User Manual

WingtraRAY

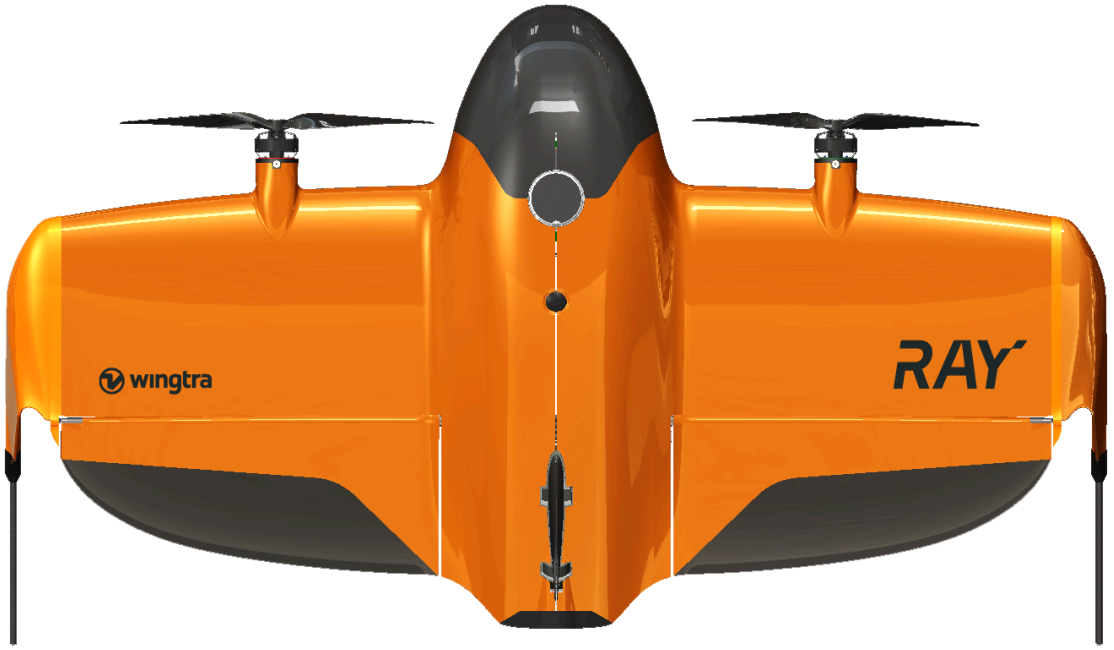

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Table of revisions

Version	Change	Date
0.9	Factually final user manual with low quality example images and visual refinement. Visually to be still updated for the final release version.	2025-05-12
0.95	Corrections to the user manual based on certification feedback and addition of missing information.	2025-06-03
0.96	Corrections and addition of missing information.	2025-06-16

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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 WingtraRAY 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 Humidity
RTH	Return-to-home
TFR	Temporary Flight Restriction
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
UGZ	UAS Geographical Zone

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1 Product Overview

WingtraRAY has been designed from the start to fulfil the requirements of multiple different regulatory requirements from FAA and EASA. WingtraRAY features many failsafe features including an optional independent parachute module.

For flights in the US WingtraRAY is compliant with the following requirements:

- FAA Standard Remote Identification
- FAA Operations Over People – Category 3
- FAA Part 107 standard flight rules
- Green UAS

For flights in Europe WingtraRAY is compliant with following requirements:

- EASA C3 class
- EASA C6 class
- EASA MOC Light-UAS.2511-01
- EASA MOC Light-UAS.2512-01

2 Technical specifications WingtraRAY

2.1 Overview

The WingtraRAY has several features and certifications fulfilling multiple requirements from both the FAA and EASA. Always remember to review the relevant local regulations before flying with WingtraRAY.

Type:	WingtraRAY
Hardware version:	V1
Software version:	V1.9 or higher
Firmware version:	V2.19 or higher
UAS certifications:	• FAA Operations Over People - Category 3 • FAA Standard Remote Identification • Green UAS • EASA C3 class • EASA C6 class • EASA MOC Light-UAS.2511-01 • EASA MOC Light-UAS.2512-01
UAS Configurations:	WingtraRAY + Parachute module + Payload
MTOM:	5.2 kg*

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	*It is the responsibility of the remote pilot to ensure this MTOM is not exceeded. The payload mass should be 1.3 kg including the optional parachute. DO NOT use any non-qualified replacement parts, such as propellers, batteries etc.
Mass of loose items	Tail fin: 92 ±5 g Winglet pair: 152 ±8 g Nose cone: 59 ±3 g
Needed equipment to fly	• WingtraRAY – Wing/body with propellers • Tail fin • Winglets • Nose cone • 2x Batteries • Tablet + telemetry module • Payload (All approved payloads in Chapter 3) ! For OOP Cat3 and STS-02 flights the parachute module must be installed and the manual trigger device used together with the tablet.

