# S400E *Quadrotor UAV*

v1.0  2023.09

**User Manual** *GDU RC SEE*

# CONTENTS

# User Instructions

## Warning

Thank you for using this GDU product. This product is a special electronic product. Improper operation may result in property damage, personal injury, or even death. The user will bear the legal consequences of these actions. This product must not be used by juveniles under the age of 18. In order to ensure a positive operating experience and to protect your personal safety, please carefully read the following documents before use:

*Disclaimer and Safety Guidelines*
*Item List*
*User Manual*
*Quick Start Guide*
*Intelligent Battery Safety Guide*

This document is subject to updates without notification. Please refer to the latest version at www. gdu-tech.com.

## UAV legal registration

As per the Provisions on Real-time Registration Management of Civil Unmanned Aerial Vehicles of the Civil Aviation Administration of China, all UAV owners must register their real name and fill any related information at time of purchasing their UAV in the official government UAV registration system (https://uom.caac.gov.cn/), and paste the registration mark on the hull of the UAV.

# Product Overview

This chapter mainly introduces the functional characteristics of the product, the guidelines for aircraft instruction, as well as the names of parts of the aircraft and the remote controller.

# Product Overview

## Introduction

The S400E is equipped with an advanced flight control algorithm, camera processing algorithm, gimbal stabilization algorithm, and visual AI algorithm. By integrating an omnidirectional obstacle avoidance system, high-precision RTK system, and visual positioning system, this product is capable of automatic patrol inspection, AI intelligent object recognition and tracking, automatic return, automatic precision landing, and other autonomous flight functions. In addition, visual assistance positioning, visual omnidirectional obstacle avoidance, and other functions ensure a safer and more stable flight of the UAV. The portable fuselage is easy to fold and carry. The maximum battery life is 58 minutes (1), and the flight control radius is 15 km (2). As it can be used with different types of payloads, this product can meet the needs of different industries in complex Applications and various scenarios.

① The maximum battery life is affected by the environmental climate, and the reference value is 58 minutes.
② The flight control radius of 15 km was measured in an open environment using line of sight operation in a straight-line range test at an altitude of 200 m.

## Function highlights

1. Relay networking and cross-barrier communication: Use the relay to realize the cross-barrier communication and networking where mountains are completely blocked.
2. Obstacle avoidance day and night with everything under control: Integrate millimeter-wave radar and binocular visual obstacle avoidance technology, enabling accurate sensing of obstacles at night.
3. 58-minute flight time and durable propulsion: High-efficient propulsion system in the UAV ensures a super-long flight.
4. 23m/s flight speed and robust flight: The maximum flight speed is 23m/s, and the wind resistance is up to Level 7.
5. Lightweight and portable One pack bag can accommodate all devices and tools with the overall size (folded) as small as a piece of A4 paper.
6. Multiple payloads and robust functions: The payload is 3kg . It supports dozens of payloads, including quad-sensor camera 1K thermal & visible dual camera, and 8K visible camera. (3)
7. Megapixel infrared light camera captures every detail: The megapixel thermal & visible dual camera has an effective pixel up to 1280×1024, which is 4 times of the highest pixel of infrared payloads on the market. It is capable of working day and night, and capturing every details of an object.
8. Intelligent docking station and unattended operation: When the UAV is used with the intelligent docking station, it is capable of accurate takeoff and landing day and night with non-stop and unattended operation.

③ The payload is 3kg. The aircraft will restrict its flight speed to ensure flight safety.

## Preparation of the aircraft

### Installation of the left and right landing gears

1. Insert the landing gear into the landing gear connection base.
2. Push the landing gear locking ring into the seat of the landing gear connection base indicated by the direction arrow, and rotate it based on the locking direction indicated on the fuselage.
3. Align the orange point on the landing gear to the orange point on the fuselage to complete the installation.
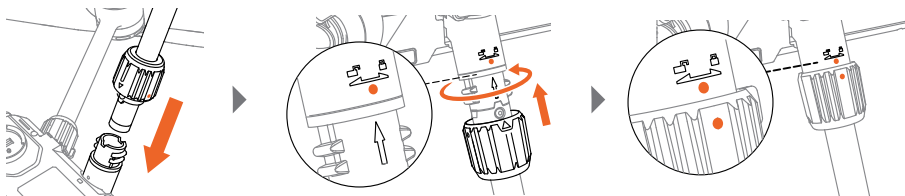


### Unfolding and locking of the arms

1. Unfold the arms one by one.
2. Push the arm locking ring into the seat of the arm connection base indicated by the direction arrow, and rotate it based on the locking direction indicated on the arm.
3. Align the orange dot on the drone arm with the orange area marked on the fuselage to complete the arm unfold and lock.
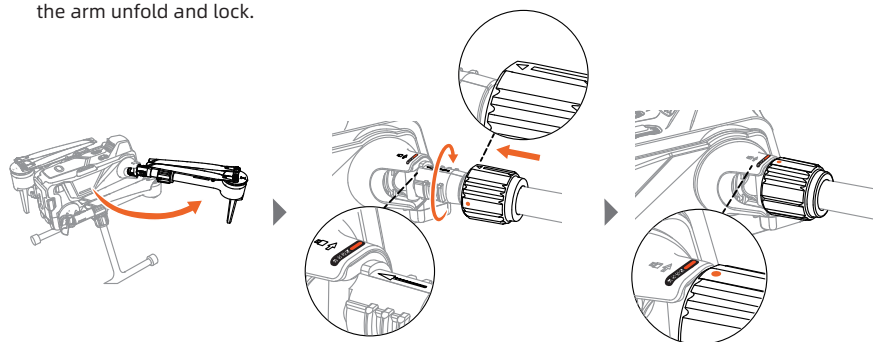


### Unfolding of the propellers
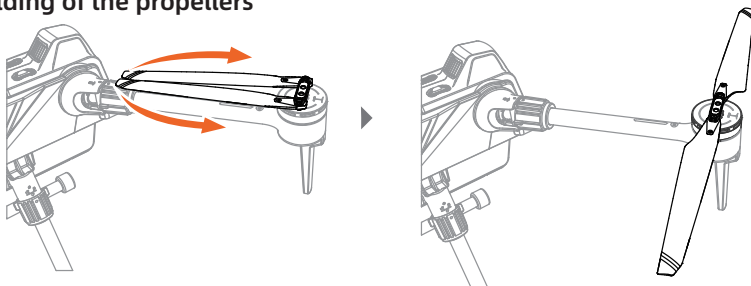


⚠ • Before a flight, make sure that the arms, propellers, and landing gears are all unfolded and locked in position properly.

## Installation/removal of the gimbal camera

1. Insert the micro-SD card based on the position shown on the gimbal.
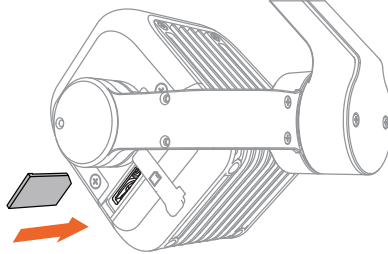


2. Press the payload unlocking button to remove the protective cover.
3. Align the red point on the payload interface and insert the gimbal into the installation position.
4. Rotate it by 90° based on the direction shown on the casing to lock it.
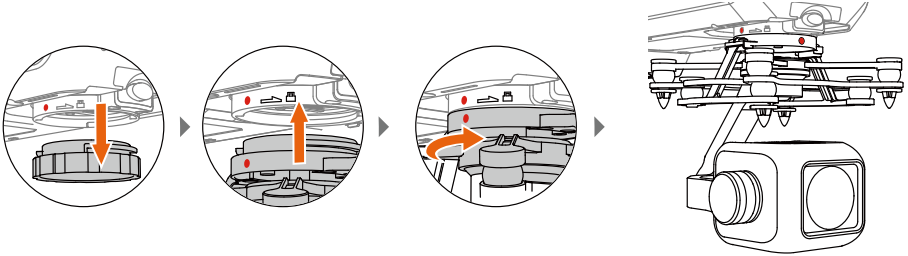


5. Press the payload mount adaptor button, and rotate the gimbal by 90° based on the direction shown on the casing to remove it.
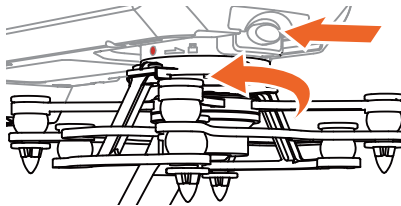


⚠ • When the payload mounts are aligned, manually rotate the payload interface connector by 90° and install the gimbal.
  • The gimbal camera models shown in the figure are only for purposes of illustration.
  • It is required that the aircraft be powered off before mounting the gimbal.
  • Please power off the aircraft before inserting or removing a micro-SD card. High-speed micro-SD cards of Samsung, SanDisk and other brands are supported.

## Installation of intelligent batteries/checking of battery levels

### Battery installation/removal

Battery installation: Put the battery into the battery compartment and push it horizontally until you hear a "click" sound. The installation is complete when the latches on both sides of the battery snap up.
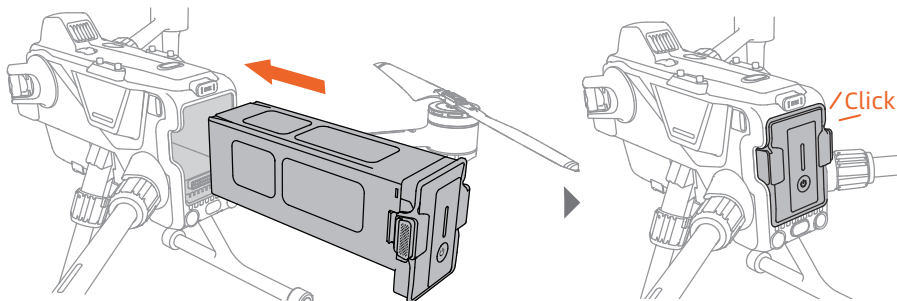


### Battery removal

Press the latches on both sides of the battery and pull the battery outwards to remove it.
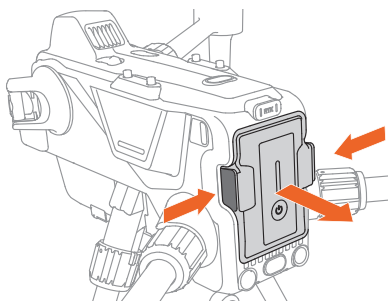


### Checking battery levels

Press the battery power button once to display the current battery level.
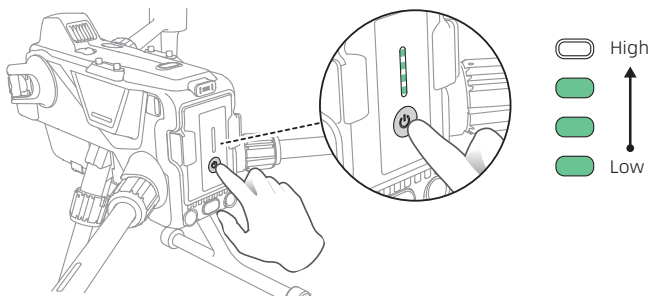
## Powering on

Powering on: Press the battery power button once, and press and hold the power button for 3 seconds. At this point, you will hear a beep sound, and the aircraft indicator light is up.

Powering off: Press the battery power button once, and press and hold the power button for 3 seconds to power off. After powering off, the aircraft indicator light is off.
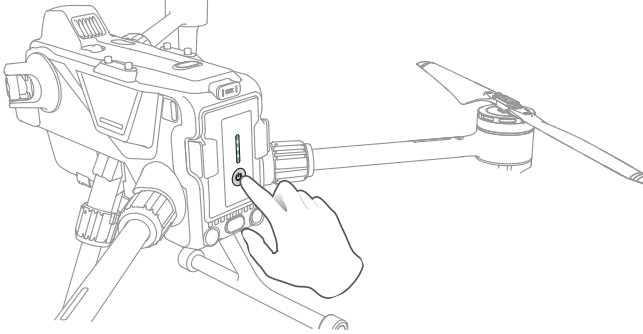


## Pairing

When the aircraft is powered on, press the aircraft power button 8 times continuously. The aircraft will enter the pairing status, and the aircraft status indicator light is solid white. At this point, there are two pairing ways:

1. When the remote controller is powered off, press the power button and return button at the same time, until the remote controller indicator lights blink alternately. At this point, the remote controller enters the pairing status. After the pairing is successful, the aircraft indicator light is solid green, and the pairing completes.

2. After the aircraft enters the pairing mode, power on the remote controller and connect the same to the App. On the flight interface of the App, click "Settings" - "Remote Controller Settings" - "Remote Controller Pairing" to start pairing. After the pairing is successful, the aircraft indicator light is solid green.

⚠ • When the remote controller and the aircraft are purchased in the form of combo, it is defaulted to be paired with the aircraft during ex-factory.
 • This linking method is applicable to the case when a single aircraft is paired with a single set of remote controller. For the pairing between several aircraft and remote controllers, please refer to Advanced Network Mode (p31).

## Aircraft parts
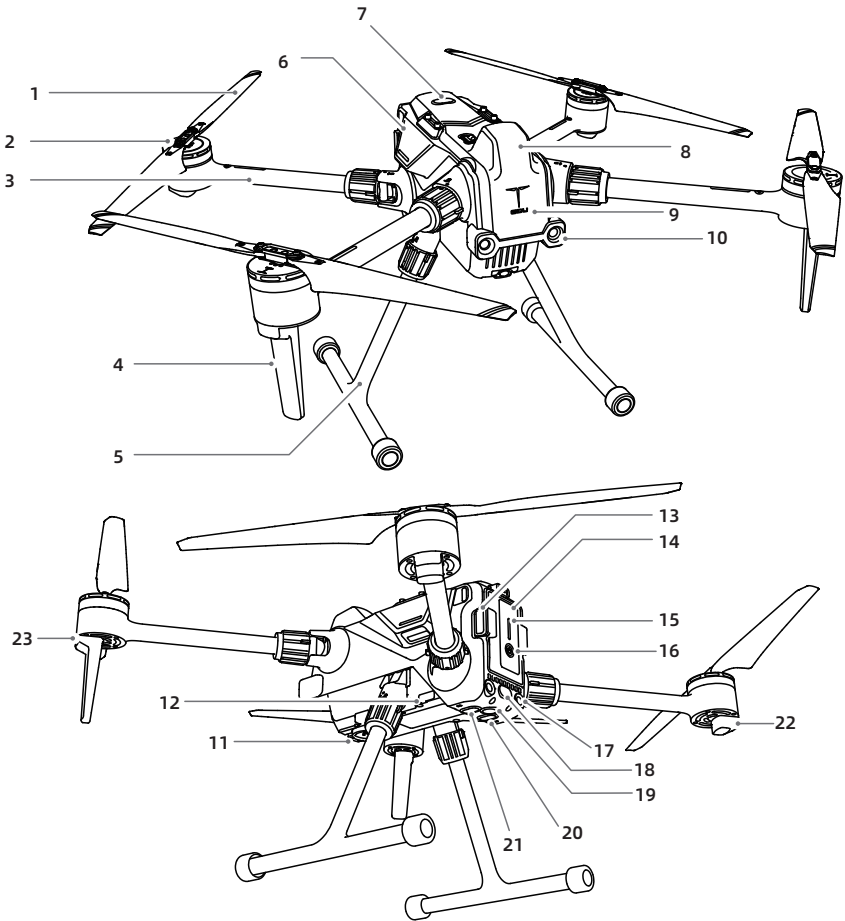


| | | | | | |
|---|---|---|---|---|---|
| 1 | Propeller | 9 | Front radar | 17 | Rear visual system |
| 2 | Motor | 10 | Front visual system | 18 | Rear TOF |
| 3 | Arm | 11 | Payload interface | 19 | Bottom auxiliary light |
| 4 | Video transmission antenna | 12 | Video transmission master/slave button - debugging interface | 20 | Downward visual system |
| 5 | Landing gear | 13 | Battery buckle | 21 | Underneath TOF |
| 6 | Side radar | 14 | Intelligent batteries | 22 | Rear arm indicator light |
| 7 | Upward TOF | 15 | Battery level indicator light | 23 | Front arm indicator light |
| 8 | RTK antenna | 16 | Battery power button | | |

## Remote controller parts
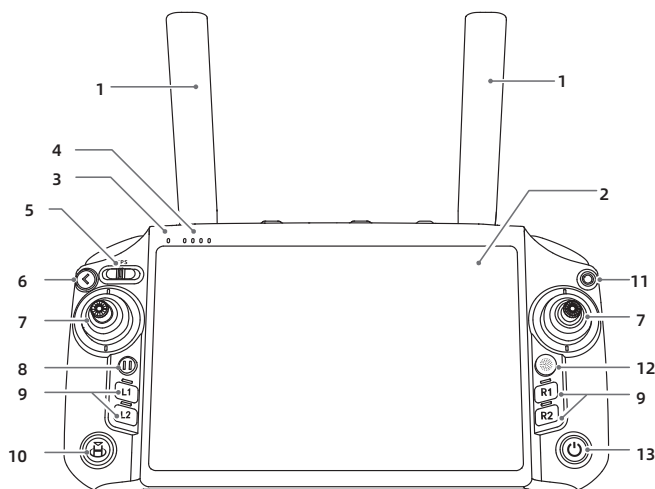


1. **External antenna of remote controller**
   Transmits the control signals and video transmission wireless communication signals between the aircraft and remote controller.

