



# RigiCloud User Manual

## RigiCloud User Documentation

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**Rigi Technologies SA**

Route des Flumeaux 39  
1008 Prilly, Vaud, Switzerland  
UID number: CHE-423.156.595

Main contact:  
[operations@rigi.tech](mailto:operations@rigi.tech)

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# Introduction

## Introduction to RigiCloud

RigiCloud is RigiTech's dedicated Command Unit and Fleet Management software. It allows operators to:

- Plan and operate delivery networks;
- Manage UA fleets, batteries and Edge Nodes;
- Record flight experience and history.

In order to create the best platform for delivery operations, the software has been developed in accordance with the common vision of RigiTech's Operations, Engineering and Business teams, as well as the feedback from RigiTech customers.

RigiCloud is updated every three months. It is the responsibility of its users to be up to date and adapt training and procedures to be consistent with the new software release.

## Authors

### Written by:

- Alejandro del Estal Herrero: Operations, Training and Support

## Version history

- Version 1.19.0
- Publication date: June 1<sup>st</sup>, 2026

## System requirements

RigiCloud is a cloud-based software, so, virtually there are no particular hardware or software requirements and it can be used in any computer/tablet/smartphone with internet connection.

However, depending on the OS, internet browser or the size of the screen, the user experience could be affected.

The operator is responsible of ensuring that the hardware and screens used are compatible with a safe operation. Minimum hardware requirements are provided in the UFM.

## Support information

If you have any comment or question, please refer to [RigiTech Help Center](#) or [support@rigi.tech](mailto:support@rigi.tech).

## Delimitation of Responsibilities

- This manual is meant as a guide only, and reading the manual is not sufficient to operate RigiTech UAS. Training according to RigiTech guidance and material is required.
- RigiTech will not take responsibility for any operations that are planned or controlled by their software.
- Operators need to follow the regulations of the country/countries in which they operate and have their own insurance.

[🏠](#) > [RigiCloud User Manual](#) > [Getting started](#)

# Getting started

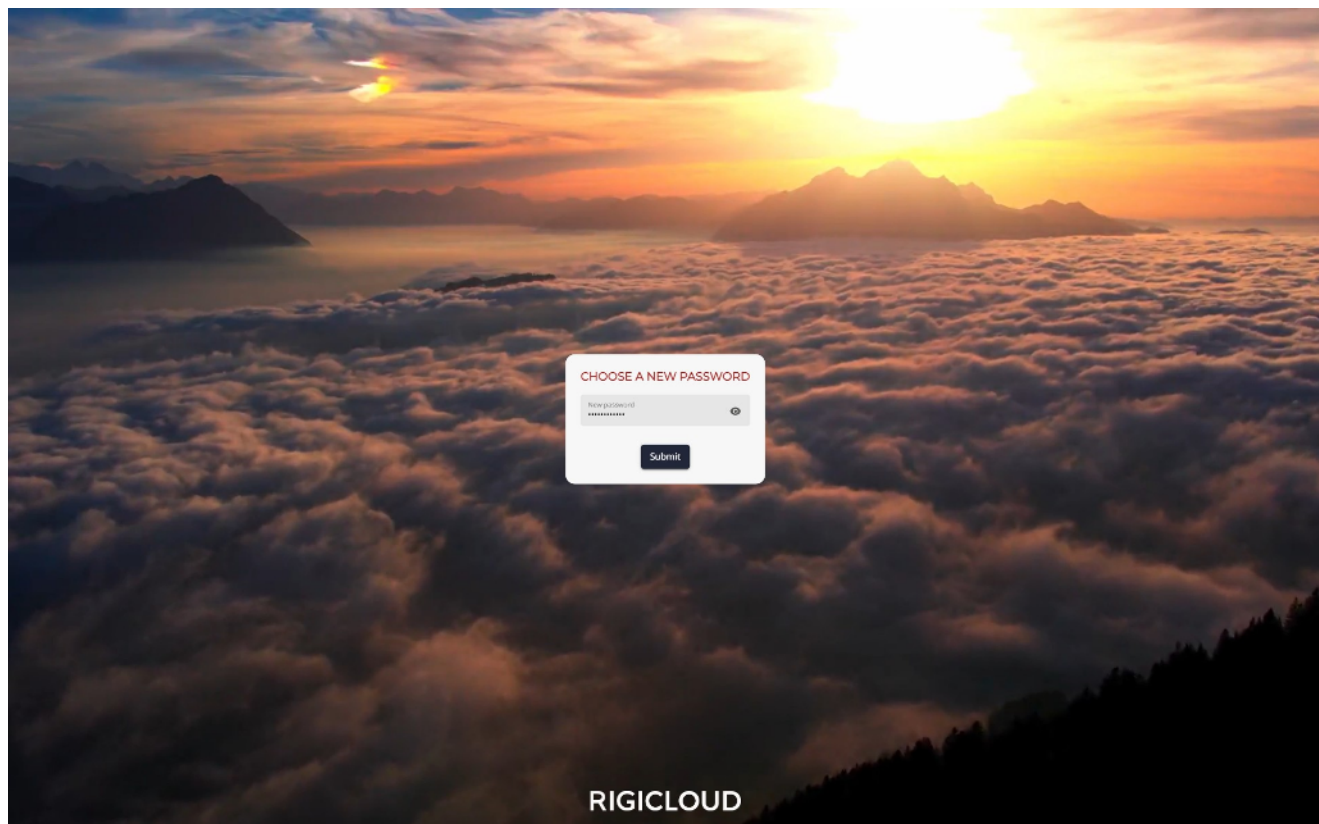
## First steps

### User creation

In order to access RigiCloud, users need to be invited (directly by RigiTech staff or by one colleague with a "Head of Operations" user). An email called "RigiTech account activation" should be received (if this was not the case, the spam folder shall be reviewed).

After clicking on "Confirm Account" or accessing the provided link, the user will be requested to set a password. The password needs to respect **all** of the following rules:

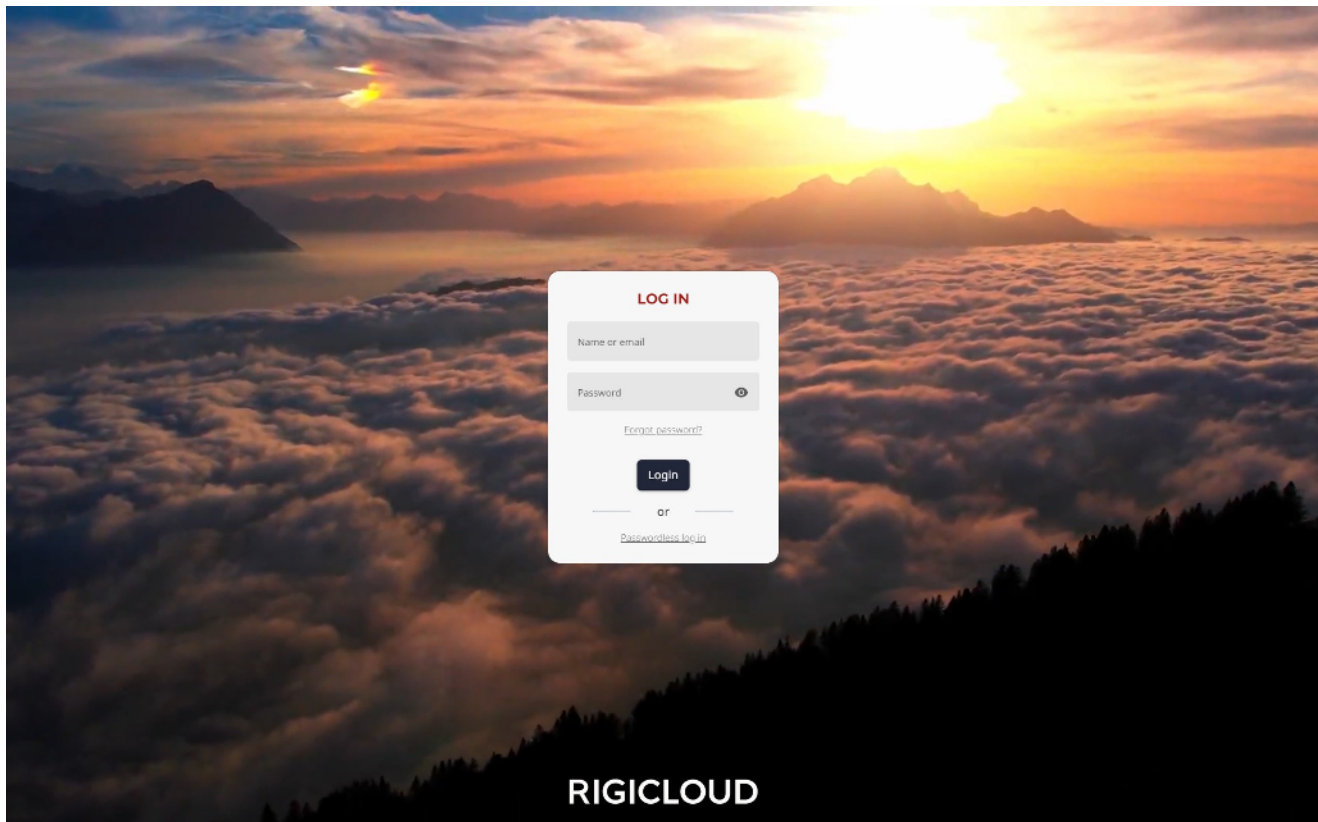
- At least 8 characters.
- At least one number.
- At least one uppercase letter.
- At least one lowercase letter.
- At least one special character.
  - !@#\$%^&\*



In case the user cannot confirm the password, the user shall check that all of the previous the rules are respected. In particular, only the special characters listed above shall be used.

## Login page

RigiCloud can be accessed through the last available version of Google Chrome at <https://cloud.rigi.tech/>, where the login page can be accessed. Other browsers can be used, but some features might not be supported.



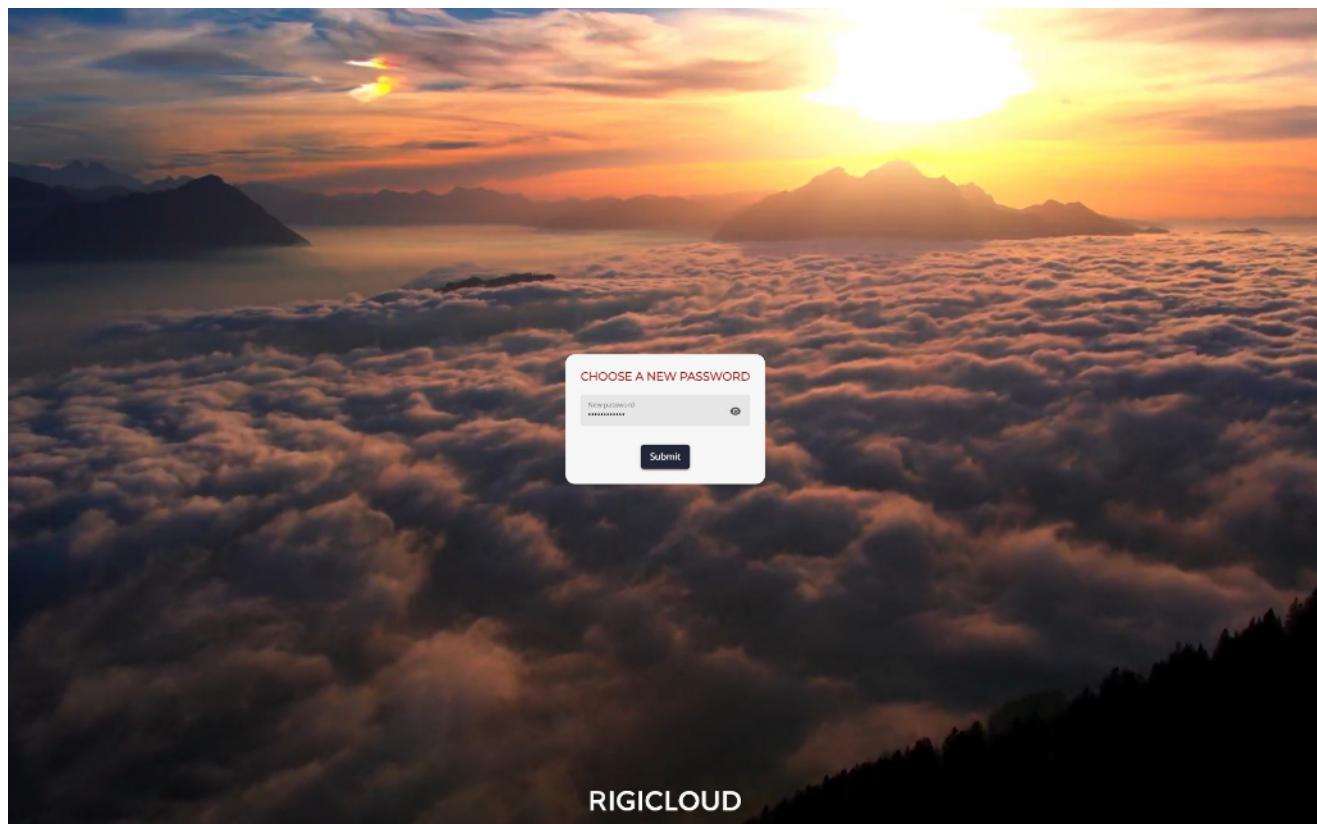
In order to log, the user needs to enter the correct credentials:

1. **Name:** enter the user or the associated email.
2. **Password:** enter the password.
3. **Login:** click here to log in.

If Two Factor Authentication (2FA) is enabled, the user should then introduce the code provided by the authenticator app.

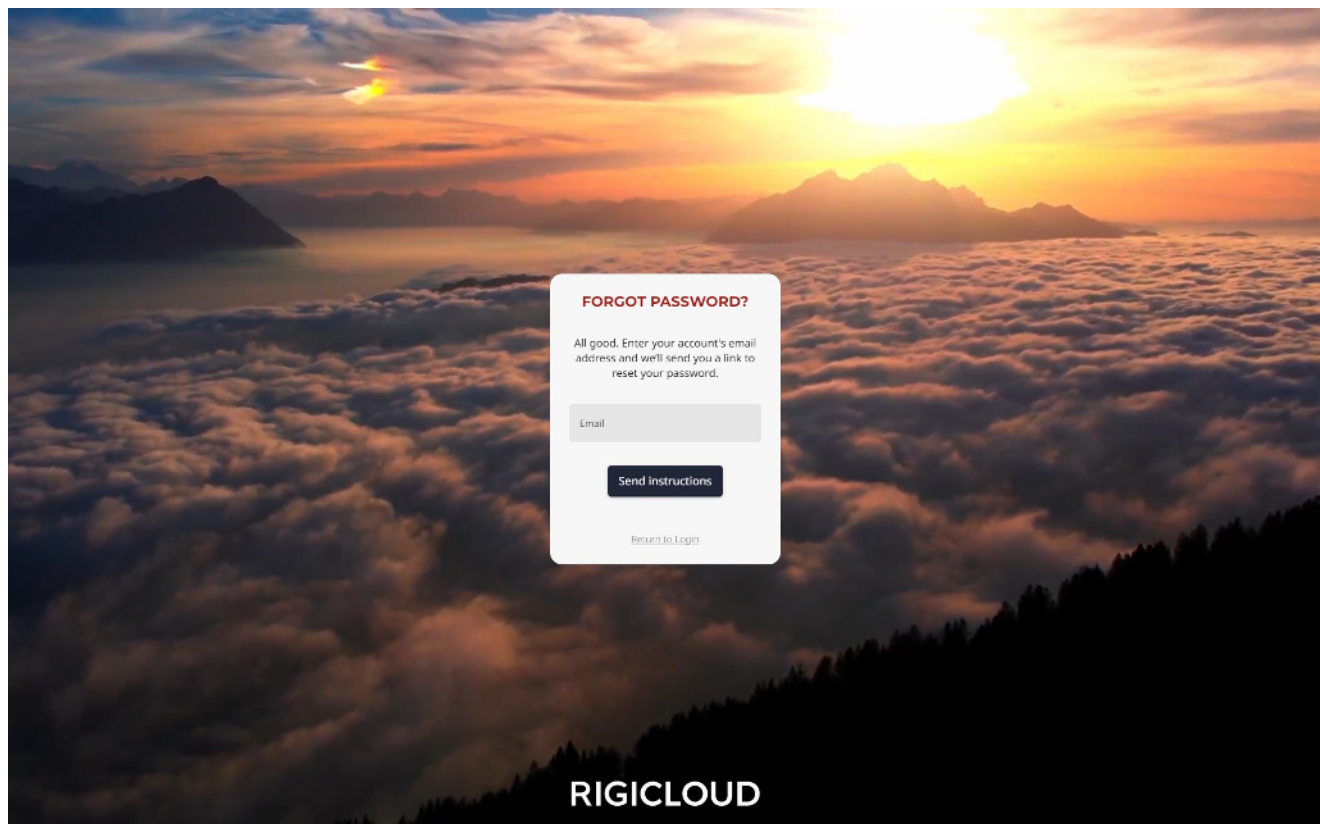


It is also possible to log in without password, by clicking on "Passwordless log in". If the email account introduced is correct, a one-time logging link will be sent by email.



## Forgotten password

If the user has forgotten the password, the user shall click on "Forgot your password?", enter the email and click on "Send me instructions". The instructions received by email shall be followed.



If the user does not receive instructions (spam folder included), the user shall contact RigiTech support.

## Main page

By default, after logging into RigiCloud, the main page will be the "Dashboard" page (which will be presented in its own section).

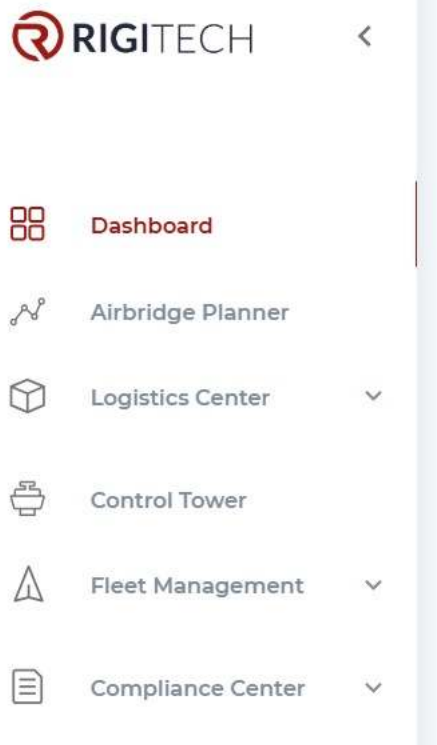


Independently of what tab is open, the following common elements are displayed:

1. **Main menu:** allows to navigate through the different modules of RigiCloud (which will be presented in its own section).
2. **Logout:** allows to log out from RigiCloud
3. **Alerts and notifications:** allows to see alerts and notifications.
4. **User information:** allows to:
  - Access the user information page (by clicking on it)
  - See the user's profile picture, user name, email and role (by passing the mouse over it).

## Main menu

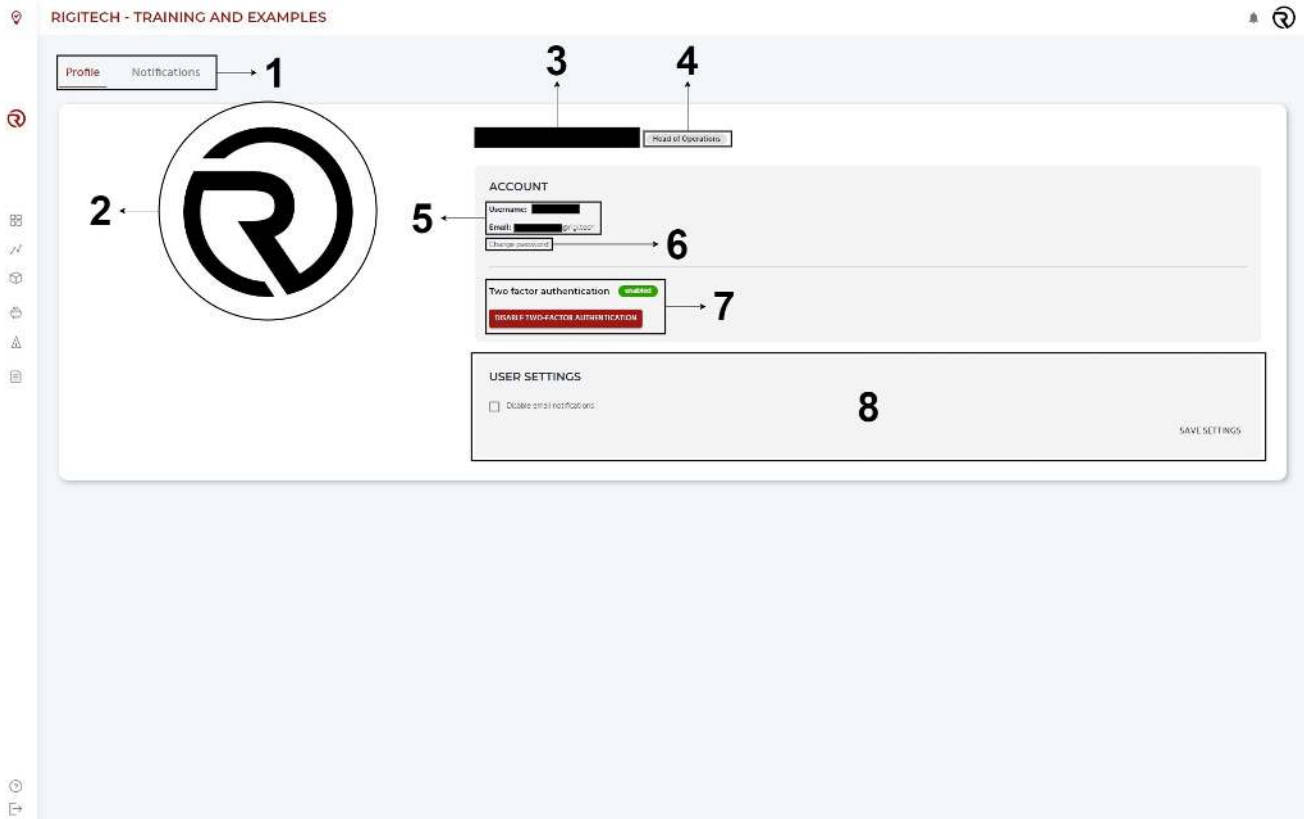
The main menu has a total of 6 main tabs:



- **Dashboard:** displays an overview of the project, including various flight statistics, as well as past and scheduled operations.
- **Airbridge Planner:** contains the tools related to route planning.
- **Logistics Center:** allows to create and edit flight checklists, schedule operations and gives access to a list of past operations.
- **Control Tower:** this tab contains all the tools related to flight control.
- **Fleet Management:** allows to manage (add, edit, delete) drones, simulators, batteries and edge nodes associated to the project.
- **Compliance Center:** allows to manage users, create safety profiles, access documentation and modify settings.

## User information

After accessing the user information page, it is possible to change the password and/or profile picture, check the email associated to the user and see the user's role.



1. **Change tab:** allows to change tab (Profile or Notifications).
2. **Profile picture:** allows to change the profile picture.
3. **User name**
4. **User role**
5. **User information:** username and email.
6. **Change password:** allows to change the password.
7. **Two-factor authentication:** allows to enable/disable two-factor authentication. The user should follow the steps indicated directly in RigiCloud.
8. **User settings:** allows to change user settings.

## User types

Depending on the context of the project, different types of users might be needed. Available types of users are presented hereunder:

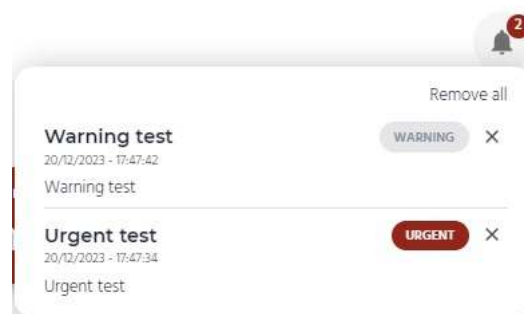
- **Head of Operations:**
  - Operations: full control
  - Flight plans: edition and approval
  - Fleet Management: can view information of drones and systems and configure them.
  - Checklists: creation

- Users: creation
- **Operator:** similar to Head of Operations, but without the option to approve flight plans, modify checklists or create users.
- **Observer:** can only monitor operations and view details of the systems.
- **External:** similar to observer, but with access to systems details.
- **API and API (full control):** have access to the API. Full-control users can also request operation commands and manage drones.

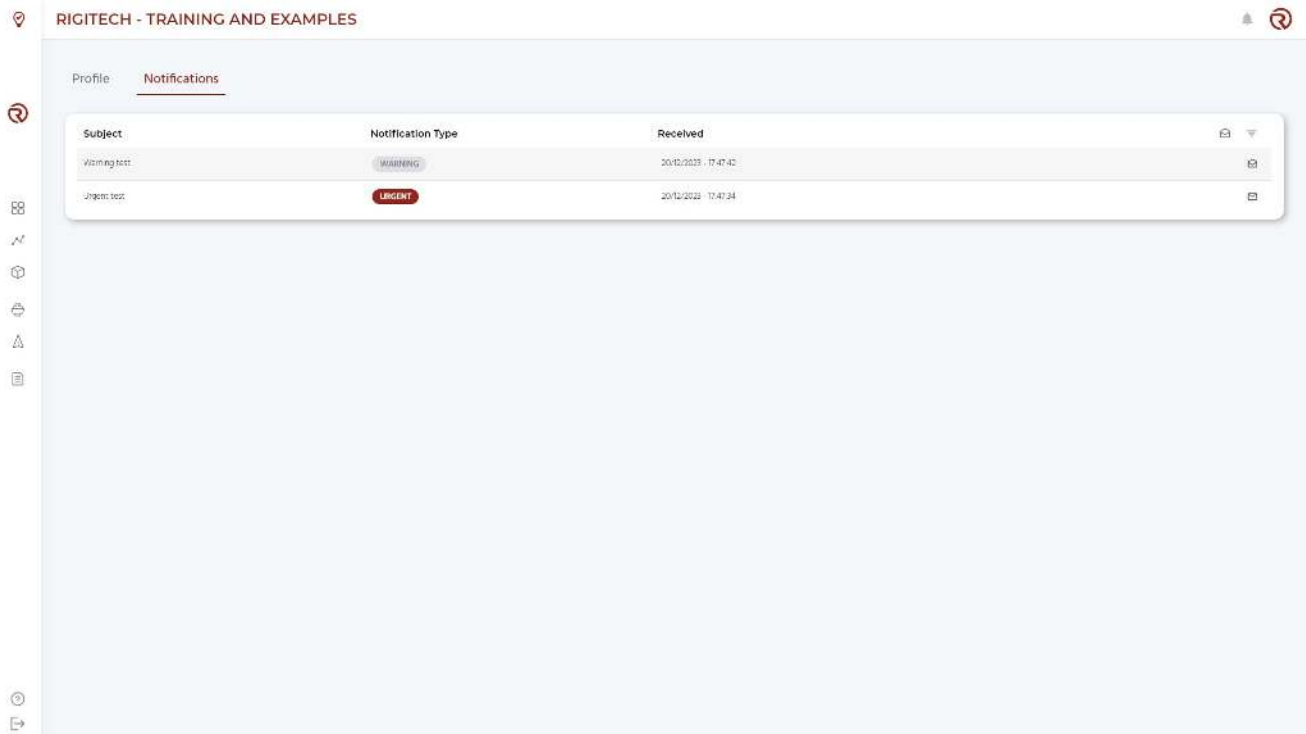
## Alerts and notifications

Alerts and notifications give information about the project and missing elements (bases, batteries, drones, etc.).

Warnings and urgent notifications will be shown next to the bell icon (in those RigiCloud modules where it is visible).



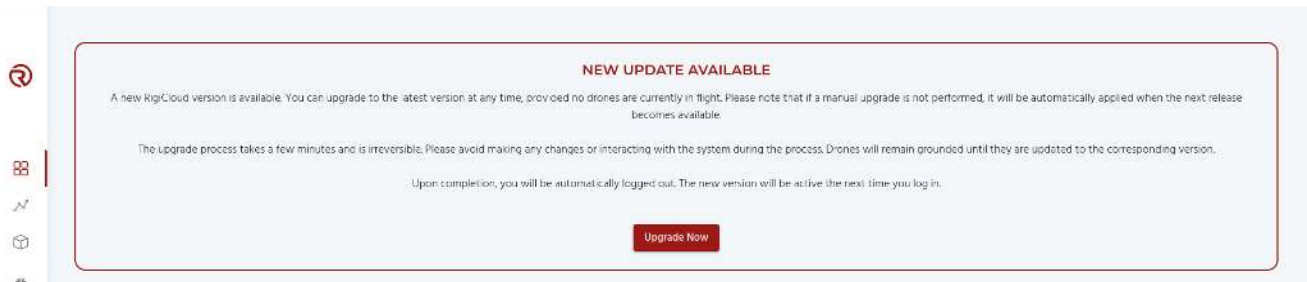
They can also be accessed from the User information, by clicking on the "Notifications" tab. They are categorised per type (Info, Warning and Urgent). RigiTech use this channel to inform users about software releases, updates and other relevant communications. Therefore, users are expected to read, as they may include relevant information for safety and instructions.



Notifications can be accessed by clicking into their subjects (within the list).

## Multiversioning

From June 2026, RigiCloud can support multiple versions of its core services simultaneously, allowing operators more flexibility in the upgrade process. When a new software version is released, the past version remains temporarily active, allowing Head of Operations users to update their portal at a time of their choosing, until shutdown by RigiTech.



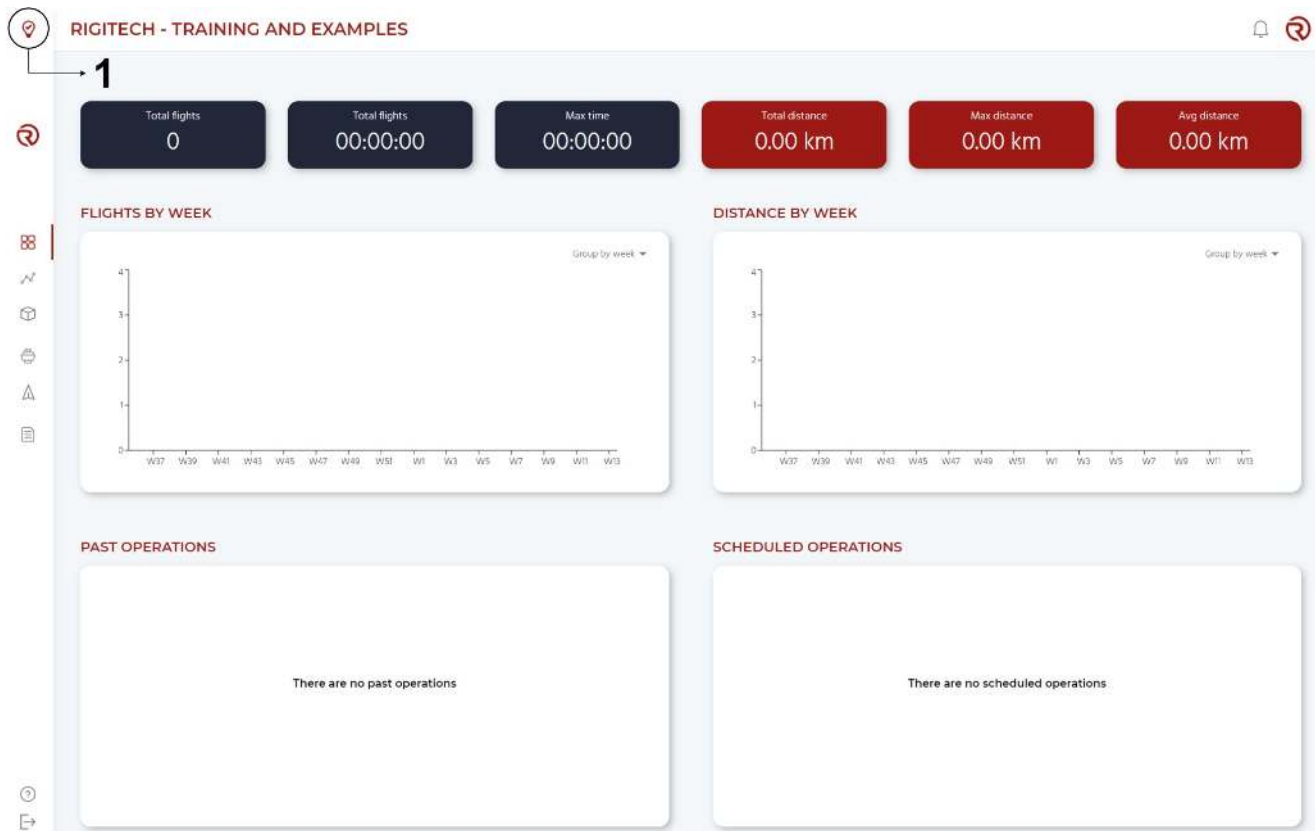
Once an upgrade is triggered, all drones will also need to be upgraded to the new version, and there is no possibility to downgrade. The previous version remains supported for a limited time period. Critical hotfixes may still result in mandatory upgrades to the new version.

## RigiCloud servers

Customers can also access to a testing server of RigiCloud at <https://cloudtest.rigi.tech/>, which has the following characteristics:

- The database from the main server (Production) is exported automatically to the testing version every Friday.
  - Anything stored in the Production server will be exported to the testing version, including users, flight plans, drones, settings, etc.
  - Anything stored in the Testing server before the exportation will disappear and be replaced by the last database from the main version.
- The Testing server includes pre-released software that can be used by customers both for training and testing.

In general, the appearance of the Testing server is almost identical to the main version.