Drone components

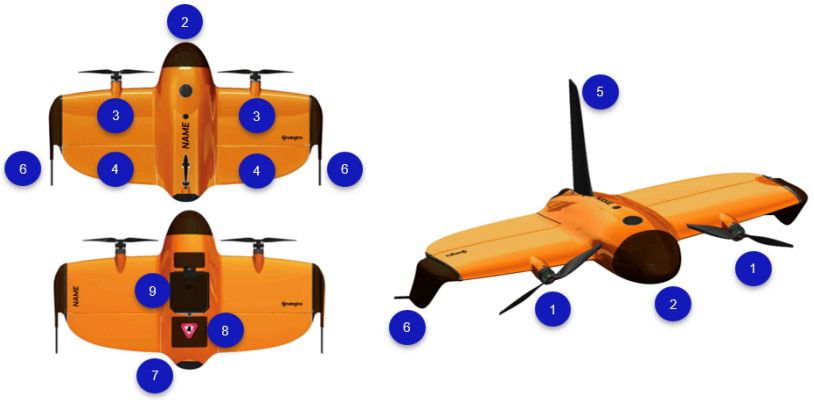
WingtraRAY has two control surfaces actuated by servo motors and two motors driving pusher propellers. Wingspan is 1.25 m and the MTOM is 5.2 kg. The maximum airspeed is 21.9 m/s, but the speed will typically be 19 m/s for most payloads at most flight altitudes.

The ground control tablet and telemetry module use a 2.4 GHz direct radio link and an optional backup LTE mobile telemetry link to the drone. The parachute module has an additional manual trigger device with an independent radio.

The flight planning software on a computer is called WingtraCloud and runs in a browser, the tablet control software is called Wingtra App which has all the same controls for pilots as the previous software WingtraPilot, but with some UI changes and a 3D flight planning view.

The figure below illustrates the flight control surfaces and describes the actuators in more detail.

1. Propellers
2. Nose cone
3. Motors
4. Control surfaces
5. Tail fin
6. Winglet / Landing gear
7. Distance sensor
8. Parachute
9. Payload



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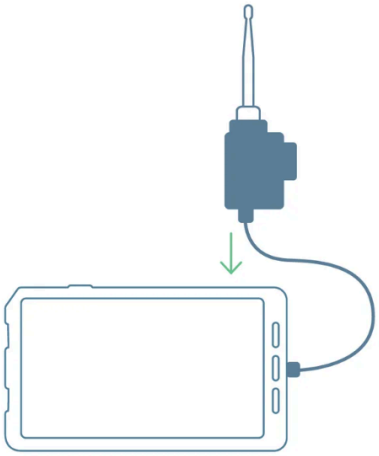
Main transport case

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

1. Tablet
2. Telemetry module
3. Flight batteries (1 set)
4. Screwdriver and tablet SD card adapter
5. Charger for flight batteries and tablet

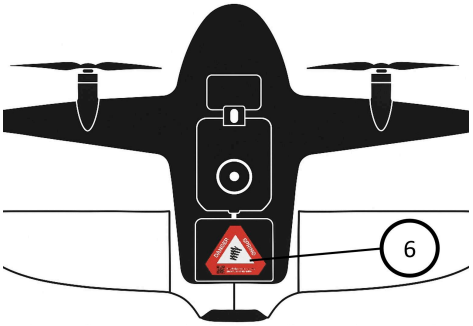
With optional parachute module included:

6. Parachute module (Noticeable from the red warning triangle)
7. Manual Trigger Device



Tablet + Telemetry module

Manual Trigger Device



Parachute module

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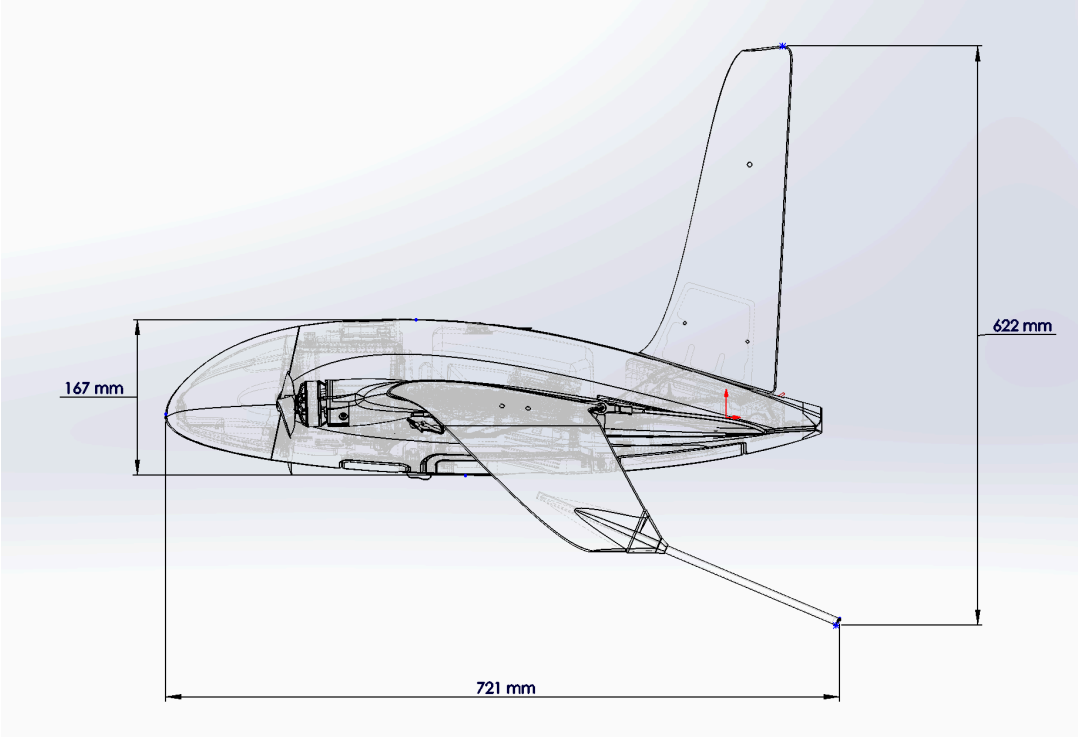
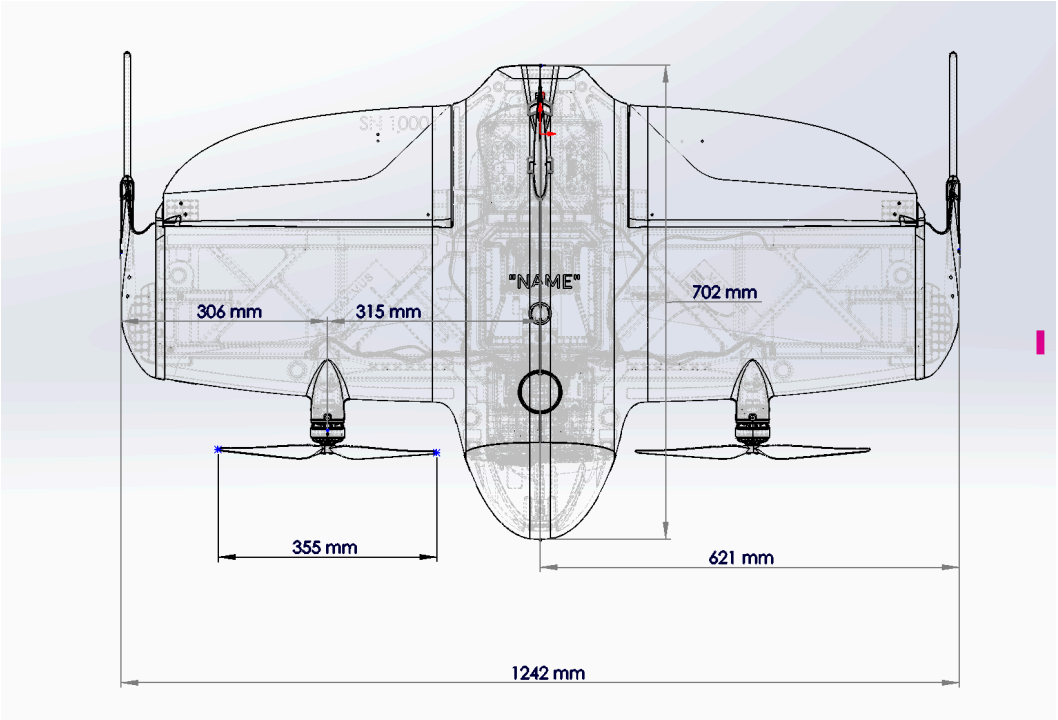
2.2 Dimensions & Centre of gravity



WingtraRAY dimensions – side



WingtraRAY dimensions – plan

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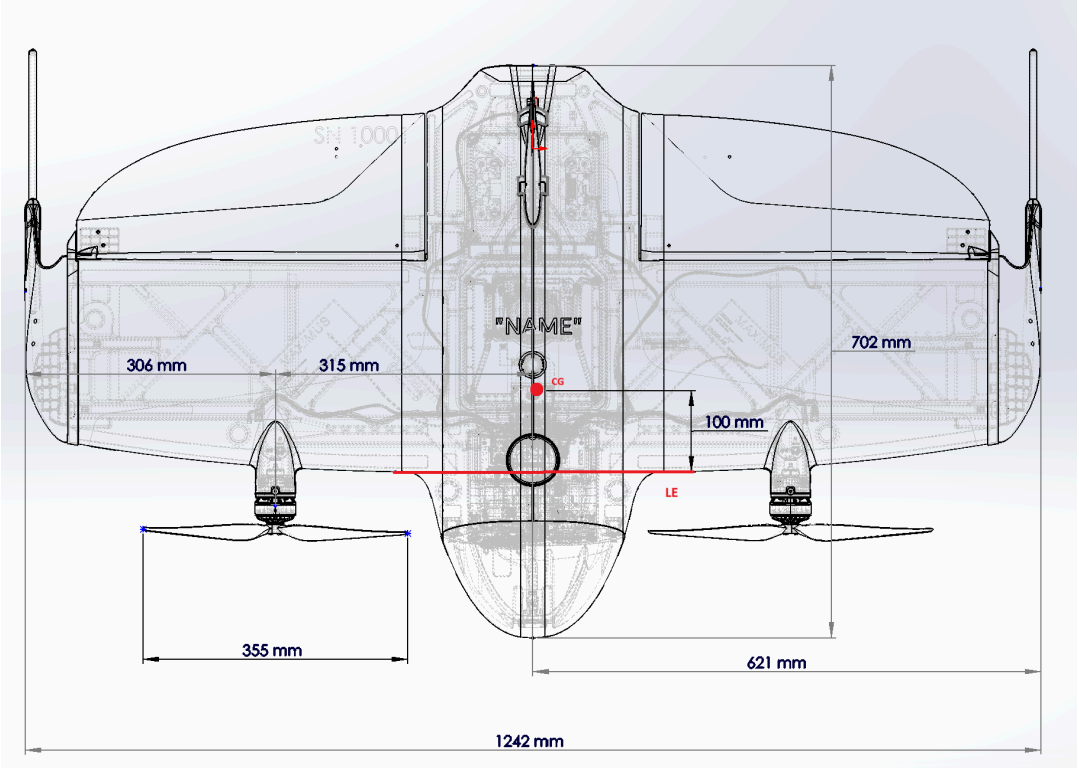