2. **Touch display screen**
   Displays the system and App-related screen, and support 10-point touch control. If there is water on the screen during use, wipe it clean to avoid affecting the touch function.

3. **Status indicator light**
   Displays the remote controller's system status. For details, refer to the "Remote Controller Indicator Light" section.

4. **Battery level indicator light**
   Display battery level of the aircraft.

5. **Flight mode switch**
   Switch flight modes. Includes T mode (Tripod), P mode (Standard) and S mode (Sport), A mode (attitude),which can be customized in the App.

6. **Return button / system function button**
   Click to return to the previous interface, and double click to return to the system's homepage. For combination buttons using the return button and other buttons, refer to the "Remote Control Button Function" section for details.

7. **Control stick**
   Switch flight modes in GDU Flight II.

8. **E-stop button**
   Press once and the aircraft will carry out emergency braking and hover in place (when the GNSS or vision system is in effect).

9. **L1 / L2 / R1 / R2**
   Check the functions corresponding to the buttons in GDU Flight II.

10. **Intelligent return button**
    Press and hold to start intelligent return, and press once to cancel intelligent return.

11. **Confirm button**
    Click to confirm the current operation.

12. **5D button**
    Up, down, left, right and re-center.

13. **Power button**
    Press once to turn on / off the remote controller display screen. When the remote controller is powered off, press and hold the power button for 3-5s to power it on; when the remote controller is powered on, press and hold the power button for 3-5s and click the "Off" button displayed on the remote controller screen to power it off; when the remote controller is powered on, press and hold the power button for 8s for forced shutdown.
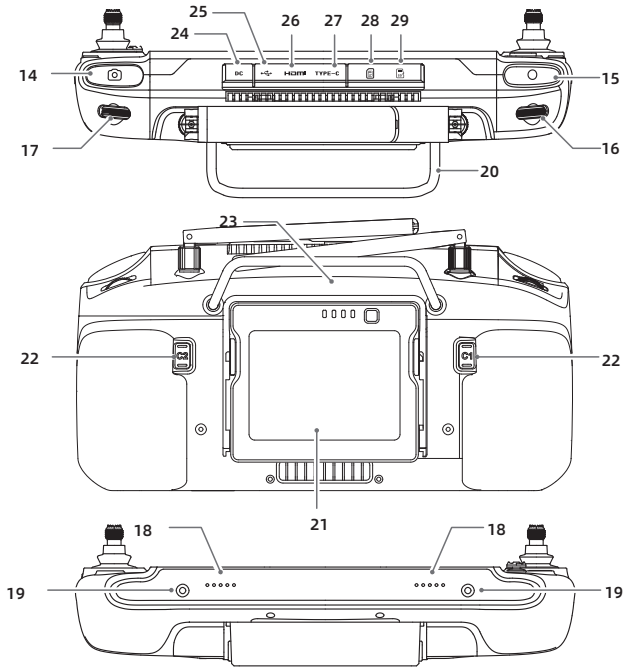
14. **Photograph button**
    Press to take photos.

15. **Video button**
    Start or stop recording.

16. **Left dial wheel**
    Toggle to adjust the gimbal camera's pitch angle.

17. **Right dial wheel**
    Toggle to adjust the gimbal camera's EV value.

18. **Pickup**
    Avoid foreign matter blocking during use, which may affect the pickup effect.

19. **Lanyard hole**
    It is used for installing the remote controller strap.

20. **Handle**

21. **External battery of remote controller**

22. **C1 / C2 button (customizable)**

23. **Speaker**

24. **DC charging interface**

25. **USB-A interface**
    Connect to mobile devices, USB card readers or network transfer output.

26. **HDMI interface**
    Output a HDMI signal to the external display.

27. **TYPE-C interface**
    It is used for Android system debugging, external extension and connecting to a charging device to charge the remote controller.

28. **SIM card**
    Connect to the mobile network.

29. **SD card**
    The microSD card can be inserted.

# Aircraft

This chapter introduces various functional characteristics of the flight control system, visual system and intelligent battery in the aircraft.

# Aircraft

## Aircraft overview

The S400E aircraft mainly consists of a flight control system, a communication system, a visual system, an image processing system, a propulsion system and a battery system. This chapter introduces the functions of various components on the aircraft in detail.。

### Aircraft indicator light

The fuselage has a total of 4 front and rear arm indicator lights, and their positions are shown in the figure.

The front and rear arm indicator lights indicate different flight status. For the specific meanings, please refer to the table below:

⚠ · The front arm indicator light is solid red, indicating the aircraft nose heading.

Front arm indicator light

Rear arm indicator light
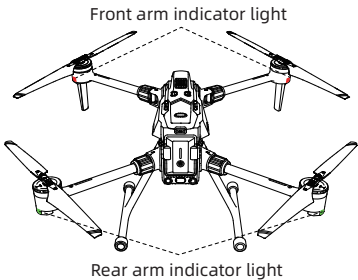
| Normal status | Front arm indicator light | Rear arm indicator light |
|---|---|---|
| System self-check | Red, green, and blue indicator light are solid on in succession | Red, green, and blue indicator light are solid on in succession |
| Magnetometer horizontal calibration | Yellow indicator light is solid on | Yellow indicator light is solid on |
| Magnetometer vertical calibration | White indicator light is solid on | White indicator light is solid on |
| Algorithm converging | White indicator light blinks once for 0.5s | White indicator light blinks once for 0.5s |
| Return | Red indicator light is solid on | Green indicator light blinks once for 1s |
| Attitude mode | Red indicator light is solid on | Yellow indicator light is solid on |
| Sport mode | Red indicator light is solid on | Green indicator light blinks once for 1s |
| Standard mode | Red indicator light is solid on | Green indicator light is solid on |
| Power on the aircraft and connect to the remote controller | Red indicator light is solid on | Red indicator light blinks once for 1s |
| Pairing | White indicator light is solid on | White indicator light is solid on |
| IMU calibration status ready | Indicator light is solid cyan | Indicator light is solid cyan |
| **Warnings and errors** | **Front arm indicator light** | **Rear arm indicator light** |
| Magnetometer horizontal calibration error | Yellow indicator light blinks once for 0.5s | Yellow indicator light blinks once for 0.5s |
| Magnetometer vertical calibration error | White indicator light blinks once for 0.5s | White indicator light blinks once for 0.5s |
| IMU1 error | Red indicator light blinks once for 0.2s | Red indicator light blinks once for 0.2s |
| Barometer error | Red indicator light blinks once for 0.2s | Red indicator light blinks once for 0.2s |
| Magnetic error | Red indicator light blinks once for 0.2s | Red indicator light blinks once for 0.2s |
| Emergency low battery alert | Red indicator light is solid on | Red indicator light blinks once for 0.2s |
| Low battery alert | Red indicator light is solid on | Red indicator light blinks once for 0.5s |
| Battery system error | Red indicator light is solid on | Red indicator light blinks once for 1s |
| In a no-fly zone or outside a Geofence | Red indicator light is solid on | Red indicator light blinks once for 0.5s |
| Approaching a no-fly zone or Geofence | Red indicator light is solid on | Yellow indicator light blinks once for 0.5s |
| Lost communication and no-error status | Red indicator light is solid on | Red indicator light is solid on |

## Flight modes

The aircraft has the following flight modes, which can be switched manually through the remote controller and the GDU Flight II App. Details are as follows:

### 1. A mode (attitude)

The forward / backward obstacle sensing system, GNSS positioning and downward visual positioning system do not work; when the aircraft is off the navigation control, it will drift in the horizontal direction if the control stick is not pushed. It is required to use the control stick for real-time control.

### 2. P mode (standard)

If the GNSS signal is strong, the aircraft will be positioned through GNSS; if the GNSS signal is weak and the light conditions meet the needs of the intelligent visual positioning system, the intelligent visual positioning system will be used. If the GNSS signal and visual assistance positioning fail, the aircraft will automatically switch to the A mode to be controlled by a professional pilot.

### 3. S mode (sport)

The S mode is the enhanced mode under the P mode. The aircraft performance is enhanced, and the GPS and the downward vision positioning system is functioning. The aircraft's control sensitivity value is prompted, and the flight response is quick. Please fly with caution. In this mode, the obstacle avoidance system is disabled, and the aircraft is unable to avoid obstacles automatically

### 4. T mode (tripod)

The tripod mode restricts the aircraft's maneuvering performance on the basis of P mode to make the aircraft shooting more stable.

### 5. V mode (Vision)

The V mode refers to vision positioning mode. When the GNSS signal is weak, and aircraft altitude is lower than 9 m, the system will automatically switch to the V mode. At this point, the aircraft's maximum speed is restricted to 10 m/s.

### Special note

**A mode (attitude) description**

1. The A mode is a professional mode. Please do not switch to this mode in non-special conditions.
2. When the GNSS satellite signal is weak or the compass is interfered, and the vision positioning conditions are not met, the aircraft will enter the attitude mode in a passive manner.
3. The user can use the flight mode switch button on the remote controller to manually switch to the A mode. In this mode, the aircraft is likely to be interfered, and will drift in the horizontal direction. In addition, the visual system and some intelligent flight modes will not work. Hence, the aircraft cannot achieve fixed-point hovering and automatic braking on its own in this mode. The user needs to manually control the remote controller to hover the aircraft.
4. In this mode, it is much more difficult to control the aircraft. The user must be familiar with the aircraft behavior in this mode and be capable of operating the aircraft skillfully. The user should never fly the aircraft for a long distance to avoid the loss of determination of the aircraft attitude, which may cause a risk.
5. Once the aircraft enters the attitude mode in a negative manner, please land the aircraft as soon as possible to a safe place so as to avoid accidents. Meanwhile, avoid flying the aircraft in a narrow, semi-obstructed environment, or an environment with weak GNSS satellite signals to avoid entering the attitude mode in a passive manner, which may result in flight accidents.
6. When the aircraft triggers the vision mode, it can only be switched to the A mode. The other modes do not work.

**S mode (sport) description**

1. The user must note that, when flying the aircraft in the S mode (sport), the visual obstacle avoidance will not work. The aircraft will not actively brake. The user must take note of surrounding environments and operate the aircraft to avoid obstacles along the flight route.
2. The user must note that, when flying the aircraft in the S mode (sport), the aircraft's flight speed is much increased than that in the P mode (standard). As such, the braking distance is greatly

increased. When flying the aircraft in a windless environment, the user should reserve at least 50 m braking distance to ensure flight safety.

3. The user can switch the P mode to the S mode for operation only after getting familiar with the aircraft characteristics and various flight modes.

**V mode (vision) description**

The V mode is an auxiliary positioning mode and will be automatically triggered when the GNSS signal is weak. Once the GNSS signal is effective again, the aircraft will automatically switch back to the GNSS mode.

## Automatic return

The aircraft comes with an automatic return function. There are four methods to execute the automatic return, that is "one-button return", "low power return", "lost communication return" and "accurate return".

During takeoff, the aircraft will record the GNSS coordinates, which correspond to the return point (also called "HOME point"). If automatic return is triggered, the aircraft will automatically return to the HOME point, which is only valid for this flight.

⚠ • The HOME point is generated only for effective GNSS coordinate records. When the GNSS signal is weak before the aircraft takeoff, the aircraft will take off in the A mode or the V mode. Then, the position of the recorded HOME point is the coordinate point that takes effect for the first time during the flight process, and not the takeoff point.

### 1. One-button return

Automatic return can be triggered during the flight process by pressing the "Return" button on the remote controller or by clicking "⌂" in the APP. During the return process, the user can use the "Control stick", "RTH" button or the app interface to exit the return cycle and regain active control.

### 2. Low power return

Two mechanisms are provided: low power return and emergency low power landing.

**Low power return**

When the intelligent battery's battery level is too low to return the aircraft,the user should land the aircraft as soon as possible. To prevent unnecessary dangers due to insufficient battery level, the aircraft will intelligently determine whether the current battery level is sufficient based on the flight position information. If the current battery level is only sufficient for the aircraft to return, the GDU Flight II App will remind the user whether to return or not. If the user makes no choice within 15 seconds, the aircraft will automatically return after 15 seconds. During return, the user may press the intelligent return button on the remote controller or click Cancel Return on the App to exit return. Intelligent return only occurs once in the same flight process. If the user cancels the low power return prompt and continues the flight, the aircraft may be forced to land during the return due to an insufficient battery level, resulting in aircraft loss or crash.

**Emergency low power landing**

In case of emergency low power, the aircraft will be forced to land, which cannot be canceled. During the returning and descending process, the user can use the remote controller (if the remote controller signal is normal) to control the aircraft.

**Low battery alert**

When the aircraft is at a low battery level status, the aircraft signal indicator light will blink red slowly. When the aircraft is at a emergency low power status, the aircraft signal indicator light will blink red quickly.

The low battery alert threshold can be set on the App interface. The ex-factory default low battery alert value is 20%, and the emergency low power landing alert value is 5%.
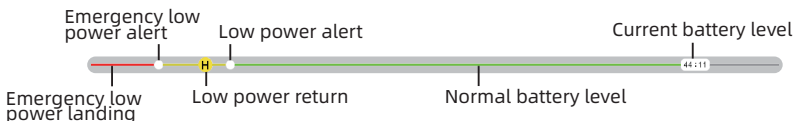
| Battery level indication | Meaning | Aircraft status indicator light | App interface prompt | Flight |
|---|---|---|---|---|
| Low power return | Remaining battery level is only sufficient for the aircraft to return safely. | Blink green slowly | Prompt whether to return or not. If the customer makes no choice, the aircraft will default to return after 15 seconds. The user can return the aircraft immediately or cancel the return. | After selection, the aircraft will automatically return to above the HOME point and enter an automatic landing process. The user can regain the control right during return, and land the aircraft. Notes: After the control right is regained, the intelligent return prompt box will not appear again. |
| Emergency low power landing | Remaining battery level is only sufficient for the aircraft to land at the current altitude. | Red light blinks quickly | Remind the user that the aircraft is being forced to land, which cannot be canceled. | The aircraft will land automatically. |
| Current battery level | Remaining flight time supported by the current battery level | None | None | None |
| Low battery alert | The user sets the alarm value on their own. | Red light blinks slowly | Give a beep alarm. | None |
| Emergency low battery alert | The user can automatically set the alarm value, which should not be greater than the low battery alert value. | Red light blinks quickly | Give urgent beep alarms. | None |

### 3. Lost communication return

During the flight process, if the remote controller is disconnected from the aircraft, the aircraft will trigger a lost communication return (It is required to set the lost communication action to return in the App). During the return process, if the signal connection between the remote controller and the aircraft restores to normal, the aircraft will continue to return. During the return process, the user can press the intelligent return button on the remote controller or click Cancel Return on the App interface to cancel the return.