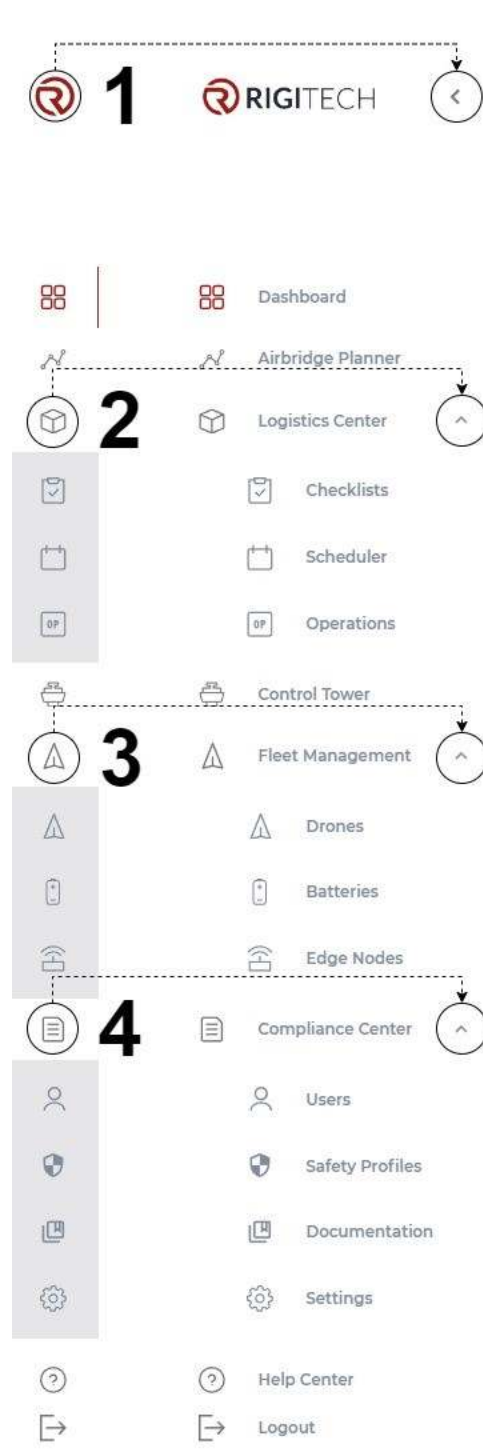
1. The only difference is the lightbulb icon in the top left corner.

 > RigiCloud User Manual > **Main menu**

# Main menu

## How does the main menu work

In the main menu, users can navigate through the different modules of RigiCloud.



1. The main menu has two views: one with only icons (minimalistic view) and one with the definition of the icons (detailed view). It is possible to switch between them by clicking on the RigiTech (minimalistic to detailed) or the left arrow (detailed to minimalistic).

Some of the buttons of the main menu lead the users to specific pages of RigiCloud, while others expand their specific modules encompassed within the same category.

2. Logistics center
3. Fleet management
4. Compliance center

## Overview of RigiCloud's modules

- **Dashboard:** by default, first page showed in RigiCloud. It provides statistics on the operations and flights.
- **Airbridge planner:** allows to access see/edit/validate flight plans.
- **Logistics center:**
  - **Scheduler:** allows to schedule operations.
  - **Operations:** allows to see and edit the resources of scheduled and past operations.
- **Control tower:** allows to command and control UAS and simulators.
- **Fleet management:**
  - **Drones:** allows to access the information of the drones associated to the project, including history, maintenance and update interface.
  - **Batteries:** allows to access the information of the batteries associated to the project.
  - **Edge nodes:** allows to access the information of the Edge Nodes associated to the project.
- **Compliance center:**
  - **Users:** allows to access the information of the users associated to the project as well as managing them.
  - **Documentation:** allows to access to the user guides and manuals stored in RigiCloud.
  - **Settings:** allows to access to the settings of the project
- **Help center:** allows to access RigiTech's Help Center.

Depending on the specific needs and type of the user, the aspect of the main menu can change. If the user cannot see certain modules, it is because the type of user has limited permissions. If a different type of user is needed, the user shall contact with the administrator of the project. If it is a general issue for all the users within the same category, RigiTech Support shall be contacted.

Users are defined in [Getting started](#).

# Dashboard

## Overview

The dashboard module is, by default, the first module showed in RigiCloud when accessing it. In this module, the overall statistics of the operations and flights are available.



### 1. Name of the project

### 2. Flights and distance - Summary: Summary of the flights. From left to right:

- **Total flights:** Shows the total number of flights.
- **Total time:** Shows the total time flown.
- **Max time:** Shows the time of the longest flight (in terms of time).
- **Total distance:** Shows the total distance flown.
- **Max distance:** Shows the distance of the longest flight (in terms of distance).
- **Avg distance:** Shows the average distance flown per flight.

### 3. Flights and distance - Graphs: Summary of the flights (left) and distances flown (right) grouped by different time categories.

### 4. Type of grouping (for flights)

#### 5. Type of grouping (for distances)

6. **Information on past and scheduled operations:** Summary of the past (left) and scheduled (right) operations.

- From left to right, Past operations show the name of the operation, the vehicle used, the distance (and time) of the flight, the start time and the status of the operation.
- From left to right, Scheduled operations show the name of the operation, the route selected and the scheduled time.

## Flights and distance - Graphs

In this section of the page, two graphs are displayed: flights by time grouping (left) and distance by time grouping (right).

For both graphs, the x-axis corresponds to the units of the time grouping, while the y-axis represents the main unit of the graph (flights or distance).

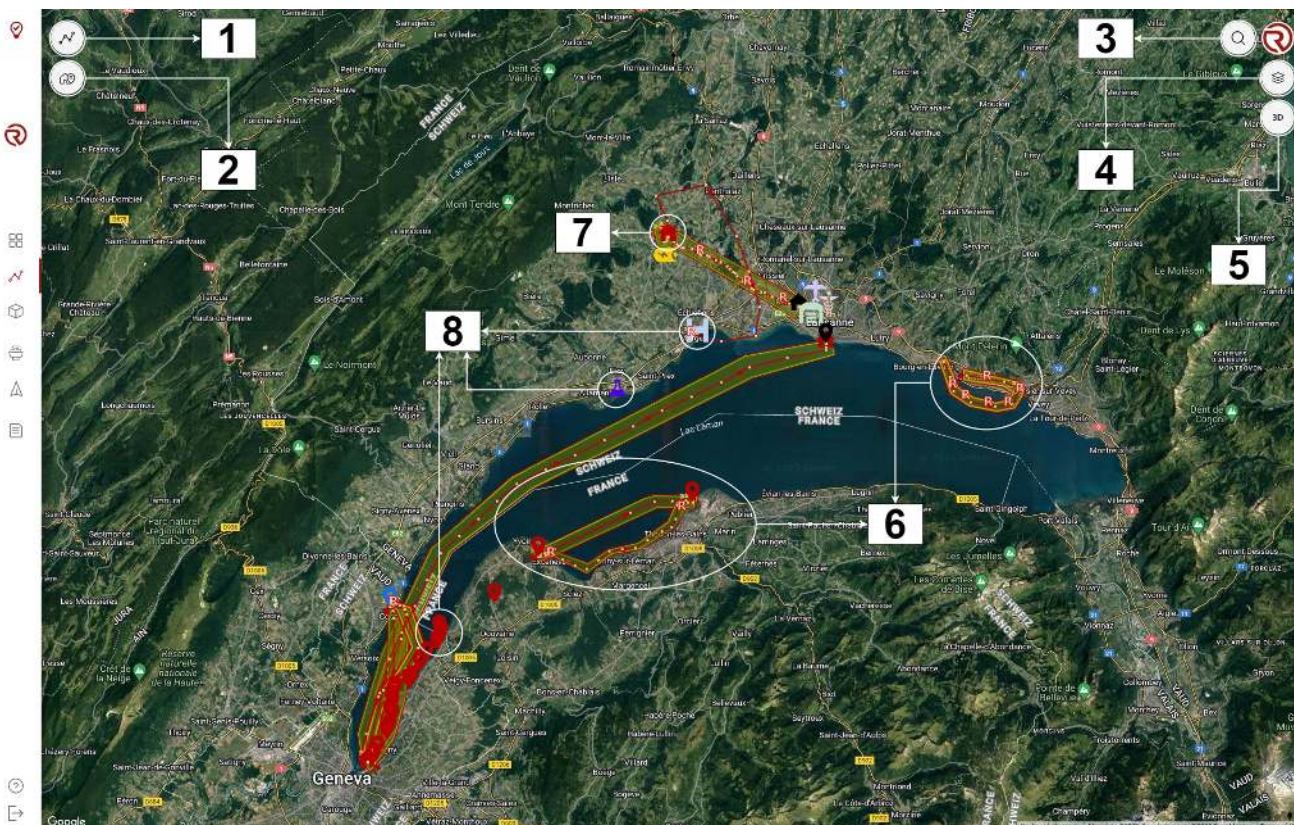
The different time groupings available are:

- **Group by day**
- **Group by week**
- **Group by month**
- **Group by quarter**
- **Group by year**

# Map navigation and tools

After accessing the Airbridge Planner, the map will be centred at the main base of the project. There are different options to navigate through this map:

- **Mouse navigation:** navigation is handled by clicking on the map with the mouse (left, right or middle-click) and zoom in/out by scrolling the mouse wheel or, respectively, by double-left-clicking or double-right-clicking.
- **Keyboard navigation:** navigation is handled with the arrows and zoom in/out with "+" and "-".



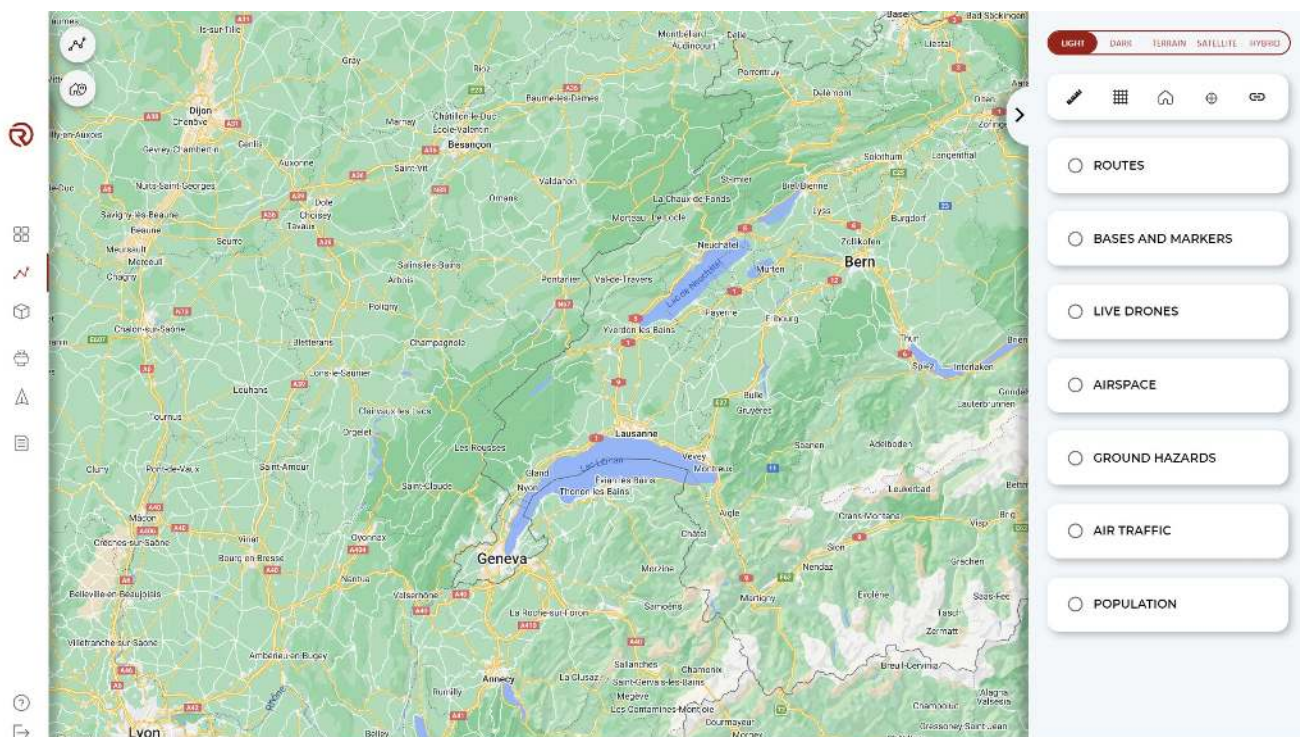
Depending on the filters, layers and content of the project, different elements can be displayed in the map.

1. **Routes:** opens the "Bases, Markers and Routes" menu in the "Routes" module, where the user can plan new routes and see/edit existing ones (see Bases, markers and routes).
2. **Bases and markers:** opens the "Bases, Markers and Routes" menu in the "Markers" module, where the user can create/modify bases (see Bases, markers and routes).
3. **Search box:** opens a box in which the user can search for specific locations. The search can be confirmed by clicking "Enter" in the keyboard. A list of available options will be shown and the map will be centred at the desired location after left-clicking on it. To start a new search, the user shall click twice on the icon.

4. **Layers and map tools:** opens the "Layers and map tools" menu, where the different map layers and filters are available, as well as a set of tools that can help the user to prepare flight plans and share them (see [Layers, filters and map tools](#)).
5. **3D View:** switches to 3D view (see [3D View](#)).
6. Examples of different routes
7. Example of a base
8. Examples of different markers

## Layers, filters and map tools

By clicking on the "Layers and map tools" button, a new menu opens at the right side of the window offering new options to use RigiCloud Airbridge Planner, including metric tools, filters and layers.



**Map layers:** allows to switch the map layer between the four possibilities (see [Layers](#)).

**Map tools:** RigiCloud offers a set of tools that can be used for planning, navigating through the map or sharing the project with other stakeholders.

- **Ruler:** opens the ruler tool, which can help to measure distances (see [Ruler](#)).
- **Grid:** opens the grid tool, which displays a square grid in the map (see [Grid](#)).
- **Centre map to network:** centres the map on the main base.
- **Centre map to current location:** centres the map on the the user's current location.
- **Copy share link:** creates and copies a link that can be sent to other stakeholders of the project with a restricted view of the project.

**Routes:** allows to show/hide the routes and/or specific elements of the routes. Specific elements available are:

- Path (lines between waypoints)
- Geocages (includes geocages, pre-geocages, ground buffer, etc.)
- Waypoints
- Rally Points

**Bases and Markers:** allows to show/hide bases and/or markers. Specific elements available are:

- Base
- Marker

**Live drones:** allows to show/hide drones, simulators and/or Edge Nodes. Specific elements available are:

- Drones
- Simulators
- Edge Nodes

**Airspace:** allows to show/hide information of the airspace (see [Airspace](#)).

- **Note:** this feature is currently not supported.

**Ground hazards:** allows to show/hide information of the ground hazards (see [Ground Hazards](#)).

- **Note:** this feature is currently not supported.

**Air Traffic:** allows to show/hide air traffic detected by available systems and filter them (see [Air Traffic](#)).

**Population:** allows to show/hide population density data (see [Population](#)).

The airspace, ground hazards and population filters include the following options and messages:

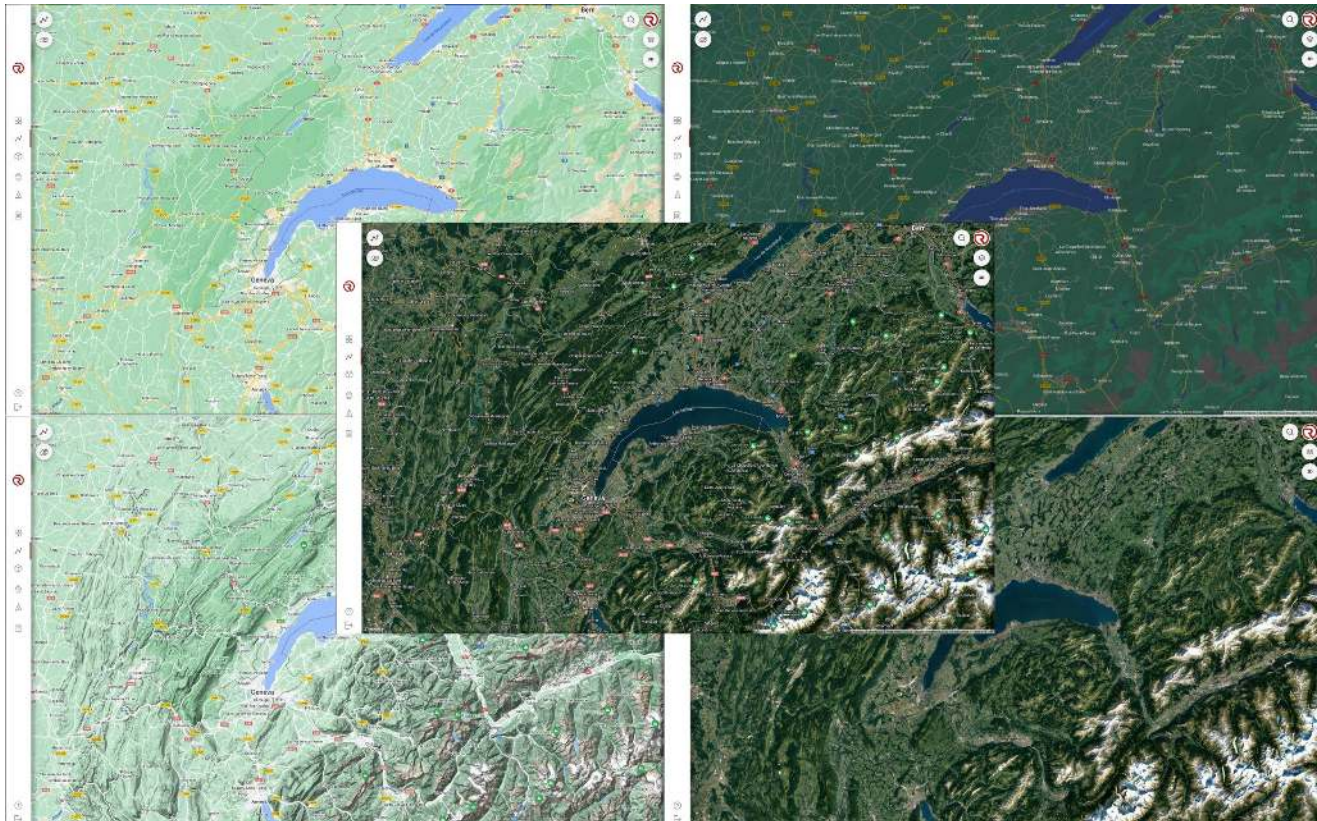
- Data source: refers to the data source of the layer.
- Layer opacity: modifies the opacity of the layer.
- Auto update: enables/disables the automatic update of the layer when the position or zoom of the map is changed. It is useful to disable it when the required data have already been displayed in order to make a more efficient use of the resources and reduce the time delays.
- Under certain conditions, the following messages can be displayed within the filters:
  - "No data": there are no available data in the displayed region of the map.
  - "Zoom in": the user shall zoom in to have the layer displayed.

## Layers

There are four types of layers:

- **Light:** minimalistic light view with minimum information. Most suitable for general operations in order to reduce the amount of information displayed on the screen.
- **Dark:** minimalistic dark view with minimum information. Most suitable for general operations in order to reduce the amount of information displayed on the screen.

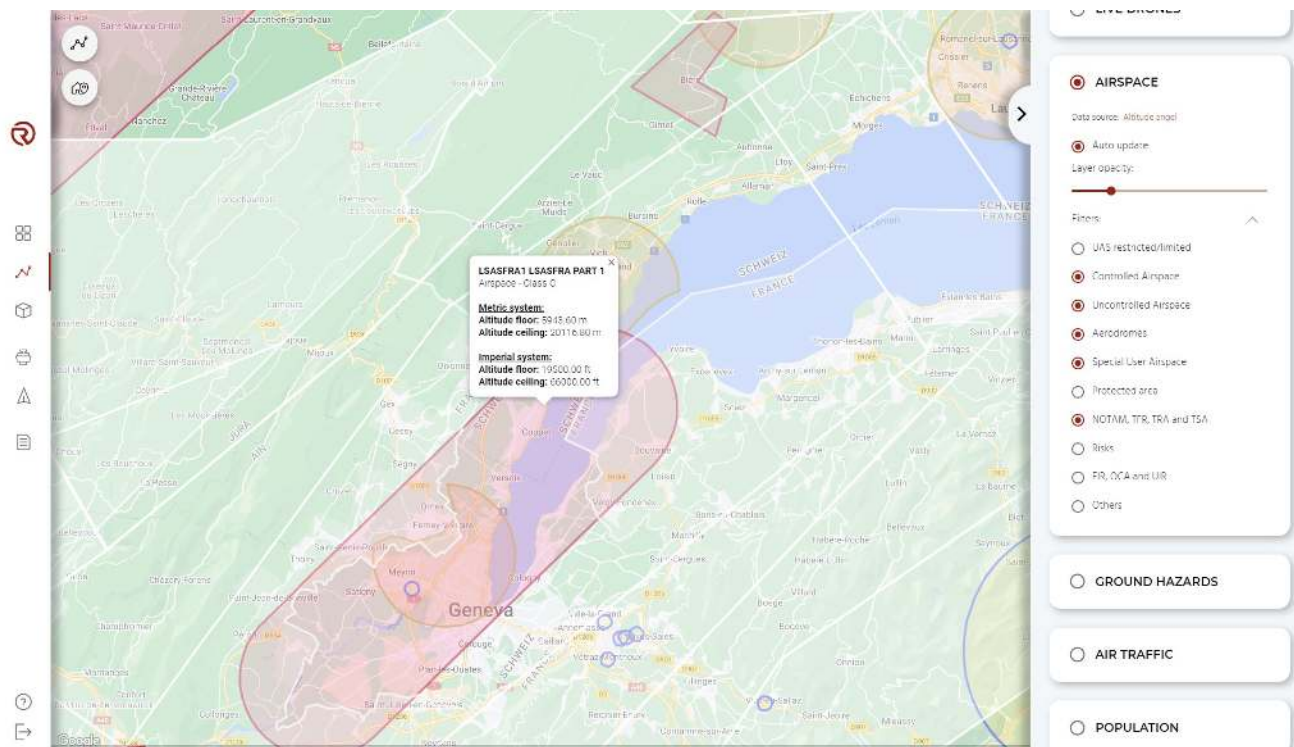
- **Terrain:** map view with terrain information. Most suitable for flight planning with important deviations in altitude. Can also be suitable for operating with these flight plans.
- **Satellite:** map with satellite imagery only. Most suitable for general operations in order to reduce the amount of information displayed on the screen.
- **Hybrid:** map with satellite imagery and geographic information. Most suitable for planning, especially in/near urban environments. It can also be used for operations, especially in case of accidents or fly-aways (to better identify the position), although the amount of information displayed on the screen might decrease the remote's crew reaction during operations in crowded environments.



## Airspace

***This feature is currently not supported.***

Airspace structures for different countries are available and obtained from an external source ([Altitude Angel - Airspace](#)):



Within the Airspace, it is possible to:

1. Show/hide all the airspace.
2. Enable/disable Auto update.
3. Modify the layer opacity.
4. Expand/collapse individual filters.
5. Show/hide individual filters.

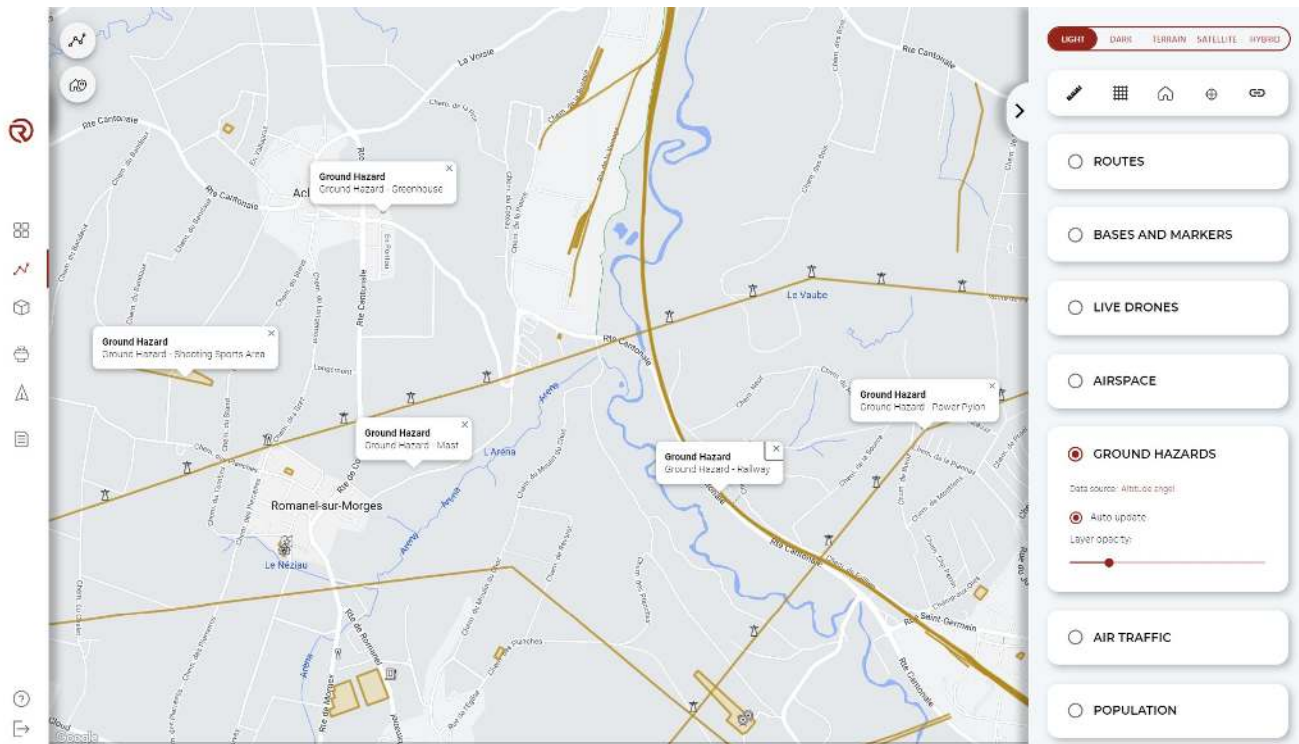
By left-clicking on an airspace hazard structure, additional information may be available (name, type, floor and ceiling of the structure).

If no data is being shown, it may be necessary to zoom in.

## Ground Hazards

***This feature is currently not supported.***

Ground hazards for different countries are available and obtained from an external source ([Altitude Angel - Ground Hazards](#)):



Within the Ground Hazards layer, it is possible to:

1. Show/hide all ground infrastructures.
2. Enable/disable Auto update.
3. Modify the layer opacity.

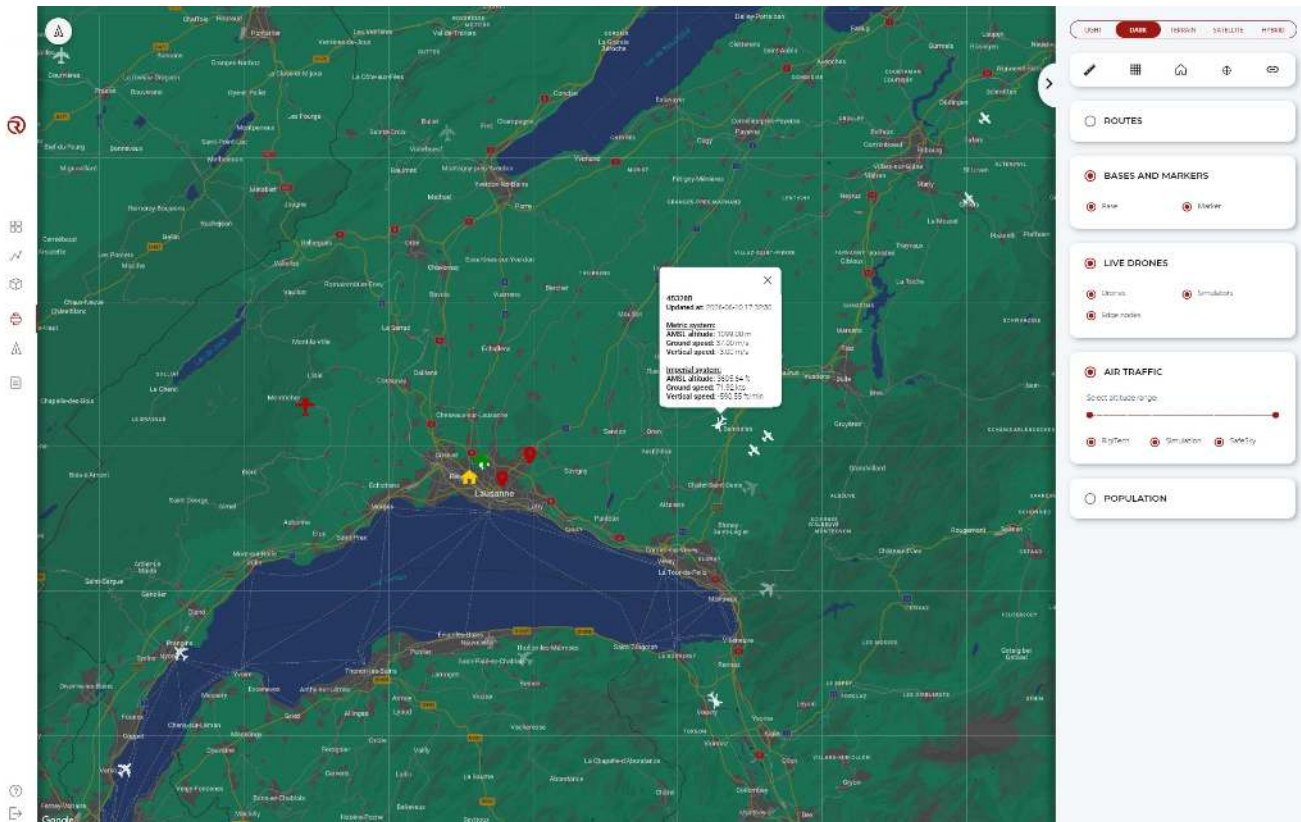
By left-clicking on an air/ground hazard structure, additional information may be available (floor and ceiling of the structure).

If no data is being shown, it may be necessary to zoom in.

## Air Traffic

Air traffic information can be obtained through two main sources:

- **SafeSky:** live information obtained through the service network and/or ground receivers (when installed).
  - *Note:* ULM, paragliders and parachute are represented with the same icon (a parachute/paraglider).
- **RigiTech:** on-board TCAS (when installed in the UAS). More details on air traffic detection will be given in [Air traffic detection](#).



#### Disclaimer:

- The operator shall consult official local sources when planning operations.
- The operator shall consult with their competent authority what means are acceptable to ensure proper air traffic detection.
- RigiTech is not responsible for any airspace or ground infrastructure not evaluated by the operator.
- RigiTech is not responsible for any aircraft not detected through the available means.

Within the Air Traffic layer, it is possible to:

1. Show/hide all the available air traffic information.
2. Filters the available air traffic information based on the altitude range (in m AMSL).
3. Filters the available air traffic information based on the source of the information.
  - UTM services (e.g., SafeSky) and RigiTech: show/hide any aircraft globally detected through all the available technologies.

By left-clicking on a detected aircraft, its trail for the last 30 seconds will be shown.

By right-clicking on a detected aircraft, additional information may be available (floor and ceiling of the structure).

- ID of the aircraft.
- Time of the last update.
- Metric system information:
  - AMSL Altitude (in m)

- Ground speed (in m/s)
- Vertical speed (in m/s)
- Imperial system:
  - AMSL Altitude (in ft)
  - Ground speed (in kt)
  - Vertical speed (in ft/min)

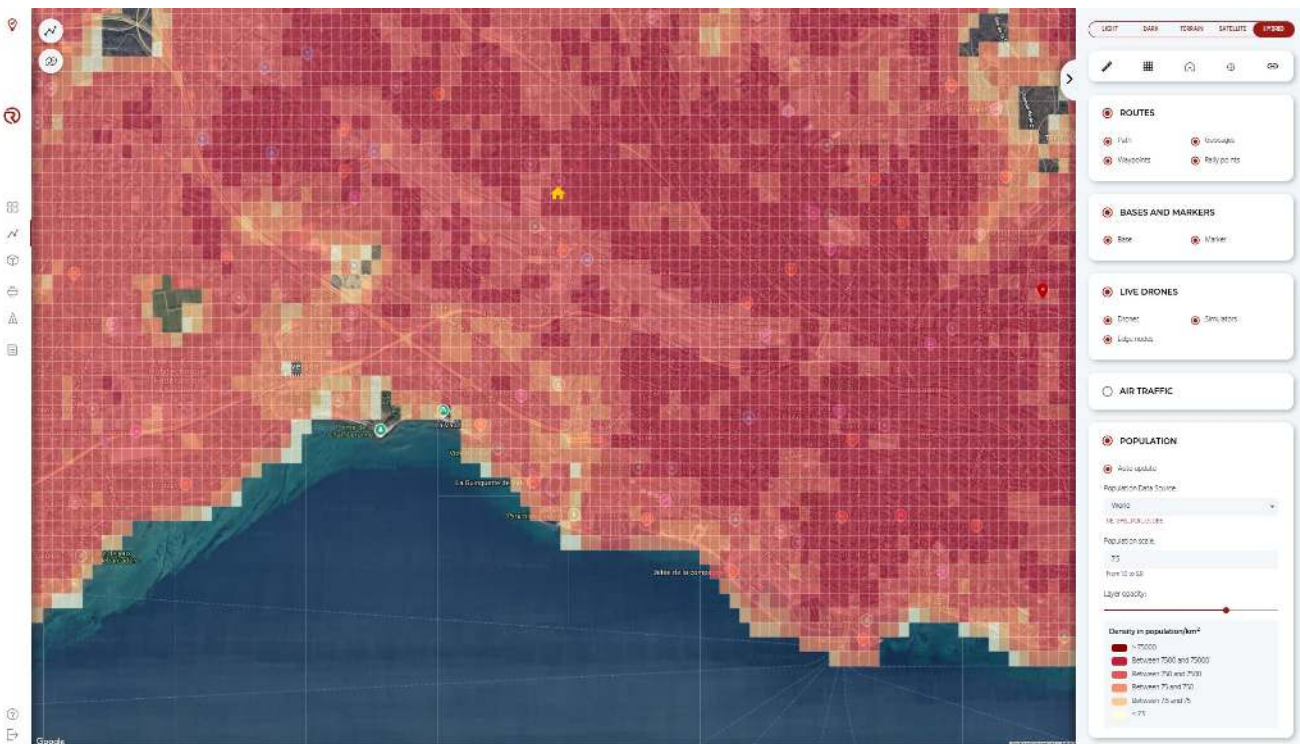
## Population

RigiCloud integrates population density information obtained from external sources:

- World data: [Global Human Settlement Layer](#)
- France: [Géoportail](#)

### Disclaimer:

- The operator shall consult with their competent authority what sources are acceptable to ensure proper population density identification.
- The operator shall evaluate the real number of people at risk during operations.
- RigiTech is not responsible for any decision taken by the operator due to the interpretation of the used population density information.