WingtraRAY - centre of gravity (CG) from leading edge (LE)

2.2 Specification

Drone

Drone type	Fixed-wing vertical take-off and landing (VTOL)
Maximum take-off weight	5.2kg (11.5 lbs)
Wingspan	125 cm (4.1 ft)
Battery capacity	Two 99 Wh batteries (a pair of batteries required)
Maximum propeller speed	8500 RPM
Telemetry link	Bi-directional 10 km (6 mi) in direct line of sight, keep in mind that obstacles reduce the range
Parachute manual trigger device	4 km range

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Operations

Maximum speed (airspeed)	21.9 m/s (49 mph) *(Maximum ground speed 35 m/s)*
Maximum climb / sink rate	8 / 8 m/s
Maximum bank angle	55 degrees
Wind resistance *For regional and operation type specific wind limits see chapters 13 & 14.*	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 Dependent on diverse factors.
Min. space for take-off and landing	2 m × 2 m (6.6 ft × 6.6 ft)
Operating temperature	-10 to +40 °C (14 to 104 °F)
Max. take-off altitude above sea level	2500 m (8200 ft)
Weather	IP53, Do not fly in fog, rain or snow
Visibility	WingtraRAY is allowed to be flown only during daylight in good visibility conditions.
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 Green UAS	Listed on the AUVSI Green UAS cleared list, WingtraRAY NDAA compliant—tested and cleared for cybersecurity and safety.
FAA Operations Over People -Category 3 (Applicable in US)	WingtraRAY is compliant to fly over people in the US following the Part 107 regulations limits for Category 3. See details in chapter 13
Open category A3 / C3 EASA STS-02 permit / C6 (Applicable in Europe)	WingtraRAY undervent testing and conformity evaluation in 2025 by the notified body, TüV Rheinland LGA Products GmbH, to be designated as C3 & C6 class compliant following the European Commission Delegated Regulation (EU) 2019/945 on unmanned aircraft systems.
EASA Specific category -MOC 2511-01 -MOC 2512-01 (Applicable in Europe)	The evidence for the two EASA MOCs show WingtraRAY to be compliant with the SORA 2.5 Medium robustness containment and M2 mitigations Medium robustness requirements.

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3 Payloads & UAS combinations

Only use Wingtra approved payloads in your WingtraRAY drone. Below is the list of Wingtra approved payloads for WingtraRAY.

Payload limitations			
Total payload maximum mass (including parachute)	1.3 kg *The parachute module weighs 250g		
Maximum size	All payloads must fit within the payload bay dimensions. Some payloads have a lens protruding through the payload cover.		
Payload name picture	**Payload mass**	**Take-Off mass** A. without parachute B. with parachute	**Dimensions**
MAP61	655g ± 10g	A. 4.4 kg B. 4.7 kg	Depth 157.5 mm Width 175mm Length 230 mm
LIDAR	1075g ± 15g	A. 4.9 kg B. 5.13 kg	Depth 157.5 mm Width 175mm Length 230 mm

3.1 Items & Accessories

#	Item / Accessory
1	**WingtraRAY drone**
2	**Set of 2 batteries (2x needed to fly drone)**
3	**TabActive 3 tablet + Telemetry module (ground control unit)**
4	**MAP61 (payload)**
5	**LIDAR (payload)**
6	**Parachute Rescue System module + Manual Trigger Device**

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4 Equipment to control the UA remotely

The WingtraRAY 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 Wingtra App 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 App is running, the software for local flight planning, flight monitoring and in-flight controls. Charge the tablet with the normal mobile charger provided with the tablet.
With the optional parachute module installed the pilot has also an additional manual trigger device for the parachute which has its own direct radio link.

Description	
Samsung Galaxy Tab Active 3 SMT-570	Android Version: 13 or higher
Wingtra App Software version:	1.11 or higher
Firmware version	2.19 or higher
Parachute Manual Trigger Device Firmware	V 1.0

Note: It is recommended NOT to install additional applications on the tablet besides Wingtra App and Knowledge Base to ensure good performance of the tablet.

The environment in which the drone is operating affects the strength of the telemetry and the manual trigger device link.

