TAKEOFF

User Manual

Ver. 3.10-US1



10/13/2026

NOTICE: Read this manual in its entirety before using the Takeoff software. Also, read the manuals for the ACSL industrial aircraft before using the aircraft.

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Chapter 1

Precautions

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1.1 Introduction

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1.1.2 Warning

- Before using this product, read carefully and fully understand the following safety precautions and instructions.
- Follow the warnings in this manual. Failure to do so may result in personal injury or property damage.

1.1.3 Definitions – Classifications of Alert Symbols

In this manual, and on the product itself, the following classification of alert symbols is used in conjunction with the headings “WARNING”, “CAUTION” and “ADVISORY”. These symbols are deployed to ensure safe and proper use of the product and to prevent property damage and injury to the user or to others.
The symbols and their meanings are shown below. Please read carefully and understand the meaning of each.



This symbol is the safety alert symbol.
This symbol is used to alert you to hazards that could potentially harm people.
To avoid possible injury or death, follow all safety instructions that follow this symbol.



WARNING

This symbol indicates that failure to follow the associated guidance could result in death or serious injury.



CAUTION

This symbol indicates that failure to follow the associated guidance could result in minor or moderate injuries.



ADVISORY

This symbol indicates that failure to follow the associated guidance could result in malfunction or failure of the product, or damage to other property.

1.2 Ensuring Safe Use

1.2.1 About TAKEOFF

- This document describes how to use the ACSL TAKEOFF Ground Control Application (hereto referred to as “TAKEOFF”) to perform flight monitoring, flight planning, and various other functions to manage and control industrial aircrafts manufactured by ACSL.

1.2.2 License

TAKEOFF Software License Agreement

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12. **Export Control.** The Licensed Materials are not intended for export, re-export or use outside of the United States. If Licensee intends to bring or use any of the Licensed Materials outside of the United States, Licensor shall first obtain the written consent of Licensor and comply with all Laws related to export control of the United States, including the Export Administration Regulations ("**EAR**"), as well as any other applicable Laws of any country or jurisdiction that may apply to the export of the Licensed Materials from the United States. Licensor will not be responsible for Licensee's export, re-export or use of the Licensed Materials outside the United States and for any sanctions, fines, or other penalties imposed by the governments of any country due to violations of any export control Laws or other Laws.

13. **Force Majeure.** Any delay in the performance of any duties or obligations of Licensor that is caused by an event beyond the reasonable control of Licensor, including, but not limited to strikes, walkouts or other labor disputes, shortages of materials, losses of power or Internet connectivity, natural disasters (including, but not limited to, fires, earthquakes, floods, hurricanes, or tornados), states of war, pandemics, epidemics, acts of any government or quasi-governmental authority, changes in Law, acts of any third party (including, but not limited to, any act of terrorism, theft, hacking, ransomware, or similar event), shall not be considered a breach of this Agreement if Licensor uses commercially reasonable efforts, under the circumstances, to resume performance as soon as possible.

14. **Applicable Law.** This Agreement is governed by and interpreted in accordance with the internal Laws of the nation of Japan without regard to the conflicts of laws.

15. **Arbitration.** Any and all disputes, Actions, or claims arising out of, relating to, or in connection with this Agreement, Licensee's use of the Licensed Materials, or any other aspect of Licensor and Licensee's relationship shall be resolved solely and exclusively through binding and final arbitration, rather than a court, in accordance with the Commercial Arbitration Rules of the Japan Commercial Arbitration Association. Judgment on any arbitral award, as well as actions for provisional relief by Licensor in accordance with Section 17 or actions to compel arbitration may be initiated or entered in any court having jurisdiction. The place of arbitration shall be Tokyo, Japan and the language of arbitration shall be Japanese. All aspects of the arbitration proceeding, and any ruling, decision, or award by the arbitrator, will be strictly confidential for the benefit of all parties. Whether in arbitration or any other venue, jurisdiction, or before any tribunal, Licensor and Licensee agree that all aspects of any Action will take place without resort to any form of class or representative action. Licensor and Licensee may only bring Actions against each other in an individual capacity and waive any right they may have to do so as a class representative or a class member in a class or representative action. THIS CLASS ACTION WAIVER PRECLUDES ANY PARTY FROM PARTICIPATING IN OR BEING REPRESENTED IN ANY CLASS OR REPRESENTATIVE ACTION REGARDING AN ACTION.

16. **Amendment.** No amendment, modification, or termination of this Agreement shall in any event be effective unless the same shall be in writing and signed by duly authorized representative of Licensor and Licensee, provided that any modifications to the Licensed Materials by Licensor shall automatically constitute an amendment to the relevant provisions hereof.

17. **Specific Performance.** Licensee agrees that irreparable damage would occur if any provision of this Agreement were not performed in accordance with the terms hereof and that Licensor shall be entitled to specific performance of the terms hereof, temporary restraining order, preliminary or permanent injunction, or other similar relief, in addition to any other remedy to which Licensor is entitled to at Law or in equity, without the obligation to prove damages. Licensee hereby waives any requirements for Licensor to secure or post any bond, provided that if a court or arbitrator requires Licensor to secure or post a bond, one thousand dollars ($1,000.00) shall be the cumulative bond amount.

18. **Miscellaneous.** This Agreement supersedes all prior and contemporaneous agreements, representations, warranties, and understandings of any nature (whether written, oral, or implied) and contains the entire agreement between Licensor and Licensee with respect to the subject matter hereof. All the terms

and provisions of this Agreement shall be binding upon and inure to the benefit of Licensor and Licensee and their respective successors and permitted assigns, representatives, heirs, and estates, as applicable. Any term or provision of this Agreement that is invalid or unenforceable in any situation in any jurisdiction shall not affect the validity or enforceability of the remaining terms and provisions hereof or the validity or enforceability of the offending term or provision in any other situation or in any other jurisdiction. The section headings of this Agreement are for convenience of reference only and do not form a part hereof and do not in any way modify, interpret, or construe the intentions of the Parties. For purposes of this Agreement, (a) the words "include," "includes," and "including" are deemed to be followed by the words "without limitation"; (b) the word "or" is not exclusive; (c) the words "herein," "hereof," "hereby," "hereto," and "hereunder" refer to this Agreement as a whole; (d) words denoting the singular have a comparable meaning when used in the plural, and vice-versa; (e) words denoting any gender include all genders; (f) the word "days" refers to calendar days; and (g) the word "dollars" or symbol "$" refers to United States dollars. Nothing in this Agreement is intended to, nor should be construed to, create a partnership, agency, joint venture, or employment relationship between Licensor and Licensee or any of the owners, officers, employees, independent contractors, or agents of the Licensor and Licensee. Neither Licensor nor Licensee shall be considered an agent for the other party, nor shall either party have authority to bind or obligate the other to third parties. No waiver of any provision of this Agreement or consent to any departure therefrom shall be effective unless in writing and signed by the waiving party, and then such waiver or consent shall be effective only in the specific instance and for the specific purpose for which given. Except as may be expressly required hereby, no notice to or demand on any party in any case shall entitle it to any other or further notice or demand in similar or other circumstances. No failure or delay on the part of any party in exercising any right, power or remedy hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such right, power, or remedy preclude any other or further exercise thereof or the exercise of any other right, power, or remedy hereunder.

1.2.3 Software Usage Precautions

- Enable the lock screen for all devices on which TAKEOFF is installed (e.g. biometric authentication or PIN lock) and set the devices to automatically lock after a certain amount of idle time.
- Users are responsible for managing their own authentication credentials for their devices.
- Use only secure Wi-Fi connections.
- Install and activate security software and keep it up to date.
- TAKEOFF provides a feature for the user to record the live video stream that is received from the aircraft to an unprotected file folder of the user's choosing. It is the user's responsibility to manage this video data.
- While using TAKEOFF, discontinue the use of other non-essential applications. Integration of TAKEOFF with unauthorized apps will not be covered by the warranty.

1.2.4 Compatible Aircraft

- Table 1 shows the aircraft models supported by the TAKEOFF app.

Table 1 Compatible models

Model name	Remarks
SOTEN (ACSL-ST1)	—

1.2.5 System Requirements

- The system requirements for the TAKEOFF app are shown in Table 2 and 3.

Table 2 Recommended system requirements (for mobile devices)

Items	Specifications	Remarks
OS	Android 11	—
	Android 12	—
	Android 13	—
Supported mobile devices	Sony Xperia 5-II	—
	Sony Xperia 1-II	—

Table 3 Minimum system requirements (for Windows OS)

Items	Specifications	Remarks
OS	Windows 11	—
RAM	8 GB	—
Resolution	1920 x 1080 (Full HD)	—

*Normal operation may be affected by security software that is installed in the host device. Please be aware of the potential impact of security software when using TAKEOFF.

1.3 Installation Procedure

- To use TAKEOFF, download the app from ACSL website or Google Play Store, or obtain the APK file from an official dealer.



Figure 1 TAKEOFF icon

Download the APK file to your mobile device

Select the APK file located in the Files application of your mobile device. (If transferred from a PC or similar device, it is usually stored in the Downloads folder.) Install the APK file. After the installation is complete, the TAKEOFF icon will be displayed on the home screen.

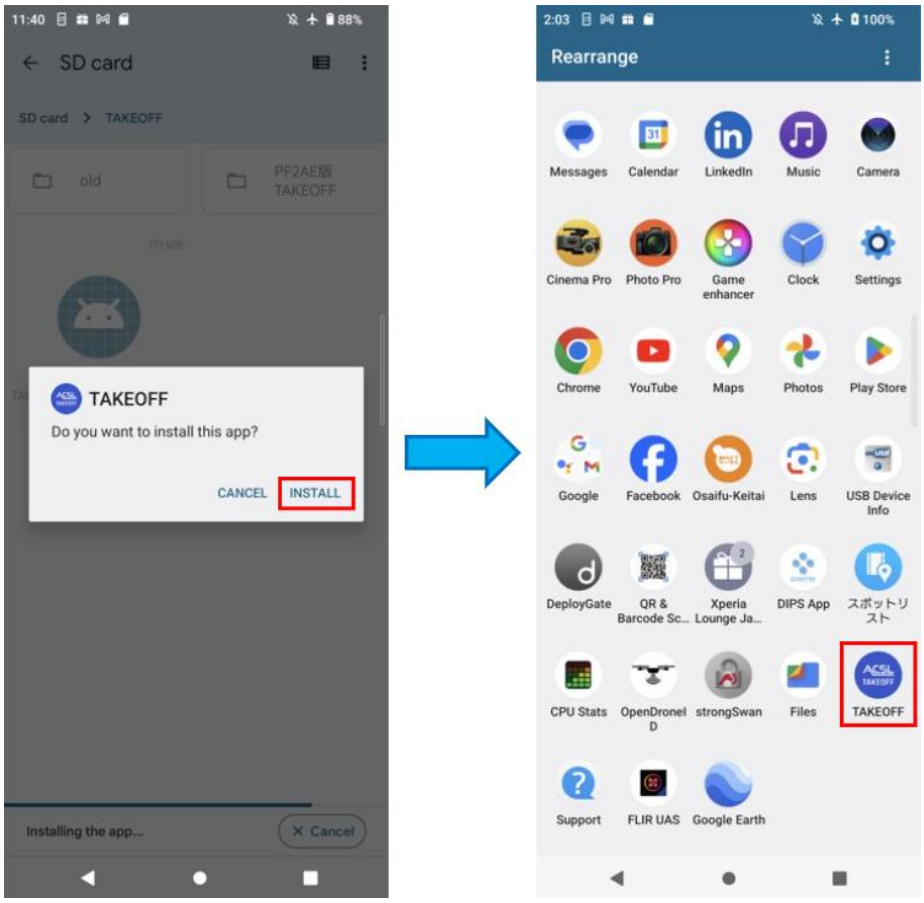


Figure 2 Installing TAKEOFF

Updating firmware

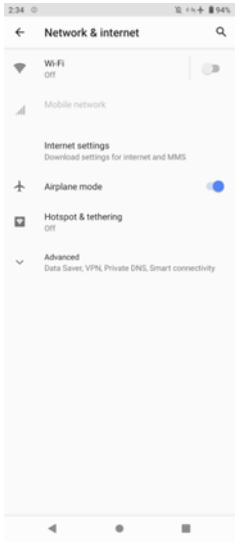
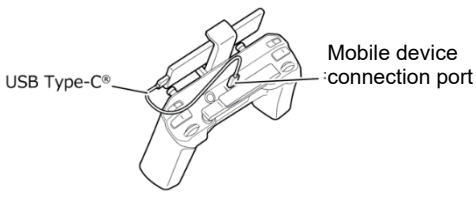
➔ Refer to 4.2.4. Update firmware.

1.4 Connecting to the Aircraft

1.4.1 Wi-Fi

- Before creating a flight plan (see Section 3.2: Creating a flight plan), download the map of the intended flight area to your mobile device in advance, and set your mobile device to airplane mode before the flight.
- Refer to the following procedure.

Table 4 Wi-Fi connection procedure

	Procedure	Reference image
1	Turn on the aircraft and the controller.	
2	Prior to connecting the mobile device to the controller, go to Settings -> Network and Internet -> Connect with Wi-Fi on your mobile device, and connect to the controller.	
3	Start the TAKEOFF app and download the map of the area around the flight path from the map screen.	
4	Go to Settings and enable the Airplane Mode on your mobile device. Confirm that Wi-Fi is turned OFF.	
5	Connect the controller to your mobile device.	

1.4.2 Connecting to the Aircraft

- The first time you connect the controller to your mobile device after binding the aircraft and controller, the following pop-up window will appear. By selecting "Always open TAKEOFF", the TAKEOFF app will automatically launch the next time your mobile device is connected to the controller.

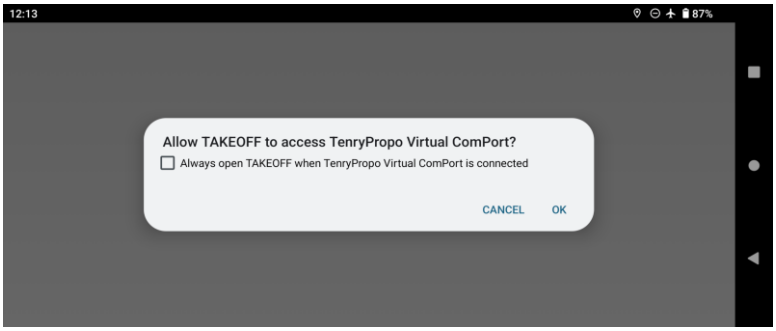


Figure 3 Connecting to the aircraft

- On mobile devices with Android 12 or later, a pop-up window will appear requesting permission for Bluetooth connections. Tap "Allow."

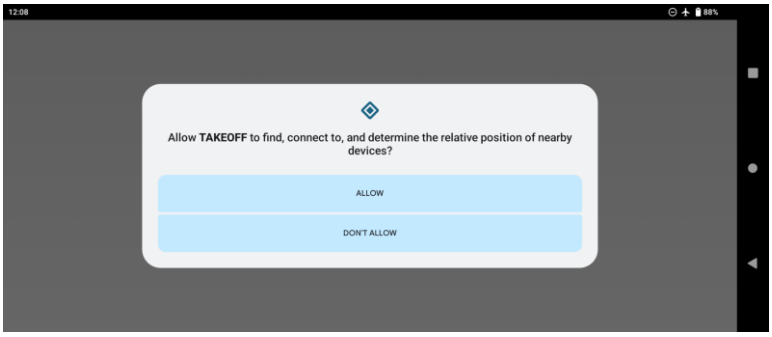


Figure 4 Bluetooth connection

1.4.3 Initial Settings

- Once the TAKEOFF application is opened after initial installation, a pop-up window for setting the units of measurement will appear.
  Select the units of measurement you wish to use and tap “OK”. The next time the application is opened, the selected units of measurement will be maintained and no pop-up will be displayed.

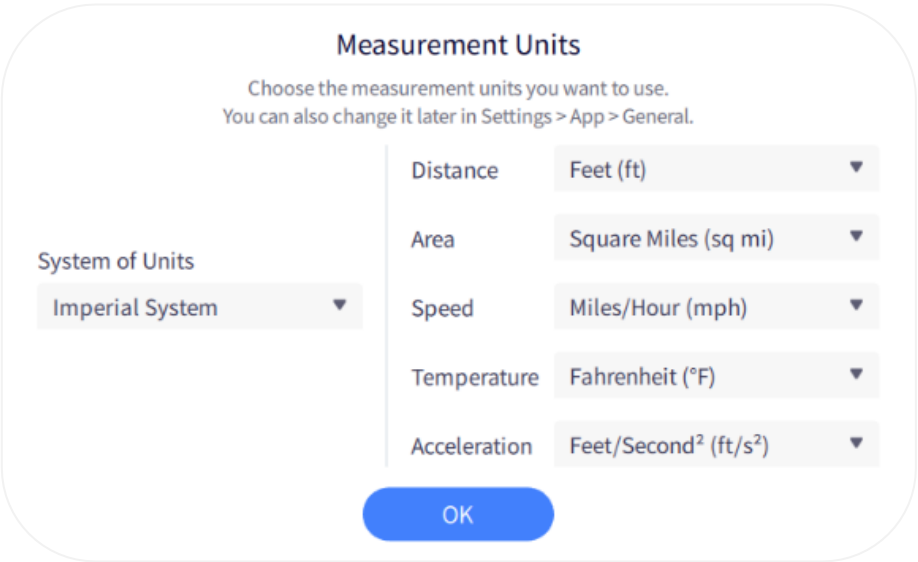


Figure 5 Measurement Units

[If you are using a version earlier than TAKEOFF ver.1.13.6]

- Connect the TAKEOFF app to your mobile device and perform the initial settings to enable the video stream.

> ADVISORY
>
> From TAKEOFF ver. 1.13.6 and later, the initial setting for the video stream is not necessary as it is configured automatically.

> CAUTION
>
> - Perform the following initial setup when using for the first time.
> - If the video stream is not received, confirm that the settings match those described below.
> - It may be necessary to reapply these settings after a firmware update.

1. **Upon startup, TAKEOFF will display a screen similar to that shown in Figure 6, tap the Main menu button and tap the Settings button from the displayed menu to display the settings.**



Figure 6 Initial settings: Initial TAKEOFF screen

2. **Tap [App] -> [General] on the settings screen. Scroll down on the right side to find [Video Source].**

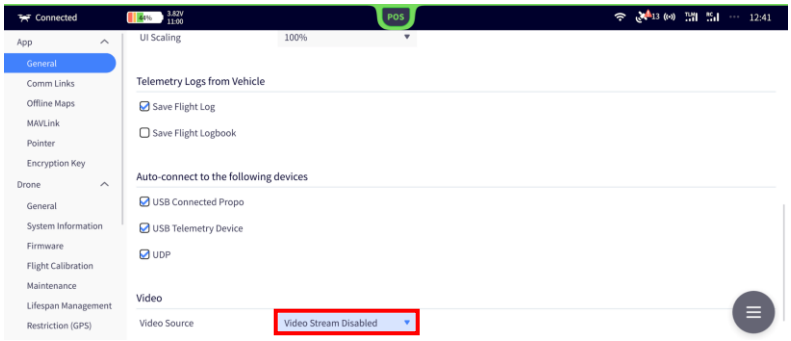


Figure 7 Initial settings: Video source

3. **Tap the [Video Source] pull-down menu and select [UDP h.264 Video Stream]. The item [UDP Port] is displayed. Change the value of the [UDP Port] to 8555.**

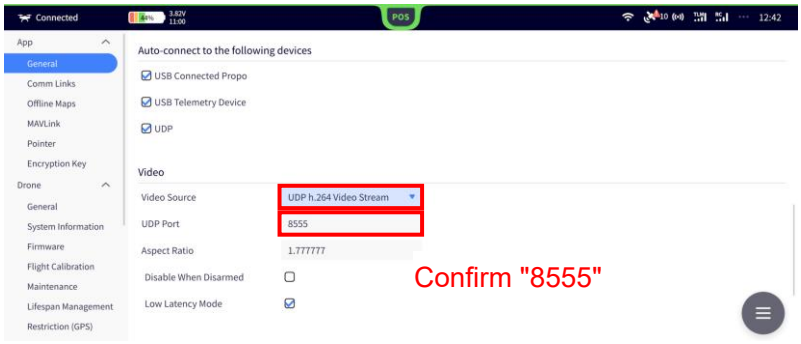


Figure 8 Initial settings: UDP port settings

- This completes the initial setup.

Chapter 2

Flight View

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2.3 Command Operations ····· 27
2.4 Camera Operation ····· 36
2.5 Emergency Menu ····· 45
2.6 RTK Icon (Option) ····· 47

2.1. Screen Details

2.1.1. Flight View Elements

- The flight view screen, which is the basic screen of TAKEOFF, is structured as follows when the aircraft is in a standby state.

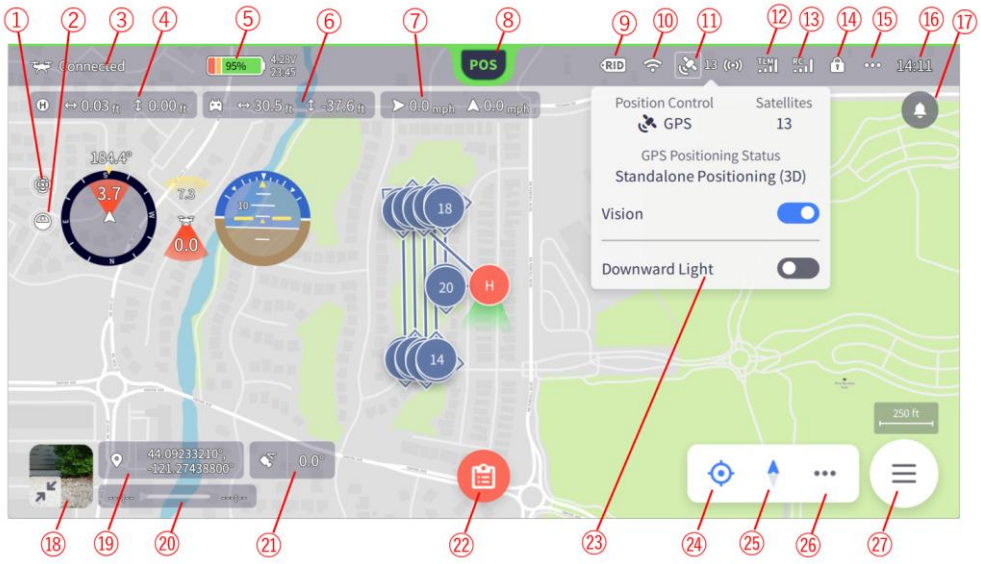


Figure 9 Flight view outline

Table 5 Description of flight view buttons

	Function and name	Description
1	Obstacle Radar Display	Displays distance to nearby objects detected by the stereo camera and infrared sensors.
2	Attitude Indicator	Displays the pitch and roll of the aircraft relative to the horizon.
3	Aircraft status	Displays the operational status of the aircraft.
4	Distance from home	Displays the horizontal and vertical distances from the home position.
5	Battery level	Displays the remaining battery level of the aircraft.
6	Distance from controller	Displays the horizontal and vertical distance from the controller.
7	Aircraft speed	Displays the current horizontal and vertical speed of the aircraft.
8	Flight Mode of Aircraft	Displays the flight mode of the aircraft.
9	Remote ID	Displays the status of the aircraft's remote ID broadcast.
10	Communication link	Displays the connected controller.
11	GPS status	Displays the status of GPS and visual odometry measurements (GOOD: blue / MODERATE: yellow / BAD: red).
12	Telemetry Signal Strength	Displays the strength of received telemetry signals from the aircraft.
13	Controller Signal Strength	Displays the strength of received controller signals as reported by the aircraft.
14	Encryption functions	Displays the on/off status of the image encryption function.

15	Opacity Adjustment	Allows adjustment of the opacity of on-screen elements.
16	Time	Displays the current time.
17	Message	Displays notifications (warnings/cautions/advisories) from the aircraft.
18	Video/map Switching Button	Switches the display between the map and the video feed.
19	Location Coordinates	Displays the aircraft's current latitude and longitude coordinates.
20	Mission Time	Displays the elapsed time of the planned flight.
21	Camera Tilt Angle	Displays the tilt angle of the camera.
22	Pre-flight Checklist	Displays the pre-flight checklist.
23	Downward Light	Displays the on/off status of the downward light
24	Center Map Button	Aligns the map center to the aircraft position, controller position, or home position.
25	Orientation Button	Aligns the map orientation with north or the controller's orientation.
26	Clear flight track history	Clears the flight track of the aircraft.
27	Main menu button	Switches the view between the Flight, Plan, Analysis, Flight Logs, and Settings menu views.

2.1.2. Pre-flight Checklist

When the aircraft is in Auto (AUT) flight mode, it can only be armed after all pre-flight checkboxes have been checked.

Table 6 Pre-flight checklist

Items	Check items
LED check	Are the status LEDs blinking?
Transmitter power on	Turn on the controller. When the controller is turned on, confirm that these sounds are heard? for PF1: Motor beeps stop, for PF2: Motors chime, SOTEN: No indication.
Battery voltage	Is the battery voltage displayed?
Data Link	Is it displayed?
Transmitter link	Is it displayed?
Helmets	Are all personnel wearing helmets?
Position of Personnel	Are all personnel standing behind the pilot?
Motor initiation announcement	Before starting the motors, make a clear and audible announcement by saying "Starting Motors."
Propeller rotation direction	Verify that CW and CCW propellers rotate in the correct direction.
No-fly zone	Do not fly in no-fly zones defined by civil aeronautics law, relevant regulations, and local authorities. Non-compliance is a violation of aviation safety protocols.
GPS	Is the GPS module free of any abnormality? This item is automatically verified by the system. Operator confirmation is not required.
Sensor	Are the sensor modules free of any abnormality? This item is automatically verified by the system. Operator confirmation is not required.

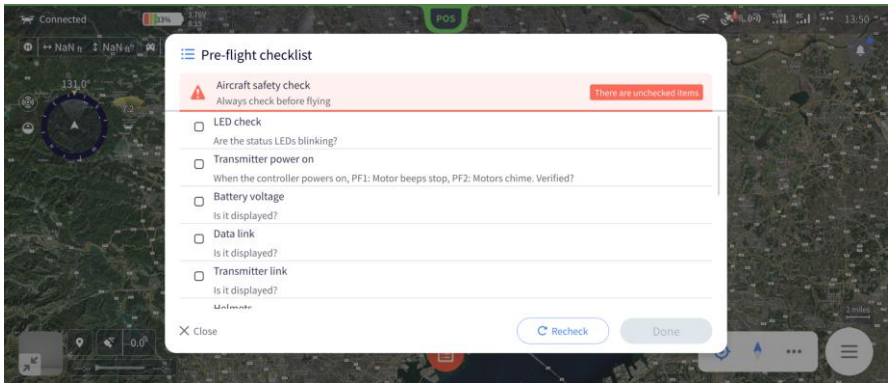


Figure 9 Preflight checklist (not completed)

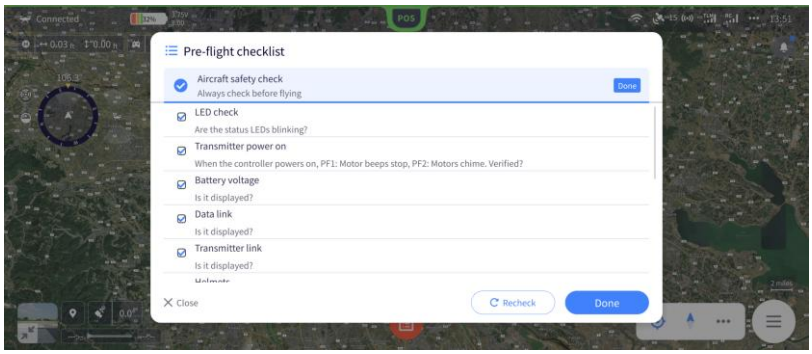


Figure 10 Preflight checklist (Completed)

2.1.3. Moving the Map

- The map can be moved by dragging any point in the desired direction.

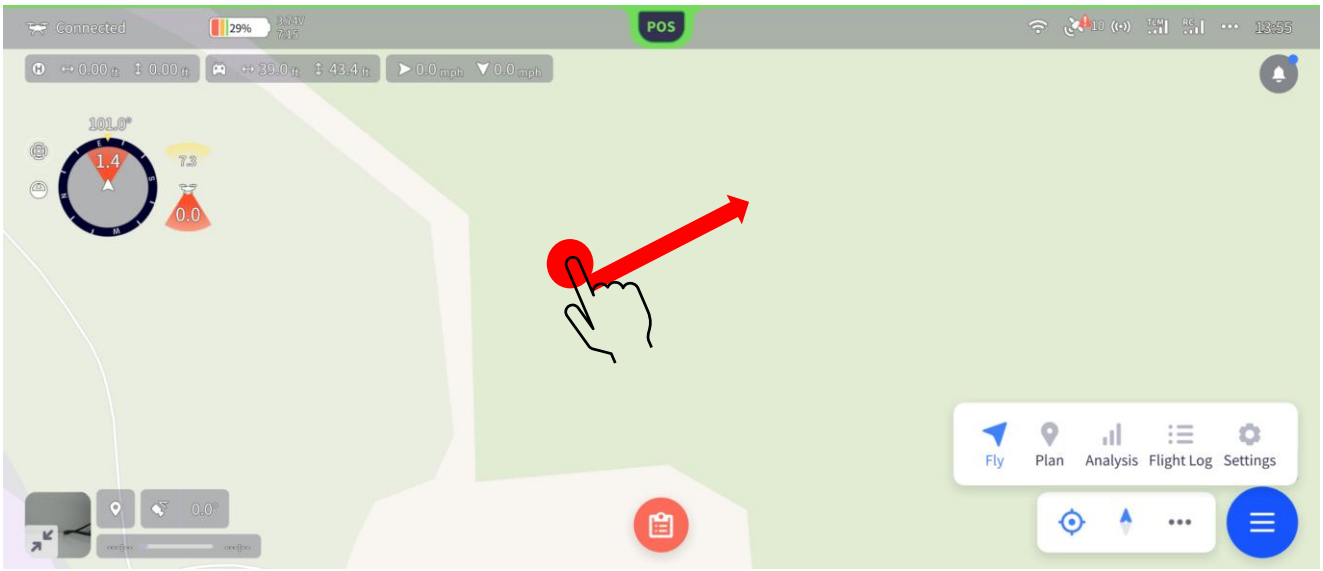


Figure 11 How to move the map

2.1.4. Zooming the Map In and Out

- Pinch anywhere on the map to zoom in or out.