### 4. Accurate return

In the App, the user can set the return mode to accurate return. In this mode, the aircraft will accurately land after returning to the HOME point. The user should ensure that when the return mode is selected or modified, there is an accurate landing 2D code at the HOME point.
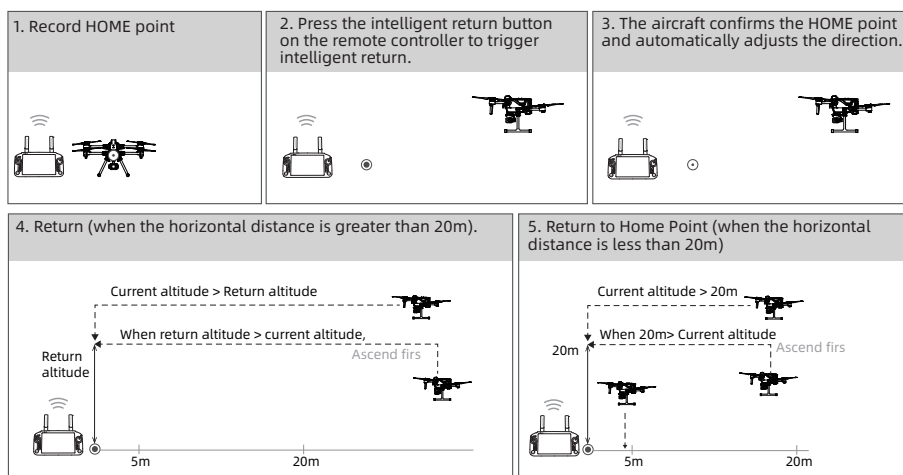
### Obstacle avoidance during return

With the obstacle avoidance during return, the aircraft can automatically avoid the obstacles ahead and return safely. By default, the obstacle avoidance during return is enabled.

⚠ • The obstacle avoidance capacity during return is related to the obstacle scenario. The obstacle avoidance capacity varies in different scenarios. The return speed can be set between 5m/s and 15m/s.
   • The return speed can be set to 15m/s when the aircraft flies above highly-reflective objects, such as buildings, and metal pole tower.
   • The return speed can be set to 12m/s for slightly weak reflective objects, such as glass buildings, trees, and telegraph poles.
   • The return speed can be set to 7m/s in forests, brushes, and other scenarios with a large area of green plants.
   • The return speed can be set to 5m/s in sparse vertical bars of obstacles, such as reinforcing steel bars in buildings under construction and sparse tress.
   • The obstacle avoidance capacity during return will be sharply weakened at night. It is recommended to set the return speed to 5m/s at night.

**Automatic return process**

1. The aircraft records the HOME point.
2. Trigger automatic return conditions (by pressing the remote controller button trigger, or by a low power alert and lost communication).
3. The aircraft confirms the HOME point, and automatically adjusts the nose direction.
    a) When the horizontal distance between the aircraft and the HOME point is greater than 20m, and the actual altitude is higher than the pre-set return altitude, the aircraft will return at the current altitude; and if the actual altitude is lower than the pre-set return altitude, the aircraft will ascend to the return altitude before returning.
    b) When the horizontal distance between the aircraft and the HOME point is greater than 5m and less than 20m, and the actual altitude is higher than the pre-set return altitude, or the actual altitude is lower than the pre-set return altitude but greater than 20m, the aircraft will return at the current altitude; and when the aircraft altitude is less than 20m, the aircraft will ascend to 20m before returning.
    c) When the horizontal distance between the aircraft and the HOME point is less than 5m, click the return button to immediately land the aircraft in place, and the one-button landing can be interrupted.

The text below uses the intelligent return process as an example for illustration.

| 1. Record HOME point | 2. Press the intelligent return button on the remote controller to trigger intelligent return. | 3. The aircraft confirms the HOME point and automatically adjusts the direction. |
|---|---|---|

| 4. Return (when the horizontal distance is greater than 20m). | 5. Return to Home Point (when the horizontal distance is less than 20m) |
|---|---|
| Current altitude > Return altitude<br>When return altitude > current altitude,<br>Ascend firs<br>Return altitude<br>5m  20m | Current altitude > 20m<br>When 20m> Current altitude<br>20m  Ascend firs<br>5m  20m |

⚠ • The user can toggle the control stick during the descending process to move the aircraft to a more Appropriate position before landing.
　• The color range on the battery energy tank and the estimated remaining flight time information will be dynamically adjusted based on the aircraft's flight altitude and the distance to the HOME point.

# Vision sensing system

## Visual system, millimeter-wave radar and infrared sensing system
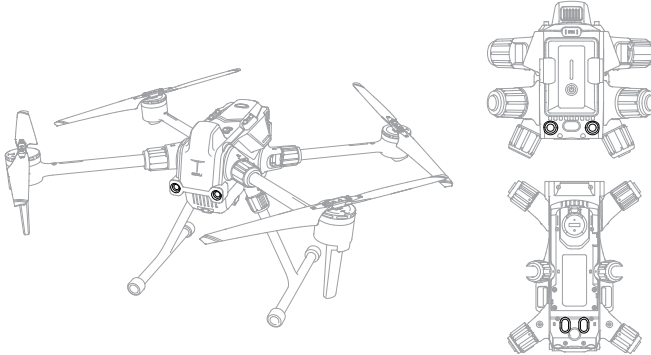


The vision sensing system consists of cameras which are located in the front, rear, and bottom of the aircraft fuselage, and are used for sensing the obstacles and position the aircraft through visual image ranging.

The millimeter-wave radars are located at the front, left, and right side of the aircraft fuselage and emit section electromagnetic wave for handling return signal and sense the obstacles.

The infrared sensing system is located at the rear, upper and lower part of the aircraft fuselage and is of the infrared TOF technology ranging to sense obstacles and the aircraft's flight altitude.

### Detection range

The detection range of the visual system and the millimeter-wave radar are shown in the figure below. When the obstacle is outside of the sensor's detection range (white), the aircraft will be unable to sense the obstacle. The user should fly with caution, and pay attention to flight security.
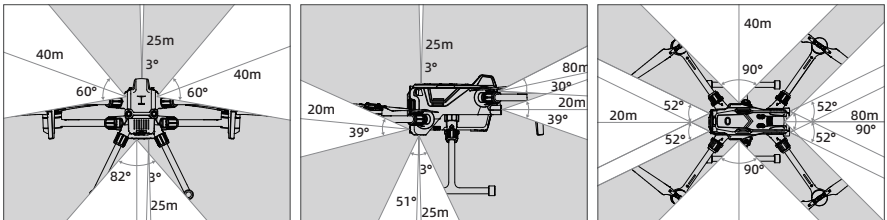


### Obstacle avoidance function

The obstacle avoidance function only works in standard mode. It is required to enable the visual obstacle avoidance in the GDU Flight II App. At the same time, the user should enable the obstacle avoidance strategy button, the aircraft will automatically brake when encountering an obstacle in the flight route.

⚠ · If the obstacle avoidance strategy button is not enabled, only the obstacle position will be displayed and only an alert will be prompted. However, the aircraft will not actively avoid obstacles.

## Usage scenario of obstacle avoidance function

The visual obstacle avoidance is Applicable to well-lit scenarios, and the obstacles encountered on the flight route must not be too sparse. When the light is too dark, obstacle information is only provided through the millimeter-wave radar and the infrared sensor. It is recommended to set the aircraft's safety distance in the GDU Flight II App to be greater than 2.5 m. To obtain better obstacle avoidance experience, it is recommended to set the flight altitude to be greater than 10 m.

During manual flight, the user can freely control the aircraft. Therefore, the user should always pay attention to the flight speed and direction, and use the obstacle avoidance function Appropriately to prevent the obstacle from entering the sensor blind area, which may result in a collision.

When the aircraft is close to the obstacle, it will automatically brake in an urgent manner until hovering. After the aircraft is hovered, the user will be unable to get the aircraft close to the obstacle by pushing the control stick, and the user can push the control stick to fly the aircraft away from the obstacle to regain the control right.

## Precautions for obstacle avoidance function usage

1. The visual system measurement is prone to be affected by the intensity of light and the texture of the surface. For example: When the obstacle surface is solid color with weak texture or strong reflection, the ambient light changes sharply and there is strong light, the obstacle is too tidy, or the visibility is too low, the visual system's obstacle detection will be affected or become invalid. Please use with caution.

2. The detection distance of the millimeter-wave radar depends on the obstacle size and material. For example: For strongly reflective objects (such as buildings, trees, telegraph poles), the effective detection distance is about 60m; for weak reflective objects (such as dead branches), the effective detection distance is 20m. Outside the effective detection distance, please use the radar with caution as the detection of obstacles may be affected or invalid.

3. The infrared sensing system must be used with large obstacles that have high reflectivity. For example: For obstacles with a strong absorption of light on surfaces, small obstacles, and transparent objects, please use the infrared sensor with caution because the detection of obstacles may be affected or invalid.

4. The obstacle avoidance function does not work indoors.

⚠ • lease make sure that the visual system camera lens is clear and clean. The shell case outside the radar module is clean and free of cracks, dents, or deformation.
   • During usage, please do not cover the visual system camera and infrared ranging sensor, which will cause visual function errors and failure of the near-ground slow descent function, which will affect normal flight.
   • If the fuselage is installed with other devices, please avoid covering the radar FOV. If the radar FOV is obstructed, the radar's obstacle sensing performance will be impaired. Please fly with caution.
   • Maintain control over the aircraft throughout the flight process. Do NOT rely solely on the information provided by the GDU Flight II app. Please determine the aircraft's flight status based on observations using the naked eye and avoid obstacles in time.

## Obstacle information display:

After the obstacle avoidance function is enabled in the App, a radar chart will Appear on the flight interface to display the detected obstacle.

When the obstacle distance is greater than the alarm distance, the obstacle is displayed as a green point.

When the obstacle reaches the alarm distance, it is displayed in yellow.

When the obstacle Approaches the obstacle avoidance braking distance, it is displayed in red.

The obstacle avoidance alarm distance and obstacle avoidance braking distance can be set in the GDU Flight II App.
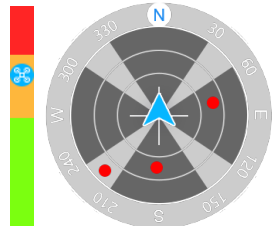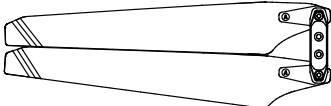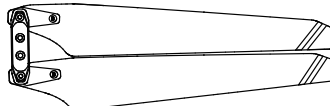
## Flight data

The App has a flight data recording function. During use, flight logs are stored in the App and can be checked and exported using the remote controller App
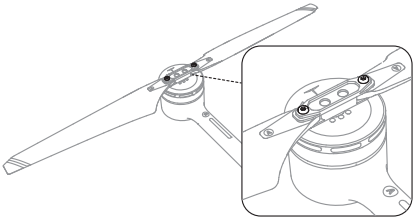
## Propellers

### Propeller usage instructions

The aircraft is provided with 1866 propellers, which ensure takeoff and landing at an altitude of 5000 m. The wind speed in the flight environment should be ≤ 15 m/s.

The aircraft comes with folded propellers, which are divided into A propellers and B propellers. Please install them based on the markings on the corresponding motor.

| Propellers | A propellers | B propellers |
|---|---|---|
| Schematic diagram |  |  |
| Installation position | Installed to A arms | Installed to B arms |

### Replace propellers

Please use H2.5 internal hexagon head wrench to replace the propellers. It is recommended only to replace propellers in an emergency situation during a field operation. After an emergency flight, please contact GDU technical support for repair as soon as possible.



⚠ • Please use the propellers provided by GDU. Do not use propellers from different models.
   • The propellers are consumables. If necessary, please purchase separately
   • Before each flight, make sure to check whether the propellers have been installed correctly and firmly.
   • Before each flight, make sure to check that the propellers are in good condition. Replace aged, damaged, or deformed propellers before the flight.
   • DO NOT approach rotating propellers or motors to avoid injury.
   • The propellers are thin and slightly sharp. Please operate with caution to avoid being scratched.
   • Except in emergencies, do not replace propellers on your own. If required, it is recommended to return the product to the factory for replacement.

## Intelligent battery pack

The battery pack has several battery ports and can charge up to eight PD12 intelligent batteries. The battery pack has a rod, making it easy to carry the pack outside.
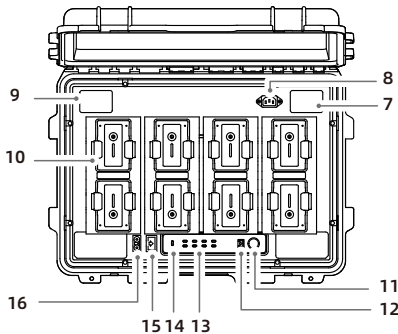
### Precautions for Use

1. Keep the battery pack dry. Avoid water, oil and any other liquids.
2. Do not close the battery pack for charging. Please keep it in an area that is well ventilated and cool.
3. The battery pack is only applicable for PD12 intelligent flight batteries, remote controller, and pad. Do not use the battery pack to charge batteries from other models.
4. During usage, please place the battery pack flat and avoid insulation and fire protection.
5. Do not touch metal terminals with your hands or other objects. If the metal terminal has any foreign matter, please wipe them with a cloth.
6. Be careful when opening and closing the battery pack and extension rod to avoid being pinched.
7. Place the battery in the proper direction.
8. In the event of long-term air transportation or ambient pressure changes, internal air pressure inside the battery pack may change. At this point, the pressure equalizing valve will automatically adjust to balance the internal and external air pressure without manual adjustment.
9. Please use a dust remover for dust inside the battery pack.

### Component description
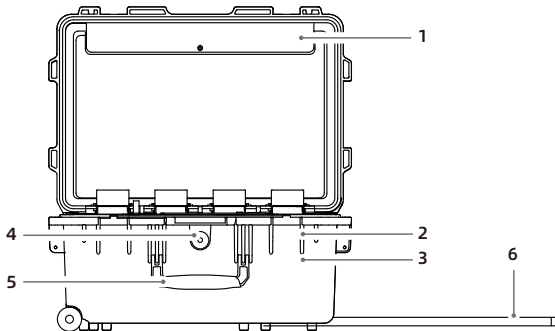


| 1 | Storage position of power cables |
|---|---|
| 2 | Padlock hole |
| 3 | Hasp |
| 4 | Pressure equalizing valve |
| 5 | Handle |
| 6 | Retractable rod |

| 7 | Air intake vent |
|---|---|
| 8 | AC 220V power interface |
| 9 | Air exhaust vent |
| 10 | PD12 battery interface |
| 11 | Power button |
| 12 | Firmware/software update interface |
| 13 | PD12 battery status indicator light |
| 14 | Alarm indicator light |
| 15 | USB charging interface |
| 16 | DC 12V charging interface |

## Use
Charging
Use an AC power cable to connect to the battery pack's power interface to an AC power (100-240Vac, 50-60Hz).
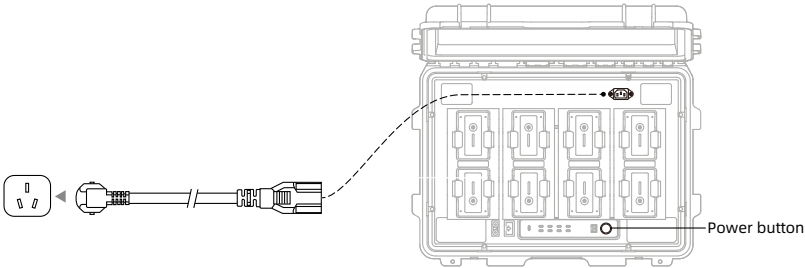


2.Press the power button to turn on the battery pack.
3. Insert a battery for charging.
It takes about 120 minutes to fully charge two PD12 intelligent batteries when using 100-240Vac power supply, and about 50 minutes to charge the batteries from 20% to 90%.

