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 Chinese 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 Titan 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://faadronezone-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 Titan 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.
- 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 Titan 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 5000 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℃ to +50℃.
- 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 (includes the mount), 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: Maximum Mount Mass≤MTOM – 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.

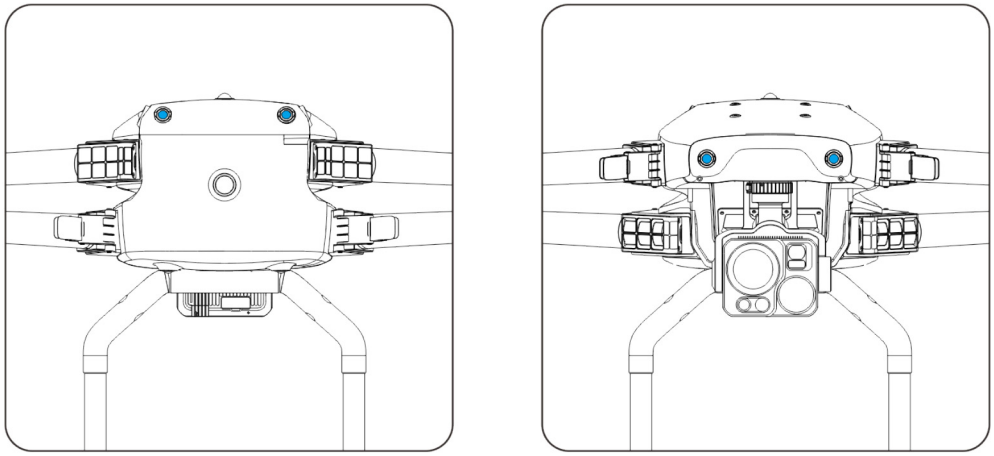


Fig 2-1 Front and rear visual lens modules of the aircraft

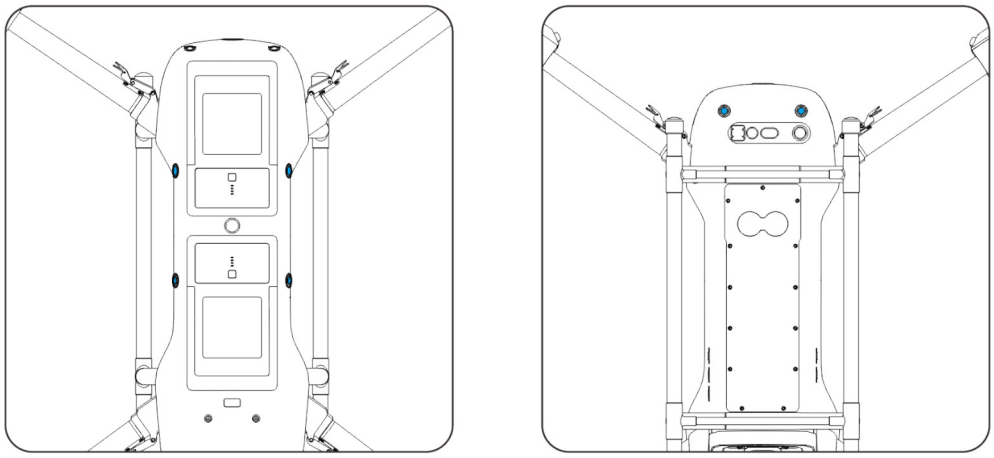


Fig 2-2 Upper left, upper right, and bottom visual lens modules of the aircraft

⚠ **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 Titan 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.
- Please be noted that the frequency band of the millimeter-wave radar is a hardware parameter, which cannot be adjusted through software. Autel Robotics ensures that the millimeter-wave radar frequency band of the Autel Titan aircraft complies with local legal 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.

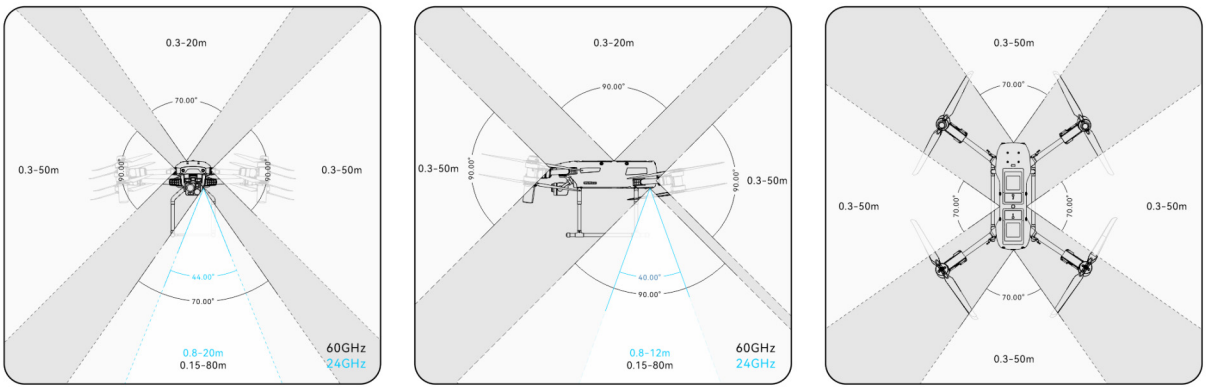


Fig 2-3 Observation Range of Millimeter-wave Radars

⚠ 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 “6.5.2 OA Settings” 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 “6.5.1 Flight Control Parameter Setting” 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 10s." to reminder users to decide i to execute low battery auto-return. If you choose to execute it or don't take any action within 10 seconds, the aircraft will initiate low battery auto-return after 10 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 "6.9 Flight Missions" 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 “6.5.1 Flight Control Parameter Setting” 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 ≤ 10 meters	The aircraft returns to the home point at the current altitude.
10 meters＜Distance from the home point ≤ 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 ≤ 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 and hover in place until the battery is critical low and the aircraft will start auto landing.
- 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 hover in place until the battery is critical low and the aircraft will start auto landing.

