User Manual

WingtraOne GenII

European Open Category Class 3

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Table of revisions

Version	Change	Date
1.0	Initial version	2023-08-07
1.1	Revised version after C3 type examination	2023-09-15
1.2	Revised version after C3 document review	2023-09-21
1.3	Added LIDAR payload	2023-12-20
1.4	• Corrected weight including LIDAR payload • Combined subchapters on fail-safe operations and safety precautions into a general Safety chapter (chapter 6)	2024-01-10
1.5	Added MAP61 payload	2024-08-19
1.6	Moved some material from Knowledgebase to the user manual. Additional clarifications.	2025-01-30

Table of content

0 General Guidance

The Wingtra KnowledgeBase (https://knowledge.wingtra.com/en) serves as the general manual for the complete Wingtra customer base. This document describes specific operational guidelines required for the operation of the WingtraOne GenII in the European Open Category.

In case of conflicting information between this user manual and the information available on KnowledgeBase, this user manual is applicable.

Acronyms and Abbreviations

Hereafter are the acronyms used in the following document:

AMSL	Above mean sea level
EASA	European Aviation Safety Agency
GPS	Global Positioning System
ISA	International Standard Atmosphere
MTOM	Maximum Take-Off Mass
NOTAM	Notice To Air Missions
OCV	Open Circuit Voltage
OPRN	Operator Registration Number
PPK	Post-Processing Kinematics
RH	Relative Humidiy
RTH	Return-to-home
TFR	Temporary Flight Restriction
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
UGZ	UAS Geographical Zone

1 Information notice - European Open Category C3

Starting from 1 January 2024 operations in the open category must be conducted either with a drone bearing a C0 to C4 class identification label, or being privately built or even without class identification label but only if purchased before 31 December 2023. The WingtraOne GenII falls under the category C3. You will be able to operate it as described in the table below.

To support the drone community in the safe operation of their drones, EASA is putting at everyone's disposal leaflets covering the main safety points related to drones in class from Class 0 to Class 6. The leaflets highlight the do's and don'ts for drone operators and pilots. We encourage you to take full advantage of this material. You can download them from this website:
https://www.easa.europa.eu/en/document-library/general-publications/drones-information-notices

To operate a C3 drone in the open category, you have to consider the following requirements:

Subcategory	A3
Operational instructions	● Must not overfly uninvolved people; ● Maintain a horizontal distance of 150 m from uninvolved people and urban areas; ● Maintain flight altitude below 120m above ground level. ● Keep the UA in the line of sight
Drone operator registration	Yes
Remote pilot competence	● Read carefully the user manual; ● Obtain a 'Proof of completion for online training' for A1/A3 'open' subcategory by: ○ Completing the online training ○ Passing the online theoretical exam
Remote pilot minimum age	16*

* A State may lower the remote pilot minimum age to 12. In that case, the lowered age limit will apply only in that State.

2 Unmanned Aircraft System

2.1 Overview

The WingtraOne Gen. II fulfils the relevant requirements of the Delegated Regulation R(EU) 2019/945 as regards to unmanned aircraft systems and on third-country operators of unmanned aircraft systems as a C3 class UAS. The characteristics of the C3 approved UAS are the following:

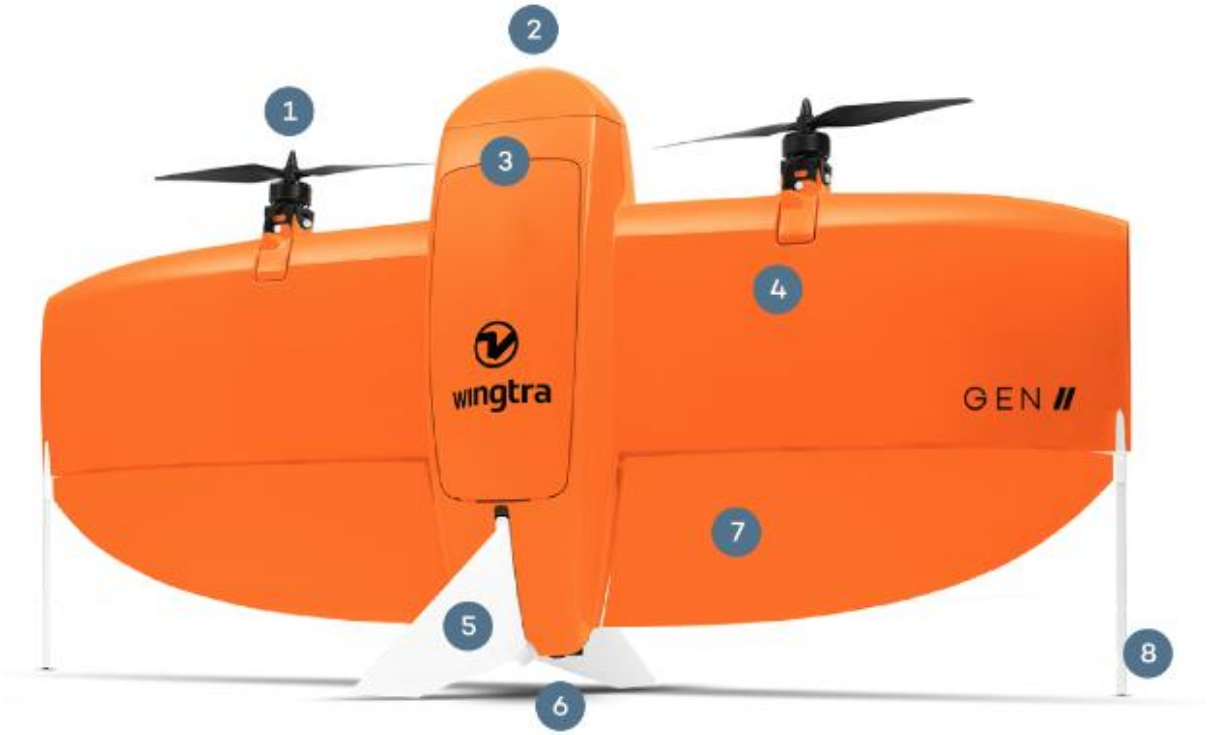
Type:	WingtraOne Gen II
Hardware version:	V.4
Software version:	2.17 or higher
UAS Class:	C3
UAS Configurations:	Mass • WingtraOne Gen. II + Payload Wingtra RGB61 4.5 kg • WingtraOne Gen. II + Payload Sony RX1RII 4.4 kg • WingtraOne Gen. II + Payload Sony A6100 4.3 kg • WingtraOne Gen. II + Payload Sony A6100 Oblique 4.5 kg • WingtraOne Gen. II + Payload Micasense RedEdge-P 4.3 kg • WingtraOne Gen. II + Payload Micasense RedEdge-MX 4.2 kg • WingtraOne Gen. II + Payload Micasense Altum 4.4 kg • WingtraOne Gen II + Payload Wingtra LIDAR 4.8 kg • WingtraOne Gen II + Payload MAP61 4.4 kg Optional: High-Altitude propellers for take-offs >2500m ~ High-Altitude propellers within the same mass tolerances as normal propellers
MTOM:	4,8 kg*
Mass of loose items	Middle stand: 120 g ± 6 g Top cover: 55 g ±2.5 g Top cover Micasense & LIDAR: 48.0 g ±2.5 g Nose cover: 55 g ±5 g
Needed equipment to fly	• WingtraOne Gen II – Wing/body with propellers • Middle stand • Top cover • Nose cover • 2x Batteries • Tablet + telemetry module • Payload (anyone from the UAS configurations list)

*It is the responsibility of the remote pilot to ensure that the MTOM never exceeds the declared by the manufacturer.

Below the content of the standard bundle with the drone and Pilot box is listed. The use of 3rd party or modified equipment with the WingtraOne GenII is not foreseen and will result in loss of warranty.

Drone components

1. Propellers
2. Battery compartment
3. Top cover: access to camera, PPK and electronics
4. Motors
5. Middle stand
6. Distance sensor
7. Flaps
8. Side stands



Pilot box

Including all items to control the drone, as well as accessories and spare parts

1. Tablet
2. Telemetry and its cable
3. Wind measurement tool
4. Flight batteries (2 sets)
5. Spare Propellers
6. Screwdriver and tablet SD card adapter
7. SD card holder (SD card comes with the camera)
8. USB sticks
9. Torx L-key
10. Charger for flight batteries and tablet

2.2 Dimensions & Centre of gravity

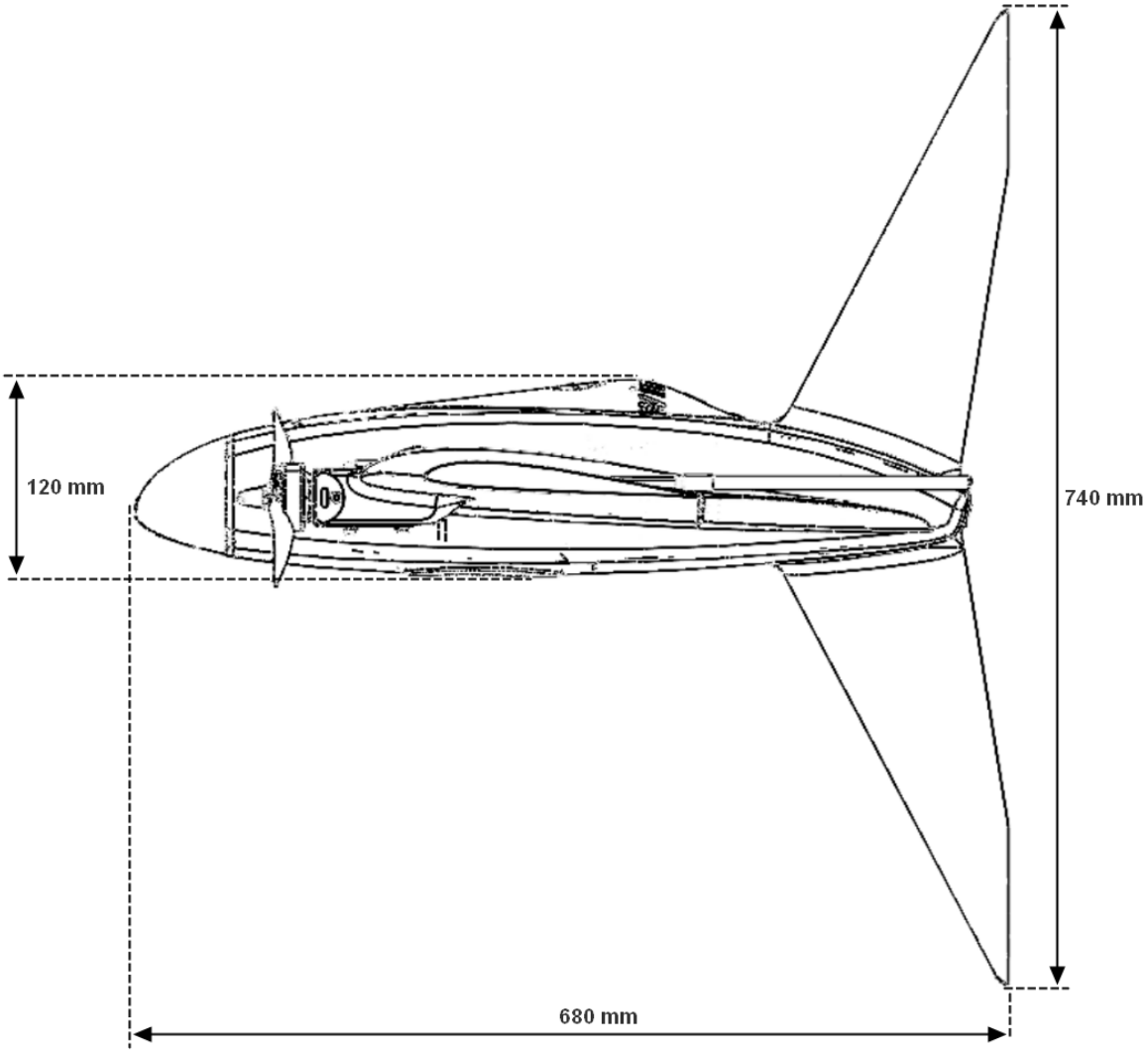


Figure 2.2-1. WingtraOne Gen II dimensions - side

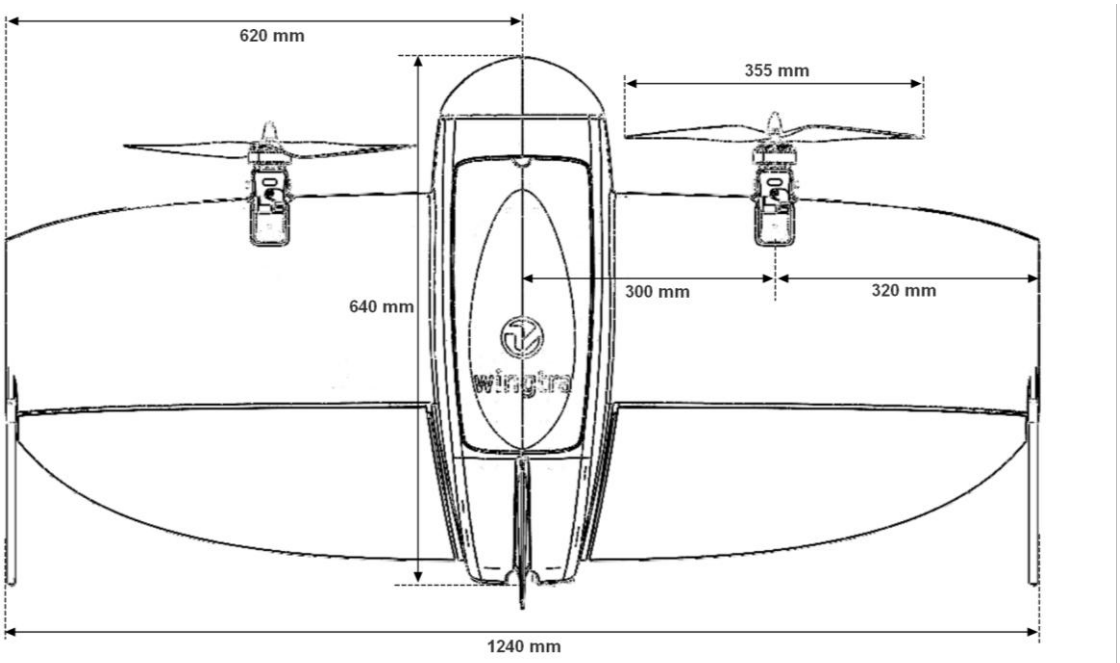


Figure 2.2-2. WingtraOne Gen II dimensions - plan

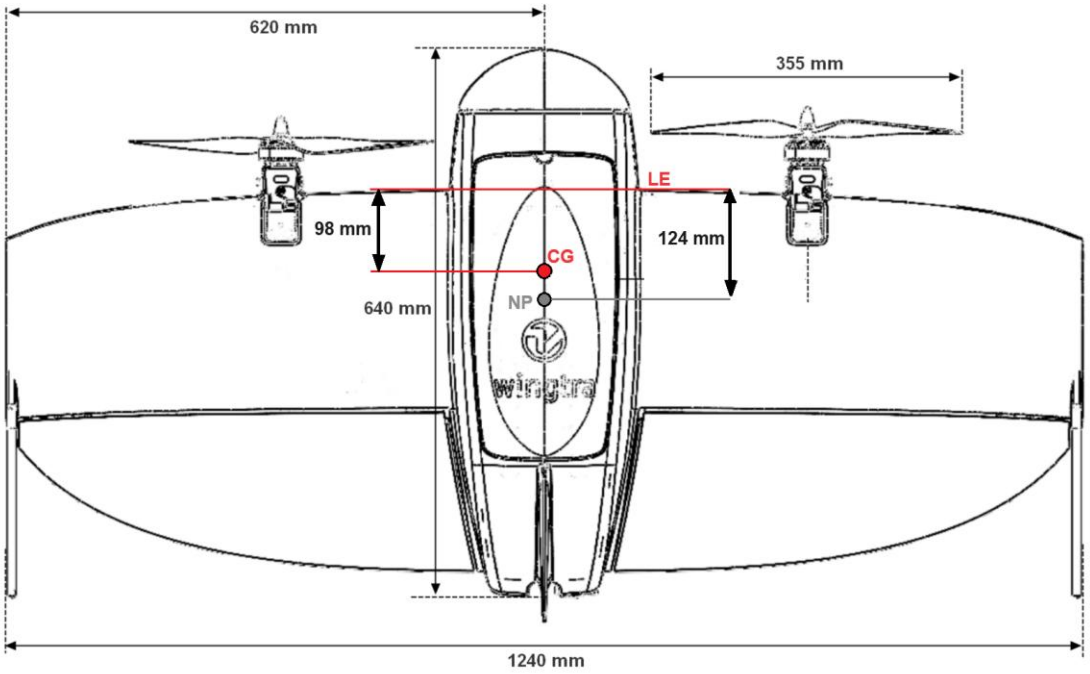


Figure 2.2-3. WingtraOne Gen II - centre of gravity (CG) from leading edge (LE)

Payload	CG from LE
RGB61	98 mm + - 1 mm
RX1	98 mm + - 1 mm
A6100	98 mm + - 1 mm
Oblique	98 mm + - 1 mm
RE-P	98 mm + - 1 mm
RE-MX	98 mm + - 1 mm
ALTUM	98 mm + - 1 mm
LIDAR	98 mm +2 -0 mm
MAP61	98 mm + - 1 mm

Table 2-1 Centre of gravity for compatible payloads

2.2 Specification

Drone

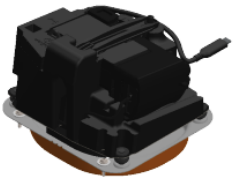
Drone type	Tailsitter vertical take-off and landing (VTOL)
Maximum take-off weight	4.8 kg (10.6 lb)
Wingspan	125 cm (4.1 ft)
Battery capacity	Two 99 Wh batteries (a pair of batteries required)
Radio link	Bi-directional 10 km (6 mi) in direct line of sight, keep in mind that obstacles reduce the range

Operations

Flight speed	16 m/s (35.8 mph)
Wind resistance	Max sustained wind: 12 m/s (27 mph) Max wind gusts: 18 m/s (40 mph) Max sustained wind on the ground: 8/ms (19 mph)
Maximum flight time	Up to 59 min See Knowledge Base for what flight time to expect in different flying conditions
Min. space for take-off and landing	2 m × 2 m (6.6 ft × 6.6 ft)
Temperature	-10 to +40 °C (14 to 104 °F)
Max. take-off altitude above sea level	2500 m (8200 ft) With high-altitude propellers it is possible to take off from up to 4800 m (15,700 ft) and fly up to 5000 m (16,400 ft) AMSL
Weather	IP54, not recommended to fly in fog, rain and snow
Ground Control Points required	No (with PPK option) Using 3 checkpoints to verify the accuracy is recommended
Auto-Landing accuracy	< 2 m (< 7 ft)
Wingtra Blue UAS	Listed on the US Defense Innovation Unit's Blue UAS cleared list, WingtraOne GEN II (2022) is 848 FY20 NDAA compliant—tested and cleared for cybersecurity and safety.
C3 certification (Europe only)	WingtraOne GEN II undervent testing and conformity evaluation in 2022 by the notified body, NavCert GmbH, and in 2025 notified body Droneport Europe S.L, to be designated as C3 class compliant following the European Commission Delegated Regulation (EU) 2019/945 on unmanned aircraft systems.

3 Payloads

The following payloads are compatible with the WingtraOne Gen II and approved for use in the Open Category:

Model	Manufacturer	Take-Off Mass with payload	Dimensions (mm) LxHxW	Picture
RGB61	Wingtra	4.5 kg	158.5x138x106.4	
Sony RX1R II	Wingtra	4.4 kg	158.5x138x102.9	
Sony a6100	Wingtra	4.3 kg	158.5x138x118.8	
Oblique Sony a6100	Wingtra	4.5 kg	158.5x138x126	
RedEdge-P	Wingtra	4.3 kg	158.5x138x144	
RedEdge-MX	Wingtra	4.2 kg	158.5x138x144	

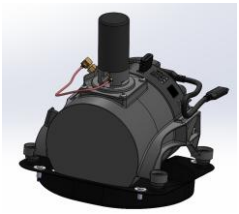
Model	Manufacturer	Take-Off Mass with payload	Dimensions (mm) LxHxW	Picture
Altum	Wingtra	4.4 kg	158.5x138x144	
LIDAR	Wingtra	4.8 kg	158.5x138x184	
MAP61	Wingtra	4.4 kg	158.5x138x129	

Table 3-1 Compatible payload with weight & dimensions

Other payloads not specified by Wingtra will not comply with the C3 certification. The use of 3rd party or modified payloads is not foreseen and will result in loss of warranty.

4 Equipment to control the UA remotely

The WingtraOne Gen. II has the ability to conduct the missions in semi-automatic mode, which means that the UAS performs the required manoeuvres to complete a mission on its own with the possibility to interrupt and finish the flight with the dedicated buttons on the WingtraPilot interface on the Samsung tablet.
The ground control station consists of the Samsung Tab Active 3 tablet and the telemetry module. On the tablet Wingtra Pilot is running, the software for flight planning, flight monitoring and in-flight controls.

Description	
Samsung Galaxy Tab Active 3 SMT-570	Android Version: 8 to 13
WingtraPilot Software:	2.17 or higher

Note: It is recommended to install as few additional applications other than WigtraPilot and Knowledge Base as possible in order to not reduce the performance of the tablet.

The environment in which the drone is operating affects the strength of the telemetry.

In urban areas, the connection between the drone and the telemetry is expected to be lost faster due to obstructions, like buildings and other structures, or due to interferences with the mobile network signals.