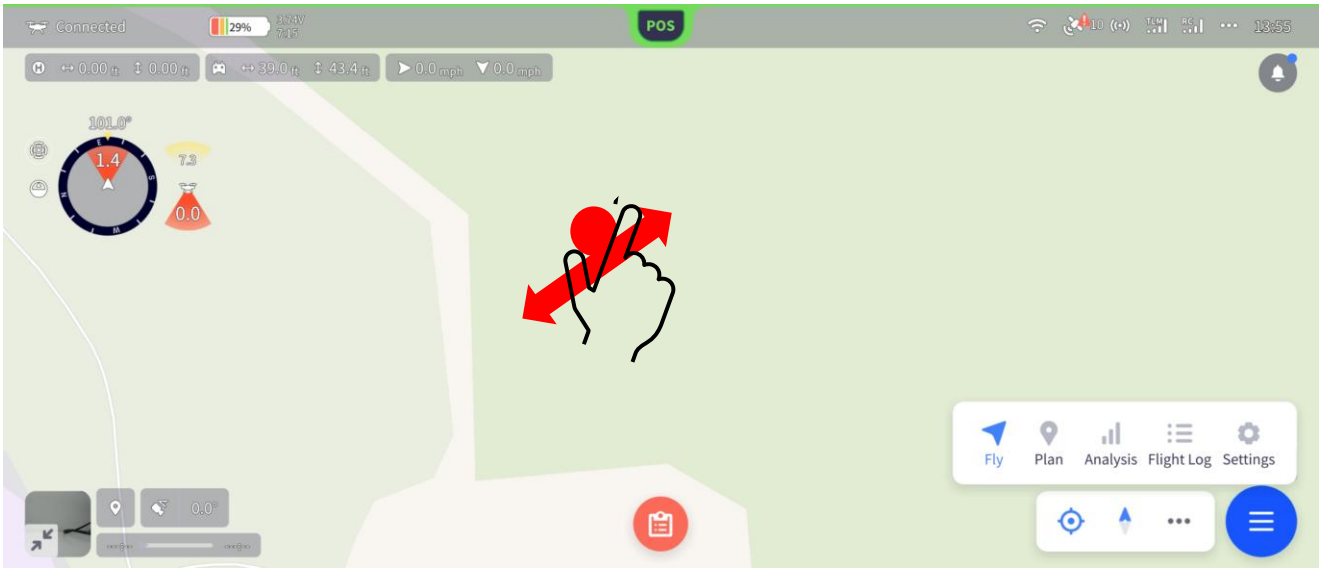


Figure 12 How to zoom the map in and out

2.1.5. Rotating the Map

- The map orientation can be changed by dragging and rotating it from any point on the map.

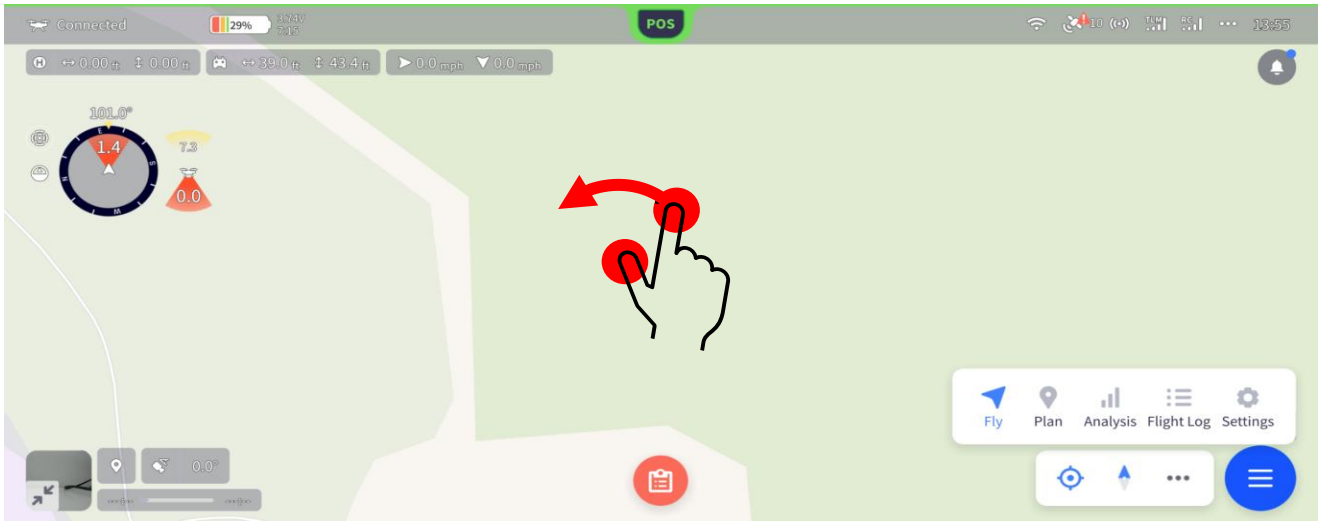
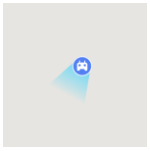


Figure 13 How to rotate the map

2.1.6. Icons

- The icons displayed on the map are as follows:

Table 7 Map icons

Icon	Description
	Displays the position and orientation of the aircraft.
	Displays the position and orientation of the controller.
	Displays the home location (takeoff location).

2.1.7. Centering the Map

- The map can be automatically centered on one of the following: the aircraft location, the controller location, or the home location.
- When you tap the Center Map button, icons for aircraft location, controller location, home location appear. Tapping one of these icons will cause the map to continuously follow and keep the selected target centered on the screen.
- Tapping the selected icon again disables the automatic centering of the map.

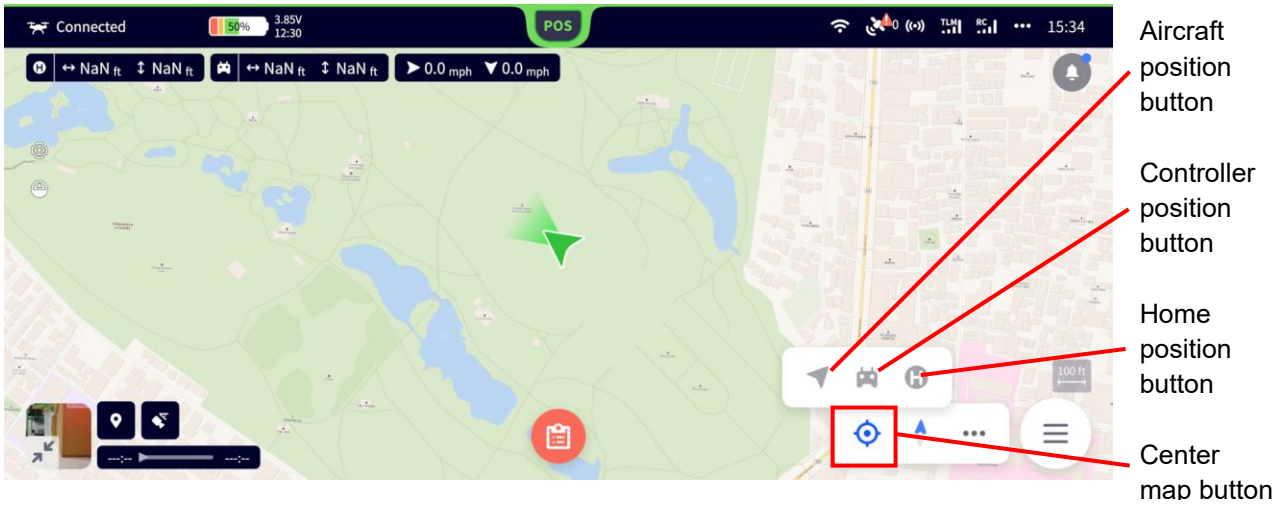


Figure 14 Centering the map

2.1.8. Changing the Map Orientation

- The map orientation can be set to either North Up (where the upward direction corresponds to North) or Heading Up (where the upward direction corresponds to the controller's orientation).
- To change the orientation, tap the orientation button and select either the North Up or Heading Up icon from the options displayed.

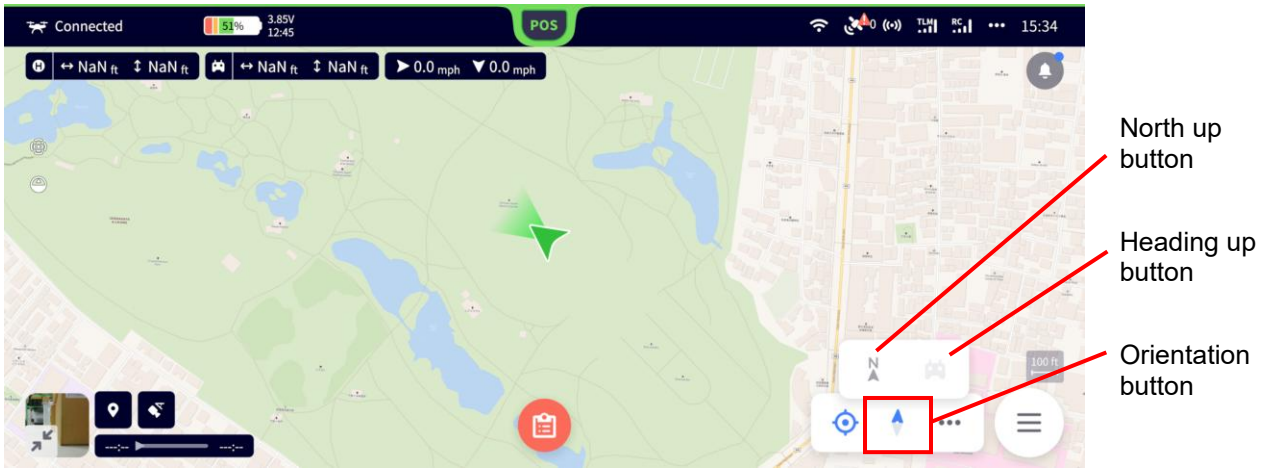


Figure 15 Changing the map orientation

2.1.9. Clearing the Flight Track History

- A flight track history is normally displayed on the map.
- The flight track history can be cleared by tapping the [Erase the trajectory] button.

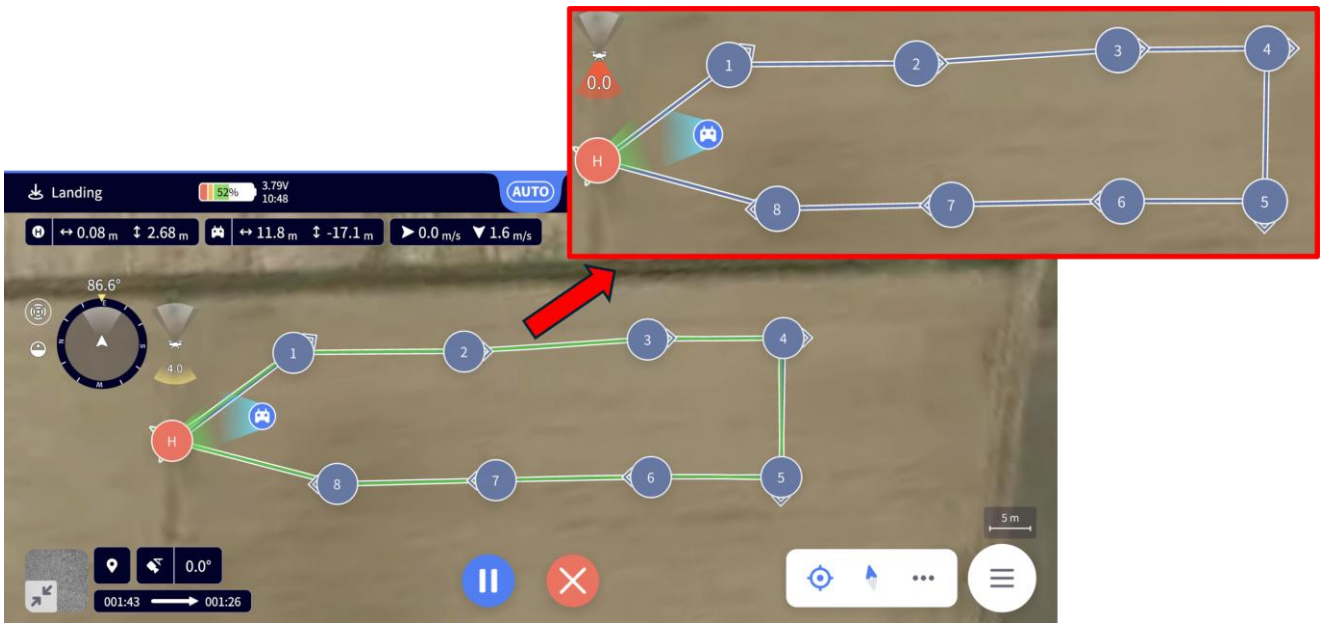


Figure 16 Clearing the flight track history

2.1.10. Remote ID

- A remote ID icon is a color-coded indicator of the status of the aircraft's remote ID transmitter.
- A blue icon indicates that the remote ID transmitter is functioning properly. Takeoff is permitted.
- A red or gray icon indicates that the remote ID transmitter is not functioning properly. Takeoff is inhibited.

Table 8 Remote ID Icons

Icon	Description
Takeoff permitted	Aircraft GPS data communication: Good Ground control station GPS data communication: Good Remote ID transmitter: Functioning properly
Takeoff inhibited	Aircraft GPS data communication Ground control station GPS data communication Remote ID transmitter } One or more errors
Takeoff inhibited	Disconnected

2.2. Attitude Indicator and Obstacle Radar Display

2.2.1. Attitude Indicator

- The attitude indicator on the left side of the flight view screen shows the pitch and roll of the aircraft relative to the horizon.
- Refer to the figure below for how to read the pitch and roll angles from the attitude indicator.

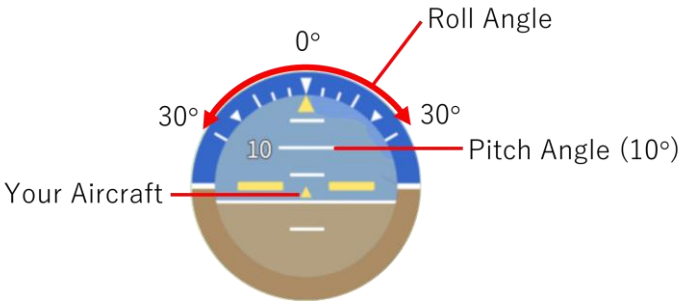


Figure 17 How to read the attitude indicator

- By tapping the attitude indicator button, the attitude indicator will be displayed.

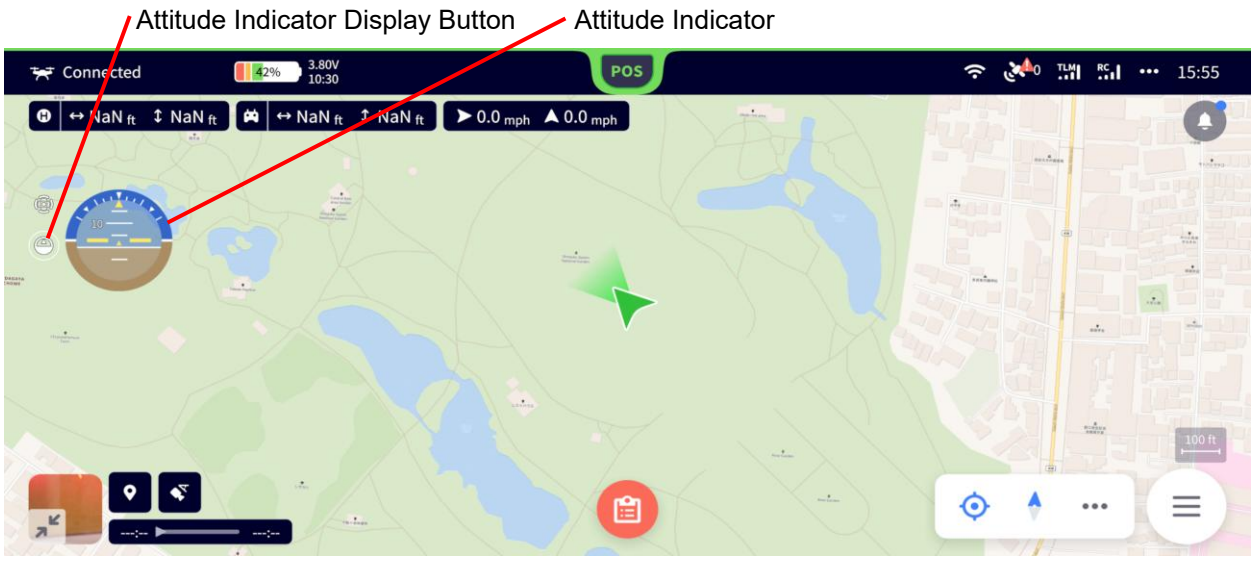


Figure 18 Attitude indicator and obstacle radar display switching button

2.2.2. Obstacle Radar Display

Distances to nearby objects are continuously measured by the infrared sensors or stereo cameras mounted on the aircraft. These measurements can be monitored using the **Obstacle Radar Display**.

- The distance to each obstacle is shown both as a number and through color-coded indicators on the **Obstacle Radar Display**.
- The color changes according to the preset obstacle avoidance sensor distance (see p.91): white indicates no obstacle detected, yellow/orange indicates a long/medium distance, and red indicates a dangerously close distance.



Figure 19 Obstacle radar

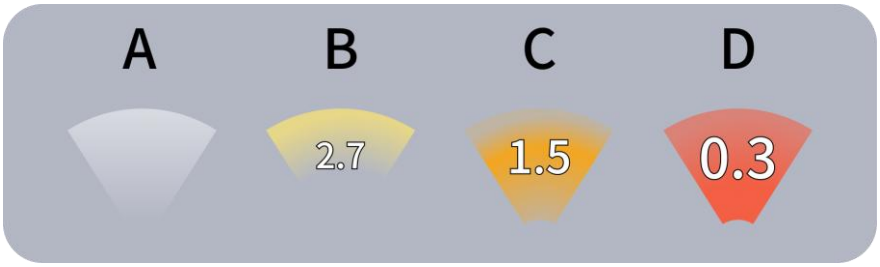


Figure 20 Color indication of the distance to obstacles

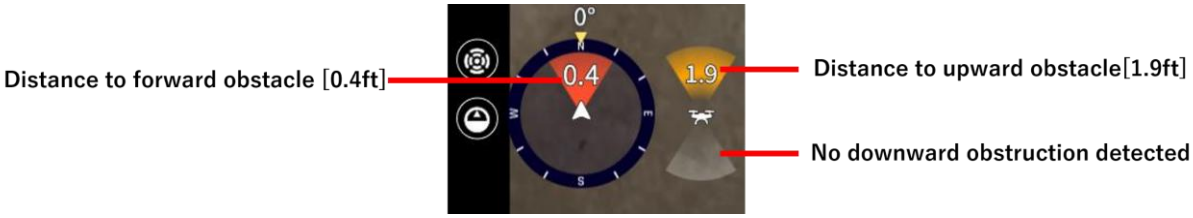


Figure 21 Display of the distance to obstacles

2.3. Command Operations

Various command buttons appear at the bottom of the flight view screen when the aircraft is in flight, or on the ground (excluding manual [MAN] mode), after the completion of pre-flight checklist.

- The command menu items that appear vary depending on the aircraft's flight mode and flight status.
- Flight command buttons that appear at the bottom of the flight view screen vary depending on the aircraft's flight mode.
- A summary of command items that appear in each flight mode is provided below.

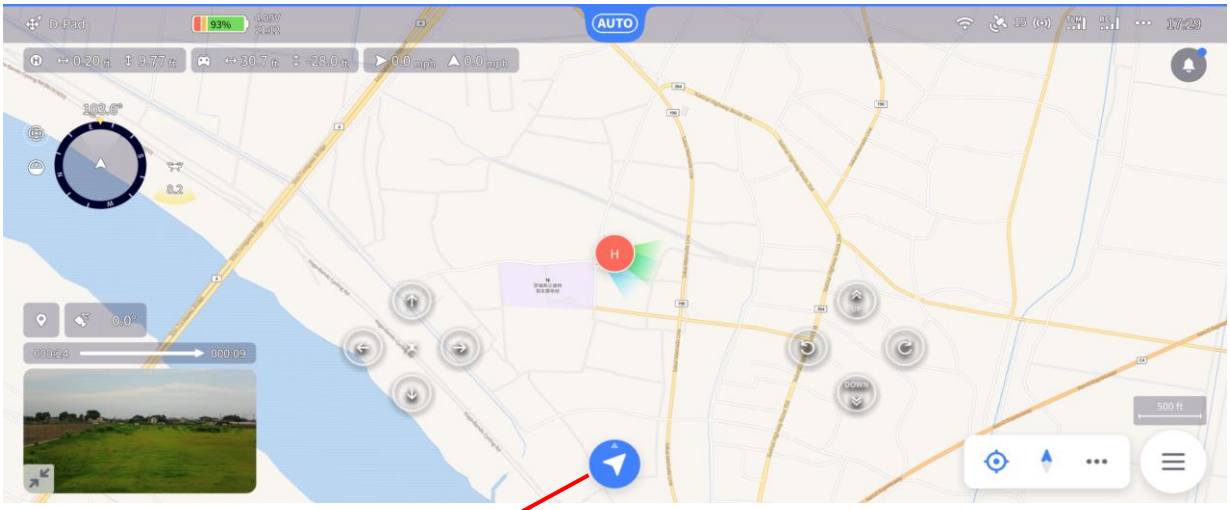


Figure 22 Command operations

Table 9 Flight and flight mode correspondence table

Command menu		Manual mode	Position mode	Auto mode
Arm		—	—	✓
Automatic takeoff		—	—	✓
Disarm button		✓	✓	✓
Command Menu button	Go Home	✓	✓	✓
	Go to Transmitter	✓	✓	✓
	Automatic landing	✓	✓	✓
	Auto	—	—	✓
	D-pad	—	—	✓
Pause		Only for Go Home or automatic landing		✓
Resume		✓	✓	✓
Emergency button	Emergency landing	✓	✓	✓
	Forced stop	✓	✓	✓

The availability of some functions also changes depending on the aircraft's flight mode.

Table 10 Function/control mode correspondence table

Function	Manual mode	Position mode	Auto mode
Free flight	—	—	✓
Go Home (and ascend to avoid obstacles)	✓	✓	✓
Go to Transmitter (and ascend to avoid obstacles)	✓	✓	✓
Camera/gimbal operation	✓	✓	✓
Planned flight	—	—	✓
Geofence	—	✓	✓

2.3.1. Arm Button

When the aircraft's flight mode is set to Auto mode, the **Arm** button appears upon completion of the pre-flight checklist.

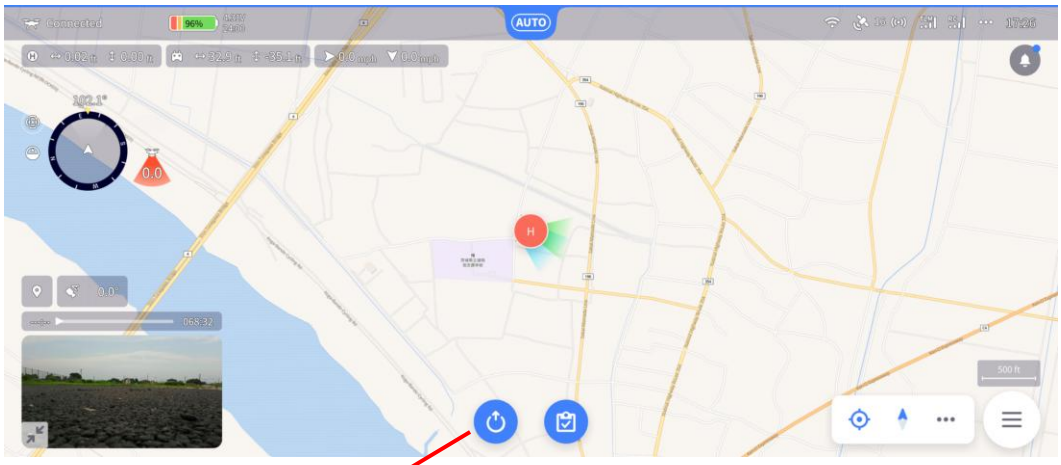


Figure 23 Arm button

- Tap the **Arm** button to display the arming pop-up.
- Slide the slider to the right to activate the motor and enter the idling state.

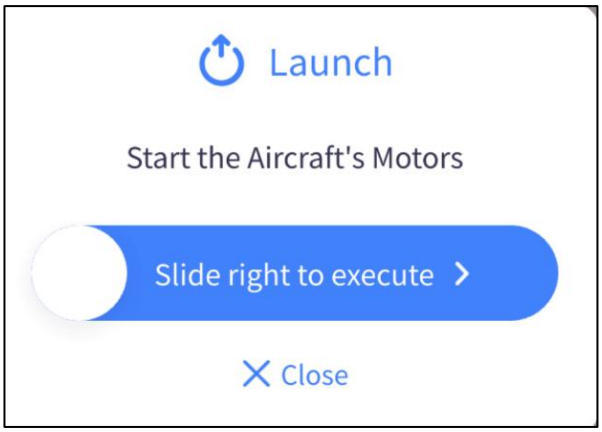


Figure 24 Arming pop-up

- When the aircraft transitions to the idling state, the **Automatic Takeoff** button and the **Disarm** button appear.

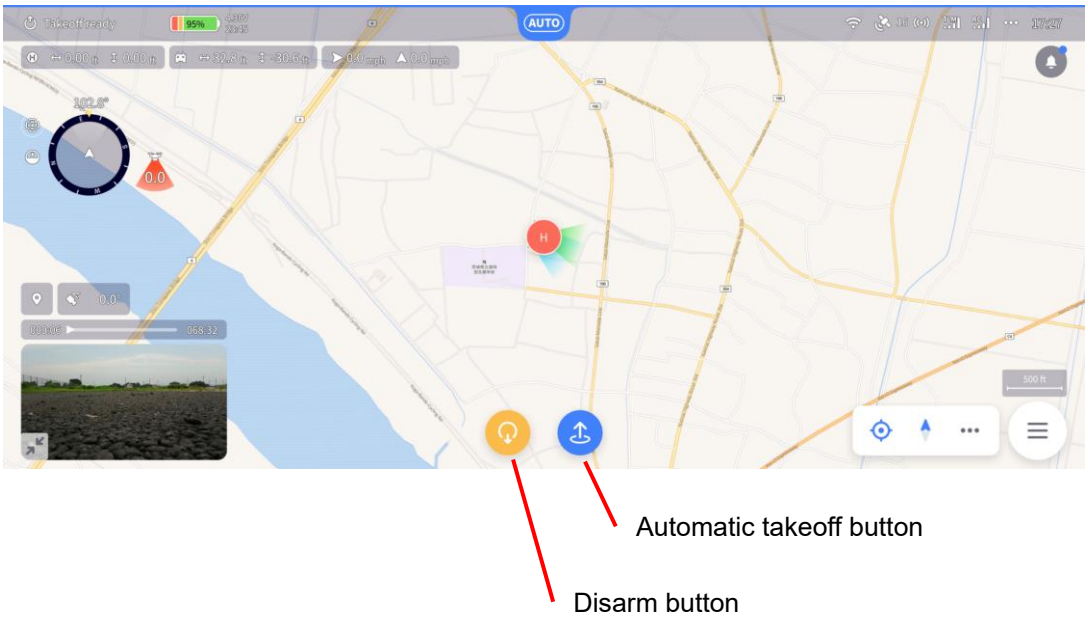


Figure 25 Disarm and Automatic takeoff buttons

- Tap the **Disarm** button to stop the motors.
- Tap the **Automatic Takeoff** button to display the automatic takeoff pop-up and slide the slider to the right to initiate automatic takeoff.



Figure 26 Takeoff pop-up

2.3.2. Command Menu Button

- The Command Menu button is displayed while the aircraft is in flight.
- Tap the Command Menu button to display the various autonomous directives.

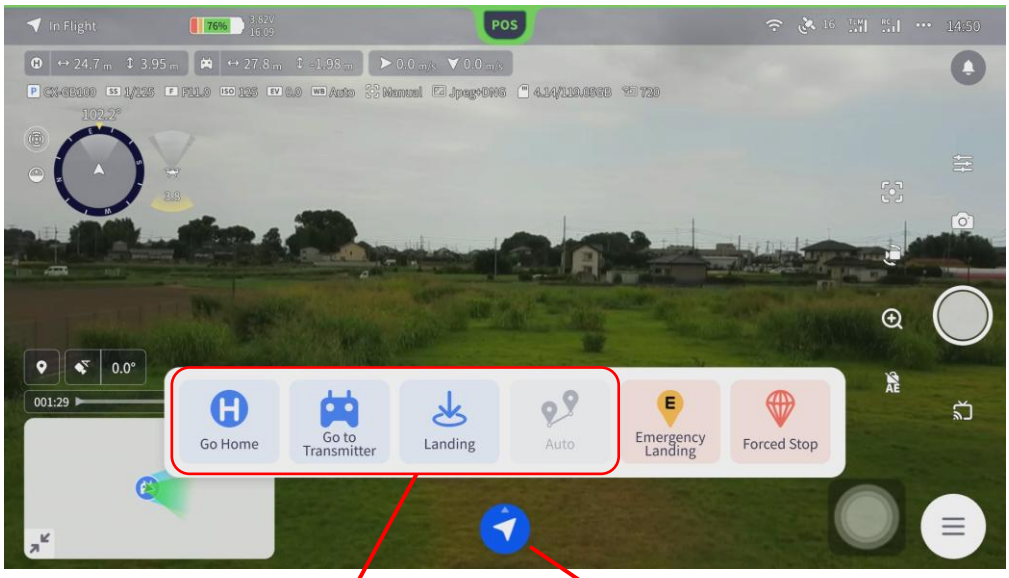


Figure 27 Autonomous directives in the command menu

Table 11 Autonomous directives

Directive	Description
Go Home	The aircraft autonomously returns and lands at the home (takeoff) location.
Go to Transmitter	The aircraft autonomously returns to the location of the controller.
Landing	Perform an autonomous landing at the current position.
Auto	(In auto mode) Start/continue a planned flight.

2.3.3. Pause/Resume Button

- Ongoing autonomous operations such as planned flight, automatic landing, Go Home, etc. may be suspended by tapping the Pause button. (On Windows, autonomous operations may also be suspended by pressing the Spacebar instead of tapping the Pause button.)
- Once the operation is paused, the button changes to the Resume button.
- To resume the paused automatic operation, tap the Resume button.
- During the preset waiting time in a planned flight, you can tap the Resume button to cancel the waiting state and restart the automatic operation.