Within the population layer, it is possible to:

1. Show/hide the population layer.
2. Enable/disable Auto update.

3. Select the Population data source.
  - Depending on the zoom and the source, there are different sizes of squares:
    - World data ([Global Human Settlement Layer](#)): based on the latitude (3 and 30 arcsec).
    - France ([Insee FiLoSoFi 2019](#)): 200 m and 1000 m.
4. Population scale: allows to change the population scale (multiples of 1.0 to 9.9).
5. Modify the layer opacity.
6. See the legend of the layer.
  - The levels of population represented are:
    - Below 5 hab/km<sup>2</sup>
    - Between 50 and 500 hab/km<sup>2</sup>
    - Between 500 and 5000 hab/km<sup>2</sup>
    - Between 5000 and 50 000 hab/km<sup>2</sup>
    - Above 50 000 hab/km<sup>2</sup>
  - Depending on the source and the projection of the data, the population density is represented by squares of different colours from pale yellow to dark red.

By right-clicking on any square, additional information may be available (floor and ceiling of the structure).

If no data is being shown, it may be necessary to zoom in.

## Additional Tools

### Ruler

The ruler tool allows to measure distances between two points, as well as measuring the total distance of a sequence of points.

In order to use the tool, the user shall click on its icon in the "Layers and map tools" menu. Then, click on the desired location in the map, which should be an empty location (i.e., with no other map elements such as waypoints, bases, markers, etc.). A dotted arrow will be displayed with a text box with the distance measured (in m, km and NM).

By clicking on a second location, the distance between the two first points will be fixed and will now be able to add a third point. The measure appearing in the new text box counts the total distance of the sequence of points.

By repeating this process, it is possible to add multiple points and know the sequential distances.

- **How to add a point:** A new point can be added by left-clicking on an empty location in the map. An empty location is a location without other map elements (bases, markers, waypoints, rally points, vertices of geofences, etc.).
- **How to remove a point:** A point can be removed by right-clicking.
- **How to erase a sequence of points:** A sequence of points can be erased by following any of the next procedures.
  - Clicking on the "X" in any text boxes.
  - Clicking the "Esc" of the keyboard.
  - Clicking on the "Ruler" button in the "Layers and map tools" menu.



When using the ruler tool, the following elements will be displayed:

- 1. Point:** After clicking on any empty space of the map, a new point will appear. The last point created will be the origin of a new dashed arrow. If a new point is created, the previous arrow will be fixed and a new dashed arrow pointing to the mouse will appear.
- 2. Text box:** Displays the distances between a given point and the previous one (if the given point is the second one), the distance of the sequence of points up to the given point (if it is a point between the second and the last one) or the total distance of the sequence of points (over the mouse position, before creating a new point).

This tool is particularly useful when an exact measure of the distance between the route and other elements is needed, such as buildings, roads or other infrastructure.

## Grid

When the measure or estimation of multiple distances is needed, instead of using the ruler case by case, it might be more efficient to use the grid tool.

This tool displays a grid in the map for which the user can choose its length (between 10 m and 12 km) and angle.

In order to use it, the user shall click on its button in the "Layers and map tools" menu, and a new submenu will be displayed, allowing to modify the parameters of the grid.



When using the grid tool, the following elements will be displayed:

1. **Grid size:** The size of the squares of the grid can be modified (between 10 m and 12 km) by entering manually a number or by choosing the desired value with the scrolling bar. If the numbers of the grid size are erased, the value will be set automatically at 10 m.
2. **Grid angle:** Allows to rotate the grid between 0° and 90°.
3. **Reference point:** Allows to modify the reference point of the grid by clicking on the orange circle in the map and dragging it. This point is not necessarily attached to the vertex of one of the squares of the grid.

This tool is particularly useful when planning operations. It is possible to first set a geocage and then have the grid in the same direction of the geocage in order to have set the waypoints in the middle of the geocage. It is also possible to do the opposite and align the grid with the flight plan and prepare the geocage with the help of the grid.

The tool is also fitted to obtain quick estimations of the distance between the flight plan/operational volume with relevant infrastructures (such as the runways of an airport), mountains, shores, etc.

Finally, the tool can also be used to show relevant distances of the operational volume/ground buffer with urban environments, infrastructure, etc. and take pictures to support the operational risk assessment.

#### Additional comments:

- The size of the grid is limited to 80 x 80 km<sup>2</sup>. If the zoom is too small, the grid might not cover the whole space.

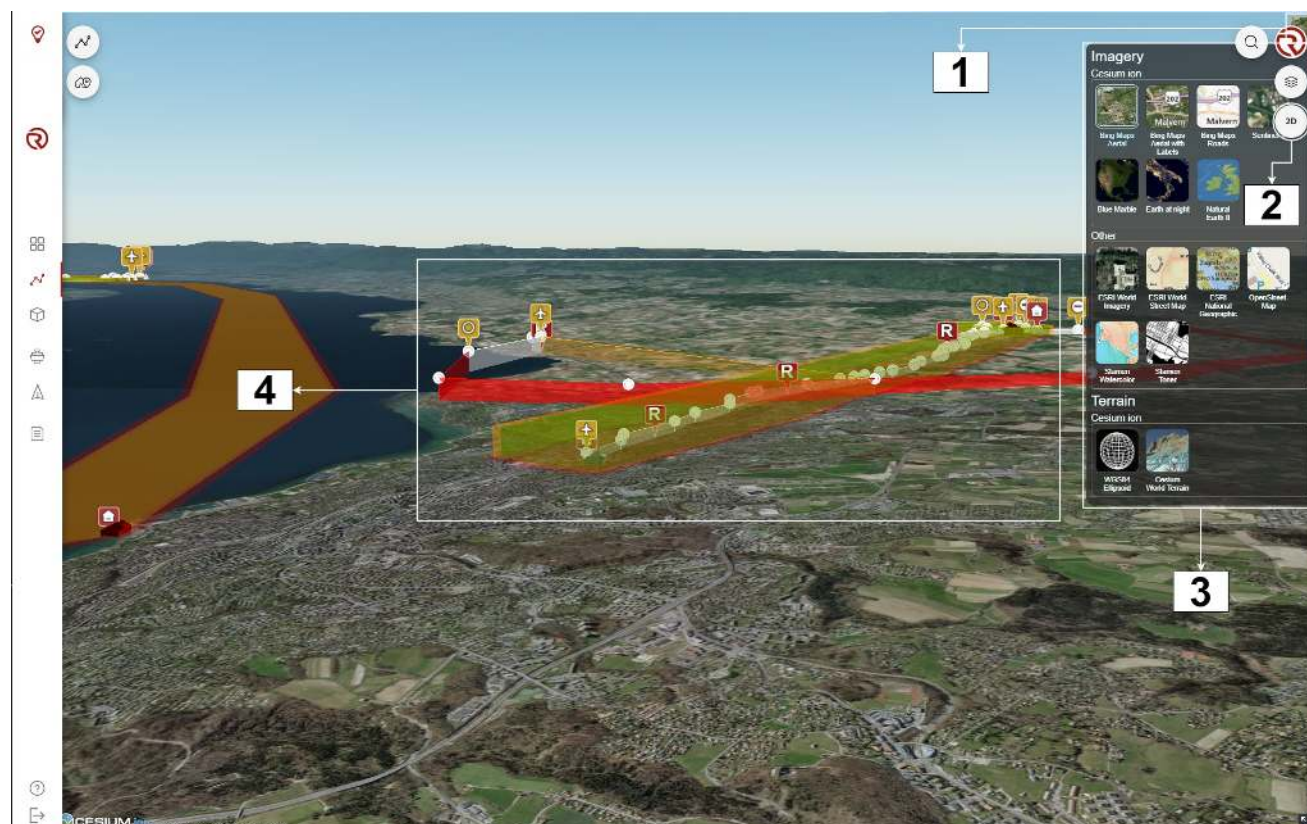
- If the grid size is small with a small enough zoom, the computer could be slowed down. It is advised to adjust the size of the window, the size of the grid and the zoom to have less than 100 squares visible per row.
- Every time the grid is turned on, its reference point is set in the centre of the map.
- If the position of the map is moved, a section of the grid and its reference might be lost. In order to avoid this, the user can simply turn off and turn on the grid.

## 3D View

RigiCloud allows to see the flight plan (including other elements, such as bases and markers) in a 3D view and assess if the waypoints and geocages are well defined and coherent with the terrain. The tool can also help to find the best trajectory in order to fly above/between mountains, in order to avoid regions that could be specially affected by chaotic winds.

### Disclaimer:

- The 3D View does not include artificial and natural obstacles.
- The operator shall consult with their competent authority what sources are acceptable to ensure proper obstacle avoidance.
- The operator shall evaluate the presence of obstacles in their operational volume and plan operations accordingly.
- RigiTech is not responsible for any decision taken by the operator due to the interpretation of the 3D View.



1. **Imagery:** opens the imagery selector.
2. **Switch to 2D:** allows to switch back to 2D view.

3. **Imagery box:** allows to select the imagery source of the 3D and altitude view.

4. **Example of a flight plan represented in 3D**

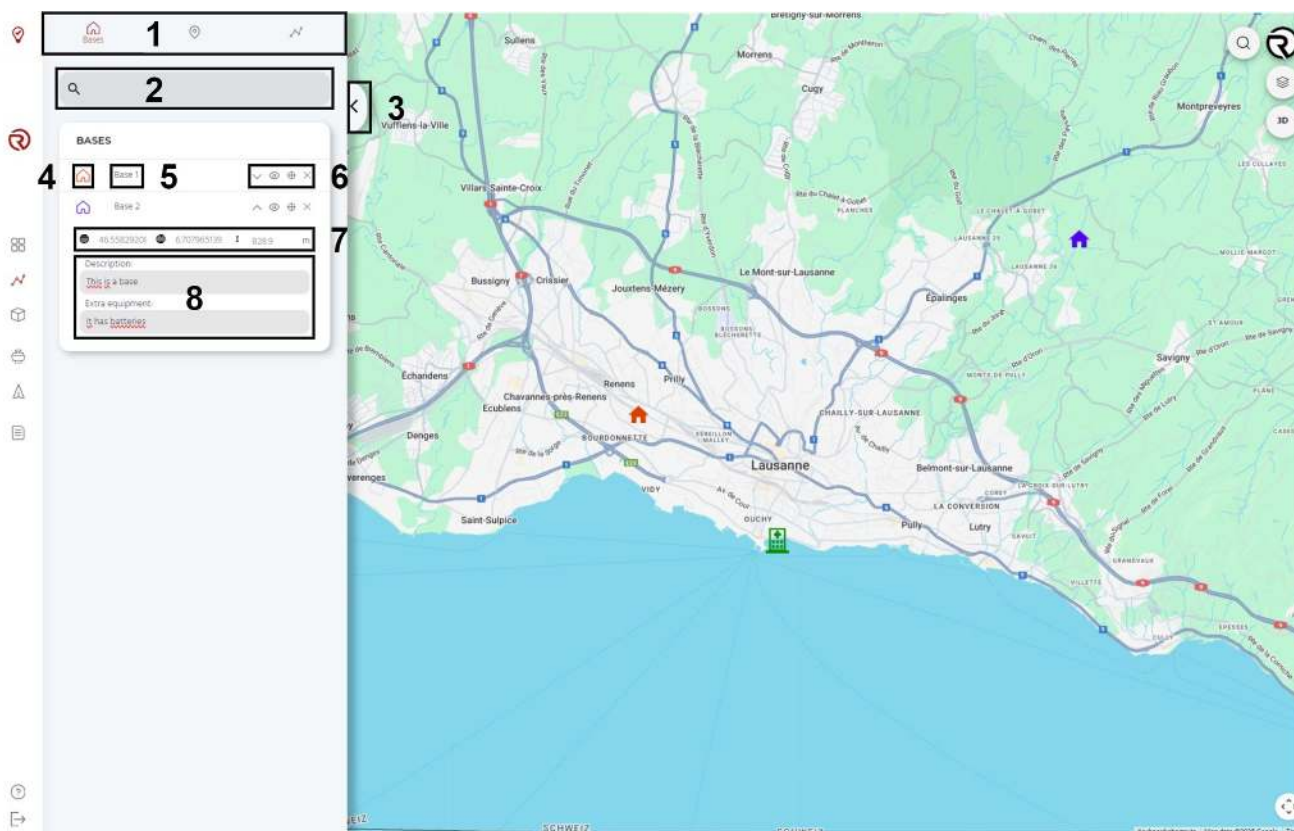
# Bases, markers and routes

## Bases

After clicking on the "Bases and markers" button, the "Bases, markers and routes" menu will open on the "Markers" module. Within this menu, bases can be added to the project, modified and/or removed.

Bases include a position (altitude above mean sea level included) and can include a description, as well as information on extra equipment available in the base. The two latter need to be defined by the user.

With the 'Bases' module open, you can create new bases by clicking directly on the desired location on the map. The position of a base can be edited by clicking on it and dragging it to the new location.



- Tab selector:** there are three icons representing, from left to right, the different modules of the menu: "Bases", "Markers" and "Routes". The tab selected will have its name shown and its colour will turn to red.
- Search box:** with the help of the search box, depending on the open module, it is possible to search specific bases, markers or routes.
- Close the menu:** closes the bases, markers or routes menu.

4. **Colour selector:** bases will be shown in the map with a house icon. The colour can be modified by clicking on the icon displayed in the menu.

5. **Name editor**

6. **General tools:** by clicking on the different icons, from left to right, it is possible to:

- Show/hide information of the base.
- Show/hide the base/marker on the map.
- Go to base (centers the map on the selected base).
- Remove base.

7. **Position:** if a base/marker is selected and its information shown, from left to right, the position of the base will be displayed:

- Latitude.
- Longitude.
- Altitude of the base/marker (AMSL).
  - The coordinates can be edited by writing or pasting a new value in decimal format.
  - Zeros need to be written before the last decimal. Zeros written in the last position (before writing subsequent decimals), will not be taken.
  - If the format or the number is incorrect, it will be positioned in an unexisting position.

8. **Description and extra equipment:** a description and information on extra equipment available on the base can be added.

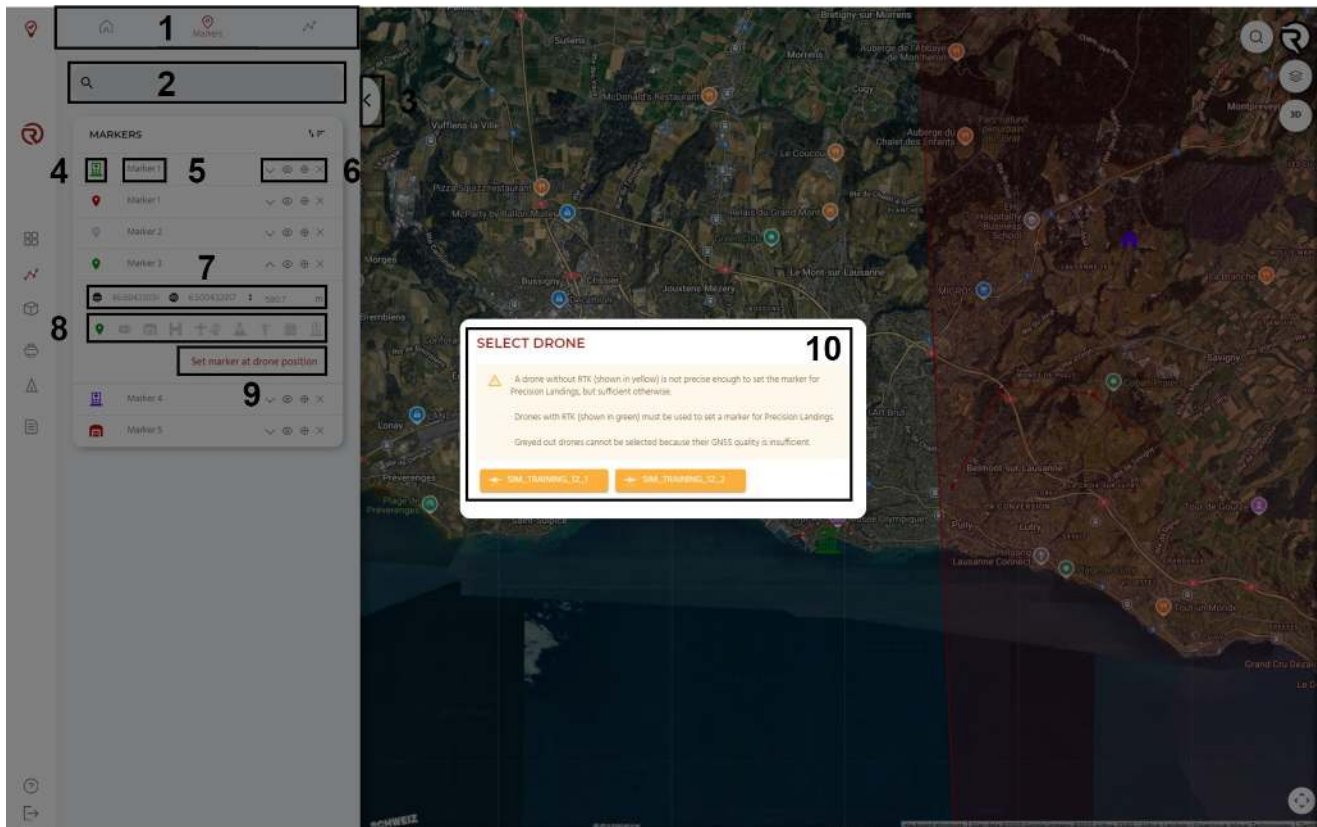
## Markers

After clicking on the "Bases and markers" button, the "Bases, markers and routes" menu will open on the "Markers" module. In order to access the "Markers" module, the corresponding menu shall be selected.

Markers can help to understand the context in which the flights will take place, for example, by showing relevant infrastructures (such as airports or hospitals).

Additionally, their use is required to mark exact takeoff and landing positions measured with a drone.

With the 'Markers' module open, new markers are generated by clicking directly on the desired location on the map. The position of a marker can be edited by clicking on it and dragging it to the new location.



Most of the tools available for markers are identical to the ones presented for bases.

1. **Tab selector**
2. **Search box**
3. **Close the menu**
4. **Colour selector**
5. **Name editor**
6. **General tools**
7. **Position**
8. **Marker type:** modifies the icon of the marker in order to better represent its purpose. From left to right, the different options are:
  - Generic marker
  - Recharge station
  - Warehouse
  - Heliport
  - Aerodrome
  - Airport
  - Laboratory
  - Pharmacy
  - Clinic

- Hospital
- 9. **Set marker at drone position:** opens a window to update the position based on online drones. By clicking on a given drone, the coordinates of the marker will be updated based on that drone's coordinates.
  - Green: drone with RTK precision.
  - Yellow: drone without RTK precision.
  - Grey: drone without sufficient GNSS quality.
  - **Note:** Simulators are also displayed (in yellow) for training and testing purposes.

Markers must be used to mark the takeoff and landing position in when editing a route. If a marker is linked to a route and the marker is then moved or removed, a warning will be displayed to confirm the action.

Moving this Marker will reset the following routes to Draft status:

Marker example

OK

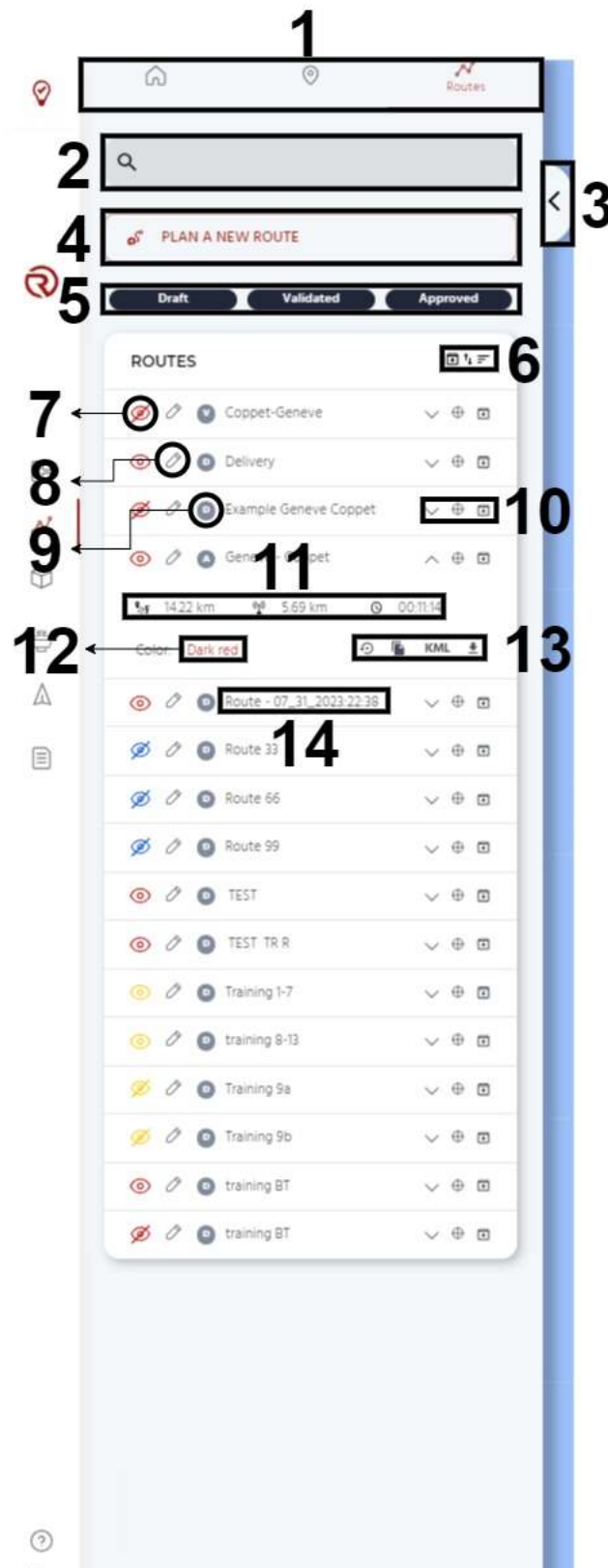
Cancel

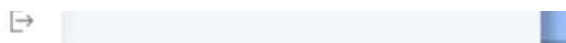
This behaviour is linked to safety checks for the takeoff and warning points, explained in Safety checks.

## Routes

After clicking on the "Routes" button, the "Bases, markers and routes" menu will open on the "Routes" module.

Routes are one of the most important elements of RigiCloud, as they are key elements of any automatic UAS operation. Therefore, multiple sections will show all the functionalities available, including some insights on how to prepare a safe route (Route planning overview, Mission, Geocages, Rally Points, Safety settings, Safety checks and Operation structure). However, for now, routes are discussed only as another element of the map.





Some of the tools available for routes are identical to the ones presented for bases and markers.

1. **Module selector**

2. **Search box**

3. **Close the menu**

4. **Plan a new route:** opens the route planner and allows to create a new route. By default, new routes have a "Draft" route state.

5. **Route state filter:** shows/hides routes by their state. States shown have a dark button, while states hidden have a light button. More information on sates is given in Route planning overview. From left to right:

- Draft
- Validated
- Approved

6. **Sorting options:** similar to the equivalent options for markers. Additionally, the left button allows to show/hide archived routes.

7. **Show/hide route**

8. **Edit route:** opens the route planner and allows to modify an existing route.

9. **Routes tools:** by clicking on the different icons, from left to right, it is possible to:

- Show/hide information of the route.
- Go to route (centers the map in the selected route).
- Archive route. When showing archived routes, this icon becomes "Unarchive routes" in archived routes.
- Remove route (only when showing archived routes, in archived routes).

11. **Route information:** shows the main information of the route. From left to right:

- Estimated flight distance.
- Estimated time of the flight.

12. **Colour editor:** changes the colour of the flight path displayed in the map.

13. **Clonation and exportation tools:** different tools to clone and export routes. From left to right:

- **Reverse route:** creates and opens a reversed clone of the route in the same project (*useful to do when the first way of a two way operation is already planned and approved*). The reversed route needs to be saved manually and reviewed by the operator. Its state becomes "Draft" by default.
- **Clone route:** creates and opens a cloned route in the same project (*useful for having similar routes with minor modifications, or to create a route based on an existing one*). The cloned route needs to be saved manually. Its state becomes "Draft" by default.
- **Download kml:** downloads the route in .kml format (*useful for sharing the geography of the route with other stakeholders, such as regulators*).
- **Download:** downloads the route in .plan format (*useful to copy it into other RigiCloud projects or servers, as well as to prepare back-ups*).
  - "Download" should be prioritised over "Download kml" if the flight plan may be re-imported later to RigiCloud. For external exportations (e.g. Google Earth), "Download kml" should be used instead.

14. **Name editor**

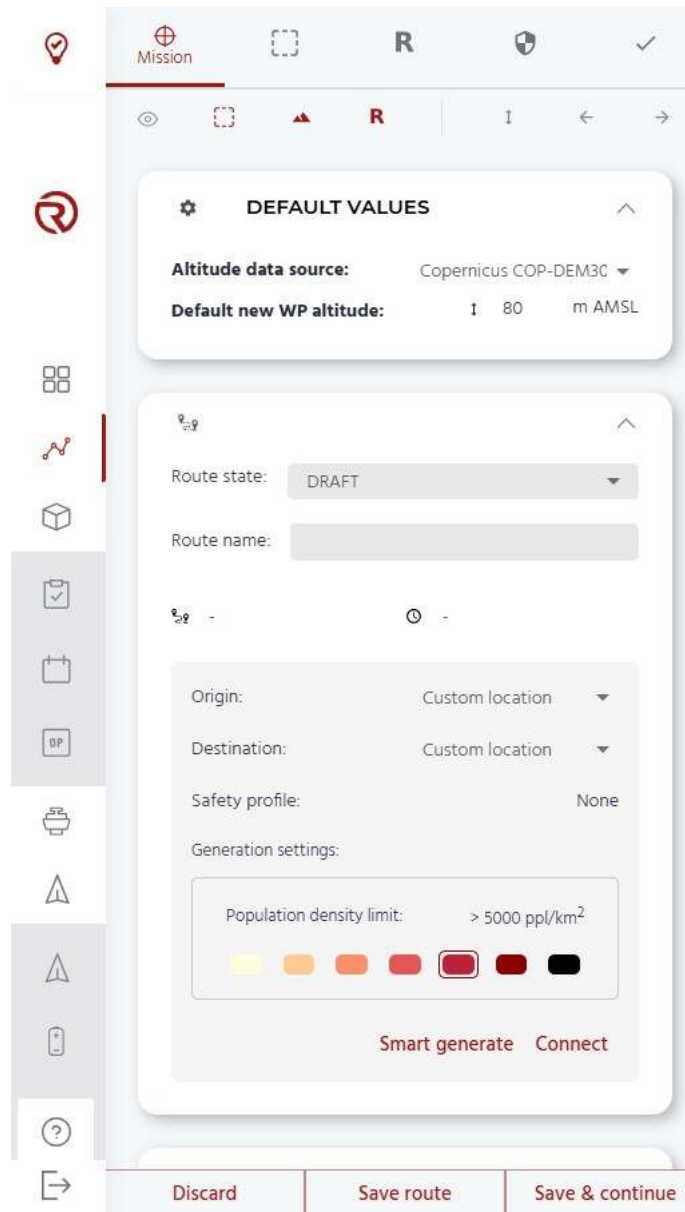
Within the "Routes" module, new routes can be planned by clicking on "Plan a new route" and existing routes can be edited (both by searching it in the list or by right-clicking on its representation in the map and selecting "Edit route").

[Home](#) > 
 [RigiCloud User Manual](#) > 
 [Airbridge Planner](#) > 
 [How to plan a route?](#) > 
 [Route planning overview](#)

# Route planning overview

## Overview

When clicking on "Plan a new route" (or editing an existing route), the route planner will open, where routes can be created, imported or edited.



The screenshot displays the RigiCloud Route Planner interface. On the left is a vertical sidebar with icons for Mission, Route, and other functions. The main area is titled 'Mission' and contains several sections:

- DEFAULT VALUES**: Includes 'Altitude data source' set to 'Copernicus COP-DEM30' and 'Default new WP altitude' set to '80 m AMSL'.
- Route state**: A dropdown menu currently set to 'DRAFT'.
- Route name**: A text input field.
- Origin**: A dropdown menu set to 'Custom location'.
- Destination**: A dropdown menu set to 'Custom location'.
- Safety profile**: A dropdown menu set to 'None'.
- Generation settings**: Includes a 'Population density limit' set to '> 5000 ppl/km<sup>2</sup>' and a color-coded legend with six options (yellow, orange, red, dark red, black).
- Buttons**: 'Smart generate' and 'Connect' buttons.
- Bottom Bar**: Three buttons: 'Discard', 'Save route', and 'Save & continue'.

The following features are described from top to bottom and left to right.

## Module selector

There are five icons representing, from left to right, the different modules of the menu: "[Mission](#)", "[Geocages](#)", "[Rally](#)", "[Safety](#)" and "[Checks](#)". The module selected will have its name shown and its colour will turn to red.

## Show/hide elements

"Show/hide elements" allow to show/hide different elements of the routes and the screen. A red icon represents a shown element, while a grey icon represents a hidden element. From left to right, the different elements are:

- **Show/hide VLOS area:** a white translucent circle around the operator showing the region in which he has visibility and where VLOS conditions could be considered. By default, the radius of this circle is 1000 m.
- **Show/hide geocages:** geocages and other areas/volumes. Geocages include: geocage, pregeocage, ground buffer and generic polygons. See [Geocages](#).
- **Show/hide altitude profile:** the altitude profile shows the flight plan profile and compares it with the ground level. See [Mission](#).
- **Show/hide rally points:** rally points are safety points towards which the drone could go automatically in case of contingencies or emergencies when the UAS is too far from the takeoff or landing points. See [Rally Points](#).

## Quick edition tools

"Quick edition tools" are different tools that allow to quickly edit the route. From left to right, the icons are:

- **Set or increase point altitude:** modifies the altitude of all the waypoints at once. See [Set altitude](#).
- **Undo action:** undoes the last action. It should be noted that, since waypoint edition requires the system to do multiple calculations of the ground level, this action might take a few seconds.
- **Forward:** redoes undone actions. It should be noted that, since waypoint edition requires the system to do multiple calculations of the ground level, this action might take a few seconds.

## Default values

Default values provide information on altitude data source

- **Show/hide Default Values:** shows/hides default values (altitude data source, default altitude for new waypoints and altitude frame).
- **Altitude data source:** allows to change the altitude data source for the terrain. Available sources are:
  - [Copernicus COP-DEM30](#)
  - [Google Elevation API](#)
  - [Luxembourg DEM](#) (if enabled in the project)
  - **Disclaimer:**
    - The altitude data sources do not include artificial and natural obstacles.
    - The operator shall consult with their competent authority what sources are acceptable to ensure proper obstacle avoidance.
    - The operator shall evaluate the presence of obstacles in their operational volume and plan operations accordingly.
    - RigiTech is not responsible for any decision taken by the operator due to the interpretation of the altitude data.
- **Altitude default values:** allows to set the default altitude for new waypoints. The altitude frame is "AMSL - Altitude above sea level".
  - By default, 80 m above the terrain calculated for the first waypoint (Takeoff), in AMSL.

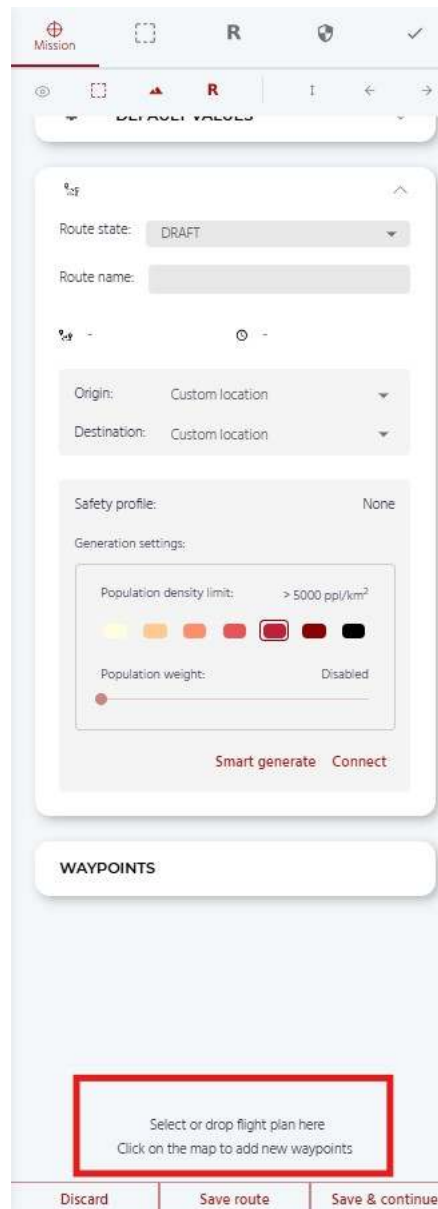
## Route information

Within the route information, the name, state and estimated distances and times are available. This section also includes tools for automatic route generation.

- **Show/hide route information**
- **Route state:** allows to change the state of the route (Draft, Validated and Approved). See [Route state](#).
- **Name editor** allows to name or edit the name of the route. When saving a nameless route, it will be named automatically based on the date and time of the first saving.
- **Route information:** from left to right, estimated flight distance of the route and estimated time of the flight. It should be noted that the estimated distance and time do not need to match with the actual distances/time flown by the UAS during an operation due to possible deviations, sharp turns, wind, etc.
- **Origin and destination for automatic generation:** allows to set the origin and destination (waypoints, bases and/or markers) to automatically generate a flight plan through the available tools (smart generation and connection). Origins/destinations can be selected by clicking on the down arrow and selecting a location in the list that will open. This list contains all the markers and bases of the project. If no location is selected, the default location will be "Custom location", which allows to create a flight plan based on the current first and last waypoints.
- **Safety profile:** indicates which safety profile is defined for this route.
- **Generation settings:** allows to define the maximum population density over which the drone can fly when using the "Smart generate" feature. See more details in the [Smart generate](#) section.
- **Smart generate:** allows to automatically generate a flight plan between two points. See [Smart generate](#).
- **Connect:** allows to automatically generate a simple connection between two points. See [Connect](#).
- **List of waypoints:** shows the list of waypoints added to the route (empty at the creation of a new route).

## Import flight plan

Existing flight plans can be imported by dropping the file in this area or by clicking on it and browsing the file from the computer.



Only flight plans in .plan format are supported. Files with .kml format are not natively supported.