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 other 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 WingtraRAY 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 WingtraRAY. For example, when the WingtraRAY is flying towards the antenna, the signal is stronger.

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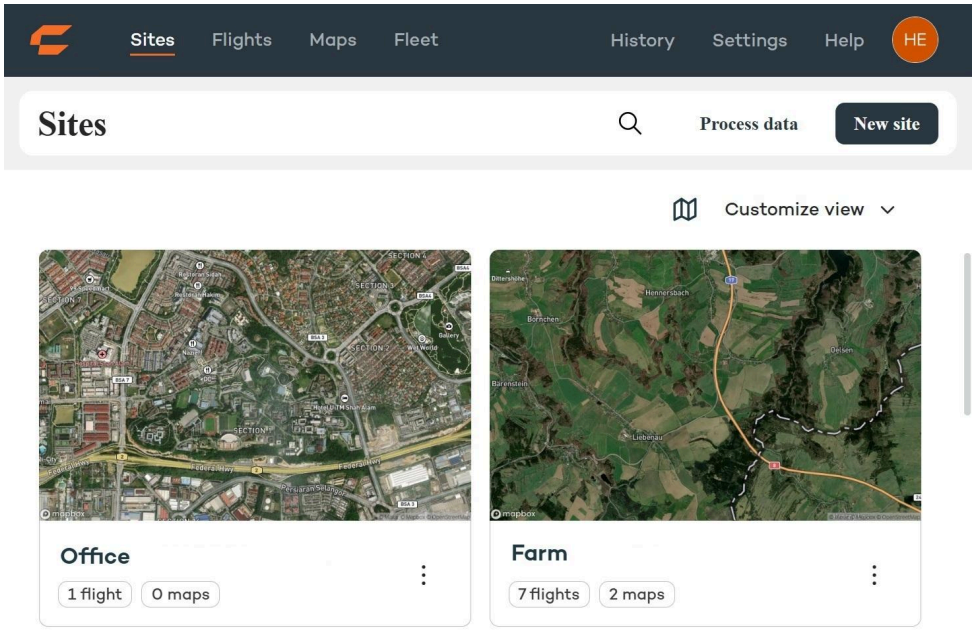
5 WingtraCloud / App - flight planning & control software

WingtraCloud is the software running in a browsers on a computer that can be used for flight planning, organisation and fleet management. Wingtra App on the tablet is used for local flight planing, 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 WingtraCloud and App:

5.1 Flight Planning

1. **Open WingtraCloud or App and login, Create a new site**



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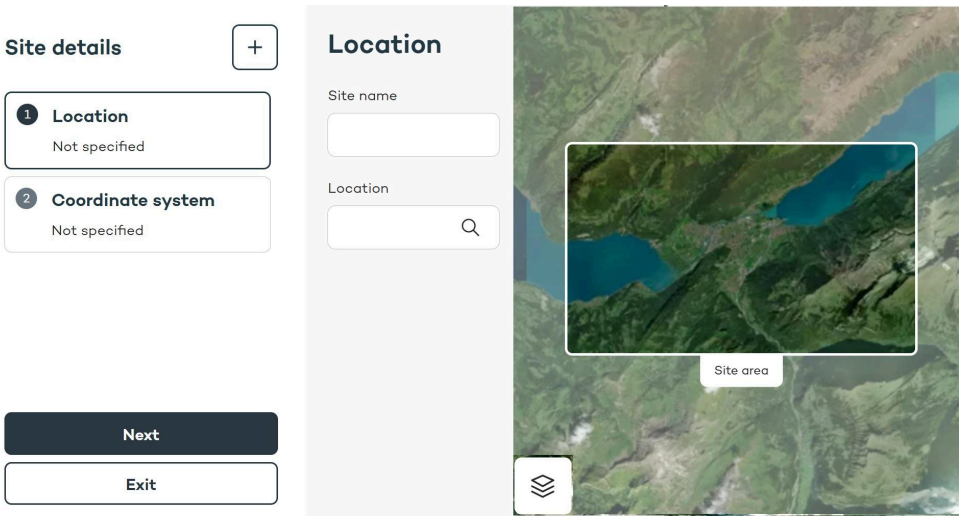
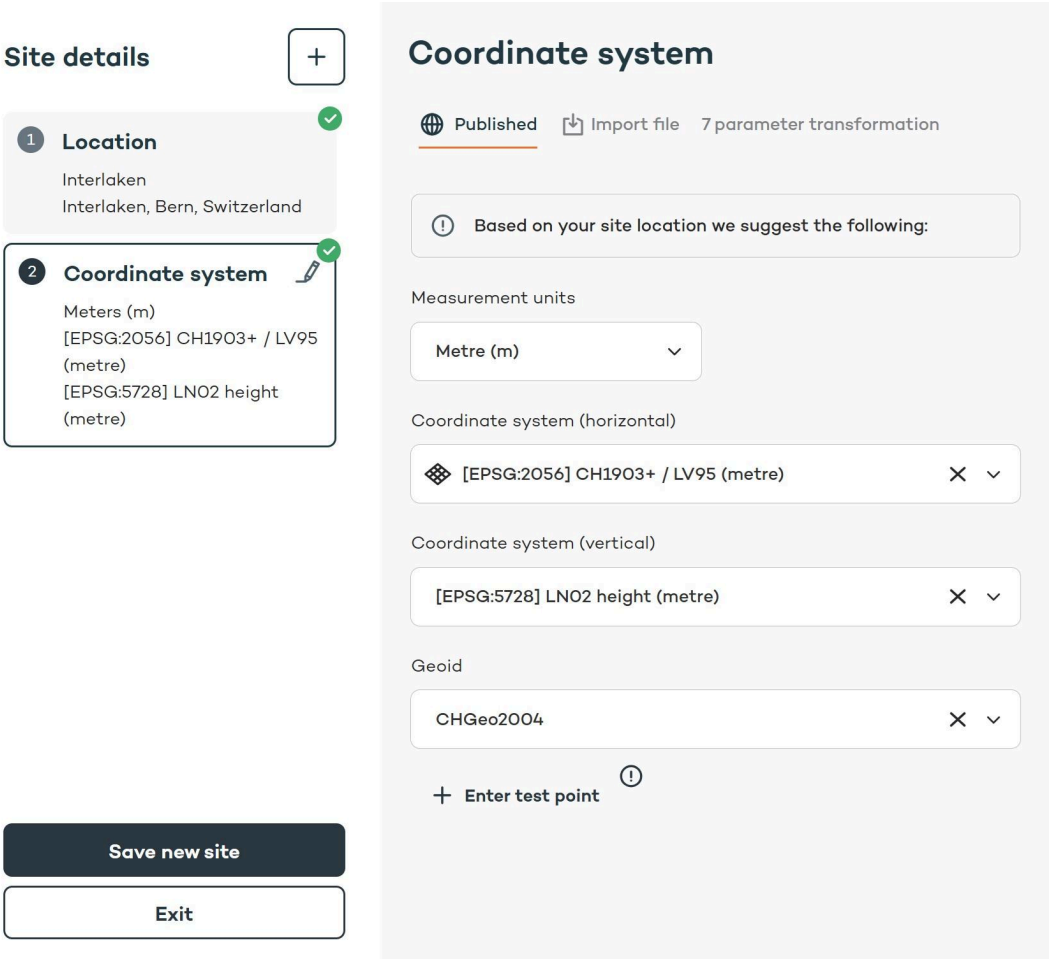