## Specifications

| | |
|---|---|
| Product model | ABP01 |
| Dimensions | 580mm* 420mm * 297mm |
| Empty box weight | 15±0.05kg |
| Items that can be accommo-dated | PD12 intelligent batteries×8 pcs<br>AC power cable, DC charging cable, USB charging cable |
| Input | 90-264VAC，47-58Hz |
| Output | PD12 intelligent battery port: 26.4V, 14A×2<br>DC charging port: 12V, 3A×2<br>USB charging port: 5V, 3A×2 |
| Output power | 800W |
| Charging time | Two PD12 intelligent batteries can be charged at the same time, which take 110 min to fully charge them, and about 50min to charge the batteries from 20% to 90%. |
| Charging hub | Intelligently detect the battery level, and charge the high-battery level batteries at first. |
| Operating temperature | 5℃~40℃ |
| Protection functions | Anti-back flow protection, short-circuit protection, over-voltage protection, over-current protection, and over-temperature protection |
| Battery status display | Battery not connected-red light is solid on<br>Battery connected but not charged-yellow light is solid on<br>The battery temperature is abnormal-yellow light blinks<br>Battery charging-green light blinks<br>Battery fully charged-green light is solid on |

## Battery Pack LED Description

### Buzzer prompt tone description

The buzzer prompt tone is mainly used for indicating an error:
When the alarm status indicator light is red, the buzzer beeps to prompt a battery pack hardware error.

| LED indicator lights | Description |
|---|---|
| Power button indicator light | |
| Green indicator light is solid on | The battery pack is powered on. |
| Battery status indicator light | |
| Green indicator light is solid on | The charging is finished |
| The indicator light blinks green | Charging |
| Yellow indicator light is solid on | Ready-to-charge status |
| The indicator light blinks yellow. | Low temperature/high temperature alarm (1. The battery has low temperature. Charge it after the temperature has risen; 2. The battery temperature is too high and is cool-ing. Charge the battery after it has cooled to the proper temperature.) |
| Red indicator light is solid on | Battery malfunction (1. The battery is inserted reversely; 2. The battery is not fully inserted; 3. There is a battery communication error. Please use another charging interface;) |
| | The charging interface is malfunctioning. Please replace it. |
| Alarm indicator light | |
| The indicator light blinks red | Battery pack malfunction (1. The battery pack has low power voltage; 2. There is a power module communication error or some other issue; 3. The main board/fan is malfunctioning;) |

⚠ • Please contact the after-sales or a local dealer.

## Intelligent batteries

### Introduction to intelligent batteries

The PD12 intelligent flight battery comes with a high-capacity cell and an advanced battery management system to power the aircraft. The intelligent battery must be charged with the special charger provided by GDU. Before its first use, be sure to charge the intelligent battery fully.

### Intelligent flight battery function

1. Short circuit protection: When a short circuit is detected, the battery will automatically cut off output for protection.

2. Balanced protection function: Automatically balance the voltage of the internal cell to protect the battery. The battery has a static equalization and charging equalization function.

3. Overcharging protection: Overcharging will seriously damage the battery. When the battery is fully charged, it will stop charging.

4. Charging temperature protection: The battery will not begin charging at temperatures below 5°C or above 50°C because charging under such conditions will damage the battery.

5. Charging over-current protection: Current surges will seriously damage the battery. The battery will stop charging when the charging current is too high.

6. Overdischarging protection: Overdischarging will seriously damage the battery. When the battery is not operating during a flight, the battery will cut off output if the cell is discharged to 3.2V; when the battery is operating during a flight, overdischarge protection will not engage to ensure flight safety. When the battery is in flight discharge status the battery will turn off overdischarge protection to maintain continuous battery output, maximizing flight time in order to give the operator more time to land. Once this occurs, cell voltage is likely to be less than 2.5V due to overdischarging. Recharging an over-discharged battery may result in a serious fire risks. Therefore, when the voltage of a single cell is below 2.5V, the battery will be locked, prohibiting recharging. The battery can no longer be used. Therefore, please take careful note not to deliberately overdischarge the battery. In doing so the user takes the risk of severe battery damage. When the battery is overdischarged and locked, the battery level indicator lights will flash quickly after pressing the battery button.

### Battery installation/removal
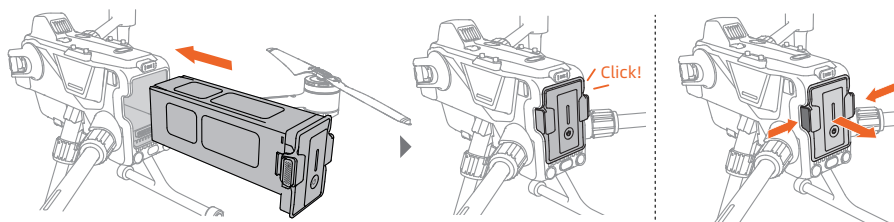


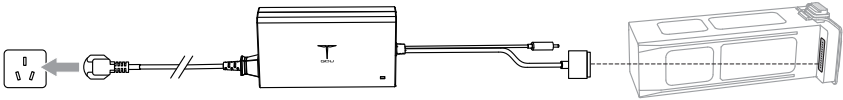Battery installation                                      Battery removal

## Charging

1. Remove the aircraft battery.
2. Input voltage: 26.4V
3. Charging time: 16400mAh battery ≤120 minutes



⚠ · Using this device in a residential environment may cause wireless interference.

## Turn on/off the battery (with diagram changed)

Turn on the battery: When the battery is turned off, press the battery power button once, and the battery level LED indicator light blinks alternately. Press and hold the power button for 2 seconds to turn on the battery. When the battery is turned on, the battery level LED indicator lights light on from bottom to top in succession. The battery level LED indicator light displays the current battery level.

Turn off the battery: When the battery is turned on, press the battery power button once, and the battery level LED indicator light blinks alternately. Press and hold the power button for 2 seconds to turn off the battery. When the battery is turned off, the battery level LED indicator lights turn off from top to bottom in succession until all indicator lights are off.
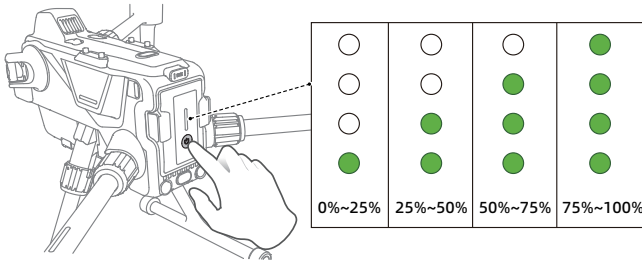
## ADS-B

The manned aircraft carrying an ADS-B emitter with broadcast automatic correlation monitoring will actively broadcast its own flight information. The GDU aircraft with ADS-B can receive flight information transmitted by the ADS-B emitter in compliance with 1090ES or UAT standards . Through the received flight information, ADS-B can analyze and obtain the position of manned aircraft, altitude, course, speed, and other information, and compare with the current position, altitude, course, speed information of the GDU aircraft for real-time calculation of the rough risk level of manned aircraft. Based on different risk levels, ADS-B sends different warning information to the user via the GDU Flight II App.

This module only sends warning information regarding the approach of a certain manned aircraft under specific circumstances and cannot actively control the GDU aircraft to avoid the approaching manned aircraft. The user should always fly the aircraft within their range of visibility and ensure flight safety. This module has the following restrictions:

1. This module can only receive information transmitted by manned aircraft with an ADS-B out in compliance with 1090ES (RTCA DO-260) or UAT (RTCA D0-282). For manned aircraft not equipped with an ADS-B out or the manned aircraft that have been equipped with an ADS-B out but fails to work, this module cannot receive related broadcast information and send warning information.

2. This module functions based on wireless frequency. If there are any obstructions between the GDU aircraft and the manned aircraft, this module will be unable to effectively receive the broadcast information and send warning information.

3. Due to the change and interference of the surrounding environment, this module is likely to delay the transmission of warning information. As such, please fly with caution and keep an eye on surrounding environments.

4. When the GDU aircraft cannot effectively obtain its position, there may be an error with the warning information sent by this module.

5. When this module is powered off or does not work, it will be unable to receive the broadcast information sent from the manned aircraft, and therefore cannot send any warning information. When the ADS-B system determines that there are any risks, it will send 3 levels of alerts based on the distance between the UAV and manned aircraft. When the user receives an alert, please land the aircraft immediately or avoid the obstacles through other methods.

    a) Level 1 alert: All flights searched by the UAV will be displayed in the app (Up to 10 flights can be displayed at the same time). Please pay attention to flight safety;

    b) Level 2 alert: There may be a manned aircraft passing by within the 2km range of the UAV. Please pay attention and avoid the aircraft;

    c) Level 3 alert: There may be a manned aircraft passing by within the 1km range of the UAV. Please pay attention to avoiding;

When a Level 1, Level 2, and Level 3 alert is given, a blue, yellow, and red aircraft icon will appear on the map page respectively.

Blue: Level 1 alert    Yellow: Level 2 alert    Red: Level 3 alert

⚠ • ADS-B function is only available when the ADS-B module is added.

## Multiple expansion devices

The aircraft has several SDK extension interfaces and can support a variety of expansion devices. The list of expansion devices is as follows: Night navigation light, rear RTK, FPV single upward gimbal component, LTE backup video transmission, and downward multi-payload component.
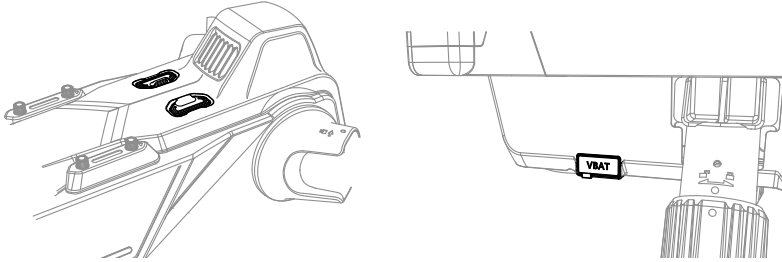


⚠ • Either a night navigation light or a parachute can be selected, as well as an FPV or a downward multi-payload component.

## IP45 description

1. DO NOT fly the aircraft when the precipitation level is higher than 100mm/24h.
2. DO NOT fold the arms when it is raining.
3. Before a flight, please check that the battery port, battery compartment port, battery surface, and battery compartment surface are dry, and then insert the battery into the aircraft;
4. Make sure that the battery port and surface are dry before charging.
5. Please wipe the aircraft's surface, and ensure that there are no droplets before putting it into the package.
6. Damage caused by liquid influx is not covered by the warranty.

### IP45 is not applicable to the following circumstances:

1. The arms are folded;
2. The port protective cover is not mounted properly;
3. The upper cover's dust-proof rubber falls off;
4. The aircraft has other possible damages, such as a cracked shell, waterproof glue failure, etc.

# Remote Controller

This chapter introduces the various functions of the remote controller, including its set-up and aircraft controls.
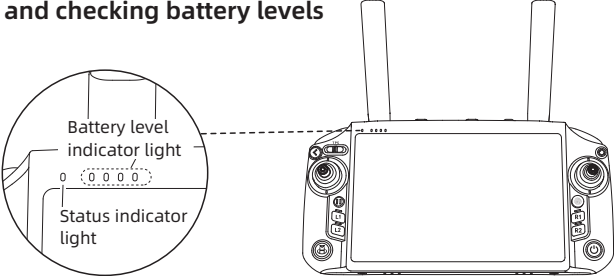
# Remote Controller

## Remote controller overview

GDU RC SEE is a highly-integrated remote controller with a highlight screen. The product comes with an Android 9.0 or above platform system and is capable of local storage and data analysis. It is an intelligent remote controller with a remote networking data link that integrates mobile public network access, GPS positioning and local LAN connection. The product's interaction interface has a humanized design and rich extension interfaces; it is capable of video post-processing and the local and external output of videos; it also supports secondary development and can quickly achieve the professional Application of UAV products.

## Preparation of the remote controller

### Powering on/off and checking battery levels



Battery level indicator light

Status indicator light

### 1.Status indicator light

For specific meanings, please refer to the table below:

| Status indicator light | Description |
|---|---|
| Red indicator light is solid on | The remote controller is powered on and the aircraft is not connected. |
| The indicator light blinks red | Slow blink: excessive temperature of remote controller |
| The indicator light blinks red | Quick blink: aircraft low battery alert |
| Green indicator light is solid on | The aircraft is connected. |
| The indicator light blinks blue. | The remote controller and aircraft are being paired. |
| Yellow indicator light is solid on | Firmware update fails. |
| The indicator light blinks yellow. | Low battery alert of remote controller |
| The indicator light blinks cyan. | The remote controller's control stick is not re-centered. |

### 2.Battery level indicator light

The battery level indicator light indicates the aircraft's battery level.
For specific meanings, please refer to the text below:

1. When the four indicator lights are all on, this indicates that the battery level is full as fed back by the aircraft. The indicator lights turn off in succession based on battery level consumption;
2. When the aircraft's battery level is lower than 20%, the last indicator light blinks 3s once; when the battery level is lower than 5%, the indicator light blinks 1s once.
3. When the remote controller battery is being charged, the battery level indicator lights blink alternately to indicate that the remote controller is being charged. The battery level indicator lights are continually lit after discharging ends, and blink once together with an interval of 3s.

| Blinking method | Remaining battery |
|---|---|
| ▮▮▮▮ | 75%~100% |
| ▮▮▮▯ | 50%~75% |
| ▮▮▯▯ | 25%~50% |
| ▮▯▯▯ | 0%~25% |

29

## Installing an external intelligent battery

If an external battery for the remote controller is to be purchased separately, please refer to the steps below for installation.

Insert the external battery into the battery compartment and push it to the top. When a "click" sound is heard, this indicates that the external battery is installed in place.
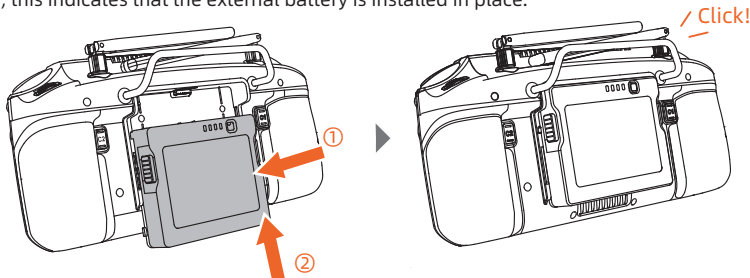


⚠ • To remove the external battery, press the battery's unlock button and push it downwards.

## Installing a strap support kit

1. Install the two triangular ring screws on the remote controller.
2. After the strap is attached, pass the two ends through the triangular rings for installation.

⚠ • After use, hold the remote controller with one hand first, release it with the other hand and take off the strap.

## Adjusting the antenna

Unfold the remote controller antenna and adjust it to an Appropriate position. The strength of the received signal varies across different antenna positions.

Based on the relative position between the remote controller and the aircraft, adjust the orientation of the external antenna of the remote controller and align the antenna plane against the aircraft's direction to achieve the optimal status of the remote controller and aircraft signal quality.

⚠ • When the antenna is adjusted to the limit, do not use great force to avoid antenna damage. Damaged remote controller antennas may affect the product's performance and safety. Please contact the GDU technical support in time.
• Do not use another communication device in the same frequency band (2.4 GHz or 5.8 GHz) during flight as this may interfere with the remote controller's signal. For example: turning on your mobile phone's Wi-Fi.
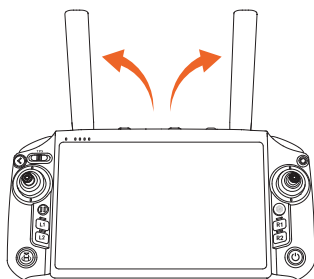
# Charging the remote controller and checking the battery level

When charging the remote controller, the user can determine whether the battery is fully charged based on the remote controller's indicator light color. When the white indicator lights blink in succession, this indicates that the battery is being charged; when the white indicator lights are continually lit, this indicates that the battery is fully charged.

It takes Approximate 2.2 h to fully charge the internal battery of the remote controller using the official DC charger (7000 mAh@7.2 V) when the remote controller is powered off at normal temperature.
Input: 12V / 3A
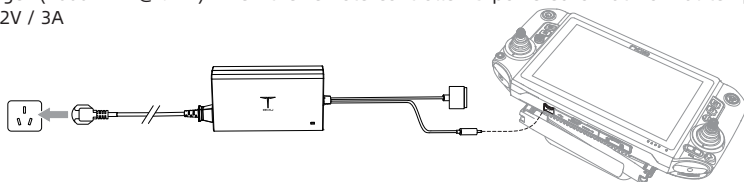


⚠ • Be sure to use an original charger to charge the original battery and remote controller. Alternatively, use a charger provided by GDU to charge the battery. GDU takes no responsibility for any product fault or damage caused by using non-original accessories.
  • To maintain the optimal remote controller battery status, please fully charge the remote controller every 3 months.

## Charging description

There are two charging methods for the internal battery:
1. Fast charging 1: DC port, 12V / 3A,0~90% battery level: 1.5 h, 0~100%full battery level: 2.2 h;
2. Fast charging 2: USB-C port 12V / 3A, 90% battery level: 1.8 h, 0~100%full battery level: 2.5 h (the adapter must support the 12 V fast charging port and QC protocol, and the output power level must be > 45 W).