This feature can be used when working in RigiCloud Test with flight plans created/modified before the database update of the Test server, by downloading the .plan file from the list of routes in RigiCloud Production (**not the .kml file**).

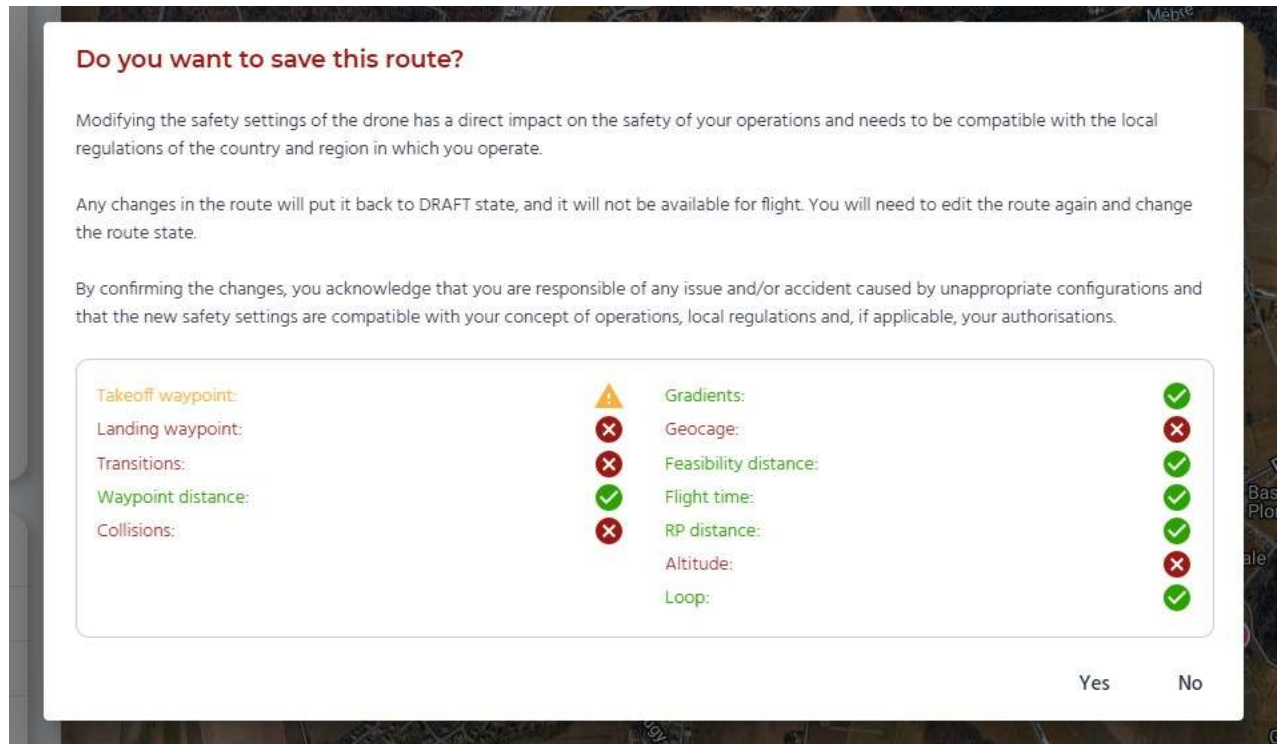
It can also be used to transfer routes modified in the Test server to Production.

## Discard/save route

- "Discard": cancels all the changes done since the last time the route was saved.

- "Save route": saves the route (which is not possible if the route has not been named or if there are errors) and leaves the editor. It is recommended to save the route periodically to avoid losing information.
- "Save & continue": saves the route and continues in the editor.

When saving clicking on "Save route", a window will pop up showing the safety checks of the route, as well as a request to confirm the saving of the route. It is the operator's responsibility to confirm the modifications under the conditions of the flight plan.



## Route state

Route states have multiple purposes:

- Allows to order/filter routes by their state (in the "Route" menu).
- Allows to prevent modifications on approved/validated routes by unauthorized users.
- Allows to prevent non approved routes to be uploaded to the UAS.

Only Head of Operations users can modify the status of the route and modify "Validated" or "Approved" routes.

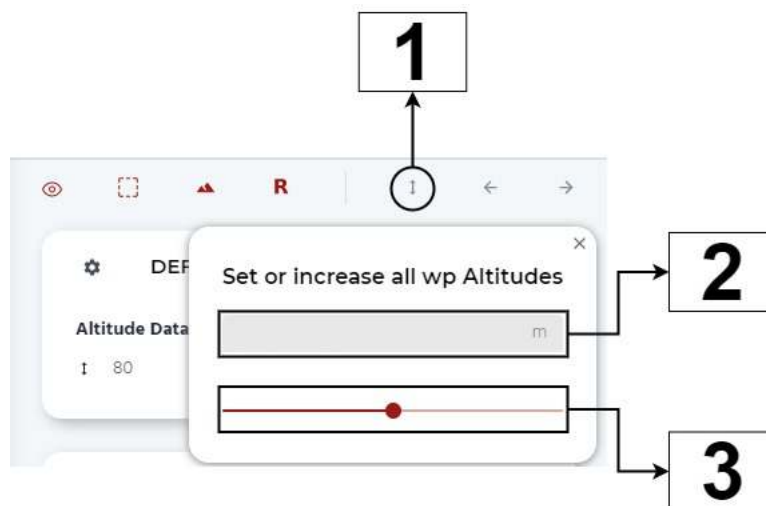
There are three route states available:

- Draft: default route state.
  - Any new, cloned or reversed will start with this status.
  - Modified routes will become "Draft" automatically.
  - "Draft" routes cannot be uploaded to UAS.

- "Draft" routes can be uploaded to simulators.
  - The purpose of this state is to show routes that are in an early stage and have not been validated.
- Validated:
  - "Validated" routes cannot be uploaded to a UAS.
  - "Validated" routes can be uploaded to simulators.
  - The purpose of this state is to show routes that have been validated internally, but that have not been approved by the authorities (or, if not required, by the Head of Operations).
- Approved:
  - "Approved" routes are the only routes that can be uploaded to a UAS.
  - "Approved" routes can be uploaded to simulators.
  - The purpose of this state is to show routes that can be operated and should not be modified.

## Set altitude

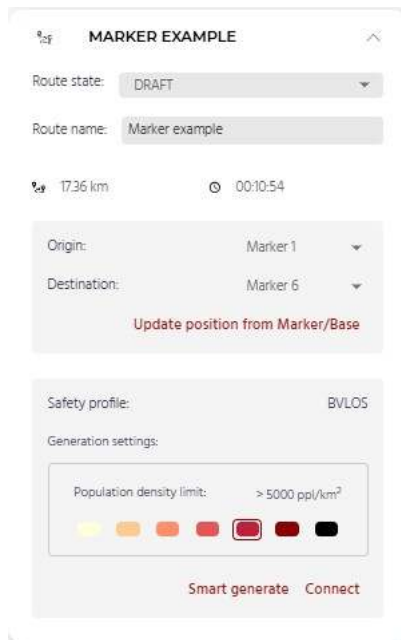
There are specific tools to set or increase the altitude of all the waypoints at once.



1. **Set altitude:** makes the window of the tool to pop up.
2. **Set an altitude for all the waypoints:** sets an altitude for all the waypoints.
3. **Increase/decrease all the waypoints altitudes:** modifies the altitude of all the waypoints by increasing/decreasing them a constant number with the the scrolling bar.

## Use of markers for origin and destination

Markers should be used to define precise takeoff and landing locations (based on the drone's measured GNSS coordinates). This is particularly important when using RTK.



By clicking on "Custom location" next to Origin and Destination will open the list of markers and bases. After planning the takeoff and landing waypoints on the map, when selecting one (or both), the button "Update position from Marker/Base" will be displayed.

By clicking on it, the following waypoint coordinates will be updated:

- Takeoff (as per the marker/base defined for the Origin)
- Landing (as per the marker/base defined for the Base)

To properly support RTK, this procedure requires that the markers/base coordinates have been set at the drone's position, as described in [Bases, markers and routes](#).

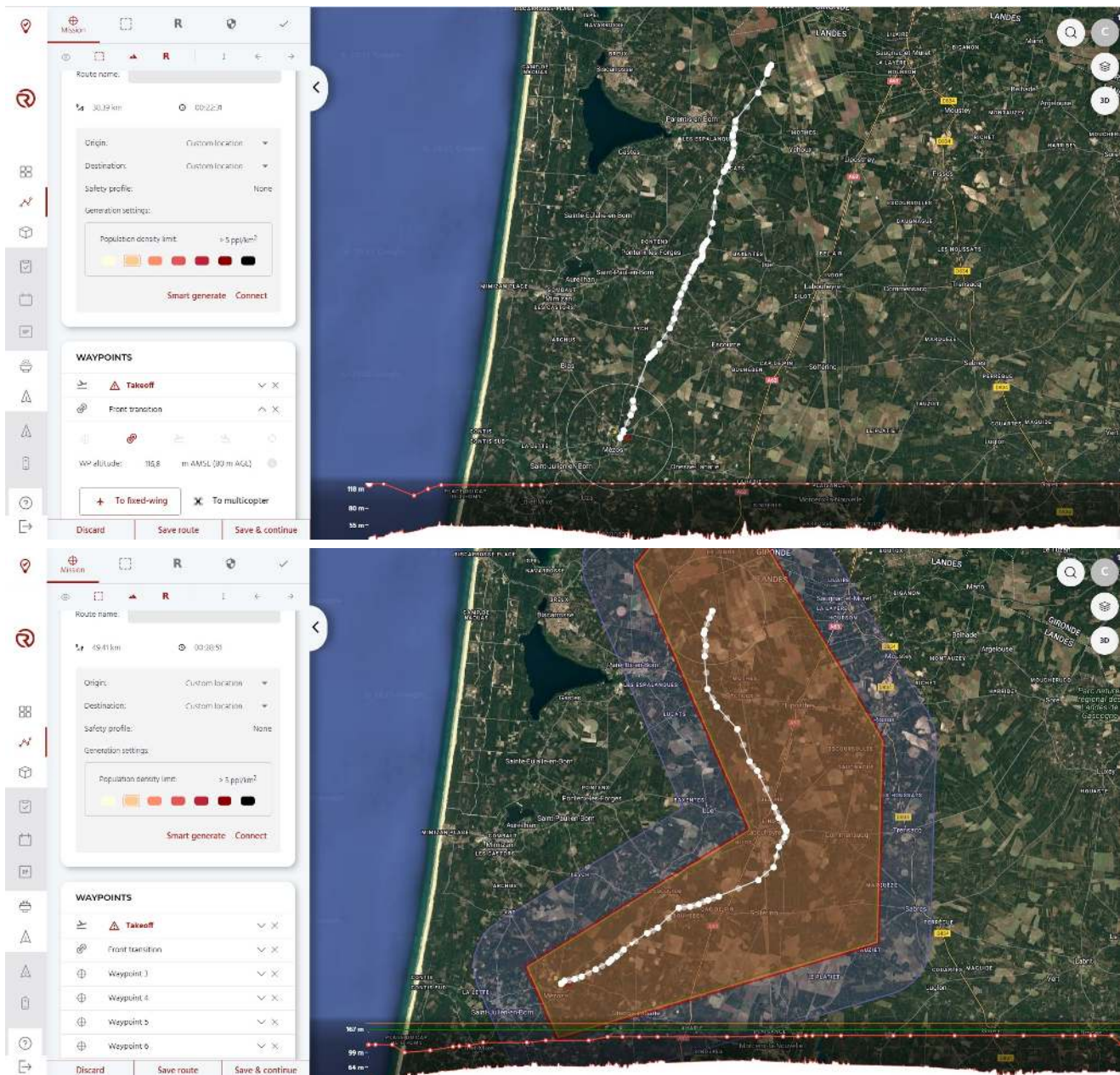
## Smart generate

The Smart generate tool allows to quickly generate a complete route between two locations or waypoints. The route is generated in such a way that the first waypoint and the last waypoint (or the origin and destination) are set as the takeoff and landing waypoints, with transition waypoints just after/before them, and a series of waypoints between them, generated automatically by taking into account the terrain profile and, if applicable, the geocages.

The user can also select a maximum population density over which the drone can fly. The Smart Generate algorithm will then automatically generate an entire route based on the population density, terrain and geocages.

In the examples below, two automatically generated flight plans are presented. In the first one, the flight plan is generated based only on the elevation and the capabilities of the drone. In the second one, a group of geocages were defined before the generation of the flight plan. Therefore, the automatically generated flight plan has selected the best path in terms of the elevation and the capabilities of the UAS within the available space.

It should be noted that to smartly generate flight plans within geocages, the latter must be wide enough to allow turns, climbings, descents, etc.



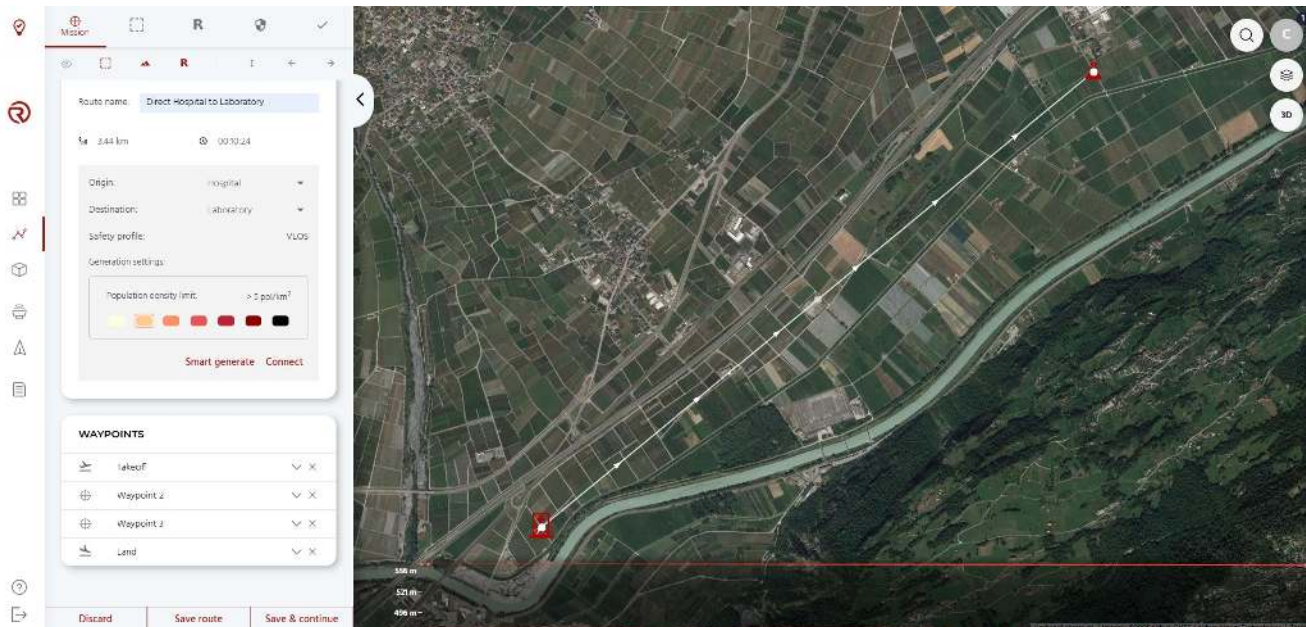
#### Disclaimer:

- Although the flight plans generated take into account certain restrictions, such as the feasible gradients of the drones, the elevation and the geocage, it is the operator's responsibility to ensure that:
  - The flight plan is within the capabilities of the drone;
  - There are no obstacles in the trajectory of the drone;

- The flight plan does not violate local regulations and/or restrictions.

## Connect

The connect tool allows to quickly connect two locations (based on a base or a marker), by creating a route with four waypoints and the first safety profile available.



It should be noted that this flight plan shall not be used in real flights.

# Mission

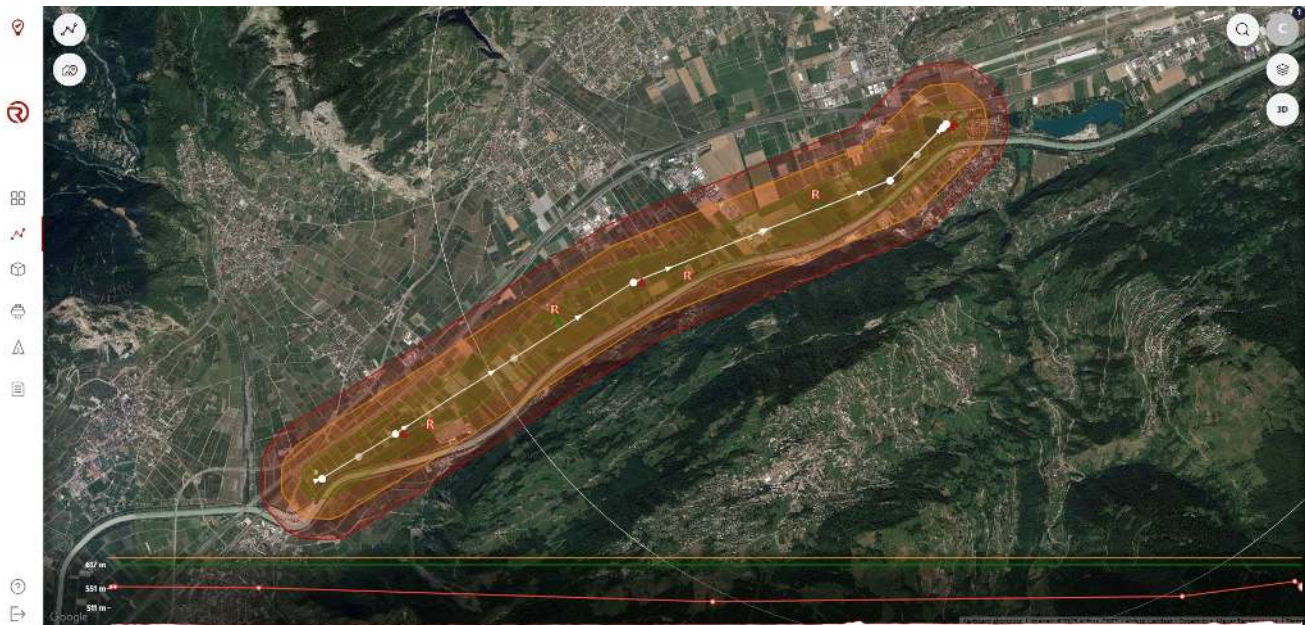
## Overview

Within the "Routes" module, the "Mission" menu allows to prepare the flight plan by adding/removing/editing waypoints, the main elements of a route.

Waypoints can be added by simply clicking on the desired location in the map. "Intermediary waypoints" can become new waypoints by clicking on "middle points" (transparent circles between waypoints) and dragging them.

Their position can be edited by clicking on them and dragging them to the new position. Their coordinates can also be edited manually by opening a waypoint's information and changing the numerical values of the coordinates.

Finally, waypoints can be removed by clicking on "Remove" in the waypoints menu or by right-clicking on them on the map and selecting "Delete".



On the map, the following elements of the flight plan are represented:

- **Waypoints:** white circles.
- **Waypoint with warnings:** warning symbol next to the waypoint.
- **Intermediary waypoints:** white semi-transparent circles.
- **Flight path:** white line connecting waypoints.
- **Geocages:** areas or circles with different colours. See [Geocages](#).
- **Rally points:** red "R". See [Rally Points](#).

- **Altitude graph:** as long as it is shown (third show/hide element under the module selector), the altitude graph displays the vertical profile of the operation. See [Operation structure](#).

See [Operation structure](#) for more information on how to properly set an operation in terms of distances, altitudes, radii, etc.

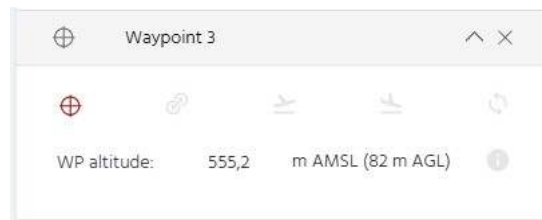
## Waypoints menu

Under "WAYPOINTS", waypoints can be edited (altitude and type) and configured/removed. Their detailed information is also available.

- **Waypoints:** from left to right, icon of the waypoint (which depend on its type), name and, eventually, its number (if it is a regular waypoint).
- **Expand waypoint:** expand one waypoint and displays its type, altitude (in AMSL and AGL) and additional information icon. Altitudes can be edited only in AMSL, but information in AGL is visible.
- **Remove waypoint**
- **Waypoint type:** allows to change the type of the waypoint. The selected type of waypoint is highlighted in red. From left to right, the different waypoints are:
  - **Waypoint**
  - **Transition**
  - **Takeoff**
  - **Land**
  - **Drop payload**
    - Only if enabled for the UA.
  - **Loop**
- **Altitude:** all the waypoint types allow to select at least one altitude. For regular waypoints, transitions and loops, "WP altitude" represents the altitude at which the UA will aim to fly.
- **Show/hide waypoint information**
- **Waypoint information:** includes relevant information of the waypoint compared to the terrain and other waypoints. From left to right and top to bottom:
  - **Latitude** (can be edited manually)
  - **Longitude** (can be edited manually)
  - **Ground leavel**
  - **Heading**
  - **Distance to the previous waypoint**
  - **Distance to the next waypoint**
  - **Altitude difference with the previous waypoint**
  - **Altitude difference with the next difference**
  - **Gradient with previous waypoint**
  - **Gradient with next waypoint**

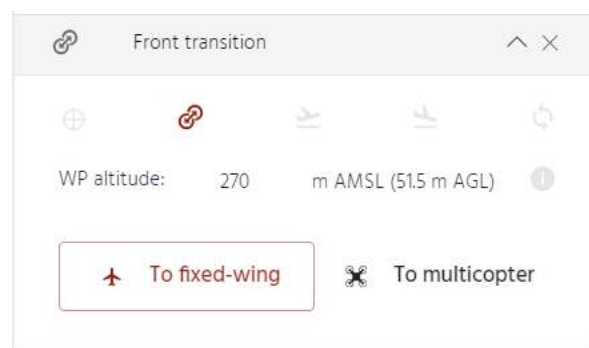
## Waypoint

Generic waypoints are the points aimed by the UA when flying. They are the main element of the flight plan.

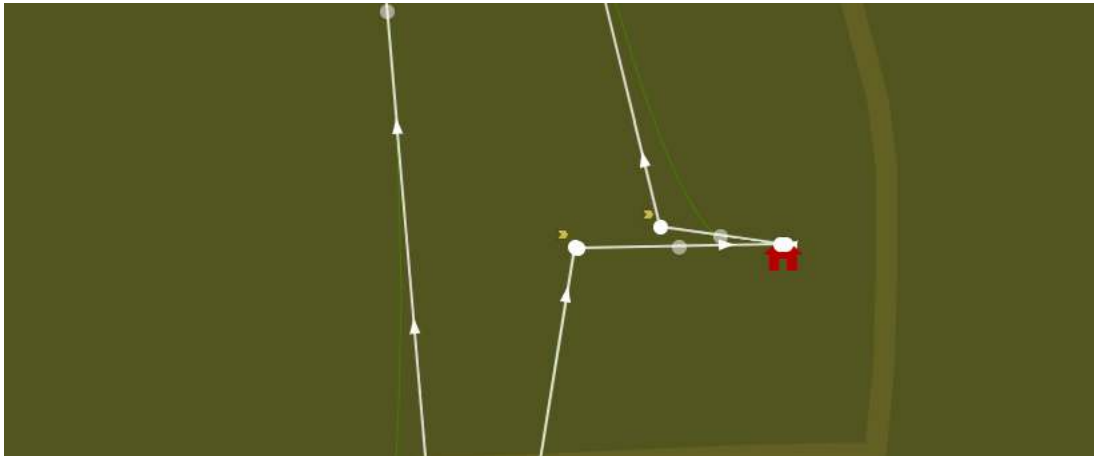


## Transition

When clicking on "Transition" on a given waypoint, a new selector will open, allowing to choose between a "To fixed-wing" waypoint (Front transition) and a "To multicopter" waypoint (Back transition).



- By default, the first transition point created will be a "To fixed-wing" one (**Front transition**), while the second, as long as the waypoint is after the first one, will be a "To multicopter" point (**Back transition**). Users shall confirm that they are in the correct order.
- A front transition starts at the "To fixed-wing" point and aims to end before the next waypoint.
- A back transition point starts before this point and aims to end no later than this point. If this was not possible, an overshoot might happen.
- Transition points are marked with small yellow arrows next to the white circles.
- Users may plan multiple sets of transitions. It is their responsibility to ensure that all transitions have the correct order and are planned properly.



## Takeoff

By default, the first waypoint created is a "Takeoff" point (TO).

- The UA arms, starts to spin the motors and will takeoff and climb in multicopter configuration up to the selected altitude (Climb altitude) and go to the next waypoints (WP).
- "Pad altitude" represents the altitude where the UA starts spinning its motors from ground (where the Precision Pad would be located, if any). This altitude may be different from the ground level (e.g. takeoff from a roof or structure, terrain model resolution, etc.).

 Takeoff 

Climb altitude:

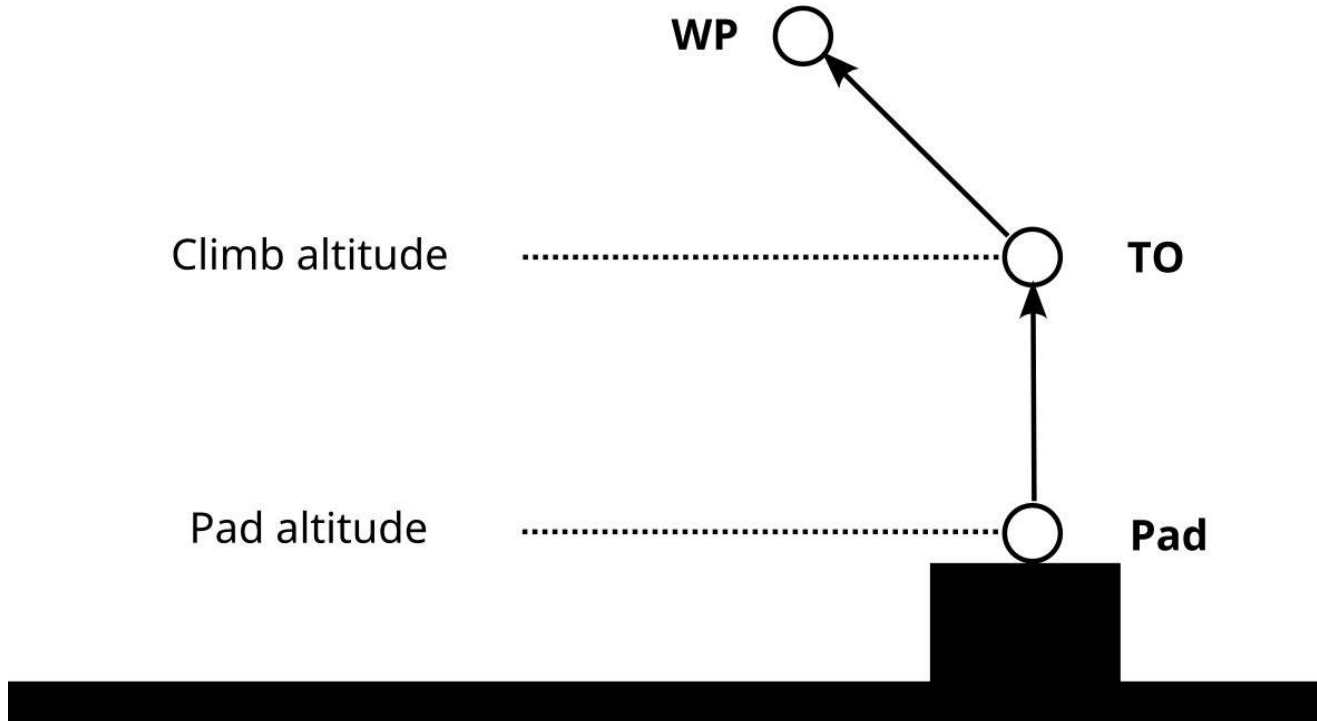
464.1

m AMSL (80 m AGL)

Pad altitude:

384.1

m AMSL (0.1 m AGL) 



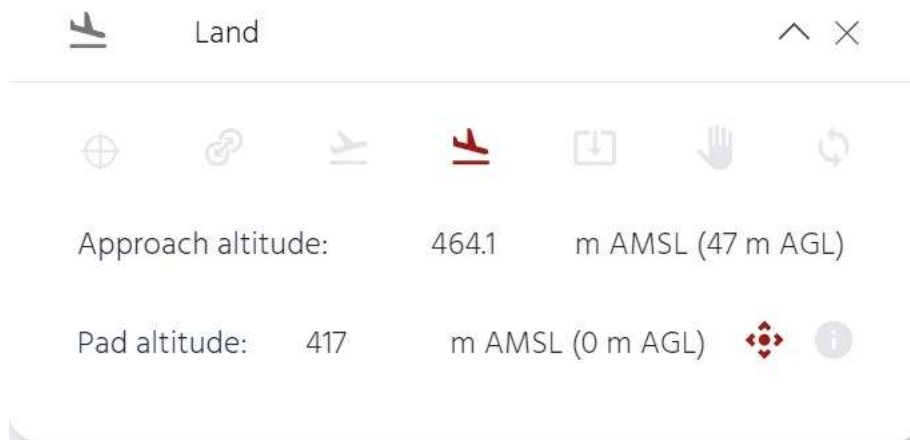
**Note:** If the pad altitude is below the measured ground altitude, a warning will be displayed. However, this will not block the flight plan from being saved and/or uploaded to the UA.

The coordinates of the Takeoff point should be updated based on a marker position, as defined in [Route planning overview](#).

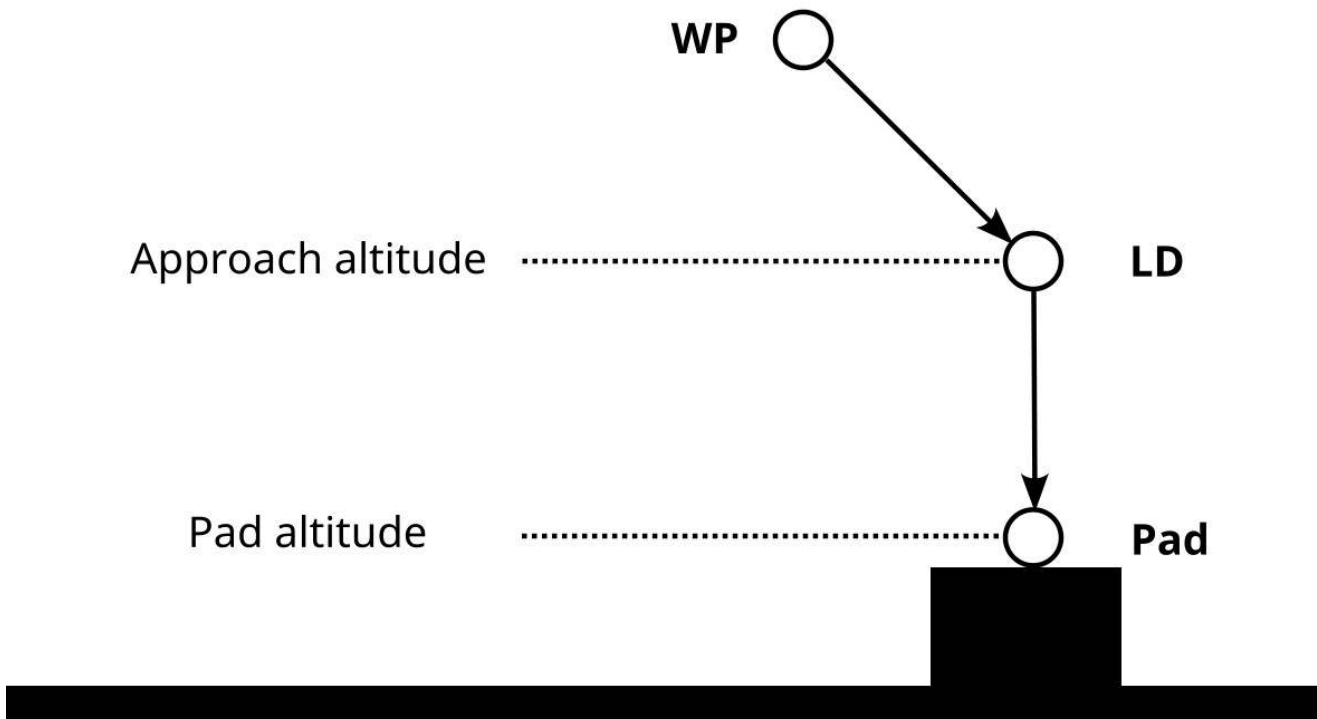
## Land

The "Land" point (LD) must be the last waypoint of the list.

- It must be put in a section of the route in which the UA is set to fly in multicopter configuration from the previous waypoints (WP).
- The UA will reach the landing location at the specified altitude (Approach altitude), and then will descend until it detects the ground, stop spinning the motors and disarm.
- "Pad altitude" represents the altitude where the UA stops spinning its motors after having touched the ground (where the Precision Pad would be located, if any). This altitude may be different from the ground level (e.g. landing on a roof or structure, terrain model resolution, etc.).



If there is a Precision Pad, enabling the "Precision landing" option will make the UA look for the Precision Pad.

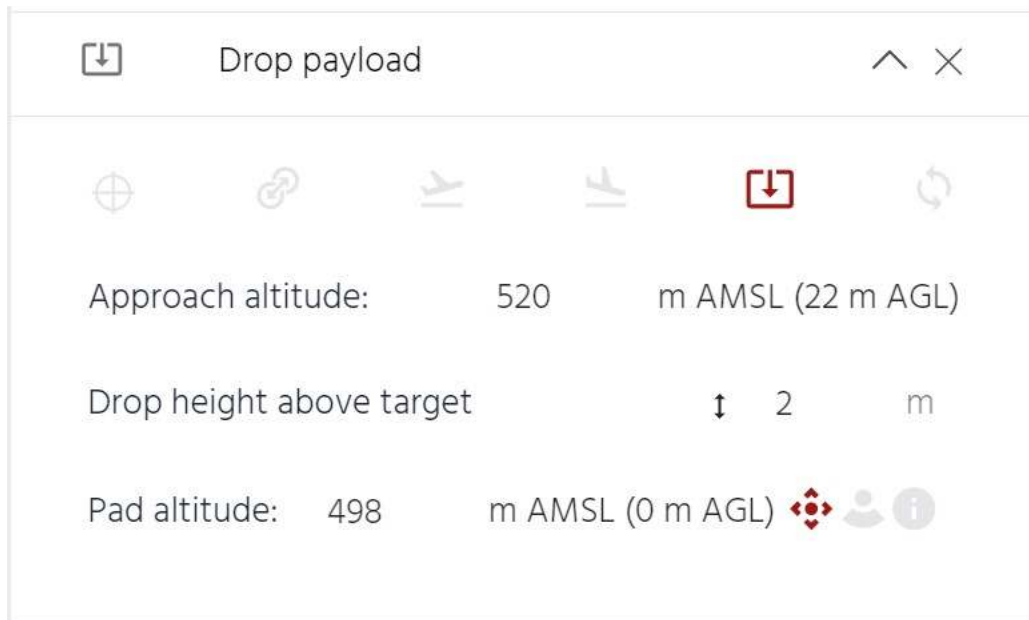


**Note:** If the pad altitude is below the measured ground altitude, a warning will be displayed. However, this will not block the flight plan from being saved and/or uploaded to the UA.