2. Choose the wanted coordinate reference system for your site

WingtraCloud will suggest to you a common locally used coordinate system. Once the wanted coordinate system is chosen save the new site.



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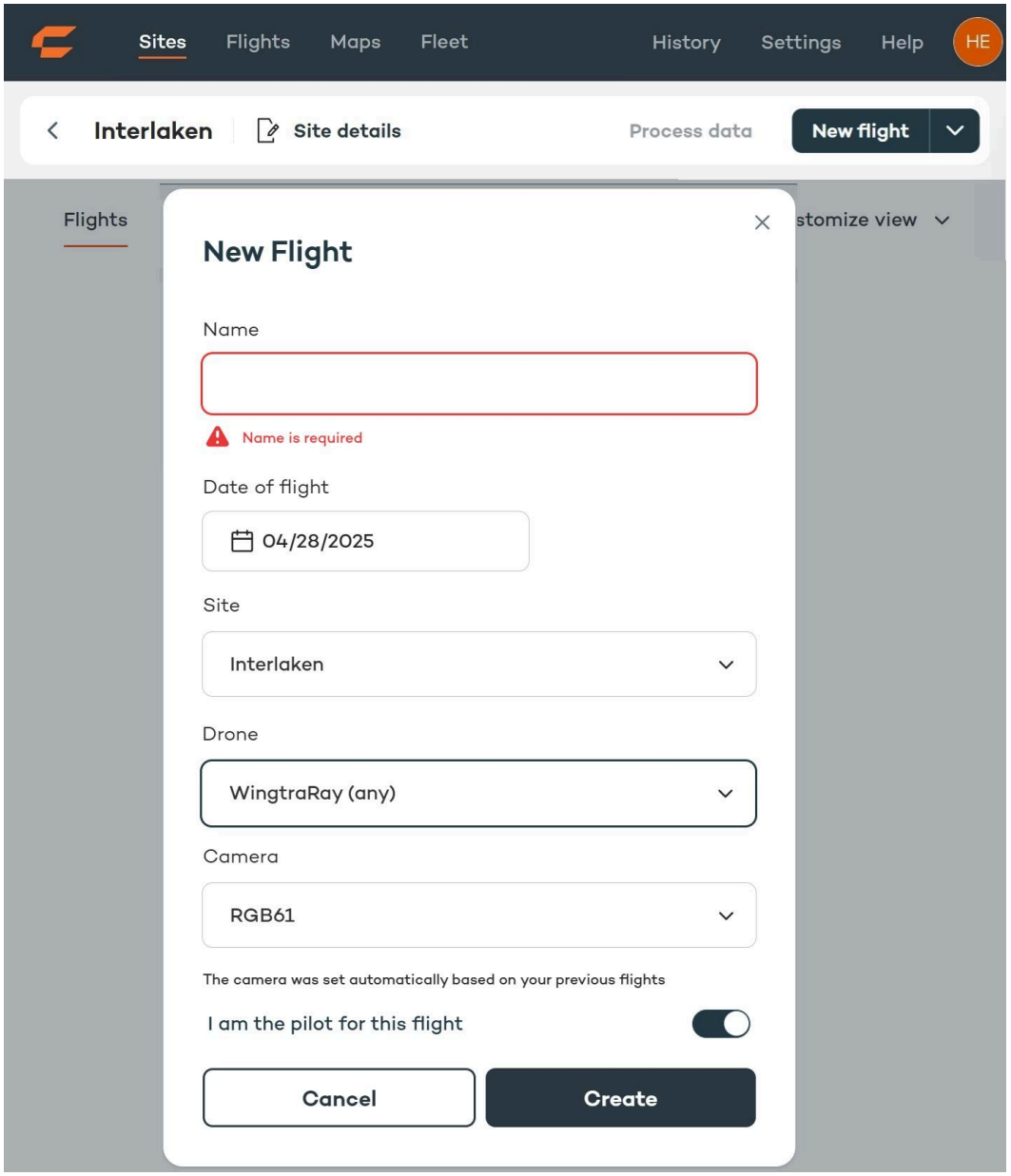
3. Create a new flight

