling the aircraft for landing, pull the throttle stick down to its lowest position. In this case, the aircraft will descend to an altitude of 1.2 meter above the ground, and then it will perform an assisted landing and automatically descend slowly.

4.10.3 Starting/Stopping the Aircraft Motor

Table 4-15 Start/Stop the Aircraft Motor

Process	Stick Operation	Description
Start the aircraft motor when the aircraft is powered on		Power on the aircraft, and the aircraft will automatically perform a self-check (for about 30 seconds). Then simultaneously move the left and right sticks inward or outward for 2 seconds, as shown in the figure, to start the aircraft motor.
		When the aircraft is in landing state, pull the throttle stick down to its lowest position, as shown in the figure, and wait for the aircraft to land until the motor stops.
Stop the aircraft motor when the aircraft is landing		When the aircraft is in landing state, simultaneously move the left and right sticks inward or outward, as shown in the figure, until the motor stops.

 Warning

- When taking off and landing the aircraft, stay away from people, vehicles, and other moving objects.
- The aircraft will initiate a forced landing in case of sensor anomalies or critically low battery levels.