It takes 3.5 h to charge two batteries at the same time from 0% to 100% when an external battery charging base (DC fast charging) is connected.

## Checking the power level of the internal battery

Press the external battery button for the battery level to be presented in the form of an LED indicator light.

| Blinking method | | | | Remaining battery |
|---|---|---|---|---|
| 🟢 | 🟢 | 🟢 | 🟢 | 75%~100% |
| 🟢 | 🟢 | 🟢 | ⬜ | 50%~75% |
| 🟢 | 🟢 | ⬜ | ⬜ | 25%~50% |
| 🟢 | ⬜ | ⬜ | ⬜ | 0%~25% |
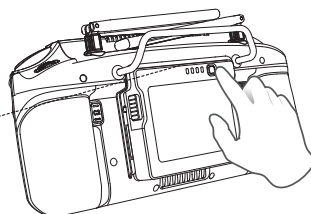


## Low battery alert

| Low battery alert of remote controller: a single beep | |
|---|---|
| The battery level is lower than 15%. | The beeper sounds once for 10 s. |
| The battery level is lower than 5%. | The beeper sounds once for 3 s. |
| The battery level is lower than 2%. | The beeper alarms once for 1 s. |
| Low battery alert of the aircraft: two beeps | |
| The battery level is lower than 20%. | The beeper sounds once for 10 s. |
| The battery level is lower than 5%. | The beeper sounds once for 3 s. |
| The battery level is lower than 2%. | The beeper alarms once for 1 s. |

## Remote controller pairing

When the aircraft is powered on, the pairing ways are as follows:

1. Power on the remote controller and connect it to the App. On the flight interface of the App, click "Settings" - "Remote Controller Settings" - "Remote Controller Pairing" to enter the pairing interface;
2. Power on the aircraft and make sure that the original battery is installed. Press the aircraft's power button (about 8 times) until the rear arm indicator light turns white, indicating that the aircraft has entered pairing mode.
3. At this point, click the pair button in the App again. When the App feeds back that the pairing is successful, the green indicator light on the aircraft will be continually lit. The remote controller status indicators will.

⚠ • Turn green when pairing is completed.
   • During pairing, keep the distance between the aircraft and remote controller within 50 cm.

## Switching among remote controller flight modes

Use the flight mode switch button on the remote controller to switch the aircraft's flight mode by pushing the switch to A mode (attitude), S mode (sport), or P mode (standard).

### 1.A mode (attitude)

The forward / backward obstacle sensing system, GPS positioning and downward visual positioning system are disabled; when the aircraft is not under navigation control, it will drift in a horizontal direction if the control stick is not pushed. Use of the control stick is required for real-time control.

### 2.S mode (sport)

The F mode is the enhanced mode under the P mode. The aircraft performance is enhanced, and the GPS and the downward vision positioning system is functioning. The aircraft's control sensitivity value is prompted, and the flight response is quick. Please fly with caution. In this mode, the obstacle avoidance system is disabled, and the aircraft is unable to avoid obstacles automatically.

### 3.P mode (standard)

If the GNSS signal is strong, the aircraft will be positioned through GNSS; if the GNSS signal is weak and the light conditions meet the needs of the intelligent visual positioning system, the intelligent visual positioning system will be used. If both the GNSS signal and visual assistance positioning fail, the aircraft will automatically switch to A mode to be controlled by a professional pilot.

⚠ • A mode (attitude) is a professional mode. Please do not switch to this mode unless the conditions demand it.

# Remote controller function button

| Channel | Definition |
|---|---|
| Power button | Press once to turn on / off the remote controller display screen. When the remote controller is powered off, press and hold the power button for 6 s to power it on; when the remote controller is powered on, press and hold the power button for 6 s and click the "Off" button displayed on the remote controller screen to power it off; when the remote controller is powered on, press and hold the power button for 8 s for forced shutdown. |
| Return button / system function button | Click to return to the previous interface, and double click to return to the system's homepage. For combination buttons using the return button and other buttons, refer to the "Remote Control Button Function" section for details. |
| Confirm button | Click to confirm the current operation. |
| 5D button | Up, down, left, right and re-center. |
| Intelligent return button | Press and hold to start intelligent return, and press once to cancel intelligent return. |
| E-stop button | Press once and the aircraft will carry out emergency braking and hover in place (when the GNSS or vision system is in effect). |
| Control stick | Switch flight modes in GDU Flight II. |
| Left dial wheel | Toggle to adjust the gimbal camera's pitch angle. |
| Right dial wheel | Toggle to adjust the gimbal camera's EV value. |
| Photograph button | Press to take photos. |
| Video button | Start or stop recording. |
| Flight mode switch | Switch flight modes. Includes A mode (Attitude), P mode (Standard) and S mode (Sport), which can be customized in the App. |
| C1 | Customizable function button |
| C2 | Customizable function button |
| L1 | Customizable function button |
| L2 | Customizable function button |
| R1 | Customizable function button |
| R2 | Customizable function button |

## Customizable function buttons
The controls corresponding to the customizable function buttons C1, C2, L1, L2, R1, and R2 of the remote controller can be set in the GDU Flight II App interface.

## Remote controller combination buttons
The default combination buttons on the remote controller cannot be modified. The table below lists all default combination buttons and their corresponding functions. During use, press the return button and operate another button synchronously to activate the functions in the list.

| Combination buttons | Function |
|---|---|
| Press and hold the return button + left dial wheel | Adjust screen brightness |
| Press and hold the return button + right dial wheel | Volume adjustment |
| Press and hold the return button + video button | Video recording |
| Press vand hold the return button + photograph button | Screenshot |
| Press and hold the return button + 5D button | Toggle the dial wheel upwards to enter the home page; downwards to enter the shortcut menu; to the left to enter multiple task management; and to the right to enter the App center. |

## Control of the aircraft

The remote controller supports three operation modes: American mode, Japanese mode, and Chinese mode. The control stick definitions in the three operation modes are as follows:
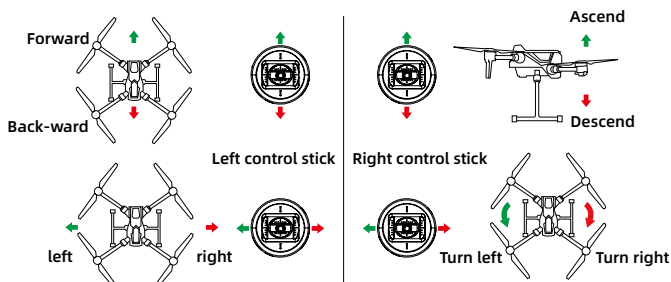
1.  American mode: The left-hand stick controls the throttle and yaw, while the right-hand stick controls pitch and roll.
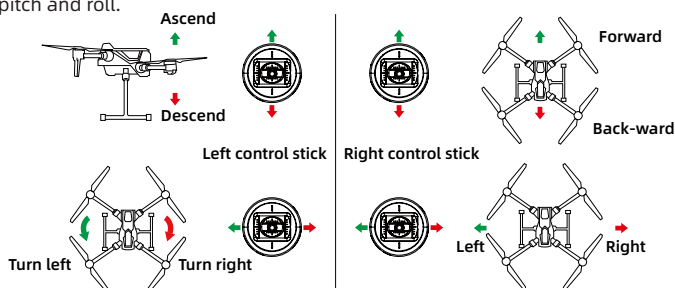


2.  Japanese mode: The left-hand stick controls pitch and yaw, while the right-hand stick controls the throttle and roll.
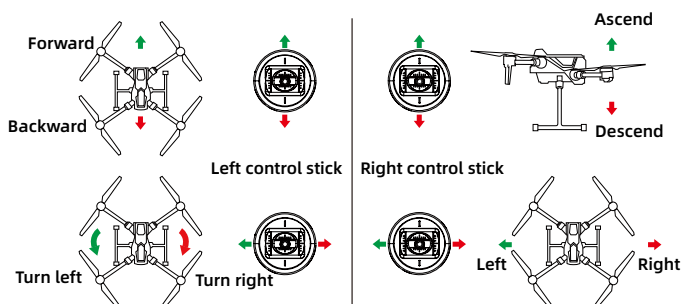


3.  Chinese mode: The left-hand stick controls pitch and roll, while the right-hand stick controls the throttle and yaw.



The default operation mode of the remote controller upon leaving the factory is American mode. You can enter the "Control Settings" interface in the GDU Flight II App or the remote controller debugging software to change the remote controller's operation mode.

## Communication range of the remote controller

When controlling the aircraft, the orientation and distance between the remote controller and the aircraft should be adjusted in time to ensure that the aircraft always remains in optimal communication range.

To obtain optimal communication range, the recommended corresponding position of the remote controller and the aircraft is shown in the figure; in addition, continuously face the antenna directly toward the aircraft to ensure optimal signal quality status between the remote controller and the aircraft.
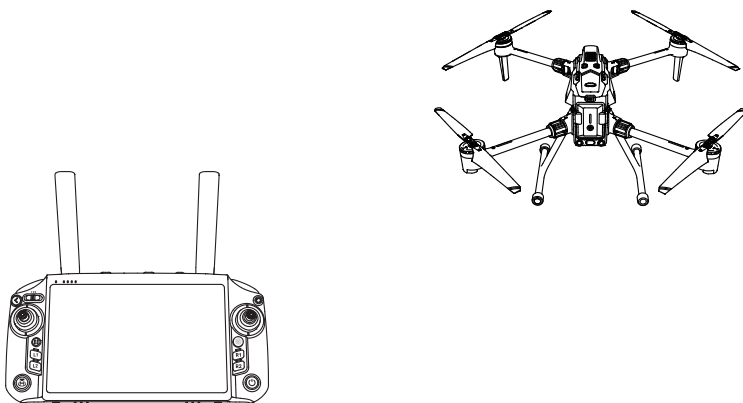


⚠ • Do not use another communication device in the same frequency band, this may interfere with the remote controller's signal.
  • During actual operation, the GDU Flight II App will issue a prompt when the video transmission signal is weak. Please adjust the antenna position based on the prompt to ensure that the aircraft is in the optimal communication range.

## Control of the gimbal camera

The user can remotely operate the gimbal and camera in real time through the photograph button, video button and dial wheel on the remote controller to execute the various functions.
The left dial wheel of the remote controller controls the pitch angle of the gimbal, and the right dial wheel adjusts the EV of the camera (left "-" and right "+" ).
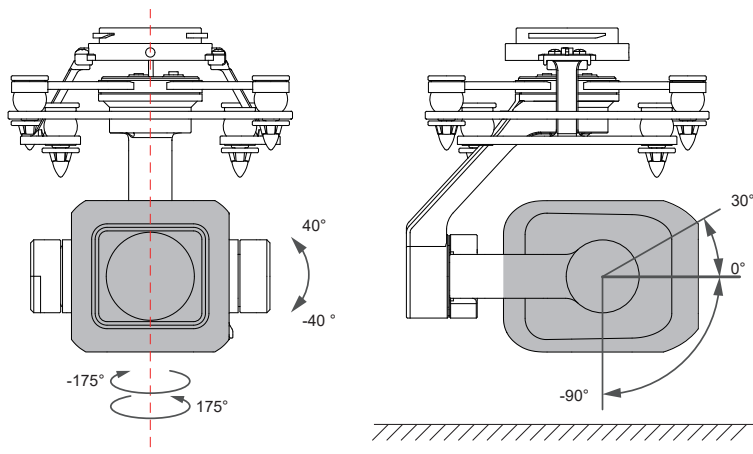


The photograph button, video button and recentering button at the bottom are all one-click operation buttons; C1 and C2 buttons can be customized in the GDU Flight II App according to your requirements.
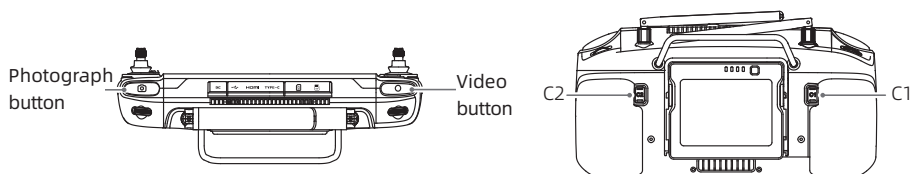


⚠ · The gimbal camera models shown in the figure are for illustration purposes only. The mounted gimbal camera configuration will vary based on the actual products used.

## IP rating

1.  The product can reach the IP54 rating stated in the IEC 60529 standards when tested under controlled lab conditions. The IP rating is not permanent and may be degraded due to wear and tear caused by long-term use.
    a.  Do not use the product under conditions of rainfall greater than 50 mm / 24 h.
    b.  Do not open any protective cover in the rain, such as the external interface cover, remote control rear cover, network card cover, air exhaust vent or air exhaust vent protective covers. Do not disassemble or assemble the control stick or antenna in the rain. Please move the remote controller to an indoor environment or shelter. Wipe the rain from the remote controller body before opening / closing each cover and assembling / disassembling the antenna.
    c.  When using the product in the rain, make sure that the external interface cover, remote control rear cover, network card cover, air exhaust vent and air exhaust vent protective covers are closed and snapped tightly, and that the control stick is tightened in place.

d.  When using the external interface, it is normal for there to be water stains around the interface after opening the cover. Wipe the water stains away before using the external interface normally.

e.  Damage caused by liquid influx is not covered by the warranty.

2.  The IP54 protection rating is not available in the following statuses:
    a.  The cover of the external interface is not snapped properly;
    b.  The remote controller rear cover is not snapped properly;
    c.   The air exhaust vent and air exhaust vent protective covers are not snapped properly;
    d.  The network card cover is not snapped properly;
    e.  The control stick is not tightened properly;
    f.  The antenna is not tightened properly;
    g.  The aircraft has other possible damages, such as a cracked shell, waterproof glue failure, etc.

## Description of the remote controller display screen

### Homepage
Turn on the remote controller to enter the home page.
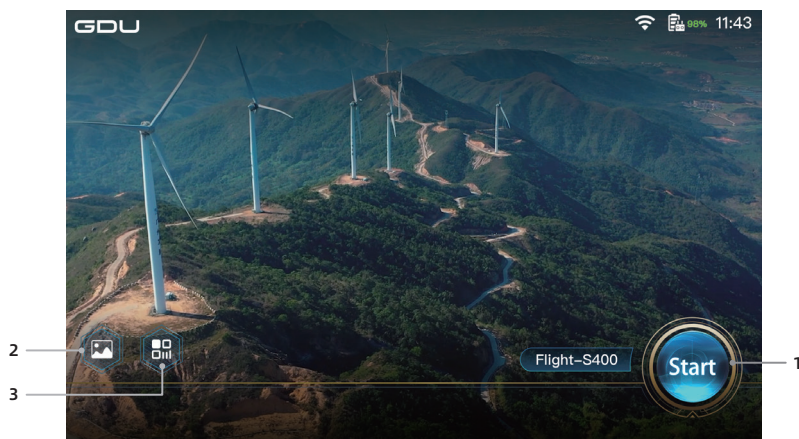


1.  **GDU Flight II App entry**
    Click "Start" to enter the GDU Flight II App. Click to log in with the GDU account to directly enter the GDU Flight II App homepage.

2.  **Album**
    Click to enter the album and check the photos and videos stored in the settings.

3.  **App information**
    Click to check all Apps in the remote controller.

## Shortcut panel interface
Swipe downward from the top of the screen on any interface to enter the shortcut panel.
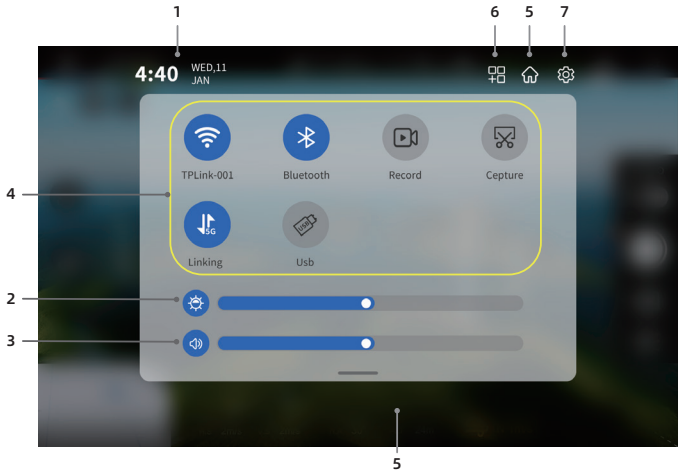


1. **Time / date**
   Current time / date on remote controller.