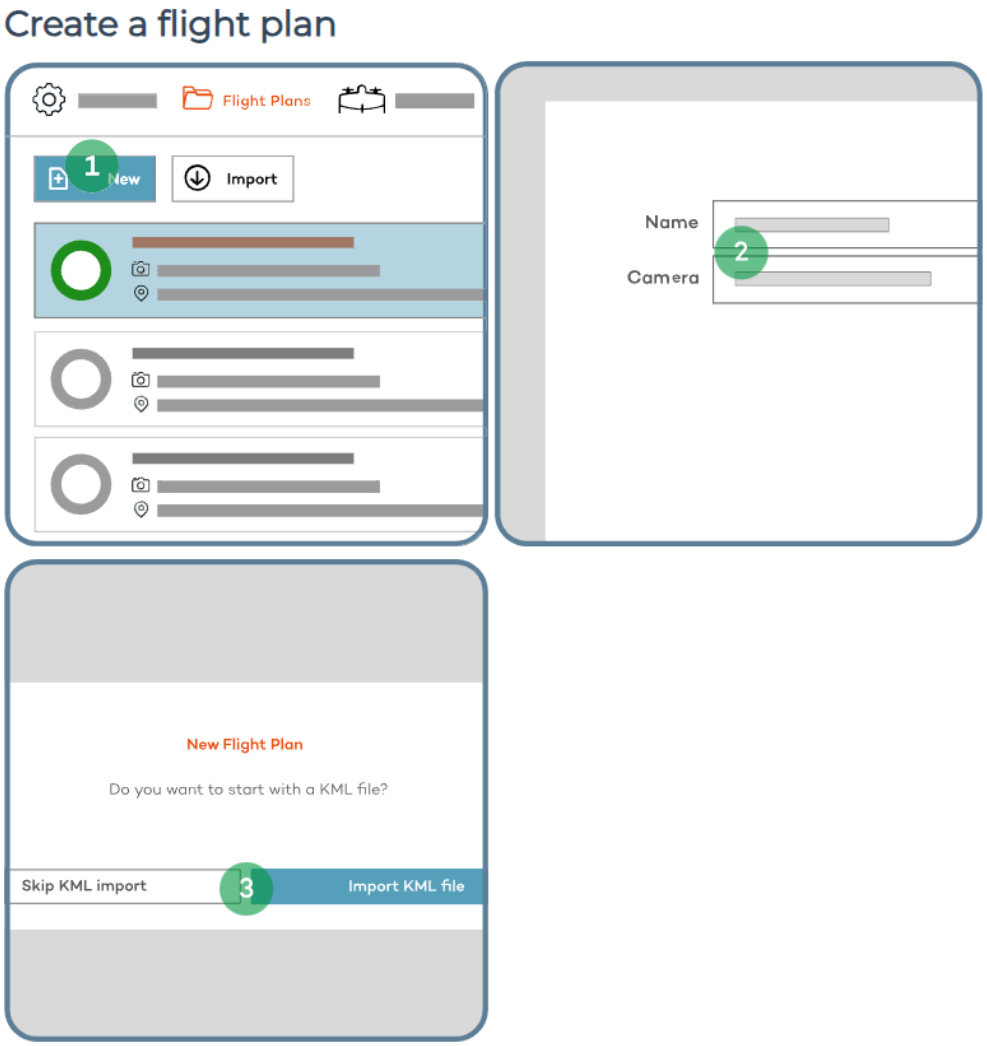
In rural areas, the connection can be interrupted due to natural obstructions such as trees, hills, etc. For example, when you are standing in a valley and your mapping area is at a higher altitude, the telemetry signal is weakening earlier due to the obstruction of the line of sight between the WingtraOne and the operator.

Another parameter that affects the range of the telemetry is the placement of the antenna and the position of the antenna in relation to the WingtraOne. For example, when the WingtraOne is flying towards the antenna, the signal is stronger.

5 Wingtra Pilot - flight planning and control software

Wingtra Pilot is the software for flight planning, flight monitoring and in-flight controls. It comes preinstalled on your tablet. Before going into the field for the first time you should be familiar with the following workflows, controls and error messages in WingtraPilot:

5.1 Flight Planning

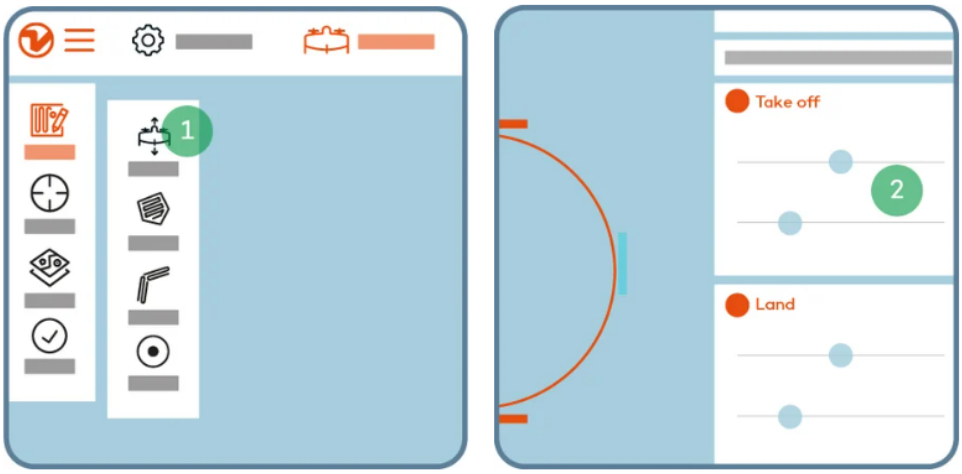


1. Open WingtraPilot and select “New” to create a new flight plan
2. Give your flight plan a descriptive name, select the camera, and select “Next”
3. Import a KML file or skip if you want to plan from scratch

Center your map

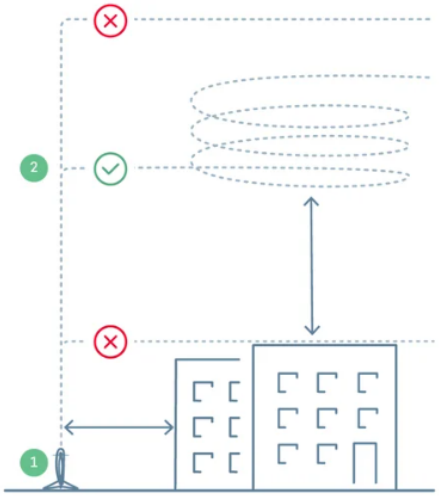
1. Use the "Center" or "Search" function to locate the area of interest
2. Click on "WingtraOne" to center the map on the current drone location

Create a home point and set the transition height



1. Tap the "Plan" and then "Home" icon to create a home point at the planned take-off location; it will be updated once connected to the drone
2. Adjust transition height and direction; it's the same for take-off and landing

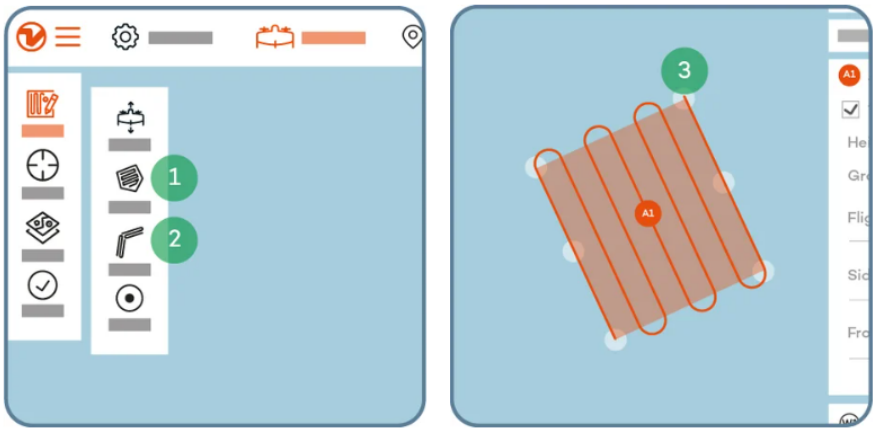
Home point and transition height explained



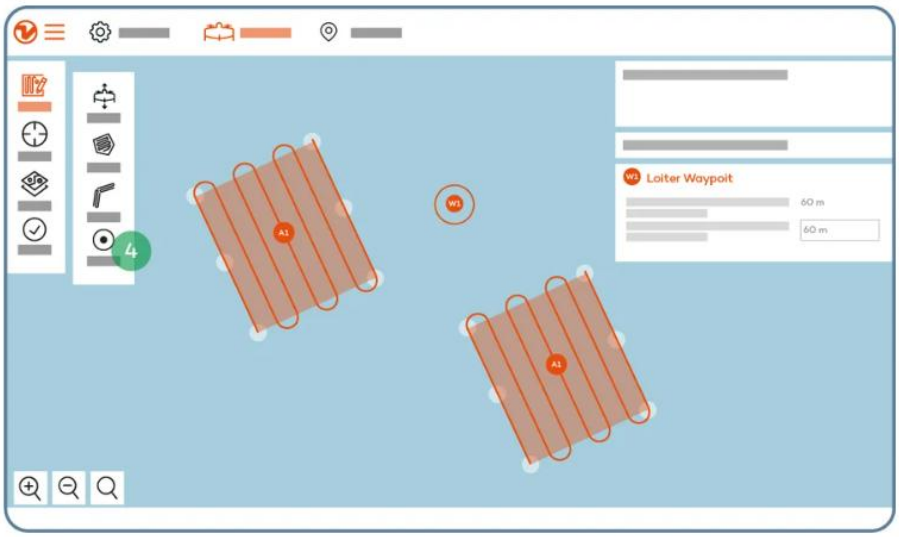
1. Home point is the place where your WingtraOne takes off and lands
2. Transition height is where your drone transitions into a forward flight mode

Create area(s) or corridor(s)

An "area" or a "corridor" is where you want your WingtraOne to fly and capture the data.

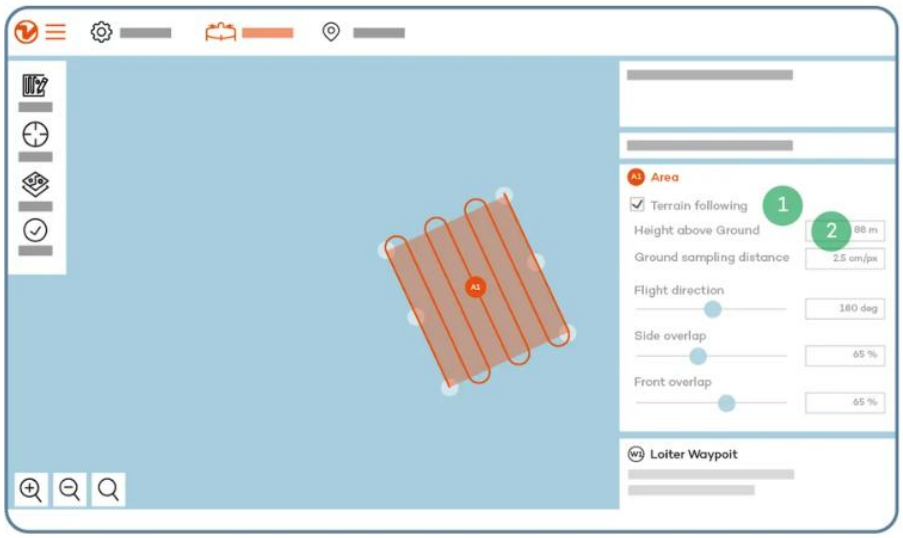


1. Add one or several areas by clicking on "Plan" and then "Area"
2. If you are using the corridor feature, click on "Plan" and then "Corridor"
3. Move the corners until you have outlined the area(s); you can also move the position of the area(s) by moving the A1/A2 bubble in the middle
4. When necessary, loiter waypoints are automatically inserted between two areas; additional waypoints can be inserted manually to ensure safe flight paths between areas and back to the home point



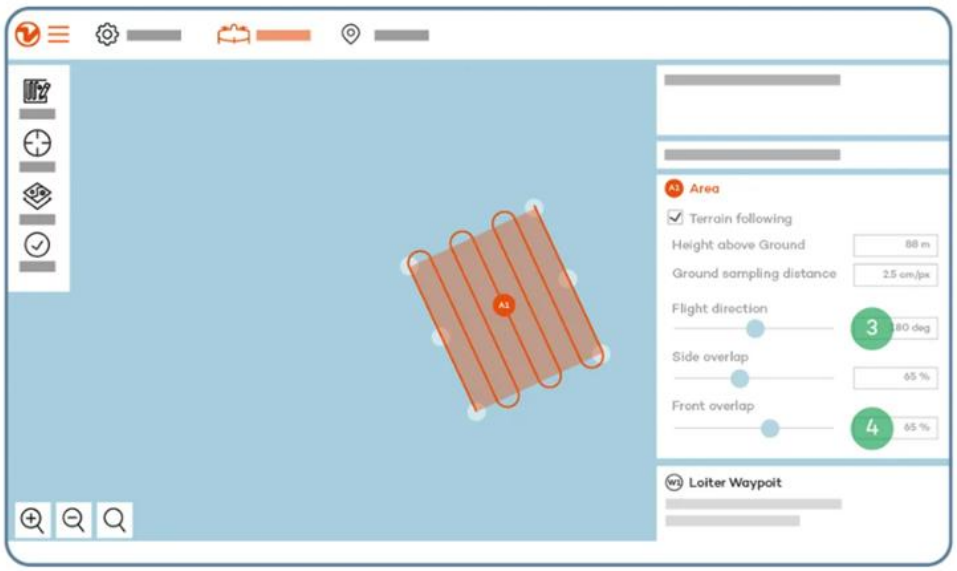
Adjust parameters

Important



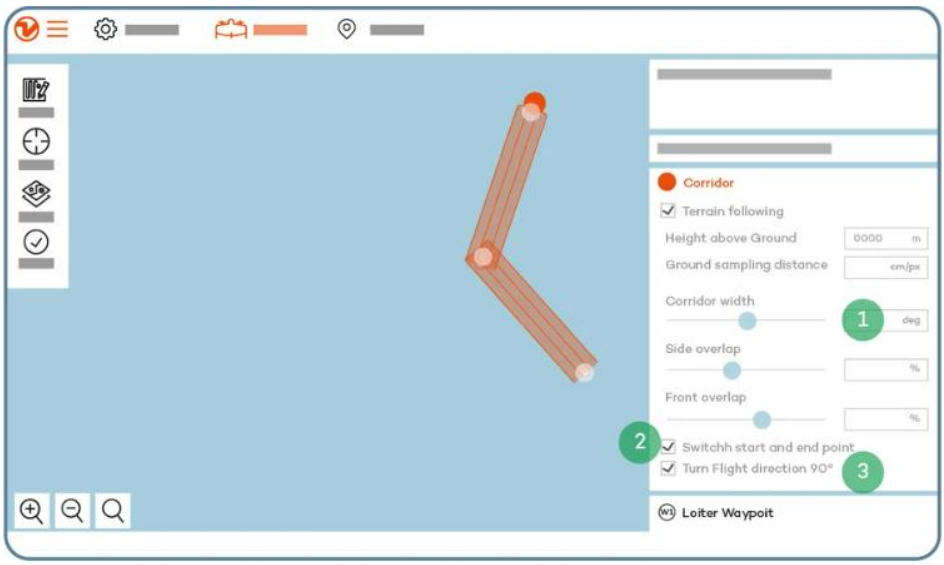
1. "Terrain following"—make sure the box is ticked especially when flying over hilly terrain
2. "Height above ground" and "Ground sampling distance"—define at what height your drone should fly to get the required GSD

Optional



1. "Flight direction"—set the angle of your flight direction, if possible perpendicular to the wind direction
2. "Side overlap" and "front overlap" is based on percentage, and >60% is recommended

Optional "corridor" parameters



1. Define the corridor width
2. Switch start and end point
3. Turn flight direction 90°, e.g., if the terrain is steep

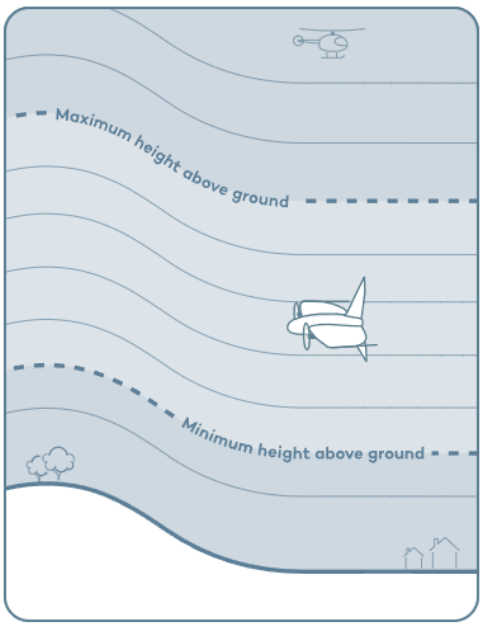
Minimum and maximum height above ground

These parameters define the minimum and maximum height above ground for the flight of the drone.

If the drone cannot fly within these parameters, take off will be denied.

Sections where these safety parameters cannot be respected will be highlighted in red on the altitude graph.

Recommended minimum height is 10 m (30 ft) higher than the tallest object in your area.

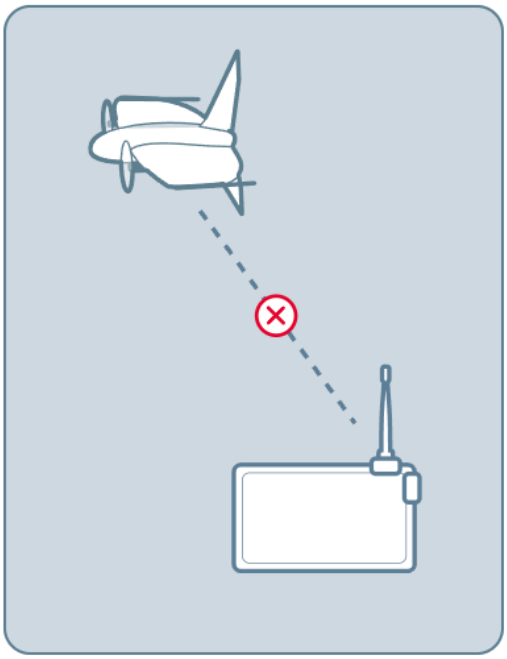


Connection loss timeout

This parameter defines the maximum time a telemetry connection can be lost until a flight is aborted and Return to Home (RTH) is triggered.

Increase this value if you are flying beyond visual line of sight (BVLOS) or if you are flying in environments where the telemetry connection cannot be maintained (e.g. due to the topography of the area of operation).

The drone will still collect data, if the telemetry connection is lost during the flight. However, the user interface in WingtraPilot will not be updated in real time.



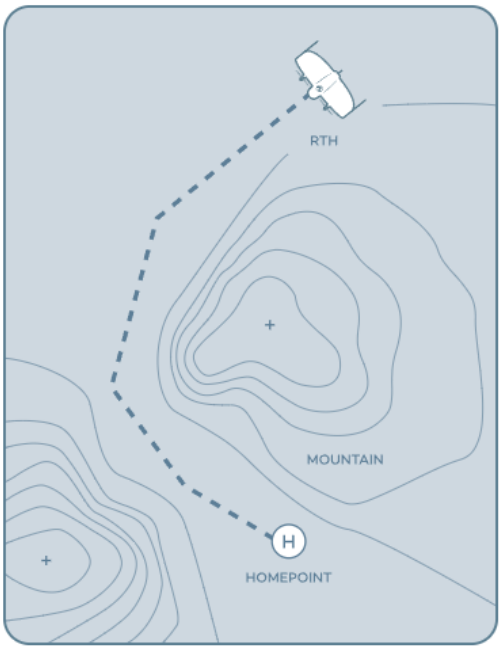
Safe Return To Home (RTH)

The drone will fly home on a safe path. This may not be a direct path to home, depending on the planned mission or topography of the area of operation.

Safe RTH is triggered if:

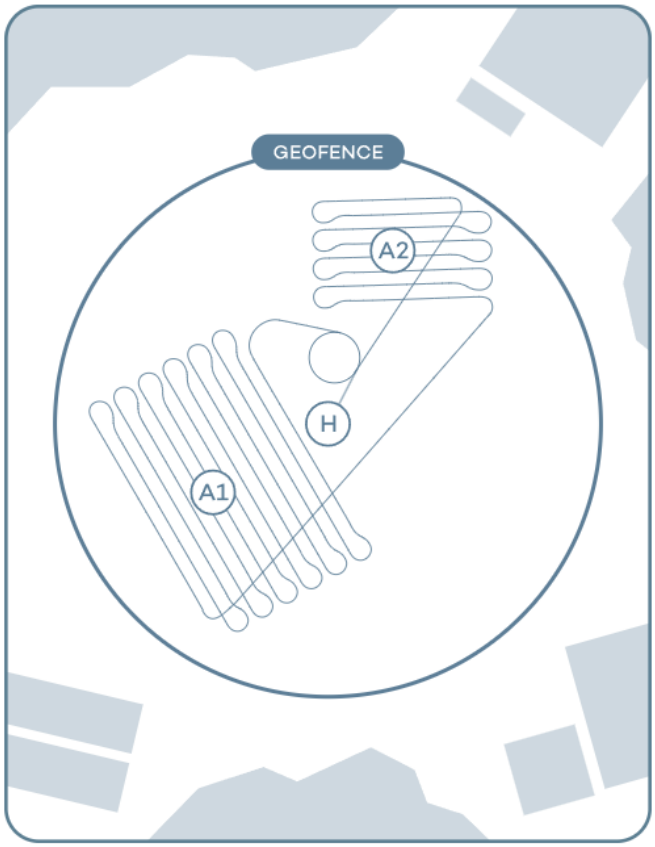
1. The drone flies beyond your geobarrier
2. The connection between operator and drone is lost
3. Battery gets low

You can adjust the thresholds for the triggers in the “Safety” box of your flight plan.



Adjust geobarrier

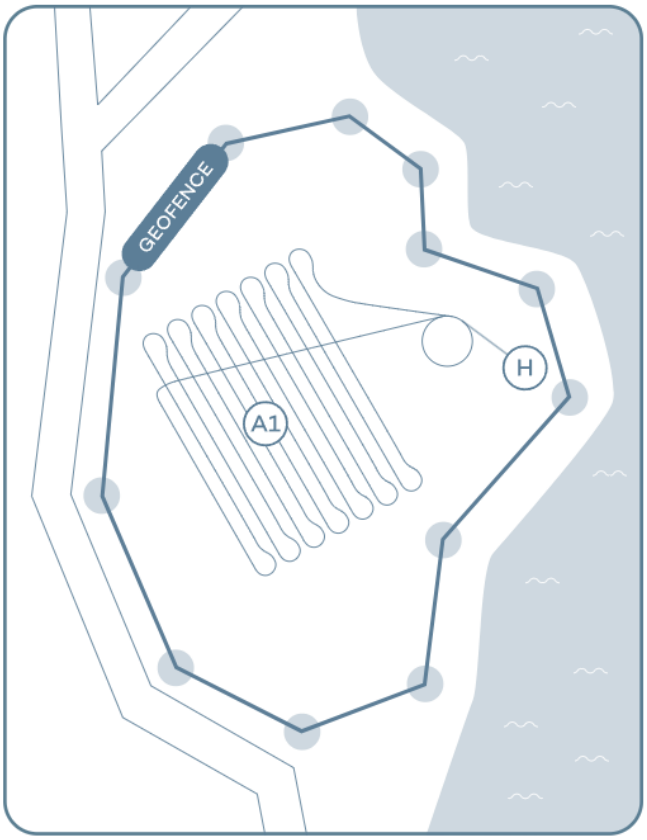
Geobarrier type: Circle



This type of geobarrier confines the drone's flight area to a circle with the home point at the center. If the drone crosses this geobarrier, the Return to Home command is triggered automatically.