Once the new site is created you can create flights within the site. This way you can organize your data of survey areas which require multiple or repeating flights.

- Click the “New flight” button in the top right corner.
- Name your flight plan. Adjust the date of flight if it is not today. Select the drone model used for the flight.
- Select the payload used for the flight.
- Either choose the slider for “I am the pilot for this flight” or select another pilot from your organization to be the pilot for this flight and press create.



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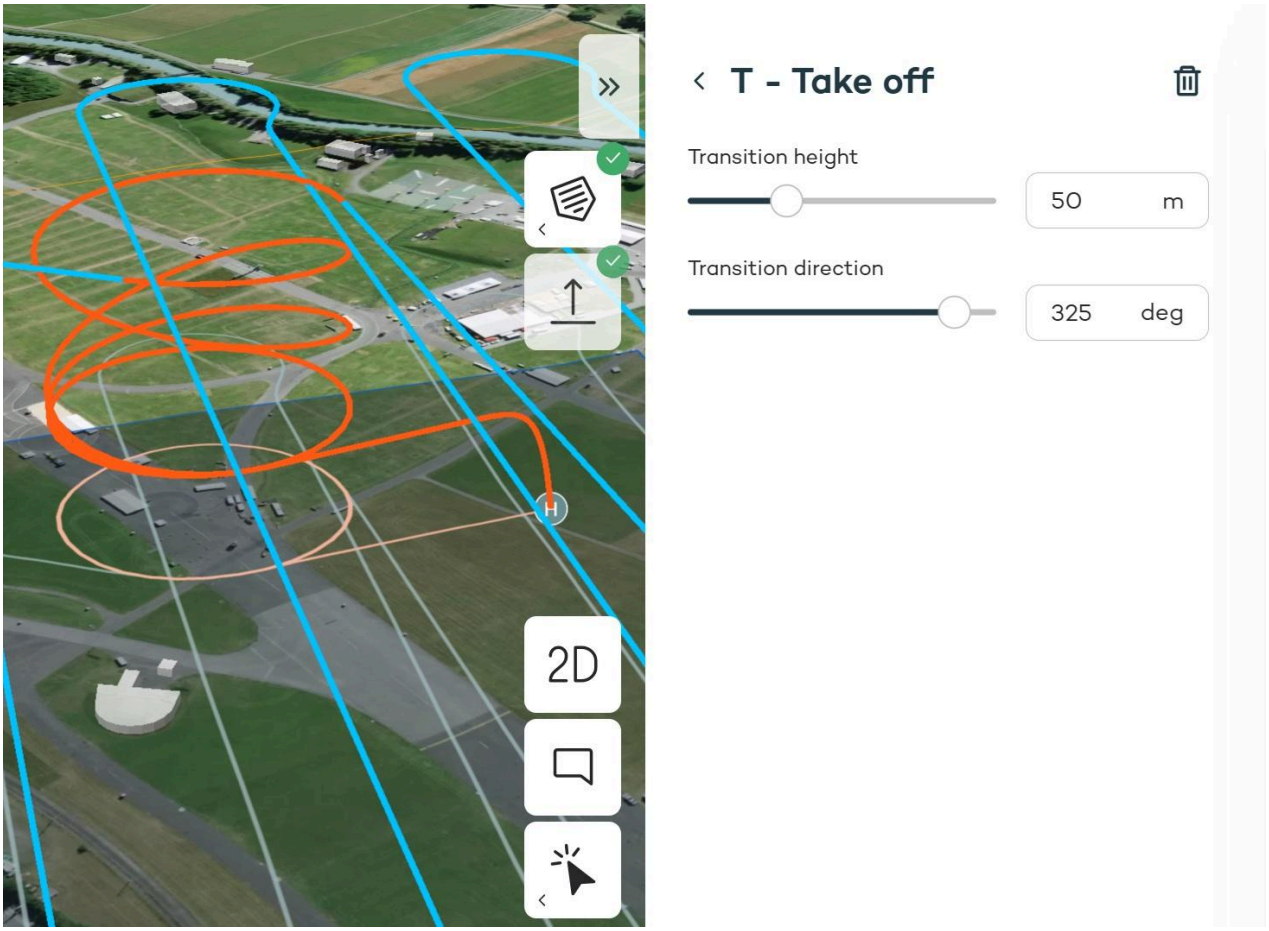
4. Set a home point (take-off and landing point)

Tap the “Home point” icon to create a home point at the planned take-off and landing location; This location will be updated to the accurate position once connected to the drone. Home point is the place where your WingtraRAY takes off and lands.