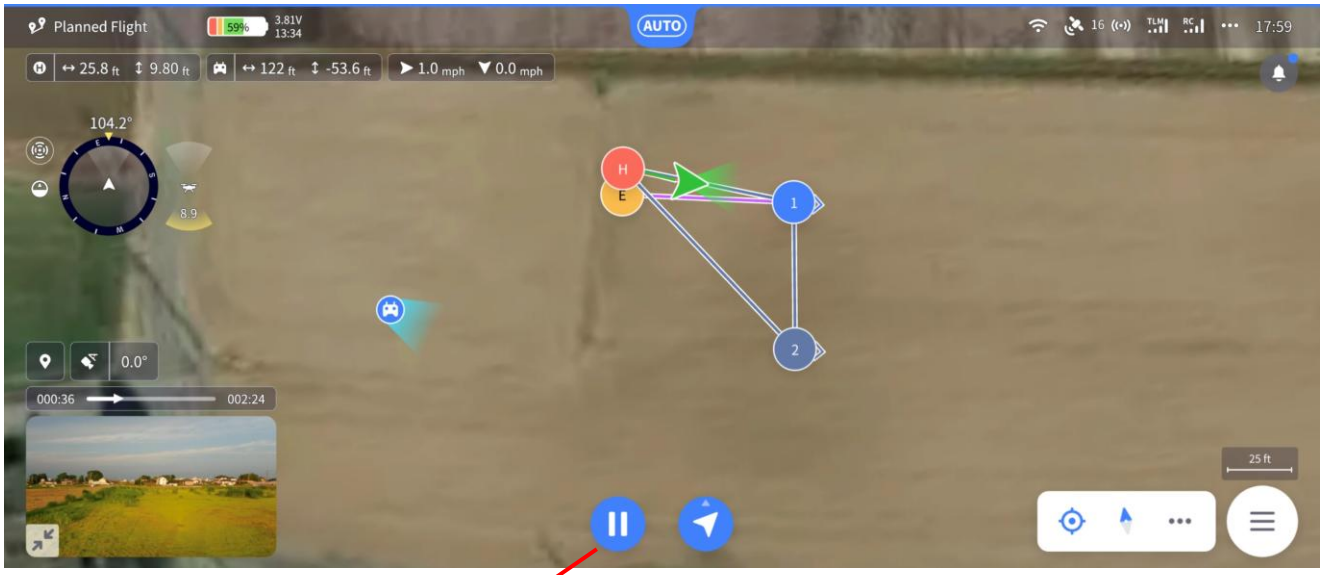


Figure 28 Pause/Resume button

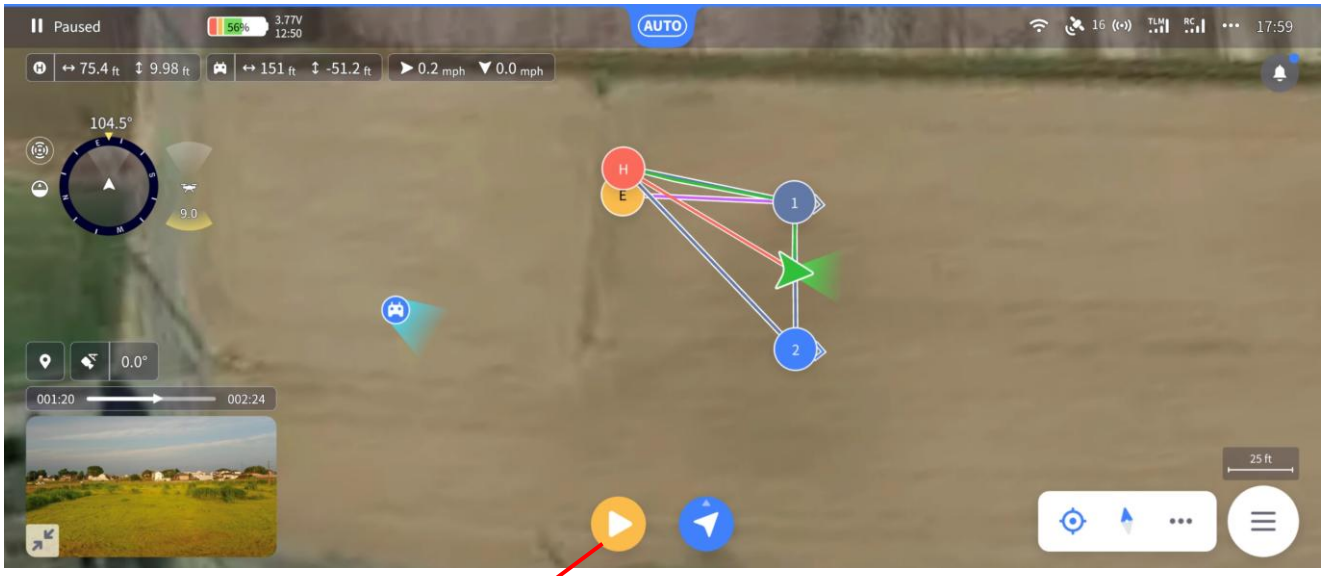


Figure 29 Pause/Resume button

2.3.4. Emergency Commands

- Tap the Command Menu button during flight to display the emergency commands.

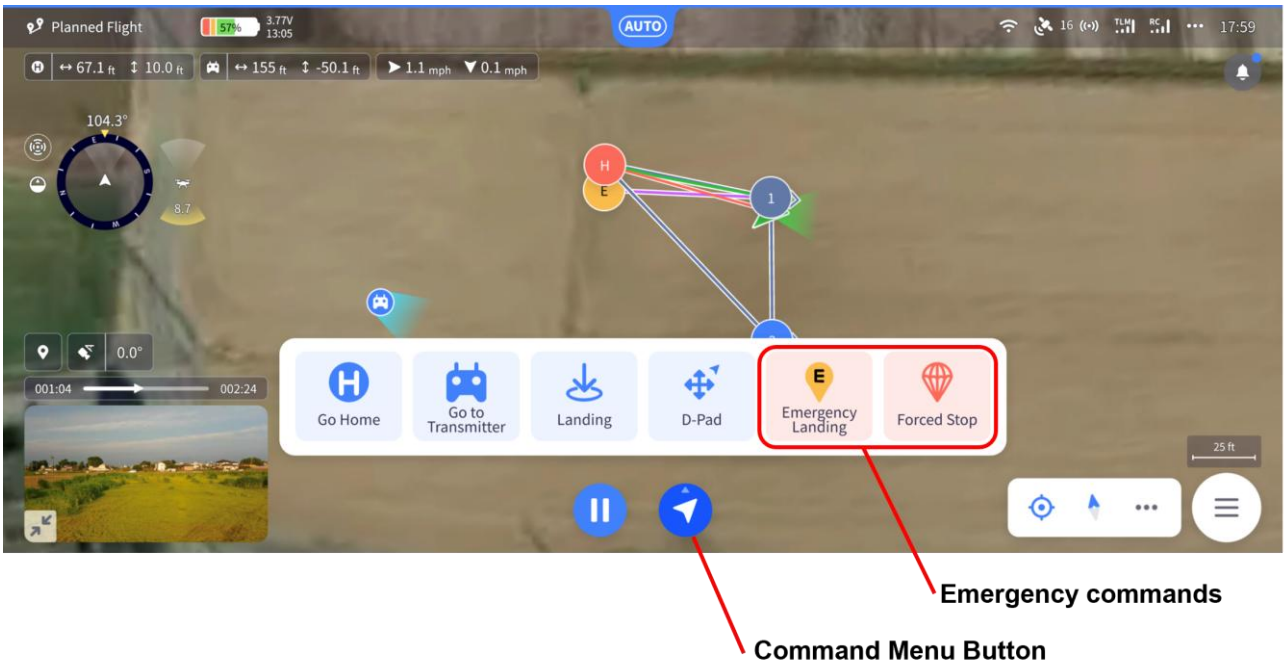


Figure 30 Emergency commands

Table 12 Emergency commands

Name	Description
Emergency Landing	The aircraft will automatically return to and land at a designated emergency landing site.
Forced Stop	The motors will stop immediately, and the aircraft will fall to the ground.

- When a forced stop is executed, the following pop-up window appears.

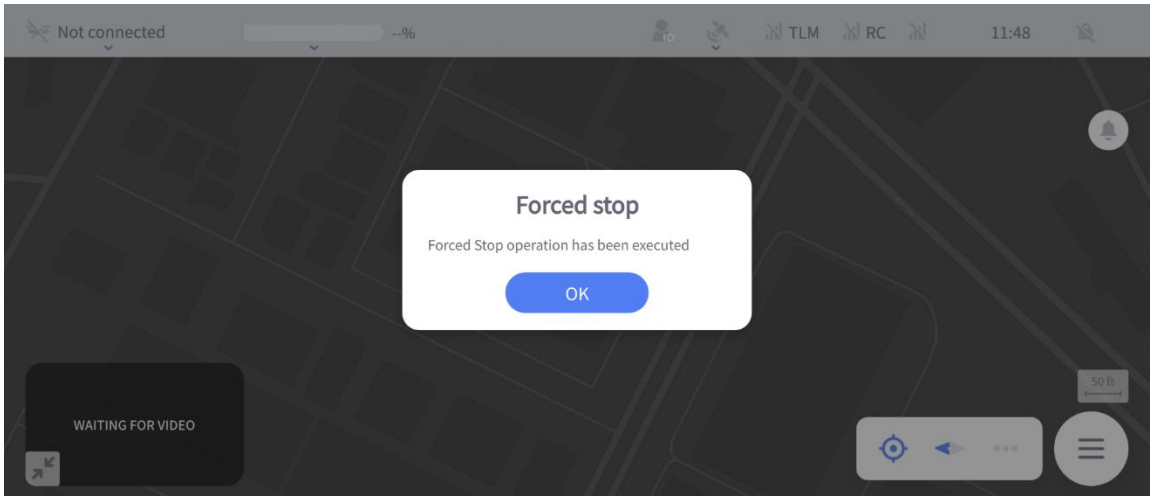


Figure 31 Forced stop pop-up

2.3.5. Free Flight Operation

- The D-Pad buttons appear when D-Pad is selected from the command menu or emergency menu (e.g. following a communications disruption), or when the aircraft is flying in Auto Mode but no flight plan has been uploaded.

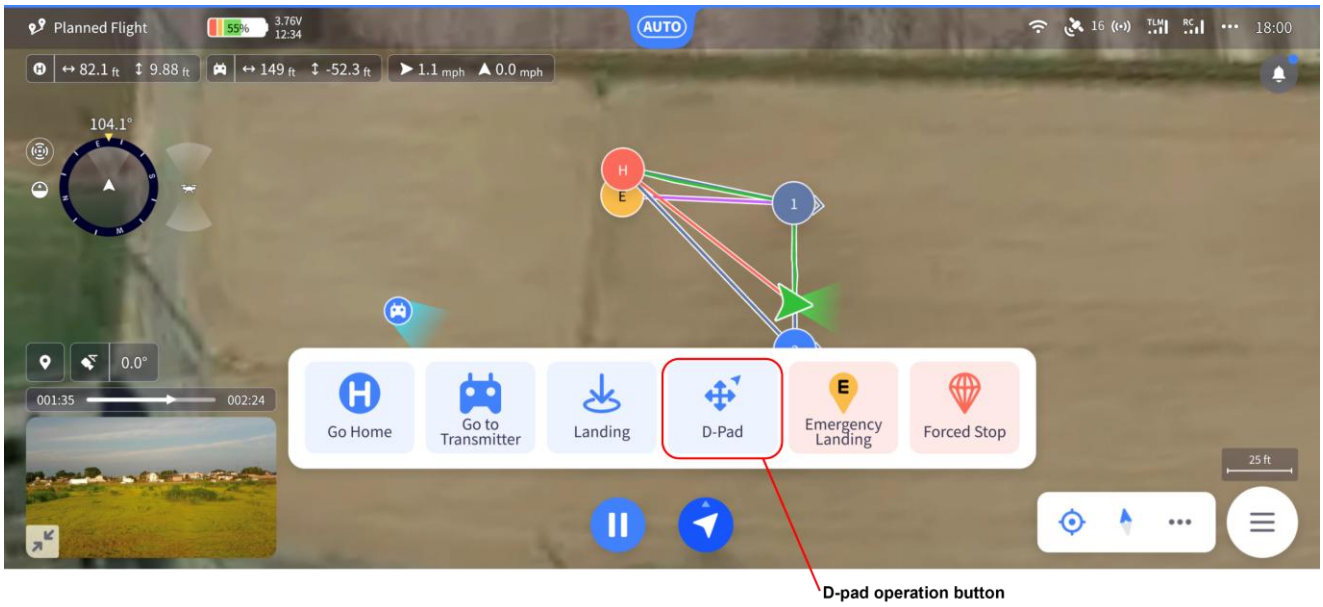


Figure 32 Initiating D-pad control from the command menu

When the D-pad is displayed, tapping any point on the map displays the [Go to location] pop-up. Slide the slider to the right to command the aircraft to automatically move to the tapped location while maintaining altitude.

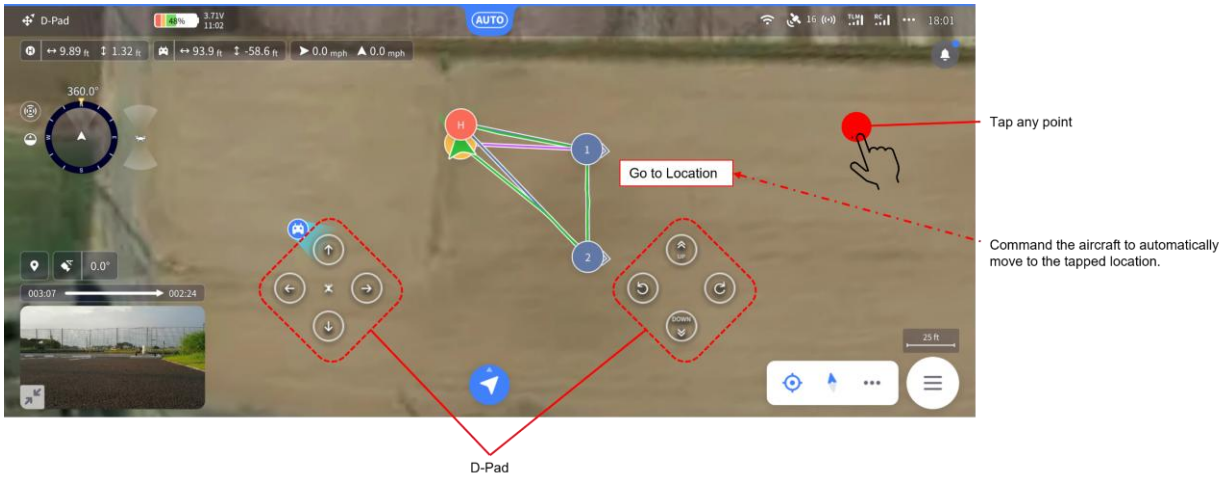


Figure 33 Free flight

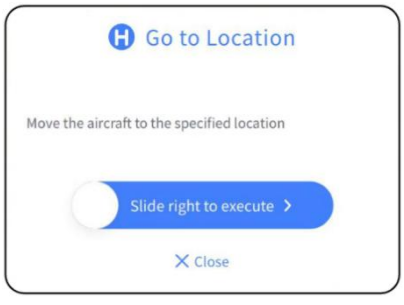


Figure 34 Go to location pop-up: Command the aircraft to move to the tapped location

2.3.6. D-Pad Operation

- The D-pad can be used to manually command movement of the aircraft from TAKEOFF. Tap once to move the aircraft a fixed distance. Note that holding a button does not cause continuous movement.

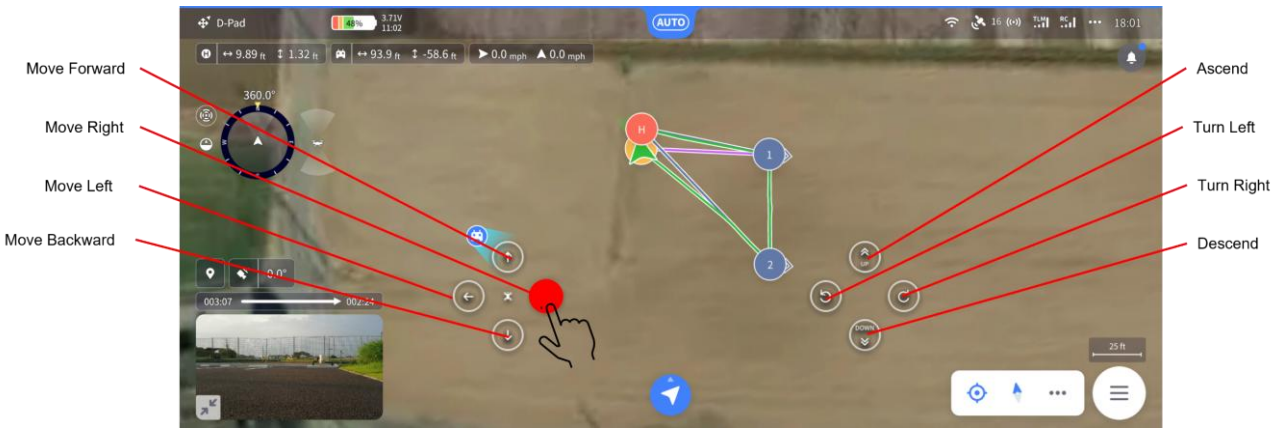


Figure 35 D-pad

Table 13 Default setting for D-pad

Left key (Horizontal Control)				Right key (Vertical/Rotational Control)			
Button	**Behavior**	**Speed**	**Distance/Tap**	**Button**	**Behavior**	**Speed**	**Distance/Tap**
	Move forward	1 m/s	2 m per tap		Ascend	1 m/s	2 m per tap
	Move backward	1 m/s	2 m per tap		Descend	0.5 m/s	2 m per tap
	Move right	1 m/s	2 m per tap		Turn right	N/A	30° per tap
	Move left	1 m/s	2 m per tap		Turn left	N/A	30° per tap

2.4. Camera Operation

Switching to the camera view displays the video feed from the main camera, allowing for easier camera shooting operations and access to camera settings.

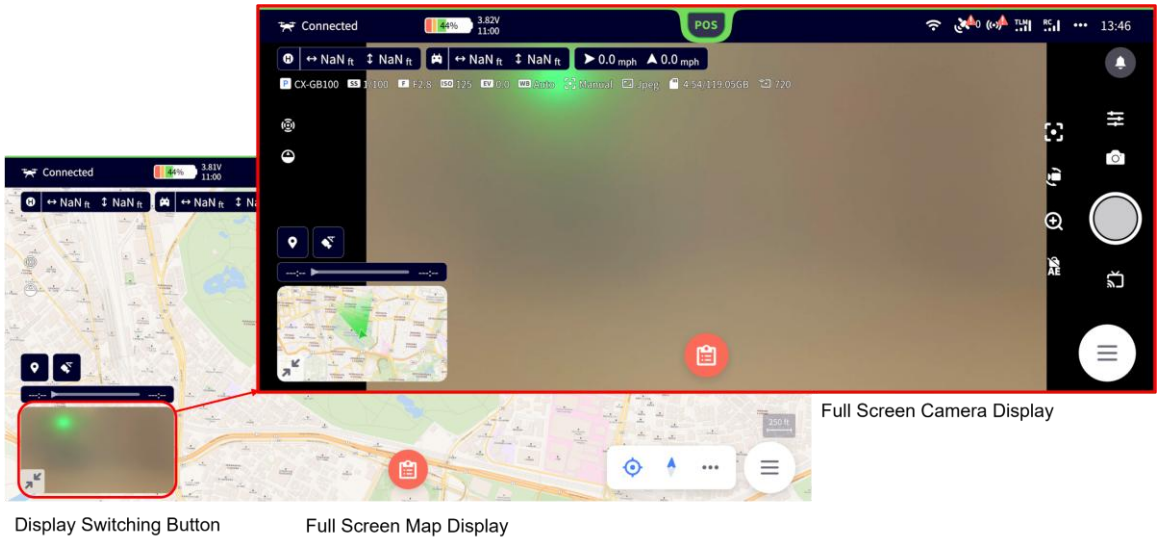


Figure 36 Switching to the camera view

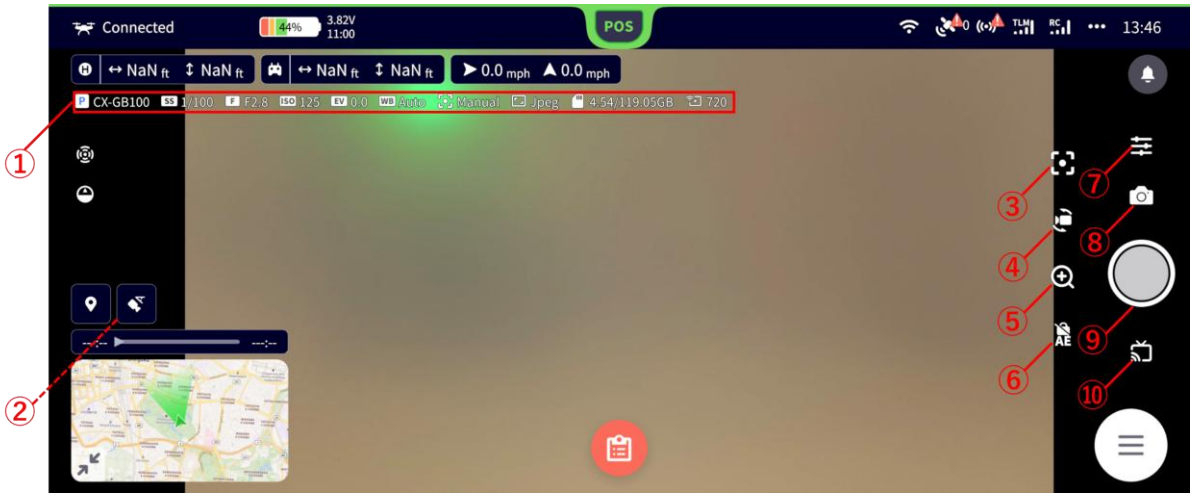


Figure 37 Camera view

Table 14 Camera view icons

Number	Name	Description
1	Camera settings	Displays the current camera settings.
2	Gimbal angle	Displays the gimbal angle.
3	Manual focus button	Opens the manual focus slider.
4	Gimbal tilt button	Opens the gimbal tilt slider.
5	Zoom button	Opens the camera zoom slider.
6	AE lock button	Locks/unlocks automatic exposure adjustment (AE).
7	Camera settings button	Display the camera settings menu.
8	Camera mode button	Cycle between still image, video, and interval shooting modes.
9	Shutter button	Take a picture or start shooting.

10	Video stream recording button	Store the display the received video stream to the mobile device.

Switching camera modes

Tap the Camera Mode button to open the Camera Modes menu. From the menu, select the desired mode: **Still Image, Video, Interval or 360° Capture,** to switch the camera to that mode. The selected mode is highlighted to indicate the current setting.

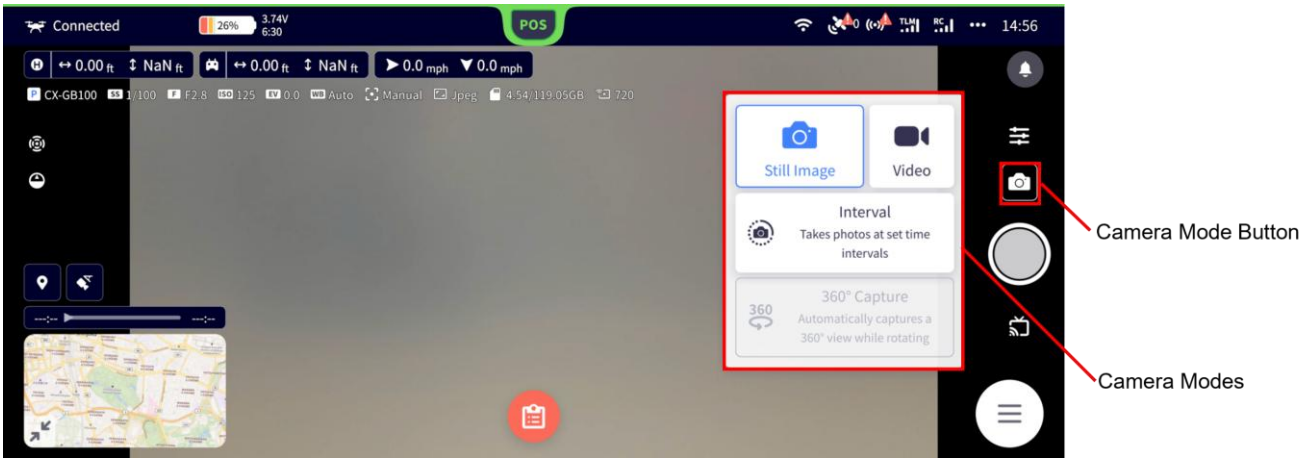


Figure 38 Switching camera modes

Table 15 Camera mode icons

Camera mode	Description
Capture Still Image	Capture a single still image. (The shutter button activates once.)
Record video	Record a video. (The shutter button turns red during recording.)
Take photos (Interval)	Capture still images continuously at predefined intervals.
360° Photo Capture	Capture still images in all directions from the current location. * Only available in free flight (Auto mode).

2.4.1. Camera Operation

Manual focus

Tap the Focus button to display the focus slider.

Slide the slider **upward** to focus on distant objects, and **downward** to focus on nearby objects.

Tap anywhere outside of the slider to hide it.

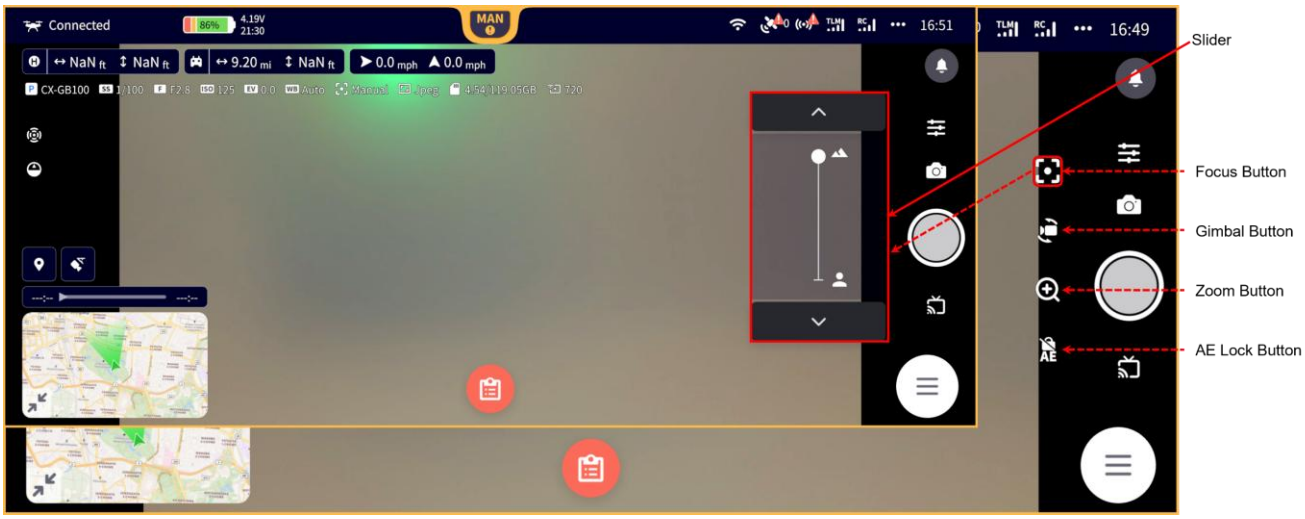


Figure 39 Focus button

Tap to Focus

Tap anywhere in the camera view to focus on the tapped location.

Gimbal tilt

Tap the **Gimbal Tilt** button to display the gimbal tilt slider.

Slide the slider **upward** to tilt the gimbal **upward**, and **downward** to tilt it **downward**. Tap the **∧** button to tilt the gimbal up by 15° and the **v** button to tilt down by 15°.

Tap anywhere outside of the slider to hide it.

Zoom

Tap the **Zoom** button to display the zoom slider.

Slide the slider **upward** to zoom in, and to the **downward** to zoom out.

Tap anywhere outside of the slider to hide it.

AE Lock

To lock/unlock the auto exposure (AE), tap the **AE Lock** button.

2.4.2. Camera Settings and Advanced Camera Settings

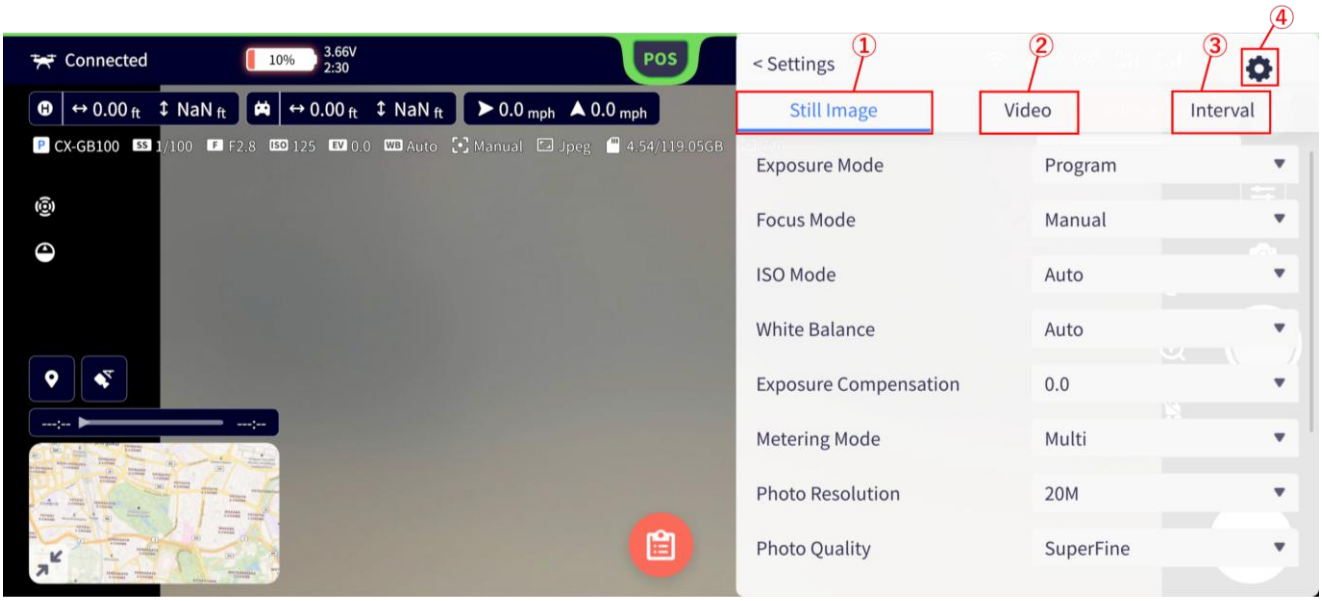


Figure 40 Camera Settings menu

- Tap the Camera Settings button to open the Camera Settings menu for the selected shooting mode.

Table 16 Camera settings screen

No.	Name		Description
1	Camera Settings	Still image shooting settings	Change the camera settings for still image shooting.
2		Video shooting settings	Change the camera settings for video shooting.
3		Interval shooting settings	Change the camera settings for interval shooting.
4	Advanced camera settings		Change additional camera settings.

Camera settings

Refer to Table 17 for the settings that can be set in the camera settings menu.

Table 17 Camera settings

Items	Parameters	Description
Exposure mode	[CX-GB100] Manual, Shutter speed, Aperture, Program [CX-GB200] Manual, Program auto [CX-GB300] Manual, Shutter speed priority, Aperture, Program auto [CX-GB400] Manual, Program auto	Select the exposure mode (automatic or manual).
Focus mode	Manual, Automatic	Select the focus mode.
ISO mode	Auto, Semi-Auto, Manual	Select the ISO mode.
Aperture	F2.8-F11.0	In manual or aperture exposure mode, set the aperture (F-number).

Shutter speed	1/8000 s to 8 s	In manual or shutter speed exposure mode, set the shutter speed.
White balance	Auto, Daylight, Cloudy, Shady, Incandescent, Fluorescent	Select a white balance preset.
ISO	125 to 6400	Set the ISO sensitivity.
Exposure compensation	-2.0 to +2.0	Set the exposure compensation (EV).
Metering mode	Multi, Center	Set the metering region of the image used for exposure adjustment.
Still image resolution	20 M to 10 M	Set the image resolution.
Video resolution	4K, 2.7K, FHD, HD, nHD	Set the video resolution.
Still image quality	Superfine/Fine/Normal	Select the JPEG compression quality.
Image format	JPEG, DNG, JPEG+DNG	Select an image file format.
Frame rate	30 to 240 fps	Set the video frame rate. Videos at a frame rate of 120 fps and 240 fps are recorded as slow-motion videos.
Seamless recording time	1 min to 10 min or Unlimited	Select a duration at which to split continuous video recordings into multiple video files.
NDVI color map	-1.0 to 1.0	Set the NVDI scale for vegetation analysis.
Interval time	2 to 60	Set the image capture interval time.