The dimension of this geobarrier type may be adjusted with the radius, measuring the distance from the home point to the geobarrier.

Geobarrier type: Polygon



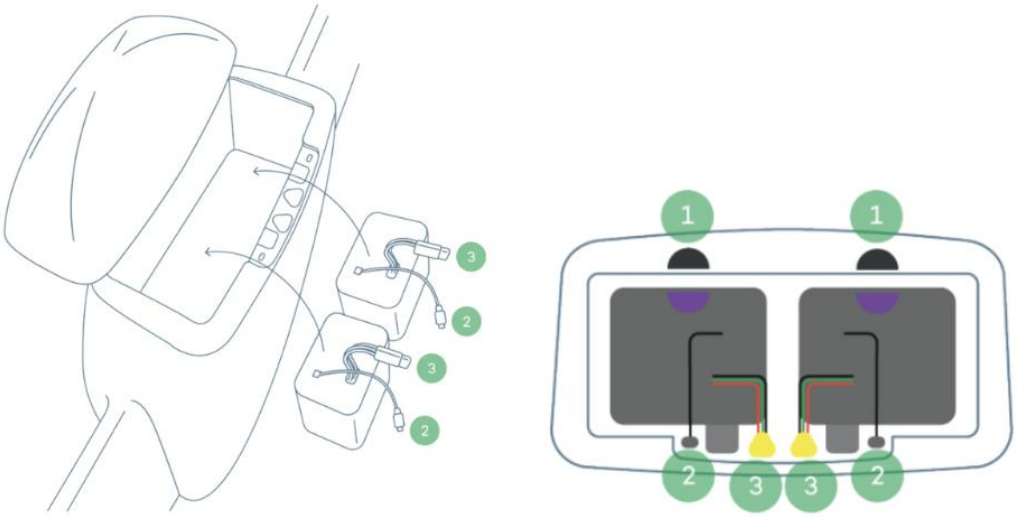
This type of geobarrier confines the drone's flight area to a polygon shape. This shape may be modified by moving, adding or removing corner points.

If the drone should cross this geobarrier, the Return to Home command is triggered automatically.

To create a geobarrier from a KML file, drag the imported KML polygon onto the geobarrier settings window.

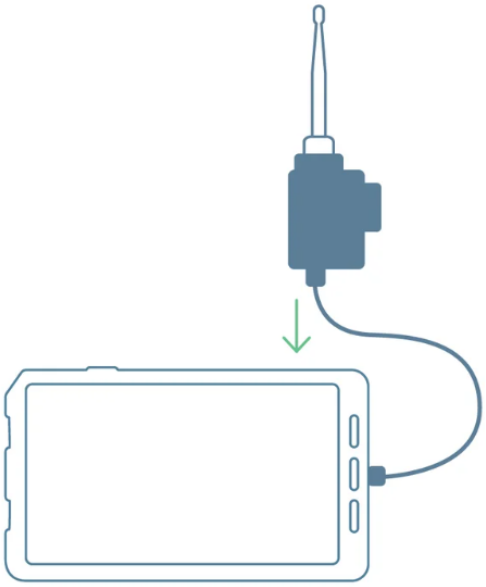
5.2 Pre-flight checks

Power your drone



1. Put the batteries in the battery compartment; use the battery pair that has the same color-coded half circles—the half circles on the batteries and on the drone should match
2. Plug in the two smart battery cables
3. Plug in the two smart power cables

Assemble your ground station

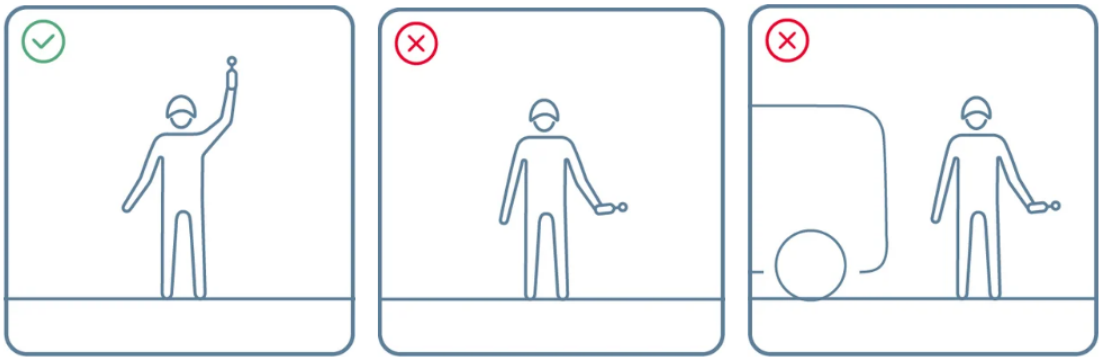


Ground stations are not interchangeable between drones. Make sure that the drone ID matches the ID of the ground station.

The telemetry connection between drone and tablet operates on 2.4016 to 2.4776 GHz (EIRP: 19,8 dBm)."

Optionally, you can operate the WingtraOne with a secondary RC link that operates on 2.405 to 2.474 GHz (EIRP: 19,5 dBm)."

Measure the wind speed



Use the wind measurement tool to measure the wind speed.

Don't measure the wind speed while standing behind big objects, e.g., buildings or trees. Raise the tool above your head to get the most accurate results.

Drone tipping expectations

In calm conditions, WingtraOne lands smoothly on its tail. In windy conditions, the aircraft can tip over upon landing. Generally this is not a problem and damages rarely occur.

Measured on ground*	Surface wind**	Tipping expectations
0-5 m/s (0-11 mph)	0-7 m/s (0-16 mph)	**Tippings rarely occur**
5-8 m/s (11-18 mph)	7-10 m/s (16-22 mph)	**Tippings can occur**
>8 m/s (>18 mph)	>10 m/s (>22 mph)	**Not recommended to fly**

* As measured with the wind measurement tool from the pilot box—approx 2 m (7 ft) above the ground

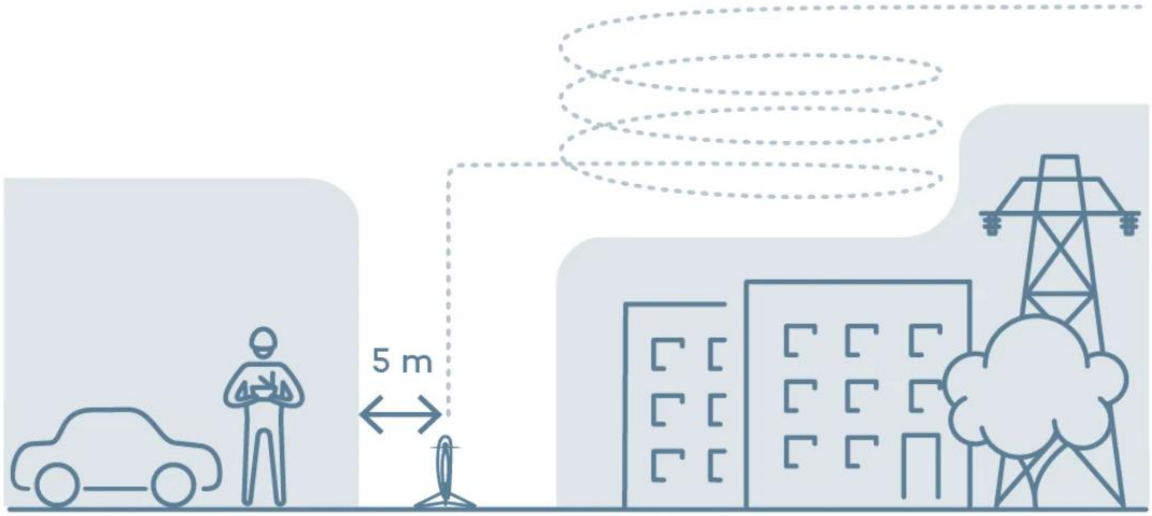
** As referenced in most weather forecasts—approx 10-20 m (33-66 ft) above the ground

Avoid obstacles

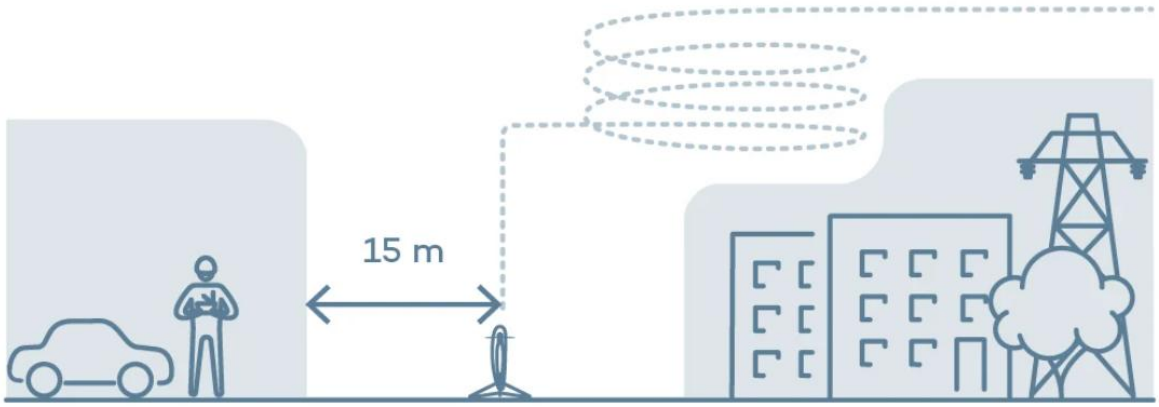
Be aware that the obstacle clearance zone should correspond to the wind conditions. The stronger the wind, the farther from obstacles the drone should be.

Distance to objects in different wind conditions:

< 5 m/s (< 11 mph) continuous wind speed



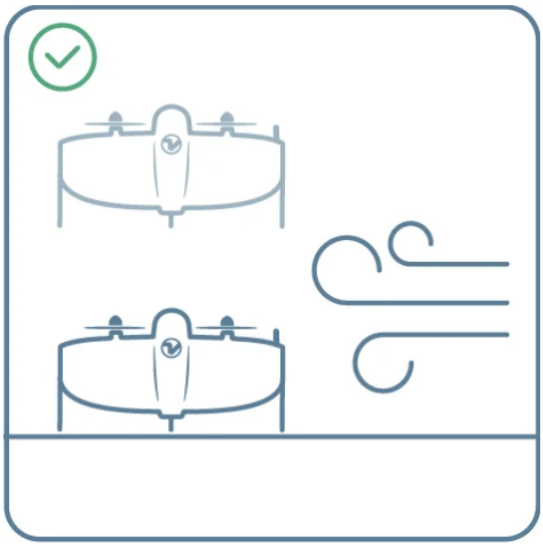
> 5 m/s (> 11 mph) continuous wind speed



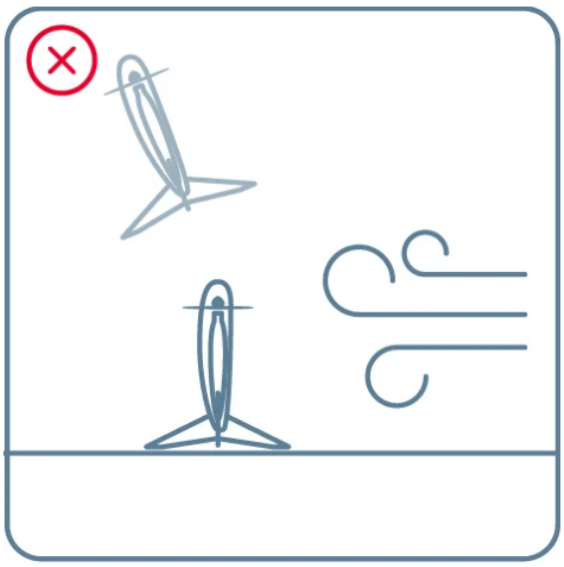
Take-off position in wind

When placing the drone for take-off, make sure that it is positioned parallel to the wind direction.

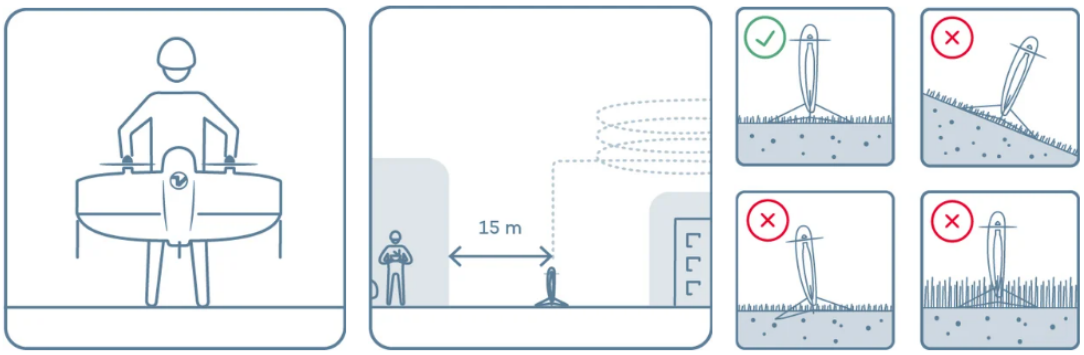
Parallel to wind



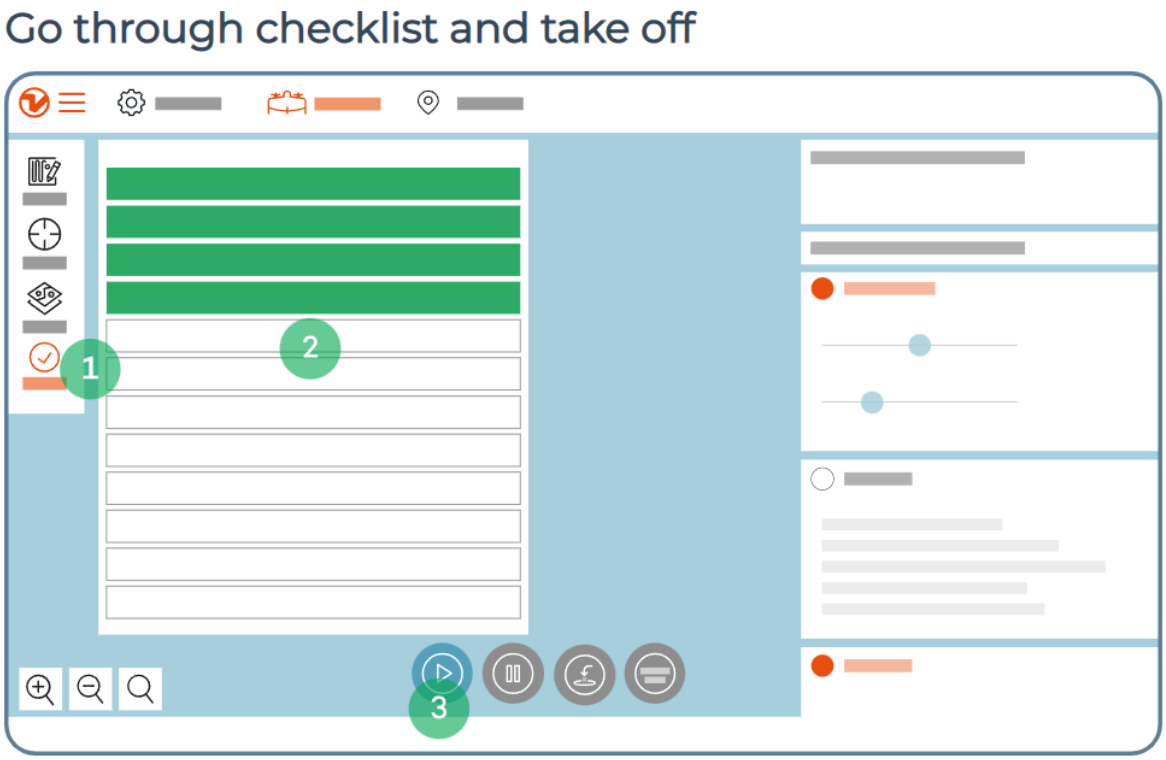
Perpendicular to wind



Prepare for take-off



1. Firmly insert the middle stand until you hear a click and, holding the motors, place the drone on the take-off point
2. Make sure the take-off point is a safe distance from people and obstacles
3. Place it on even ground, making sure it doesn't sink into mud and that the grass surrounding it is not too high



1. Select the checklist
2. Follow the instructions
3. Once all the checklist items are green, press the button to take off

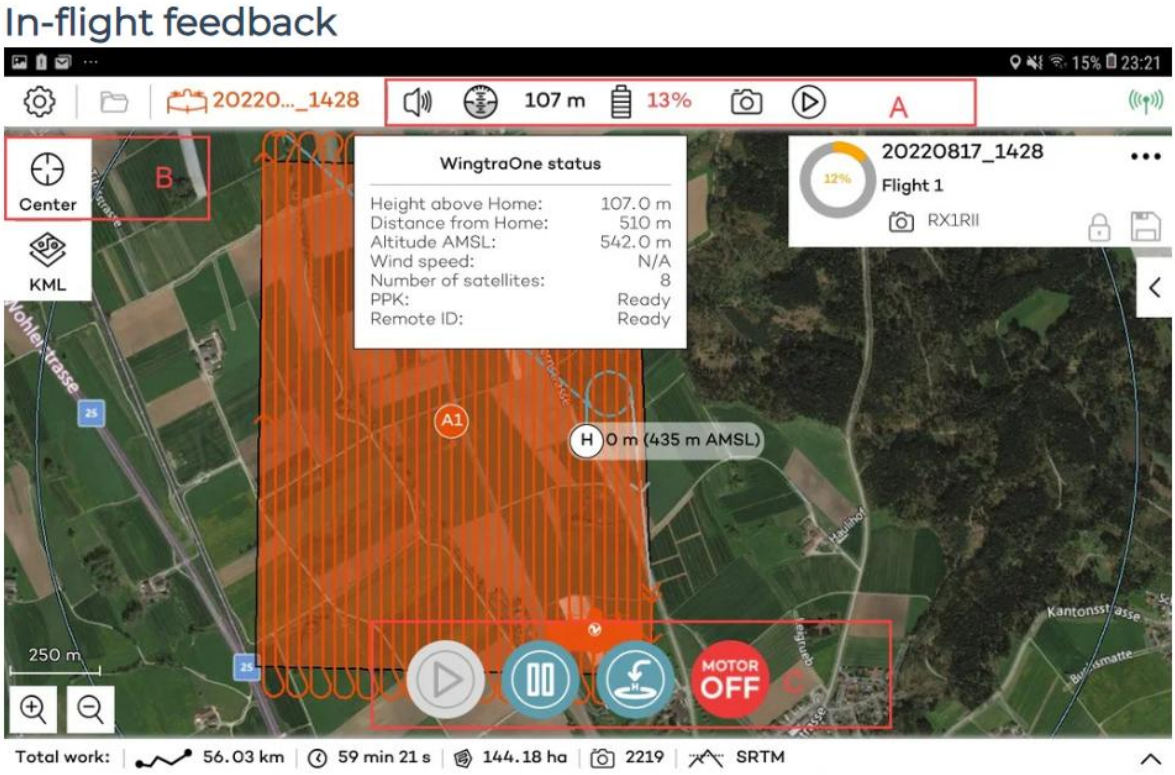
WingtraPilot features an extensive, partially automated, and mandatory safety checklist to be completed before allowing take-off:

The following pre-flight checks are covered:

- Automated ground clearance check for the full flight, comparing all flight altitudes to terrain data.
- Manual instructions for examining the hardware for potential damages.
- Automated check for an active data link.
- Automated check for charged flight batteries.
- Automated check for the level position for take-off.
- Automated check for semi-manual flight control option.
- Automated check for GNSS lock and number of satellites.
- Automated check for the payload sensor to ensure complete data collection.
- Automated check for the PPK
- Automated check to ensure the SD card is inserted and ready
- Automated check to ensure Remote ID is broadcasted before take-off
    - A warning sign is displayed in case no OPRN is available and the operator has the option to jump to the settings page where the OPRN can be entered
- User confirmation that flight plan and flight restrictions have been reviewed and the flight plan can be uploaded

- Automated check for control surfaces range of motion and force.
- Fit to operate declaration.
- Confirming sufficient safety clearance for take-off.
    - Note: This is the distance to ensure safety of the operator and other involved persons during takeoff. It is the operator responsibility to respect the national regulations, e.g. regarding uninvolved people and distance to residential, industrial or commercial areas.
- Automated motor check (completed after commanding takeoff, and before lifting off the ground).

5.3 In-flight monitoring



Above screen key:

A: Information about warnings, GPS quality, remaining battery, and camera connectivity. The audio symbol turns into a red triangle with an exclamation mark when there are warnings or errors. Clicking on the audio symbol after uploading the flight plan on the WingtraOne, the PPK connectivity status is indicated. Clicking on the triangle, the warning or error messages are displayed.

B: Change the center of the map

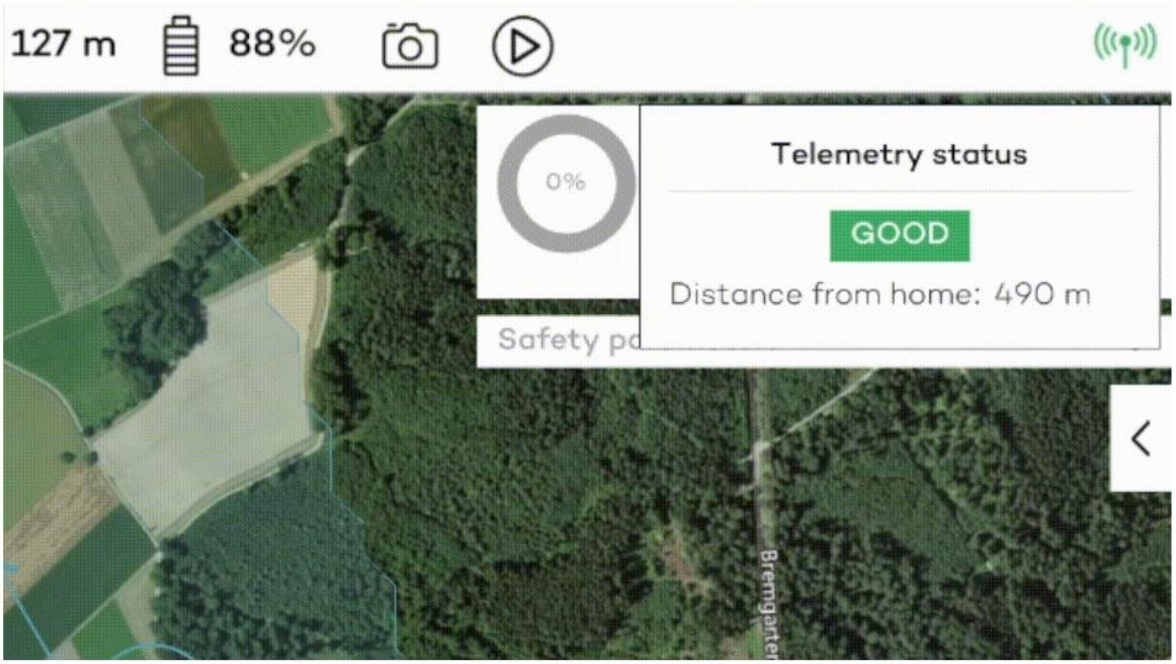
C: Options to take over

The small WingtraOne icon on the display, which moves along the flight path after you start, shows you the current position and direction of the WingtraOne in flight.