The coordinates of the Land waypoint should be updated based on a marker position, as defined in [Route planning overview](#).

## Drop payload

The "Drop payload" point allows the UA to drop its payload at a selected height above the ground. The sequence starts once the UA reaches the location of the "Drop payload" point at the "Approach altitude". The UA will then use the precision sensor selected (downwards facing camera and Precision Pad or lidar) to descend to the "Drop height above target". If the precision sensor is not available (Precision Pad not detected or lidar not in range), the "Drop payload" point is skipped. Once the "Drop height above target" is reached for 2 seconds, the payload is dropped and the UA will climb back to the "Approach altitude".




Drop payload
^
×








Approach altitude: 520 m AMSL (22 m AGL)

Drop height above target  2 m

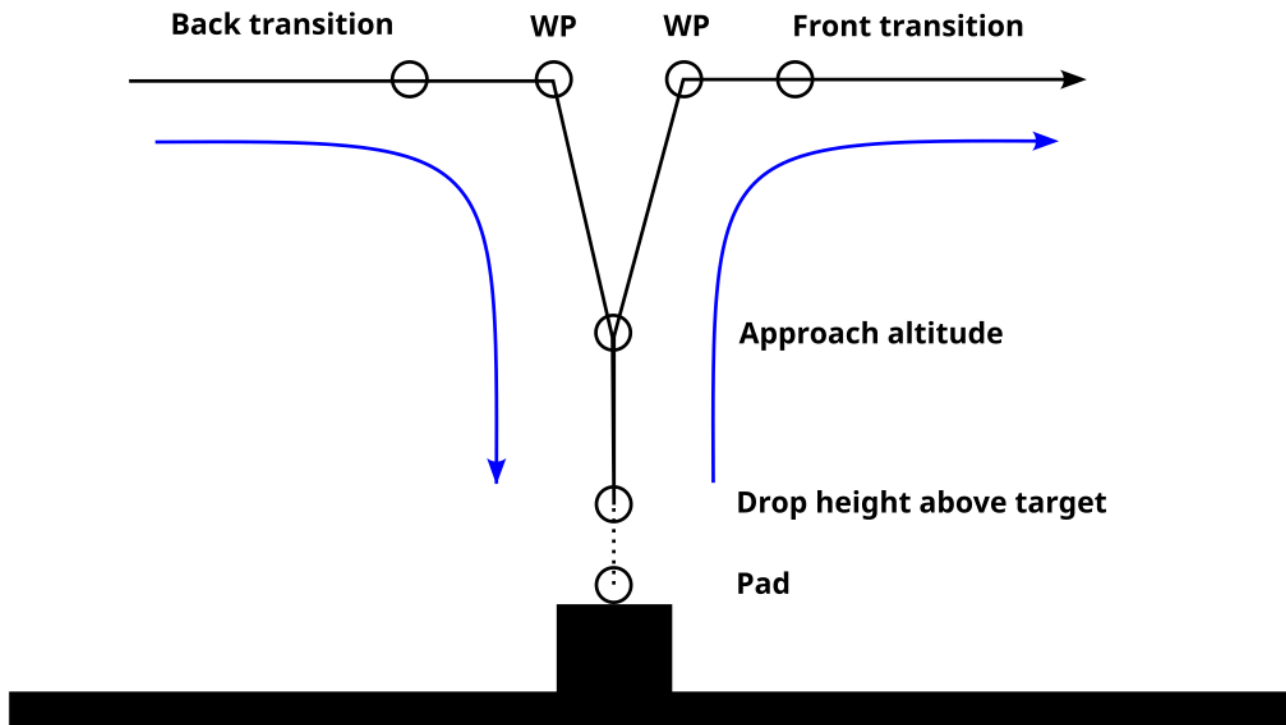
Pad altitude: 498 m AMSL (0 m AGL)   

#### Drop payload point horizontal structure:

- The "Drop payload" point is skipped if it is not reached in multicopter configuration.
- It is recommended to have one waypoint between the Back Transition and the Drop payload points, and another waypoint between the Drop and Front Transition points.

#### Drop payload point vertical structure:

- "Approach altitude": altitude at which the drone will start using the precision sensor to navigate towards the payload drop zone. It must be between 20 and 25 m above the "Pad altitude" to maximize the chances of having a valid precision sensor i.e. Precision Pad detected or lidar in range.
- "Drop height above target": height above the "Pad altitude" at which the payload is dropped. It must be set between 2 and 10 m.
- "Pad altitude": altitude of the Precision Pad (or the ground when using the lidar as precision sensor). This altitude may be different from the ground level displayed in cloud (e.g. landing on a roof or structure, terrain model resolution, etc.).



#### Selection of precision sensor:

- "Drop with target": The UA will use the downwards facing cameras and the Precision Pad to navigate towards the drop zone. The UA will correct horizontally to attempt to drop on the Precision Pad.
- "Drop with lidar": The UA uses the lidar to descend to the drop height. The UA will not correct horizontally.
- At least one of the previous options must be chosen.

#### Notes:

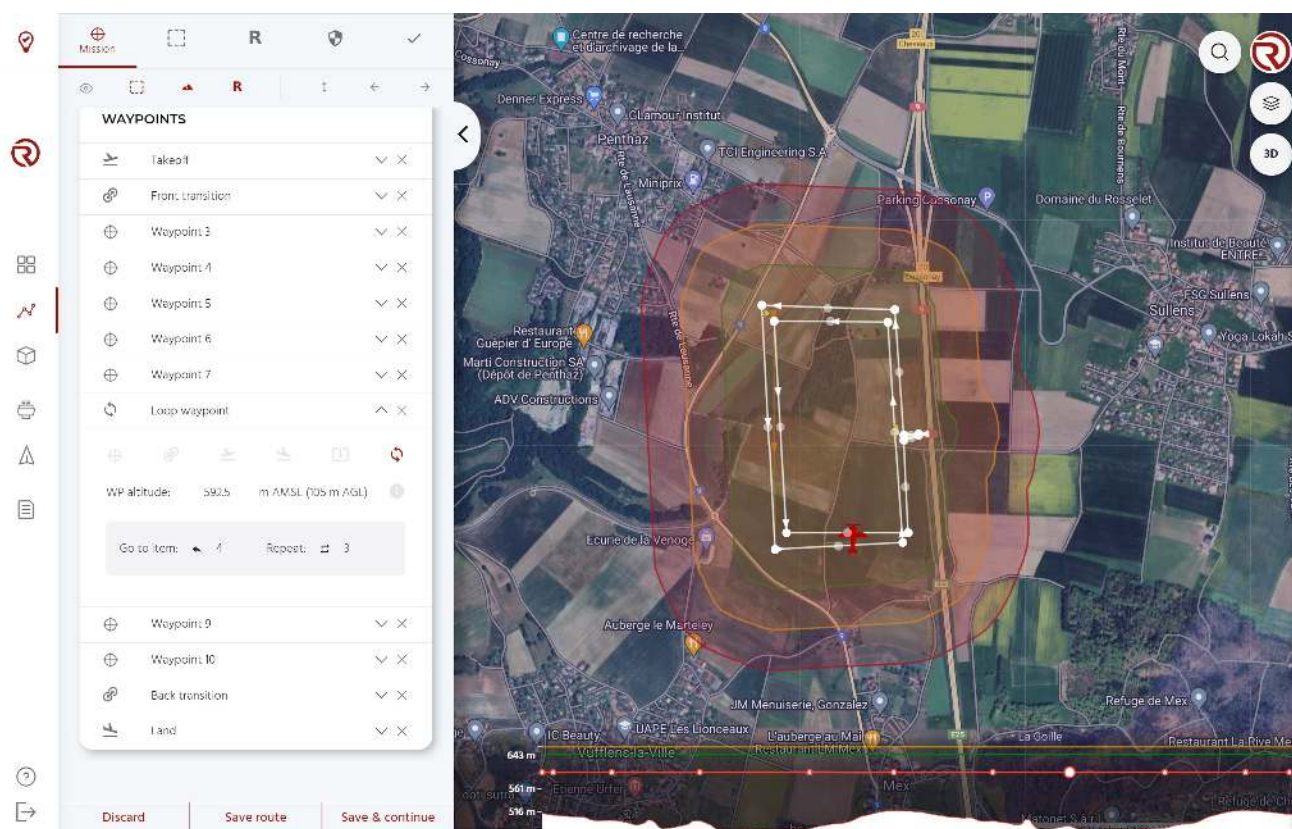
- If the pad altitude is below the measured ground altitude, a warning will be displayed. However, this will not block the flight plan from being saved and/or uploaded to the UA.
- The "Drop payload" point is only available for UAs with a dropping mechanism.

## Loop

Although loops are generally not required in long-range delivery routes, they are frequently used for flight testing and training.

In order to prepare a loop, within the "Mission" menu, after expanding the waypoint of the list in which the loop is desired, the "Loop" type of waypoint shall be selected.

When clicking on "Loop" in a given waypoint (origin of the loop), a new selector will open, allowing to configure the loop.



- **Example of loop waypoint** (within the waypoint list)
- **Go to item:** waypoint at which the drone should go. The number refers to the position of the waypoint/point in the list.
- **Repeat:** number of repetitions of the loop.
- **Example of loop** (within the map): an orange line with arrows shows the path followed during the loop, from the origin to the destination of the loop.
- **Example of origin of a loop:** loop points (origins) are marked with small yellow arrows next to the white circles.
- **Example of destination of a loop**

The loop is defined by the starting waypoint, which is the waypoint where the loop is selected. The next waypoint of the loop is the one selected in "Go to item". The path flown by the UA in the context of the loop is represented by an orange arrow that goes from the first waypoint and the waypoint selected in "Go to item".

In the picture, the flight plan has the following structure.

| Item | Identification                |
|------|-------------------------------|
| 1    | Takeoff                       |
| 2    | VTOL front trans (waypoint 2) |
| 3    | Waypoint 3                    |

| Item | Identification              |
|------|-----------------------------|
| 4    | Waypoint 4                  |
| 5    | Waypoint 5                  |
| 6    | Waypoint 6                  |
| 7    | Waypoint 7                  |
| 8    | Loop to item 4 (waypoint 8) |
| -    | Waypoints 5 to 8 (3 times)  |
| 9    | Waypoint 9                  |
| ...  | ...                         |

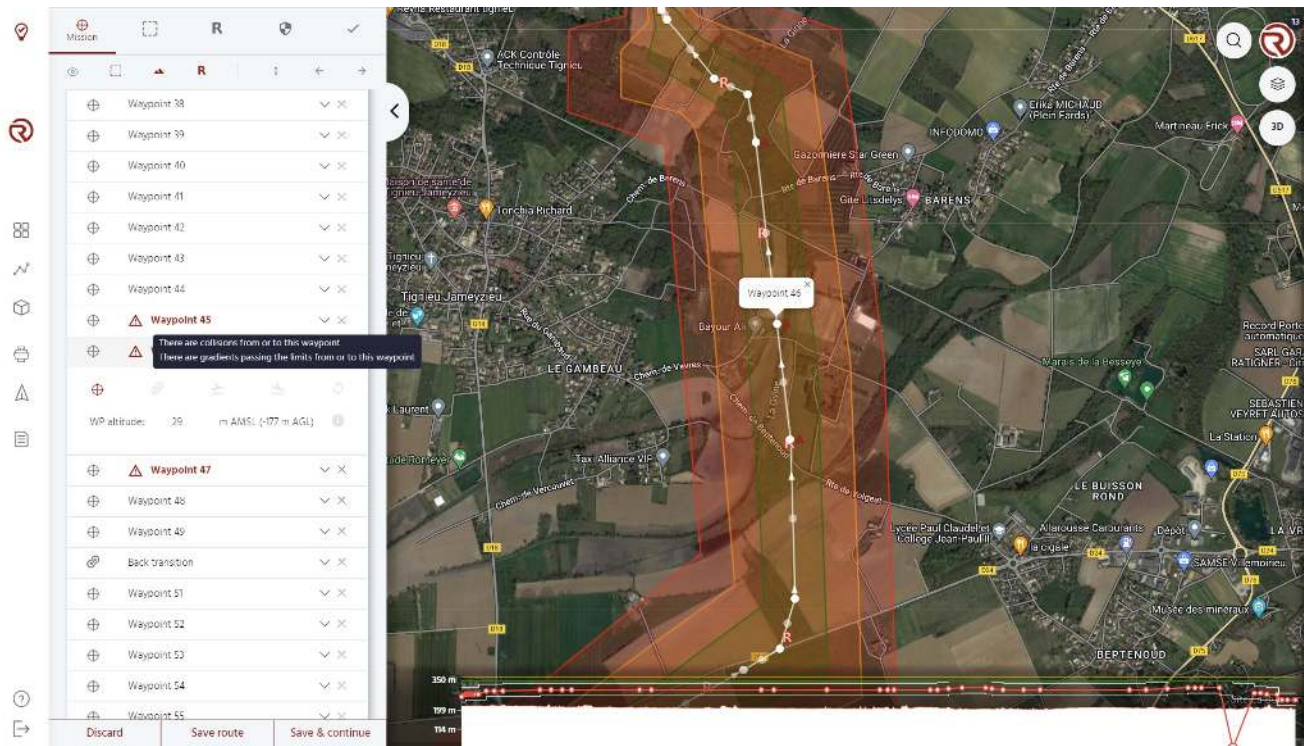
**Additional notes:**

- When a loop is prepared, the turns should not be too sharp and that the altitudes between the first waypoint of the loop and item towards the UA "goes" should respect the limit gradients of the UA.
- The destination of a loop should be a regular waypoint.
- Within the loop, no special waypoints should be used (takeoff, land, transition or other loops).

## Warnings

Both within the waypoint list and the map when a waypoint or a set of waypoints do not pass the safety checks, a warning will be displayed next to it.

When hovering over the warning icon in the waypoints list, the issue of that waypoint will be displayed.



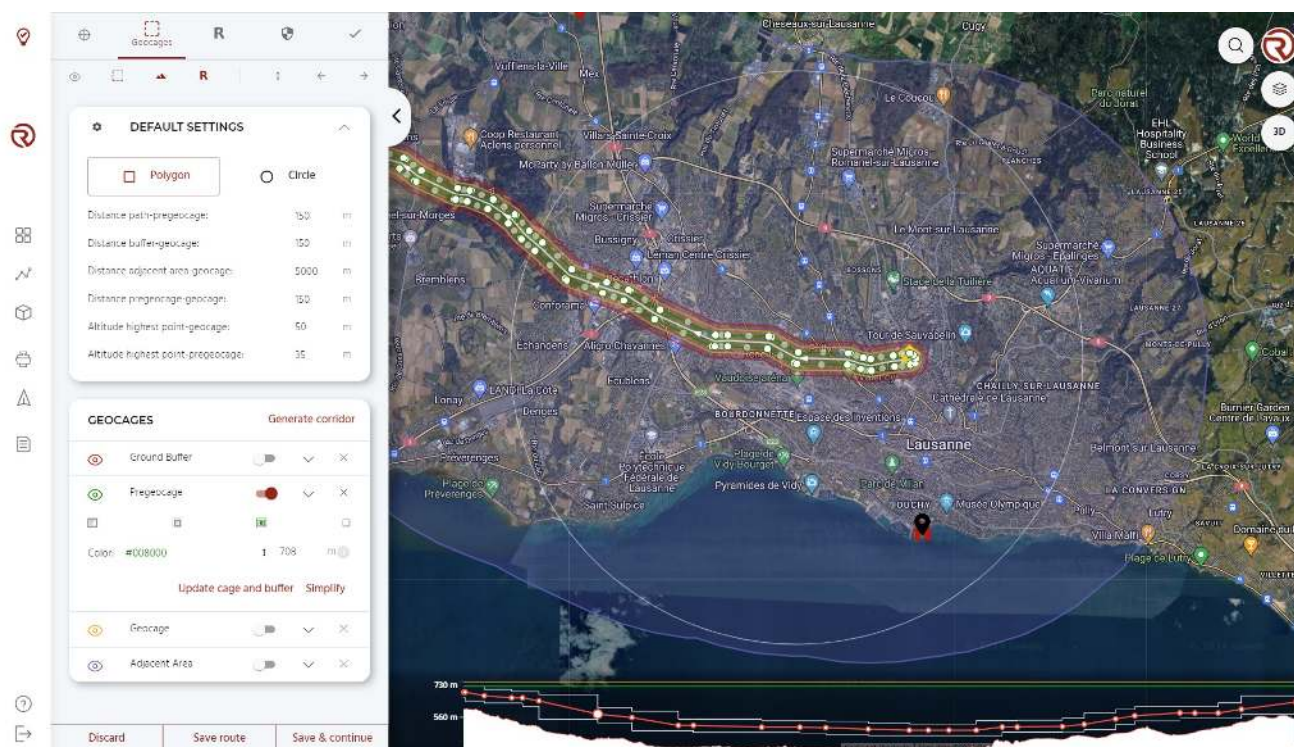
# Geocages

## Geocages

The "Geocages" menu allows to work with different types of areas and volumes whose goal is to increase the safety of the operations by ensuring the containment of the UA within the operational volume and ground buffer.

The surfaces prepared can be differentiated by their shape (polygons or circles) and their nature. There are five types of surfaces:

- **Pregeocage:** pregeocages and geocages are similar in terms of their capabilities. However, the idea behind pregeocage is to execute a less drastic measure when the UAS crosses it, including warning to the remote crew. Typically, it is expected to consider the pregeocage as the boundary between the contingency volume and the flight geography.
  - Default colour: green.
- **Geocage:** geocages are typically the external border of the contingency and operational volume. If the UAS crosses it, it is programmed to automatically trigger a predefined failsafe action (see [Safety settings](#)).
  - Default colour: orange.
- **Ground buffer:** it represents the area in which the UAS could fall in case of terminating it after crossing the geocage.
  - Default colour: red.
  - This area does not affect the operation and crossing it will not trigger any warning or measure. However, it is used to support operational risk assessments and discussions with civil aviation authorities.
- **Adjacent area:** the adjacent area (based on JARUS SORA Main Body 2.5) represents the ground area adjacent to the ground risk buffer where it is reasonably expected that the UA may crash after a loss of control situation resulting in a flyaway. For simplicity, in RigiCloud the adjacent area starts at the outer borders of the operational volume (geocage).
  - Default colour: purple.
  - This area does not affect the operation and crossing it will not trigger any warning or measure. However, it is used to support operational risk assessments and discussions with civil aviation authorities.
- **Polygon:** generic polygons are volumes with only visual purposes and do not affect the operation.
  - Default colour: yellow.
  - This area does not affect the operation and crossing it will not trigger any warning or measure.



The size and altitude of the different areas and volumes should be based on the models defined in the UAS Flight Manual, operational requirements and/or regulations. Civil aviation authorities may require to justify the sizes and altitudes selected.

## Geocage Default Settings

Under "DEFAULT SETTINGS", the shape of the surface (polygon or circle) can be defined, as well default distances between surfaces and their vertical limits.

From top to bottom:

- **Show/hide geocage default settings:** allows to show/hide geocage default values.
- **Shape selector:**
  - **Polygon** allows to draw polygonal surfaces.
  - **Circle** allows to draw circular surfaces.
- **Distance path-pregeocage:** predefined distance between the flight path (waypoints) and the pregeocage (only when the geocages are generate through "Generate corridor"). Equivalent to half the width of the flight geography according to the SORA semantic model.
- **Distance pregeocage-geocage:** predefined distance between the geocage and the pregeocage. It should be large enough to allow the remote crew to react in case of surpassing it (if "warning" is the predefined failsafe action). Equivalent to the width of the contingency volume according to the SORA semantic model.
- **Distance geocage-buffer:** predefined distance between the geocage and the ground buffer. Typically, following the 1:1 rule, it should be at least as large as the vertical limit of the geocage. Equivalent to the width of the ground risk buffer according to the SORA semantic model.
- **Distance geocage-adjacent area:** predefined distance between the geocage and the adjacent area. Roughly equivalent to the width of the adjacent ground area according to the SORA semantic model (SORA 2.5).

- **Altitude highest point-pregeocage:** vertical buffer between the highest waypoint and the pre-geocage.
- **Altitude highest point-geocage:** vertical buffer between the highest waypoint and the geocage.

Altitudes and distances shall be checked to confirm that they correspond to the desired/required limits. Altitudes can be compared in the altitude graph and the 3D view. As for the horizontal distances, the ruler or the grid can be used. If the parameters differ to the parameter selected, the geocage/pregeocage/ground buffer shall be updated.

## Geocage creation

Geocages and other containment areas/volumes can be created in three ways:

- Automatic generation through [Generate corridor](#).
- Manual generation: clicking on the map to generate/move vertices for the selected type of area/volume. See [Geocage edition](#).
- Automatic update through "Update *cage*" (the term *cage* will be different for the different types of areas/volumes). See [Update cages](#).

Under "GEOCAGES", users may select the type of the area/volume, edit their altitudes and update/simplify/remove surfaces. When there is at least one area/volume available, the following features and information will be displayed.

- **Show/hide area/volume**
- **Area/volume type:** shows the type of the area/volume.
- **Enable/disable edit mode:** allows to enable manual edition of the area/volume. See [Geocage edition](#).
- **Remove area/volume**
- **Surface type selector:** allows to choose the type of the area/volume. From left to right:
  - **Ground buffer**
  - **Geocage**
  - **Pregeocage**
  - **Polygon**
    - Adjacent areas can only be created when generating an automatic corridor or when updating other geocages.
- **Colour selector:** allows to change the colour of the given area/volume.
- **Altitude definition:** allows to change the vertical limit of the given surface (in AMSL).
  - Altitudes can be updated automatically from the highest waypoints (defined in the geocage default settings) or defined manually (for example, when a particular AMSL limit is requested from competent authorities).
  - Altitudes can only be defined for volumes (geocages, pregeocages and polygons).
- **Radius definition:** for circular surfaces, the radius can be edited parametrically from the list of geocages.
- **Show information:** allows to show/hide additional information of the surface.
- **Additional information:** shows additional information of the area/volume. From left to right:
  - Surface of the area/projected volume (in km<sup>2</sup>).
  - Number of vertices (only in polygons). **In geocages, for redundancy, this number should be below 256 in order to have the geocage stored both in the autopilot and the onboard computer.**
  - Vertical limit (AMSL). Only for volumes (geocages, pregeocages and polygons).
- **Update [cages]:** see [Update cages](#).
- **Simplify:** simplifies the shape of the surface. This tool should only be used if there are more than 255 vertices in the geocage. If this tool is used, the user shall remember to check that the flight plan is still within the different surfaces and that the level of safety is still compatible

with the authorisations.

See **Operation structure** for more information on how to properly set geocages, pregeocages and ground buffers

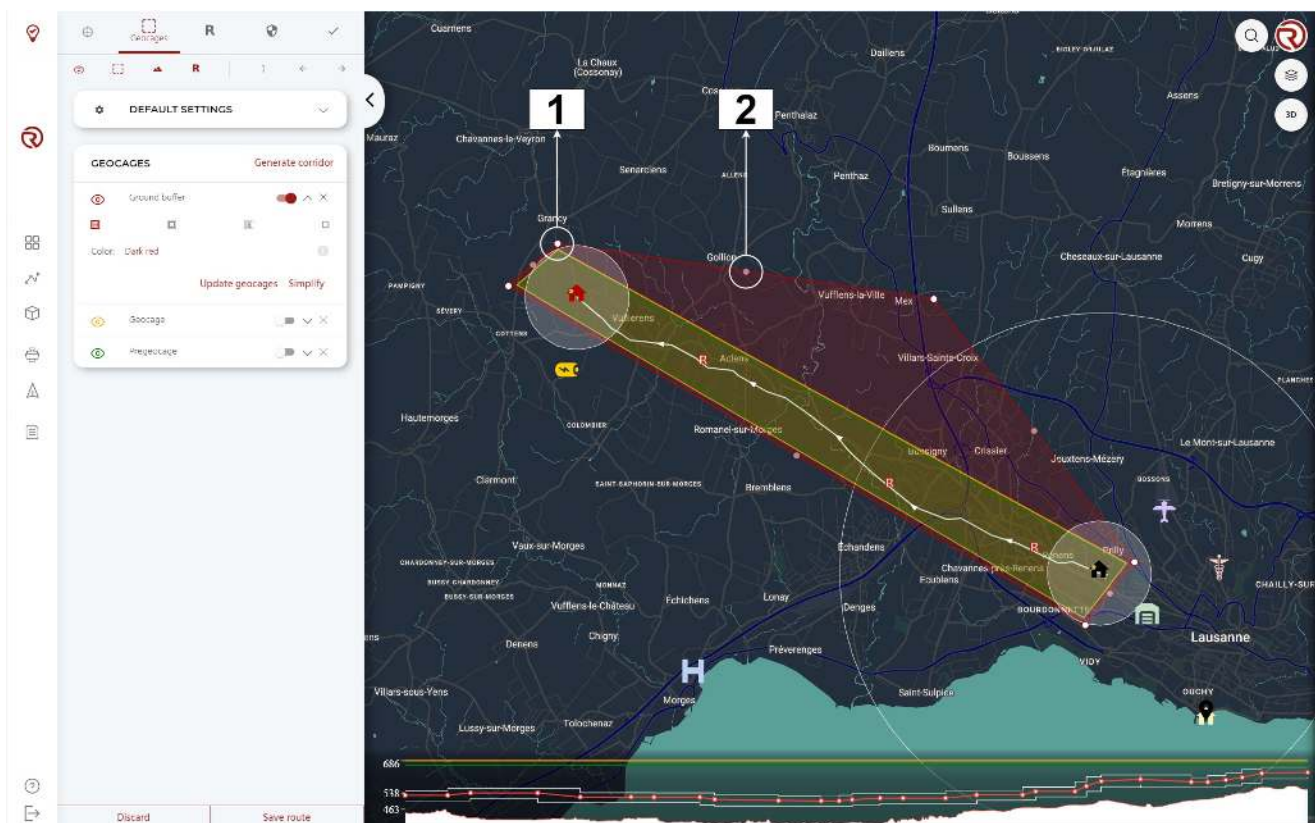
## Generate corridor

This tool allows to automatically generate a corridor based on the geocage default settings, including "Distance path-pregeocage". Manual modifications might still be needed, whether it is to reduce their size locally (e.g. during multicopter phases) or to increase it (e.g. in a location where more space is needed to executing certain contingency manoeuvre).

## Geocage edition

### Polygons

Vertices can be added by simply clicking on empty locations in the map. Existing vertices can be edited by clicking on them and dragging them to the new location. Intermediary vertices (white circles) can be added by clicking on and dragging intermediary points between vertices (semi-transparent circles). The user shall ensure that there is always at least one path connecting two different points without crossing the geocage.

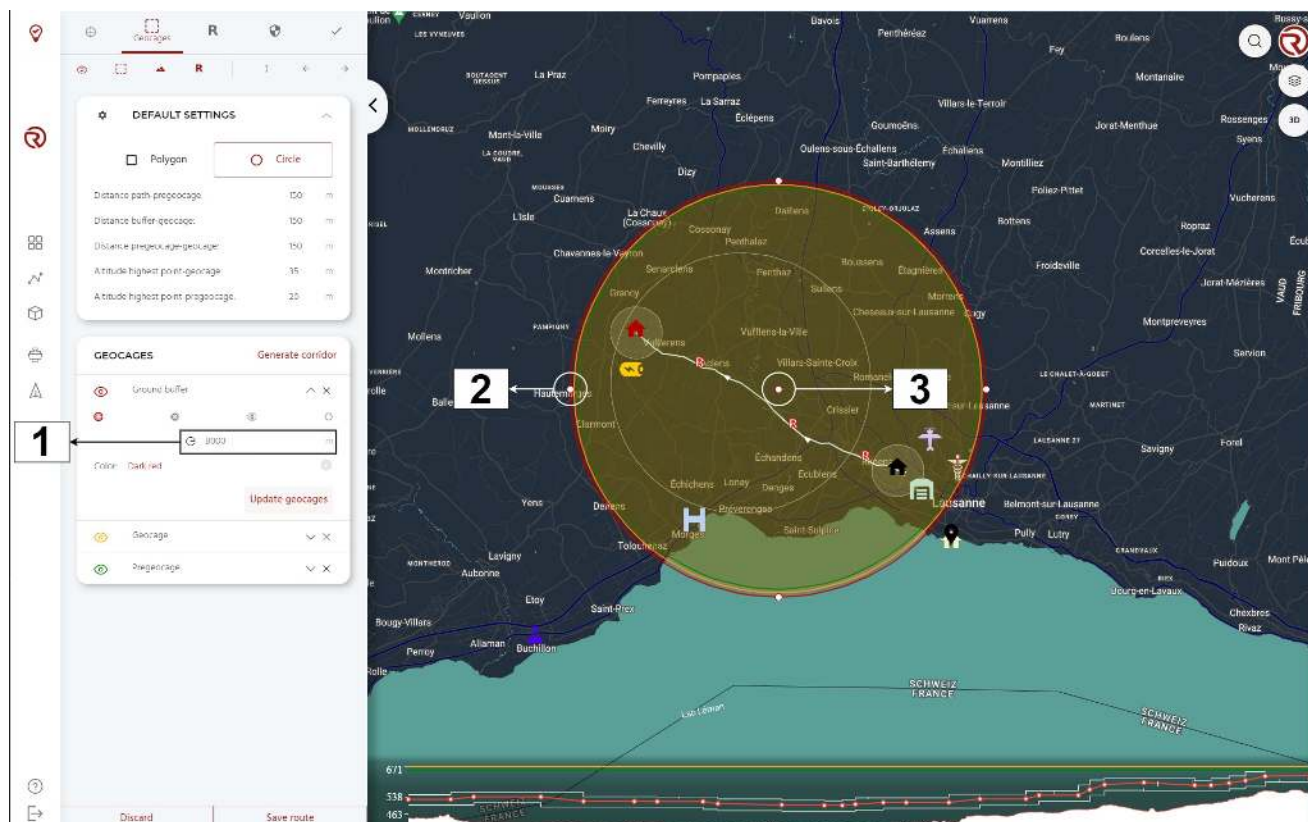


1. Example of vertice

2. Example of intermediary vertice

## Circles

The center of a circle can be added by clicking on the map. To edit its position, it can be dragged within the map. The radius can be modified directly in the geocage menu or by dragging the external points of the circle on the map.



1. **Radius:** here the radius of the geocage can be modified.
2. **Example of external point**
3. **Example of circle center**

## Update cages

Depending on the type of area selected, by clicking on "Update *cage*", the other types of areas/volumes will automatically be updated/generated based on the values defined in "Geocage settings". The altitudes are also modified based on such settings, but **only the updated area/volumes**. The altitude of the reference area/volume is kept as it is. If a different value is desired, the user needs to modify it manually or update [cages] from a different reference area/volume.

# Rally Points

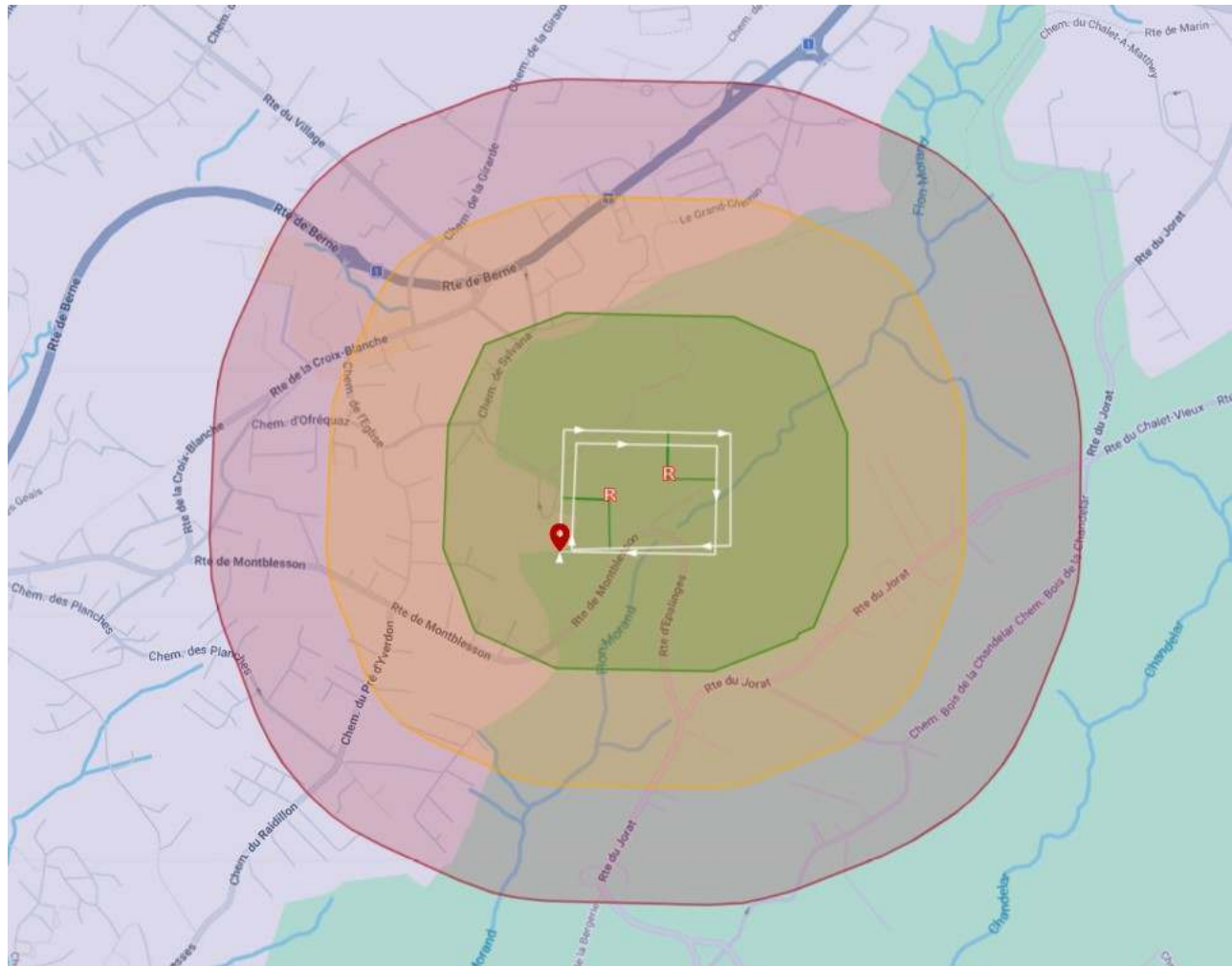
## Rally Points overview

When commanding a Smart Rally Point (SRP), the UA will fly towards the rally point with the closest path towards it.