Advanced camera settings

Refer to Table 18 for the advanced settings that can be set in the camera settings menu.

Table 18 Advanced camera settings

Items	Parameters	Description
Shutter type	Electronic, Mechanical	Select between electronic and mechanical shutter.
HDR mode	ON, OFF	Enable or disable HDR image and video capture.
Electronic image stabilization	ON, OFF	Enable or disable electronic image stabilization during image and video capture.
Distortion correction	ON, OFF	Enable or disable lens distortion correction.
Sensor mode	[CX-GB200] Visible, IR, Dual [CX-GB300] No Binning, Binning2x2, Binning3x3	Select a sensor mode for the IR camera (CX-GB200) and Multispectral Camera (CX-GB300).
Live view	[CX-GB200] Standard Definition, IR, Superimpose, Side by Side, Picture in Picture, Mix [CX-GB300] NDVI, G-NDVI, Mono Tone IR, Mono R, Mono G	Select how the IR camera (CX-GB200) and Multispectral Camera (CX-GB300) display images.

IR color palette	White hot, Black hot, Rainbow, RainHC, Ironbow, Lava, Artic, Glowbow, Graded Fire, Hottest	Select a color palette for the IR camera (CX-GB200).
Sharpness enhancement	Default, Sharp +1, Sharp +2	—
Picture-in-picture	Enable, Disable	Switch the screen display of the multispectral camera (CX-GB300).
Picture-in-picture view	Inspection camera, Vision camera	Select the camera to be used for the main screen of the multispectral camera (CX-GB300)
Picture-in-picture direction	Forward, Downward	Select the forward or downward view of the vision camera displayed by the multispectral camera (CX-GB300)
Framing Guides	None, Square Reticle, Thirds Grid, Thirds + Diagonals	Select to display a framing guide on the live view screen.
Firmware version	—	Display the firmware version of the camera.
Gimbal reset	—	Calibrate the gimbal while in flight.
Reset	—	Restore the camera to default factory settings.
Format SD card	—	Format the SD card inserted in the camera.

Table of available functions by camera

The items in camera settings and advanced camera settings vary depending on the camera used. Refer to Tables 19 and 20 for availability details.

Table 19 Available functions by camera - Camera settings

Items	CX-GB100	CX-GB200	CX-GB300	CX-GB400
Exposure mode	✓	✓	✓	✓
Focus mode	✓	x	✓	✓
ISO mode	✓	✓	✓	✓
Aperture	✓	x	✓	x
Shutter speed * In Exposure mode [Manual/Shutter speed priority]	✓	✓	✓	✓
White balance	✓	✓	×	✓
ISO * In ISO mode [Manual/Semi-auto]	✓	✓	✓	✓
Exposure compensation	✓	✓	✓	✓
Metering mode	✓	✓	✓	✓
Still image resolution	✓	✓	x	✓
Video resolution	✓	✓	x	✓
Still image quality	✓	✓	x	✓

Image format (still image)	✓	✓	x	✓
Frame rate (Video)	✓	✓	x	✓
Video recording split time	✓	✓	x	✓
NDVI color map	x	x	✓	x
Interval time	✓	✓	✓	✓

Table 20 Available functions by camera - Advanced camera settings

Items	CX-GB100	CX-GB200	CX-GB300	CX-GB400
Shutter method	✓	x	✓	x
HDR shooting	✓	✓	x	✓
Electronic image stabilization	✓	✓	x	✓
Distortion correction	✓	✓	x	✓
Sensor mode	x	✓	x	x
Live view	x	✓	x	x
IR Color palette	x	✓	x	x
Framing Guides	✓	✓	✓	✓
Firmware version	✓	✓	✓	✓
Reset	✓	✓	✓	✓
Format SD card	✓	✓	✓	✓

2.4.3.360° Shooting

- Automatically shoot still images in all directions.
- This function is designed to support image capture for creating 360°spherical image.
- Images taken using the 360° shooting function are saved in a dedicated folder on the camera's SD card.
- **Note** : ACSL does not provide or endorse any specific software for 360° spherical image stitching. Users are responsible for selecting and obtaining suitable software.

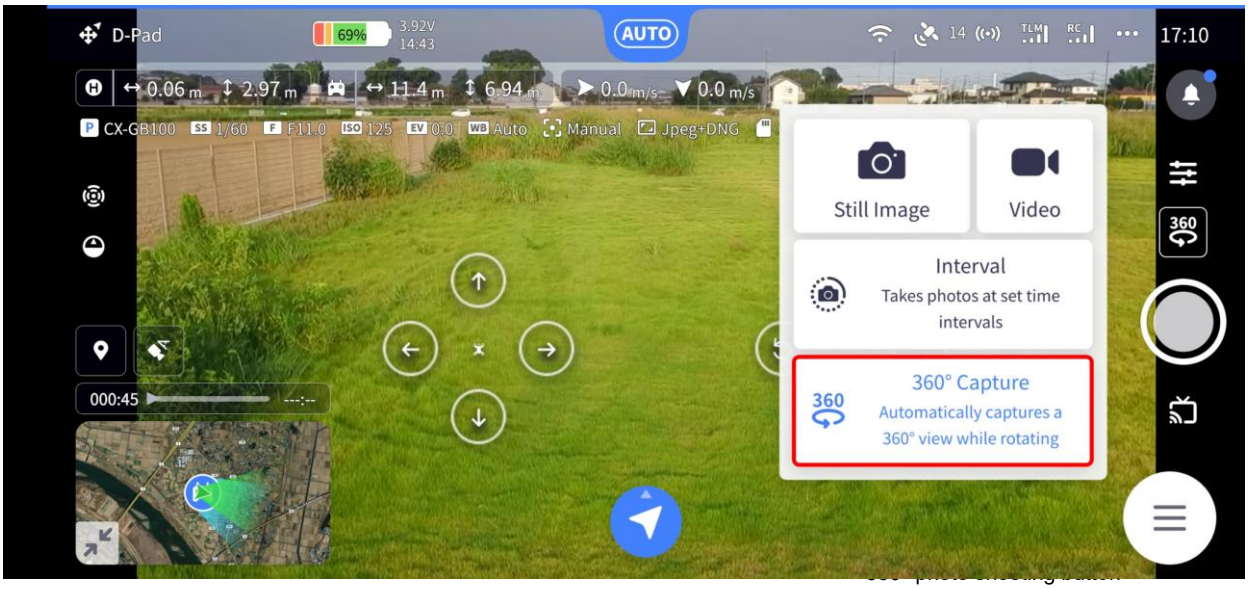


Figure 41 360° photo shooting

1. **Set the flight mode to free flight (see Section 2.3.5) (10 m or more above ground is recommended)**
2. **Change the camera mode to select 360° shooting mode.**
3. **Press the Shutter button to start shooting (the aircraft will move automatically to collect the images from all directions)**

2.4.4. Video Stream Recording

- Tap the video stream recording button to begin saving the video stream that is received from the aircraft.
- Videos are saved in the “Videos” folder under the “TAKEOFF” folder, which can be viewed via the Files app on your mobile device.

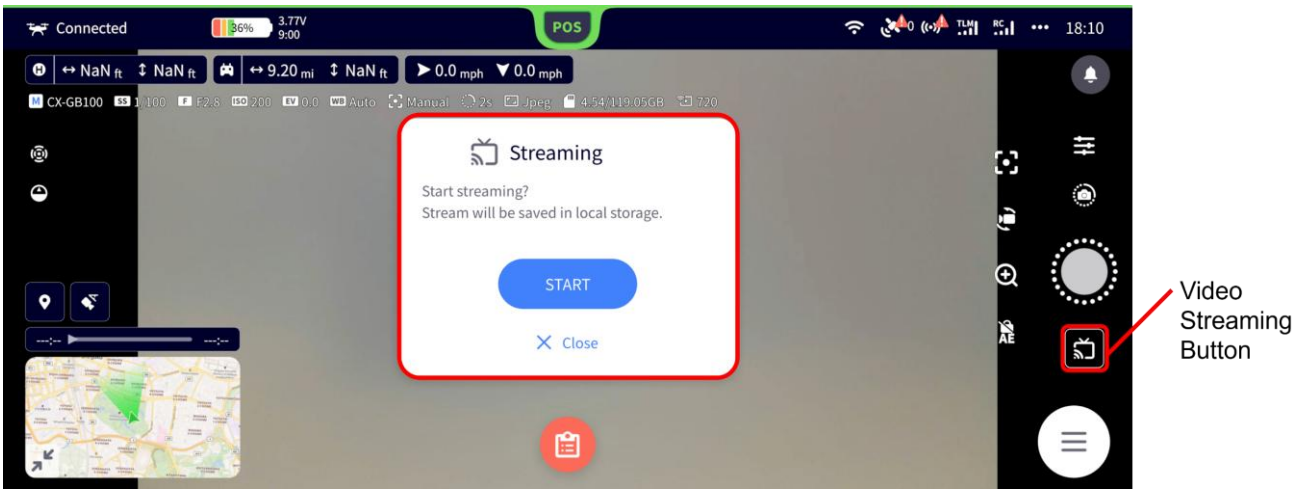


Figure 42 Stream recording

2.5. Emergency Menu

- If communication between the aircraft and the controller is lost, or if the battery level drops below the warning threshold, the aircraft will enter emergency mode and begin hovering in the place for the duration specified in the aircraft settings (60 seconds by default).
- TAKEOFF will display the following emergency menu.

If communication between the aircraft and the controller is lost

- The aircraft will initiate the action specified in the aircraft setting (Go Home/ELS after 60 seconds by default).
- If communication is restored before the specified time (60 seconds by default) has elapsed, emergency mode will be cancelled, and the flight will resume.

Note: When the radio communication is restored, the emergency mode can be deactivated by switching the controller's flight mode to different mode.

When the battery level drops below the warning threshold

- If communication with the controller is established, send a command within the time specified in the aircraft settings (60 seconds by default) and terminate the flight.



Figure 43 Emergency pop-up window - 1

If “Motor wiring error (fit.)” is detected during flight

- Land the aircraft immediately in a safe area.

Note: In POS/AUT mode, only the following commands are valid: "Auto-Landing", "Emergency Landing", and "Forced Stop". All commands are invalid in MAN (Manual) mode.

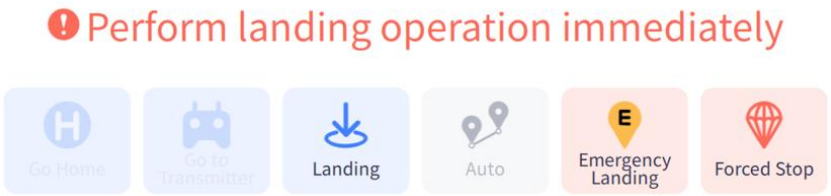


Figure 44 Emergency pop-up window - 2

ADVISORY

- If the aircraft does not receive any command from the pilot within the amount of time specified in the aircraft settings (60 seconds by default), the aircraft will automatically return home or proceed to an emergency landing site (ELS).

- Plan your flight and ensure that the altitude settings are high enough so that the aircraft does not encounter any obstacles if it needs to go home or proceed to an emergency landing site (ELS).

2.6. RTK Icon (Option)

The RTK icon is displayed only when the optional RTK-SOTEN unit is connected to the aircraft.

The icon indicates the current positioning status and connection status of the RTK module.

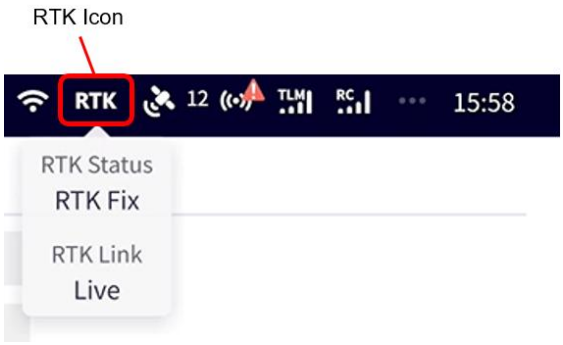


Figure 45 RTK Icon

2.6.1. RTK Icon Status

The RTK icon changes according to the positioning status and connection status as shown in the table below.

Table 21 RTK Icon Status

RTK icon	Icon status	RTK-SOTEN Positioning Status	Positioning Accuracy (Reference)
	Not Displayed	Not positioning (RTK-SOTEN not connected)	SOTEN onboard GNSS positioning accuracy
	Red color + Strikethrough	Not positioning (RTK-SOTEN connected)	SOTEN onboard GNSS positioning accuracy
	White color + Red exclamation mark	Standalone positioning or DGNSS	Vertical : 1.0~3.0m Horizontal : 1.0~3.0m
	White color + Yellow exclamation mark	RTK float	Vertical : 0.5~1.0m Horizontal : 0.5~1.0m
	White color	RTK fixed	Vertical : 0.01 m + 1 ppm Horizontal : 0.01 m + 1 ppm

Chapter 3

Plan View

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3.2 Creating a Flight Plan ····· 51

3.1 Overview of Plan View

- The TAKEOFF application enables users to create and upload flight plans to the aircraft, allowing fully autonomous missions, including takeoff, landing, and camera operations, without pilot intervention. This section explains how to create such a flight plan.

3.1.1 Plan View Elements

Tap Plan in the main menu to go to the plan view screen.



Figure 46 Plan view

Table 22 Plan view basic buttons

	Name	Description
1	File menu	Create a new, open, or save a plan. Upload a plan to the aircraft or clear the plan from the aircraft.
2	Search bar	Search for a place on the map by typing a location name, address, etc.
3	Flight distance	Displays the total flight distance for the entire plan.
4	Mission time	Displays the total flight time for the entire route.
5	Waypoint display	Displays the waypoints created on the map.
6	Geofence display	Displays the geofences created on the map.
7	Emergency landing site display	Displays the emergency landing sites created on the map.
8	Flight plan details	Opens the flight plan details tab.
9	Altitude/speed window	Displays the altitude and speed of the created plan.
10	Plan menu	Menu with flight plan creation tools.
11	Undo button	Undo the last performed action.
12	Redo button	Repeat the last undone action.

13	Move entire route	Either manually move the entire route or automatically adjust the route so that the point aligns with the aircraft's current position.

3.2 Creating a Flight Plan

3.2.1 Setting Takeoff Point

- First, set the takeoff point. Tap the takeoff point icon in the plan menu. The takeoff point is automatically placed at the aircraft location if the TAKEOFF app is connected to the aircraft. If TAKEOFF is not connected to the aircraft, tap a point on the map to set the location of the takeoff point.
- To move the takeoff point, drag the takeoff point icon, or edit the latitude and longitude in the flight plan details tab.

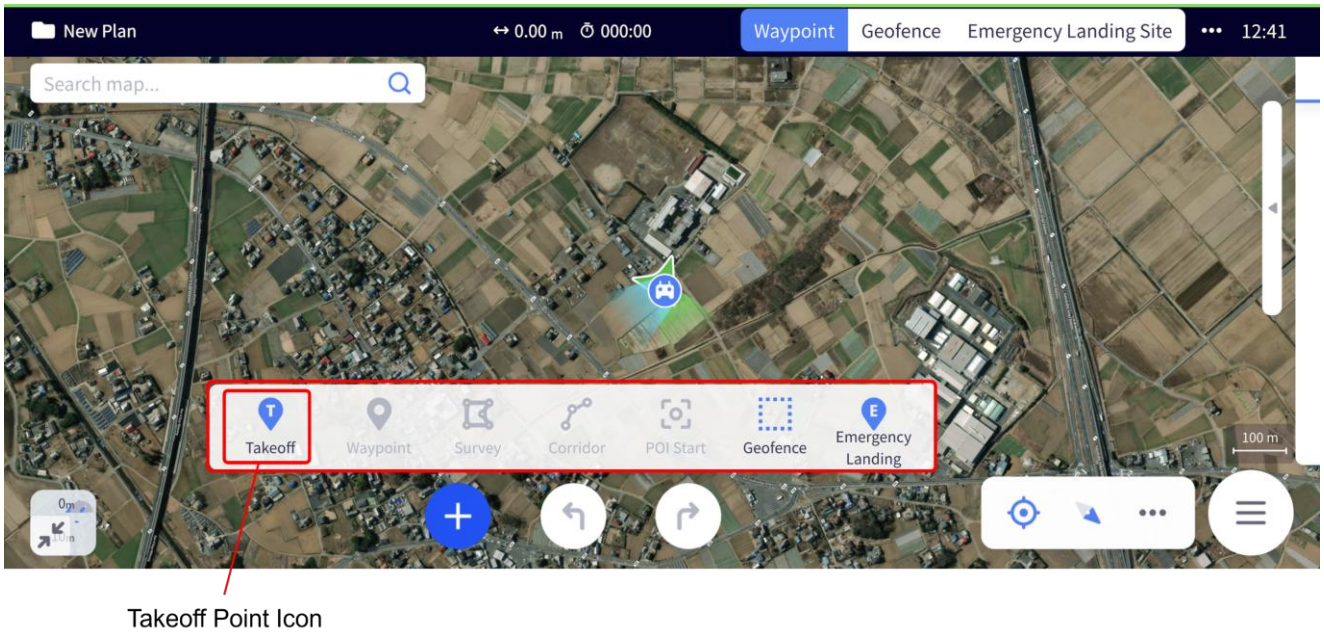


Figure 47 Add the Takeoff Point

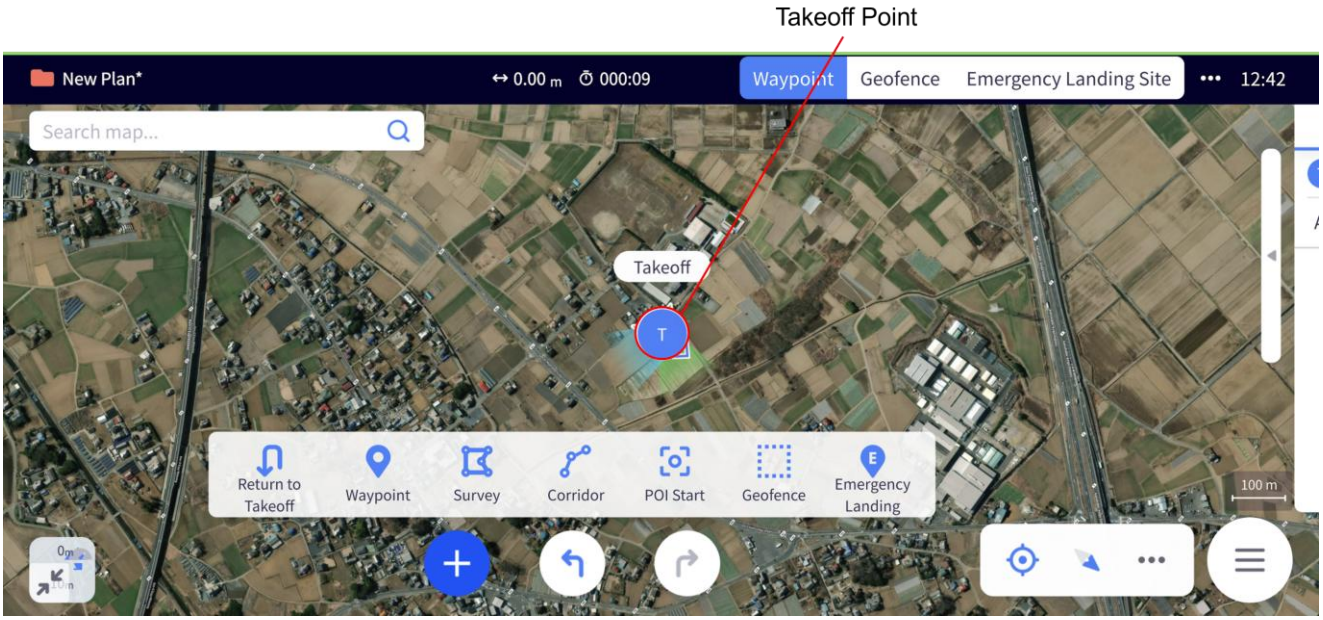


Figure 48 Takeoff Point added

3.2.2 Setting Waypoints

Standard setting of waypoints

Select the point icon in the plan menu and tap any point on the map to set a waypoint (the latitude and longitude of the waypoint will correspond to the location on the map that was tapped).

The latitude, longitude, heading, etc., for each waypoint can be viewed in the flight plan details tab.

Tap the flight plan details button on the right edge of the screen to display the list of waypoints.

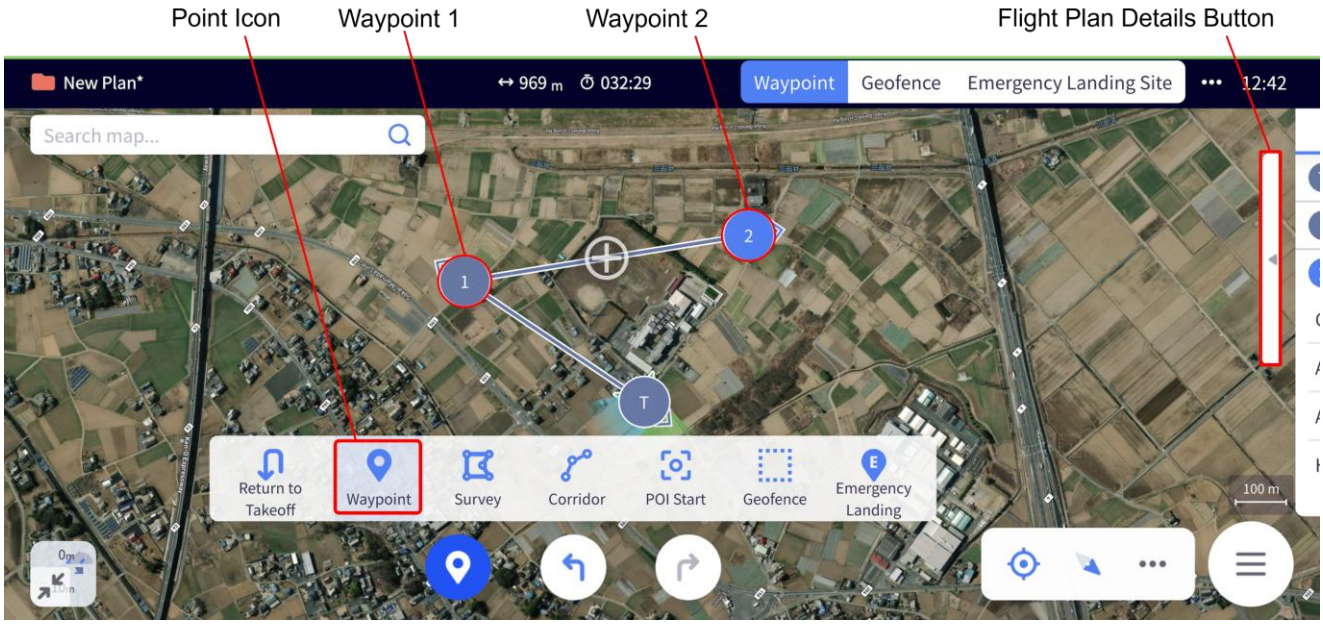


Figure 49 Setting a Waypoint

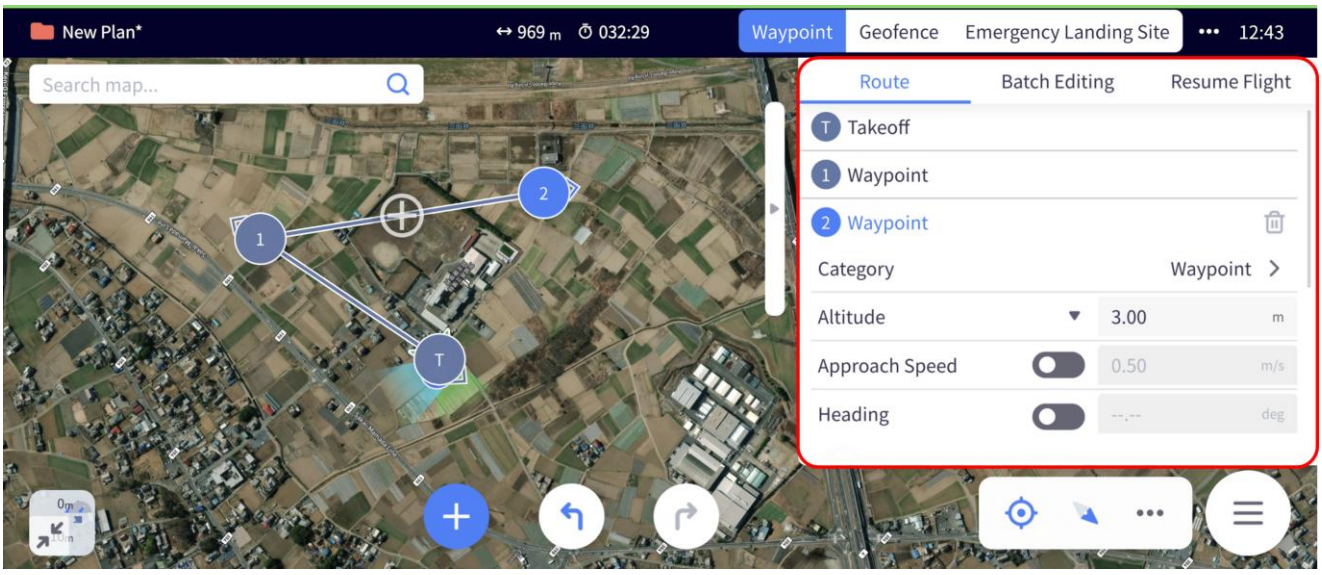


Figure 50 Flight Plan Details

Setting waypoint details

A list of the created waypoints is shown in the flight plan details window.

Tap the desired waypoint number in the flight plan details window, or tap the waypoint icon on the map to view or edit the waypoint's settings.

The selected waypoint is highlighted in blue on the map.

Table 23 Waypoint settings

Items	Description
Altitude	Altitude above the takeoff location, altitude above sea level, or above ground level.
Speed	With the toggle set to OFF, the aircraft will approach this waypoint with the same approach speed of the previous waypoint. With the toggle set to ON, the aircraft will approach this waypoint at the specified speed.
Direction	With the toggle set to OFF, the aircraft will approach this waypoint with the nose pointed in the direction of travel. With the toggle set to ON, the aircraft will approach this waypoint with its nose pointed in the specified direction.
Wait time	The amount of time the aircraft will hover at this waypoint before proceeding to the next.
Threshold	If this value is set to greater than zero, then as the aircraft approaches this waypoint, it will make a curved turn toward the next waypoint. The radius of this turn will be equal to this value.
Distance from takeoff reference point (North)	The distance north of this waypoint from the takeoff point.
Distance from takeoff reference point (East)	The distance east of this waypoint from the takeoff point.
Latitude	The latitude of this waypoint.
Longitude	The longitude of this waypoint.

Setting waypoint approach heading direction

The direction with which the nose is pointed (heading direction) when approaching a waypoint can be adjusted selecting the target waypoint, setting the **Direction** toggle to **ON**, and moving the direction slider, as shown in Figure 48.

The direction the aircraft's nose will face when approaching this waypoint is indicated by the arrow next to the waypoint on the map.

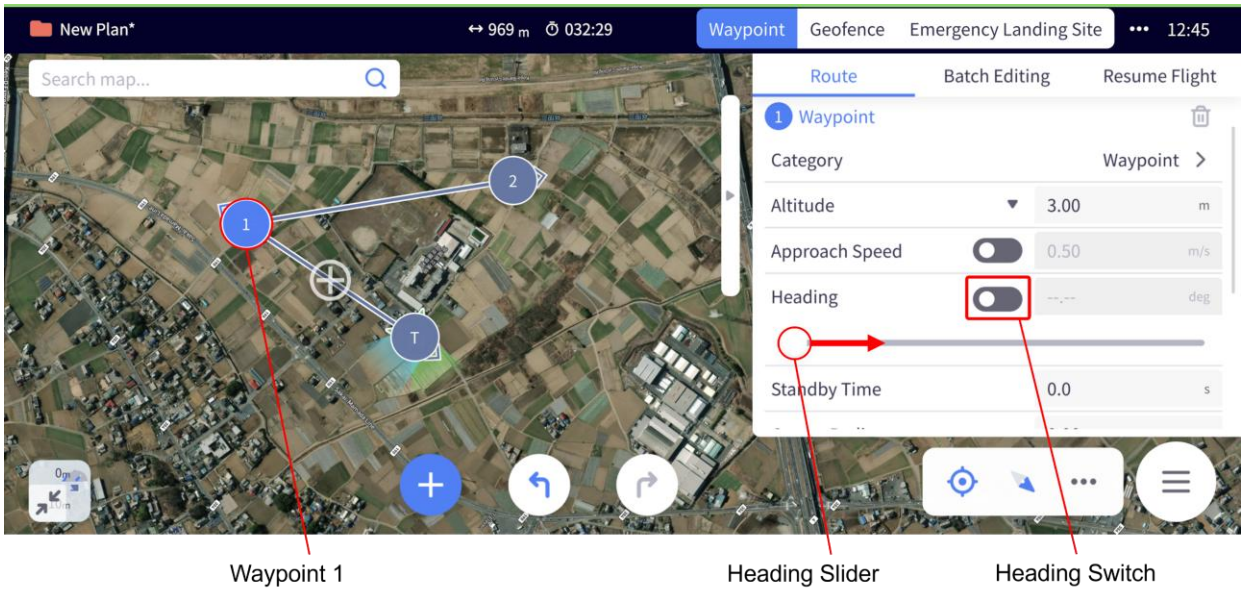


Figure 51 Setting waypoint approach heading direction

Setting waypoint altitude

The altitude of each waypoint can be specified in one of three ways as shown in Figure 49: (1) altitude relative to the takeoff point, (2) altitude above sea level, or (3) altitude above ground level (when map elevation data is available).

To specify the altitude, tap the numeric entry field and enter a value corresponding to the selected altitude type.

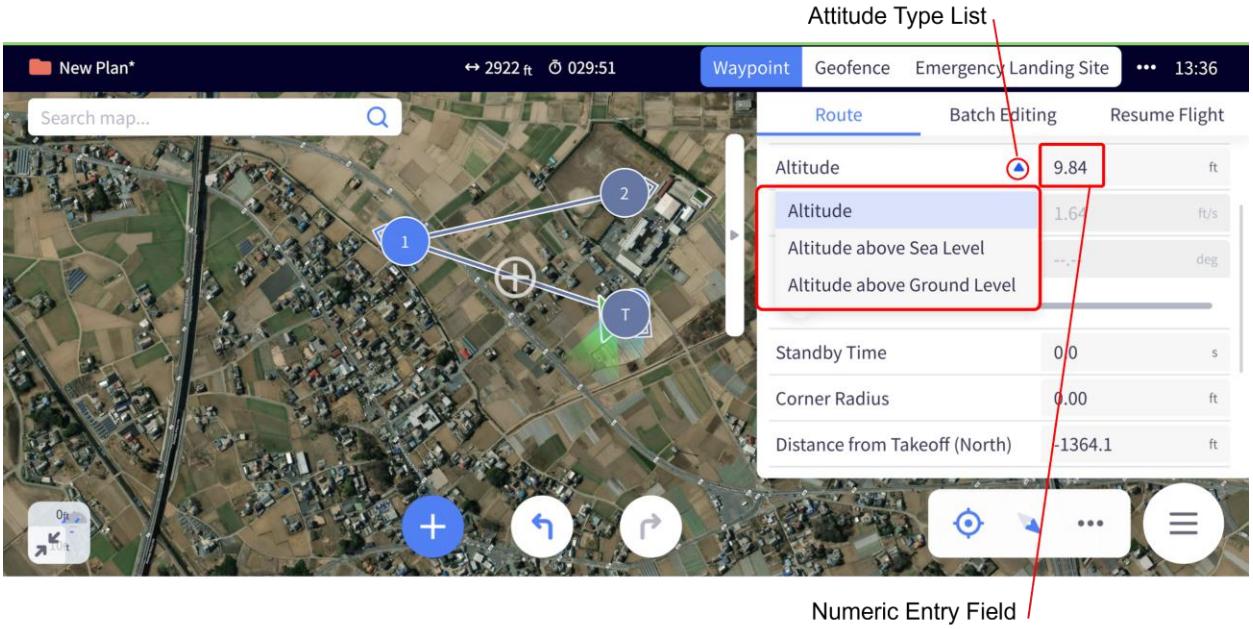


Figure 52 Setting waypoint altitude

Changing waypoint categories

For each waypoint, the waypoint type can be changed by tapping its current category designation. A category selection window will then appear, as shown in Figure 50.