2. **Screen brightness adjustment**
   Drag the slider to adjust screen brightness.

3. **Volume adjustment**
   Drag the slider to adjust voice volume.

4. **Shortcut**
   WIFI: Click to turn on / off Wi-Fi network. Press and hold to select or set the Wi-Fi network.

   Bluetooth: Click to turn on / off Bluetooth connection. Press and hold to set Bluetooth connection.

   Screenshot: Click to start video recording. During video recording, the remote controller interface will display the recording time.Click "▶" to end video recording.

   Screenshot: Click once to return to the current interface to take a screenshot.

   Mobile data: Click to turn on / off mobile data connection. Press and hold to check traffic usage.

   USB: Click to turn on / off USB connection. Connect the remote controller to a computer for data import / export.

5. **Homepage**
   Click to return to the remote controller's homepage interface.

6. **Recent tasks**
   Click to check recent tasks.

7. **Settings**
   Click to enter system settings.

# GDU Flight II App

This section describes the interfaces and functions of the GDU Flight II App.

# GDU Flight II App

The GDU Flight II App is a software application which integrates a variety of professional functions to make manual flight simple and efficient. During a mission flight, the flight routes can be set through the flight planning function to control the autonomous operation of the UAV, thus simplifying the work process and improving work efficiency.

⚠ • This App is only suitable for mobile devices using Android 7.0 or above.

## Homepage

Turn on the remote controller and connect to the App to enter the home page.
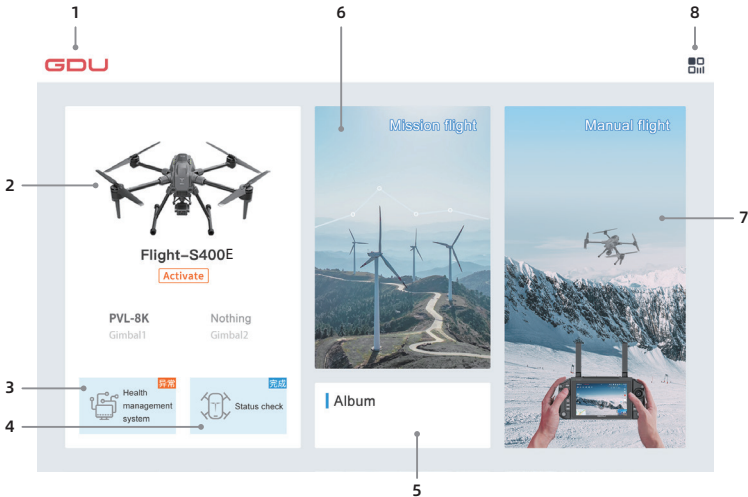


1. **Return to main interface**
   Click to return to main interface.

2. **Status bar**
   Displays the connection status between the aircraft and payload, and payload model. During first use, activate the UAV first.

3. **Health management**
   Click to check IMU, GPS, barometer, magnetometer, vision system, gimbal system, aircraft storage and battery system, UAV connection display, firmware version, log management, abnormal records and other statuses.

4. **UAV status inspection**
   Click to check UAV status. For details, refer to "UAV status inspection".

5. **Album**
   Click to check the photos and videos taken during the flight mission.

6. **Manual flight function entry**
7. **Mission flight function entry**
8. **Settings**
   Click to check the flight records, find your plane, about us, offline map, settings, etc.

⚠ • The App interface and function will be updated continuously. Please refer to the latest version.
   • The main interface shown varies slightly depending on the payloads.
   • Turn on the aircraft. When the App displays that the aircraft has been connected, upgrade the firmware as prompted. During one-button upgrade, ensure that the mobile device has been connected to the Internet.

## UAV status inspection

Before entering the flight interface, the system will check and confirm the aircraft status and important settings to ensure flight safety.
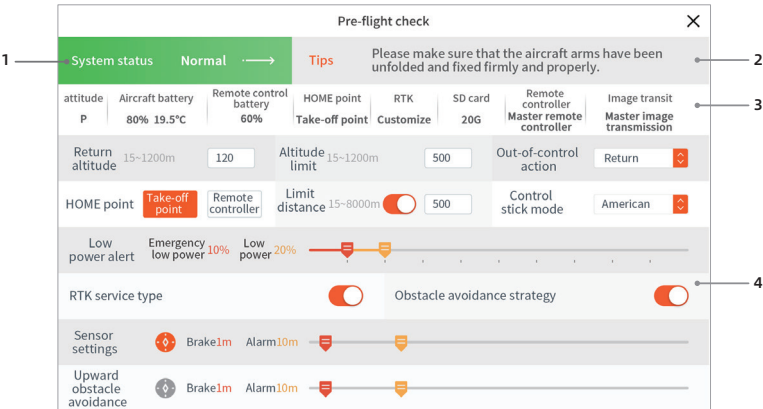


1. Aircraft system inspection: before takeoff, conduct a self-check for the aircraft system, including IMU, GPS, barometer, magnetometer, visual system, gimbal system, aircraft storage and battery system.
2. Alarm prompts.
3. Aircraft status display.
4. Flight return altitude, HOME point, low battery alert, vision sensing, 4-direction obstacle avoidance, upward obstacle avoidance and other quick settings.

## Manual flight

### Camera interface description

Click "Manual Flight" to enter the flight interface.

The text below uses the 8K gimbal camera as an example for illustration. The interface display may vary in the actual operation depending on the mounted gimbal camera.
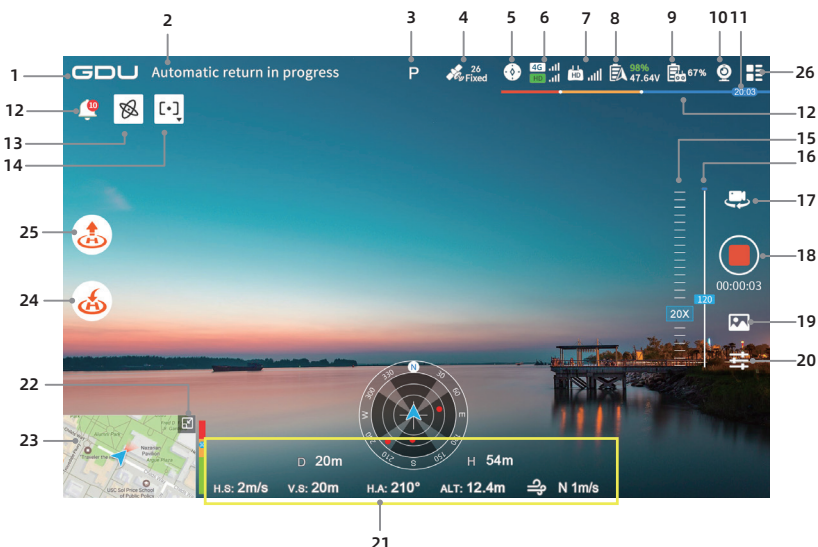


1. **Return to main interface**

   Click to return to the main interface of the App.

2. **Flight status alert**

   Display the aircraft connection status and various warning messages. Click to enter the flight inspection interface.

3. **Flight mode**

   Ⓟ Display the aircraft's current flight mode.

4. **GNSS status**

   ✖ ³¹ Fixed Display the GNSS status. After the RTK is connected, display the RTK's status information. The signals from strong to weak include Fixed, Float, 3D, and 2D.

5. **Working status of obstacle avoidance system**

   Ⓐ Display whether the current obstacle avoidance system works or not.

   When the obstacle avoidance system works, green is displayed; and otherwise, white is displayed. When all status are displayed green, it indicates that the obstacle avoidance system works; and when all status are displayed white, it indicates that the obstacle avoidance system does not work now. Please fly with caution.

6. **Aircraft video transmission**

   Display the strength of aircraft signals. GNSS is in use when the icon is green, and not in use when the icon is white.

7. **Remote controller video transmission**

   Display the strength of remote controller signals.

8. **UAV battery level**
   🔋 Display the UAV's remaining battery level and voltage.

9. **Remote controller battery level**
   🔋 Display the remote controller's remaining battery level.

10. **Livestream switch**
    👁 Transmit the gimbal view to the backend platform in a real-time manner.

11. **Intelligent battery level icon**
    ○—○—○—○ The remaining battery level and flight time of the current aircraft intelligent battery are displayed in real time. Different colors on the battery level progress bar indicate different battery level statuses. When the battery level is lower than the alert threshold, the battery icon becomes red to remind the user to land the aircraft and replace the battery as soon as possible.

12. **Message box**
    🔔 Click to read all error information.

13. **Object tracking**
    ⊕ Click to enable object tracking and intelligent tracking to automatically identify the vehicles and personnel in the screen. After all objects are identified, the aiming icon will be marked and the icon will be refreshed in real time as the object moves. When the user clicks to confirm an object, the screen will lock and track the selected object, and place it right in the center of the screen. The gimbal orientation and focal length will be automatically adjusted to ensure the clarity of the object. If there is no object on the screen that can be automatically identified, objects can be manually selected and tracked.

14. **Accompanying flight / encircling**
    Click to set accompanying flight / encircling functions.

15. **Variable power adjustment of variable power camera**
    Click to adjust the variable power of the variable power camera.

16. **Gimbal angle**
    ●———— Display the current gimbal pitch angle.

17. **Photo / video switch button**
    Photo / video 📹: Click to switch between photo / video.

18. **Photograph / video button**
    ◉/⬤ Click to trigger photo taking or to start / stop video recording. Press the photograph / video button on the remote controller to take photos / record videos.
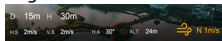
19. **Media preview**
    🖼 Click to quickly preview the photos / videos taken by the camera (non-camera's original photos / videos).

20. **Camera settings**
    ☰ Click the button to set camera parameters and control the gimbal.

21. **Flight data**

    | D: 15m | H: 30m | | |
    |---|---|---|---|
    | H.S: 2m/s | V.S: 2m/s | H.A: 30° | ALT: 24m | N 1m/s |

    D: Distance; H: relative altitude; H.S: Horizontal speed; V.S: Vertical speed; H.A: Aircraft course angle; ALT: Altitude;

    Wind direction / speed display; (for example: E4.0m/s: East wind, wind speed 4.0m/s)

22. **Map / attitude indicator switch**
    🗺 Click to switch the picture-in-picture window to map / attitude indicator.

23. **Real-time map**
    The area displays the real-time position of the UAV and the user on the map. Click to switch to the map page.

24. **One-button return**
    ⏚ Click to automatically return and land the UAV.

25. **One-button takeoff / vertical landing**
    ⏚/ ⏚ Before takeoff, display the one-button takeoff button; and after takeoff, display the vertical landing button.

26. **Settings**
    Click ▤ to enter the Settings menu where you can set various module parameters.

    Flight settings: Includes altitude limit switch, altitude limit, distance limit switch, return altitude, return speed and lost communication. It is permitted to switch the flight mode, advanced settings, sensor status, etc.

    Intelligent batteries: Includes battery voltage difference, temperature, voltage, current, battery level and number of cycles, as well as setting the low battery alert value and emergency low battery alert value.

    Video transmission settings: Includes video transmission mode, current server address, HDMI view screen output, channel mode, modulation bandwidth and noise.

    RTK settings: Includes service type and corresponding parameter settings and status display, and RTK single-point assistance.

    Remote controller settings: Includes control stick mode, remote controller customizable button, remote controller pairing and advanced networking mode.

    Sensor settings: Includes vision sensing, obstacle avoidance strategy and corresponding parameter setting and status display, display radar chart, auxiliary light, enabling of landing protection, obstacle avoidance switch during return and upper TOF switch.

    Gimbal settings: Includes video size, photo resolution, gimbal mode, gimbal drift calibration, storage capacity and gimbal rotation speed.

    Slow starting / stopping of pitch and slow starting / stopping of yaw.

    General settings: Includes display grids, sound prompts, attitude prompts, parameter units, video livestream, ADS-B switch, ESC beep, aircraft information and mounting payload.

## Map interface description

Click to switch the map thumbnail to the map interface.
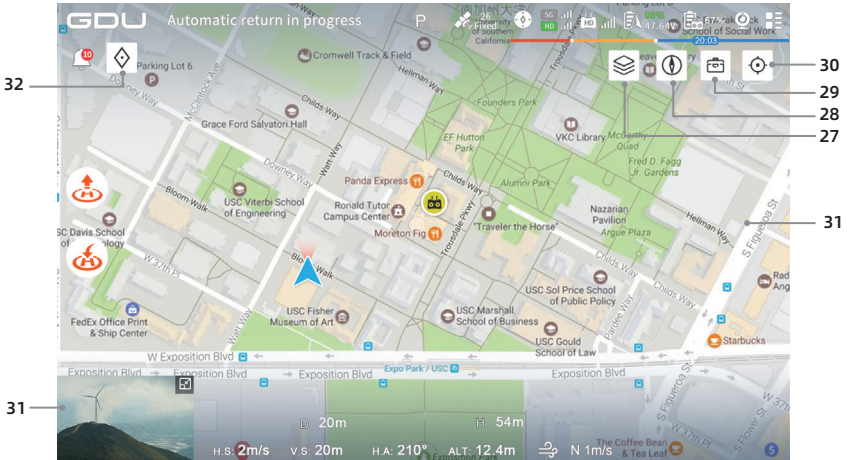


27. **Map style switching**

    ⬳ Click to change the map display style between normal map and satellite map.

28. **Orientation lock**

    ⦿ Click to lock the mobile device map orientation. After locking, the orientation on the map is always facing north.

29. **Toolbox**

    ⬒ Click to use ranging / side area function.

30. **Positioning**

    ⊕ Click to see the current position of the aircraft.

31. **Camera interface switching**

    Click to switch to the camera interface.

32. **Point marking and positioning**

    Click to mark a point on the map center.

    b) Point marking on the map interface: Click ◇ to mark a point on the map center. After selection, the interface will display the point position name and number, aircraft altitude (namely, the aircraft altitude while recording the point), relative altitude, altitude, and latitude and longitude.

    The selected point can be edited as follows:

    1. Set the point as HOME point. 2. Edit the point position, including its name, latitude and longitude, altitude, and marked color. 3. The point can be deleted.

    After entering the editing status, the point position can be changed by dragging it on the map

⚠ • The App interface language must be the same as the mobile device's system language. To change the interface language, please change the mobile device's system language first.
   • The interface shown varies slightly depending on the payloads.
   • The App interface and function will be updated continuously. Please refer to the latest version.

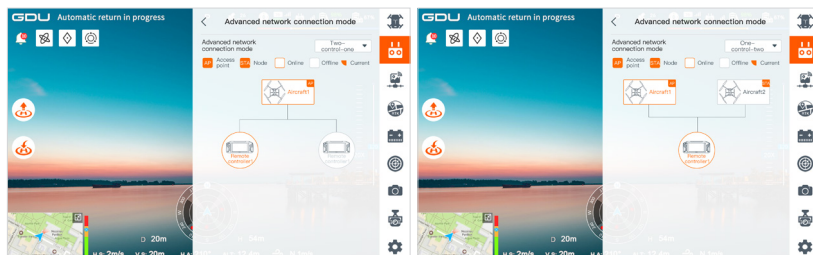# Advanced networking mode

## Introduction

The S400E supports an advanced networking mode which is suitable for controlling one aircraft using multiple remote control terminals and controlling several aircraft with one remote control terminal. Based on the equal weight design principle (in other words, the roles of multiple remote controllers are not distinguished), after pairing is finished, all remote controllers can establish flight control over the UAV. During operation, the pilot can assign flight control over the aircraft and view display control as required to allow the user to be more focused and efficient during operation. There are two types of control operation parameters: Flight control and view display control. When a remote controller has the flight control assigned to it, it can control the flight; when the remote controller has the view display control assigned to it, it can display the real-time view of the current aircraft.