Adjust the transition height and direction; These will be the same for take-off and landing. Transition height is where your drone transitions into forward flight orientation.



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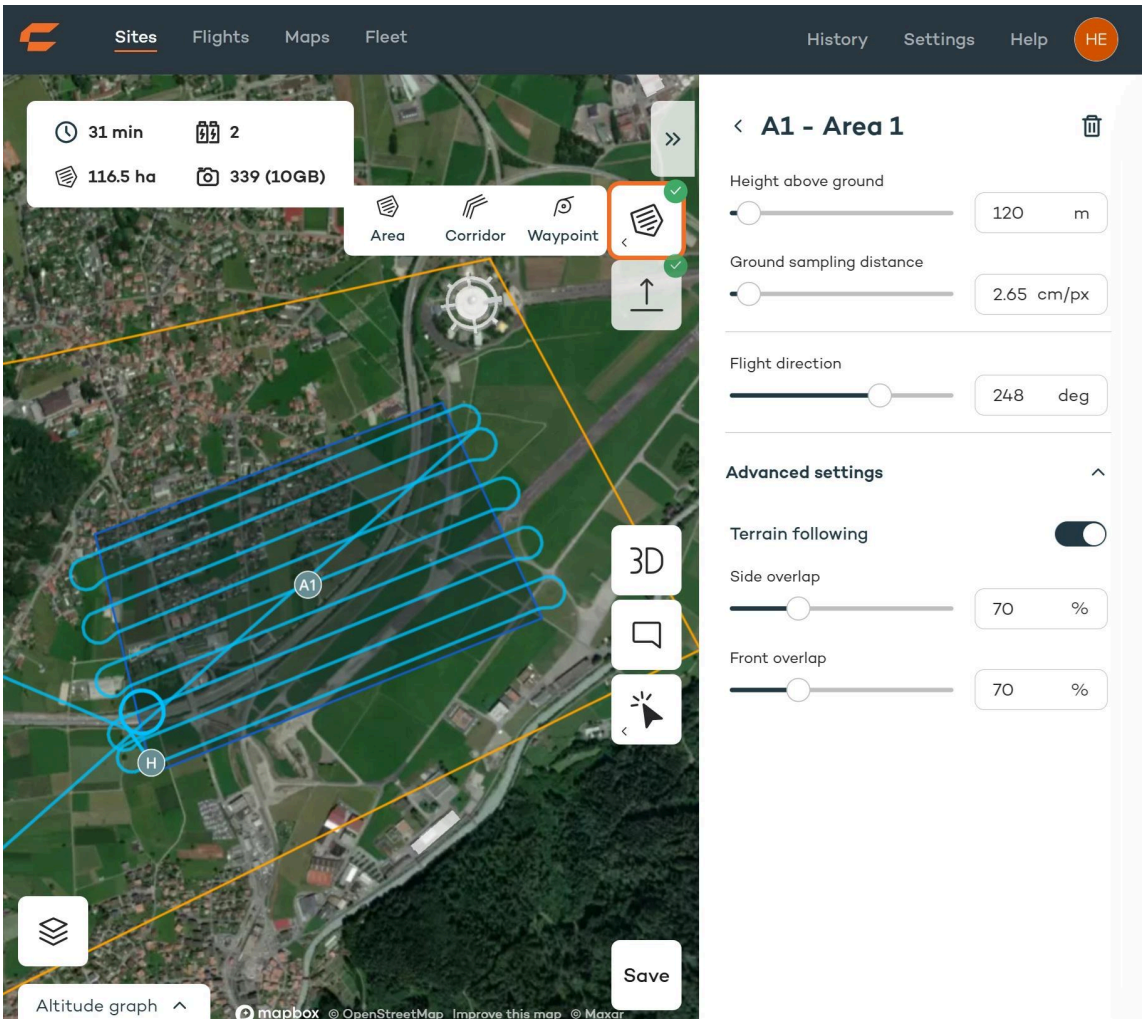
5. Plan flight areas or a corridor

Select the icon from the column on the right edge of the map to plan either areas or a corridor to be mapped.

The areas and corridors shown with the blue color will be mapped by the payload with selected overlaps and GSD/altitude as selected. It is recommended to keep the terrain following selector on for flight areas especially in hilly areas.

WingtraCloud or App generates the needed flight lines over these areas or corridors automatically, but you can adjust the flight line directions per area manually with the flight direction selector.

A geobarrier is generated automatically around your first placed area and you can adjust by selecting the geobarrier in the list on the right edge. The shape can be either a convex polygon or a circle.



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