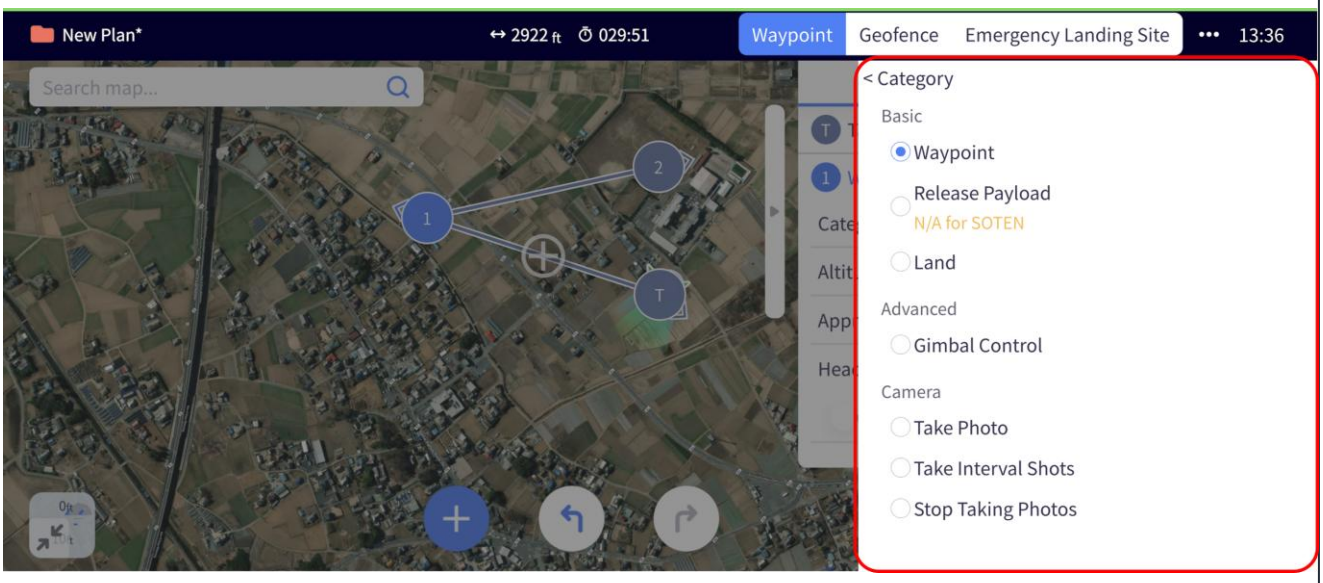


Figure 53 Waypoint categories

ADVISORY

Set the category to the waypoint. Adding a category to the takeoff reference point will have no effect.

Table 23 shows a summary of waypoint categories.

Table 24 Outline of categories

Category	Description
Waypoint	Standard target waypoint.
Release Payload	Perform a package release and re-takeoff (delivery drones only).
Land	Perform a landing at this location.
Gimbal Control	Control the camera tilt (immediately after the previous waypoint). • **Neutral:** Point the camera straight forward (0° tilt) • **MAVLink Targeting:** Specify camera tilt via the numeric fields
Take Photo	Activate the camera shutter (immediately after the previous waypoint).
Take Interval Shots	Start interval shooting (immediately after the previous waypoint).
Stop Taking Photos	Stop interval shooting (immediately after the previous waypoint).

Deleting Waypoints

To delete a waypoint, open the flight plan details tab and select the waypoint you want to delete. Tap the trash can icon to delete the waypoint.

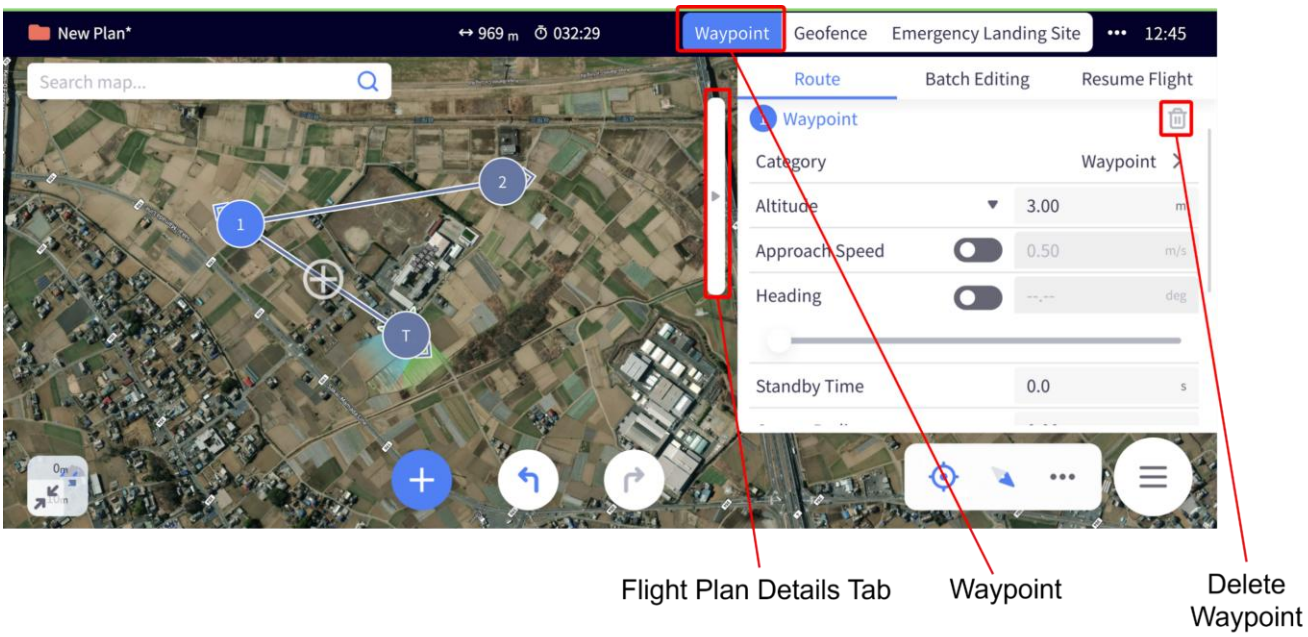
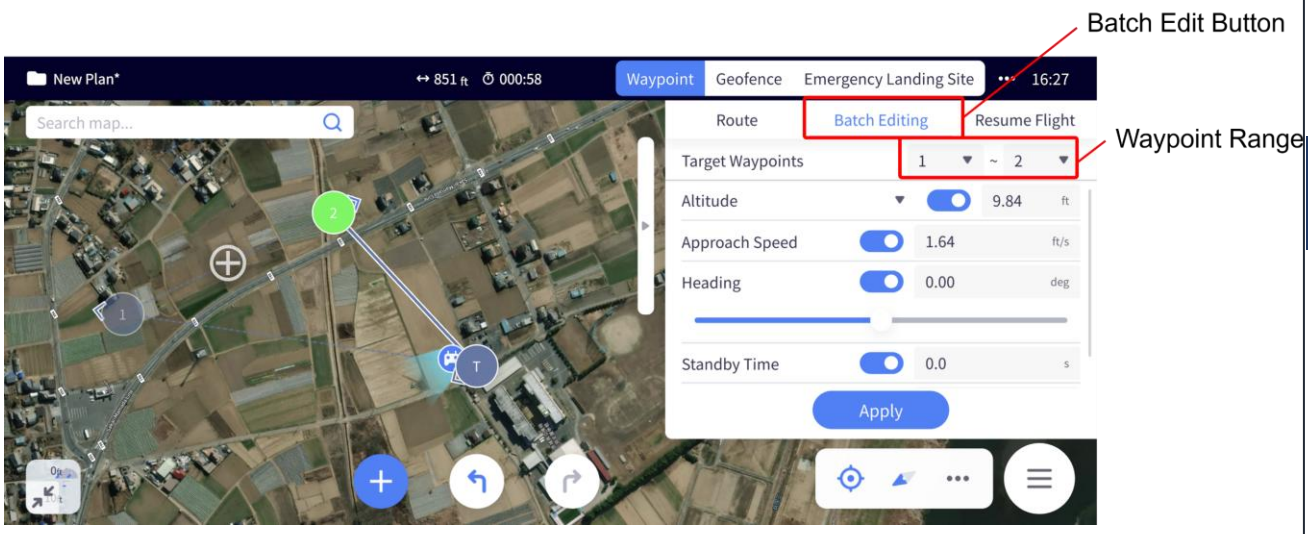


Figure 54 Deleting Waypoints

Batch editing

To change the settings of more than one waypoint, select the **Batch Editing** tab and specify the range of waypoints to edit.

Any combination of **altitude, speed, direction, wait time**, and **threshold** can be changed for a range of waypoints.



Return to Launch

1. **After reaching the final waypoint, the aircraft transitions to Go Home mode and ascends to the preset Go-Home altitude.**

   Note: if the aircraft is already flying above the Go-Home altitude, it maintains the current altitude.

2. **The aircraft changes its heading toward the home point and moves horizontally toward the home point while maintaining its altitude.**
3. **Upon reaching the home point, the aircraft changes its heading to the same direction as at takeoff.**
4. **The aircraft then switches to Auto Landing mode and lands at its current position.**

> CAUTION
>
> - If the final waypoint (from which Return to Launch is initiated) is located within 5 m(16.4 ft) of the home point and below the Go Home altitude, the aircraft transitions to Auto Landing mode and lands at the final waypoint position.

Resume Flight

To restart a flight from the middle of a flight plan, select the **Resume Flight** tab, check the **Resume Flight** checkbox, and choose the waypoint number to resume the flight plan from. The approach speed can also be specified. The plan must be resent to the aircraft to take effect.

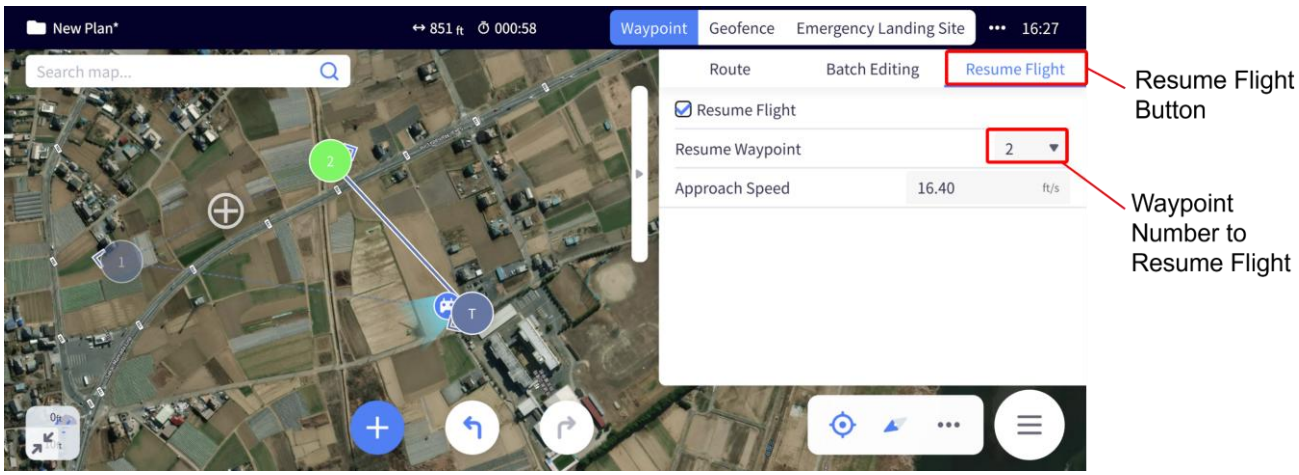


Figure 55 Resume Flight

CAUTION

- When resuming flight in Auto mode, the aircraft first ascends to the altitude set for the resume waypoint and then travels horizontally to the resume waypoint position.
- If the aircraft takes off in Manual mode or Position mode and then switches to Auto mode to resume the flight, or if a flight plan containing a resume waypoint is transferred during flight, the aircraft will move in a straight line to the position and altitude set for the resume waypoint.
- Pay attention to altitude changes during flight.

Registering Waypoints During Flight (Add to Favorites)

In **POS** or **MAN** mode, you can register a waypoint (a favorite point) by tapping a desired location on the map in the flight view.

The details of the registered waypoint can be confirmed in the waypoint list window of the Plan view.

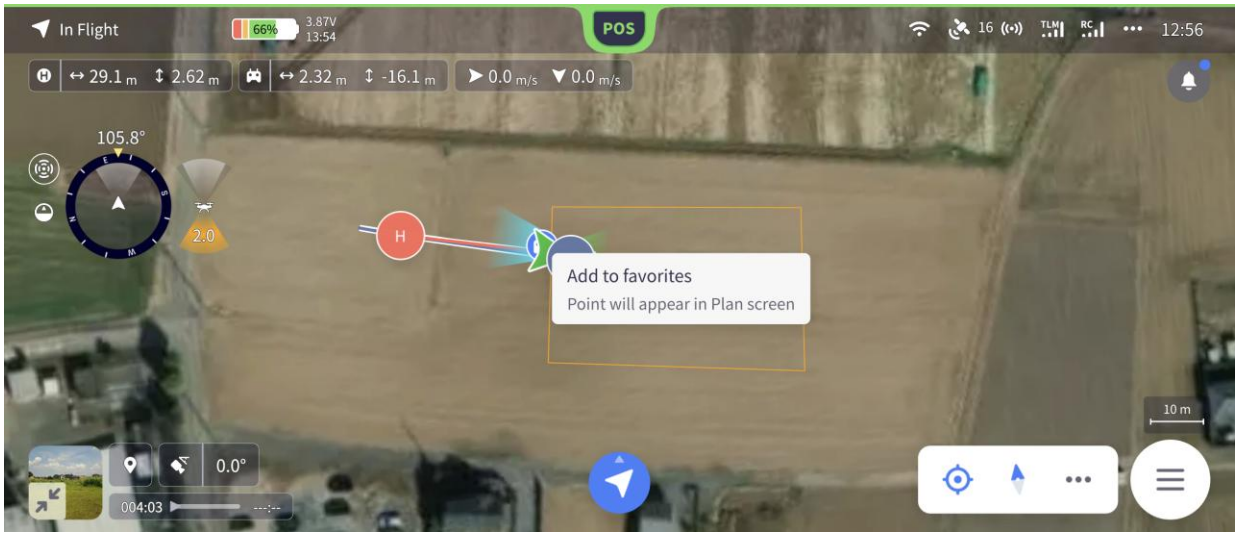


Figure 56 Add Favorite Waypoint

3.2.3 Survey and Corridor Scans

Survey

The Survey plan automatically sets waypoints so that the aircraft will perform a lawnmower pattern within a designated area within a polygon. The Survey plan is suitable for creating a set of overlapping images of an area for surveying and for 3D reconstruction of structures.

To create a survey plan, select Survey from the plan menu.

The aircraft will fly directly to the first survey waypoint from the previous waypoint (or from the takeoff location if there is no previous waypoint). Upon reaching the first survey waypoint, the aircraft will fly a lawnmower pattern within the blue survey area to the exit point. The flight path within the blue survey area is shown as gray lines.

Drag the vertices to change the shape of the blue survey area.

To make the shape more complex, tap a "+" to add a new vertex. The flight path is automatically updated according to the area created.

The grid settings items for the survey are shown in Table 24, the camera settings items in Table 25, and the preset settings items in Table 26.

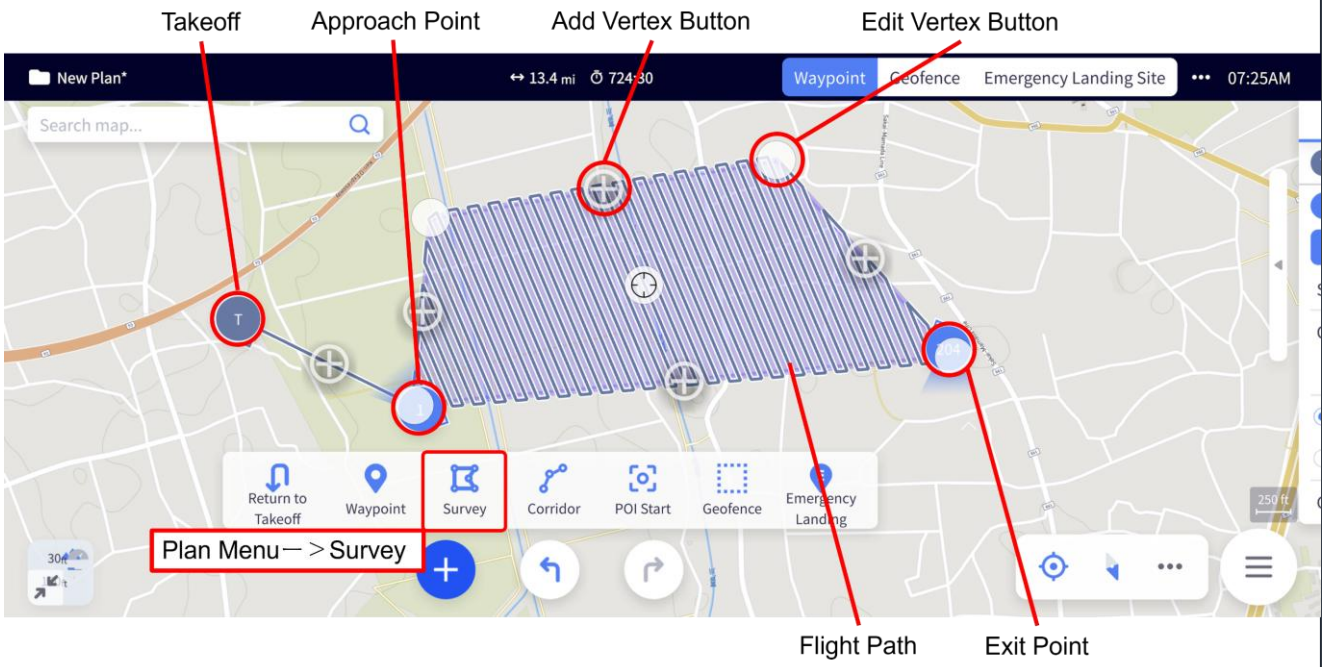


Figure 57 Automatic created waypoints

CAUTION

Be aware that the aircraft will fly directly to the first survey waypoint from the previous waypoint (or from the takeoff location if there is no previous waypoint). Note that the aircraft will not ascend to the survey altitude prior to moving horizontally.

ADVISORY

By default, the speed at which the survey is performed will be the same as the speed at the waypoint prior to the survey. To change the speed, enable the Survey Speed item in the survey settings.

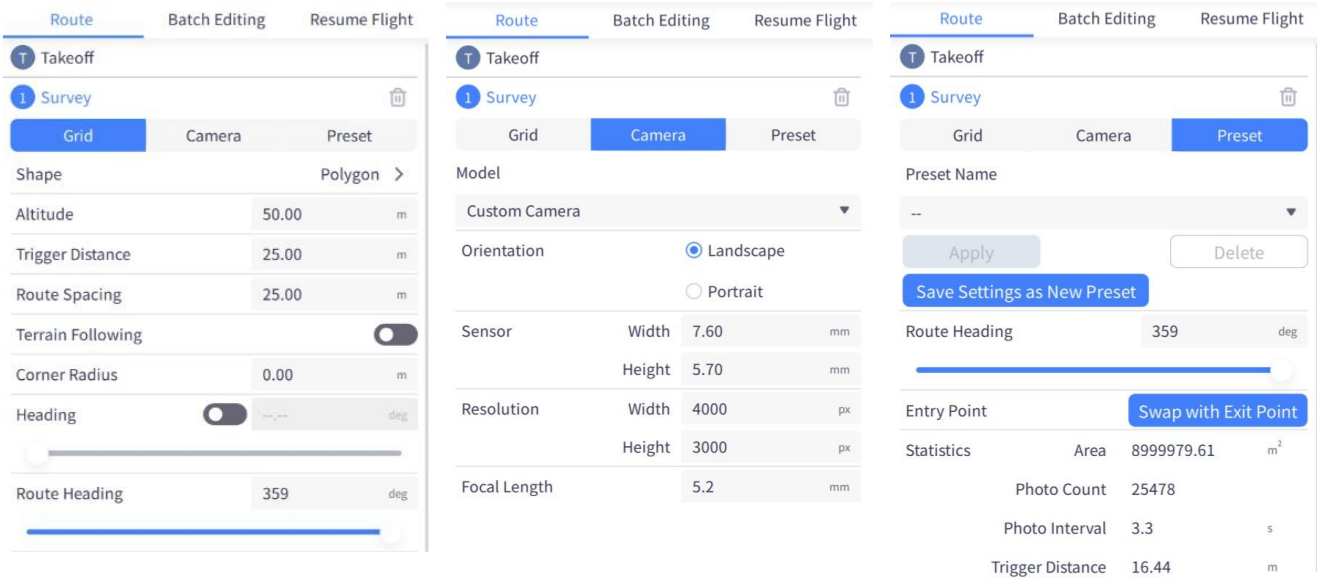


Figure 58 Survey settings

Table 25 Survey setting items

Items	Description
Shape	Select and load a KML/SHP file (map coordinate data).
Overlap	Adjust the flight path and photo interval time so that images are captured with a certain amount of overlap. Front rate is for the overlap in the direction of travel of the aircraft, and side rate is for the overlap of the parallel paths.
Altitude	Set the altitude of the survey flight.
Ground Resolution	Set the ground resolution of the flight path (assuming that ground is at the same altitude as the takeoff point). Note that this will set the altitude of the survey flight.
Terrain Following	The aircraft flies while maintaining a certain altitude from the ground using topographic information obtained from the map (when connected to the internet).
Corner Radius	When this value is set to zero, the aircraft will briefly stop at the waypoint before proceeding to the next. A value greater than zero will result in a rounded corner of the radius specified and smooth, uninterrupted motion.
Heading	Set the direction that the aircraft's nose will point to the specific direction.
Route Heading	Specify the direction (angle) of the lawnmower pattern within the survey area.
Distance to Turning point	Specify the distance to overfly the boundaries of the survey area to make the turn to start the next line.
Survey Approach Speed	Set the speed with which to approach the survey starting point.
Survey Speed	Set the speed during the survey flight.
Entry Point	Cycle the approach and exit points.
Hover to Capture Image	The aircraft will hover before taking each photo.
Repeat Survey with 90° Offset	Repeat the scan of the survey area with a lawnmower pattern that is 90 degrees from the original.
Capture Images during Turnarounds	The aircraft will continue to take photos even while turning to start the next line.

Statistics	Display the area of the survey range, the number of images shot, and the shooting interval in seconds.

Table 26 Camera settings

Items	Description
Model	Select one of the following cameras below to load appropriate camera parameters for calculating the flight path. • ACSL SAMO Thermal + Visible • Xacti CX-GB100 Standard • Xacti CX-GB200 Thermal + Visible • Xacti CX-GB300 Multispectral • Xacti CX-GB400 Optical Zoom

Table 27 Preset settings

Items	Description
Preset name	Display the preset name of the route being created. Save it to load the preset from the next time.
Route Heading	Change the direction of the scan by moving the slider.
Entry Point	Swap the approach and exit points of the survey area being created.
Statistics	Display the area of the survey range, the number of images shot, and the shooting interval in seconds.

Corridor scan

The Corridor scan plan automatically sets waypoints so that the aircraft scans within the designated area formed by continuous lines, following the area path. The Corridor scan plan is suitable for shooting continuously along a road, powerline, pipeline, etc.

To create a corridor plan, select Corridor from the plan menu.

The aircraft will fly directly to the first corridor scan waypoint from the previous waypoint (or from the takeoff location if there is no previous waypoint). Upon reaching the first corridor scan waypoint, the aircraft will fly a lawnmower pattern within the blue corridor scan area to the exit point. The flight path within the blue survey area is shown as gray lines.

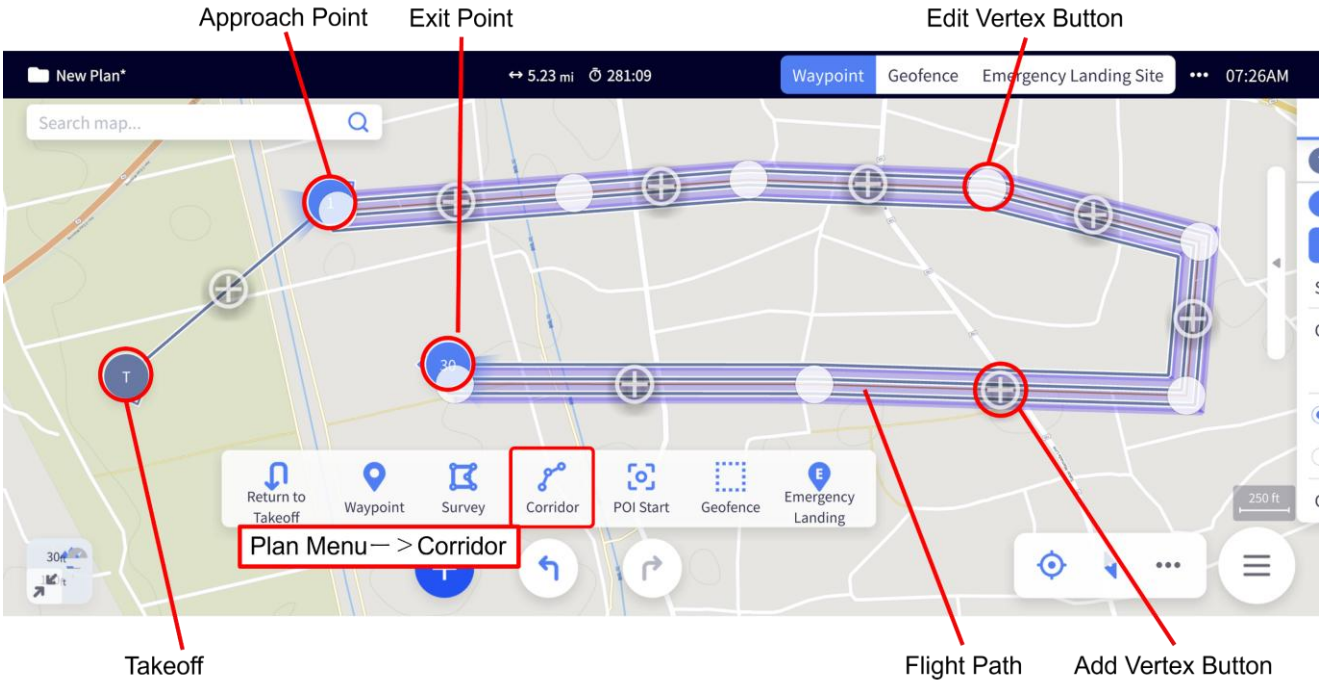


Figure 59 Corridor plan

CAUTION

Be aware that the aircraft will fly directly to the first corridor scan waypoint from the previous waypoint (or from the takeoff location if there is no previous waypoint). Note that the aircraft will not ascend to the corridor scan altitude prior to moving horizontally.

ADVISORY

By default, the speed at which the corridor scan is performed will be the same as the speed at the waypoint prior to the corridor scan. To change the speed, enable the Corridor Speed item in the corridor settings.

Table 28 Corridor scan settings

Items	Description
Shape	Select and load a KML/SHP file (map coordinate data).
Overlap	Adjust the flight path and photo interval time so that images are captured with a certain amount of overlap. Front rate is for the overlap in the direction of travel of the aircraft, and side rate is for the overlap of the parallel paths.
Altitude	Set the altitude of the corridor scan flight.
Ground Resolution	Set the ground resolution of the flight path.
Terrain Following	The aircraft flies at a certain altitude above the ground based on topographic information obtained from the map.
Corner Radius	When this value is set to zero, the aircraft will briefly stop at the waypoint before proceeding to the next. A value greater than zero will result in a rounded corner of the radius specified and smooth, uninterrupted motion.
Heading	Set the direction that the aircraft's nose will point to a specific direction.
Width	Set the width of the corridor scan.
Distance to Turning point	Specify the distance to overfly the boundaries of the survey area to make the turn to start the next line.
Corridor Approach Speed	Set the speed with which to approach the corridor scan starting point.
Corridor Speed	Set the speed during the corridor scan flight.
Capture Images during Turnarounds	The aircraft will continue to take photos even while turning to start the next line.
Entry Point	Cycle the approach and exit points.
Statistics	Display the area of the survey range, the number of images shot, and the shooting interval in seconds.

3.2.4 Point Of Interest (POI)

- The point of interest (POI) feature ensures that the camera is always pointed at a specified point in space, regardless of the relative location of the aircraft to that point.
- To set a target point of interest, tap the "POI" button and then tap any point on the map.
- Drag the point to change the location.
- As an example, in the figure below, the aircraft will fly from the takeoff point to Waypoint 1. During this flight, the nose of the aircraft and the tilt of the gimbal will always face in the direction of the POI target.

- The POI settings menu allows you to set the altitude, latitude, and longitude of a POI target.