## Setting of the advanced networking mode

Before using the advanced networking mode, it is necessary to set the pairing of the remote controller and UAV respectively. Refer to the steps below:

**Build a network in networking mode:**

1. Select one set of one-to-one-paired aircraft and remote controller (if the aircraft is not paired with the remote controller, please pair it based on the one-to-one pairing mode);
2. Run the GDU Flight II App and click "▋▋▋" to enter the "Settings" interface and "Remote Controller Settings" interface;
3. Enter the Level 2 page in Advanced Networking mode. In the "Networking Mode" drop-down list, select the required Networking Mode (default: 1-to-1 mode);
4. After switching the Networking Mode interface, an empty gray node icon will Appear on the App networking interface. Operate other nodes (remote controller or aircraft) to be added to the network; enter the pairing status and click the empty node on the App networking interface; a prompt stating "Paired sent successfully" will Appear on the App networking interface;



5. When the network receives the addition of an empty node, the original remote controller will be temporarily disconnected. When the empty node is added, check the topology icon of the Advanced Networking mode interface in the App. If it is green, this indicates that the network connection was successful and the device is online.
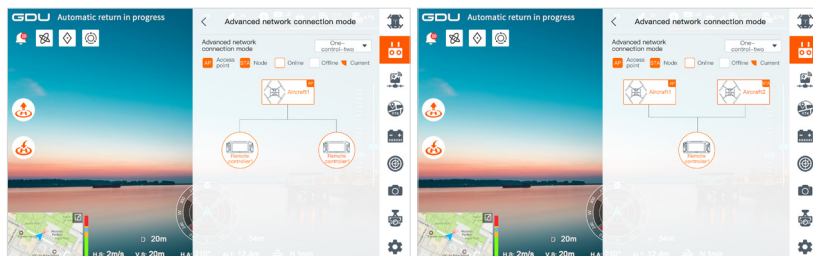
## Advanced networking description

1. Ensure that the first remote controller has been paired and connected to the aircraft. By default, the remote controller connected first has the control right over all devices (flight control right, view display control right), and the remote controller connected later can be repaired after the remote controller connected first assigns an unpaired node position.

2. When the remote controller has authorization to control devices (aircraft, gimbal camera, view display), it can control the device using the control stick, dial, shortcut key, UI icon, and other functions. The usage method is the same as using the remote controller alone.

3. The user can click to select the aircraft to be controlled and obtain the flight control permissions and view display control right over this aircraft. They can press and hold the aircraft to be controlled to only obtain the flight control right. Only a remote controller with flight control right can enable the function to return or cancel the return.

4. By default, the Advanced Network icon on the Flight Control interface is in the Networking Mode (namely, one remote controller controls one aircraft). In addition, this icon is not displayed. This icon is displayed in the non-default Networking mode to obtain the number of specified aircraft in the current Networking mode (including online, offline, and unpaired statuses).

5. In multi-control operation scenarios, when one remote controller loses communication with the aircraft, a message notification will be triggered. The user can manually select whether to take over the flight control rights. When the online remote controller opts not to take over the flight control rights, the aircraft will execute the lost communication solution. When the online remote controller fails to make a decision within specified time, the aircraft will also execute the lost communication solution.

6. During flight operation, when a remote controller that has lost communication is connected to the aircraft again, it is defaulted to have control over all devices.

7. All remote controllers can set the operation of devices related to flight, including flight control software, sensing system, battery, and video transmission settings provided that the flight control permission has been granted.

8. When no operation mission is being executed, the node can be removed by pressing and holding the paired node on the "Networking Mode Settings" page. After the node is removed, the node position will be adjusted to be unpaired, and the device's networking status will be reset. To pair the device again, a paired remote controller is required to specify an unpaired node position and connect the node to the network again after pairing.

9. When no operation mission is being executed, the networking mode can be set on the "Networking Mode Settings" page. When the number of devices in setting mode decreases, and this type of node has been connected to all corresponding device, it is required to manually remove excessive node devices to finish the mode switch; when the number of devices in setting mode increases, the total number of devices is restricted to 2-3, including the aircraft and remote controller.

10. The node type, node number, and node sequence in the Networking Mode cannot be changed.

11. When all nodes in the Networking Mode are paired, the device cannot be connected before specifying an unpaired node; however, the remote controller in the first node can be replaced for connecting through the default remote controller pairing mode. This is Applicable to initial pairing, a lost remote controller, and other scenarios.

**Description of video transmission**

The S400E aircraft adopts the professional video transmission technology developed by GDU that supports dual-channel 1080p video transmission and the operation of a single remote controller or multiple remote controllers

⚠ · The video transmission resolution is limited by the output capacity of different payloads. Please refer to the actual display.

## Advanced network connection function

### Operation interface description:
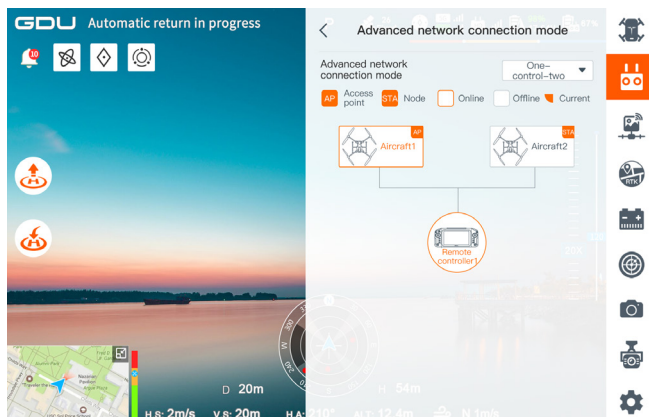




By default, there is no control right, and only the images can be viewed.



Double click to gain/cancel the control right (with a small green remote controller icon appeared) so as to control the selected aircraft. By default, there is no control right, and only the images can be viewed.



Press and hold to lock/unlock the control right (with a small golden lock appeared), so as to lock the control right. Then, the remaining remote controllers cannot be obtained.

# Mission flight

On the home page of the APP,entering the route mission list by clicking Mission Flight, you can view the created missions, or create new route flight, 2D flight, 3D flight and waypoint flight missions. All four route missions can be directly planned and generated through the APP. The mission flight function is illustrated by taking the route flight mission as an example.
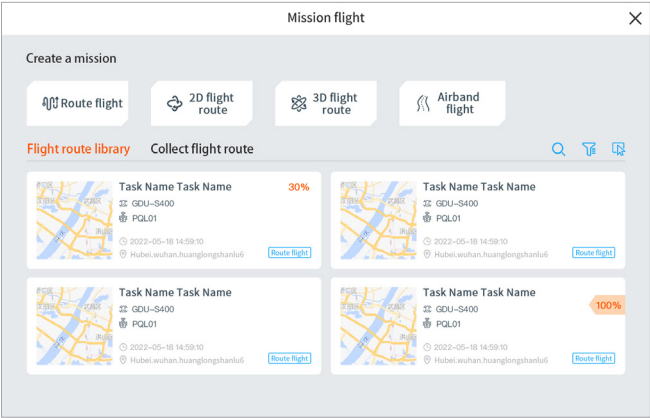


## Waypoint flight

Click waypoint flight to select the track mission in the mission list so as to execute the track mission; or create a new flight route mission.
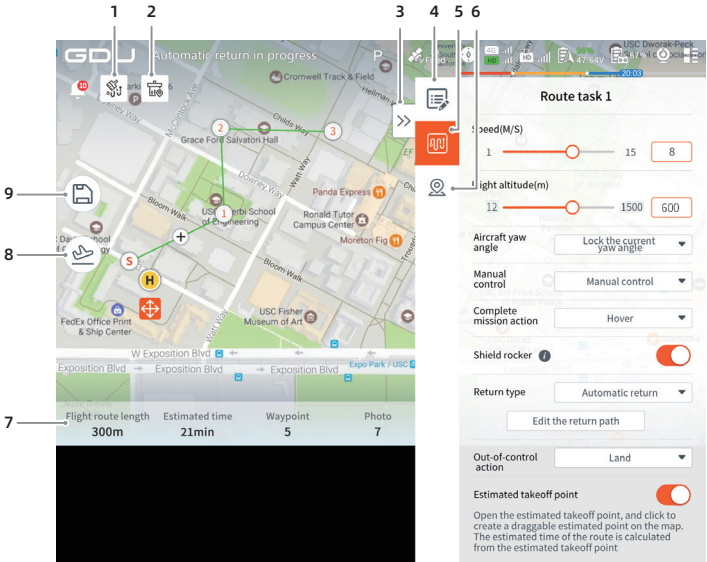
Click the map to add waypoints, then set the flight route and waypoints.

1. **Clear flight route**
   ⚙↑ : Click to clear the added flight route.

2. **Delete waypoints**
   🗑: Click to delete the currently selected waypoint.

3. **Expanding / closing**
   ≪ / ≫ Click to expand / close the taskbar.

4. **Edit mission**
   Click to edit the flight route name (the aircraft is displayed as GDU-S400E) and set the payload selection and altitude mode.

5. **Flight route editing**
   Edit the entire flight route including speed, altitude, aircraft's course angle, gimbal control, completed mission action, shielding control stick, return type, out-of-control action and estimated takeoff point.

6. **Waypoint editing**
   Select the waypoint to be edited, and set a single waypoint. Waypoint settings include speed, relative takeoff point altitude, aircraft course, waypoint type, gimbal pitch angle, waypoint action and longitude / latitude.

7. **Flight route information**
   Displays the flight route length, estimated time, number of waypoints and number of estimated photos.

8. **Flight**
   Click to access the UAV status inspection list in App and check the parameters and flight status. Click "Start flight" to execute the current flight route mission.

9. **Mission saving**
   📄 Click to save the current parameters and create a flight route.

## Aircraft point position collection

Click "Flight Route Flight" - "Aircraft Point Collection" to enter waypoint editing.
When the aircraft's takeoff altitude is above 10 m, click the Point Collection icon to record the aircraft's current latitude, longitude, and altitude as the waypoint. The App will calculate the flight route length and estimated flight time based on the number of waypoints.
Enter mission flight and select a flight route to import in the top right corner.

1. Generate files in XML, KML or KMZ format through the platform, and import the files into the mobile device file folder.
2. Select the required file and import it into the mission list to enter offline waypoint editing.

⚠ • When the user selects to respond to lost communication, please enter Flight Settings to set lost communication.
   • When the user selects not to respond to the lost communication settings, if the aircraft and the remote controller cannot communicate normally, the flight track mission can continue.
   • Complete the execution.
   • During the aircraft point collection, the aircraft altitude is above 10 m.
   • When the aircraft is in "A" mode, it is unable to automatically return or land; if the aircraft enters "A" mode during auto return or auto landing, it will automatically exit auto return or auto landing.

# Flight

This chapter introduces flight precautions, flight restricted areas and aircraft precautions

# Flight

Before a normal flight, please ask the professionals to conduct flight training and guidance training. During flight, please choose an appropriate flight environment to ensure the flight safety. Before a flight, be sure to read the Disclaimer and Safety Guidelines to learn safety precautions.
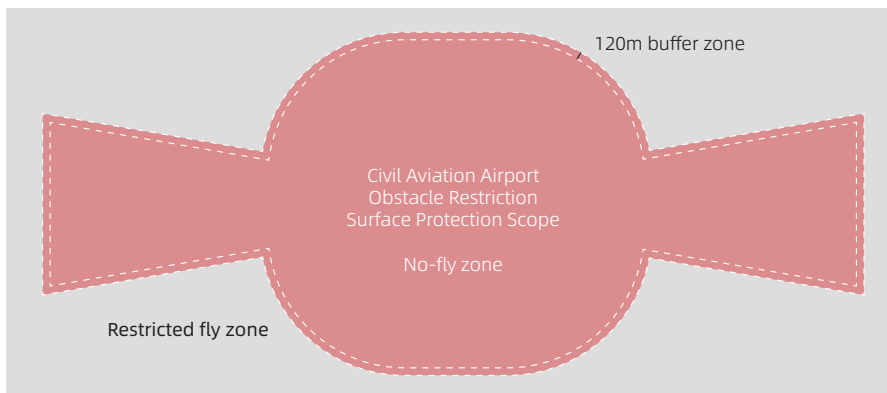
## Flight restriction functions

### No-fly zone

The no-fly zone is based on the 12 coordinate points of the restriction surface and tolerance buffer zone of civil airport obstacles published by the Civil Aviation Administration. The aircraft cannot take off in a no-fly zone. When approaching from an external area to the buffer zone at the no-fly zone boundary, the aircraft will automatically decelerate and hover.

When the aircraft enters a no-fly zone due to special reasons, the forced landing function will be triggered. At this point, the aircraft will be forced to land. During descending, the aircraft can move in the horizontal direction, but the control stick cannot be pushed upwards.

The altitude limit zone is a rectangle area of roughly 20km wide and 40km long by extending the midpoints at both ends of the runway outward for 20km, and extending for 10km along the two sides of the runway (the non-intersect part with the no-fly zone). In the altitude limit zone, the aircraft's flight altitude is restricted to 120m.



120m buffer zone

Civil Aviation Airport
Obstacle Restriction
Surface Protection Scope

No-fly zone

Restricted fly zone

## Flight environment requirements

1. No flight is allowed in severe weather conditions, such as heavy winds (with wind speed > 15 m/s). When flying in the rain, be sure to follow the IP rating requirements. Please read details of IP45 rating description.
2. Select an open area without tall buildings around as the flight site. Buildings with a large amount of reinforcing steel bars will affect the compass usage, and block GNSS signals, resulting in a poor effect or even failure of aircraft positioning. Please fly as prompted in the App.
3. During flight, please use the aircraft only within your own visual range, and avoid any obstacles, people, water, etc.
4. DO NOT use the product in close proximity to high-voltage cables when RTK mode is not enabled.
5. DO NOT use the product in proximity to communications base stations or towers, as they are prone to interfere with communication signals.
6. In high altitude areas, environmental factors may result in aircraft battery and propulsion system performance impairment, thus affecting the flight performance. Please fly with caution.
7. In the antarctic circle and arctic circle, the aircraft cannot fly in P mode. Please fly with caution.

## Buffer zone

The buffer zone is the zone by extending the no-fly zone outwards by 120m.

1. When the aircraft approaches to the buffer zone, the App starts to prompt the user that the aircraft is approaching the no-fly zone. Please note the flight direction.
2. When the aircraft enters the buffer zone, the same will start automatic braking until hovering. Within the buffer zone, pushing the control stick towards the no-fly zone direction will not work. However, the control stick can be pushed in other directions within the altitude limit range.

## Mission flight

1. When the mission flight route is within the no-fly zone, the aircraft cannot take off and cannot execute the mission.
2. In the restricted zone, when the point height of the flight route mission does not exceed the 120m altitude limit, the mission can be executed normally; and when the set altitude is higher than the 120 m altitude limit, the aircraft will hover at 120m.
3. When the waypoint A in the flight route is within the restricted zone, and waypoint B is outside the restricted zone and above the altitude limit, the aircraft will first fly to the altitude limit A1 and move horizontally out of the restricted zone to A2 position. Then, it will adjust the altitude to B point altitude and reach the A3 position to execute the mission. As shown in the figure below:
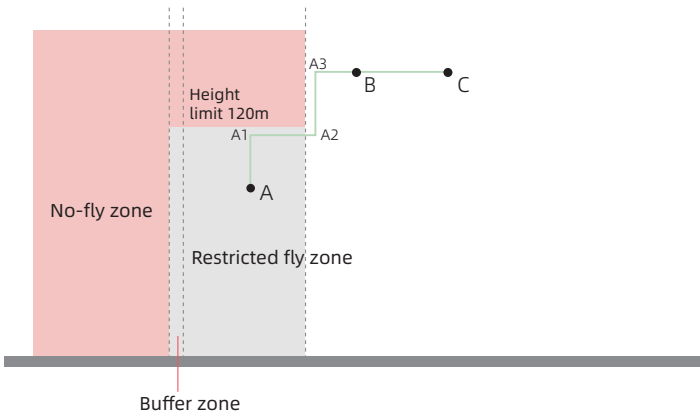
## Pre-flight check

- Carefully check whether all parts of the aircraft are in good condition. If there are any cracks or damage, please stop flying.
- Check whether the battery, remote controller, and mobile device have sufficient battery level.
- Ensure that the arms as well as the landing gear are unfolded and make sure the propellers are installed firmly.
- Ensure that the remote controller is properly connected to the aircraft.
- Check whether all firmware versions are the latest and whether the app is properly connected to the remote controller.
- Ensure that "Normal flight" is displayed on the app camera interface.
- Check whether the motor and gimbal are functioning after the aircraft is powered on.