This is particularly useful when flying in dense airspaces or areas with limited ground control in a way that, in the event of a degradation of the flight conditions, the UA could fly towards a rally point and land in safer conditions.

It is also useful in operations where battery degradation has been observed by the remote crew or detected by the system, in order to land in a safe enough place.

Operators shall ensure that rally points are not only within the operational volume (geocage and pregeocage), but also that the paths towards the rally points are within this volume.



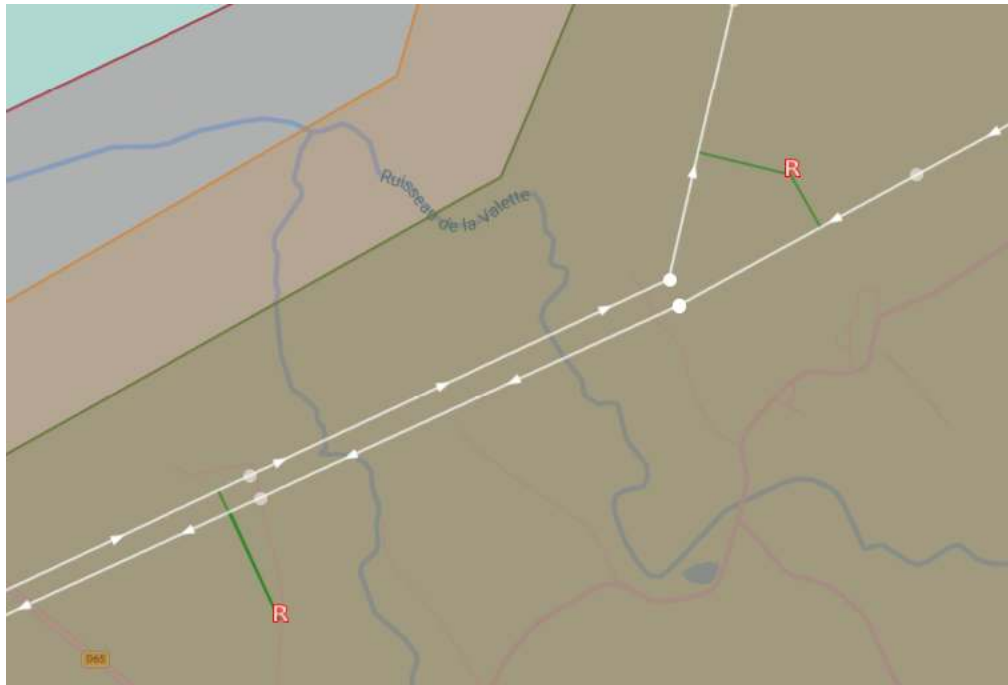
**Rally points menu:** allows to see the rally point list and their information, center the map on any of them or remove them.

#### List of rally points:

- Rally point identification
- Expand/collapse rally point information
- Center the map on the rally point
- Remove the rally point
- Rally point information (coordinates and altitude)

Operators should decide if the takeoff and/or landing waypoints should be considered rally points or not.

In the map, white lines connecting the flight path to the closest rally point (including takeoff and landing points, if so enabled) are displayed. Turning manoeuvres that might be required to go towards the rally point are not displayed.



- During an SRP command, the autopilot chooses the "closest" rally point by minimising the along-route distance from the UA projection to the rally point branch-off projection (plus a penalty of 4 km if a fixed-wing U-turn is required).
- Rally points whose path (branch-off to rally point) breaches the geocage are rejected.
- If there are no rally points available, SRP falls back to the closest operation endpoint (takeoff or landing) based on the same path-cost logic (instead of continuing to the mission-end).
- Coinciding segments: the same rally point can be projected onto several segments allowing to fly A-B-A and/or loop operations with optimal route to the rally point.

## Rally Points altitude

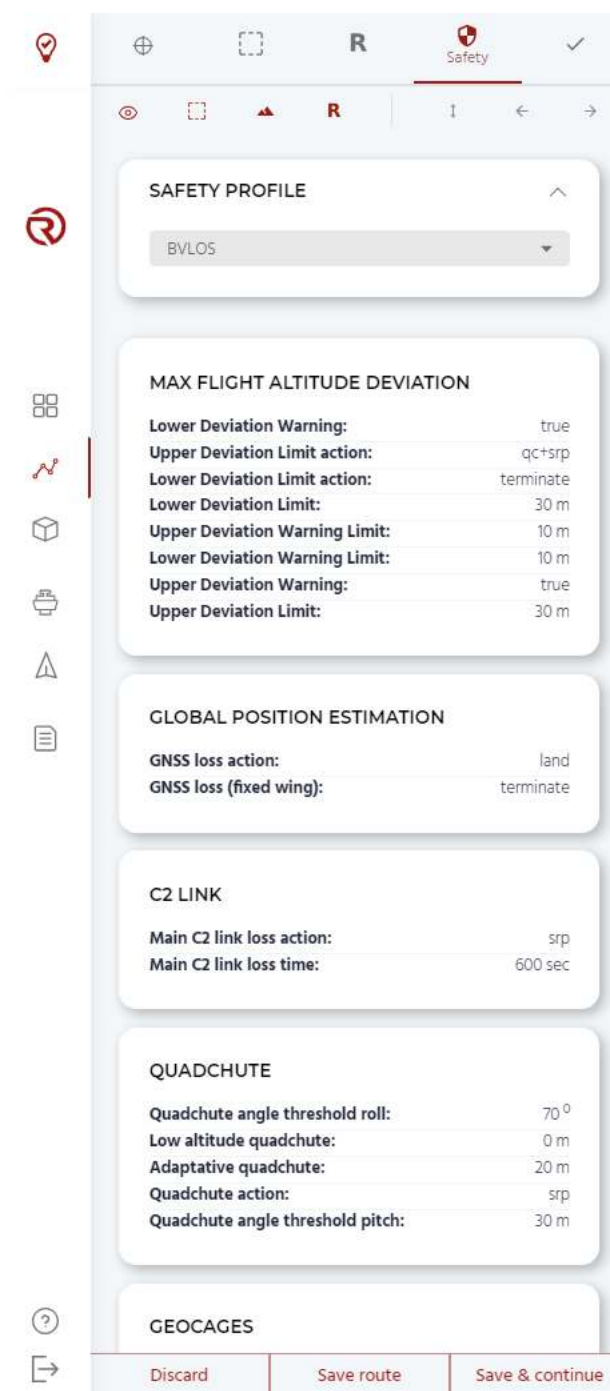
More information on Rally Points and the UAS behaviour is given in the UAS Flight Manual.

[🏠](#) > [RigiCloud User Manual](#) > [Airbridge Planner](#) > [How to plan a route?](#) > [Safety settings](#)

# Safety settings

## Available actions

The "Safety" menu opens the safety settings of the operation. Default safety settings are defined per operation instead of per project since, depending on the concept of operations and the risks involved, different operations can require different settings.



**SAFETY PROFILE**

BVLOS

**MAX FLIGHT ALTITUDE DEVIATION**

|                                |           |
|--------------------------------|-----------|
| Lower Deviation Warning:       | true      |
| Upper Deviation Limit action:  | qc+srp    |
| Lower Deviation Limit action:  | terminate |
| Lower Deviation Limit:         | 30 m      |
| Upper Deviation Warning Limit: | 10 m      |
| Lower Deviation Warning Limit: | 10 m      |
| Upper Deviation Warning:       | true      |
| Upper Deviation Limit:         | 30 m      |

**GLOBAL POSITION ESTIMATION**

|                         |           |
|-------------------------|-----------|
| GNSS loss action:       | land      |
| GNSS loss (fixed wing): | terminate |

**C2 LINK**

|                           |         |
|---------------------------|---------|
| Main C2 link loss action: | srp     |
| Main C2 link loss time:   | 600 sec |

**QUADCHUTE**

|                                  |      |
|----------------------------------|------|
| Quadchute angle threshold roll:  | 70°  |
| Low altitude quadchute:          | 0 m  |
| Adaptative quadchute:            | 20 m |
| Quadchute action:                | srp  |
| Quadchute angle threshold pitch: | 30 m |

**GEOCAGES**

Discard Save route Save & continue

The user shall select a safety profile among the available ones (including default RigiTech safety profiles and project profiles defined by users of the project). See [Safety profiles](#).

When selecting a safety profile, a summary of its safety settings is shown.

**Disclaimer:**

- The operator shall ensure that safety settings are defined properly and are adapted to the operational, technical and regulatory context, such as: presence of obstacles, gradient, size of the pregeocage and geocage, maximum allowed altitudes, etc.
- RigiTech is not responsible for any incident related to incorrect or inconsistent safety settings.

# Safety checks

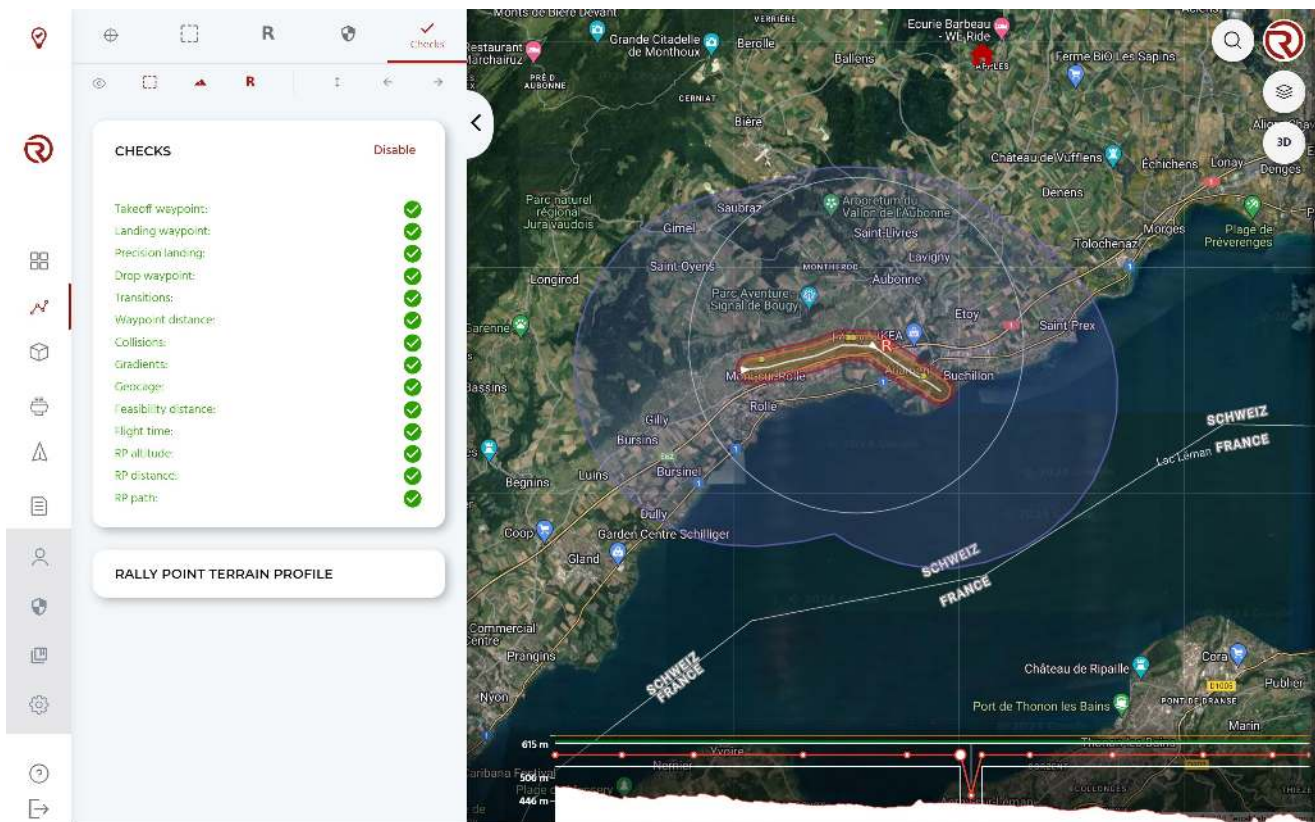
## Safety checks overview

Safety checks are a preliminary way to ensure that the flight plan is properly prepared by checking its structure (takeoff, landing and transitions, as well as gradients and possible collisions with the terrain) and safety elements (geocages and rally points).

### Disclaimer:

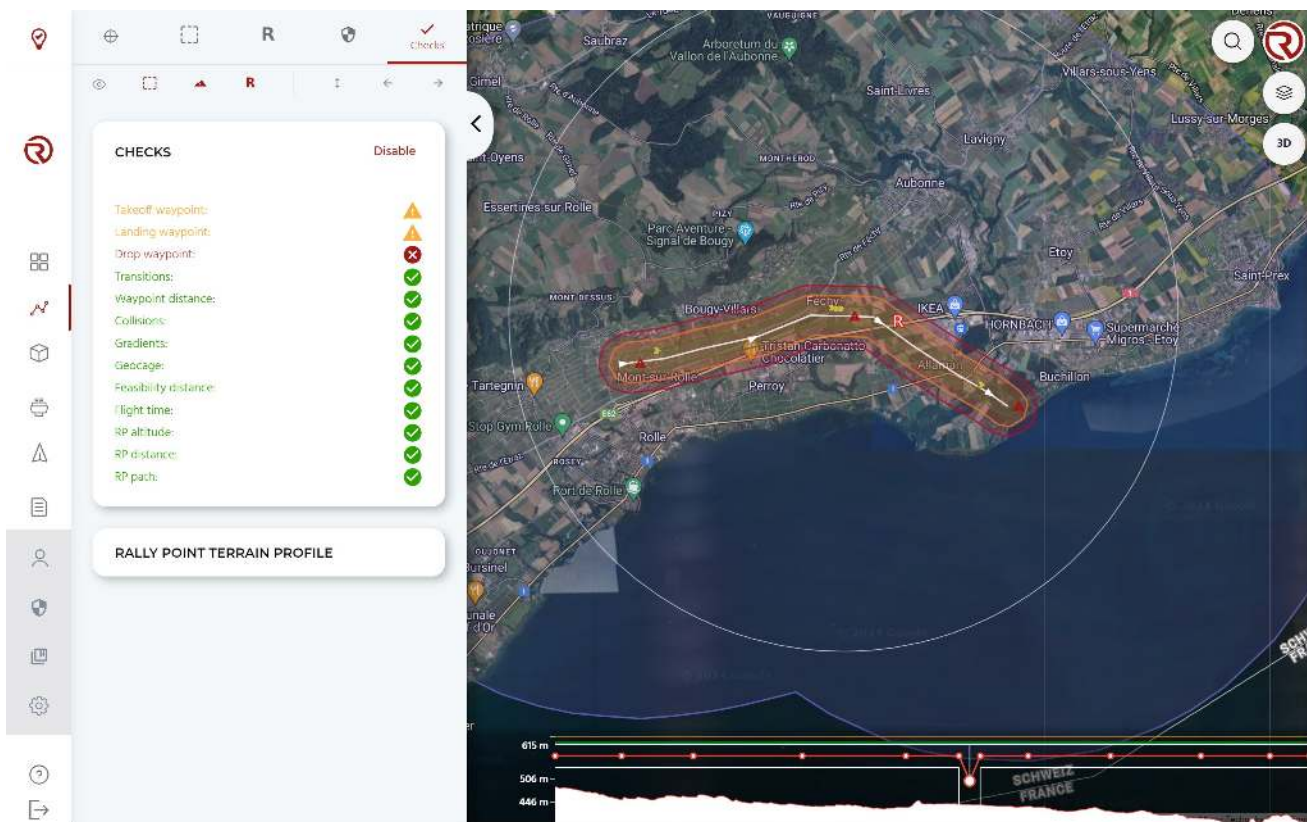
- Although passing all the mandatory checks ensures a certain coherence of the route, passing them does not warranty that the route will be safe and no accidents will happen, since safety checks do not verify elements such as the weather, sharp turns, collisions with obstacles or airspace density.
- The operator shall ensure that the route is safe enough and suitable for the operation.
- RigiTech is not responsible for any decision taken by the operator due to the interpretation of the safety checks.

The following pictures contain examples of a route with all the checks passed while the second one includes warnings and checks not passed.



- **List of safety checks:** allows to see the status of the checks.

- **Enable/Disable:** enables/disables checks. This tool can be used to restart the checks in case of need.
- **Rally point terrain profile:** allows to see the terrain profile in the vertical slice of the path between a generic point of the flight plan and the rally point. See [Rally Points Checks](#)
  - In order to see this profile, the user shall hover the mouse over a rally point path.



Not all the checks have the same importance. For example, there could be flights without a transition (if planned only in multicopter), but takeoff and landing points are definitely needed.

## Takeoff waypoint

Checks if the flight plan starts with a takeoff waypoint and if there are multiple takeoff waypoints.

### Passing this check is mandatory

A warning will also be displayed if:

- The pad altitude is below ground. In this case, the check can be neglected, as long as the pad altitude has been measured and validated by the operator.
- The origin marker is not set. In this case, RTK will not be used.

## Landing waypoint

Checks if the flight plan ends with a landing waypoint and if there are multiple landing waypoints.

**Passing this check is mandatory.**

A warning will also be displayed if:

- The pad altitude is below ground. In this case, the check can be neglected, as long as the pad altitude has been measured and validated by the operator.
- The origin marker is not set. In this case, RTK will not be used.

## Drop waypoint

Checks the structure of the "Drop" waypoint. A warning will be displayed if:

- There is more than one "Drop" waypoint.
- The "Drop" waypoint is in a fixed-wing section.
- The Approach altitude and the Pad altitude are too close ( $< 20$  m).
- The Approach altitude and the Pad altitude are too far ( $> 20$  m).
- The Approach altitude is below the "Drop height above target".

**Passing this check is mandatory.**

A warning will also be displayed if the pad altitude is below ground. In this case, the check can be neglected, as long as the pad altitude has been measured and validated by the operator.

**Note:** This check is available only if a "Drop" waypoint is used in the flight plan.

## Transitions

Checks if the transitions are correct, both in order and in distance. The check will not be passed if:

- The number of transition points is uneven.
- The order of the transitions in the route is not "front" and "back" transitions.
- The distance of the transitions is not enough.
  - Front transition: 250 m
  - Back transition: 250 m
- The takeoff point is too far from the front transition point (1000 m).
- The landing point is too far from the back transition point (1000 m).
- One or both transitions points are too close from ground (altitude  $< 30$  m AGL).

*Passing this check is recommended. However, when there is not enough space to execute the transitions with enough distance, it might be acceptable not to pass it (only if the causes are the distances) as long as the operator has evaluated the consequences of a shorter transition distance within their operational context.*

## Waypoint distance

Checks if the maximum distance between checkpoints is respected (5000 m).

**Passing this check is mandatory.**

## Collisions

Checks if there are collisions with the terrain (only ground level + 15 m, no obstacles are taken into account).

**Passing this check is mandatory.**

## Gradients

Checks the gradients of the waypoints ( $4^{\circ}$  or 4 m/s of vertical speed while flying at 29 m/s in fixed-wing configuration).

**Passing this check is generally mandatory. However, if there is enough space for the UAS (both in containment and presence of obstacles) to execute a helicoidal climbing and/or descent, it might be acceptable not to pass this check when the operator is confident that the execution of the operation will be safe and adequate.**

## Geocage

Checks if there is a geocage and a pregeocage in the route (warning) and, in case of having one of each, if there is a violation of it (check not passed).

**Passing this check is mandatory.**

## Feasibility distance

Checks if the route distance is below the maximum distance (100 km).

**Passing this check is mandatory.**

## Flight time

Checks if the estimated flight time is below the maximum endurance of the UA (59 min).

**Passing this check is mandatory.**

## Rally Points checks

- **RP altitude:** checks if the Rally Point altitudes are acceptable.
- **RP distance:** checks maximum distance of all the generic points of the flight plan to the closest rally point (1000 m by default, but it can be changed by requesting it to RigiTech).
- **RP path:** checks if there are potential collisions between the generic points of the flight plan and the path towards the closest rally point.
  - Green path: the distance between the path and the rally point is within the predefined limit (10000 m by default, but it can be changed by requesting it to RigiTech) and there are no collisions between the path and the terrain.
  - Yellow path: acceptable distance, but collisions with the terrain.
  - Red path: no collisions with the terrain, but distance above the limits.

- Purple path: collisions with the terrain and distance above the limits.



Passing these checks depend on the standard and contingency procedures and the expected use of SRP or Smart Rally Point manoeuvre.

- It can be acceptable not to pass the RP distance safety check if the flight plan is structured in such a way that it is reasonable to expect that the SRP manoeuvre will be executed in fixed-wing. Otherwise, if the rally point is too far in multicopter, an emergency landing will likely be triggered automatically.
- If the use of SRP as a contingency measure is expected, ensuring that the RP paths are correct is mandatory.

## Interpretation and importance of safety checks

The following checks are mandatory and need to be passed:

- Takeoff waypoint (with the potential exception of the pad altitude under ground)
- Landing waypoint (with the potential exception of the pad altitude under ground)
- Waypoint distance
- Collisions
- Gradients (with exceptions)
- Geocage
- Feasibility distance
- Flight time

The following checks depend on the flight plan and the operational context:

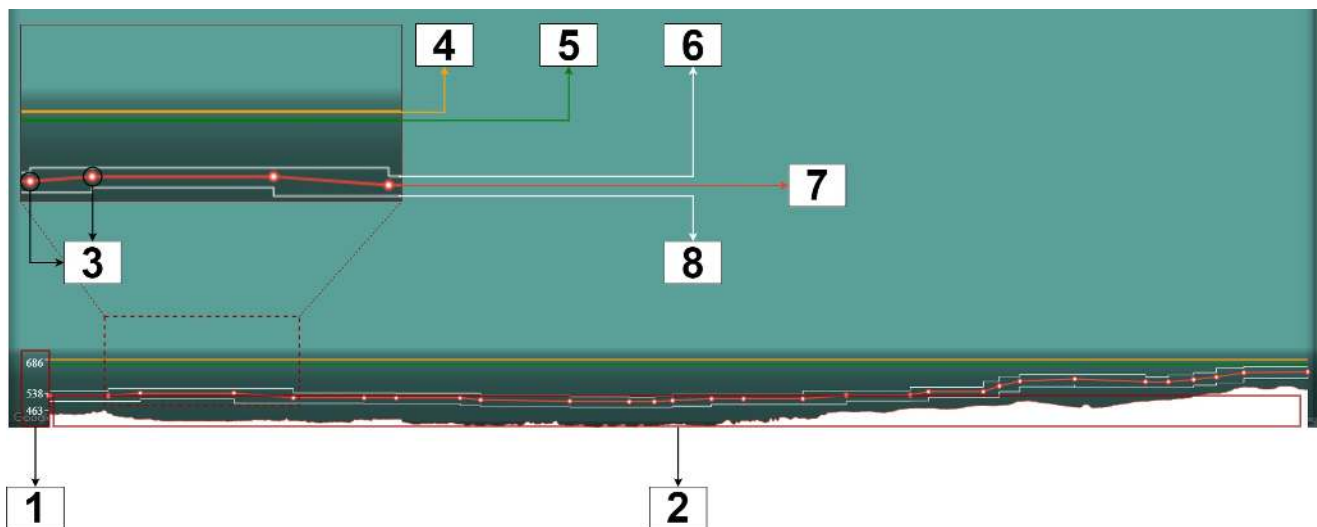
- Transition
- Rally Points checks

# Operation structure

Within RigiTech UAS Technical Manuals, operational restrictions supporting flight planning can be found in Appendix - Operational Restrictions.

## Altitude graph

The altitude graph is a fundamental tool to do a preliminary check of the altitudes and vertical structure of the flight plan, since it provides information on the terrain (without obstacles), waypoints, geocages (see [Geocages](#)) and maximum flight altitude deviations.



1. **Altitude scale** (in m AMSL)
2. **Terrain profile**
3. **Waypoints**
4. **Altitude of the geocage** (orange by default)
5. **Altitude of the pregeocage** (green by default)
6. **Upper deviation limit of the flight altitude** (white)
7. **Flight path** (red)
8. **Lower deviation limit of the flight altitude** (white)

In order to avoid collisions with the terrain and ensure a proper structure of the vertical containment, as a preliminary step, the altitude graph can be used to ensure that:

- The flight path is above the terrain
- The lower deviation limit of the flight altitude is above the terrain
- The upper deviation limit of the flight altitude is not above the pregeocage
- The pregeocage is below the geocage

### Disclaimer:

- The altitude data sources do not include artificial and natural obstacles.
- The operator shall consult with their competent authority what sources are acceptable to ensure proper obstacle avoidance.
- The operator shall evaluate the presence of obstacles in their operational volume and plan operations accordingly.
- RigiTech is not responsible for any decision taken by the operator due to the interpretation of the altitude data.

## Zoom

It is possible to zoom in a section of the altitude graph by hovering the mouse over the altitude graph, keep left-click, grab the section and release it.



Once zoomed in, to go back to the general graph, users should left-click over the altitude graph again.



## Others

Specific elements limitations and vertical structures of a UAS shall be consulted in the UAS Flight Manual (vertical structure, transitions, turns, safety distances, etc.).

# Checklists

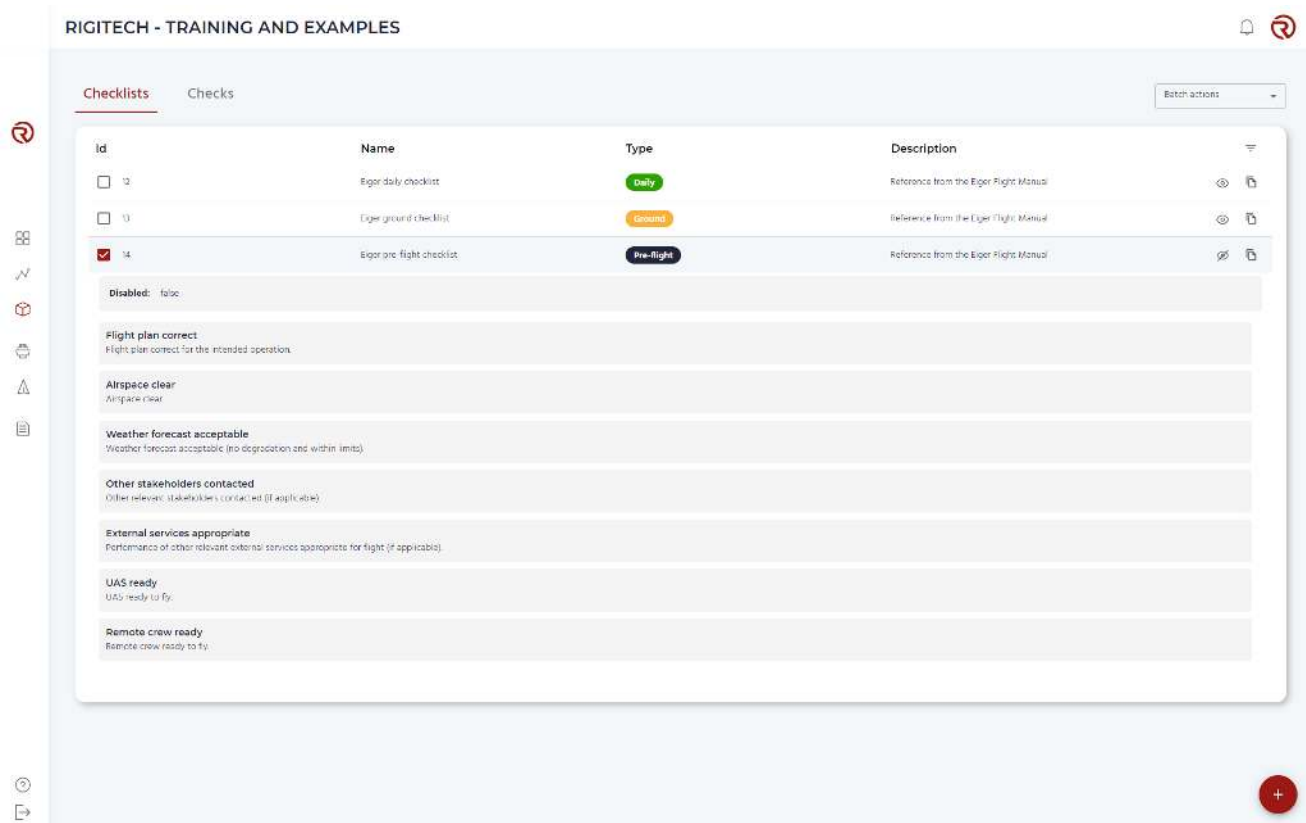
Before starting an operation with a RigiTech UAS, different checklists need to be completed by the users.

- **Daily checklist:** needs to be done at least once a day.
- **Ground checklist:** needs to be done before each flight by a person on ground.
- **Pre-flight checklist:** needs to be done before each flight, after creating an operation, by the Pilot In Command.

The "Checklists" module allows to create those checklists.

## Checklists

RigiTech proposes default checklists of each kind. Users may select these (see [Settings](#)) or create new ones.



**RIGITECH - TRAINING AND EXAMPLES**

**Checklists** | Checks | Batch actions

| Id                                     | Name                       | Type       | Description                            |
|----------------------------------------|----------------------------|------------|----------------------------------------|
| <input type="checkbox"/> 12            | Eiger daily checklist      | Daily      | Reference from the Eiger Flight Manual |
| <input type="checkbox"/> 13            | Eiger ground checklist     | Ground     | Reference from the Eiger Flight Manual |
| <input checked="" type="checkbox"/> 14 | Eiger pre-flight checklist | Pre-flight | Reference from the Eiger Flight Manual |

**Disabled:** false

**Flight plan correct**  
Flight plan correct for the intended operation.

**Airspace clear**  
Airspace clear

**Weather forecast acceptable**  
Weather forecast acceptable (no degradation and within limits)

**Other stakeholders contacted**  
Other relevant stakeholders contacted (if applicable)

**External services appropriate**  
Performance of other relevant external services appropriate for flight (if applicable)

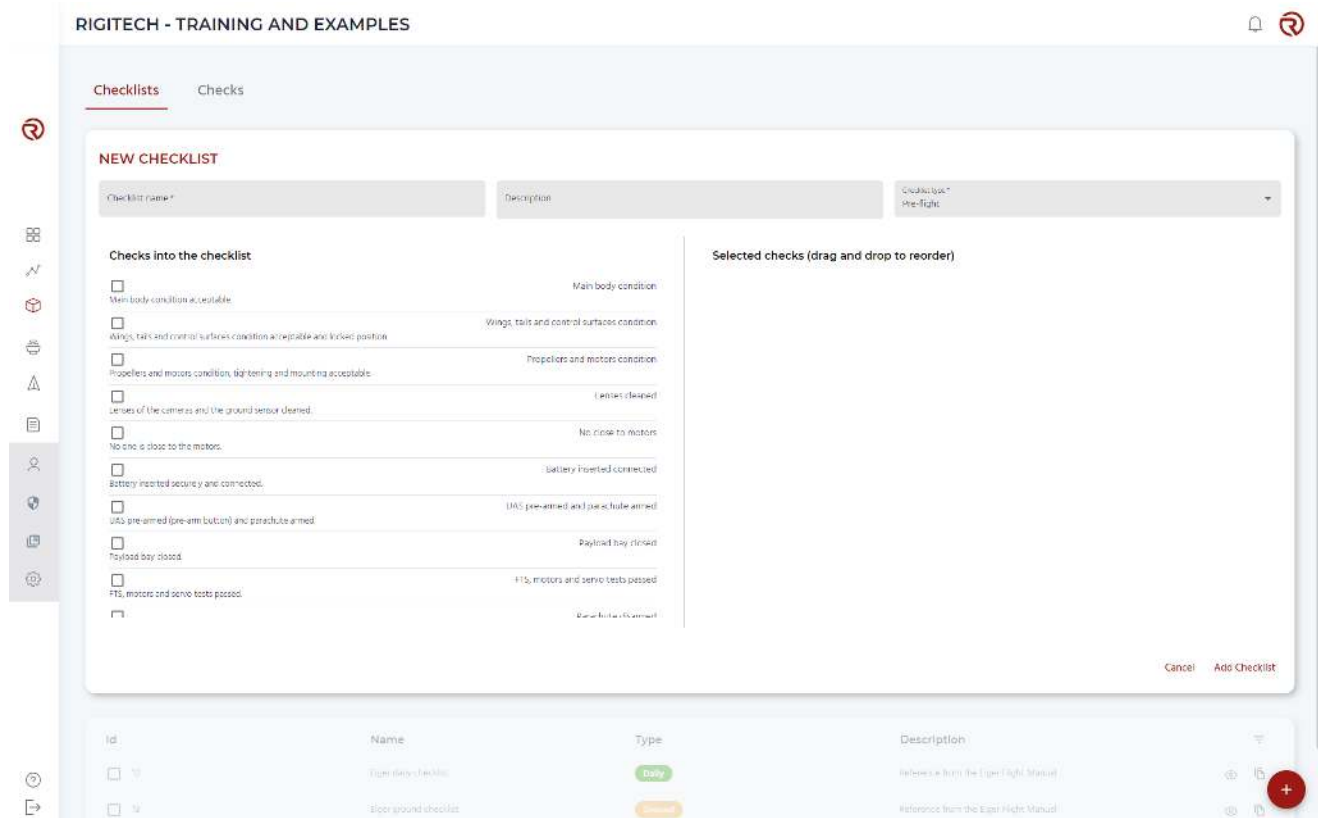
**UAS ready**  
UAS ready to fly

**Remote crew ready**  
Remote crew ready to fly

Checklists are identified by their ID, name, Type and description.