Important

- Before flight, please check the safety of the airspace, set an appropriate flight altitude, and ensure that the communication between the aircraft and the remote controller is not disturbed. And ensure that there are no obstacles which may affect the flight.
- During the obstacle avoidance process, if the aircraft detects any obstacles, it will hover in place until a critically low battery landing is triggered. In this case, please manually take control of the aircraft in advance or choose an open area for flight that is not over water to prevent the aircraft from landing on the water.
- 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 “6.5.2 OA Settings” 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 Titan 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 Titan aircraft include RTH, hover, and land.
- If Autel Titan 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 Titan 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)	Autel Robotics only provides altitude restrictions setting, allowing users to set the altitude limit accordingly. Update process: Users enable height restrictions and set the altitude limit within the Autel Enterprise App, based on the local legal regulations of the country and region. For detailed information, see "2.10 Altitude and Distance Limits" in Chapter 2 and "6.5.1 Flight Control Parameter Settings" in Chapter 6. Flight restrictions: When flying in a restricted altitude zone, the actual flight altitude of the aircraft will not exceed the set altitude limit.
Warning Zones (appear in yellow on the map)	Warning 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 warning zones and push it to the aircraft. Flight restrictions: In a warning zone, an aircraft can fly unrestrictedly (relevant flights must comply with local regulations).
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).
- Warning zone: zone name, zone level (warning 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.

Note

- Before any flight, users must fully understand the local regulations regarding altitude restrictions for unmanned aerial vehicles (UAVs) and set them in the Autel Enterprise App.

- It is important to note that it is not suggested to fly cross regions with different legal altitude restrictions. The altitude limit setting is only effective for the takeoff area, the limit may not complies with regulations in neighboring regions. Users should adjust the corresponding altitude limits when flying across different regions.

An aircraft in flight has a specific initial velocity. To prevent the aircraft from accidentally entering no-fly zones (before unlocking) and warning zones, a buffer zone with a horizontal distance of 100-meter and a vertical distance of 50-meter 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: When the aircraft approaches the buffer zone boundary, the Autel Enterprise App will display a warning alert says "The aircraft is close to the no-fly zone." and the aircraft will automatically start to decelerate and eventually brake and hover within the buffer zone.
Buffer zones of warning zones	When an aircraft flies from the outside toward a warning zone: The aircraft can directly fly into the restricted altitude zone without limitation. When the aircraft approaches the warning zone boundary, the Autel Enterprise App will display a warning alert says "The aircraft is close to the warning area." and after enter the warning area, the App will display "The aircraft is in the warning area, please fly with caution" to remind users to be cautious.

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 “6.5.1 Flight Control Parameter Setting” in Chapter 6.

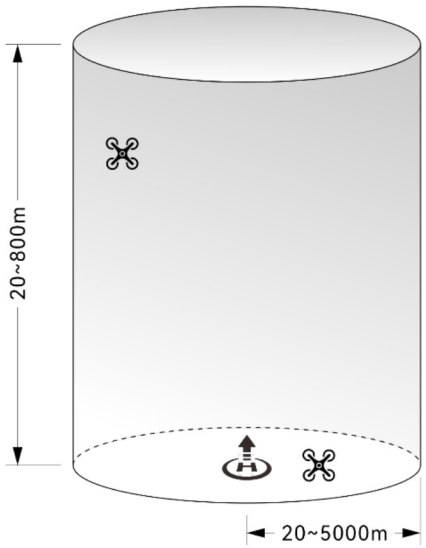


Fig 2-4 Diagram of altitude and distance limits

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. For example, Chinese mainland, the United States, and the European Union all limit the maximum flight altitude of aircraft to no more than 120 meters or 400 feet.
- 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

Important

- As the Autel Titan aircraft is with large size, it is important to have two person to carry on in the calibration process in case any damage to the aircraft during calibration.

2.11.1 Compass Calibration

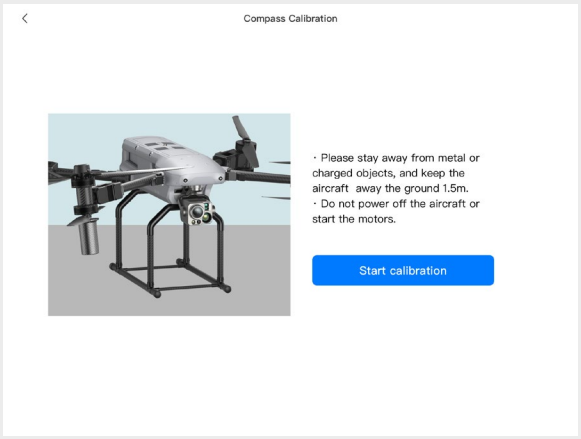
The compass (magnetometer) has been calibrated at the factory, and no user calibration is required under normal conditions.

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.