On the bottom of the screen, you can see information about the planned flight and the current flight altitude, broken down as follows:

- Total work: the total distance that WingraOne will cover
- Time: the time to complete the mission (in resume operation, the time for completing the area is displayed)
- Area: the mapping area that is covered in the mission
- Camera icon: estimation of the number of images to be captured during the mission—this can deviate slightly from the final number of images
- Current flight altitude: the altitude of the current position of WingtraOne with respect to the home point(the altitude above mean sea level is also given in parentheses)

Telemetry connection strength

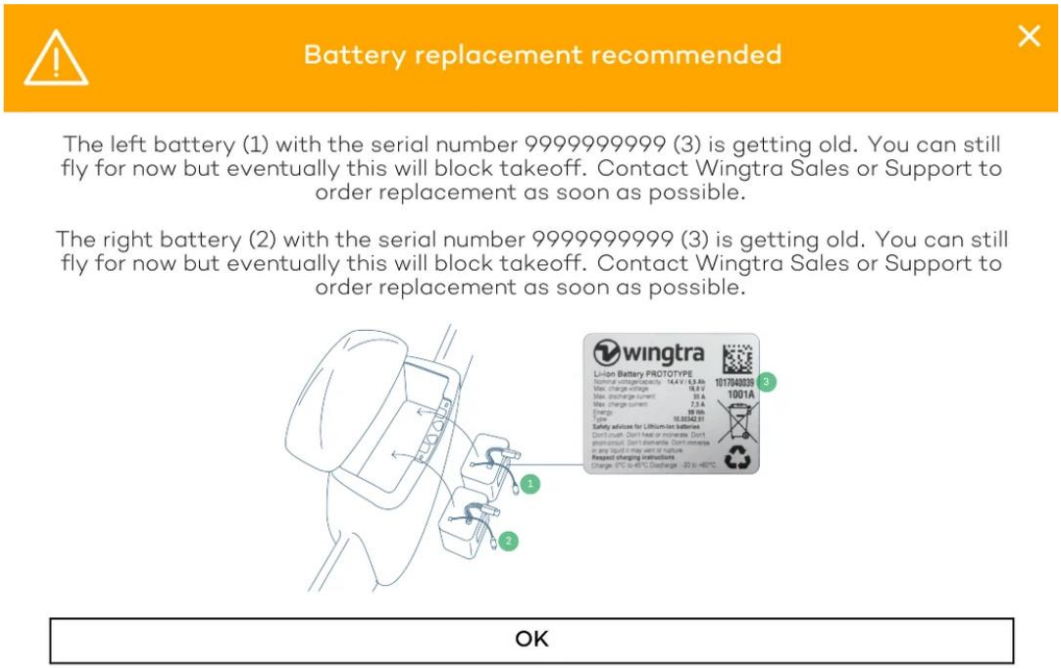


The telemetry connection strength is displayed on the top right in WingtraPilot the entire time of the flight. It offers real-time feedback about the reception strength and the real-time distance to home information. As far as the telemetry icon is green, the signal is good. If it turns orange, click on the icon to get some useful tips on how to improve the reception.

Battery state-of-health

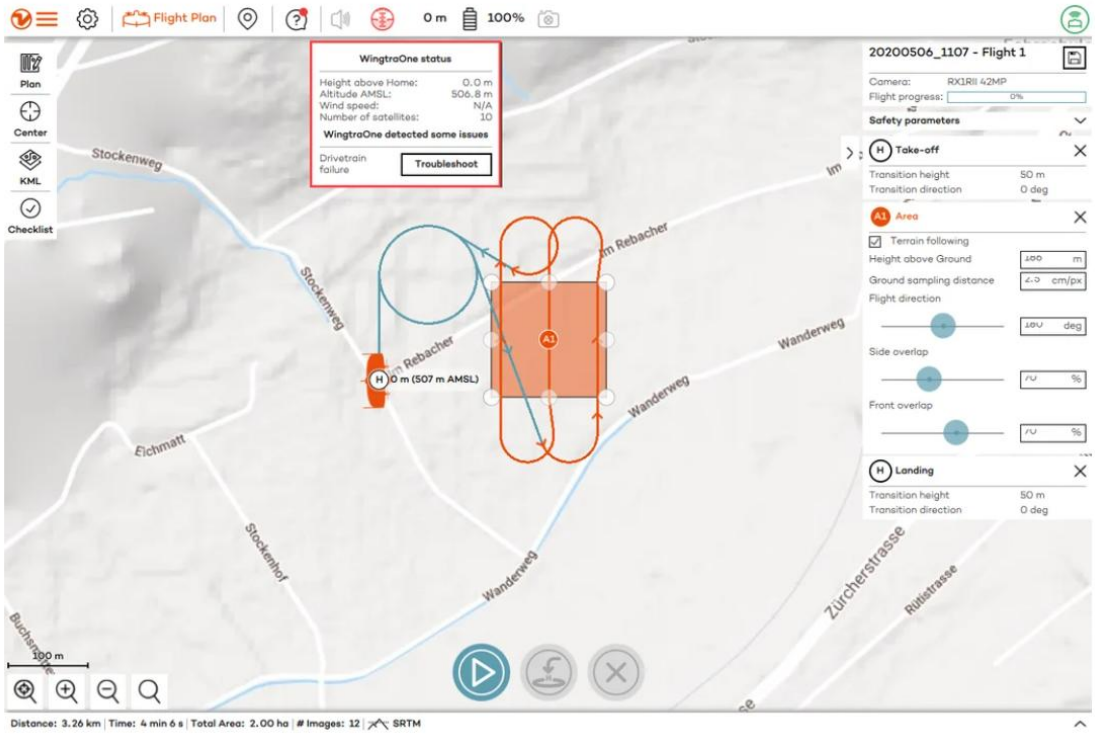
The battery state-of-health is displayed in WingtraPilot.

As the battery approaches a critical state-of-health, the user is notified about this and he will get reminded to replace the flight batteries with new ones.



Drivetrain performance

The drivetrain performance (motors, speed controllers and propellers) is monitored during flight and you are notified with timely instructions to examine the hardware at an early stage.

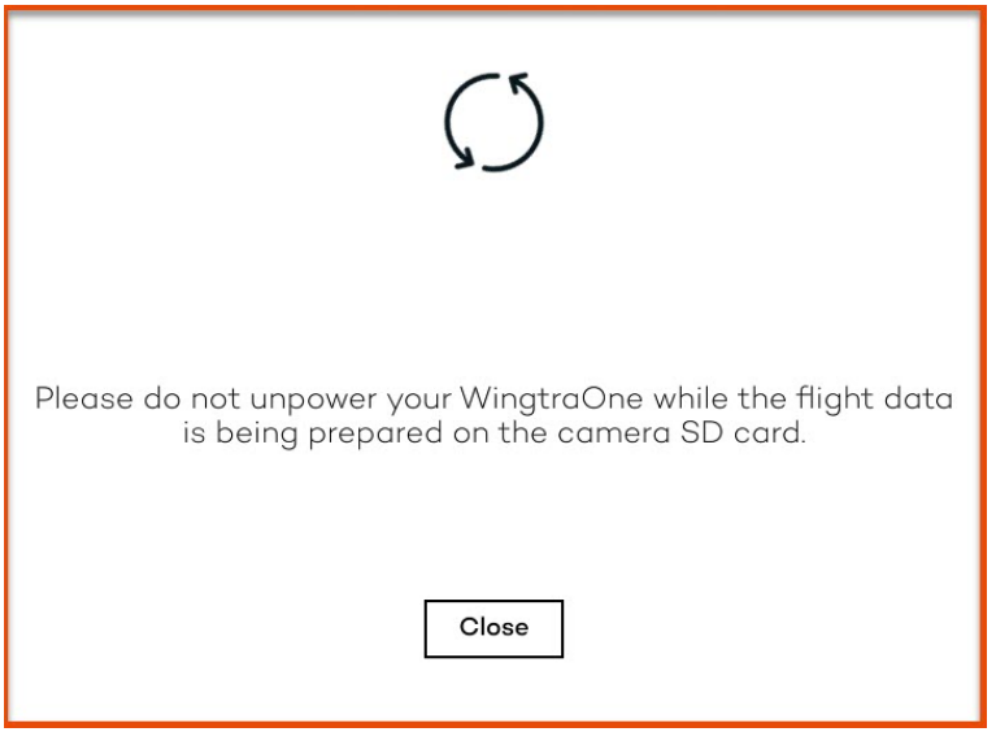


If a drivetrain deficiency is detected during the flight, the flight will be reduced by 5 minutes (warning level) or an immediate RTH will be triggered (critical level). In the warning level, it is recommended to check the propellers and motor misalignment. If the warning persists, flying is not recommended and you need to contact Wingtra Support, sending pictures of the propellers and motors from the front and side. In the critical level, flying is not permitted until the issue is addressed.

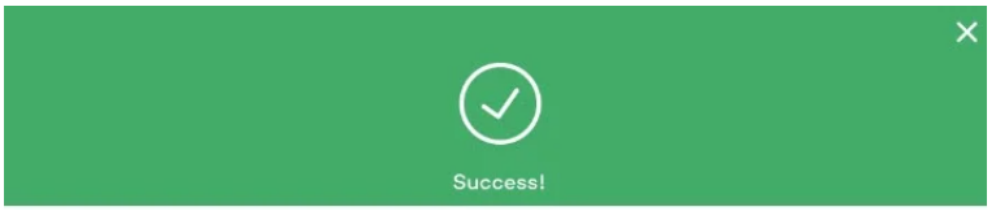
All information in the WingtraPilot app is updated with at least 1 Hz frequency and with high-precision measurement.

Post-flight feedback

When the flight is completed and WingtraOne has landed, the flight data are downloaded on the camera SD card.



You should not turn off WingtraOne during this process. A message indicating the success of the mission will notify you about the success of the download.



5.4 In-flight control and flight modes

Flight Modes

WingtraOne generally flies in either hover or cruise. **Hover** implies a vertical position of the drone for take-off and landing. In **cruise**, the drone is positioned horizontally for forward-flight, in which WingtraOne flies like a fixed-wing aircraft. The in-between stage, where WingtraOne moves from one mode to the other, is called **transition**.

To execute an entire flight plan, WingtraOne flies according to the following **main flight modes.**

List of all flight modes	
Fully automated - Mission mode	This is the normal mode where WingtraOne flies the planned flight fully automated from take-off to landing.
Semi-automated modes	During cruise flight the pilot can command WingtraOne to pause and stay in a loiter circle and then either to increase or decrease the altitude in the circle. During the landing phase when WingtraOne has automatically initiated the transition to vertical hover and landing the pilot can pause the vertical descent and reposition the drone a few meters sideways to avoid landing on dangerous areas or obstacles.
Return To Home RTH	WingtraOne will automatically fly back to and land at the take-off position.
Emergency Motor off	The pilot can shut off the motors of WingtraOne at all times.

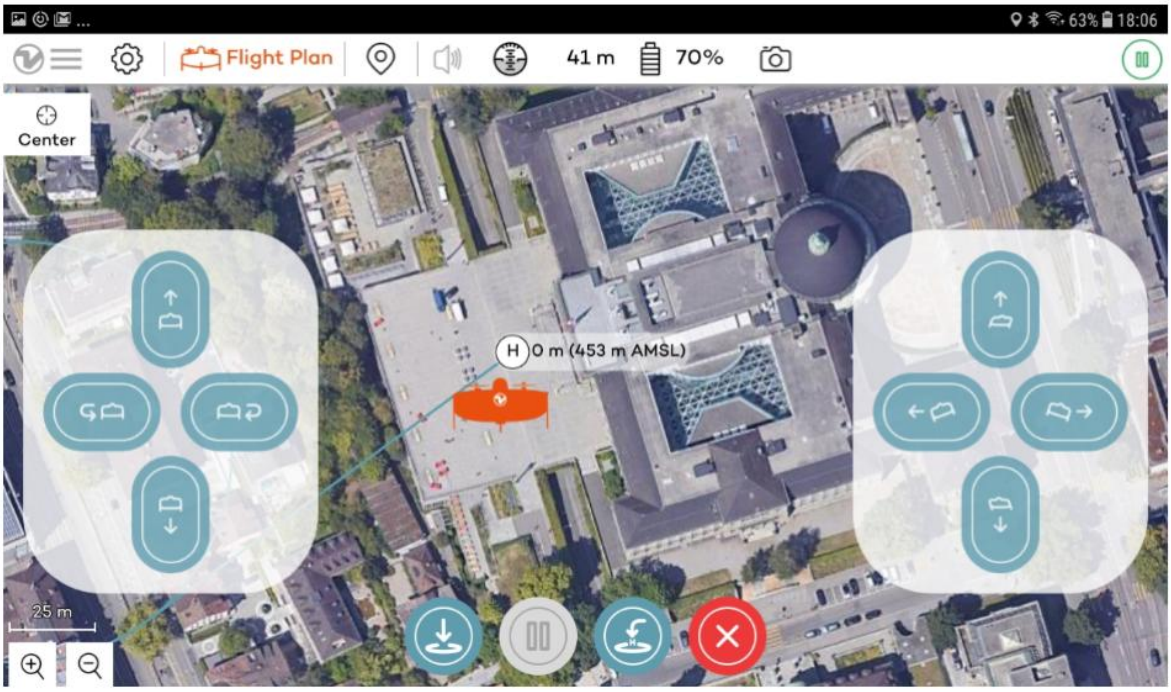
Your interaction options

When the in-app controls (default mode) are enabled all the possible actions to interact with the drone are taken from the tablet by pressing the highlighted buttons.

Repositioning WingtraOne at landing

The WingtraOne has a landing accuracy of 2 m. Therefore, automatic landing is the preferred option when flying with WingtraOne. However, if the landing spot is blocked or WingtraOne deviates a lot from it, the in-app landing controls can help reposition and safely land the drone.

By pressing the pause button during landing, WingtraOne will stop, stabilize itself and hover in one place mid-air. You can then command the next movements, using the in-app commands, as it is described below.



With the left-side buttons, you can command the WingtraOne to move up and down or control the orientation along its axis.

Once you have changed the position of the drone above the preferred landing spot, to land WingtraOne, you'll press the left button down until the drone touches the ground. Or you can press the land on the spot button. The land on spot button replaces the *Start* button during the flight. This will cause the drone to land automatically at its current position. After pressing the land on the spot button, you will need to slide to confirm in order for the landing to proceed. Another option for

5.5 Error messages and warnings

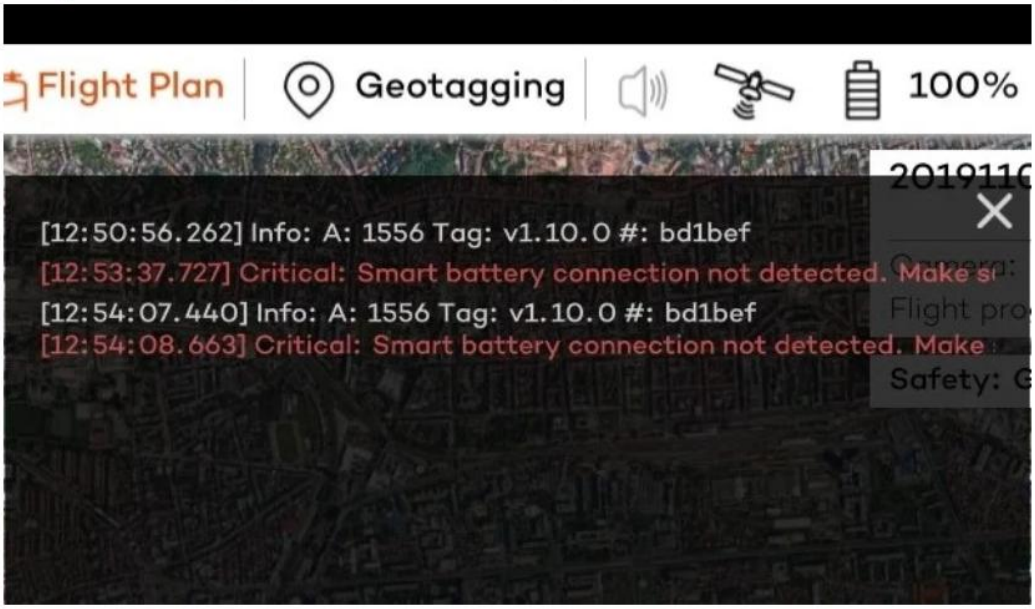
The following link contains the list of errors that you might encounter from WingtraOne and WingtraPilot as a user.

Please note that all error messages are formulated in an actionable way, meaning that if you as a user have to take an action, this will always be explained directly in the error message.

In normal conditions, without errors, the loudspeaker icon will look like this:

If the error appears the loudspeaker will change its form into the warning sign:

By clicking on warning, the list of events will appear where the actual error is visible:



Estimator error

WingtraOne's flight controller uses information from different on-board sensors (accelerometer, gyroscope, GPS, magnetometer, etc.) together with an estimation algorithm to estimate its own state, i.e. position, orientation, velocity, and so on, in real-time. This algorithm is called the state estimator.

If any of the errors mentioned below appear, please repower your WingtraOne and start with preflight check again. If the issue still appears, move WingtraOne to another take-off location and repeat the preflight check.

- "*Estimator error. Repower WingtraOne. If issue persists, please contact support.*"
- *"Accelerometer inconsistent. Repower WingtraOne."*
- *"Gyro inconsistent. Repower WingtraOne"*
- *"Compass inconsistent. Repower WingtraOne"*

To prevent estimator errors in the first place, place WingtraOne on the takeoff location and power WingtraOne now. In some situations, estimator errors appear if the drone is carried around before takeoff.

Magnetometer error

The magnetometer uses the magnetic field to define the WingtraOne's heading or direction. Flying with a bad magnetometer or without a magnetometer can cause the WingtraOne to fly in a totally wrong direction or, in the worst case scenario, crash.

- "*Magnetic anomalies detected. Repower WingtraOne. If issue persists, please contact support.*" Magnetometer detects abnormal readings. This can be caused by magnetic field distortion from metal objects or electromagnetic interference from electronics and power stations. A possible immediate solution is to remove metal objects from your body and away from WingtraOne, place the WingtraOne in a location where it is far away from a strong magnetic source, repower the WingtraOne and try again.

Batteries error

WingtraOne uses two smart batteries as the power source. The smart batteries allow the WingtraOne to extract different information—state of charge, health, etc.—about the batteries that enhances safety when using them in flight. Instead of a single cell, two 99 Wh batteries are required to power up the WingtraOne, which eases the transportation process (airlines and air shipment do not accept batteries with more than 100 Wh).

Motors / drivetrains error

WingtraOne runs motor checks before every take off. It spins each motor very quickly for two instances and checks the current drawn from these spins. WingtraOne will only take off if the detected current drawn is indicating that both motors are spinning.

Propellers

Securely mounting the propellers is essential for safe and worry-free operation and should always be double-checked before the flight.

- "***Confirm that the propellers are mounted correctly***": This message appears on the Hardware check item in the first flight after tipping during landing or in case a propeller change is detected.

GPS errors

WingtraOne uses a GPS (GNSS) to establish its home position and to navigate through the mission. For this to be done correctly, it needs to find a minimum amount of satellites to estimate its current position correctly. When powering WingtraOne for first time or when the new Home position is far away from the last one, it might take some minutes for the WingtraOne to establish its position.

Wind errors

During the flight, WingtraOne measures the wind speed. If the wind speed exceeds a certain threshold the following warnings/actions will be triggered:

- **"Wind speed above 8 m/s detected. Flight data and landing performance might be affected."** By this message, the operator is warned, the flight data might be downgraded and the issues during the landing might appear. How to fly in those situations check this article.
- **"Wind speed above 12 m/s detected. Return to Home advised."** This message will appear if the wind magnitude is above 12m/s. In order to prevent possible incidents, we recommend manually triggering RTH.
- **"Wind speed above 12 m/s detected. Returning to home!"** If wind gusts during cruise exceed more than 12 m/s for 10s, return to home will be automatically triggered, and this message will appear.

Wind errors

During the flight, WingtraOne measures the wind speed. If the wind speed exceeds a certain threshold the following warnings/actions will be triggered:

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- **"Wind speed above 12 m/s detected. Returning to home!"** If wind gusts during cruise exceed more than 12 m/s for 10s, RTH will be automatically triggered, and this message will appear.

Connection loss warnings and messages

Communication between the user and the drone is established via telemetry antenna attached to the tablet.

- *"Data link lost."* This message will appear if telemetry connection, responsible for data transfer between drone and tablet, is lost. The tested range of the telemetry signal is up to 8km; however, in some cases, this message can appear much closer, if the signal is obstructed by interference or obstacles.

6 Safety

The following sections extensively describe the features ensuring safe operation of the WingtraOne GenII.