When creating a new checklist, users can duplicate and edit existing checklists. In the checklist edition menu, the user can define its name, description and type, as well as defining which checks should go into the list.

Selected checks can be reordered by dragging and dropping them.



## Checks

Within the "Checks" menu, a list of the available checks created in the project is available (default ones are not shown in the list). Checks can be added ("+" button) or edited.

In the editor menu, checks are defined based on their weight (parameter irrelevant for end users), their name and description. Then, the user shall decide if the check is mandatory or not, and if specific telemetry values are needed for the check.

Checks with telemetry values assigned to them will show these values during the completion of the checklists before in the Control Tower.

Checklists

Checks

NEW CHECK

Check weight\*

0

\* The weight is used to order the checks in a checklist, more weight more on top

Check name \*

Description

☐ Mandatory

Needed telemetry values for the check

☐ Altitude indication

☐ Absolute altitude

☐ Relative altitude

☐ Wind

☐ Throttle

☐ Battery remaining

☐ Battery voltage

☐ Battery current

☐ Battery consumed

☐ Airspeed sensor

☐ Pitch

☐ Roll

☐ Heading

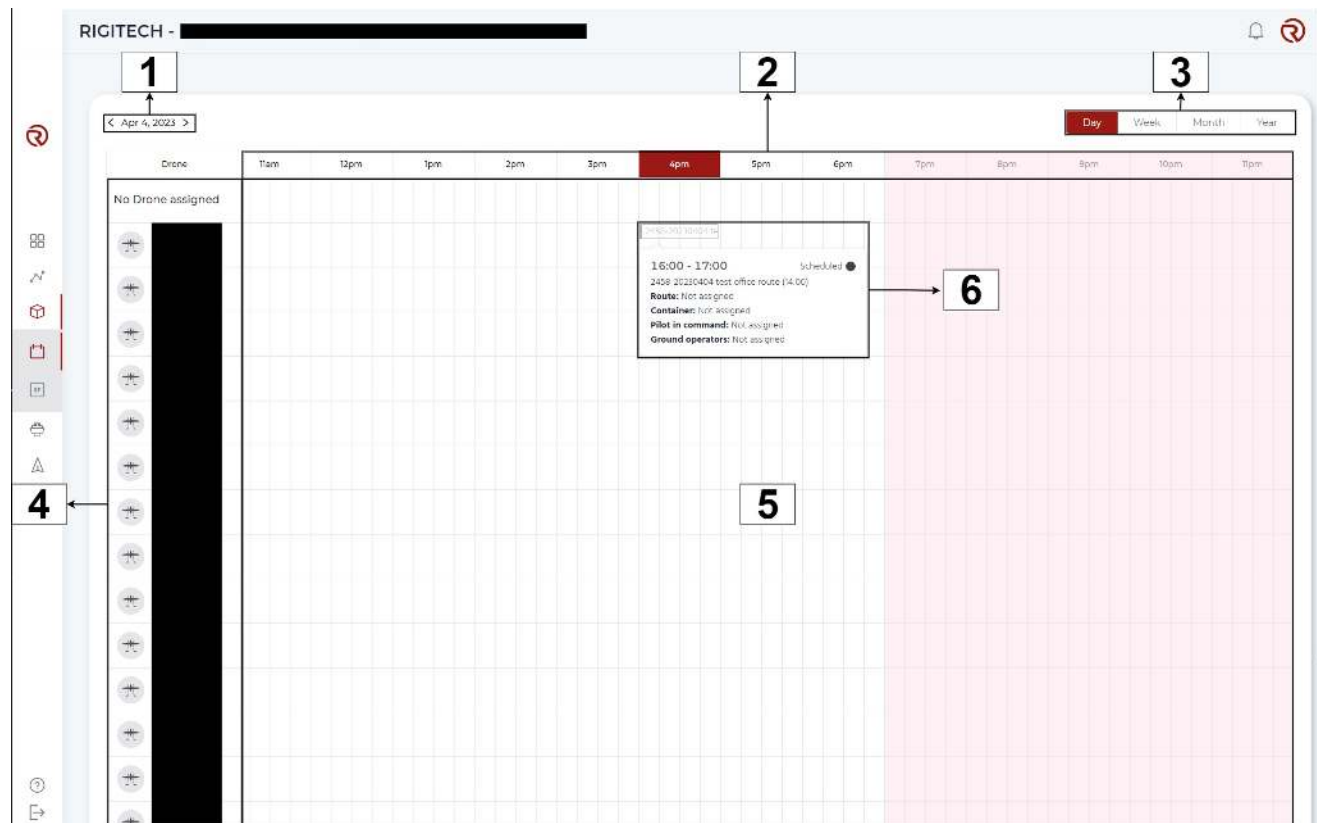
Cancel

Add Check

| Name | Description | Mandatory | Weight |  |
|------|-------------|-----------|--------|--|
|------|-------------|-----------|--------|--|

# Scheduler

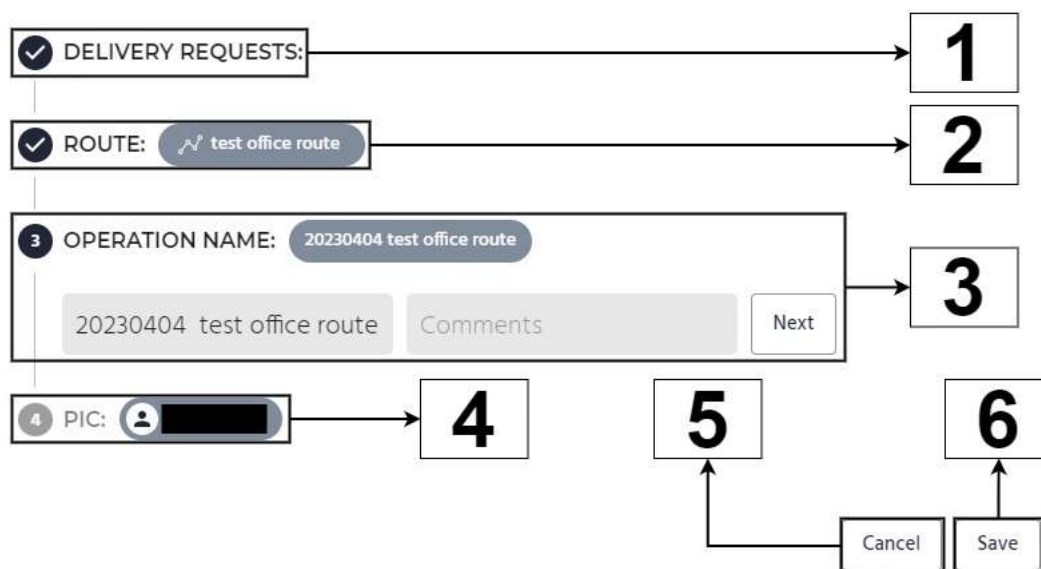
The Scheduler is a module where you can assign dates, crew members, vehicles, delivery requests and/or routes to an operation. It can be used with different views depending on the desired time view: per day, per week, per month or per year.



1. **Date/Time selector:** allows to change the date/time represented.
2. **Time row:** shows the times available within the time view. The cell in red represents the current time (hour within a day or days within a week, a month or a year).
3. **Time view:** allows to change the time view (Day, Week, Month or Year).
4. **Drone column:** shows the vehicles available in the project. The first cell is "No Drone assigned", useful for operations which don't have a specific vehicle assigned yet.
5. **Available slots:** shows the available slots for scheduling operations per time and vehicle.
6. **Example of scheduled operation:**
  - o **Summary of the operation:** shows the time, name, route and remote crew assigned to the operation.
  - o **Status of the operation:** Shows if the route is completed or in progress.

Whether an empty slot or a scheduled operation is clicked on, a window will pop up showing the parameters of the operation. Since the vehicle and the time are selected in the main view of the scheduler, it is now possible to name the operation and select a route and a pilot in command

(with ground operators, if desired).



1. **Delivery requests:** allows to assign the operation to a delivery request.
2. **Route selector:** allows to select a route within the list.
3. **Operation name:** allows to name the operation and put comments. By default, the name of the operation will be given by the date of the operation and the name of the route.
4. **Remote crew selector:** allows you to assign a remote crew to the operation. The first person is the Pilot In Command (PIC) which, by default, is the person scheduling the operation. Additional members will be assigned as ground operators.
5. **Cancel:** allows you to cancel the creation/edition of the operation.
6. **Save:** allows you to save the operation.

When navigating through the different resources, you will start with the route selector. After selecting one, you will automatically pass to the next step (Operation name). You can click on "Next" to pass to the next step and finish the creation/edition by clicking on "Save".

It is possible to navigate through the different menus by clicking on them. It is also possible to enter the name of the desired route or pilot in the search box (displayed only in "Route selector" and "Remote crew selector").

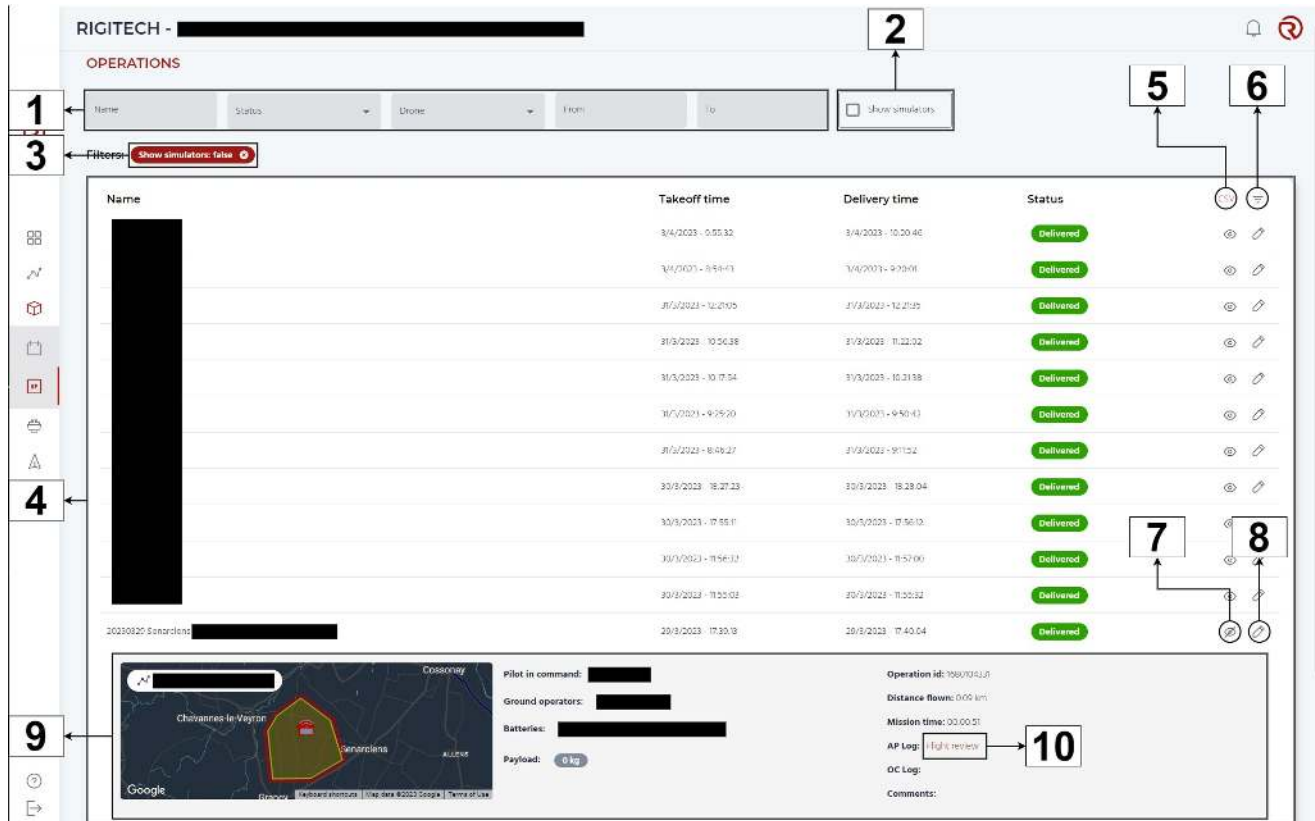
Once an operation is scheduled, it is possible to access to it again by clicking on it. If you don't click on it, but pass over it with your mouse, a summary of the resources will pop up.

Finally, it is possible to move a scheduled operation within the available slots, both per drone and date, by clicking on it and dragging it to the desired location.

# Operations

## Operations

The operations page shows information of the operations and simulations conducted within your project.



The screenshot shows the RIGITECH Operations interface. It includes a header with the RIGITECH logo and a navigation bar. The main content area displays a table of operations with columns for Name, Takeoff time, Delivery time, and Status. A sidebar on the left contains various icons for navigation. At the bottom, there is a map showing the operation location and a summary of the operation details.

Numbered callouts in the image:

- 1: Filter menu (Name, Status, Drone, From, To)
- 2: Show/hide simulators checkbox
- 3: Active filters (Show simulators: false)
- 4: Operations information table
- 5: Download in CSV button
- 6: Open filter button
- 7: Show/hide all attributes button
- 8: Name of the operation
- 9: Serial number of drone used for the operation
- 10: AP Log button

- 1. Filter menu:** here you can filter your operations, from left to right, by name, status (delivered or incident) and dates. This section is only open if you click on "Open Filters" (see below).
- 2. Show/hide simulators:** allows to show/hide simulated operations.
- 3. Active filters:** shows a summary of the active filters.
- 4. Operations information:** here you can see all the operations/simulations conducted within your project. From left to right, you can see the name of the operation, the takeoff time, the delivery time and the status of the operation.
- 5. Download in CSV:** allows to download the list of operations of the project with their attributes.
- 6. Open filter:** Opens/closes the filter menu (see above).
- 7. Show/hide all attributes:** shows/hides all attributes of the operation. From left to right, top to bottom :
  - o Name of the operation
  - o Serial number of drone used for the operation

- Takeoff time
- Delivery time
- Status
- Pilot in command
- Operation ID
- Ground operators
- Distance flown
- Batteries
- Mission time
- Payload
- Ap Log
- OC Log
- Comments

8. **Edit operations:** allows to edit the operational resources associated to a flight (delivery requests, route, operation name, remote crew and/or batteries).

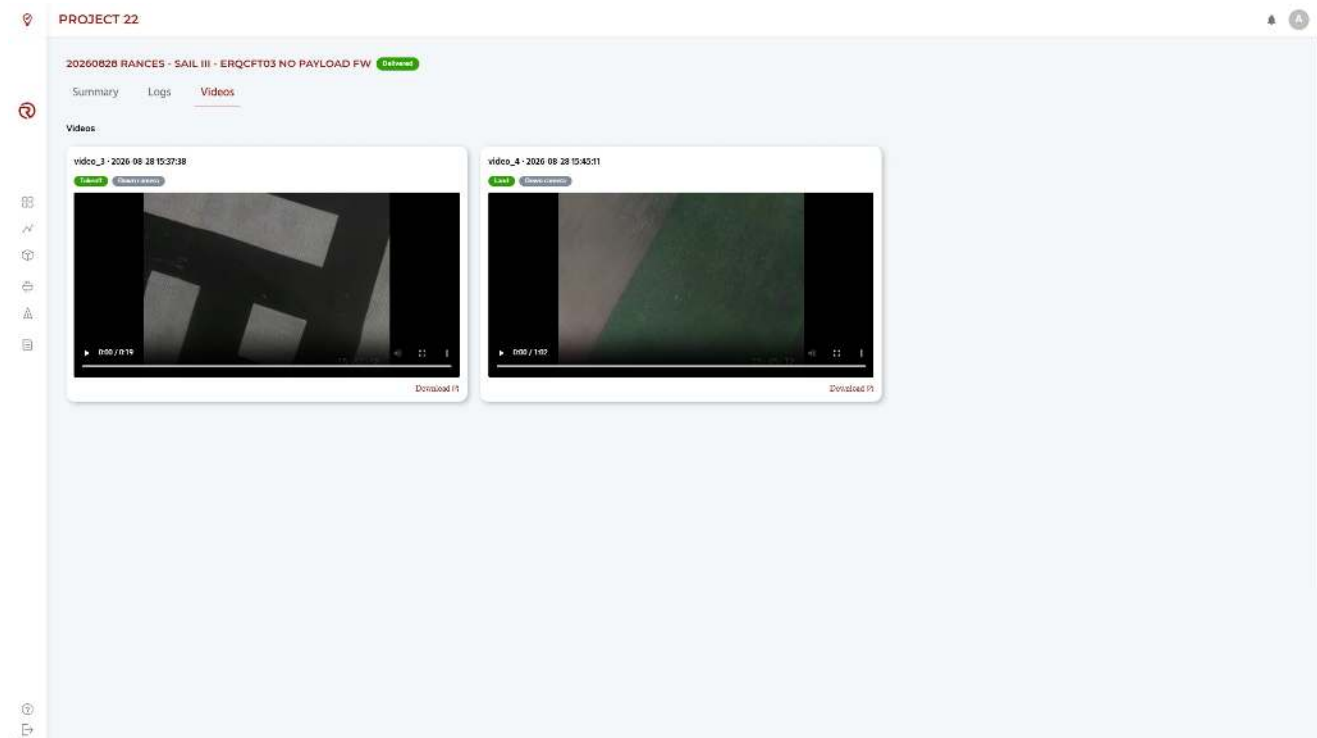
9. **Example of all attributes:** when showing all the attributes of an operation, you have access to the name of the route (and its representation on the map), and the different attributes of the operation.

10. **Flight review:** allows to access the flight review.

When clicking on the flight the operation, a new window will be available:

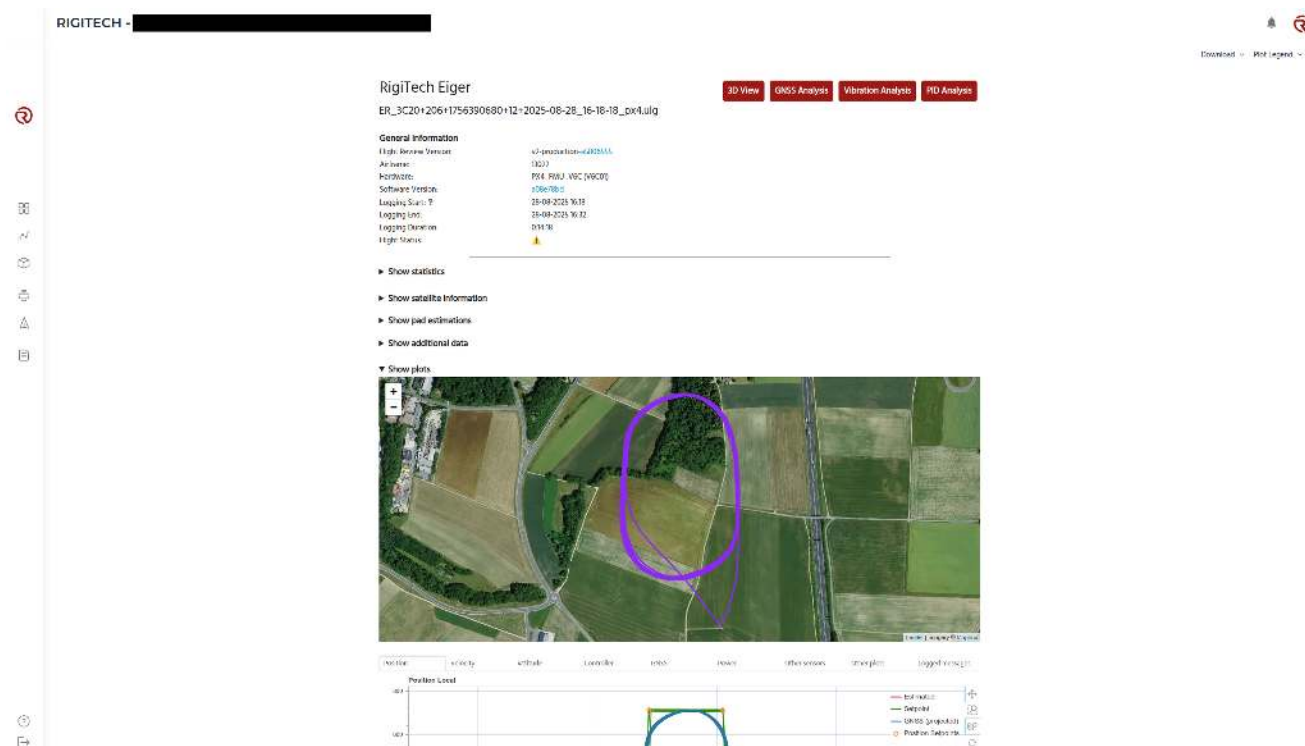
- Summary: summary (similar to the information above)
- Logs (access to the different flight logs, and summary of the flight logs)
- Videos: access to videos from Precision Manoeuvres (takeoff and landing)

[illegible]



## Flight Review

Flight Review is a tool used at RigiTech to analyse flight logs. It is based on the open-source tool of the same name by PX4. However, the version at RigiTech has been augmented with more plots and automatic checks.



- **Open 3D View:** opens the 3D View representation of the flight.
- **GNSS Analysis:** opens the GNSS analysis module. Advanced plots allowing to analyse the GNSS performance throughout the flight.
- **Vibration Analysis:** opens the vibration analysis module. Advanced plots allowing to analyse the vibrations throughout the flight, provided that the information is logged at high enough frequency.
- **Open PID Analysis:** opens the PID analysis module. Advanced plots allowing to analyse the performance of the PID controllers.
- **Show statistics:** collapsible table with statistics of the flights. Flight statistics grouped in sub-tables, split for the different flight regimes where applicable with some automated performance checks.
- **Show ...:** grouped plots. Thematic tabs for easier overview.

Additional information on the flight review can be found in the [Log Analysis using Flight Review](#).

Additional information on the 3D View representation of the flight can be found in [Replay Drone Flights in 3D with Flight Review](#).

## Checks

| Test Name            | Possible External Failure Reasons                        | Possible Drone-Related Failure Reasons                                                           |
|----------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| TECS Pusher Throttle | Route climbs or descends<br>Rain<br>Payload distribution | Airspeed sensor clogged (overspeed)<br>Damaged pusher motor or propeller<br>Damaged lift surface |

| Test Name                                                                                            | Possible External Failure Reasons                                                       | Possible Drone-Related Failure Reasons                                                                                |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| FW Avg Power                                                                                         | Route climbs or descends<br>Rain<br>Payload distribution                                | Airspeed sensor clogged (overspeed)<br>Damaged pusher motor or propeller<br>Damaged lift surface                      |
| FW Average Pitch                                                                                     | Route climbs or descends<br>Rain<br>Payload distribution                                | Level calibration<br>Airspeed sensor clogged (overspeed)<br>Damaged pusher motor or propeller<br>Damaged lift surface |
| MC Average Power (Ascending, Hovering, Descending)                                                   | Payload out-of-spec<br>Rain<br>Wind                                                     | Damaged powertrain<br>Damaged current/voltage sensors                                                                 |
| FW/MC Max Current                                                                                    | N/A                                                                                     | Damaged powertrain<br>Damaged current sensor                                                                          |
| Battery Remaining                                                                                    | Long Routes<br>Contingency Behavior<br>Wind<br>Rain<br>Battery Aging                    | Damaged current sensor<br>High FW Avg Power                                                                           |
| Lidar Strength <5m                                                                                   | No pad<br>Fog/Humidity<br>Dirty Lens<br>Dirty pad                                       | Lidar failure                                                                                                         |
| Lidar Strength <20m                                                                                  | Reflective surfaces (e.g metal)<br>Absorbent surfaces (e.g. water, grass, paint)<br>Fog | Lidar failure                                                                                                         |
| FW Max Speed                                                                                         | High winds<br>Airspeed sensor partially clogged                                         | N/A                                                                                                                   |
| MC/FW Absolute max accel (x/y/z)<br>FW Average envelop (x/y/z)<br>MC Max envelop (x/y/z)<br>Clipping | High winds<br>Loose payload<br>Loose battery                                            | Damaged / Imbalanced propellers<br>Motor dampener worn out                                                            |
| Max windspeed                                                                                        | Wind                                                                                    | Airspeed sensor partially clogged<br>Airspeed sensor failure                                                          |

| Test Name                                    | Possible External Failure Reasons                                                                                                                                        | Possible Drone-Related Failure Reasons                                        |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Airspeed Sensor Offset                       | N/A                                                                                                                                                                      | Airspeed sensor partially clogged<br>Airspeed sensor failure                  |
| MC Max Alt Deviation<br>MC Avg Alt Deviation | Wind/Updraft                                                                                                                                                             | Powertrain failure/degradation                                                |
| FW Stabilization Alt Deviation               | Turn during or immediately after transition<br>Payload distribution                                                                                                      | Not enough lift (low airspeed)<br>Pitch down on front transition end          |
| FW Alt Deviation                             | Long/steep climb/descent<br>Large gust                                                                                                                                   | Tail failure<br>Powertrain failure<br>Damaged lift surface                    |
| FT Alt Deviation                             | Turn during transition<br>Gusts<br>Updraft                                                                                                                               | Tail failure<br>Powertrain failure<br>Damaged lift surface                    |
| BT Alt Deviation                             | Updraft                                                                                                                                                                  | Airspeed sensor partially clogged<br>(overspeed)                              |
| Mag 0/1 Avg Norm                             | Strong magnetic source nearby (e.g. power station, high voltage power lines, HIRF source, payload)<br>Metallic objects nearby (e.g. drone port, lightning rods, payload) | Magnetometer calibration (only Mag Heading Disparity)<br>Magnetometer failure |
| MC Motor Stress Imbalance                    | Wind                                                                                                                                                                     | Powertrain degradation                                                        |
| Main Power Status                            | N/A                                                                                                                                                                      | Power supply failure<br>Main battery disconnection/failure<br>Cable failure   |
| Backup Power Status<br>USB Power Status      | N/A                                                                                                                                                                      | Backup power supply failure<br>Cable failure                                  |
| Max CPU<br>Max RAM                           | N/A                                                                                                                                                                      | Faulty hardware<br>Software issue                                             |
| Max RTT                                      | N/A                                                                                                                                                                      | High OC CPU load (e.g. camera stream)<br>OC temperature throttle (broken fan) |
| PX4 Error Messages                           | Detect and Avoid                                                                                                                                                         | N/A                                                                           |

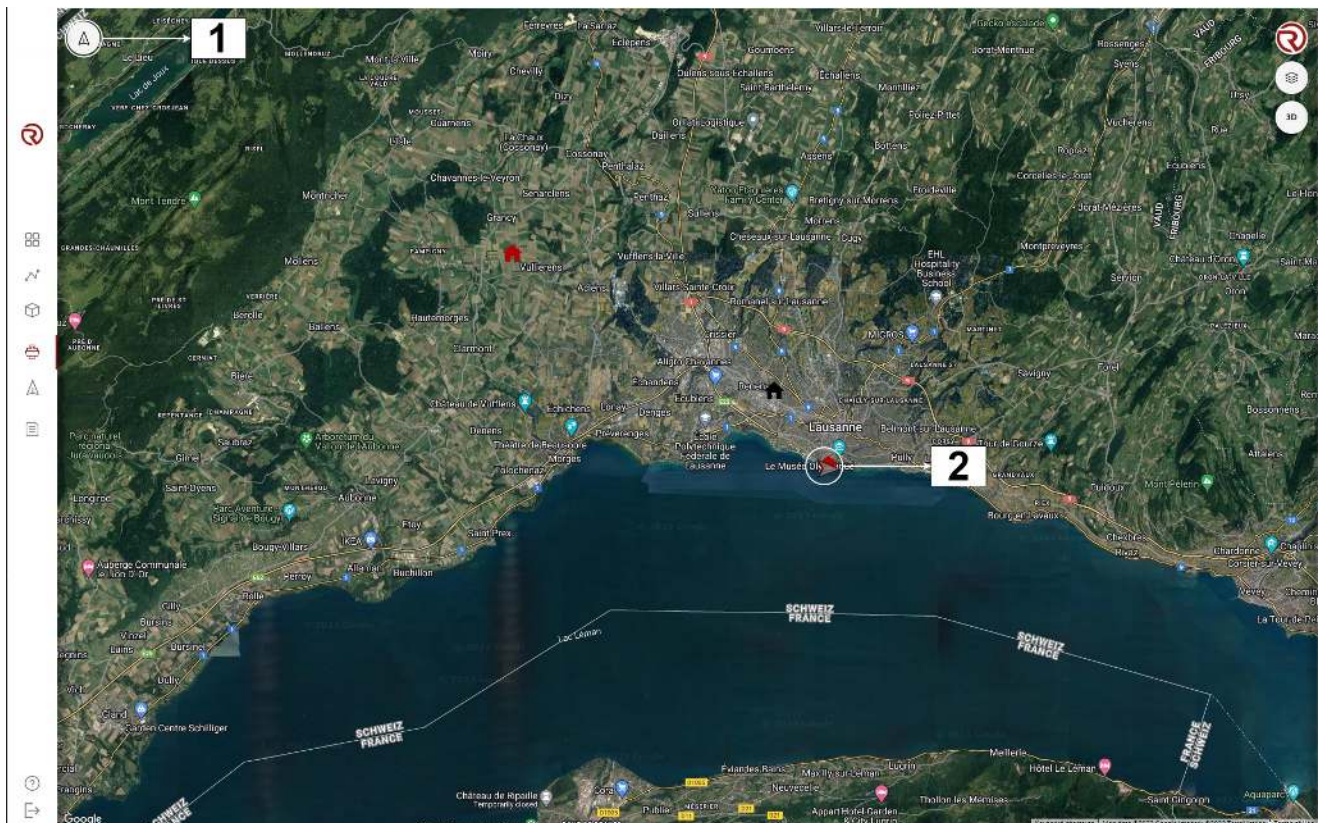
| Test Name                                                                                 | Possible External Failure Reasons                                                                                                                                                    | Possible Drone-Related Failure Reasons                                                                        |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Log Drops                                                                                 | N/A                                                                                                                                                                                  | Log incomplete (manual download required)                                                                     |
| GNSS 0/1 Min # Sat<br>GNSS 0/1 Avg # Sat<br>GNSS 0/1 Max EPH/EPV<br>GNSS 0/1 Max Fix Type | Space weather<br>GNSS Jamming<br>GNSS Outage<br>Obstacles (large buildings)                                                                                                          | GNSS antenna loose<br>GNSS antenna faulty<br>GNSS receiver faulty<br>Loss of communication with GNSS receiver |
| Pad Detecting Height (landing/takeoff)                                                    | Pad dirty<br>Camera lens dirty<br>Precision landing/takeoff not used<br>Takeoff/Landing waypoint too low (min 30m AGL)<br>Pad partially shaded<br>No visibility (e.g. darkness, fog) | Camera failure                                                                                                |
| Cross Distance to Pad (landing)                                                           | High winds<br>Pad detected too late                                                                                                                                                  | Camera failure                                                                                                |

**Note:** Nearly every check can be triggered by high wind or heavy rain. Checks may of course be triggered by real problems with drone, such as aging motors or sensors.

# Control Tower

## Overview

The Control Tower is, with the Airbridge Planner, the most important module of RigiCloud in terms of the flight operations. Here, all the connected drones (and simulators) of the project can be seen/monitored/controlled, as well as other features described in the previous sections if desired (routes, bases and markers, airspace, air traffic, weather, etc.).

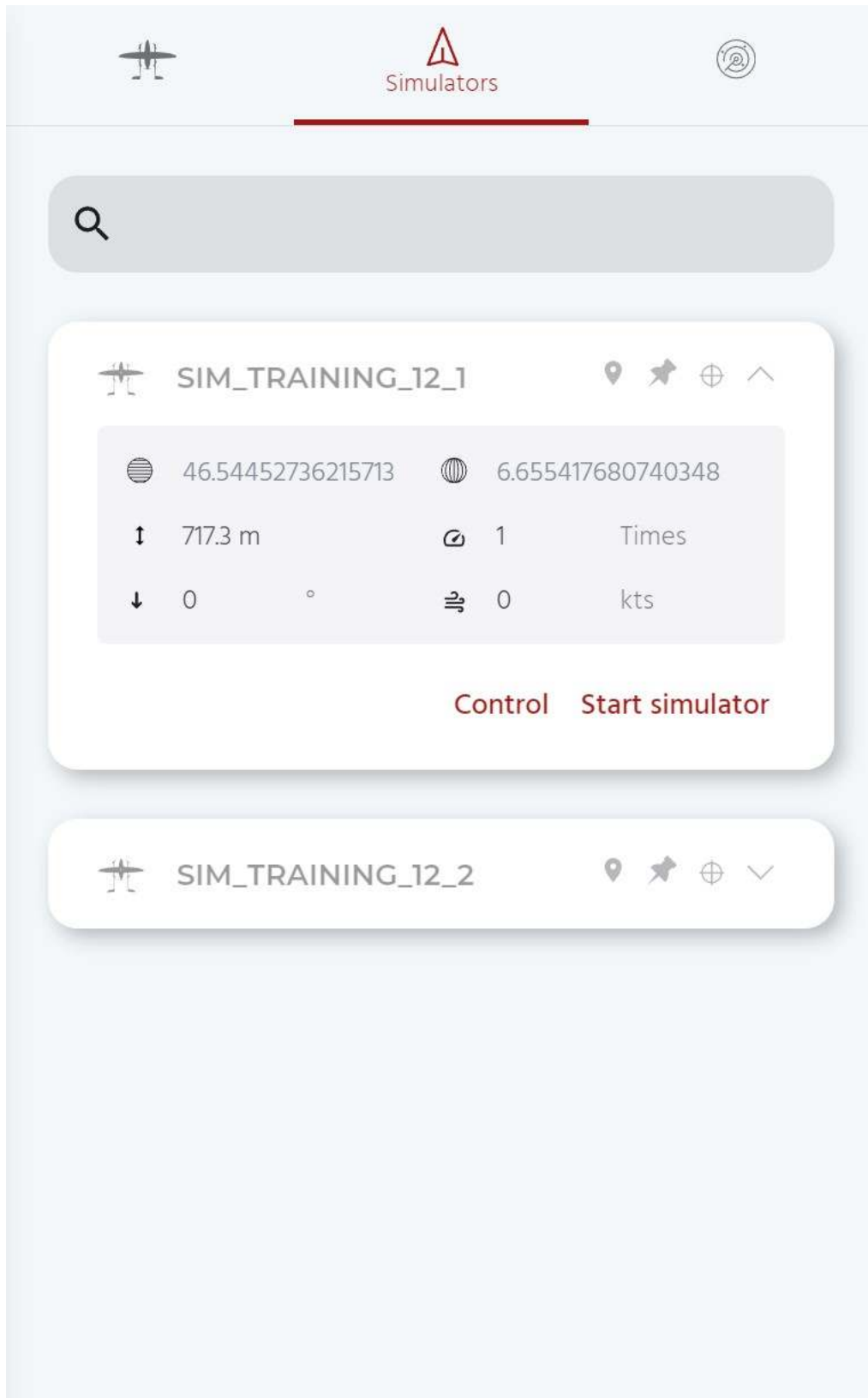


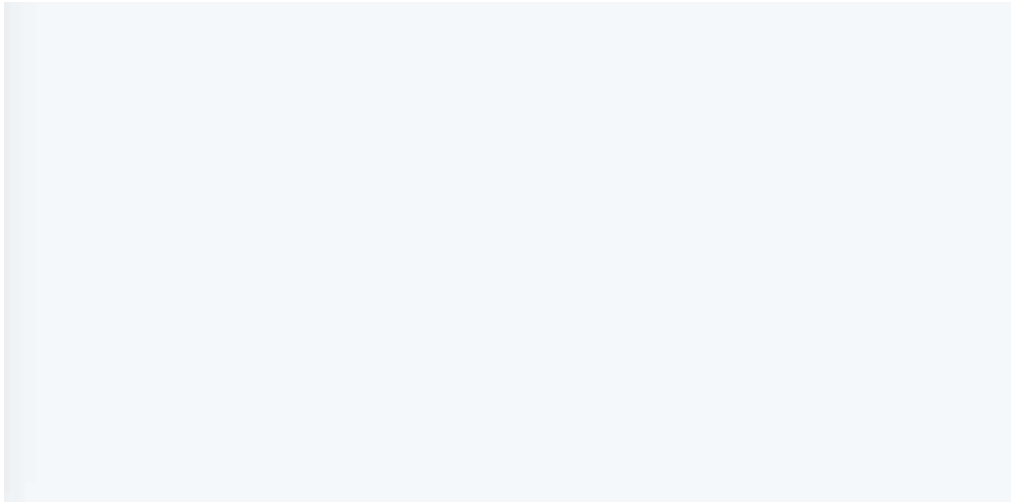
1. **Drone control:** opens the drone control menu with a list of vehicles and simulators within the project.
2. **Example of simulator**

The use of the map has been described in [Map navigation and tools](#).