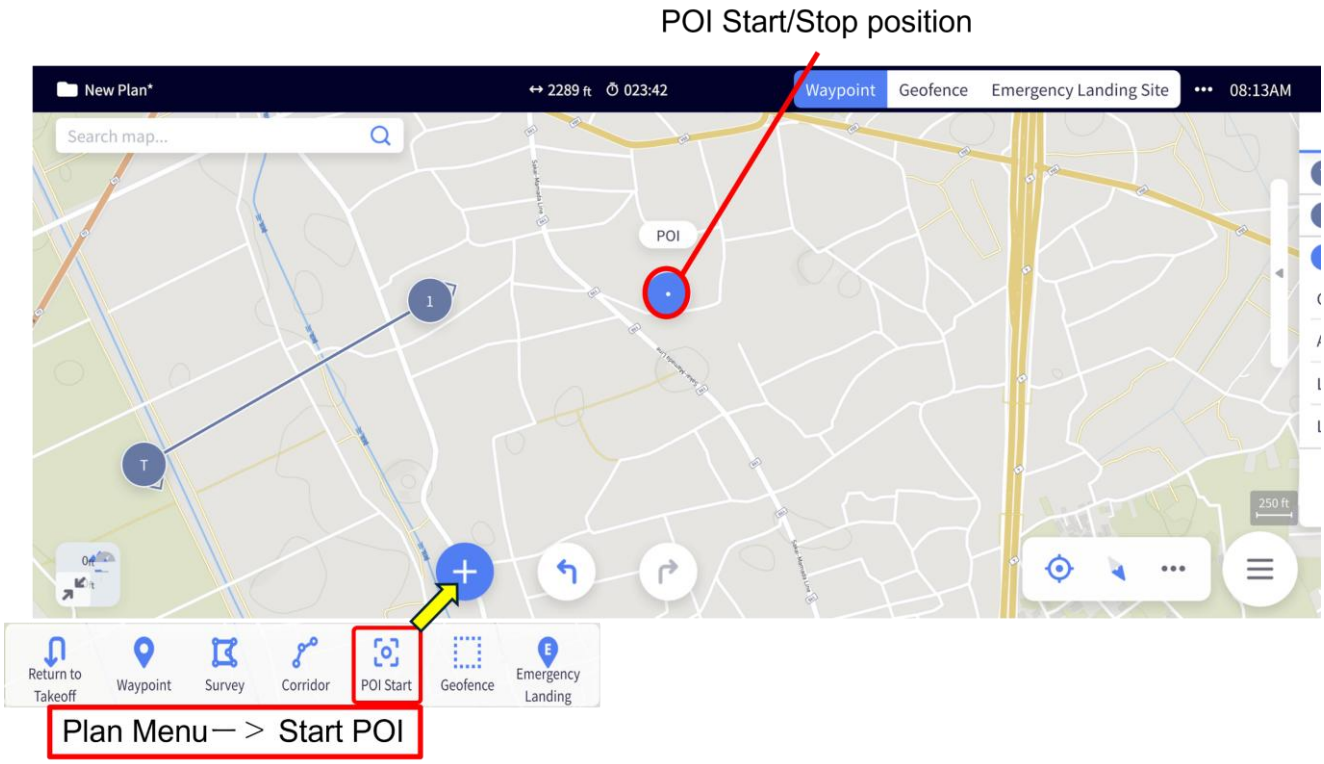


Figure 60 Setting POI

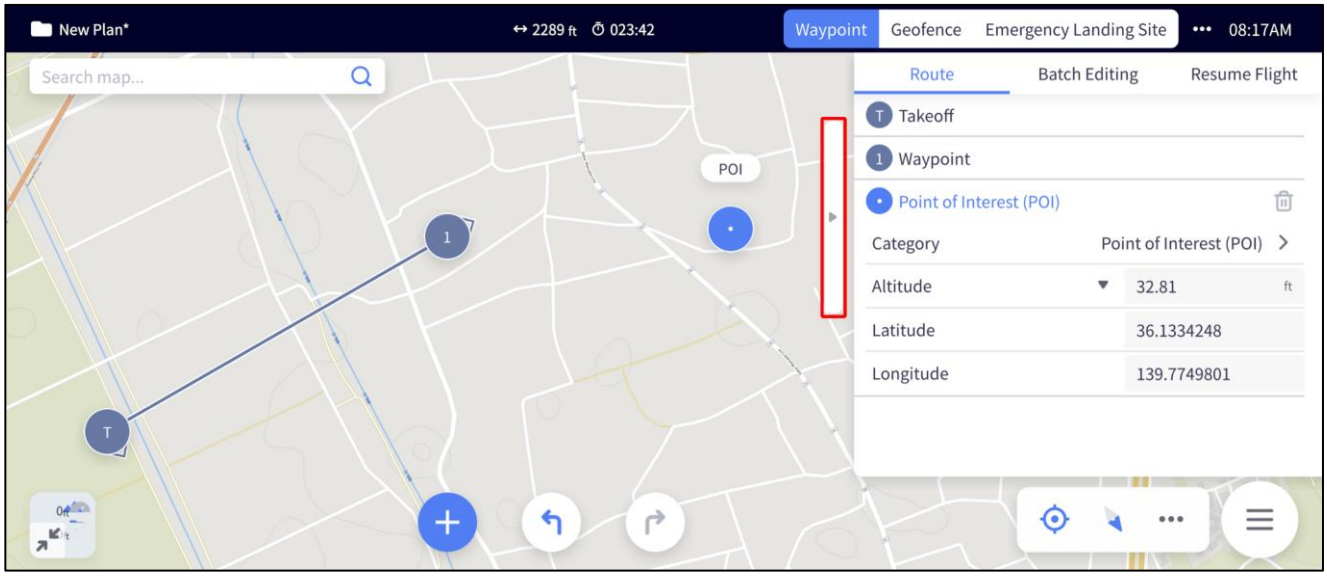


Figure 61 POI Settings

3.2.5 Emergency Landing Sites

- To set an emergency landing site, tap the Emergency landing button in the plan menu, and then tap any point on the map.

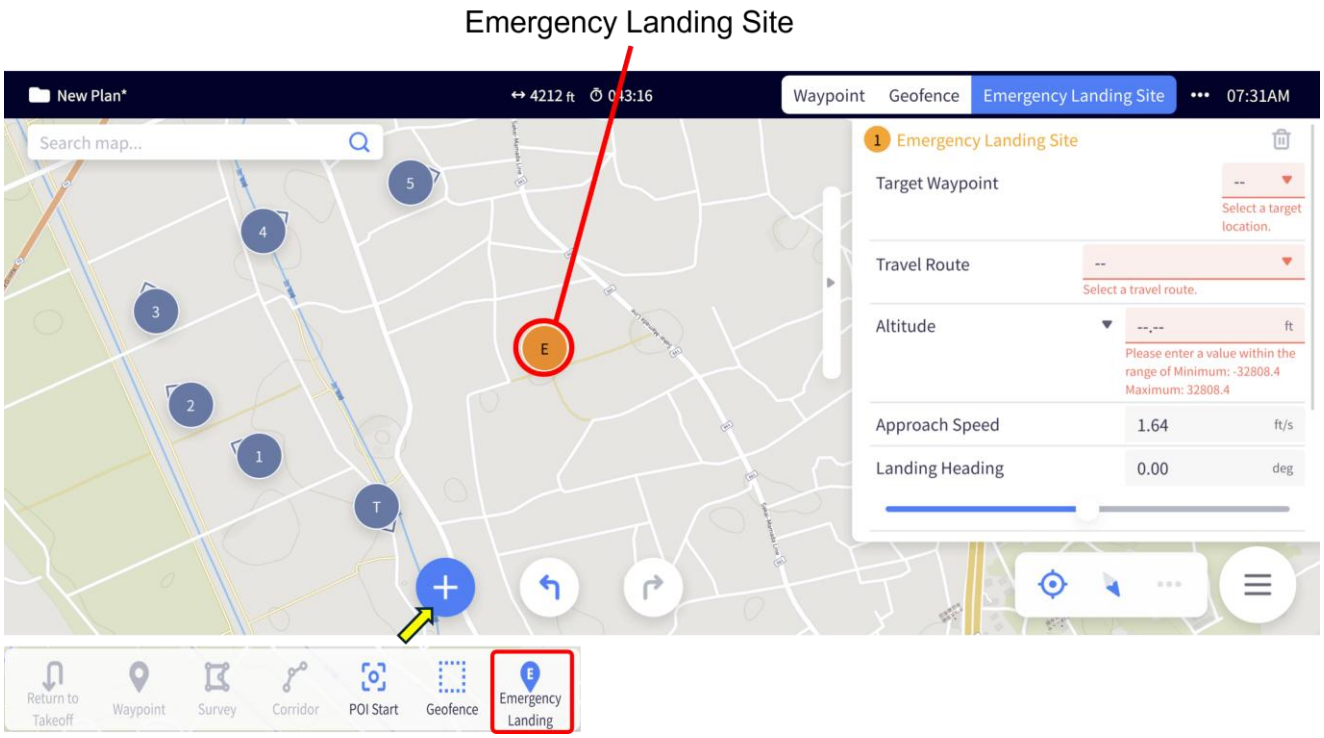


Figure 62 Setting emergency landing site

Table 29 Emergency landing site settings

Items	Description
Target Waypoint	Specify a waypoint that is linked to the emergency landing site.
Travel Route	Select a flight path to fly to the emergency landing site.
Altitude	Set the altitude during the flight to the emergency landing site.
Approach Speed	Set the speed during the flight to the emergency landing site.
Landing Heading	Set the direction that the nose of the aircraft will face during the flight to the emergency landing site.
Distance from Takeoff (North)	The distance north of this waypoint from the takeoff point.
Distance from Takeoff (East)	The distance east of this waypoint from the takeoff point.
Latitude	The latitude of this waypoint.
Longitude	The longitude of this waypoint.

3.2.6 Geofences

- This function allows the user to specify no-fly areas.

> ADVISORY
>
> A flight plan must also be created to enable the geofence function.

Area settings

1. Create: Tap the Fence button in the plan menu, then select polygon, which will display a square area.
2. Move vertex: Drag the vertices to change the shape of the geofence.
3. Add vertex: Tap a “+” to add a new vertex.
4. Move area: Drag the Move area button to move the entire area to the desired position.

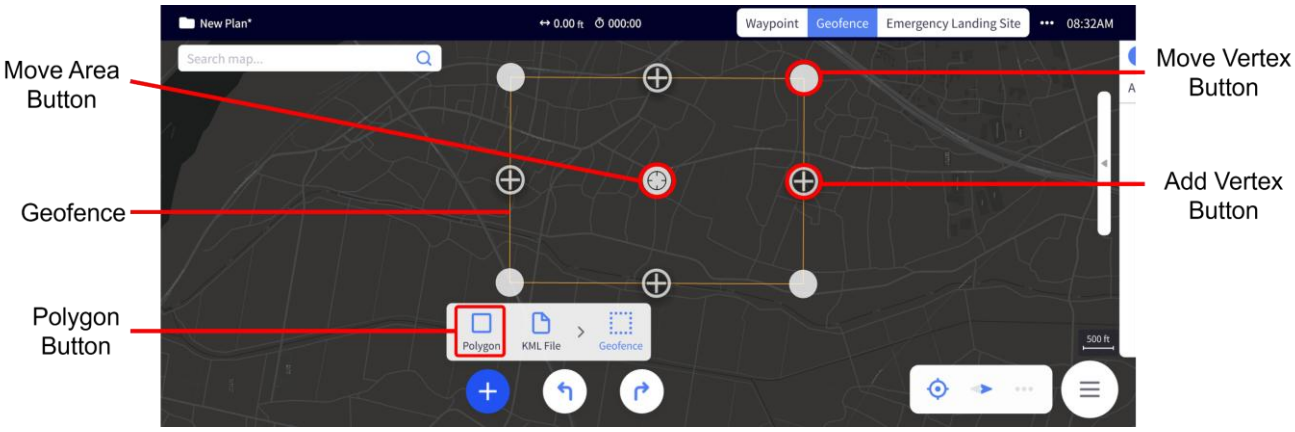


Figure 63 Geofence editing screen

5. Flight OK/No-fly: Designate the area as Flight OK or No-fly in the flight plan details tab.
6. Add areas: To add additional areas, repeat steps 1 through 5.
7. Upload to aircraft: Tap the File menu and transmit the plan to the aircraft.

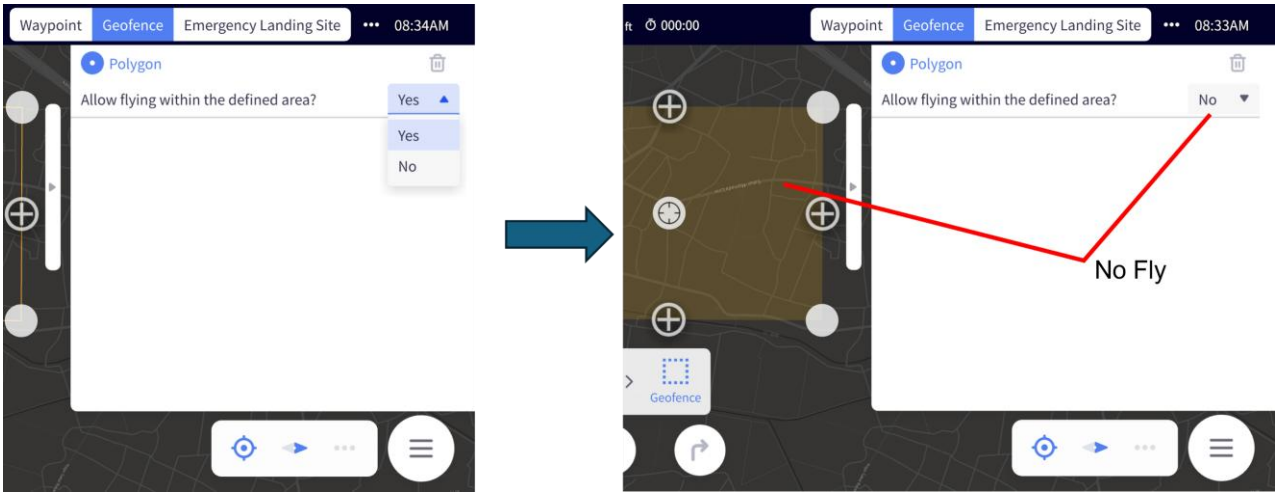


Figure 64 Geofence setting menu screen

CAUTION

- Limit geofences to a maximum of 15 vertices. A geofence with more than 15 vertices may not function correctly.
- When constructing multiple geofenced areas, do not allow the no-fly zones to overlap. Geofences with overlapping no-fly zones will not function correctly.
- Do not construct geofences with lines that cross each other. If any line of the geofence crosses another line of the geofence, then it will not work correctly.
- Do not construct geofences that might obstruct the planned flight path as the geofence may affect the aircraft's route in those situations. If during flight, the geofence is preventing the aircraft's movement, switching to manual (MAN) mode will restore the pilot's authority to continue flight or to land.

An example of geofence positioning

If a no-fly zone is set along the Go Home route, the system automatically generates the shortest path that avoids the no-fly zone.

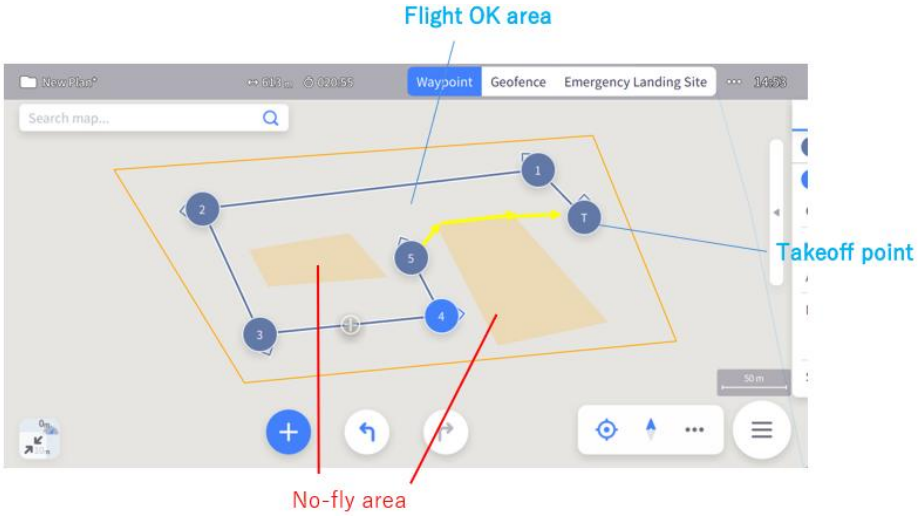


Figure 65 An example of geofence positioning

3.2.7 Using a Flight Plan

- Created flight plans, including geofences and emergency landing sites, can only be executed after they have been uploaded to the aircraft.
- Tap the file menu icon at the top left of the screen to display the file menu.
- Select “New” to create a completely new plan or select “Open” to load an existing plan.
- Tap “Send to Drone” to upload the plan to the aircraft for autonomous flight.
- It is possible to send a new flight plan to the aircraft while in flight. To do so, any in-progress planned flight must first be paused. After the new plan has been received, tapping the Resume button will result in the aircraft executing the new flight plan from the first waypoint.

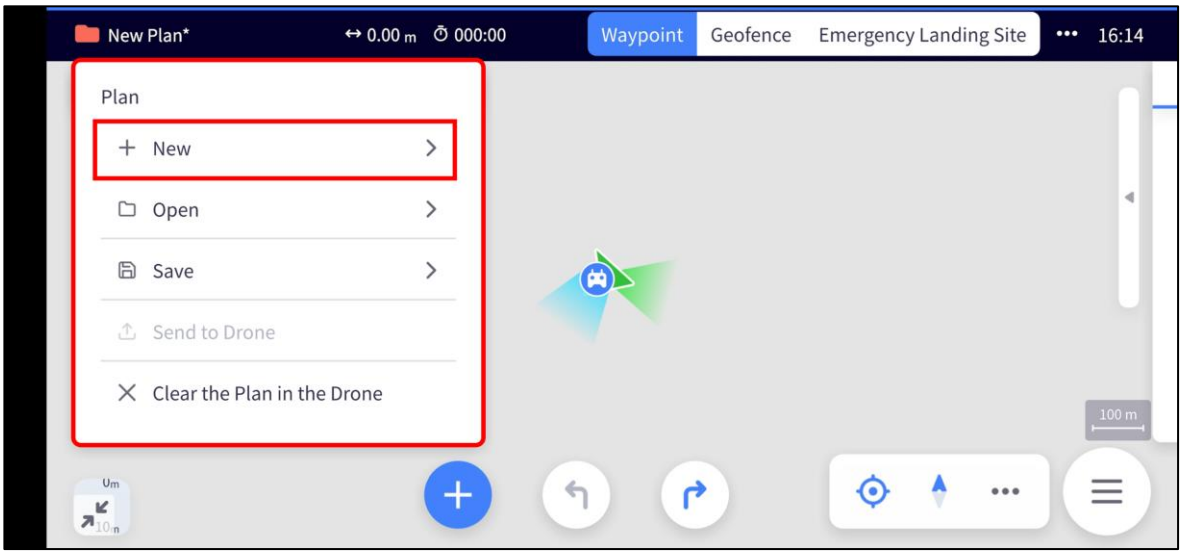


Figure 66 File menu

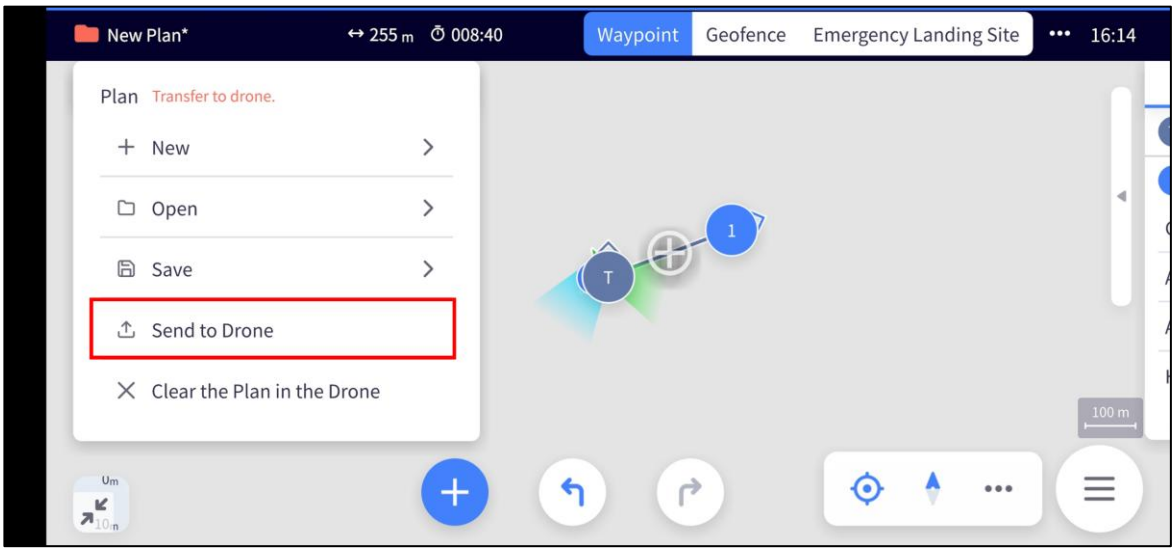


Figure 67 Sending a plan

ADVISORY

- If a plan does not include any waypoints (see Note) and only contains “Return to Takeoff Point,” it cannot be sent to the aircraft.
  Note: The following items are considered waypoints: waypoint, payload release, landing, survey, and corridor.

- The conditions under which a plan can be transmitted during a planned flight are as follows:

Flight Mode: Auto mode (Sending a flight plan is not available in Position or Manual modes.)
Flight Status: Paused or free flight (D-Pad)

Chapter 4

Settings View

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4.2 Aircraft Settings ····· 78

4.1 TAKEOFF App Settings

4.1.1 General

- A variety of application settings are provided in the settings view. The general settings are described in Table 29 below.
  -

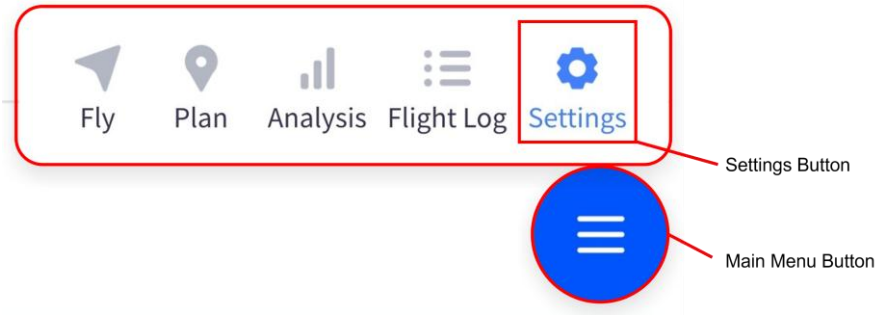


Figure 68 Main menu screen

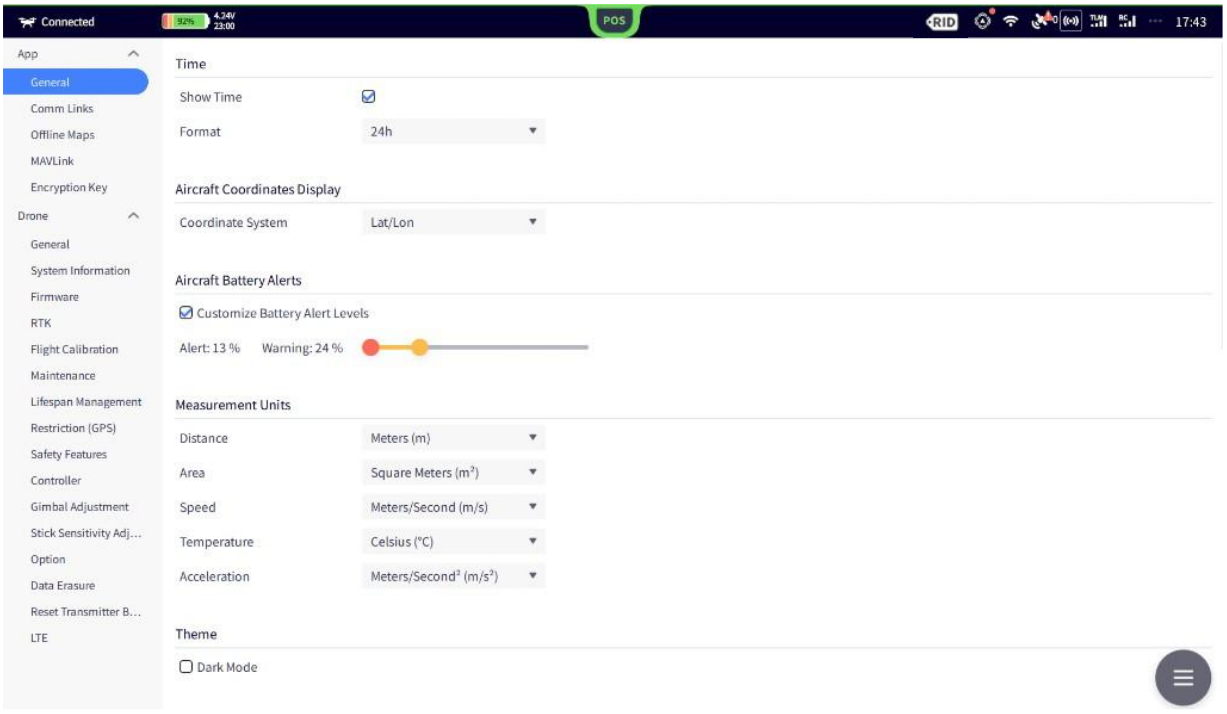


Figure 69 Settings screen

Table 30 General setting of TAKEOFF app

Setting	Possible Values	Description
Time	24h, 12h	Change the clock format.
Aircraft Coordinates Display	Coordinate System: Lat/Lon, UTM, MGRS Use Latitude Bands: Available only when UTM is selected.	Select the coordinate system for displaying aircraft position.
Aircraft Battery Alerts	Customize Battery Alert Levels ON, OFF	When this setting is turned ON, the battery level (%) at which low-battery alerts are displayed in the TAKEOFF app can be configured. [Default Settings] Caution: 13% Warning: 24% [Configurable Ranges] Caution: 13–55% Warning: 18–60% The difference between the Caution and Warning thresholds must be at least 5 percentage points. [Notes] - This setting changes the thresholds of battery alerts displayed in the TAKEOFF app only. - The “BATTERY LEVEL LOW” message displayed on the controller's LCD screen is not linked to this setting. It is displayed when the aircraft battery level reaches 24% or lower. - If the Warning threshold is set to 18–23%, the “BATTERY LEVEL LOW” message appears on the controller's LCD screen when the battery level reaches 24%. The warning message “Battery voltage low” then appears in the TAKEOFF app when the battery level reaches the configured Warning threshold. - In this case, battery-related messages appear on the controller's LCD screen and in the TAKEOFF app at different times.
Units	Various	Set the desired units for various settings.
Dark mode	ON, OFF	Change the screen display for nighttime or dark places.
Language	System, English, Japanese	Select System to display the language of the system settings.
Map provider	Mapbox, Japan-GSI (Japan only)	Select the map to be used from Mapbox or the map provided by Geospatial Information Authority of Japan.

Map type	Mapbox: • Streets Basic • Dark • Bright • Outdoors • DID Satellite (Japan only) • DID Standard (Japan only) • Light • Custom • Hybrid • Satellite • Streets Japan-GSI (Japan only): • Standard (fixed)	Change the display type of the Mapbox map.
UI scaling	60 to 120% (Android) 60 to 145% (Windows)	Change the size of the UI elements.
Application Load/Save Path (Windows only)	User defined	Set the path for saving flight plans, logs, etc.
Save Flight Log	ON, OFF	Save logs of the received telemetry. The default value is ON.
Save Flight Logbook	ON, OFF	When set to ON, a CSV file for the flight logbook will be saved. After the flight, it can be found in the “Flight Log” folder. The default setting is OFF.
NMEA GPS device	Disabled, UDP, COM port	When using an external GPS device, set this according to the device’s connection and specifications.
Video source	Video Stream Disabled, RTSP Video Stream, UDP h.264 Video Stream	Select the type of video stream from the aircraft.
UDP port	Default: 8555	Port number for video communication using UDP method. In principle, keep the default value.
Aspect ratio	Default: 1.777777	Set the aspect ratio of transmitted videos. In principle, keep the default value.
Low latency mode	ON, OFF	Set ON to reduce latency of video transmission from the aircraft. This may degrade video quality.
Auto-delete files	ON, OFF	Automatically delete the oldest saved video stream files when storage capacity is reached.
Maximum storage capacity	Default: 2048 MB (Android), 10240 MB (Windows)	Set the maximum storage capacity for saving the video stream.
Video file format	mkv, mov, mp4	Select the file format for saving the video streams.
TAKEOFF version		Displays the version of the TAKEOFF application.

4.1.2 Comm Links

- Manually open a communication path if communication with the aircraft/controller cannot be established. This is not a normal procedure.
- If communications problems are encountered, contact your dealer.

4.1.3 Offline Maps

- For the TAKEOFF application to display a map without any connection to the internet, the map must be loaded in advance when a connection to the internet is established.
- To add a map file, press the “Add” button, select a region of the map to download, and press the “Download” button.

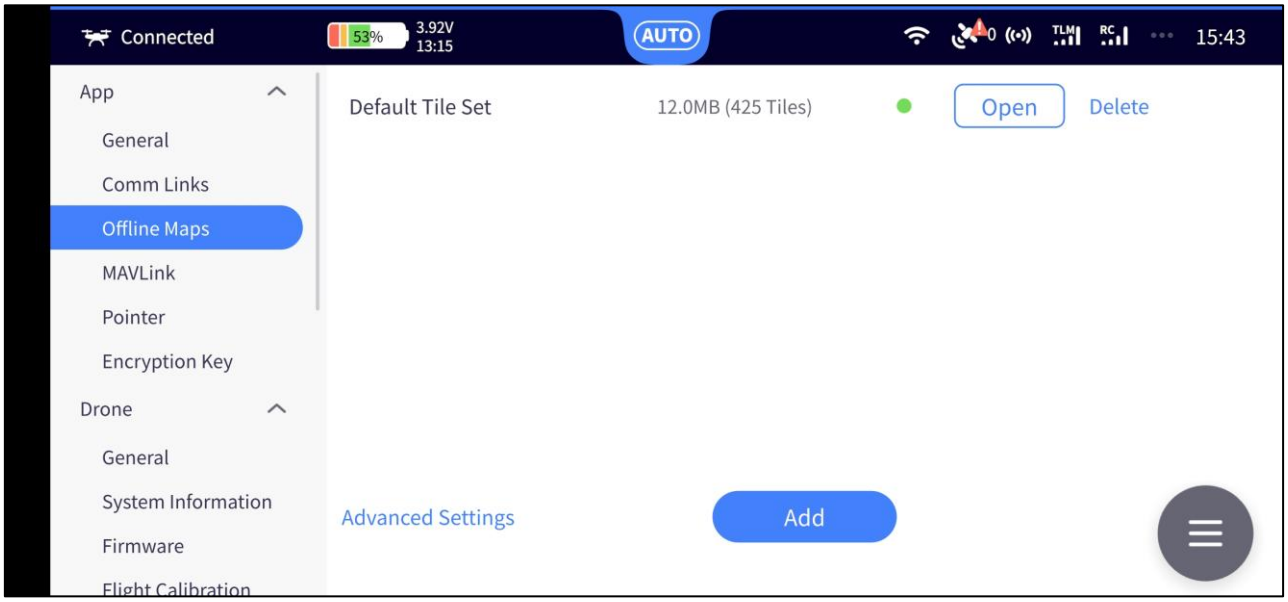


Figure 70 Offline map settings

4.1.4 MAVLink

- The TAKEOFF application communicates with the aircraft via the MAVLink protocol. This section displays basic information and status about MAVLink, which is the communication protocol with the aircraft.

Table 31 MAVLink settings

Setting	Values	Description
MAVLink System ID	Default: 255	The ID used to identify TAKEOFF to the aircraft. Do not change this value.
Emit heartbeat	ON, OFF	This function is used to check for aircraft malfunctions. Set it to ON.
Only accept MAVs with same protocol version	ON, OFF	This function is used to check for aircraft malfunctions. Set it to ON.
MAVLink Link Status (Current Vehicle)	-	Check the status of communication with the aircraft.

4.1.5 Remote ID

The aircraft is equipped with standard remote ID that is compliant with the US Federal Aviation Administration Regulation 14 CFR Part 89.

Note that to comply with US Federal Aviation Administration Regulation 14 CFR Part 89, the mobile device hosting the ACSL TAKEOFF ground control application that is connected to a controller with pilot authority must minimally be one of the following:

1) FCC Certified personal wireless device that uses GPS with SBAS (WAAS) for location services; or
2) FCC Certified personal wireless device with integrated GNSS.