The safety and reliability of the WingtraOne Gen II is ensured through the following safety features and procedures:

- Operator intervention, see chapter 5.4
- Navigation redundancies
- Technical safety features, see chapter 6.2
- Mandatory, semi-automatic pre-flight checks in Section 5.2
- Operator safety precautions, see chapter 6.1

In addition to the critical safety features for each flight, the WingtraOne monitors the health of different components and suggests timely maintenance or inspection tasks to the operator, before a safety critical level is reached. The applies to the following components:

- Deterioration in motor and propeller performance
- Batteries ageing beyond a critical level (this is done by a battery management system, which also protects the cells from events like deep-discharge or short-circuit)
- Unexpected load on powered servo motors on the ground

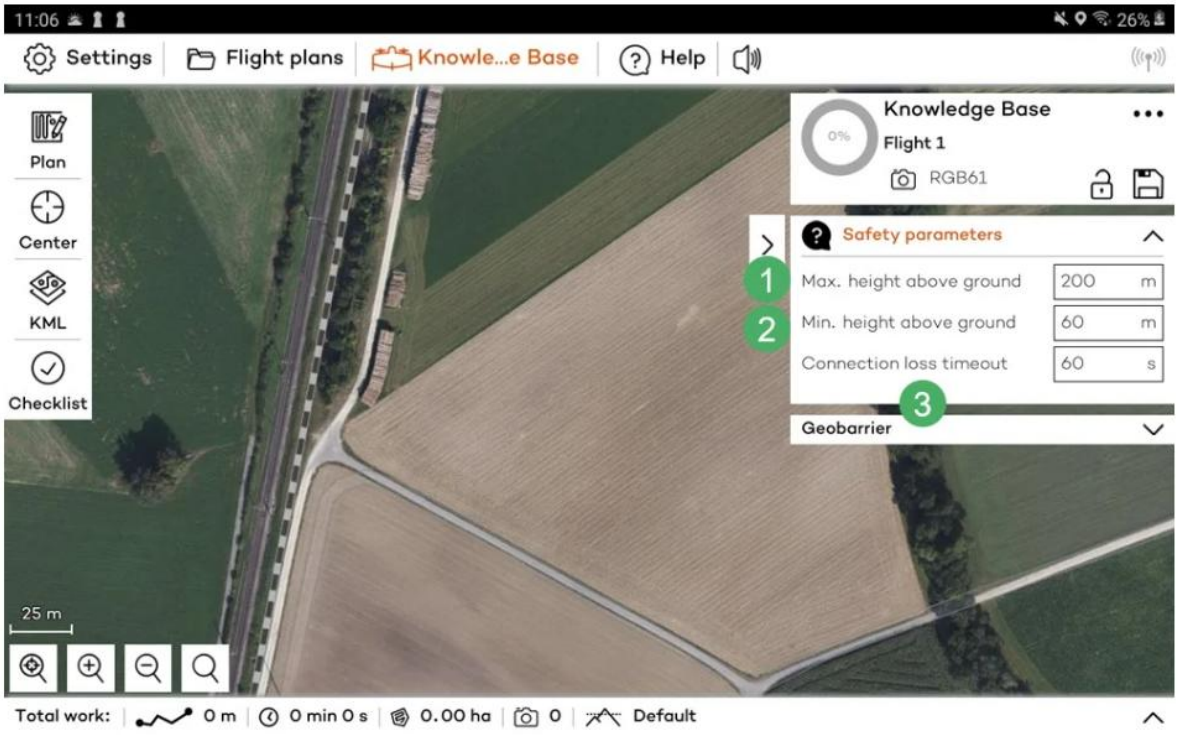
In addition to that the safety and reliability of the system is ensured through thorough qualification of all software and hardware features on component and system level.

6.1 Operator safety precautions

A drone is a tool for professionals that can be a safety risk if not used properly. Make sure you always respect the operational guidelines & limitations (chapter 7) of your system to ensure the safety of material and people.

For the safe operation of the WingtraOne GenII you should be familiar with the safety parameters.

The safety parameters are accessible on the top right during mission planning via the drop-down menu below the flight plan information.



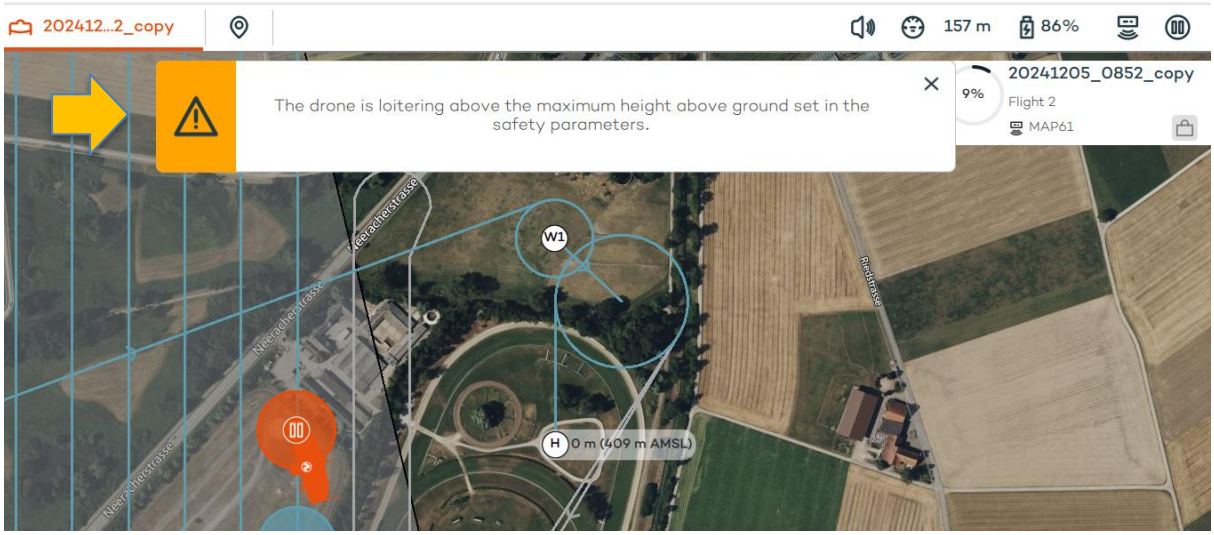
The safety parameters are saved to the flight plan. It is important to ensure that they are set correctly according to your flight plan. Keep in mind the following considerations:

1. Max. height above ground

- Defines the maximum distance between the flight height and the terrain height
- The default value is 200 m
- Set the parameter to have a margin of 60 m at least to the minimum height above ground
    - Make sure to align the flight direction with the terrain. You might want to split an area into multiple areas so that you can align better with the terrain. For more information, check out our Terrain following article.
    - Increase the maximum height above ground parameter to resolve the conflict
    - If the flight plan is too complex, consider splitting it into multiple flight plans

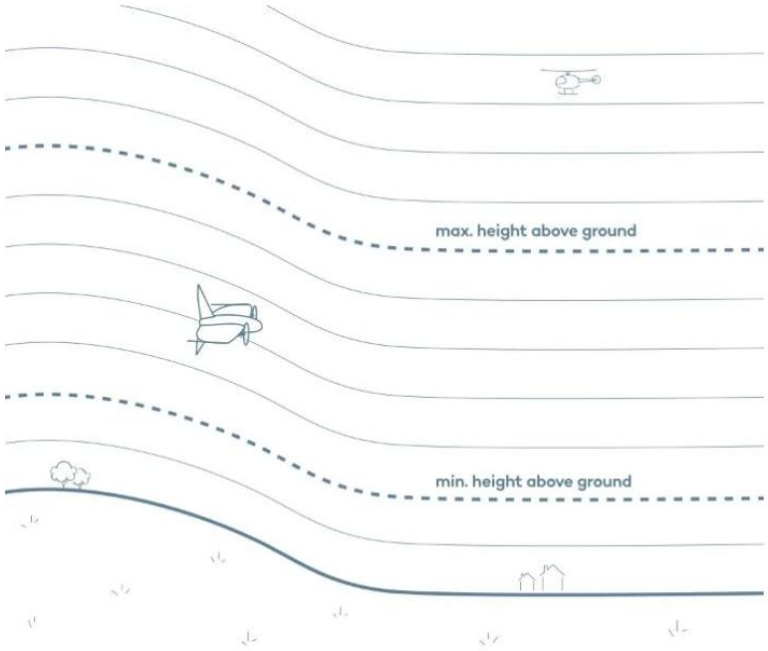
For C3 Open category flights maximum allowed setting for flown altitude is 120m!

You will receive warnings during flight planning and during flight when you are about to exceed the set maximum height above ground.



2. Min. height above ground

- Defines the minimum distance between the flight height and the terrain height
- The default value is 60 m
- Set the parameter to have a margin to the highest obstacle in the flight area
- Note: The parameter should account for the uncertainty in the elevation data, which is approximately +- 30 m. As an example, if an object is in your airspace that is 50 m tall, set the parameter to 80 m
- The flight height should always be higher than the min. height above ground. If not, the flight height will be auto-adjusted when uploading the flight plan to not violate the minimum height above ground parameter



3. Connection loss timeout

- Defines the time span after which WingtraOne will execute an RTH if the telemetry connection is lost.
- Note: since no telemetry connection is available, you will not receive feedback on the state of WingtraOne
- Adapt connection loss timeout to your mission requirements.

Geobarrier

The geobarrier defines the maximum allowable distance from home in a particular mission. If the drone crosses the geobarrier, the RTH command is triggered automatically.

There are two types of geobarriers, the circular and the polygonal. You can see the two options, by clicking on the *Geobarrier* menu on the right side menu The default option is the circular geobarrier, which is a circle centered around the home point, and the default radius is 1200 m.

In addition to that always stick to the following safety precautions:

- Keep distance from the propeller: The propeller spins at high speeds and can cause injuries if they get into contact with skin.
- Power off the WingtraOne before handling it
- Never fly with a damaged drone or any damages equipment
- Never fly without top cover, nose cover or middlestand

6.2 Technical safety features

There are several scenarios where WingtraOne will take action by itself and engage a specific failsafe routine during flight. Many components have redundancy such as the Internal Measurement Unit and barometer. Most component degradations and failures have automated detection and procedures mitigating the events.

5.6.1 Return-to-home (RTH)

RTH is triggered automatically in these scenarios:

- low battery
- faulty battery
- Geobarrier: A circular geobarrier with a default radius of 1200m around home is created by default for every flight plan. The size and shape (circular / polygonial) can be adjusted depending on the intended flight plan. Automatic RTH will be triggered in case the geobarrier is violated.
- wind speed exceeds 12 m/s for 30 seconds. If the wind speed exceeds the 8 m/s for more than 10 seconds, a warning is issued.
- telemetry connection is lost for longer than the connection loss time (see chapter 9)
- actuator failure or other sensor failures
- camera stops being responsive

The factors that affect the RTH time are: absolute altitude of take-off location, distance to the home position, wind speed, wind direction, transition altitude, and mission design.

RTH can also be triggered manually

There are two RTH modes available:

- Safe—default mode
- Direct—recommended for advanced users

> Safe RTH ensures that WingtraOne stays between the minimum and maximum height above ground during mission, RTH and resume. As a consequence, there cannot be a collision with the terrain
>
> The direct RTH guarantees that WingtraOne will always come home on the shortest path. Violation of minimum and maximum height above ground on the RTH and resume path, as well as collision with the terrain, are possible if the RTH height is not set properly.

The two modes are available in the *Safety parameters* section, after the direct RTH mode has been enabled in the *Advanced* section of the *General settings* in WingtraPilot. Enabling needs to be done only once per device.

For every flight, select the mode you want to be used for the return to home path. If the direct mode is selected, the *minimum RTH height above home* parameter will be introduced in the *Safety parameters* section.

The *minimum RTH height above home* defines the minimum height at which the drone will come back to home in a straight line. Set the parameter to be higher than all the obstacles in the vicinity of your flight plan.

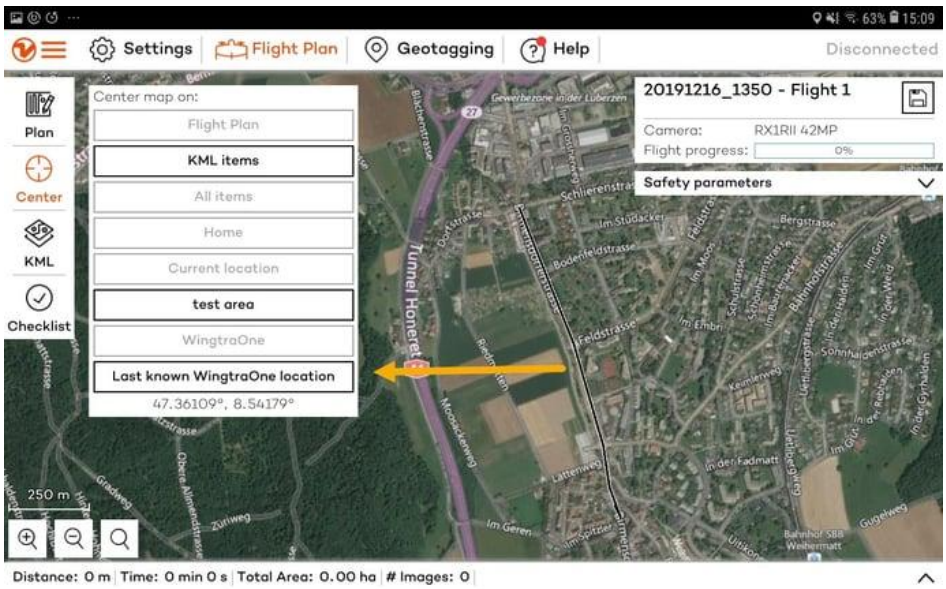
5.6.2 Safety landing / hover down

This is the most extreme failsafe, as it forces WingtraOne to perform a back transition and land from the point the landing is triggered. It is triggered in the following cases:

- if the position of WingtraOne cannot be defined, in the case of GPS loss. In that case, WingtraOne might drift since the position cannot be controlled anymore. If an accurate position estimation can be regained, the emergency landing will be interrupted and RTH will be performed.
- Failure of one servo in cruise flight. The remote pilot is still able to reposition and pause the drone during landing

5.6.4 Last known WingtraOne location

The exact GPS coordinates of the last received position of WingtraOne can be displayed at any time. In the event of a crash, you can click on the "Last known WingtraOne location" option on the tablet to check the last known GPS location of WingtraOne.



7 Operational guidelines & limitations

7.1 Remote pilot competency & health precautions

Make sure you are physically and mentally fit before every flight. You can answer the following question to check that:

I	Illness	Do you have any symptoms?
M	Medication	Have you been taking any pills?
S	Stress	Do you have any financial, family or health stressors?
A	Alcohol	Have you been drinking within the last 12 hours?
F	Fatigue	Are you tired and not adequately rested?
E	Emotion	Are you emotionally upset?

You need to fulfil the following requirements to operate a drone in the open category:

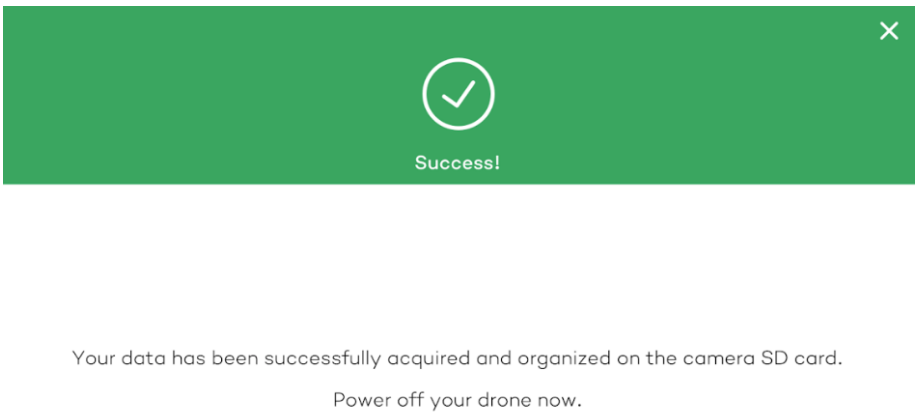
- Read the user manual
- Register the operator (through the National Aviation Authority)
- Complete the operator online training and test (through National Aviation Authority)

7.2 Ground handling, transport & storage

Ground handling pre-and post-flight

It's important to handle the WingtraOne and its equipment carefully.

After flight, wait until the following message is displayed and then power-off the drone:

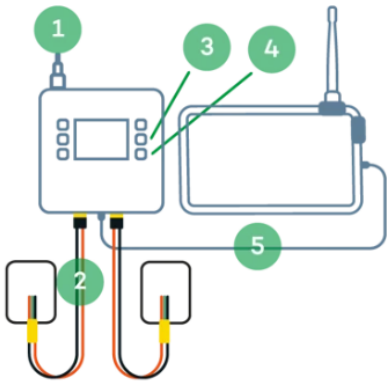


Perform a visual inspection of the batteries to check that its enclosure is free of damages post-flight. Apart from that no further post-flight checks have to be performed. The pre-flight checklists will guide you through all mandatory safety checks and inspection before each flight and the WingtraOne will monitor the health of the different subsystems in the background. It is recommended remove any dirt from the drone and its equipment after flight, before putting it back into its packaging.

Storage

- WingtraOne and associated equipment should be stored in the soft bag or hard case (depending on what you purchased), on a levelled surface.
    - Store the plane in a regular surface without any object in the surroundings that may effect any force into the wing, for example leaving equipment on the top of the wing.
- Other equipment such as the tablet, charger, other components and spare parts should be stored in the Pilot box.
- Additional payloads should be stored in their respective cases.
- For charging and storage of the batteries please note the following:
    - **Lithium-Ion battery packs may get hot, explode or ignite, and cause serious injury if exposed to abusive conditions.**

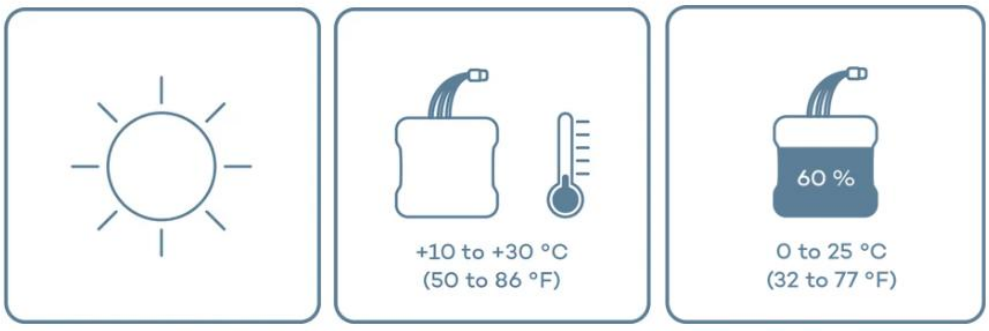
Charge your batteries



1. Power the battery charger
2. Connect the charger output cables to the charger first and only then to the batteries
3. On the side of the charger that the battery has been inserted into, press and hold the middle of the three buttons for 1 second
4. On the display screen, ensure the "task" is set to "charge" before navigating to and selecting "start"
5. Use the central USB port to charge your tablet

Once the battery has begun charging, the charger screen will turn red. When the charging is finished the screen will turn green momentarily before resting in blue. It is now safe for you to disconnect the battery from the charger output cable.

Keep your batteries healthy



1. Do not expose them to sun
2. Before flying, keep them at a moderate temperature
3. For longer storage, keep them at room temperature and charged at 60% capacity

For long-term storage of betteries please check chapter 13.

Transportation
The WingtraOne GenII can be transported as airfreight. For transportation as air freight, the hard case has to be used to avoid damages to the wing.

7.3 Operating conditions and limitations

For flights in the open category A3 the following limitations apply:

- Don't overfly uninvolved people;
- Maintain a horizontal distance of 150 m from uninvolved people and urban areas;
- Maintain flight altitude below 120m above ground level.
- Keep the UA in the line of sight

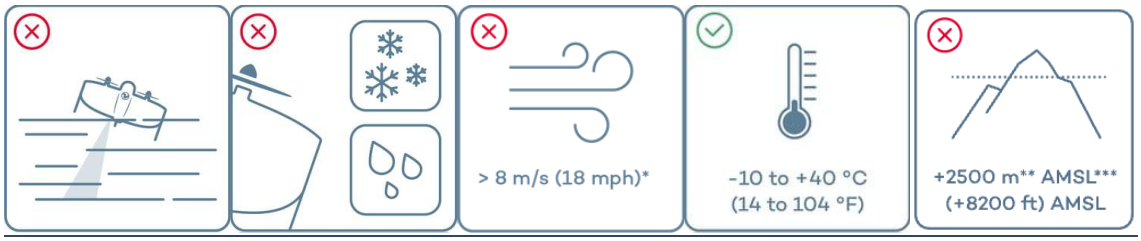
Daytime flight
You can fly at daytime without the need for any lighting. Lighting conditions have to be sufficient.

Night flights
Night flights are not allowed with the WingtraOne Gen. II, taking into consideration that night means the hours between the end of evening civil twilight and the beginning of morning civil twilight as defined in Implementing Regulation (EU) No 923/2012.

Data collection
Before starting a data collection mission you must have an authorization from the uninvolved people and field owner to not infringe people's privacy.

7.4 Environmental conditions

Do not fly in:



1. Fog
2. Snow or rain
3. Strong continuous winds*
4. Extreme temperatures
5. High altitude **

Use return to home (RTH) if conditions change while flying!

*8 m/s (18 mph) continuous wind speed measured on ground corresponds to approx 10 m/s (22 mph) surface wind

** With high altitude propellers up to 4800 m (15”700 ft) AMSL *** . Learn more about high altitude flying at knowledge.wingtra.com/high-altitude.

*** AMSL: Above mean sea level

7.5 Flight time

The flight time that can be achieved with the WingtraOne GenII is influenced by different factors. WingtraOne’s maximum tested flight time is 59 mins. However, the flight time of any drone is influenced by many factors and should not be expected to be uniform. In many cases, the coverage and job time are more important than flight time.

Factors affecting flight time
Payload mass, Altitude above sea level, Transition height, Wind speed, Temperature and Battery performance.

Below is a table with some example flight times with different payloads and settings. The table uses optimal conditions as assumptions.

Maximum flight time in optimal conditions

Payload	Take off altitude AMSL	Max.flight time	Cruise speed	Max coverage at GSD 3 cm/px (1.2 in/px)	Max coverage at 120 m / 400 ft
RXRII	0-500 m	54 min	16 m/s 36 mph	400 ha 990 ac	210 ha at GSD 1.5 cm/px 520 ac at GSD 0.6 in/px
a6100	0-500 m	54 min	16 m/s 36 mph	310 ha 770 ac	240 ha at 2.4 cm/px 600 ac at 0.93 in/px
Oblique a6100	0-500 m	49 min	16 m/s 36 mph		

8 Troubleshooting

If the drone does not power up at all, you should perform the following steps:

- Make sure the batteries are installed, charged and properly connected to the drone
- If that is the case and the issue persist: try powering up the drone with a different set of batteries
- If the issue persists: reach out to the Wingtra customer support team

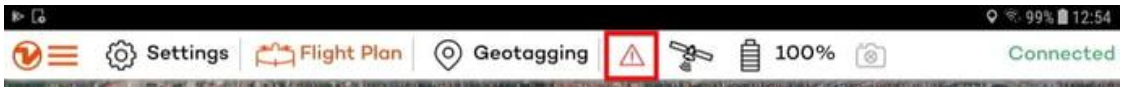
The drone will start beeping if it remains powered post-flight in order to remind the user to unpower the drone.