## Compass Calibration

If you are using the aircraft for the first time or if the flight area changes significantly, please calibrate the sensor.

Calibration method: When the green light is solid on, open the App, enter "Flight Settings" - "Sensor Status" - "Compass", enter the interface and click "Calibrate" to enter calibration mode. The aircraft indicator light is yellow and solid on.

1) Rotate the aircraft clockwise in the horizontal direction, the App prompts "horizontal calibration successful", the indicator light flashes white, vertical calibration can be performed.
2) Rotate the aircraft clockwise in the vertical direction, and wait for the app to prompt "vertical calibration successful", the indicator light is green and solid on, means calibration completed.
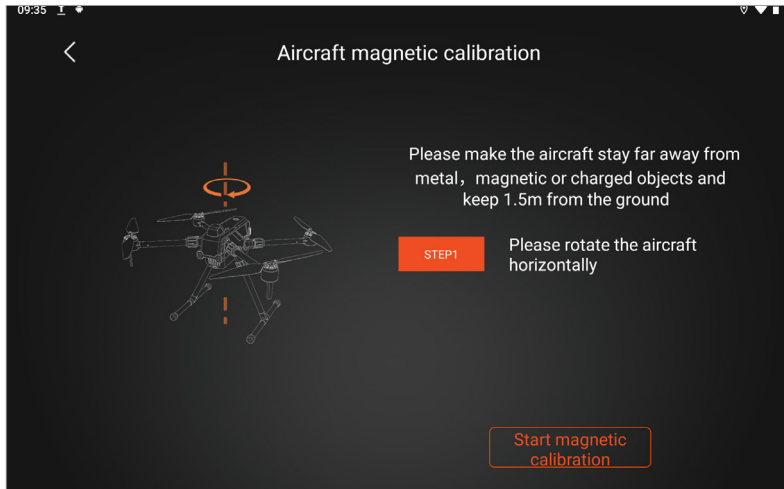
## Takeoff/landing

Takeoff: Click "One-button take-off ", in the app. The aircraft will take off and ascend to 1.5m for hovering; or push the control stick to the inner corner to unlock the aircraft motor startup. Push the throttle stick upwards.

Landing: Press or click the "one-button return " / "vertical landing" ; on the remote controller;Or, push the throttle stick downward until the aircraft lands , After maintaining this status for 2 seconds, the motor will stop. After flight, please power off the aircraft and remote controller in succession.

⚠ • Before takeoff, the user should face the tail and keep an appropriate safety distance from the place where the aircraft is located.
  • Do not unlock and launch the aircraft from a slope that is at a substantial incline.

# Appendix

# Technical specifications

S400E technical indexes

| Entire machine | |
|---|---|
| Dimension | Folded (including propellers): 347×367×424mm (L×W×H)<br>Unfolded (including propellers): 950×995×424mm (L×W×H)<br>Unfolded (excluding propellers): 549×592×424mm (L×W×H) |
| Maximum flight time | No load: 58min |
| Symmetrical motor diagonal distance | ≤ 725mm |
| Weight | 2.35kg Left and right (excluding batteries) |
| Maximum takeoff weight | 7kg |
| Maximum payload | 3kg (Under the maximum payload, the maximum safe flight speed is only 15m/s) |
| Noise | ≤ 58dB@5m position |
| Propeller | 1866 folded propellers |
| Flight control software performance index | |
| Hovering accuracy (GNSS) | Horizontal: ±1.5m (with GNSS positioning)<br>Vertical: ±0.5m (with GNSS positioning) |
| Hovering accuracy (with vision positioning) | Horizontal: ±0.3m (with GNSS positioning)<br>Vertical: ±0.3m (with GNSS positioning) |
| Hovering accuracy (RTK) | Horizontal: ±0.1m (with RTK positioning)<br>Vertical: ±0.1m (with RTK positioning) |
| RTK position accuracy | When RTK is fixed:<br>1cm+1ppm (horizontal)<br>1.5cm+1ppm (vertical) |
| Maximum angular velocity | Pitch axis: 200°/s<br>Yaw axis: 100°/s |
| Maximum pitch angle | 30° (45° during emergent braking and startup) |
| Maximum ascent speed | S mode: 5 m/s<br>P mode: 4 m/s |
| Maximum descent speed | S mode: 4 m/s<br>P mode: 3 m/s |
| Maximum wind resistance | 15 m/s (Level VII)<br>The maximum wind resistance is 12m/s during taking off and landing. |
| Maximum flight speed | S mode: 23 m/s<br>P mode: 15 m/s |
| GNSS satellite search time | Cold-startup satellite search time: ≤3.5 minutes<br>Hot-startup satellite search time: ≤50 seconds |
| IP rating | IP45 |
| Operating temperature | -20°C~55°C |
| Maximum takeoff altitude | 5000m |

| | |
|---|---|
| **Visual system** | |
| Obstacle sensing range (Buildings, trees, telegraph poles, and pylons above 10 m) | Front: 0.7 m ~ 40 m (the maximum detection distance is 80 m for large-size metal objects)<br>Left and right: 0.6 m ~30 m (For large-size metal objects, the maximum detection distance is 40 m)<br>Up, down, and rear: 0.6 m ~ 25 m |
| Operating environment | Surfaces with clear patterns and adequate lighting (> 15 lux, normal lighting environment under fluorescent lamps indoor) |
| **Compatible gimbal** | |
| Gimbal types | PVL-8K gimbal camera, PDL-300 thermal & visible dual gimbal camera, PDL-1K dual-lens gimbal camera, PQL01 quad-sensor gimbal camera |
| Gimbal mechanical interface | Gimbal payload standard interface |
| Data interface | Second-generation extension interfaces |
| **Video transmission** | |
| Video transmission distance | 15 km (maximum distance in a line-of-sight and unobstructed environment) |
| **Remote controller** | |
| **General** | |
| Display | 7.02-inch touch LCD display with a resolution of 1920 × 1200 and a highest brightest of 1000 cb/m2 |
| Dimensions (folded antenna) | 268x139x103 mm (LxWxH) |
| Weight | Approximately 1 kg (excluding the external battery)<br>Approximate 1.25 kg (including external battery) |
| Internal battery | Li-ion: 7000mAh@7.2V |
| External battery | Li-ion: 7000mAh@7.2V |
| Maximum battery life | Built-in battery: 3 hours<br>Internal battery + external battery: 6 hours |
| IP rating | IP54 |
| Operating ambient temperature | -20℃~50℃ |
| **Professional Generation 2 video transmission** | |
| Operating frequency | 2.400-2.4835GHz; 5.725-5.850GHz; |
| Maximum signal effective distance (free of interference and obstacles) | 15 km (FCC); 8 km (CE / SRRC / MIC) |
| Equivalent omnidirectional radiated power (EIRP) | 2.4GHz；＜28dBm（FCC）；＜20dBm（CE/SRRC/MIC）<br>5.8GHz；＜25dBm（FCC）；＜14dBm（CE）；＜23dBm（SRRC） |

| WiFi | |
|---|---|
| Protocol | 802.11 / a / b / g / n / ac |
| Operating frequency | 2.400-2.4835GHz; 5.725-5.850GHz; |
| Equivalent omnidirectional radiated power (EIRP) | 2.4GHZ：＜14dBm（FCC）；＜12dBm（CE/SRRC/MIC） 5.8GHZ：＜12dBm（FCC/SRRC）；＜12dBm（CE） |
| **Bluetooth** | |
| Protocol | Bluetooth 4.2 |
| Operating frequency | 2.400-2.4835 GHz; |
| Equivalent omnidirectional radiated power (EIRP) | ＜8dBm |
| Video transmission distance | 15 km (maximum distance in a line-of-sight and unobstructed environment) |
| **Battery** | |
| Battery capacity | 16400mAh |
| Voltage | 23.1V |
| Battery type | Li ion  6S |
| Energy | 379Wh |
| Overall battery weight | About 1.7kg |
| Operating ambient temperature | -20℃~55℃ |
| Ideal storage temperature | 22℃~30℃ |
| Charging environment temperature | 5℃~45℃ (charging at low temperature will reduce the battery life) |
| Charging time | It takes about 120 minutes to fully charge using the standard charger |
| **FPV camera** | |
| Resolution | 1080P |
| FOV | 132° |
| Frequency | 30 fps |

## Firmware update

### Remote controller upgrading steps

S400E remote controller firmware upgrade

Use the remote controller's parameter adjustment tool for performing upgrades:

1. Visit the official website to download the remote controller's firmware upgrade package and the remote controller's parameter adjustment tool.
2. When the remote controller is powered off, use the Micro USB cable to connect the Micro USB interface on the bottom of the remote controller to the computer.
3. Launch the remote controller parameter adjustment tool and power on the remote controller.
4. Click "Start Connection" and check whether the remote controller's connection status is normal.
5. Click "Firmware Upgrade." Select the downloaded remote controller's firmware upgrade package and open the file to start the upgrade.
6. Wait until the remote controller upgrade is completed. After upgrading, the remote controller will power off automatically.
7. Manually restart the remote controller. Click "Start Connection" to check the new remote controller's firmware version number.

⚠ ・ When upgrading, ensure that remote controller's battery level is above 20%.
　 ・ Do not plug or unplug the USB cable while upgrading.

### Aircraft upgrading steps

1. Launch the GDU Flight II App to automatically enter the firmware testing status.
2. If there are different versions, a prompt to upgrade will appear on the interface. Click "upgrade immediately" to begin downloading the firmware installation package.
3. After downloading, the firmware installation package will be installed automatically.
4. After upgrading, please restart the device.

## S400E payload compatibility table

S400E supports a single downward gimbal. For compatible payloads, refer to the table below.

| Number | Product name | Model |
|--------|--------------|-------|
| 1 | 8K camera | PVL-8K |
| 2 | Thermal & visible dual camera | PDL-300 |
| 3 | 1K infrared thermal & visible dual camera | PDL-1K |
| 4 | Quad-sensor camera | PQL01 |

## Use the multi-payload module

The multi-payload module is used to mount the gimbal camera to the bottom of the S400E aircraft.

### Installation steps of dual-payload module:

1. Press the rotating ring button on the dual-payload module and rotate it clockwise to the left.
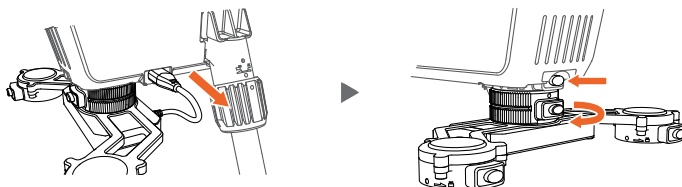2. Align the dual-payload module and the red point on the UAV payload interface.
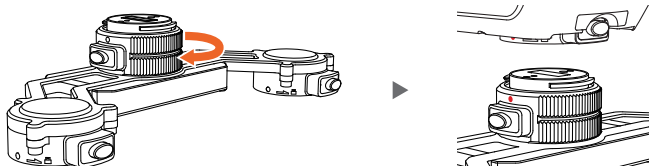


3. Rotate the rotating ring by 90° based on the direction shown in the figure to lock it tightly. After locking, the support will be fixed and unable to rotate.
4. After the multi-payload module is attached firmly, connect the power connection cable with the external power supply port. Then, the multi-payload module can be used.
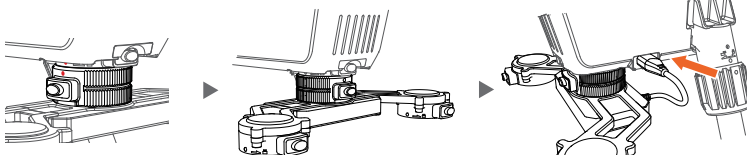


### Removal steps for the dual-payload module:

1. Remove the power connection cable from the external power port of the aircraft.
2. Press the upper payload interface button and rotate the multi-payload module clockwise to make it disengage from the center position.



3. Press the lower multi-payload module rotating ring button and rotate the rotating ring of multi-payload module by 90° based on the direction shown in the figure until it is aligned with the red point on the UAV payload interface. Then, remove the multi-payload module downward.
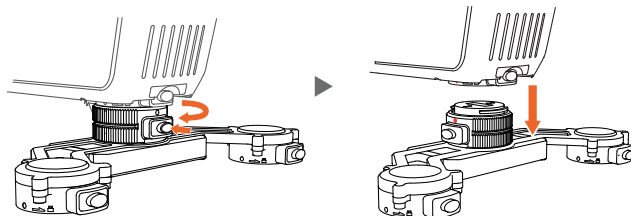


⚠ • During installation and removal, rotate the support of the multi-payload module to help increase the speed of installation and removal

## Using the night navigation light component

The night navigation light is installed on the top of the aircraft to facilitate lighting at night or poorly-lit environments. Turning the night navigation on/off and causing it to blink can be controlled through the app.

### Installation

Please follow the steps below to install the kit in the aircraft.

1. Remove the fuselage's decorative cover first.
2. Fix the night navigation light on the top of the aircraft and tighten the screws.
3. Insert the power cable into the top interface of the aircraft.
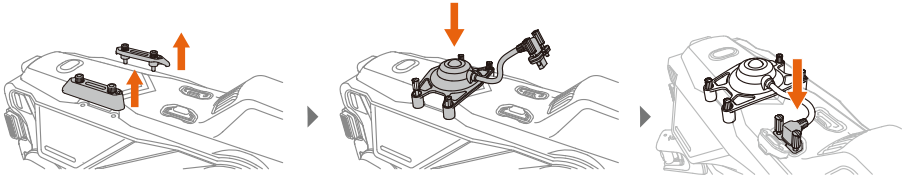


## Using the FPV component

The FPV component is a camera device installed at the bottom of the S400E aircraft for fixing the direction. It can also be used with another payload.
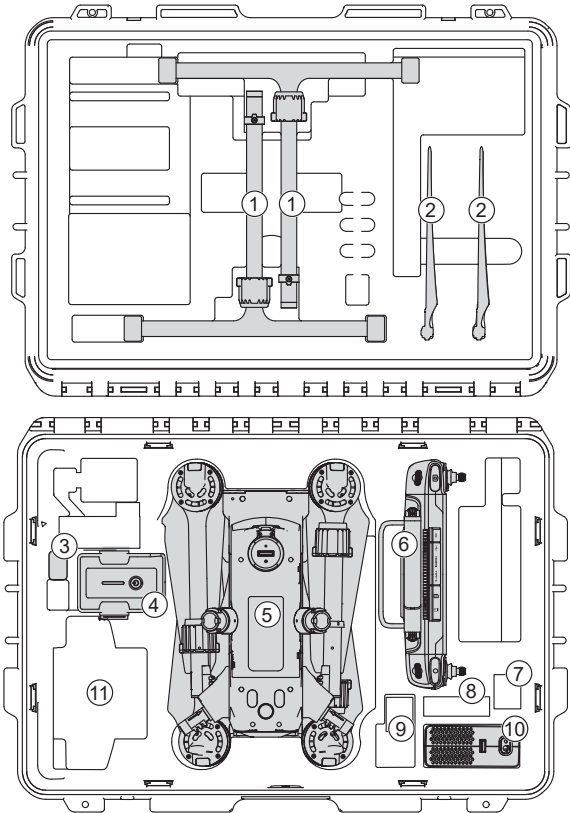
### Installation

Please follow the steps below to install the kit in the aircraft.

1. Press the payload unlocking button to remove the protective cover.
2. Align the red point on the payload interface and insert the gimbal into the installation position.
3. Rotate it by 90° based on the direction shown on the casing to lock it.
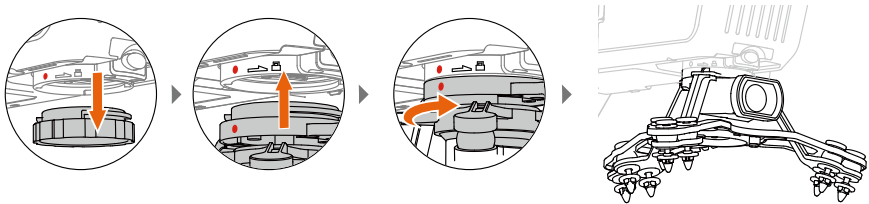
# Transportation box description



1   Landing gear
2   Backup propellers
3   Card reader
4   Aircraft battery
5   Aircraft
6   Remote controller
7   Remote controller neck strap
8   SD card
9   Charger adapter
10  Charger
11  Screwdriver set