Also, the mobile device must be operated in a way that does not interfere with the location reported and its correlation to the operator location.

In addition, the aircraft continuously performs a self-test to ensure that it can broadcast remote ID according to federal regulations. This includes a self-test of the remote ID transmitter, confirmation that position data is being received from the onboard GNSS receiver (a location fix is not required) and that position data is being received from the TAKEOFF ground control application with pilot authority (a location fix is not required). The result of this self-test is indicated by the Remote ID icon (See element 8 in Figure 8 and Table 5) with blue indicating "PASS" and red indicating "FAIL".

In the case of a self-test failure, additional information about the failure can be found in this Remote ID settings view. An example is shown in Figure 67. Table 31 shows the possible error messages.

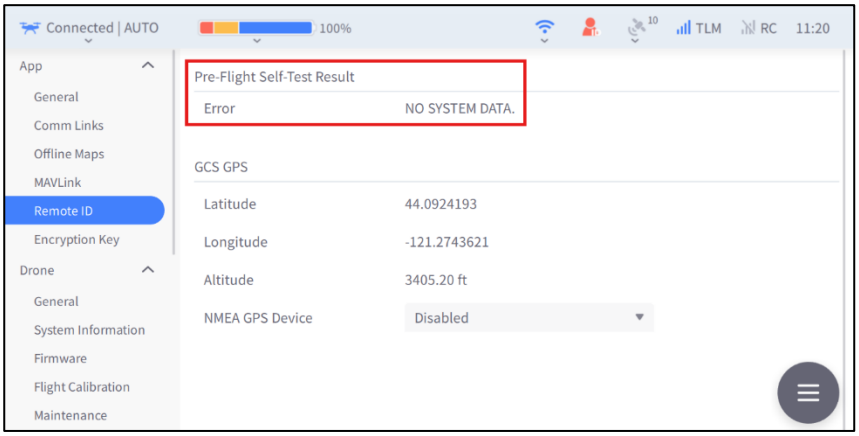


Figure 71 Remote ID self-test failure details

Table 32 MAVLink settings

Error Message	Meaning
NO LOCATION DATA	The remote ID transmitter is not receiving the position data from the aircraft's onboard GNSS receiver that is required to transmit the remote ID Location/Vector message.
NO SYSTEM DATA	The remote ID transmitter is not receiving position data from the ground control application that is required to transmit the remote ID System message.
NO SELF-TEST RESULT	The remote ID transmitter has failed.

This remote ID settings view also displays the position data (latitude, longitude, and altitude) that is being reported to the aircraft.

An external NMEA GPS Device may be used as the position source, in which case the NMEA GPS Device settings should be set to match those specified in the device's user manual.

4.1.6 Pointer

Note: This feature is only supported on ACSL smart controllers and Android devices.

- All controllers that are bound to the aircraft are capable of simultaneously receiving the video and telemetry transmission from the aircraft. When multiple controllers are connected to the aircraft, it may be desirable for an observer to indicate a point of interest to the pilot. TAKEOFF provides the Pointer feature to allow two mobile devices to communicate points of interest between mobile devices running TAKEOFF by tapping on the screen. This communication happens over a Bluetooth connection between the devices.
- To enable this feature, check “Discoverable” on one device and tap the “Find Devices” button on the other.

4.1.7 Encryption Key

- Display the imported encryption keys.
- When sending an encryption key to the aircraft, select the desired key. To delete a key, click Delete next to the corresponding key.
- To import a new encryption key, click the Import button. File Explorer will open. Select the desired encryption key file from the File Explorer to complete the import.

4.2 Aircraft Settings

4.2.1 General

Drone Photo/Video Encryption

- For Android devices, set the device to airplane mode before continuing.
  When the aircraft is connected, check the “Enable Encryption” checkbox. The “Send encryption key” dialog will appear. Tap “Send” button to proceed.

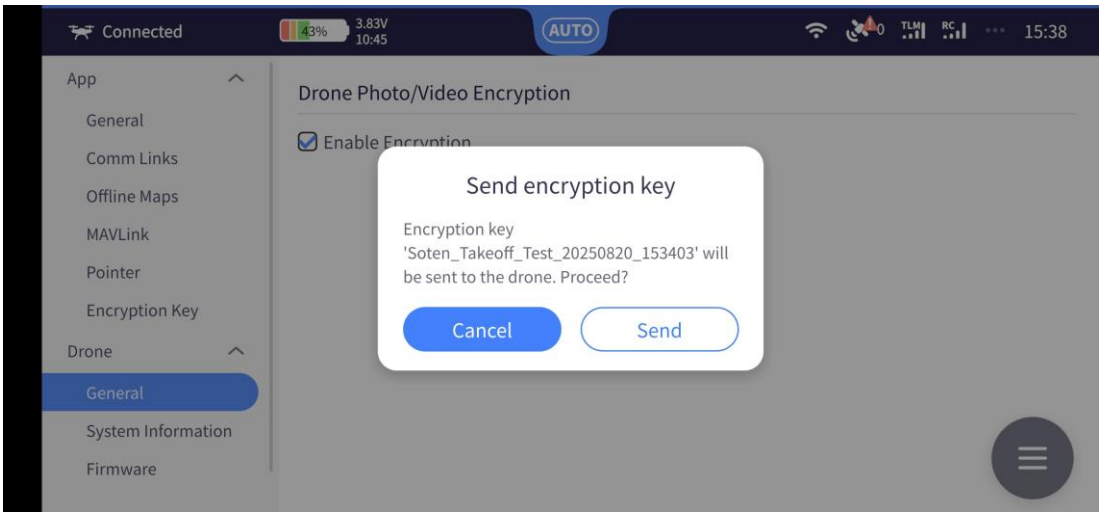


Figure 72 Send encryption key

Note: A key pair must be generated in advance using the encryption/decryption application “SnapSafe.” For details, please refer to the SnapSafe User Manual.

4.2.2 System Information

System version

Displays the version of the following firmware.

- NX: The aircraft firmware.
- Controller: The controller firmware.
- Falcon: The 2.4 GHz radio firmware.

List of serial numbers connected to aircraft

The list shows the serial numbers of the controllers that have been bound to the aircraft.

Version Checking

Retrieve the version numbers from the above components.

Note: For Android devices, set the device to airplane mode before performing the version check.

4.2.3 Firmware

- Check whether the various components have the latest firmware.
- The release notes for the latest firmware version are available on the ACSL website.

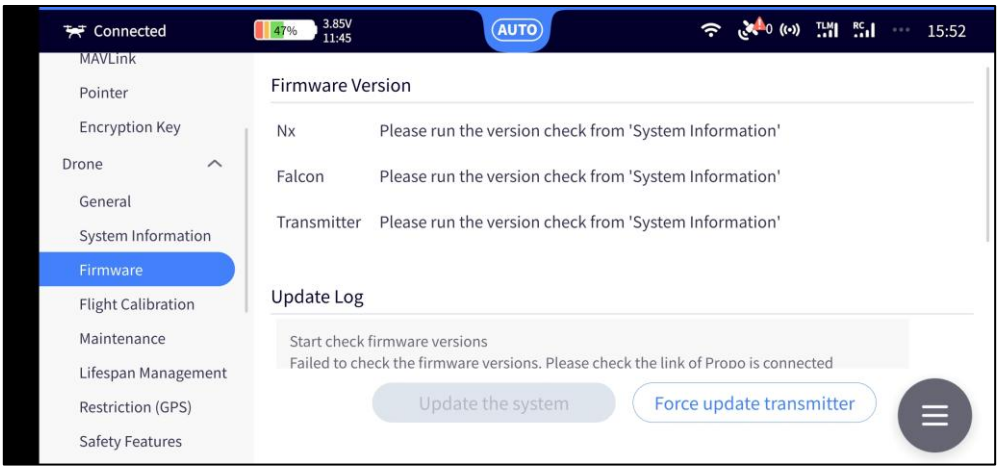


Figure 73 Firmware

ADVISORY

For Android devices, set the device to airplane mode before checking the firmware version. It may not be possible to retrieve the firmware version from the aircraft while the device is connected to the internet.

4.2.4 Updating TAKEOFF and firmware

Obtaining the latest TAKEOFF (and firmware)

TAKEOFF may be obtained from any of the following sources:

- Download directly to the device from the ACSL website
  https://acsl-usa.com/support/
- Download from the above link to an SD card or USB memory
- Receive a prepared SD card from an authorized dealer
  Contact your dealer for an SD card.

Updating TAKEOFF and firmware

1. **Install the latest TAKEOFF**
   - Download and install the applicable APK file via your computer, SD card, or USB memory.

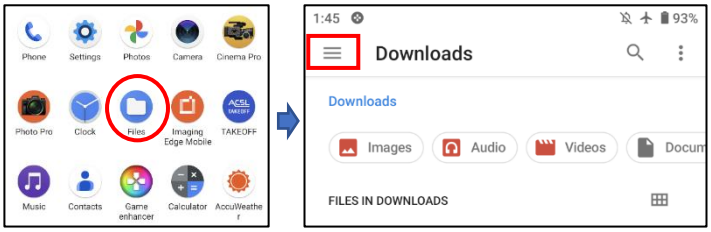


Figure 74 Installation (1)

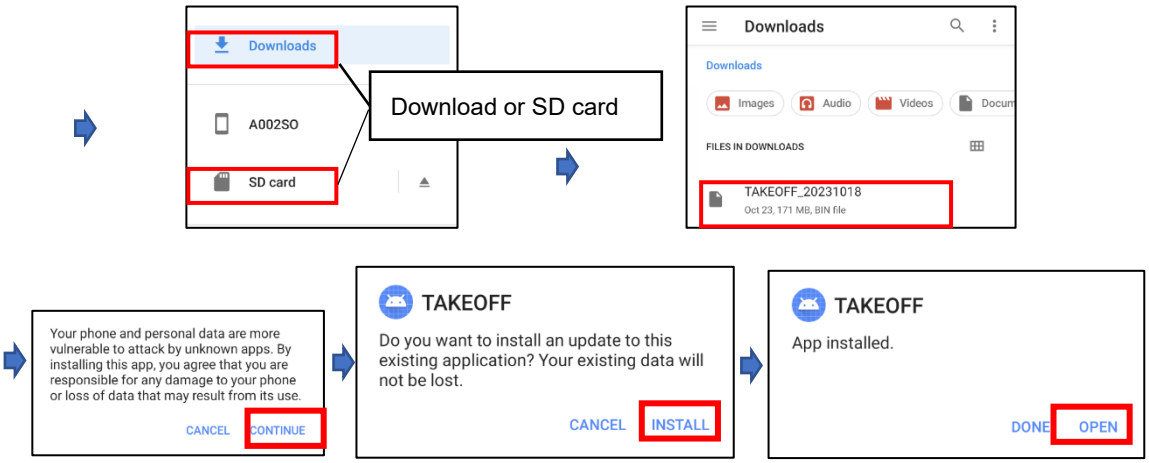


Figure 75 Installation (2)

- Start TAKEOFF and make sure it was updated successfully.

  * Do not connect to the controller until the following steps are completed.

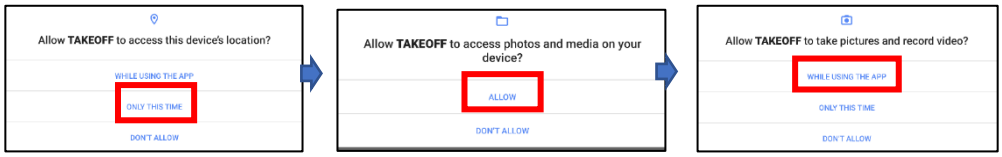


Figure 76 Installation (3)

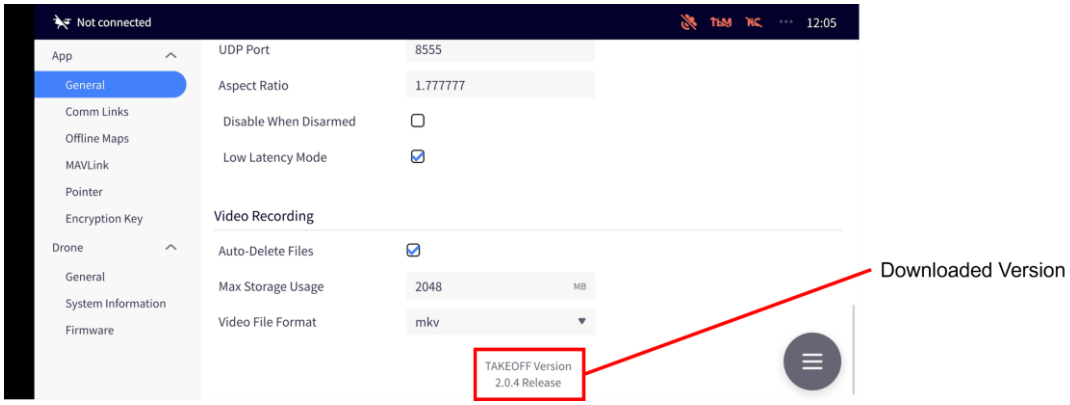


Figure 77 Installation (4)

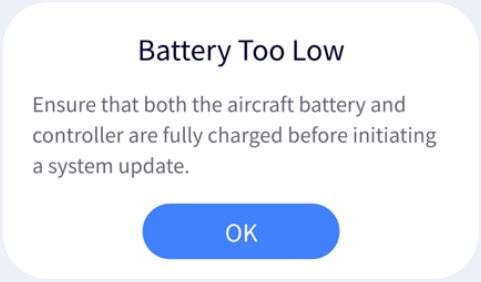
* Make sure that the TAKEOFF version is the same as the downloaded version.

2. **Update firmware**

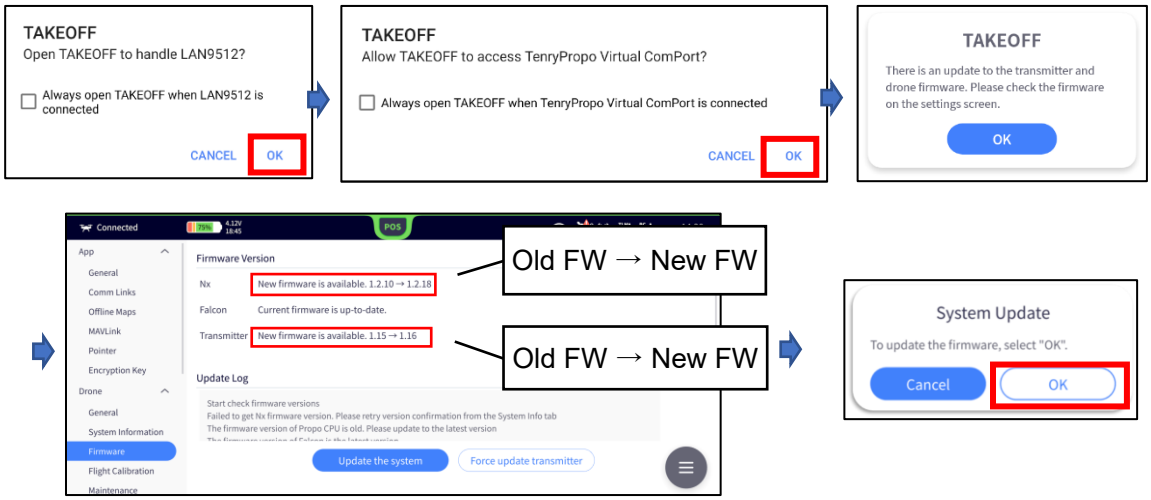
- After turning on the aircraft and controller, connect your device to the controller and update the firmware.

ADVISORY

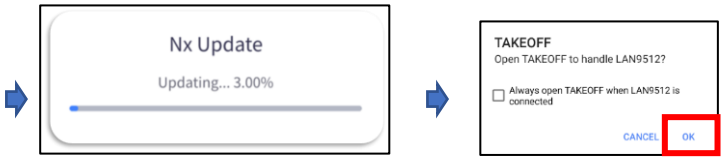
- The update process may take about 30 minutes.
- Charge the aircraft battery and controller to 100% prior to initiating an update. If the aircraft battery is less than 50% (indicated by only 1 green battery level LED illuminated), then the following pop-up will appear and the update will be rejected.



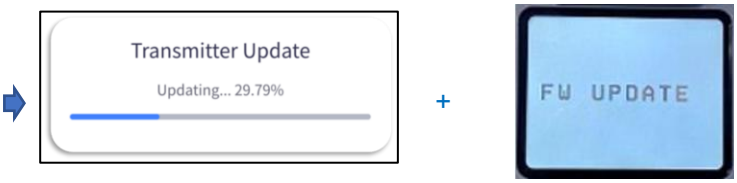
- For Android devices, put the device in airplane mode with Wi-Fi disabled before starting the update process.



◆ Tap “Update the system.”



◆ The progress status is displayed during the Nx update.

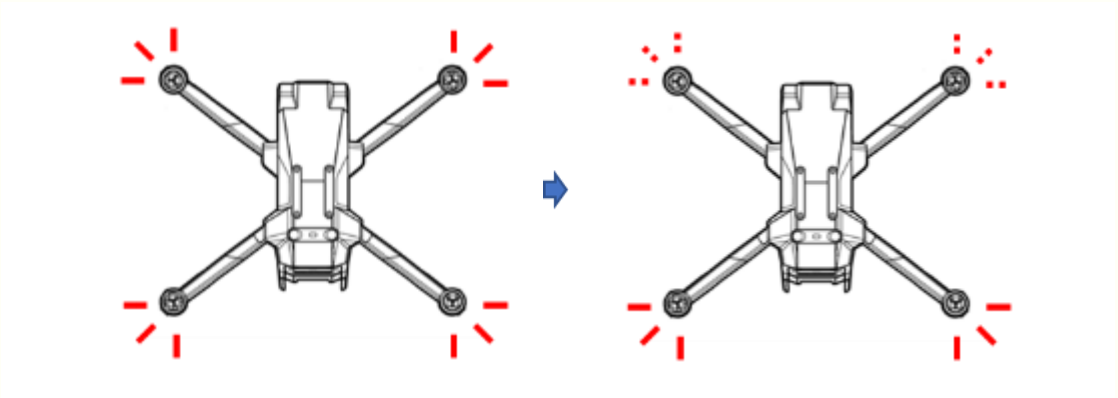


◆ If there is a firmware update for the controller, the progress status is displayed during the controller update.

Figure 78 Installation (5)

CAUTION

- If the NX update fails, the forward navigation lights will fail to start flashing. Contact your dealer.



◆ After the NX update, the 2 forward navigation lights will flash.

- If the "NO DATA FROM GCS" notification appears on the controller's LCD screen during the update, it is possible that TAKEOFF has frozen. Compare the time displayed in TAKEOFF against the time displayed natively on the device. If the time displayed in TAKEOFF is behind, restart TAKEOFF and perform the firmware update procedure again.

- Restart TAKEOFF and make sure it was updated successfully.

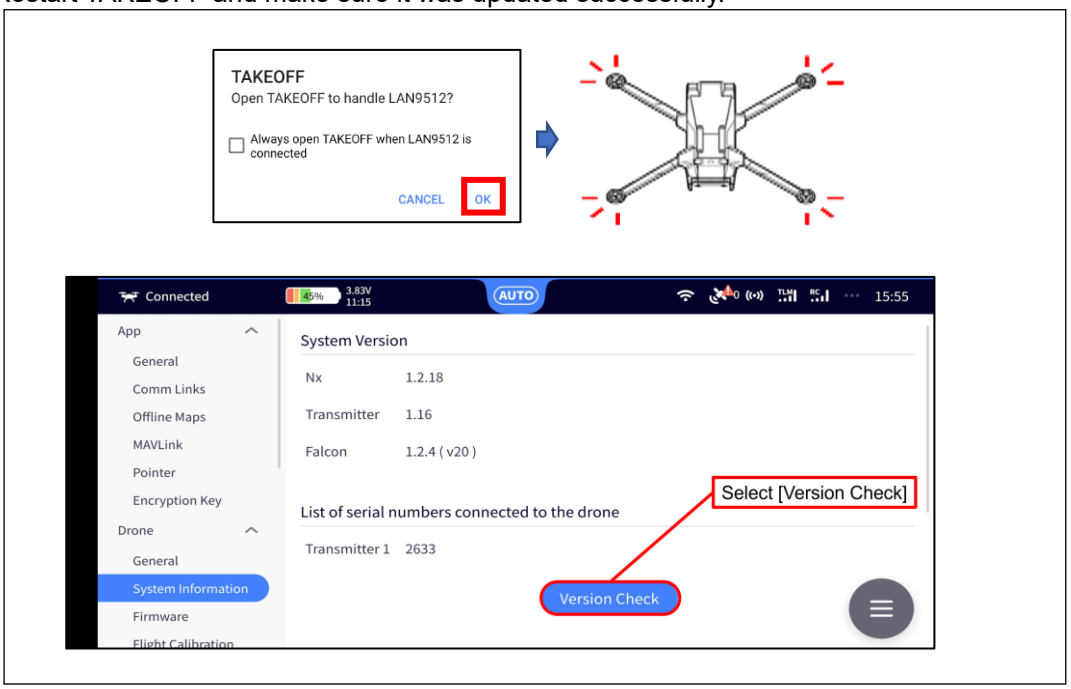


Figure 79 System information

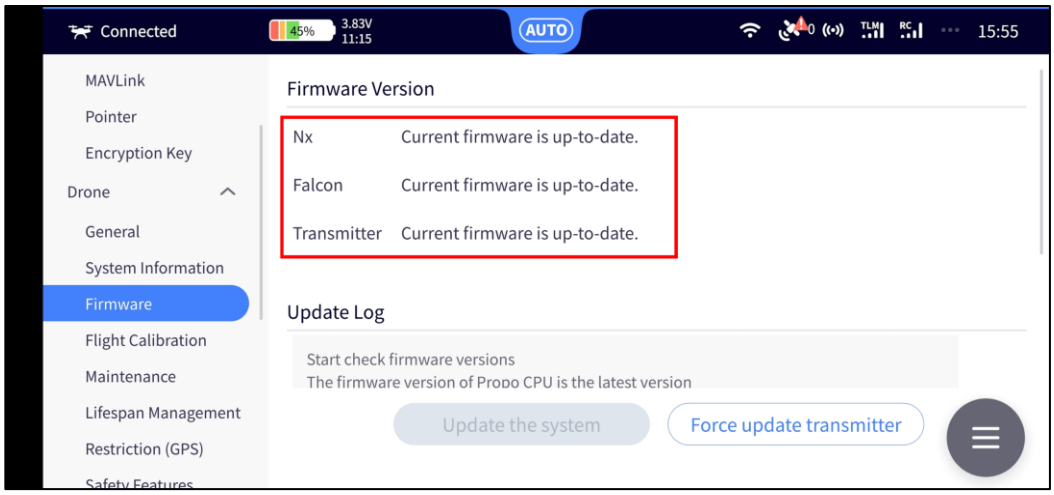
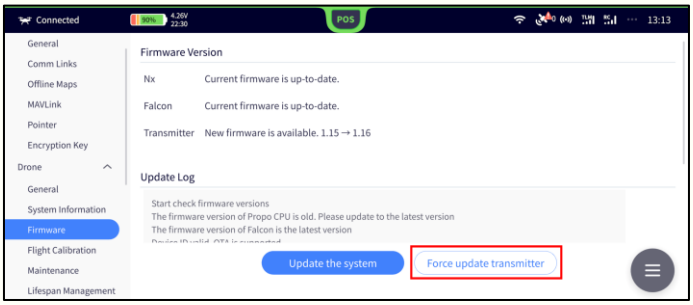


Figure 80 Firmware information

CAUTION

- The aircraft and controller firmware will normally both be updated during a system update, but if a communication disruption occurs, then the controller may not be updated. If the firmware update fails (if "FW UPDATE" is displayed on the controller screen after startup), perform the “Force update transmitter” in TAKEOFF.



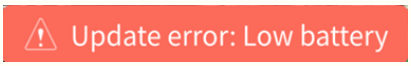
◆Tap “Force update transmitter”.

Updating the battery

Battery updates start automatically when the aircraft is connected to the battery and turned on.
Following an aircraft firmware update, a battery update will not be initiated until the aircraft is restarted.

CAUTION

- A battery firmware update will not be initiated if the battery level is less than 50% (indicated by only 1 green battery level LED illuminated). After the downlight below the fuselage blinks white for a while, the "Battery Update Failed" notification will be displayed on both the controller LCD display and TAKEOFF. Remove the battery from the aircraft and charge it to a level greater than 50% (indicated by at least 2 green battery level LEDs illuminated) before repeating the battery firmware update procedure.



- Attach the battery to the aircraft and turn it on.
- If the battery firmware is older than that held by the aircraft, then the following will occur:

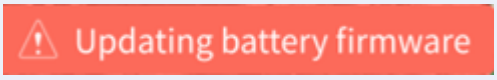
1. The battery status LED turns off.
2. The downlights on the underside of the aircraft begin blinking and continue blinking for the duration of the update (about five minutes).
3. When the update is completed, the aircraft (and the downlights) turn off.

CAUTION

Do not remove the battery from the aircraft or turn it off during the battery firmware update.
This may cause the battery to become unusable.

ADVISORY

During battery firmware update, the "Updating battery firmware" notification will be displayed on both the controller's LCD display and TAKEOFF.



Update confirmation

When the update has completed, reboot the controller.
Make sure that neither the controller nor TAKEOFF display the notification "Old Battery FW detected".

CAUTION

If the battery firmware update fails, the battery may be locked and will no longer turn on. If this occurs, contact your dealer.

4.2.5 Magnetic calibration

- The aircraft uses a magnetometer to determine its horizontal orientation, like a compass. Because geomagnetism varies depending on the surrounding environment (regardless of the obvious presence of metallic objects), it is a good practice to calibrate the magnetometer prior to flight, or if the aircraft moves in a swirling motion or an unintended direction during flight.
- This section describes two types of calibration methods.
- Normally, simple calibration is sufficient. Perform full calibration if errant behavior in flight persists.

CAUTION

- Performing magnetic calibration in the presence of magnetic fields may lead to unexpected accidents. As a simple way to check the effect of magnetic fields, use a magnetic compass or similar device to verify that the aircraft is reporting its direction accurately. Conduct a test flight in an open outdoor area.
- Calibration will not be completed successfully if no GPS position lock has not been achieved since startup. Please make sure that at least one GPS satellite has been acquired before proceeding.

Simple calibration

Simple calibration is performed by rotating the aircraft horizontally, which enables calibration not only in the horizontal direction but also in the vertical direction. Perform while keeping the aircraft away from surrounding sources of magnetic interference and while monitoring for error messages from the aircraft.

1. Select “Simple” and then tap the “Start” button. The “Start” button changes to a “Cancel” button and the status bar on the right of the screen begins to progress.
2. Hold the aircraft with both hands, keeping it level with the horizon, and rotate it about 360° around its vertical axis as shown below. Make sure that the trajectory of the heading drawn during the rotation forms a circle.
3. After enough samples are obtained, the magnetic center is plotted on the screen and the message “Calibration Successful” is displayed. Select “Write” to return the screen before the beginning of calibration. This completes the geomagnetic calibration.
4. If the message “Calibration Failed” appears, try again from step 1.
5. Fly the aircraft in position mode and check that it flies straight.
   * If it does not fly straight, repeat steps 1 through 5.

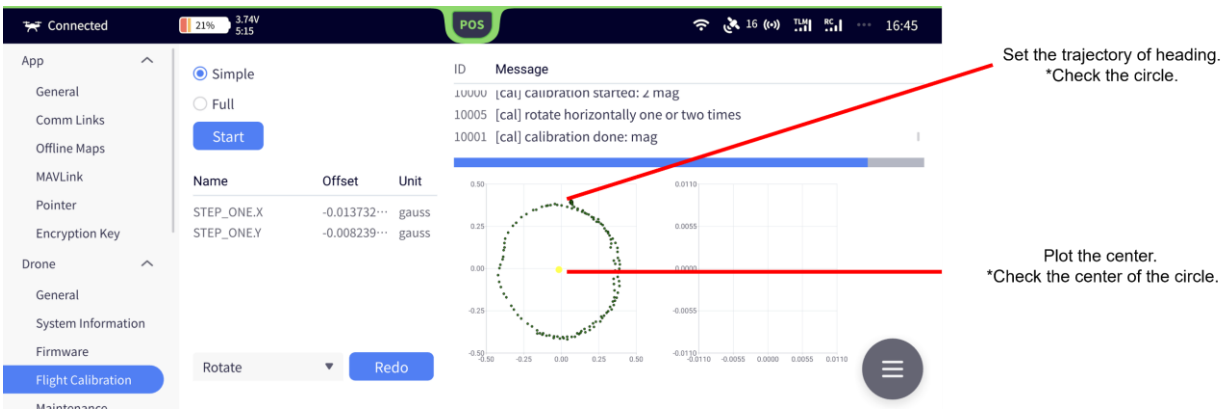
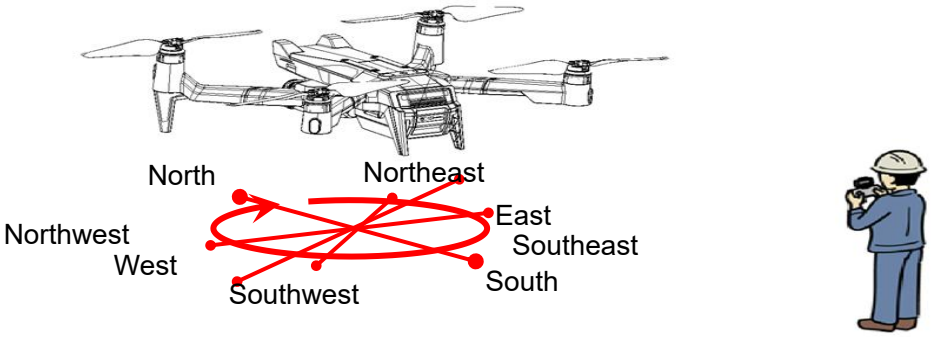


Figure 81 Calibration screen



Full calibration

Full calibration is more precise than simple calibration. Full calibration requires actual flight operation to capture the magnetic influence of the running motors.

WARNING

- Full calibration must be performed in manual (MAN) mode.
- The full calibration procedure should be performed by two people: one pilot and one person monitoring TAKEOFF.
- The aircraft will not maintain its position in manual (MAN) mode. The pilot must make continuous corrective inputs to maintain the aircraft's position in manual (MAN) mode.
- Perform the hovers for calibration at an altitude of 2 to 3 meters (6 to 9 feet) above the ground. Excessive throttle inputs will result in a poor calibration.

1. Select "Full" and tap the "Start" button. The "Start" button changes to a "Cancel" button and the status bar on the right of the screen begins to progress.
2. Hold the aircraft with both hands, keeping it level with the horizon, and rotate it about 360°around its vertical axis as shown below. Make sure that the trajectory of the heading drawn during the rotation forms a circle. * Refer to the simple calibration method above.
3. After enough samples are obtained, the magnetic center is plotted on the screen and the message "Calibration Successful" is displayed. Select "Write" to return the screen before the beginning of calibration.
4. If a message "Calibration Failed" appears, try again from step 1.
5. Next, hover the aircraft while keeping it facing north for about 5 to 10 seconds. When sampling is complete, a message appears indicating completion. Land the aircraft.
6. Repeat step 5 for the following 7 directions: Northeast, East, Southeast, South, Southwest, West, and Northwest. The calibration is complete when the hover has been performed in all eight directions.
7. Reboot the aircraft and fly it in position mode to check if it flies straight. If it does not fly straight, repeat steps 1 through 7.