8.1 Common warnings and errors from WingtraOne and WingtraPilot

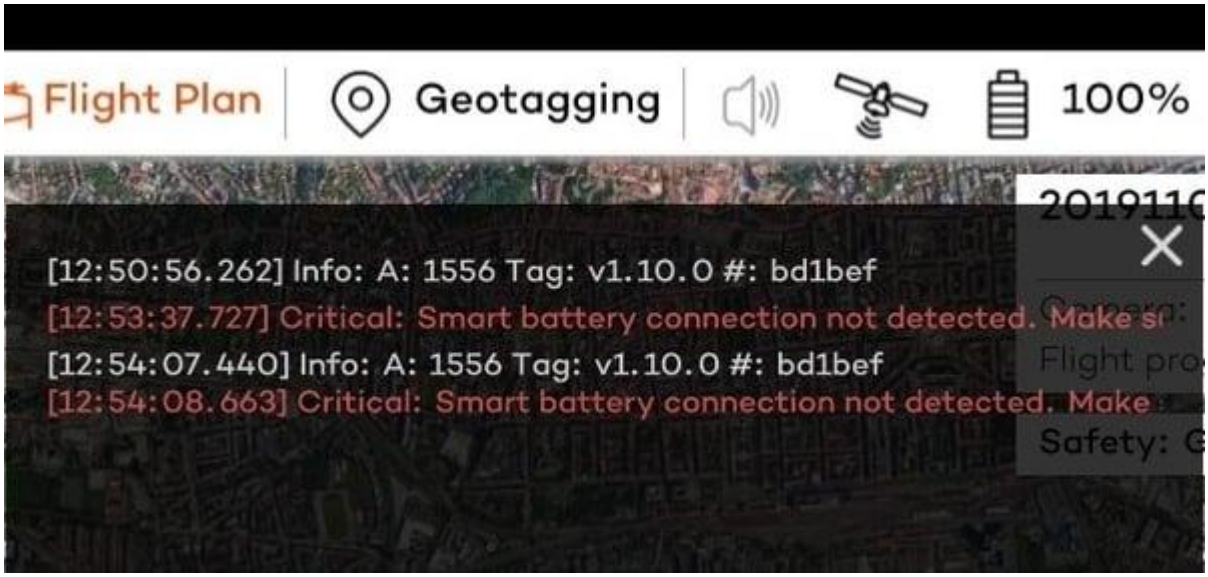
The errors appear as an audio output from the tablet and as text in the list accessible through the loudspeaker icon in WingtraPilot.

In normal conditions, without errors, the loudspeaker icon will look like this:

If the error appears the loudspeaker will change its form into the warning sign:



By clicking on warning, the list of events will appear where the actual error is visible:



The warnings can be separated into categories depending on the cause of the issue.

Estimator error
WingtraOne's flight controller uses information from different on-board sensors (accelerometer, gyroscope, GPS, magnetometer, etc.) together with an estimation algorithm to estimate its own state, i.e. position, orientation, velocity, and so on, in real-time. This algorithm is called the state estimator.
If any of the errors mentioned below appear, please repower your WingtraOne and start with preflight check again. If the issue still appears, move WingtraOne to another take-off location and repeat the preflight check. If that doesn't work, and the error appears consistently, get the flight logs and contact Wingtra Support.

- "*Estimator error. Repower WingtraOne. If issue persists, please contact support.*"
- *"Accelerometer inconsistent. Repower WingtraOne."*
- *"Gyro inconsistent. Repower WingtraOne"*
- *"Compass inconsistent. Repower WingtraOne"*

To prevent estimator errors in the first place, place WingtraOne on the takeoff location and power WingtraOne now. In some situations, estimator errors appear if the drone is carried around before take-off.

Magnetometer error
The magnetometer uses the magnetic field to define the WingtraOne's heading or direction. Flying with a bad magnetometer or without a magnetometer can cause the WingtraOne to fly in a totally wrong direction or, in the worst-case scenario, crash.

- "*Magnetic anomalies detected. Repower WingtraOne. If issue persists, please contact support.*"

Magnetometer detects abnormal readings. This can be caused by magnetic field distortion from metal objects or electromagnetic interference from electronics and power stations. A possible immediate solution is to remove metal objects from your body and away from WingtraOne, place the WingtraOne in a location where it is far away from a strong magnetic source, repower the WingtraOne and try again. If all of the above fails to help, and this error appears consistently, get the flight logs and contact Wingtra Support.

Batteries error
WingtraOne uses two smart batteries as the power source. The smart batteries allow the WingtraOne to extract different information—state of charge, health, etc.—about the batteries that enhances safety when using them in flight. Instead

of a single cell, two 99 Wh batteries are required to power up the WingtraOne, which eases the transportation process (airlines and air shipment do not accept batteries with more than 100 Wh).

- "*Smart battery connection not detected. Make sure the cable is correctly plugged in.*"

There will always be a black micro-USB cable on one of the paired batteries. This cable is the smart battery cable, which allows the WingtraOne to read more information from the batteries. A possible immediate solution is to check if the connector is properly plugged in, swap a different cable (you'll find such a spare cable in your pilot box) or batteries pair, to see if the problem is on the batteries. Otherwise, it is most likely the WingtraOne's connector which is faulty, contact Wingtra Support in this case.

Make sure both batteries are equipped with a smart battery cable. Find spare smart battery connectors in your pilot box or contact your dealer if you don’t have enough for each battery.

- "*Unequal battery levels detected. Make sure to use batteries at the same power level.*"

The smart battery technology and cable allow WingtraOne to check if both batteries have the same power level and does not allow batteries with different power levels to take off. So please make sure you charge the batteries the right way and use them always in pairs. A possible immediate solution is to exchange another set of properly charged batteries. Otherwise, get the flight logs and contact Wingtra Support.

- "*Batteries are overheated. Make sure to not expose them to the heat.*"

WingtraOne batteries can only operate in the temperature range of 10°C to 40°C. Please keep them in an air-conditioned, indoor space (e.g. car) or under the shades when the weather is hot. As an additional precaution, only insert the batteries into the WingtraOne before starting the pre-flight checklist (after the flight plan is created).

- "*Batteries are too cold. Warm them up to room temperature before flying.*"

WingtraOne batteries can only operate in the temperature range of 10°C to 40°C. Please keep them in a heated indoor space when the weather is cold.

- *“Faulty battery detected, please stop using the connected batteries pair for flying"*

This error will appear in case if one or more cells had voltage which diverge by more than 0.05V or capacity of the cells is critical. In order to avoid possible incidents, safety protocols will prevent take-off and this error will appear. If the error appears, you should not use the batteries anymore.

Motors / drivetrains error

WingtraOne runs motor checks before every take off. It spins each motor very quickly for two instances and checks the current drawn from these spins. WingtraOne will only take off if the detected current drawn is indicating that both motors are spinning.

- "*Right/left motor failure. Please check if the propeller is screwed on correctly and then re-power the WingtraOne.*"

If one or both propeller(s) is (are) not properly tightened before take-off, this can lead to a failed motor check. Another known issue is that, occasionally, the motor doesn't get power from the electronic speed controller and the motor doesn't spin (this will happen only upon take-off but not in the air). This will also lead to a failed motor check. A possible immediate solution is to check that the propellers are tightened properly and then try to take off again. In case this fails consistently for more than two attempts, get the flight logs and contact Wingtra Support.

- *"Right/left motor is blocked. Please contact support."*

Before starting the flight, there is an automatic check that spins the motors separately to ensure that both of them function properly. If the check fails, please visually inspect the motors and check whether they are stuck by manually spinning them.

Propellers

Securely mounting the propellers is essential for safe and worry-free operation and should always be double-checked before the flight.

- "*Confirm that the propellers are mounted correctly*"

This message appears on the Hardware check item of the Preflight checklist, in the first flight after tipping during landing or in the Review flight plan and upload to WingtraOne item in case a propeller change is detected.

GPS errors

WingtraOne uses a GPS (GNSS) to establish its home position and to navigate through the mission. For this to be done correctly, it needs to find a minimum amount of satellites to estimate its current position correctly. When powering WingtraOne for first time or when the new Home position is far away from the last one, it might take some minutes for the WingtraOne to establish its position.

- *"Poor GPS reception."*

This message indicates a problem with the GPS reception. Obstacles like buildings, antennas, forests or other devices can influence the GPS reception quality. Move to an open space and repower WingtraOne. Wait for 2-5 minutes whether it disappears and does not reappear again. If the error appears consistently, get the flight logs and contact Wingtra Support.

- *"Flight Plan rejected! No valid home position"*

The error appears during the flight plan upload to WingtraOne. The causes are the same as mentioned in the previous error. Please perform the steps mentioned above.

- *"Home position not set yet"*

When doing the checklist, this sign might come up and it means that the GPS has not found enough satellites or that their signal is weak. Most of the times this can be solved by letting the WingtraOne on for 5 minutes. A possible problem is that WingtraOne is not in an open space and that most of the sky is not visible (inside a pit or surrounded by trees). If this is the case, please find a clearer space for Take-off and Landing. Another possible problem is that there is interference created by surrounding water or antennas with strong signals. A solution to this would be to move the WingtraOne and look for a place with no interference.

Wind errors

During the flight, WingtraOne measures the wind speed. If the wind speed exceeds a certain threshold the following warnings/actions will be triggered:

- "Wind speed above 8 m/s detected. Flight data and landing performance might be affected."

By this message, the operator is warned, the flight data might be downgraded and the issues during the landing might appear.

- "Wind speed above 12 m/s detected. Return to Home advised."

This message will appear if the wind magnitude is above 12m/s. In order to prevent possible incidents, we recommend manually triggering RTH.

- "Wind speed above 12 m/s detected. Returning to home!"

If wind gusts during cruise exceed more than 12 m/s for 10s, return to home will be automatically triggered, and this message will appear.

Connection loss warnings and messages

Communication between the user and the drone is established via telemetry antenna attached to the tablet. Depending on the lost connection the following warnings and messages will appear.

- *"Data link lost."*

This message will appear if telemetry connection, responsible for data transfer between drone and tablet, is lost. The tested range of the telemetry signal is up to 8km; however, in some cases, this message can appear much closer, if the signal is obstructed by interference or obstacles.

- *"Failsafe enable: no datalink."*

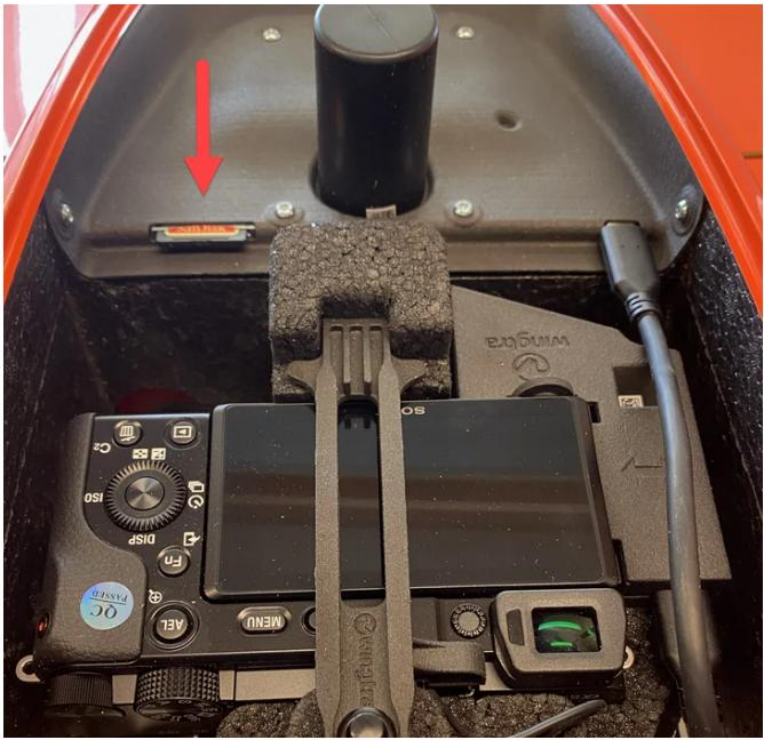
This message appears if both connections are lost for longer than the value defined by the connection loss parameter. The default value is 10 seconds. What

can impact connection loss and how to minimize the risk of loss, please check this article.

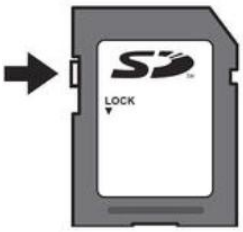
8.2 Troubleshooting WingtraOne GEN II SD Card

Warning : “WingtraOne GEN II SD Card: Not discovered”

The WingtraOne GEN II SD card needs to be plugged into the SD card slot located on the e-cover. Make sure that the SD card is inserted into the WingtraOne.



WingtraOne SD Card: SD card failure - read-only protection
Check that the SD card adapter is not locked (a small slider on the adapter needs to be on top).



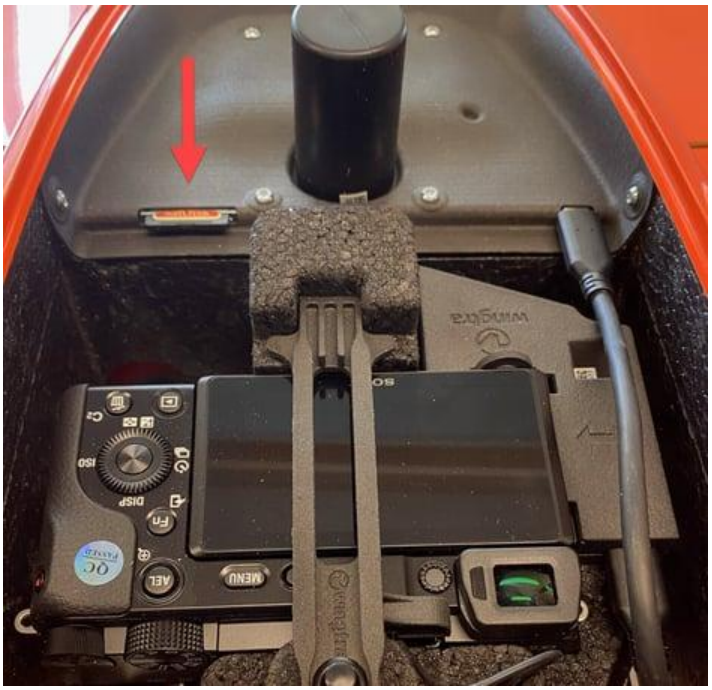
WingtraOne SD Card: SD card failure or malfunction

- Make sure that you are using the standard SD card provided by Wingtra or an SD card with the required specifications. Different SD cards may lead to

problems with the access and writing speed, resulting in missing data. Do not use Wingtra SD cards for alternative uses.
- Occasionally, the on-board computer may malfunction during operation involving the WingtraOne SD card. Please repower the drone to resolve the problem.

In case you encounter an issue, the Wingtra customer support team might ask you for flight logs. A log file is created **every time the WingtaOne is powered,** even if you do not fly the drone. Once the log transfer is complete, the files will be saved on the WingtraOne SD card.

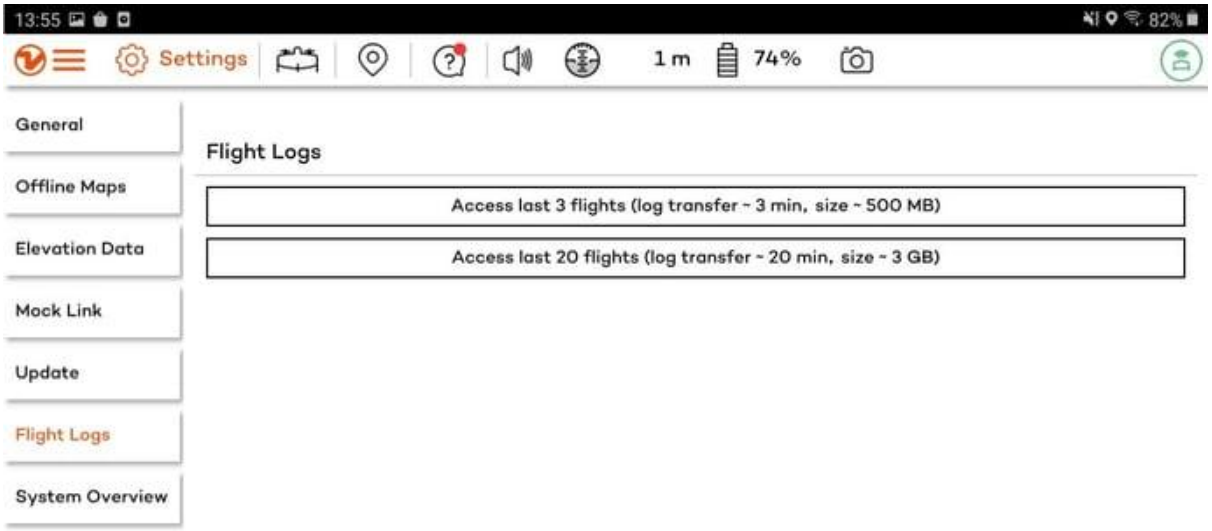
To access the flight logs from a WingtraOne GEN II, make sure the WingtraOne SD card is firmly inserted into the drone. Power on the drone and the tablet, connect the telemetry to the tablet, start WingtraPilot and wait until the telemetry connection is established.



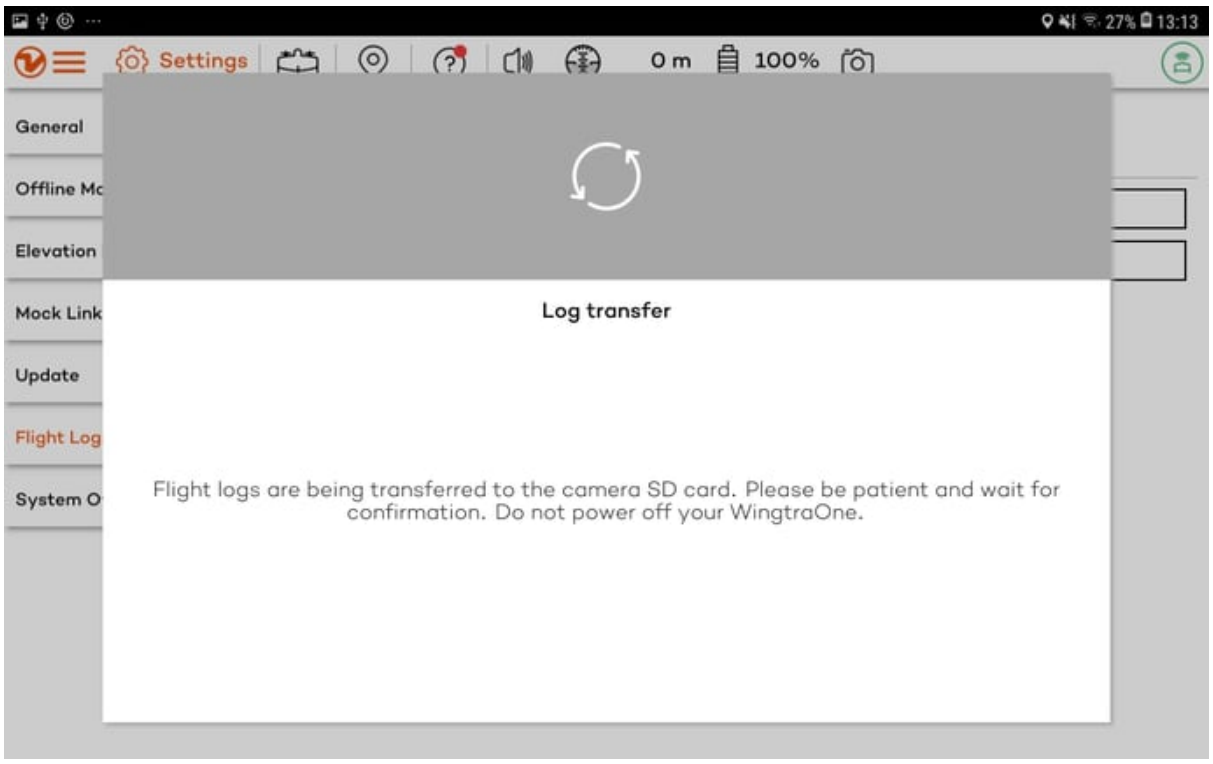
The WingtraOne SD card should be inserted into the drone when flying.

Transfer the logs
Once the telemetry is there, click on *Settings*, and then select the tab *Flight Logs*. In case you transfer the logs to the RX1 SD card wait until the automated camera preflight check is green.

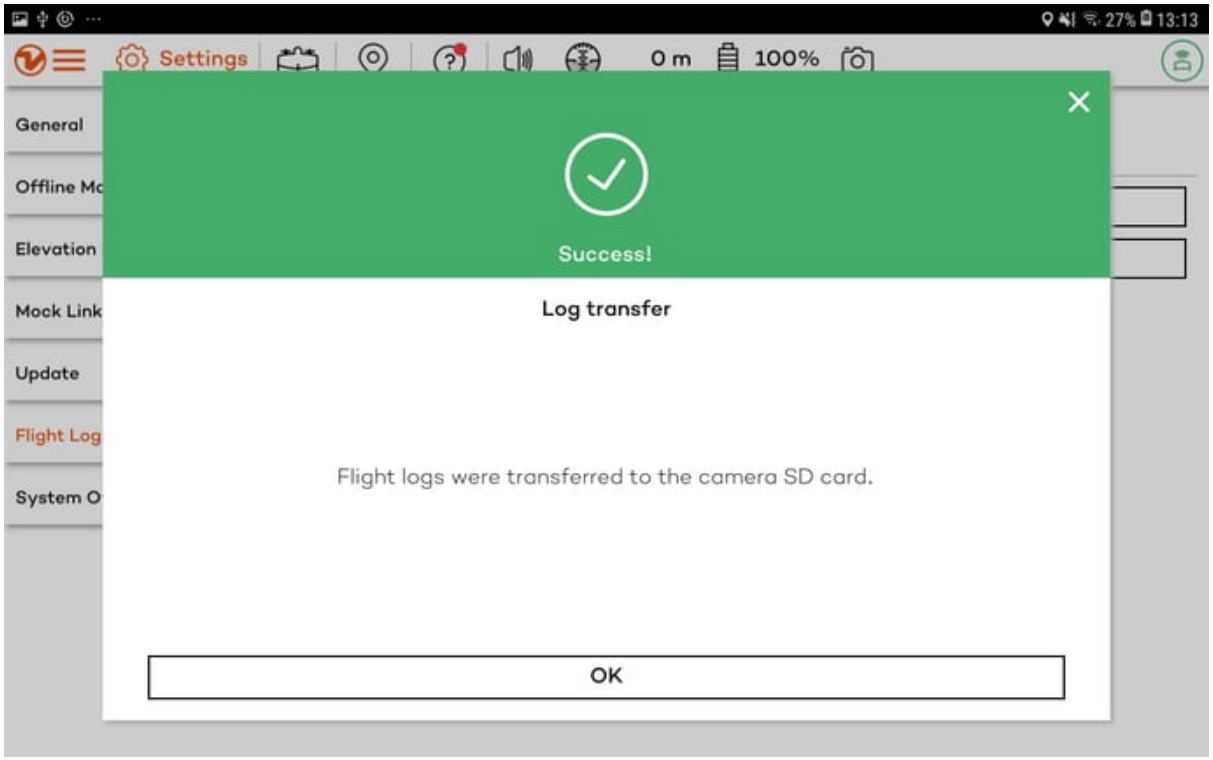
Select whether you want to download the last three flights or the last 20 flights, depending on when you encountered the issue.



Wait while the logs are downloaded to the SD card. Note that this process will take several minutes to complete. If you are retrieving logs for the last 20 flights, the process might take up to 30 minutes.



A success message indicates that the process is complete and the logs are saved to the SD card. Power off WingtraOne and get the SD card out of the adapter.



The transferred flight logs are stored on the SD card in the folder WingtraFlightLogs. The log file is named after DATETIME-FIRSTFLIGHT__DATETIME-LASTFLIGHT__Xflights.tar, where X is either 3 or 20 depending on the batch size that you chose.

Send flight logs to Wingtra support

On the tablet or computer submit a support request at address:

https://wingtra.com/support/open-a-ticket/

Describe your issue in as much detail as possible.

Upload the logs located under /WingtraFlightLogs on the SD card using the flight logs uploader,

https://forms.gle/BgDkoekwzL1A6jPTA

and submit the request.

The flight log uploader is powered by Google. If Google services are unavailable for you, or you do not have a Google account, you can send us the log files through your preferred service. Make sure to address **support@wingtra.com** when sending us logs through other channels than the official log file uploader. Common alternatives that work well are WeTransfer and Dropbox.

8.3 Telemetry Connection loss

The environment in which the drone is operating affects the strength of the telemetry.

In urban areas, the connection between the drone and the telemetry is expected to be lost faster due to obstructions, like buildings and other structures, or due to interferences with the mobile network signals.

In rural areas, the connection can be interrupted due to natural obstructions such as trees, hills, etc. For example, when you are standing in a valley and your mapping area is at a higher altitude, the telemetry signal is weakening earlier due to the obstruction of the line of sight between the WingtraOne and the operator.

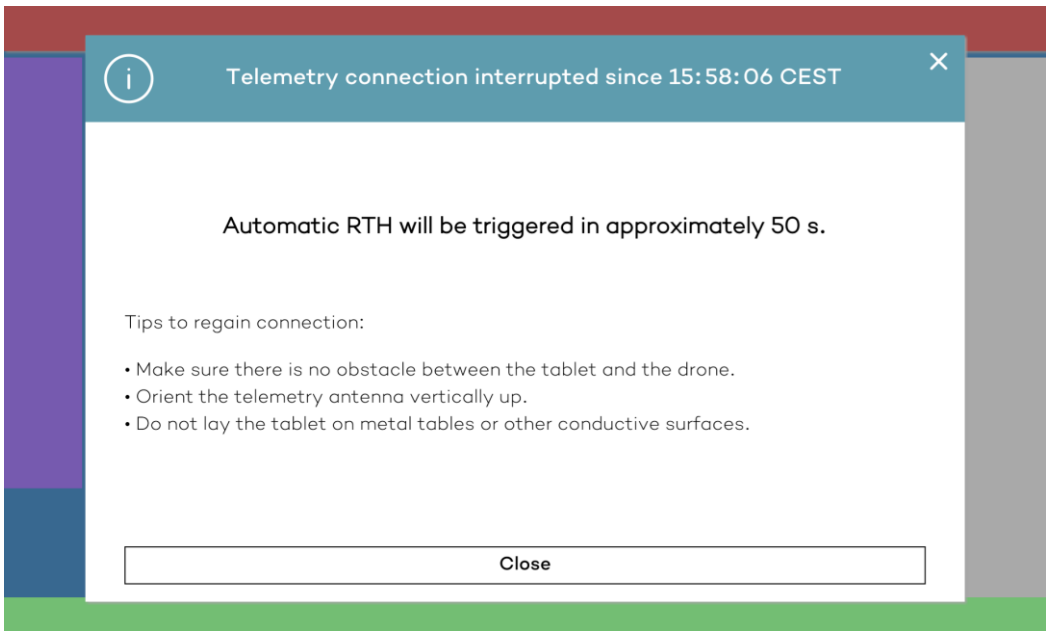
Another parameter that affects the range of the telemetry is the placement of the antenna and the position of the antenna in relation to the WingtraOne. For example, when the WingtraOne is flying towards the antenna, the signal is stronger. In the following article, you can find best practices for maintaining the connection for longer while flying.

Choose your position so that there are as few obstructions between you and the drone as possible before taking-off.

During the flight a telemetry loss may occur occasionally. If the connection between ground control station and UAS is lost, a warning will be raised to the pilot.

- On ground: the telemetry icon will change to grey colour
- In flight: A warning message will be displayed in WingtraPilot (see below) and a voice messages is output
- During RTH and hover: A voice message will be output

The warning will be displayed after 10 seconds of receiving zero messages from the plane.

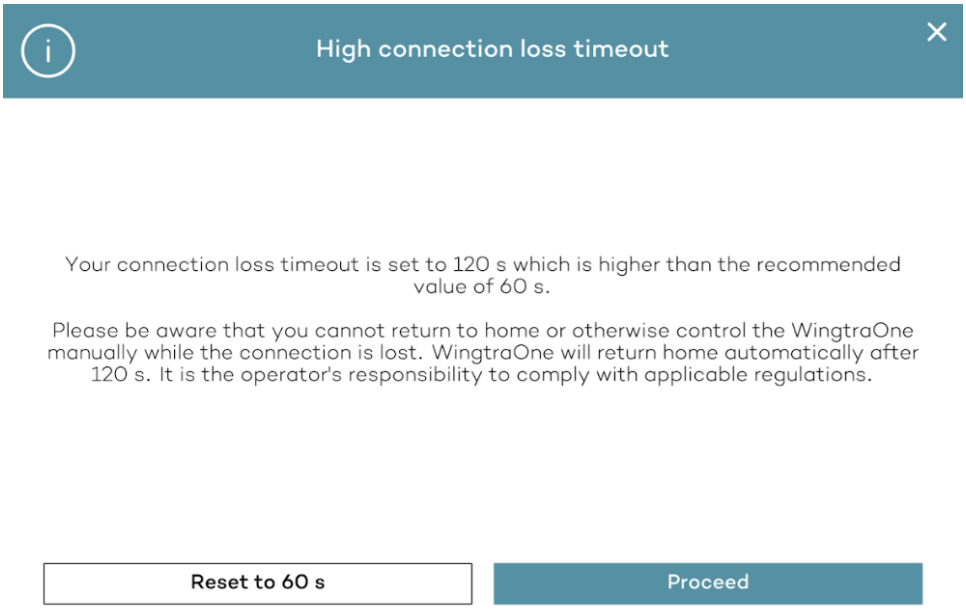


The UAS automatically attempts to re-establish a link. A safety parameter, called “Connection loss timeout” can be defined in WingtraPilot. It defines the time span after which WingtraOne will execute a return-to-home, if the telemetry connection is lost in flight.

You can set this value between 10 to 3600s. You should adjust it according to your mission requirements and local laws.

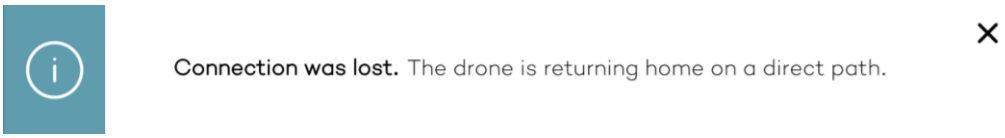
To fly in the open category under class C3, the value shall be set to 10s.

If a value >60s is defined the following warning message will be displayed:



If the connection can be re-established before the time-out elapsed, the warning will disappear and the UAS will continue its mission.

If the connection cannot be re-established before the time-out elapses, the UAS will return to the take-off point and display the following alert in WingtraPilot. RTH will be initiated independently from the control operational mode in case the time-out elapsed.



If the connection can be re-established during the return-to-home, the operator has the option to resume the mission.

As the flight plan is uploaded to the WingtraOne before the flight, it will still continue its mission while the time-out elapses, but the user will not receive a feedback on the state of the WingtraOne.

The security and integrity of the software and C2 link communication is ensured through common methods, such as cyclic redundancy checks and frequency hopping spread spectrum.

10 Remote ID

The WingtraOne Gen. II is fitted with the Remote Identification feature, which is mandatory for flying in EU countries under C3 Class. The purpose of this feature is to provide information about the UAS and the operator to the authorities and the interested observers that are nearby.

This feature broadcasts the following information using WiFi Beacon as a transmission protocol according to the IEE 802.11 b standard standard:

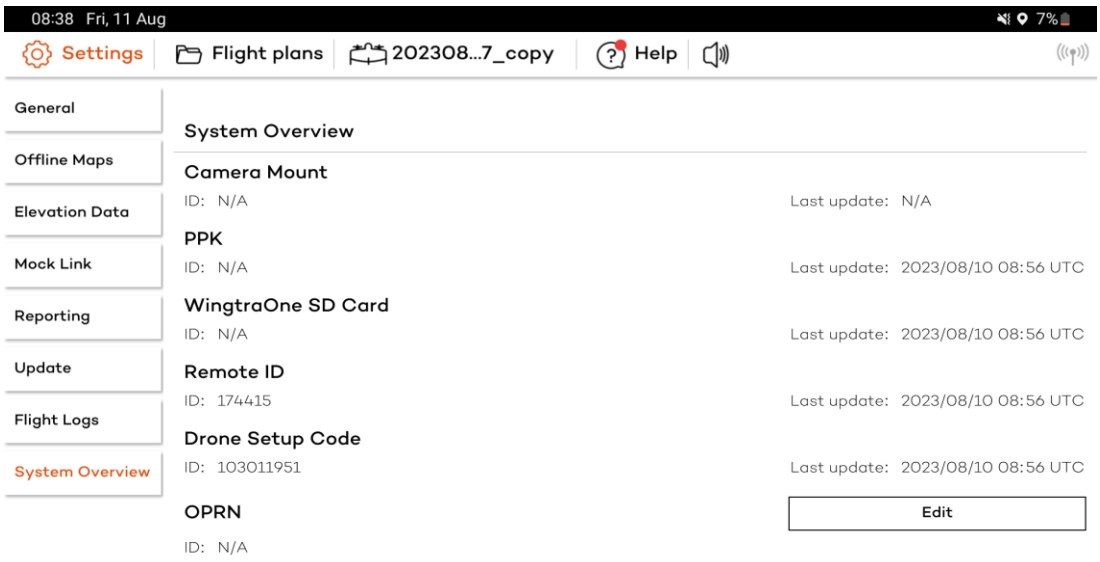
Messages	• Unique serial number
	• UAS operator registration number (OPRN)
	• The position of the remote pilot
	• UA class and category
	• The following specific WingtraOne GEN II flight information:
	  ○ Location
	  ○ Altitude
	  ○ Speed
	  ○ Flight direction
	  ○ Timestamp
	  ○ Drone status (ground/flight/emergency)

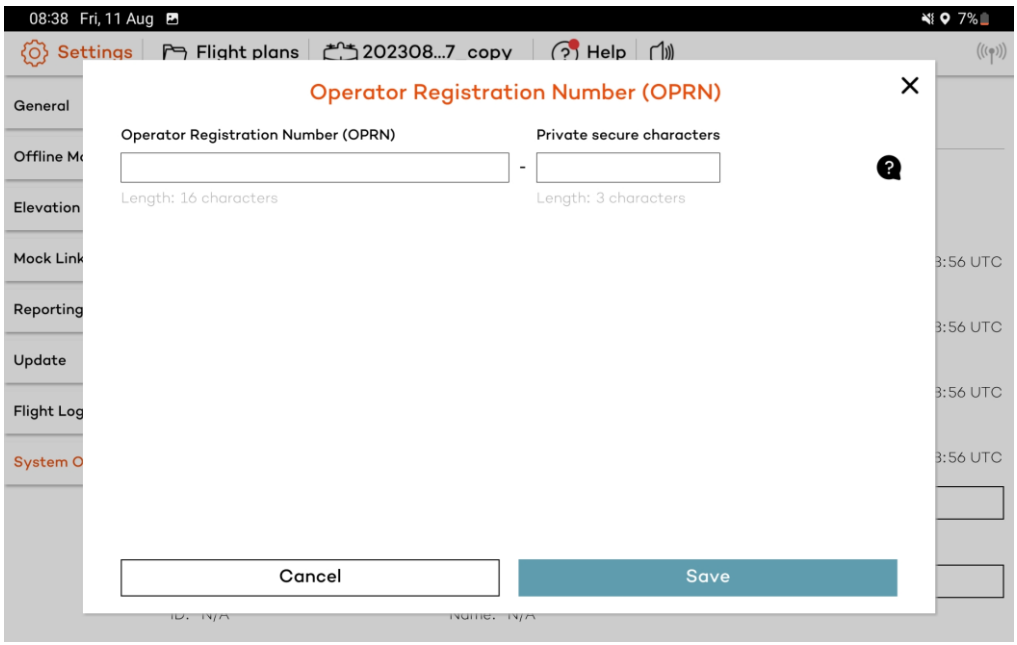
Transmission protocol	WiFi Beacon - 2.4 GHz band - 802.11b standard
WiFi Channel	Number 6

10.1 Operator Registration Number

To fly in the open category,you have to enter your unique operator registration number (OPRN) provided by your National Aviation Authority.

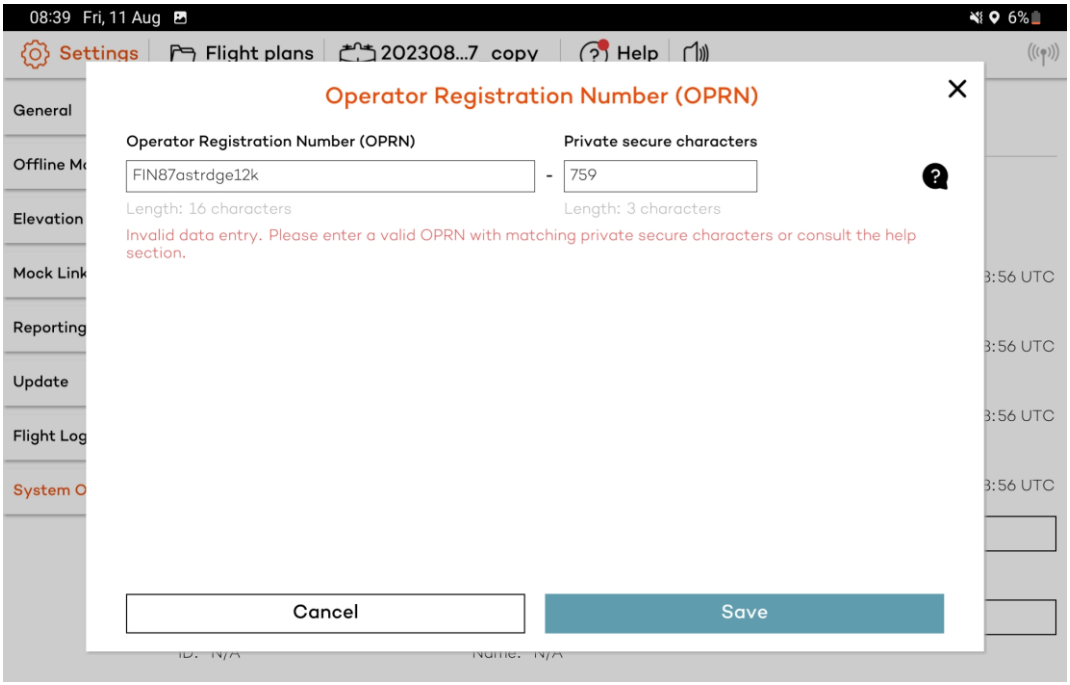
You can enter an Operator Registration Number (OPRN) in “Settings > System Overview”.



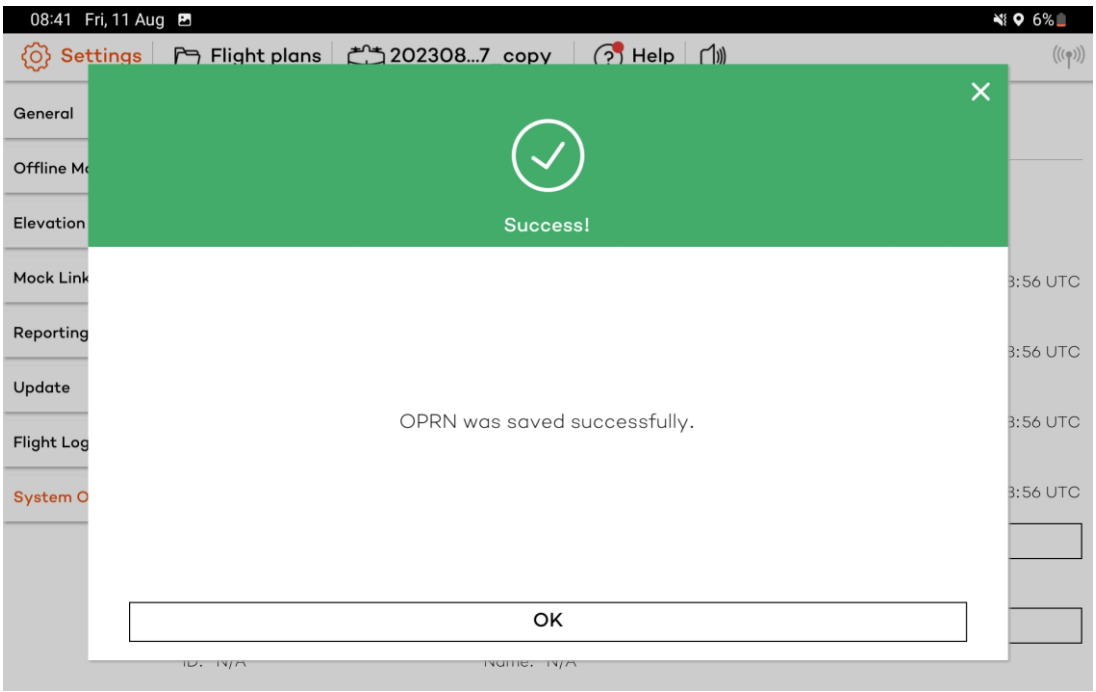


WingtraPilot will validate the consistency of the OPRN. The result of the validity check will be displayed to the operator.

- Invalid result:



- Valid result:



11 Geo-Awareness

To keep aircraft and people on the ground safe, drone geographical zones, or geo-zones, have been set up across Europe by the different States. Geo-zones are portions of airspace where drones, or to use the more official term Unmanned Aerial System (UAS), operations are facilitated, restricted or excluded. Geo-Zones are set up to:

- minimise safety risks
- protect the privacy of others
- address security issues
- deal with environmental concerns.

11.1 Uploading geo zones to the flight plan

WingtraPilot provides the functionality to upload geo zones to the flight plan, in order to respect restrictions during flight planning and during manual maneouvres in-flight. By displaying potential points of conflicts with the UGZ and your flight plan, it is ensured that you have awareness of geographical restrictions pre-flight and in-flight.

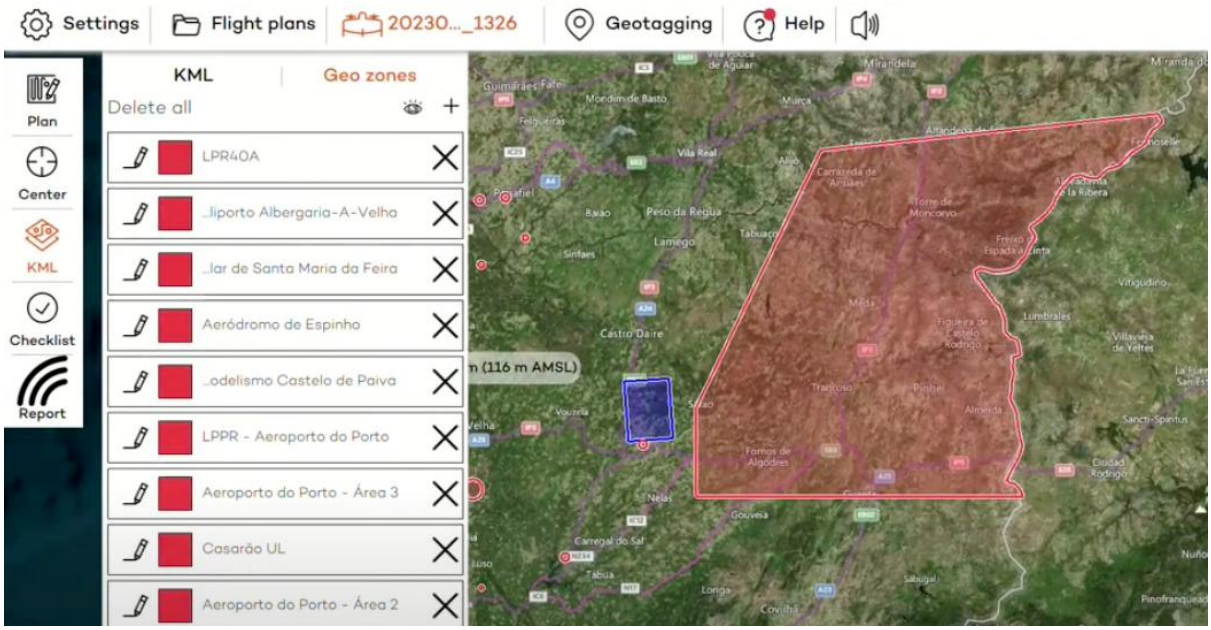
The geo zones can be uploaded by means of .kml files in the geo zone upload section.

As a first step you have to set a home location in the flight planning section (if no home location is defined the .kml upload will fail and WingtraPilot will display an error message).

To navigate to the upload section select “KML” from the tabs on the left side and select “geo zones” as illustrated in the picture below.