Figure 83 Full calibration: Hovering with the nose facing eight directions

4.2.6 Maintenance

- Obtain the maintenance history from the aircraft.
- The maintenance history is written to the aircraft by an authorized repair center when routine maintenance or a repair is performed.

4.2.7 Lifespan management

- Obtain records about the operational history of the aircraft, which can be used as a guide for maintenance timing.

4.2.8 Restriction (GPS)

- This section allows for the review and setting of control parameters that are relevant to GPS flight.
- Tap the “Load” button to obtain the currently set value for each of the settings.
- Tap the “Write” button to apply any changes that were made.

Table 33 Aircraft control parameters (for GPS-guided flight)

Setting	Description	Min.	Max.	Unit
Maximum autonomous yaw rate	The maximum yaw rate in auto (AUT) mode (under no wind conditions).	6	120	deg/s
Maximum manual horizontal flight speed	Maximum horizontal flight speed in position (POS) mode (under no wind conditions). It also applies when performing horizontal flight during an emergency landing in POS mode.	1	15	m/s
Maximum manual descent speed	Maximum descent speed in position (POS) and manual (MAN) mode (under no wind conditions).	1	3	m/s
Maximum manual yaw rate	Maximum yaw rate in position (POS) and manual (MAN) modes (under no wind conditions).	12	120	deg/s
Maximum manual ascent speed	Maximum ascent speed in position (POS) and manual (MAN) modes (under no wind conditions).	1	3	m/s
Automatic takeoff altitude	Altitude acquired immediately after automatic takeoff.	1	3	m
Automatic takeoff speed	Ascent speed to the automatic takeoff altitude (under no wind conditions).	0.4	3	m/s
Automatic landing speed	Descent speed for automatic landing (under no wind conditions).	0.4	3	m/s
Go Home altitude	Minimum altitude for the Go Home maneuver.	1	150	m
Go Home horizontal speed	Horizontal speed for the Go Home maneuver (under no wind speed conditions).	1	10	m/s
Go Home vertical speed	Vertical speed at which the aircraft will ascend to the minimum Go Home altitude (if necessary) (under no wind speed conditions).	0.4	3	m/s
Maximum altitude relative to ground	Maximum allowable altitude above the takeoff point. Set to “0” for unlimited.	0	3000	m

4.2.9 Safety Features

- This section allows for the review and setting of the failsafe features.
- Tap the “Load” button to obtain the currently set value for each of the settings.
- After changing (a) value(s), tap the “Write” button to send the updated value(s) to the aircraft.
- Except for “Acceptable radio lost link time (AUT)”, “Acceptable radio lost link time (POS)”, “Acceptable LTE lost link time”, “Emergency mode behavior”, and “Go Home route,” any other setting changes will take effect only after the aircraft is restarted.

Table 34 Safety function settings

Setting	Default Value	Description	Compatible model
Acceptable radio lost link time (AUT) [sec]	30	Specifies the amount of time the aircraft will continue executing a mission, Go To Location, or Go Home maneuver after losing the radio link with the controller before automatically entering emergency mode.	SOTEN (ACSL-ST1)
Acceptable radio lost link time (POS) [sec]	0.0	Specifies the amount of time that the aircraft will hover in place after losing the radio link with the controller in position (POS) mode before automatically entering emergency mode.	SOTEN (ACSL-ST1)
Acceptable LTE lost link time [sec]	30	Specifies the amount of time the aircraft will continue executing a mission, Go To Location, or Go Home maneuver after losing the LTE link with TAKEOFF before automatically entering emergency mode. Note that emergency mode will not be triggered if there is a stable radio link between the aircraft and a controller with pilot authority. Set to “0” for unlimited (this allows the aircraft to be piloted with a controller indefinitely even if the mobile device is disabled).	SOTEN (ACSL-ST1)
Emergency mode behavior	Go Home/ELS after 60 seconds	In certain situations, such as lost link, the aircraft will automatically enter emergency mode and begin hovering in place. This setting specifies how long the aircraft should hover before automatically initiating Go Home or proceed to an ELS, or to have it hover indefinitely.	SOTEN (ACSL-ST1)
Go Home route	Straight Line	The path that the aircraft will take when performing a Go Home maneuver.	SOTEN (ACSL-ST1)
GPS multipath risk detection	Off	When set to either “Low” or “High”, the “GPS multipath detected” message appears when the position data received from GPS significantly deviates from the position estimated internally by the aircraft. Selecting “High” increases the detection threshold and raises the notification frequency. To apply a change to this setting, press the “Write” button and then restart the aircraft.	SOTEN (ACSL-ST1)
Weak radio signal detection	Off	When set to “Low” or “High”, the “Radio signal weak” message appears when signal conditions deteriorate. Selecting “High” raises the detection threshold and increases notification frequency. To apply a change to this setting, press the “Write” button and then restart the aircraft.	SOTEN (ACSL-ST1)

Magnetic field anomaly detection	On	When enabled, the message “Compass divergence” will appear when the aircraft suspects a magnetic field anomaly that prevents accurate estimation of compass direction. To apply a change to this setting, press the “Write” button and then restart the aircraft.	SOTEN (ACSL-ST1)
Easy takeoff and landing (POS only)	On	When enabled, the aircraft will perform an automatic takeoff and landing within a 0.5 m (1.6 ft) of the ground when in position (POS) mode. To take off from an armed state, push the throttle upward from the center position and the aircraft will automatically ascend to an altitude of 0.5 m (1.6 ft) above the ground. When descending for a landing, the aircraft will automatically stop the descent at 0.5 m (1.6 ft) above the ground. Continuing to push the throttle downward will trigger an automatic landing. If an easy landing is erroneously triggered above 0.5 m (1.6 ft), turn off VISION. To apply a change to this setting, press the “Write” button and then restart the aircraft.	SOTEN (ACSL-ST1)
Enhanced takeoff safety check	On	When enabled, the aircraft will not allow motor idling in position (POS) or auto (AUT) flight mode unless certain criteria related to GPS quality and magnetic field integrity are met. This feature may prevent takeoff in challenging environments (e.g., near buildings or metal structures) and should be enabled when maximum takeoff safety is required. To override these checks to fly in the current environment, or to take off and fly using Vision Hover Assist, turn this feature off.	SOTEN (ACSL-ST1)



After adjusting the settings of the safety features, be sure to conduct a test flight to verify intended functionality and to prevent the aircraft from entering emergency mode unexpectedly.

4.2.10 Controller

- This section allows for the review and setting of the functions assigned to certain controller buttons and wheels.
- Tap the “Load” button to retrieve the current customization settings from the aircraft.
- Tap the “Write” button to apply any changes that were made.

Table 35 Controller Function Assignment Parameters

Item	Parameters
Wheel L	Gimbal tilt, Gimbal pan, EV, Zoom, Focus
Wheel R	Gimbal tilt, Gimbal pan, EV, Zoom, Focus
Button L Tap	Gimbal forward, Gimbal downward, Toggle Gimbal forward/downward
Button L Hold	Toggle Gimbal forward/downward, Toggle wheel R function
Button R Tap	Take a photo, Start/stop interval shooting, Start/stop video recording
Button R Hold	Take a photo, Start/stop interval shooting, Start/stop video recording, Toggle wheel L function

ADVISORY

- It is not possible to assign the same function to multiple controls.
- Control customization is specific to the aircraft, not to the bound controllers, so all controllers bound to an aircraft will share the same customization, and the customization will not transfer with a controller when bound to a different aircraft.

4.2.11 Gimbal Adjustment

- This section allows for the review and setting of gimbal control parameters.
- Tap the “Load” button to obtain the currently set value for each of the settings.
- Tap the “Write” button to apply any changes that were made.

Table 36 Gimbal control parameters

Items	Default value	Description
Operation mode	Mode B	Select Mode A, B, or C (see the description in Table 33 below).
Pan minimum speed [deg/s]	1	Minimum speed in the pan direction.
Pan maximum speed [deg/s]	10	Maximum speed in the pan direction.
Tilt minimum speed [deg/s]	1	Minimum speed in the tilt direction.
Tilt maximum speed [deg/s]	10	Maximum speed in the tilt direction.

Operation mode

The gimbal has 4 control modes as described in Table 33.

Table 37 Operation modes

Items	Description
Mode A	Gimbal speed is proportional to the deflection of the gimbal control wheels on the controller. Full deflection of the gimbal control wheels results in 60 degrees per second in the pan direction, and 100 degrees per second in the tilt direction. The maximum and minimum speed is not adjustable.
Mode B	Gimbal speed is proportional to the deflection of the gimbal control wheels on the controller. Suitable for scenarios that require smooth movements, such as video filming. The speed at full deflection of the gimbal control wheels (maximum speed) can be set as follows: - Pan direction: 0.0 – 60.0 deg/sec - Tilt direction: 0.0 – 100.0 deg/sec adjustable speed range
Mode C	The gimbal control speed has two steps as the gimbal control wheels are deflected: low speed (minimum speed) and high speed (maximum speed). These speeds can be set within the following ranges: - Pan direction: 0.0 – 60.0 deg/sec - Tilt direction: 0.0 – 100.0 deg/sec adjustable speed range

4.2.12 Stick Sensitivity Adjustment

- This section allows for the review and setting of the control stick sensitivity parameters.
- Tap the “Load” button to obtain the currently set value for each of the settings.
- Tap the “Write” button to apply any changes that were made.

Table 38 Stick control parameters

Items		Default value	Description
POS mode (When using GPS)	Horizontal velocity	2.5	Set the horizontal speed during operation in POS mode (using GPS).
	Ascent/Descent speed	1.7	Set the ascent/descent speed during operation in POS mode (using GPS).
	Turning speed	1.6	Set the turning speed during operation in POS mode (using GPS).
POS mode (when using VISION)	Horizontal velocity	1.0	Set the horizontal speed during operation in POS mode (using VISION).
	Ascent/Descent speed	1.7	Set the ascent/descent speed during operation in POS mode (using VISION).
	Turning speed	1.6	Set the turning speed during operation in POS mode (using VISION).
MANUAL mode	Attitude angle	1.25	Set the angle of attitude during operation in MANUAL mode.
	Ascent/Descent speed	-	The same value as the ascent/descent speed in POS mode (using GPS) is applied.
	Turning speed	-	The same value as the turning speed in POS mode (using GPS) is applied.

4.2.13 Options

Collision Avoidance Sensor

- Enable/disable collision avoidance sensors, set thresholds to display warnings/hazards, and enable/disable alert sounds.
- For enabling/disabling the collision avoidance sensors, tap the “Load” button to obtain the currently set values. After changing the check status of any checkbox, tap the "Write" button and restart the aircraft to apply the changes. The aircraft control parameters will be updated.

Note: The “Load” and “Write” buttons do not apply to thresholds for displaying warnings/hazards and for enabling/disabling the alert sounds.

Note: The thresholds for displaying warnings/hazards and alert sound settings are reset to their default values when the application is closed.

EXIF Settings

- Select the type of altitude to be set in the EXIF data for photos captured.

4.2.14 Data erasure

- Delete all the data in the aircraft’s onboard flight data recorder.

Note: deleted data cannot be recovered.

Note: Log data stored TAKEOFF on the host device is not affected by this command. To delete this data, use the Flight log view.

4.2.15 Reset Controller Binding

- Delete controller binding information that is stored in the aircraft.
- Once the controller binding information has been deleted, the controller will need to be re-bound to the aircraft.

Chapter 5

Analysis & Flight Logs Views

5.1 Analysis 97
5.2 Flight Log 99

5.1 Analysis

- A detailed view of the telemetry that is being received from the aircraft can be viewed in the Analysis view.
- This function can be used for simple analysis such as when the aircraft exhibits an abnormality.

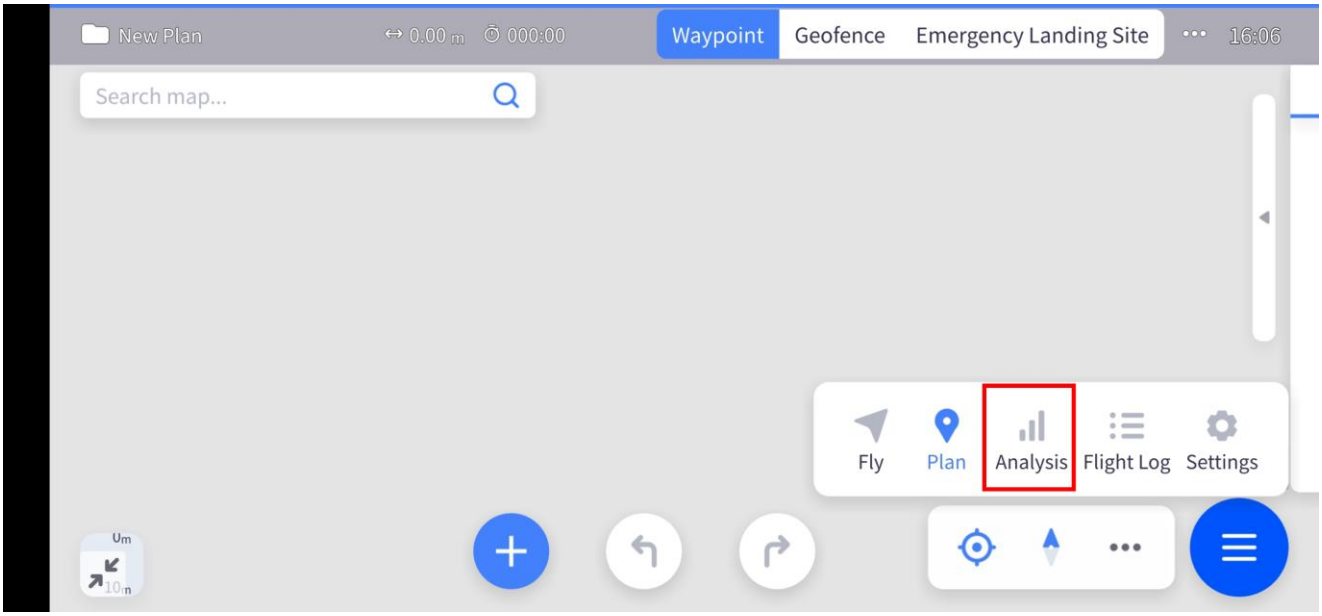


Figure 84 Main menu: Analysis

- In the Analysis view, parameters are grouped by the MAVLink message that they are packaged in. A time series of any parameter can be displayed by selecting the appropriate MAVLink message in the left submenu and then tapping the “Add to graph” checkbox for the desired parameter.

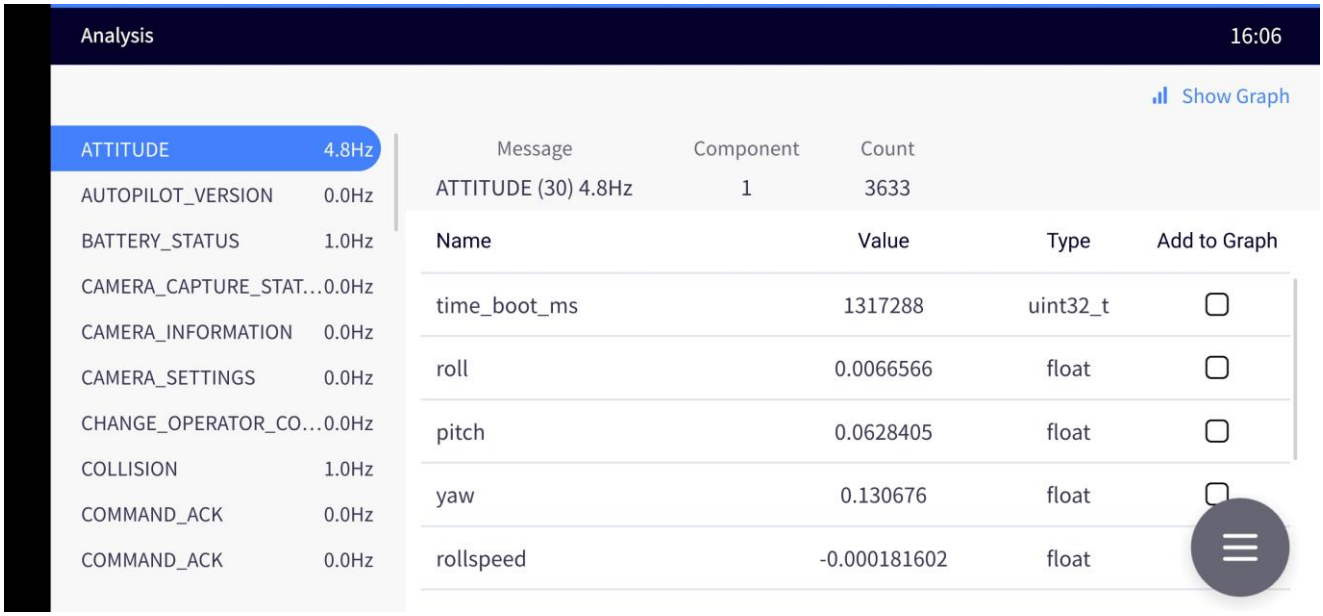


Figure 85 Adding parameters

- The range of the vertical and horizontal axes of the graph can be scaled by the Scale and Scope pulldowns respectively.

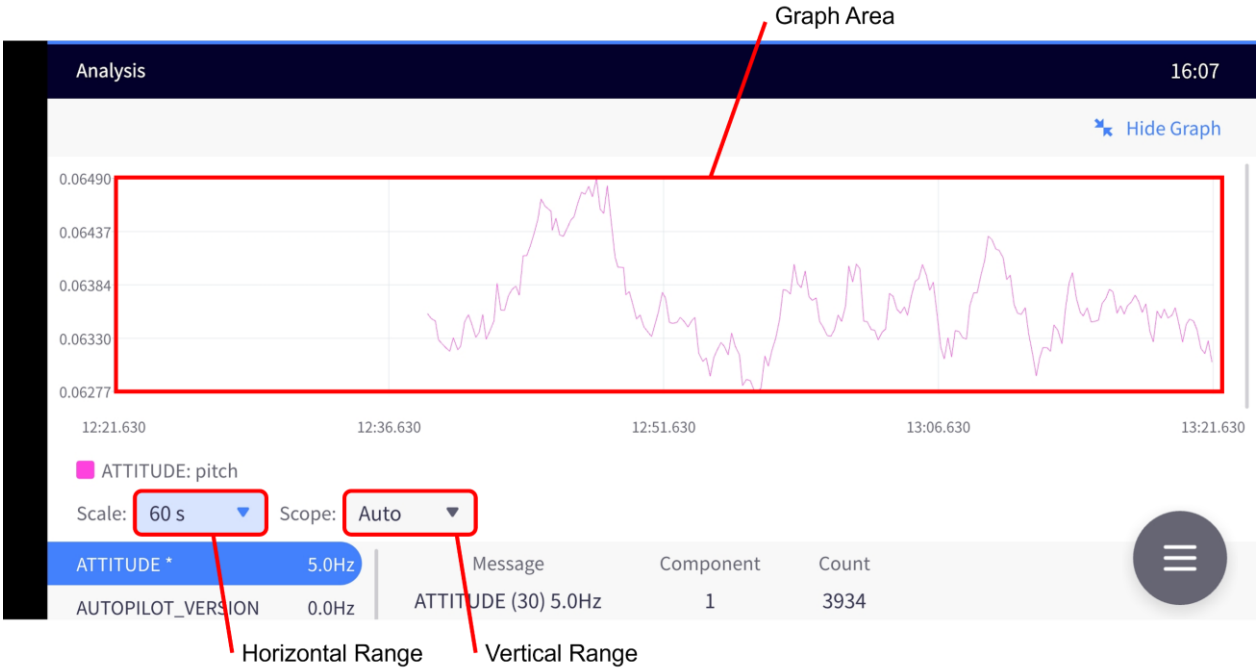


Figure 86 Time series graph

5.2 Flight Logs

- Logs of the telemetry that is received from the aircraft are saved in accordance with the TAKEOFF App General Settings (see Section 4.1.1). The logs can be reviewed in the Flight Logs view.

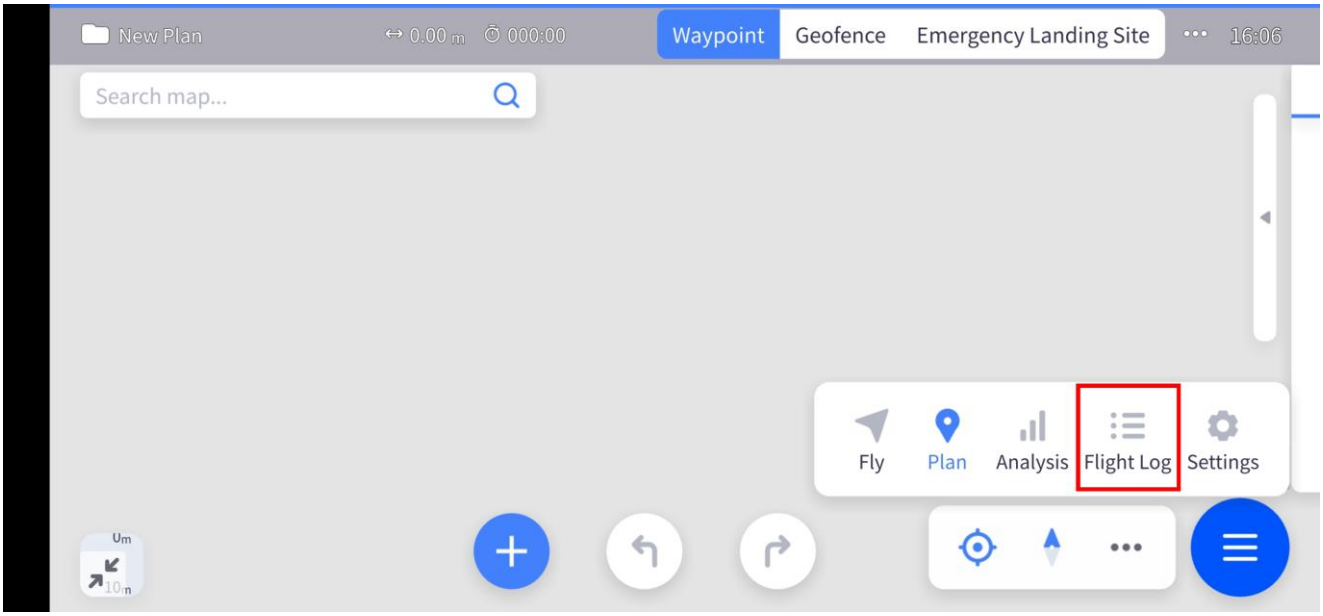


Figure 87 Main menu: Flight Log

- Pressing the Play button while not connected to the aircraft opens the Flight view map and begins to replay the telemetry.
- Tap “Convert to CSV” to generate a CSV file and save it to a local folder. On Android devices, you can select any folder to save the file.
  On Windows, the file is automatically saved to the following folder:

```
C:\Users\(User name)\Documents\TAKEOFF\Telemetry
```

Note: The base folder can be changed using the “Application Load/Save Path” setting under the App → General settings tab.

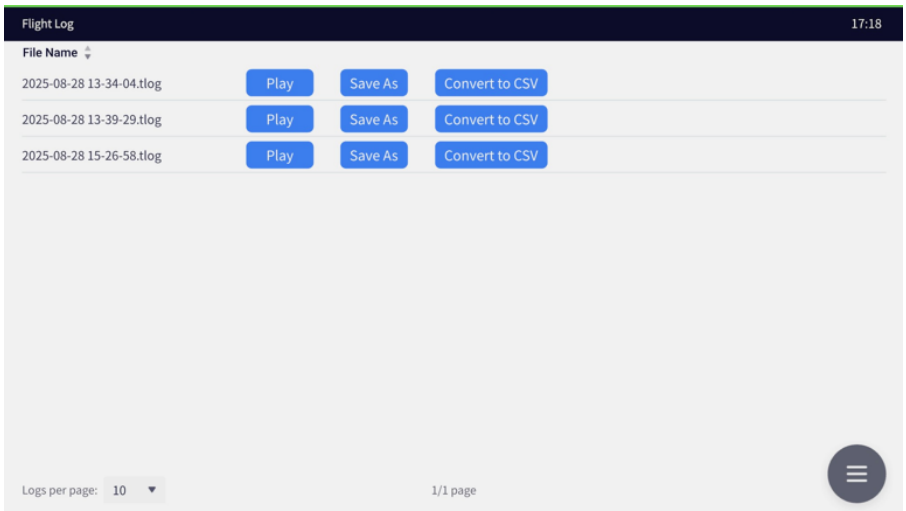


Figure 88 Flight Logs

Chapter 6

Troubleshooting

6.1 Troubleshooting ····· 101

6.1 Troubleshooting

- This section describes common troubleshooting issues. If your issue cannot be found in following sections, or if the issue persists, contact your dealer.

> WARNING
>
> Never fly the aircraft until the issue is resolved. Failure to do so could result in a crash.

6.1.1 Communication disruption

- When the aircraft and controller are linked and the controller and mobile device are connected via a USB-C cable (shown below), if the aircraft status indicator in TAKEOFF shows "Not Connected", try the following steps.

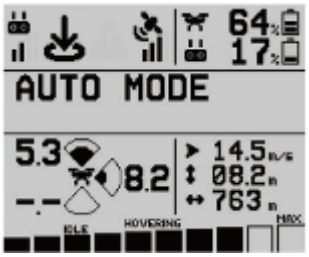


Figure 89 Example of controller screen

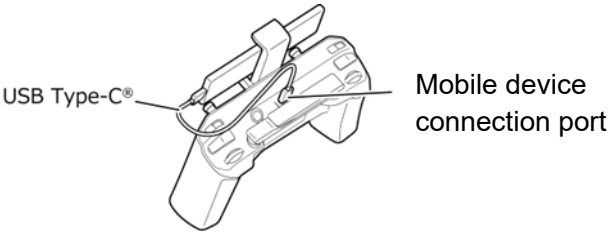


Figure 90 Connecting to the controller

How to check

1. Unplug the USB-C cable connecting the mobile device to the controller and shut down the TAKEOFF on your mobile device.
2. Connect the USB-C cable again and start TAKEOFF.

6.1.2 No map is displayed.

- When your mobile device is connected to the aircraft, if no map appears as shown below, try the following steps.

How to check

1. Close the TAKEOFF app.
2. Unplug the USB-C cable from your mobile device.
3. Gently press the power button on your mobile device to lock it, and then unlock it again.
4. Set your mobile device to airplane mode.
5. Insert a USB-C cable into your mobile device and start TAKEOFF.
6. Check that images appear.
7. Turn on Wi-Fi function on your mobile device.

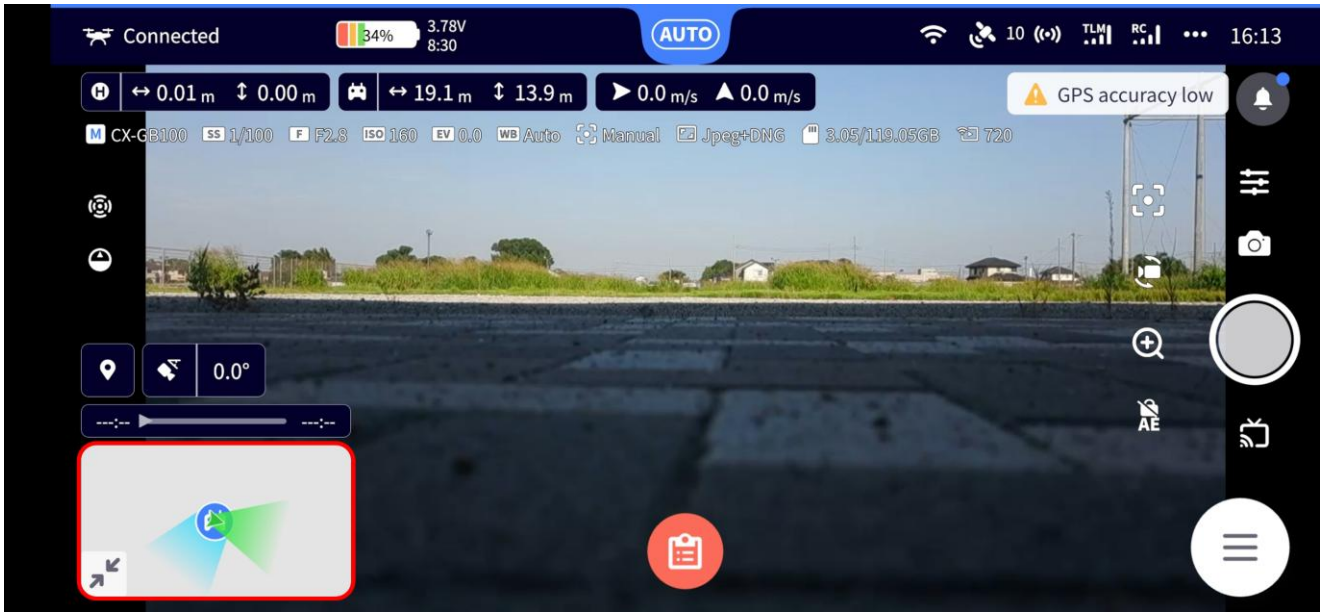


Figure 91 No map

Appendix A

A-1 Revision history ····· 104

A-1 Revision history

Version	Date	Description of revision	Editor
2.6-US1	5/30/2024	First edition	ACSL Ltd. Production Unit
3.6-US1	8/29/2025	- Android 13 support - Added estimated flight time display - Added unit conversion specifications - Unified duplicate notes for controller firmware updates - Revised battery update failure explanation - Added battery update notes - Updated “Limitations (GPS)” and “Safety Features” - Added gimbal reset item - Updated collision avoidance sensor explanation - Added troubleshooting: altitude info not acquired - Updated camera settings - Added planned flight resume - Added survey/corridor threshold items - Added Exif settings - Added file encryption specifications - Updated aircraft control parameters - Added “Controller” item - Added flight log CSV save - Reflected enabling of downlight function - Added focus specifications - Added favorite location registration - Added OTA restriction for low battery - Reflected UI updates - Reflected changes to planned flight standby time - Reflected changes to takeoff reference point handling - Added flight resumption precautions - Added survey notes - Added flight plan transmission during flight - Revised general TAKEOFF app settings; added items	ACSL Ltd. Production Unit
3.7-US1	10/14/2025	- Minimum system requirements updated to Windows 11	ACSL Ltd. Production Unit
3.8-US1	4/22/2026	- Updated Camera Detailed Settings - Added description for "Return to Launch" - Updated Resume flight feature - Updated Survey / Corridor Setting Items	ACSL Ltd. Production Unit

		- Added Automatic geofence bypass route generation function - Updated General Settings - Added additional conditions for Magnetic Calibration - Partial removal of items in "Aircraft Control Parameters" - Added notes for "Controller"	
3.9-US1	6/19/2026	- Added RTK Icon section	ACSL Ltd. Production Unit
3.9-US2	7/16/2026	- Added Spacebar support for pausing on Windows.	ACSL Ltd. Production Unit
3.10-US1	10/13/2026	- Removal of some GB300 camera settings - Addition of a feature to customize aircraft battery alert thresholds - Correction of typographical errors	ACSL Ltd. Production Unit

Manufacturer information

* For individual questions, contact the distributor shown on the back cover of this manual.

* For improvement, specifications of this product are subject to change without notice.

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Distributor contact information