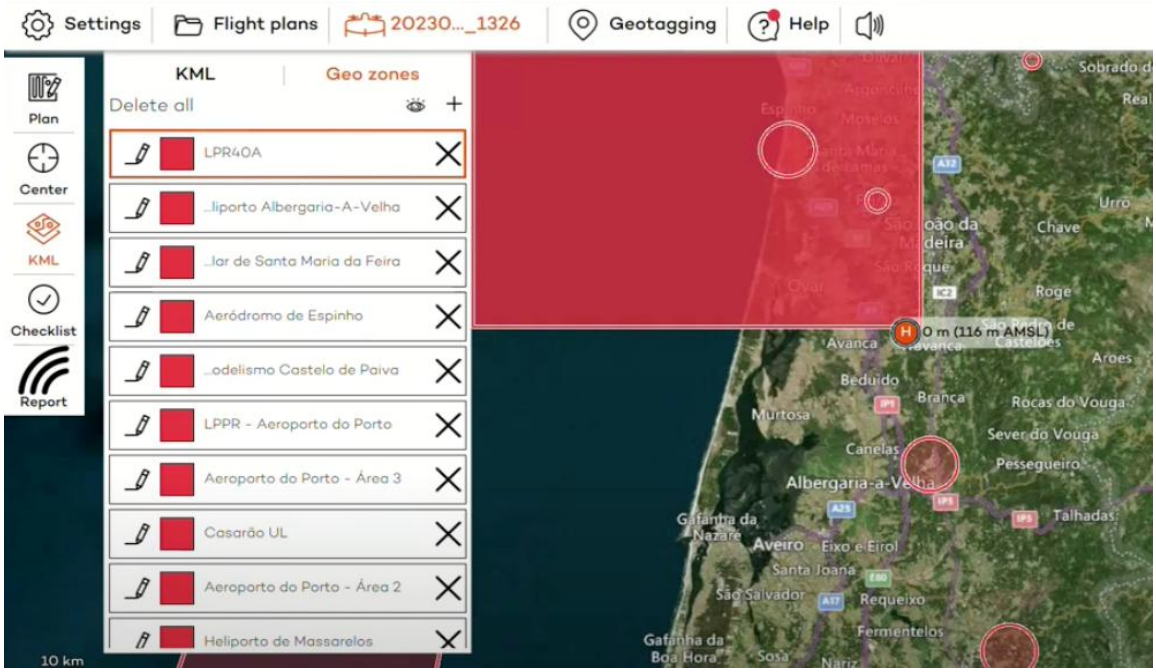
Click on the “+” sign to upload a .kml file containing geo-zones.

When the file is uploaded the geographical polygonal shape and the name of the geo zone will be displayed. See example of Portugal below.
In case the colour is specified within the .kml file WingtrPilot will take over the colour defined in the .kml. If no colour is specified the geo zones are displayed with warning red colour as default.

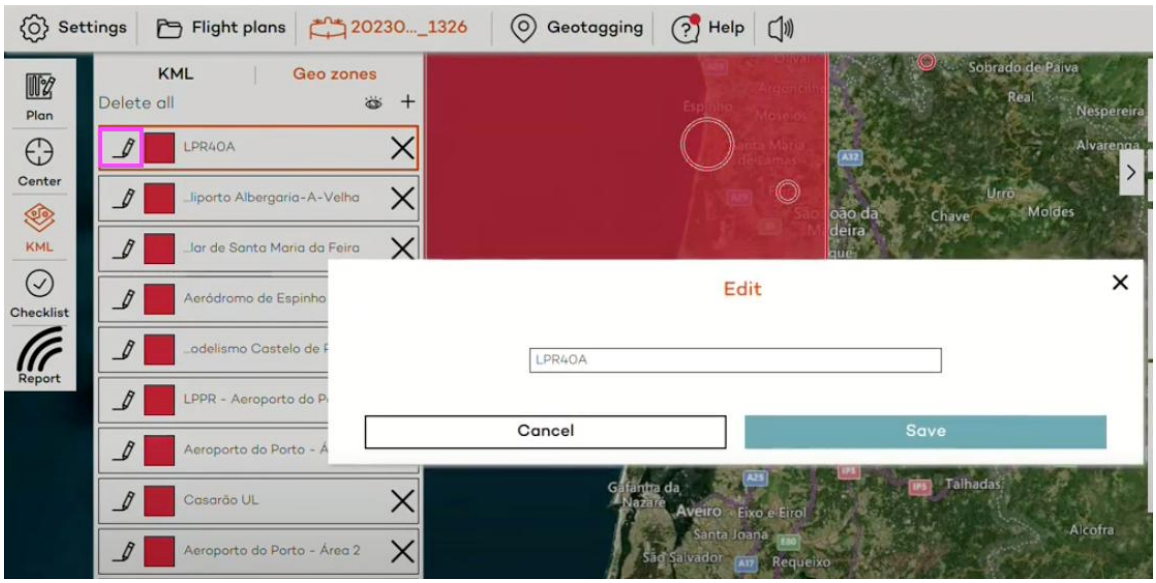


The geo zones have now been uploaded to your flight plan and will be saved as part of the flight plan.

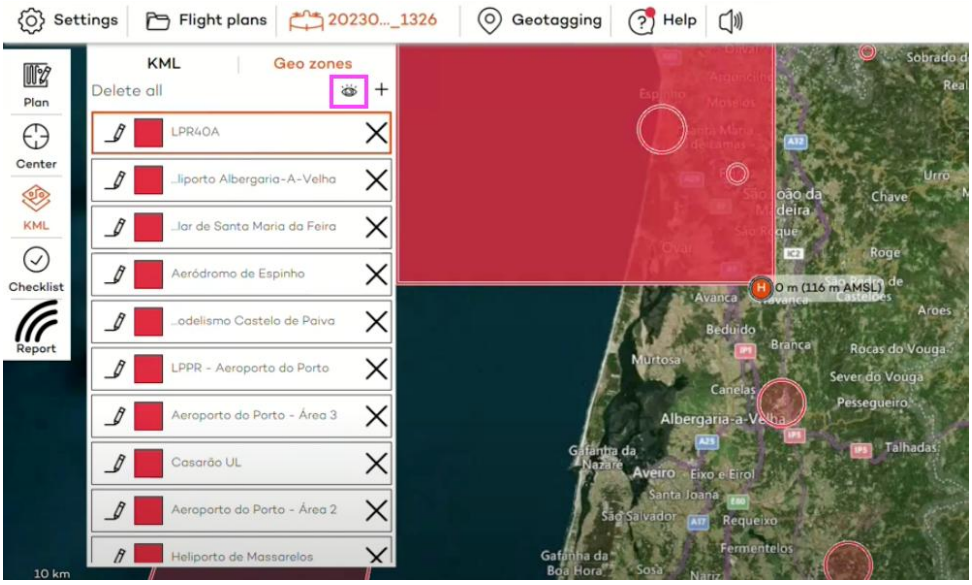
When a geo zone is selected from the list by clicking on it once, it will be highlighted on the map.



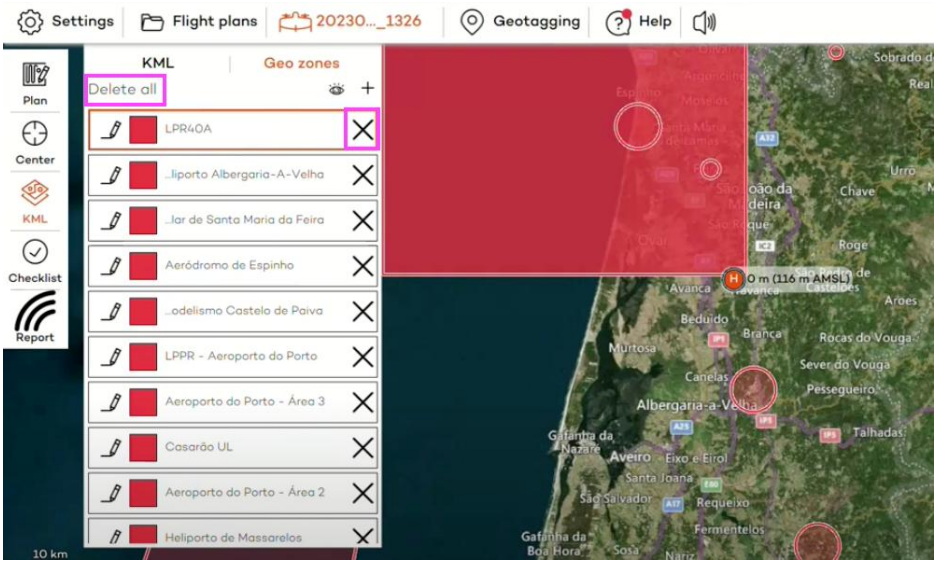
By clicking on the pencil icon in front of each zone, you can edit the displayed name of the zone. This can be used to manually add further information.



By clicking on the eye symbol you can toggle the display of the geo zones intermediately. However the zones will always appear during the review of the flight plan during the pre-flight check and will always be displayed in-flight.



In case you have uploaded a wrong file you can delete the uploaded zones. You have the option to “Delete all” or delete individual zones by clicking on the “X” symbol right to the name of the zone.



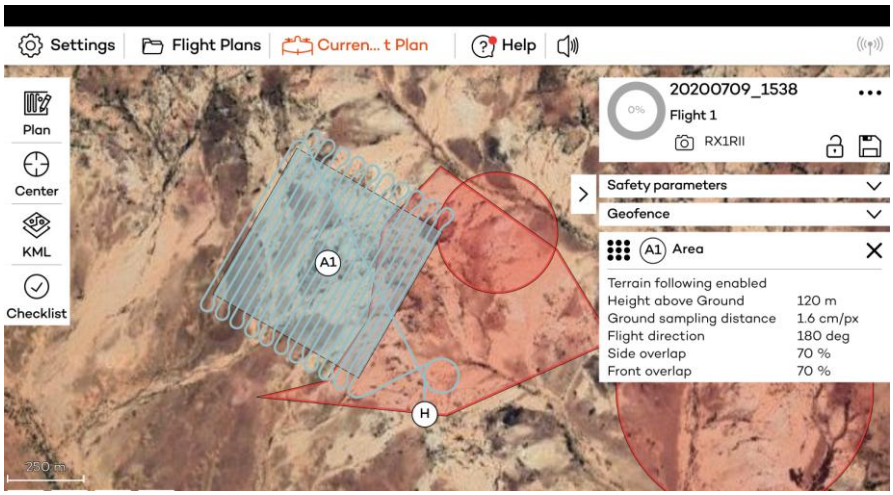
11.2 Representation of geo zones and warnings within WingtraPilot:

Geo zones are represented in WingtraPilot in the following format:

- Horizontal restrictions: The horizontal restrictions can be loaded into WingtraPilot from the .kml file
- Height Limit: The UGZ vertical limits are defined from ground to 5000 meters (AMSL) for every UGZ.
- Time window: The time restriction of the UGZ has not been considered for the display. It's the operator's responsibility to check the accuracy of the data.
- Note: The user remains responsible to check for NOTAM or TFR.

Warnings are displayed in the following situations:

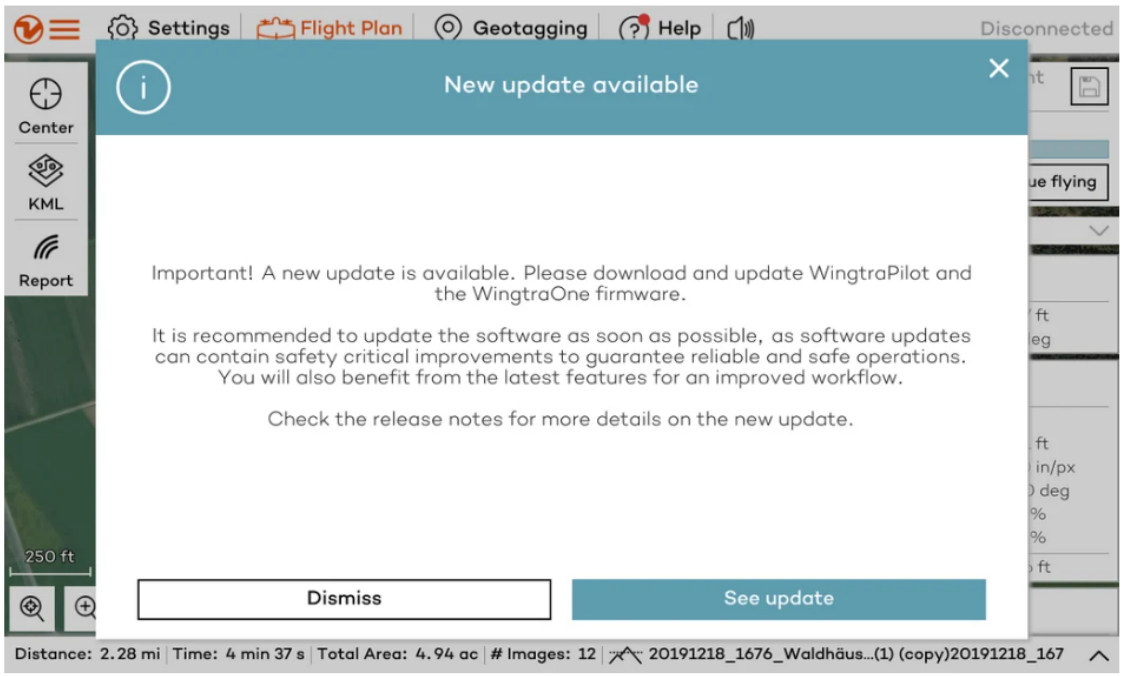
- In case the upload of the .kml fails (due to wrong or corrupted file format)
- The uploaded geo zones as well as the planned flight areas are displayed on the map pre-flight and in-flight. If the flight lines (blue lines) overlap with a geo zone (redzone) this depicts a potential breach of a geo zone.



12 Software updates

Software releases always include the WingtraOne software, as well as WingtraPilot. You can only operate the system with compatible software versions.

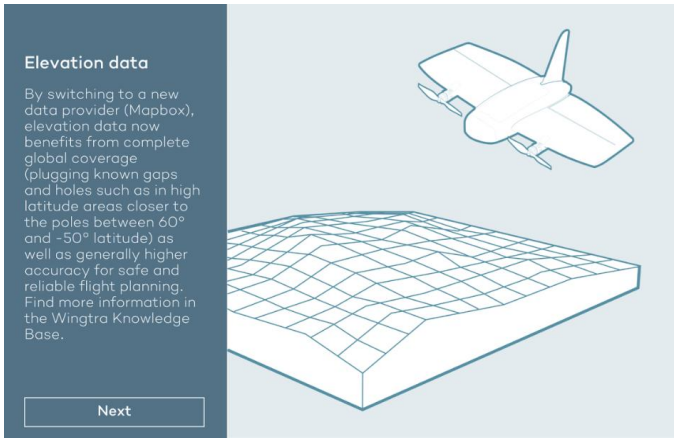
The software can be updated after a new software release. When connected to the internet, WingtraPilot will inform you when a new update is available with the following message.



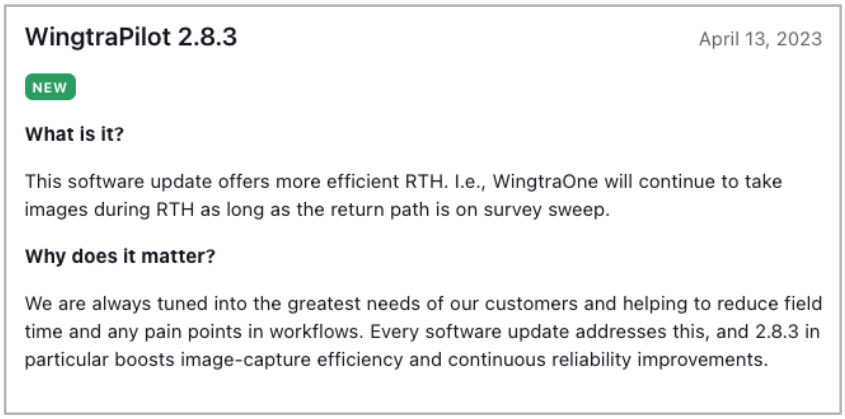
You will profit from software updates Wingtra provides for both WingtraPilot and the WingtraOne firmware.

The installation file is transferred from the tablet to the drone by means of the WingtraOne SD card. The FMU code is encrypted to protect against manipulation. Still, we recommend only using this SD card for its intended purpose in combination with the WingtraOne equipment and to ensure that only authorised users have physical access to the UAV.

No training is required for new or upgraded UAS features. In case you require guidance in order to use the feature for the first time, this is displayed on the help slides that appear directly after the SW update.



Changelog
In addition to the help slides you also have access to the change log on Canny (see example below). The platform is used for feedback, feature requests and publishing of the change log. You can log in to Canny following the linked instructions:
https://knowledge.wingtra.com/en/introduction-to-wingtra-feature-requests-1



You can always check your current software version in
“Systems Overview” -> “General” -> “About”

13 Basic maintenance instructions

13.1 Maintenance

WingtraOne does not require extensive maintenance in cases of normal operation. Here is what you need to know to maintain your drone.

Wingtra's approach to maintenance

Predictive maintenance / self diagnosis
At Wingtra we aim to make our drones as smart as possible when it comes to maintenance. Today, the WingtraOne can self-diagnose when you need to inspect or replace the batteries, the motors or propellers as well as its servos. Additionally, there are system checks in place to guarantee proper functionality of the onboard sensors (GNSS, baro, IMU), the camera, the PPK module and the telemetry.

Visual inspection
Customers should do a visual inspection of their equipment once per flying day. Visually check the WingtraOne hull, middle stand, side stands, propellers, motor mounts and batteries for damages. In case a part is damaged, it should be replaced.

Replacements and repairs
If a part breaks or reaches the end of its lifetime, it typically can be replaced by the customer.
We generally recommend that customers replace parts themselves since this minimizes downtime of the equipment. The warranty is not affected by replacements within the scope of Wingtra's documentation.
In case a customer does not want to conduct a replacement on their own, they may contact their distributor.

Lifetime
If you treat a WingtraOne carefully, it will have a typical lifetime of two to four years. Once it reaches this age, we recommend replacing it with either a new drone bundle or replacing the drone with a new spare drone in order to have continued safe operations.

An inspection for damages is included in the pre-flight check list, and should be performed before each flight. In addition to that, the predictive maintenance and self diagnosis functions of the WingtraOne might ask you to inspect or replace the batteries, the motors or propellers as well as its servos. All of these checks and inspections are logged in the flight logs to ensure traceability.

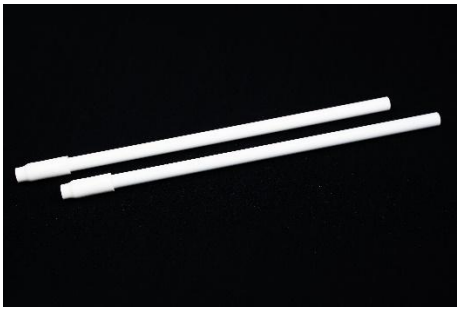
Visually inspect the battery pack post-flight in order to detect damages before storing them.

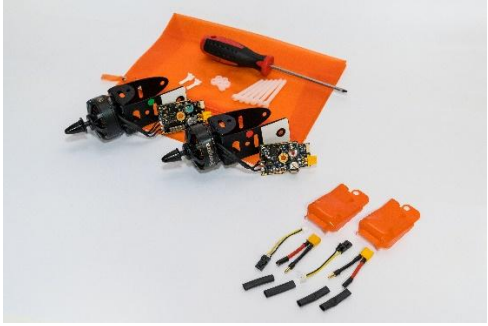
13.2 Spare parts & Replacements

Spare parts are items that can easily be replaced once an item gets damaged or reaches end-of-life.

While many components—such as motors, servos, and electronics—are automatically checked by WingtraOne predictive maintenance algorithms, we recommend visually inspecting the WingtraOne system before every flight. In case of damaged components, we recommend immediately replacing the damaged parts. Through this strategy, the WingtraOne lifetime can be maximized and incidents prevented. The following items are recommended to purchase as spare parts:

Product name Ordering ID	Description	Picture
Spare drone WIN-EMP-GEN2	WingtraOne wing, including electronics, telemetry antenna, middle stand and propellers	
Set of flight batteries BAT	Enabling a flight duration of up to 1 hour	
Battery charger CHA	To charge one pair of flight batteries in the office within about 1 hour	

4 smart battery cables CAB-BAT	Cables that transfer the battery health status to the autopilot—integral to each flight battery and must be plugged into the drone during flight	
Side stands (pair) SST	Supporting legs to ensure stability during take-off and landing	
Middle stand MST	Back rudder for stability during flight, and surface for landing as well as standing upright	
Propeller (pair) PRO	Standard set for flights at up to 2500m AMSL.	
Propeller nuts (2x2) PRO-NUT	Two nuts and two washers required to hold the two propellers in place	

Drivetrain replacement kit DTKIT	Left and right motor assembly, including all tools that are required for a replacement	
Nose cover NOSE	Covers the flight battery compartment	
WingtraOne top cover TOP-GEN2	Camera compartment cover for RGB payloads	
128GB high-speed SD card SD-RX1	Camera SD card with proven durability and reliability, based on tested read and write speed for flawless data acquisition	
Tablet SD card adapter (USB C) TAB-SD-ADAP	To inspect flight data with the tablet directly in the field	

Basic replacement instructions can be found on the customer portal on Knowledge Base.

Instructions to replace parts that require more advanced operations and skills, will be shared with you through our customer support team, for recommended replacement activities only.

13.3 Long-term storage

For long-term storage we recommend the following conditions:

Drone and payloads:

- Temperature: 25°C +/- 5 degrees (77 Fahrenheit +/- 5 degrees) .
- Relative humidity: 35 - 50% RH.
- Equipment should be stored in a dry, dark and low humidity environment.
- Be sure not to expose the drone to condensation, water drop or not to store it under frozen conditions.
- Altitude: 0m to 5000m ISA conditions.
- Protect the drone from mechanical shock and avoid drops, store the drone in the soft or hard case as mentioned in General guidelines.(chapter 7.2)
- The storage location should be clean, without direct dust particles.

Battery

- Temperature: 25°C +/- 5 degrees (77 Fahrenheit +/- 5 degrees)
- Relative humidity: 0 - 80% RH.
- Equipment should be stored in a dry, dark and low humidity
- Environment.
- Be sure not to expose the battery to condensation, water drop or not to store it under frozen conditions.
- Altitude: 0m to 5000m ISA conditions.
- Avoid short circuiting the cell. Avoid mechanical damage of the cell. Do not open or disassemble.
- Keep away from open flames, hot surfaces and sources of ignition.
- Storage capacity at preferably 20 to 60% of the nominal capacity. OCV preferably 3.6 to 3.9 V per cell. Use the "storage" mode of the charger to bring it to the 60% capacity recommended for storage. (see chapter 7.2)
- Do not store the battery in places under direct sunlight or other sources of heat.
- Avoid storing the battery in the places where it is exposed to static electricity so that no damage will be caused to the protection circuit of the battery pack.
- Incompatible materials: Do not store with metallic objects.
- In case of leaked electrolyte, the housing can be damaged.

Make sure to perform a visual inspection and conduct a pre-flight check to return to service after storage.

13.4 End of life disposal

When it comes to the end of your drone's operational life, responsible disposal is essential to minimise environmental impact. Please dispose of the product in compliance with local laws and regulations. For more information on collection systems that are available for consumers, please contact your local municipal authority.