## Drones

Once the "Drone control" button is clicked on, a menu will open, allowing to control a drone, a simulator or a simulated air traffic within the list, as well as taking its control (drone and simulator).

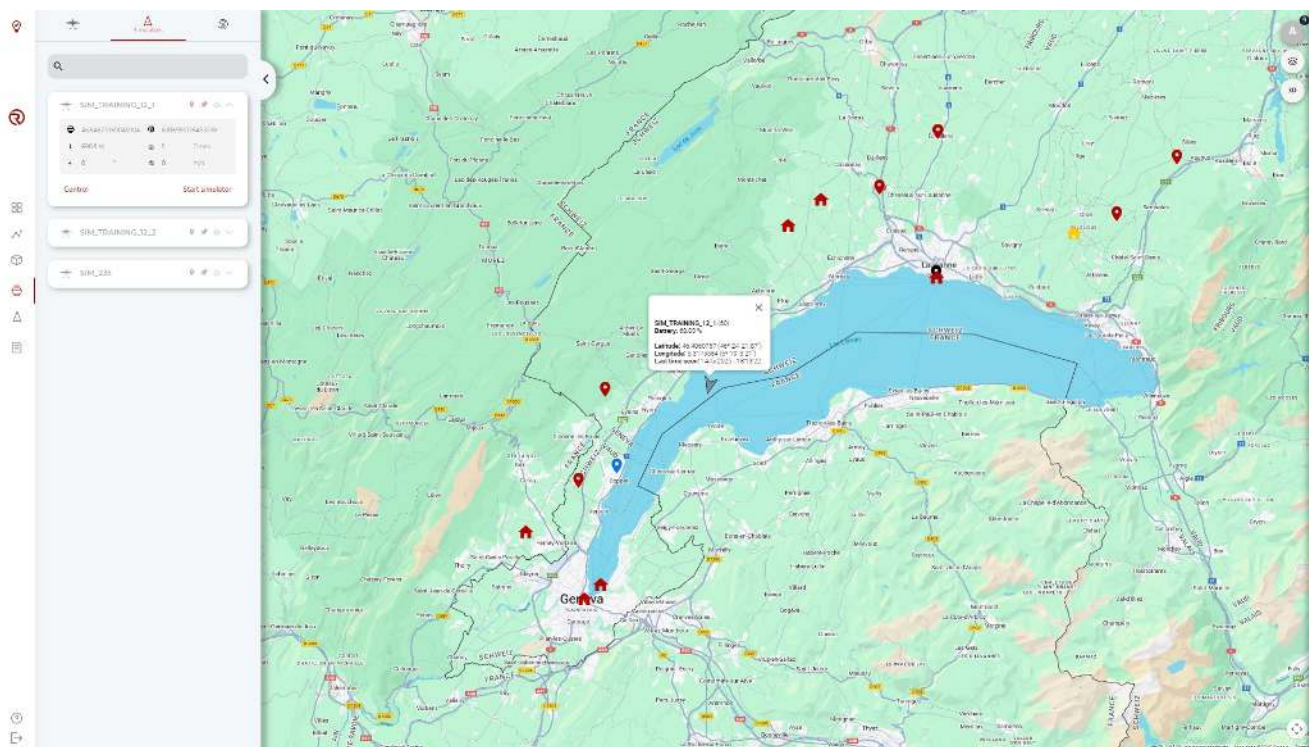




- **Module selector** switches between drones (left) and simulators (center) and simulated air traffic (right).
- **Search box:** allows to search for a specific vehicle/simulator.
- **List of drones/simulators:** list of vehicles within the project.
  - Every drone/simulator is listed with their ID.
  - If a vehicle is connected, the symbol will turn red and the status will be shown.
- **Control:** allows to take control of the vehicle (only for drones and simulators, see [Flight control overview](#)). This action can also be done by clicking on the symbol of a vehicle on the map.
- **Show last known position:** shows the last known position of the vehicle through a grey symbol on the map. Its coordinates are shown when clicking on it.
- **Pin map to drone:** fixes the center of the map to the position of the specific vehicle.
- **Go to drone:** goes to the position of the specific vehicle.
- **Show/hide information:** shows/hides information of the vehicle and control options. If the vehicle is connected, the battery and the flight mode will be displayed (see [Simulators](#)).

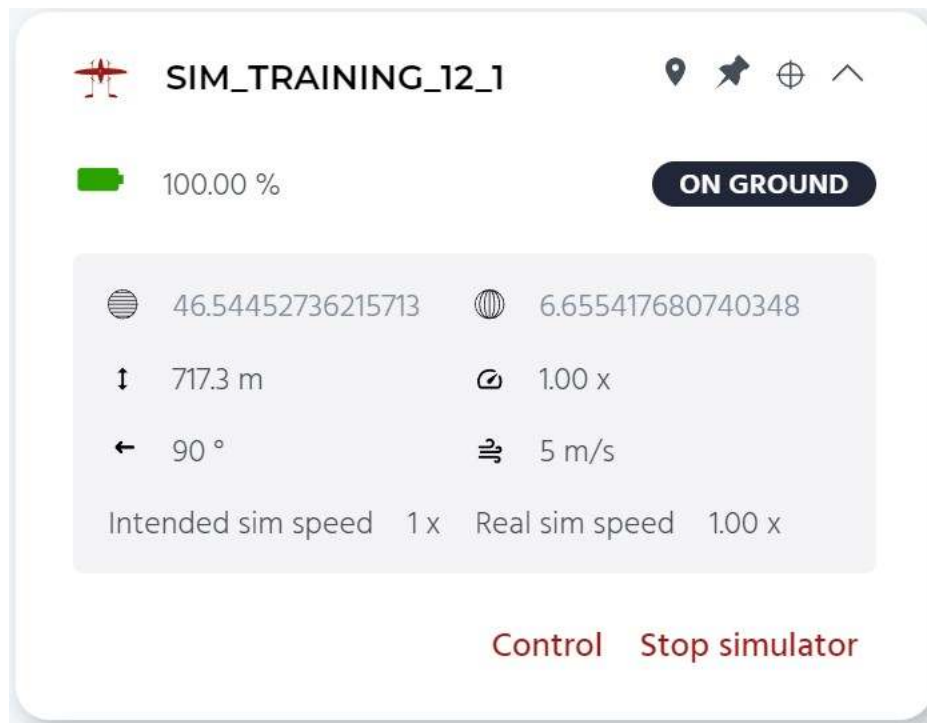
## Show last known position

When clicking on "Show last known position", the last known position of the vehicle being controlled will be displayed on the map. By clicking on it, a window will pop up containing the information of the name of the UAS, the remaining battery before losing connection, the last known coordinates and the last time of connection.



## Simulators

In order to simulate a route, the "Drone control" has a dedicated page for simulators. The interface is mostly identical to the interface of the "Drone" page, but with some differences to start them.



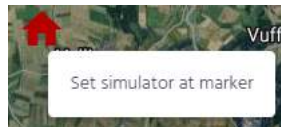
Available information:

1. **Battery of the vehicle:** shows the battery of the vehicle.
2. **Flight mode:** shows the status of the vehicle.
3. **Simulator information:** shows the position and speed of the simulator.
4. **Latitude and Longitude:** coordinates at which the simulated vehicle will start. The latter need to be close enough to the takeoff point of the simulated route. Otherwise, a warning will be displayed showing the deviation and the simulator they will not take off.
5. **Altitude:** altitude at which the simulated vehicle will start (ground altitude in m AMSL).
6. **Simulator speed:** speed at which the simulator simulates the flight (by default, 1). From 1 to 10, speed 1 intends to be real-time simulation (ideal for training and validating operational procedures), while 10 represents a faster simulation (better for supporting the validation process of a flight plan).
7. **Wind direction and speed:** allows to simulate wind conditions based on its direction and speed. The conditions will be kept until the simulator is stopped.
8. **Intended and real speeds:** when simulators are started, the intended and real simulator speed will be displayed.
9. **Start/stop simulator:** allows to start/stop the simulator (depending on the status of the simulator). The different options are:
  - **Start simulator:** allows to start the simulator at the specified location (shown coordinates).
  - **Starting simulator:** after clicking on "Start simulator", this message will be shown during a few seconds, until the simulator has started correctly.
  - **Stop simulator:** allows to stop the simulator. After using them, simulators should always stopped in order to avoid problems due to the use of the resources of the server.
  - **Stopping simulator:** after clicking on "Stop simulator", this message will be shown during a few seconds, until the simulator has stopped correctly.

## How to select the position of a simulated vehicle

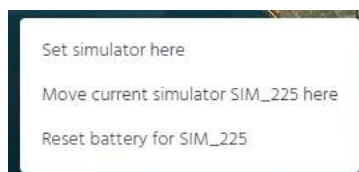
Before starting a simulator, the desired position can be selected by right-clicking on the map and click on "Start simulator here". The coordinates and altitude shown in the simulator information will change automatically. The simulator can then be started. Simulators can be started at an empty location, but also at a marker or a base.

In order to change the position of the simulator, with the control of a simulator taken, users should right-click on a base or marker (or in at an empty location) and click on "Move current simulator [ID of the simulator] here". Another option is to stop it and restart the process from a new empty position.



## Moving and resetting started simulators

In order to change the position of a started simulator, with the control of the simulator taken, users should right-click on an empty space of the map and click on "Move current simulator [ID of the simulator] here". A similar process is required to reset the battery of the simulator ("Reset battery for [ID of the simulator]").

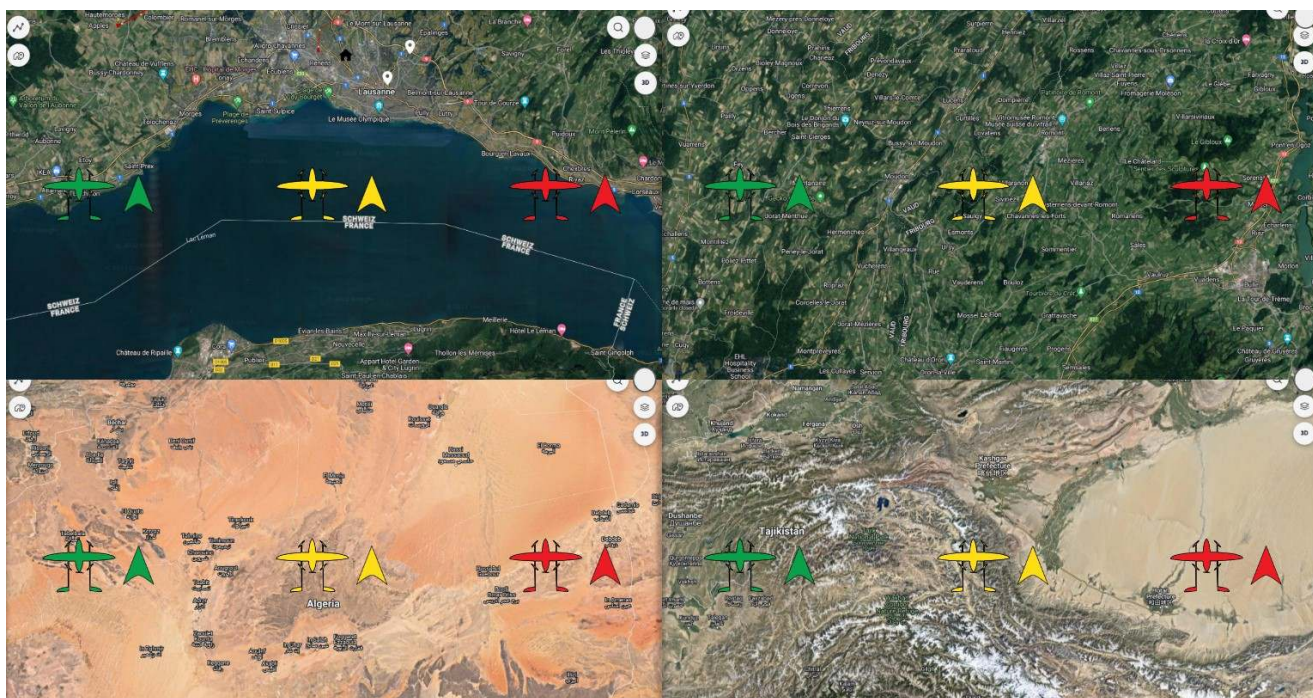


## Limitations

- If the takeoff point is higher than the landing point, the simulator will crash in flight when the flight plan crosses the same altitude as the takeoff point.
- If the takeoff point is lower than the landing, the drone will land inside the ground at the same altitude as the takeoff point.

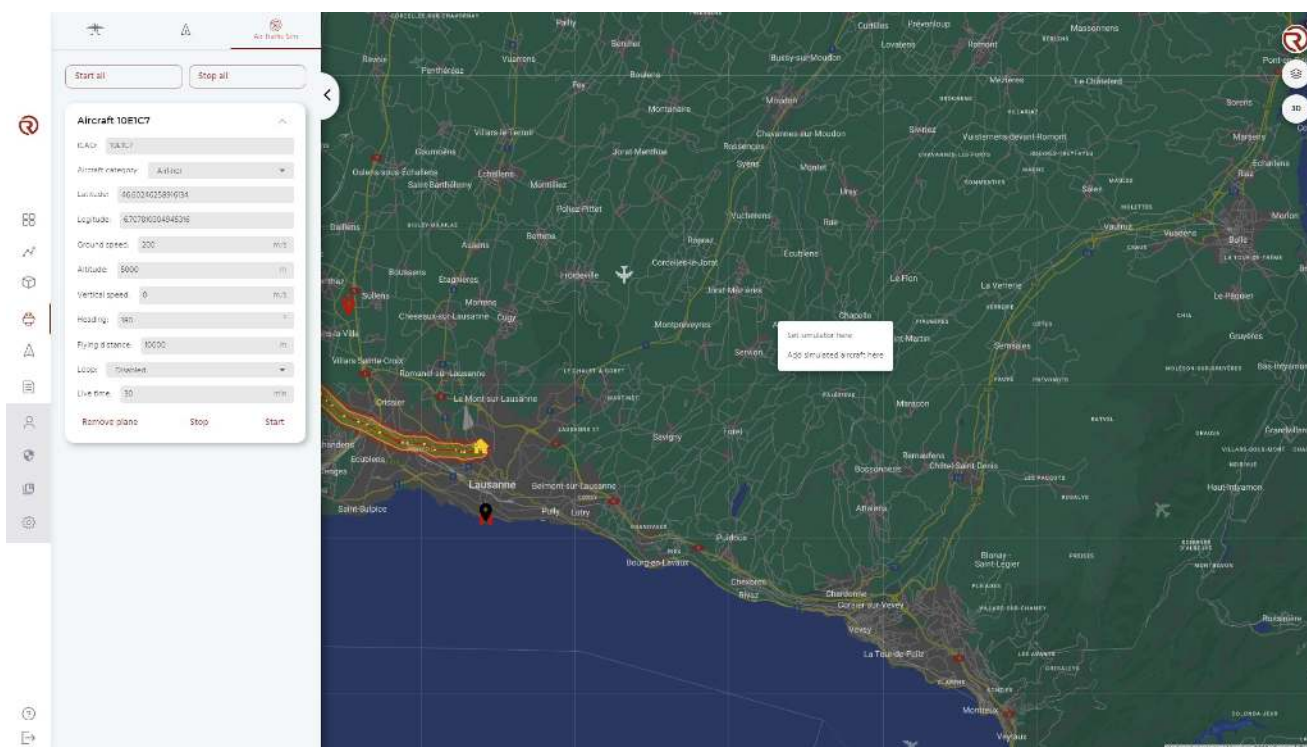
## Representation of drones and simulators

Drones are represented with the icons of drones, while simulators are represented with triangles. The presented colours depend on their status (see [Messages, status and operation boxes](#)).



## Simulated air traffic

Air traffic may be simulated by going to the "Air Traffic Sim" tab, right clicking on the map and selecting "Add simulated aircraft here".



For each new air traffic simulator, the following settings may be configured:

- ICAO number: (randomly generated) identification of the simulated aircraft.
- Aircraft category: airliner, light airplane, helicopter parachute or balloon.
- Coordinates
- Ground speed
- Altitude
- Vertical speed
- Heading
- Flying distance
- Loop (continuously repeat the simulation)
- Live time: time for which the simulator will run

Simulated aircraft may be removed, stopped or started. Finally, all simulators may be started or stopped at once.

***WARNING: SIMULATED AIRCRAFT MAY BE DETECTED BY REAL DRONES!***

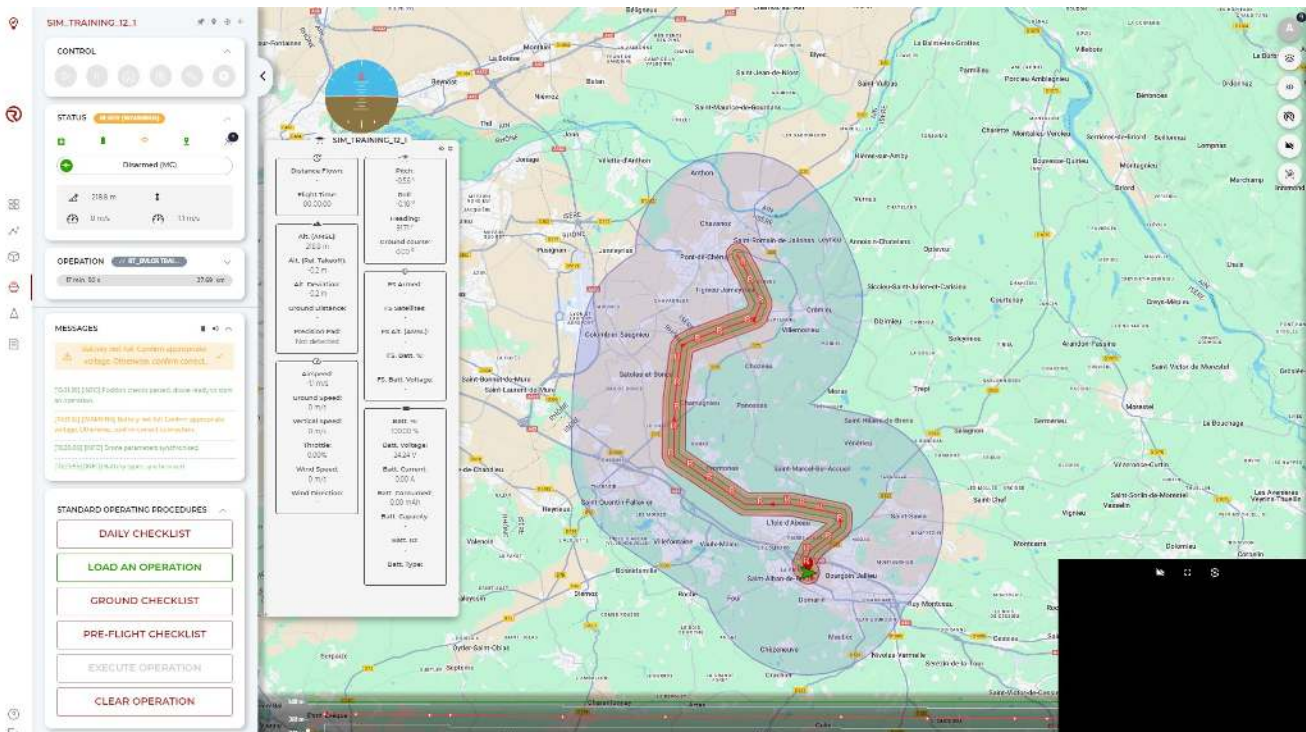
# Flight control overview

## Flight control

When a vehicle (or a simulated vehicle) is online and received by RigiCloud, it will be displayed on the map. It can be controlled and/or monitored by clicking on it directly on the map or by clicking on "Control" in the list of vehicles (or simulated vehicles).

The left panel (drone control menu) includes, from top to bottom, the following elements:

- **Drone and tools**
- **Command and control tools:** shows the commands that can be sent manually to the vehicle.
- **ID of the vehicle**
- **Control commands**
- **Messages, status and operation boxes**
  - Messages: shows relevant messages sent by the UAS to RigiCloud and RigiCloud messages.
  - Status box: shows the status and health of the vehicle.
  - Operation box: shows operational information of the vehicle.
- **Standard Operating Procedures**
- **Telemetry**



In the map, next to the vehicle/simulator, the following elements can be represented:

- Secondary GNSS position: represented with a red dot. Depending on the resolution of the map, it may be hidden behind the vehicle icon.
- Wind direction: represented with an arrow.

## Command and control tools and filters



Command and control tools allow to filter certain map elements of the operation, fix the map to the vehicle, go to the drone and leave the control of the vehicle. From left to right:

- **Show/hide mission:** shows/hide the mission (i.e. the flight plan) uploaded to the vehicle.
- **Show/hide geocages:** shows/hide the geocage (and other surfaces) of the operation.
- **Show/hide rally points:** shows/hide rally points of the operation.
- **Show/hide wind arrow:** shows/hide the wind arrow (indicating the wind direction perceived by the UAS).
- **Show/hide flight detector areas:** shows/hide flight detector areas (two cylinders used for air traffic detection).
- **Show/hide altitude profile:** shows/hide the altitude profile of the flight plan and the terrain.



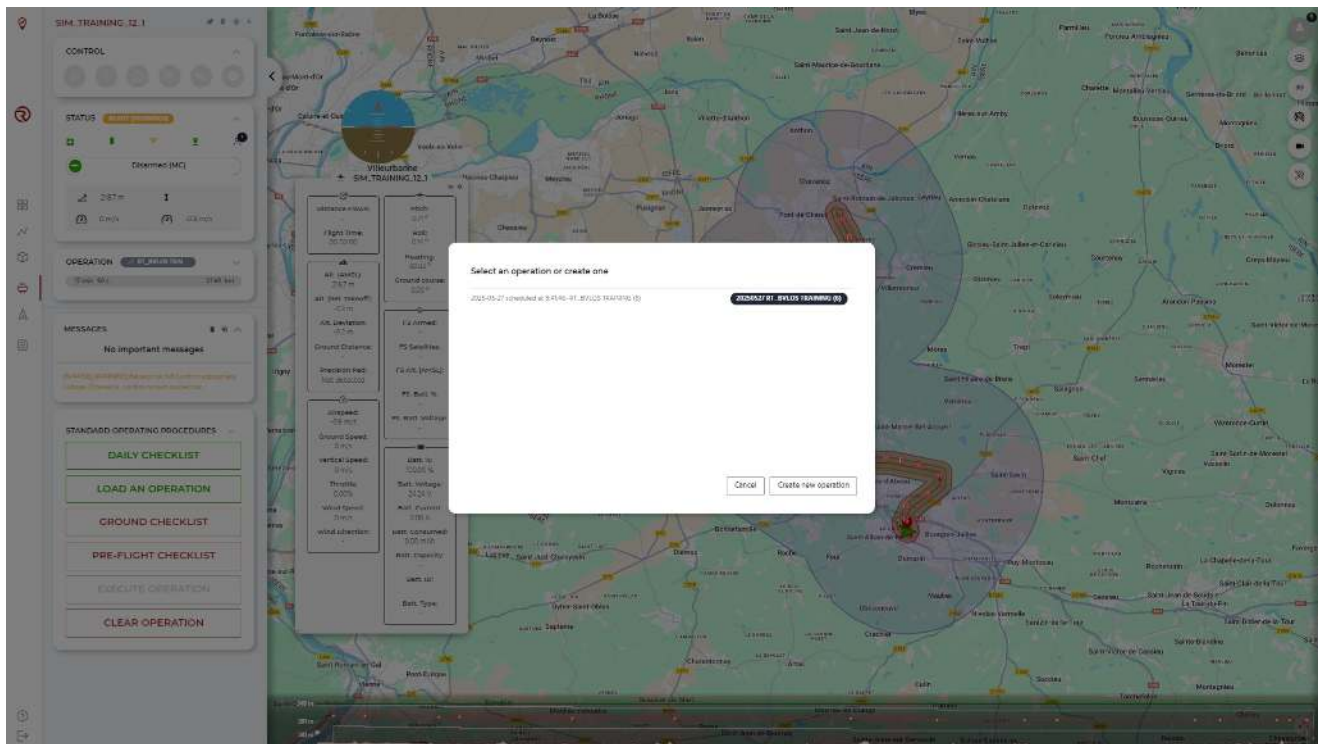
- **Pin map to drone:** fixes the center of the map to the position of the specific vehicle.
- **Show last known position:** shows the last known position of the UAS.
- **Go to drone:** goes to the position of the specific vehicle.
- **Leave control:** leaves the control of the specific vehicle.

## Standard Operating Procedures (SOPs)

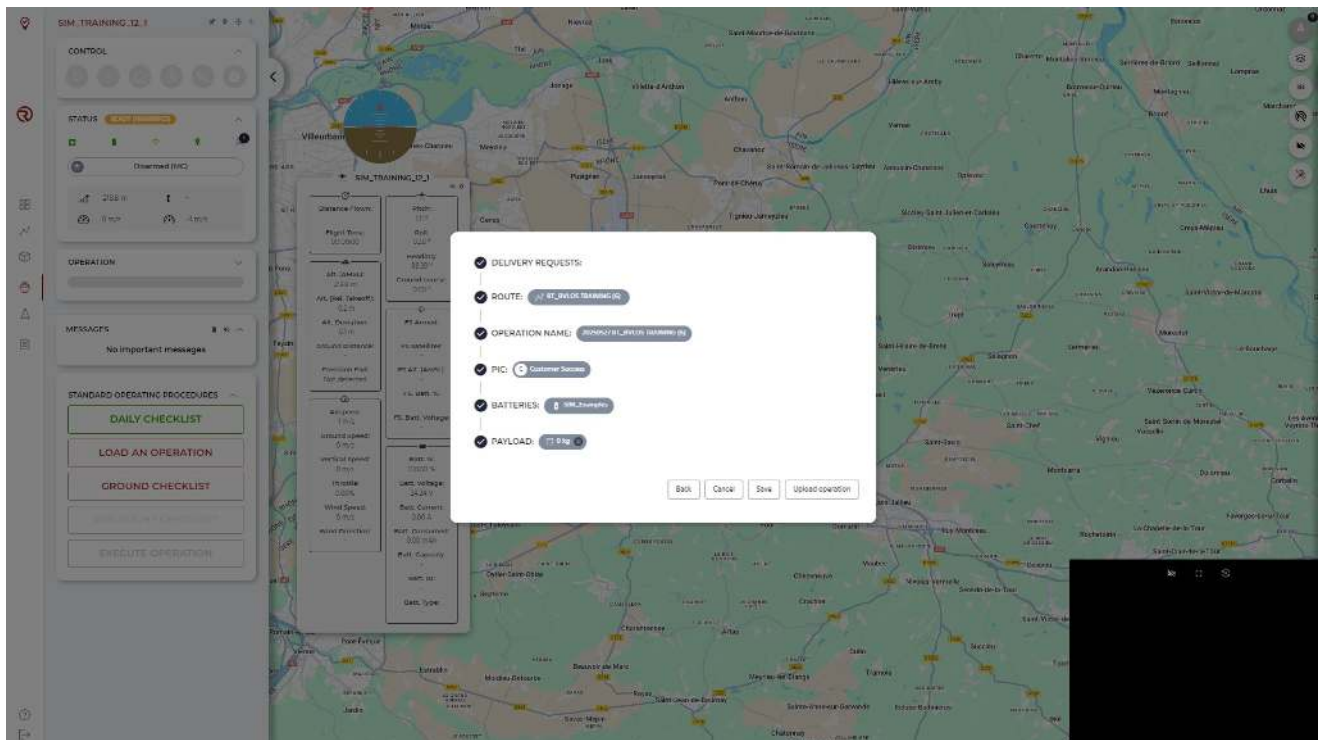
### Load an Operation

Before any flight, an operation needs to be loaded into the UAS by clicking on "Load an Operation". The operation may have been scheduled previously (selecting a route, a name and a remote crew), but it is also possible to create it after taking control of a vehicle (or simulated vehicle).

After clicking on this button, a window will pop up, allowing to select an existing operation (by clicking on it) or creating a new one (by clicking on "Create new operation"). It is also possible to click on "Cancel" to cancel to process.



Independently of the path chosen, the last parameters and resources of the operation need to be confirmed.



- **Delivery requests:** allows to link the operation to a delivery request (see [Requests interface](#)).
- **Route:** defines the flight plan linked to the operation.
  - For real drones, only flight plans with APPROVED status can be uploaded.
- **Operation name:** allows to change the name of the operation and add comments. By default, the name of the operation is based on the date and the name of the flight plan.
- **Remote crew:** allows to add a PIC (by default, the user creating the operation) and, if any, other operators.
- **Batteries:** assigns batteries to the operation (the number will depend on the model of the vehicle used).
- **Payload:** assigns an estimated payload weight to the operation.

Once the resources are selected, it is possible to go back, to cancel, to save the operation created/modified and to upload it. The operation will not be uploaded if there is any technical error in the flight plan.

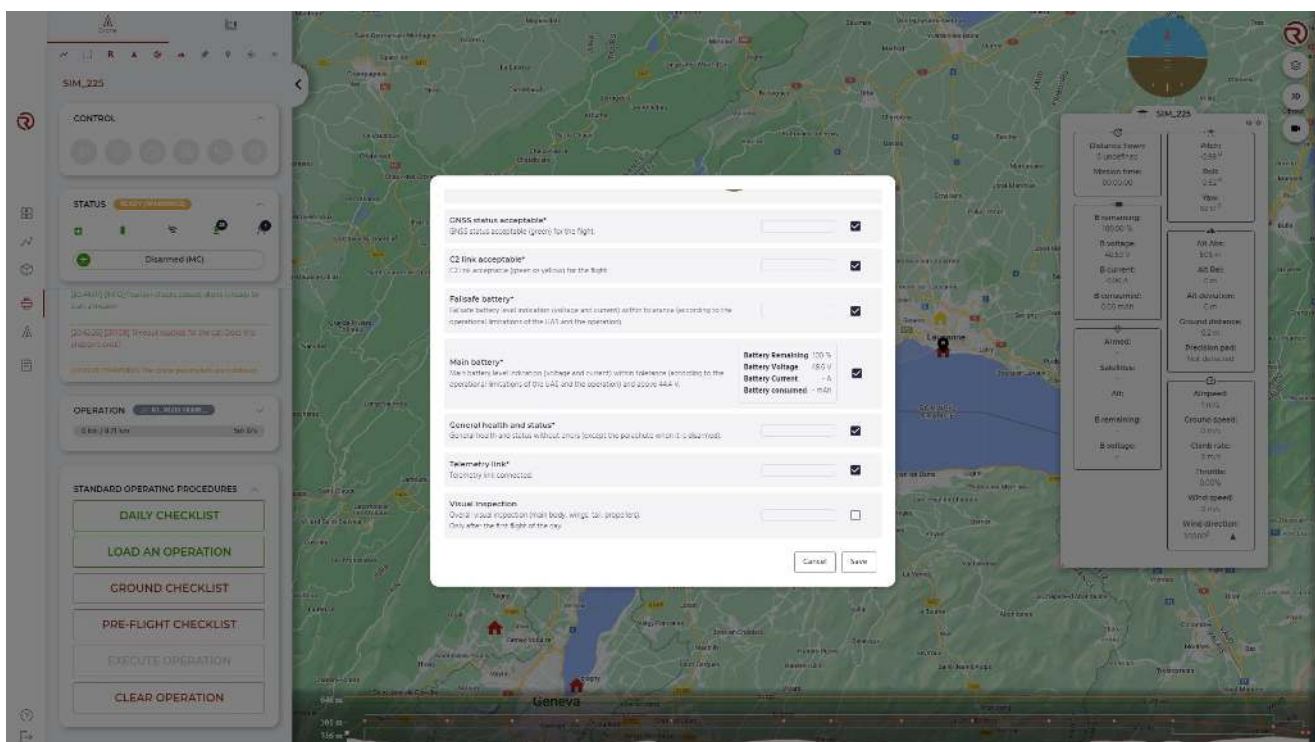
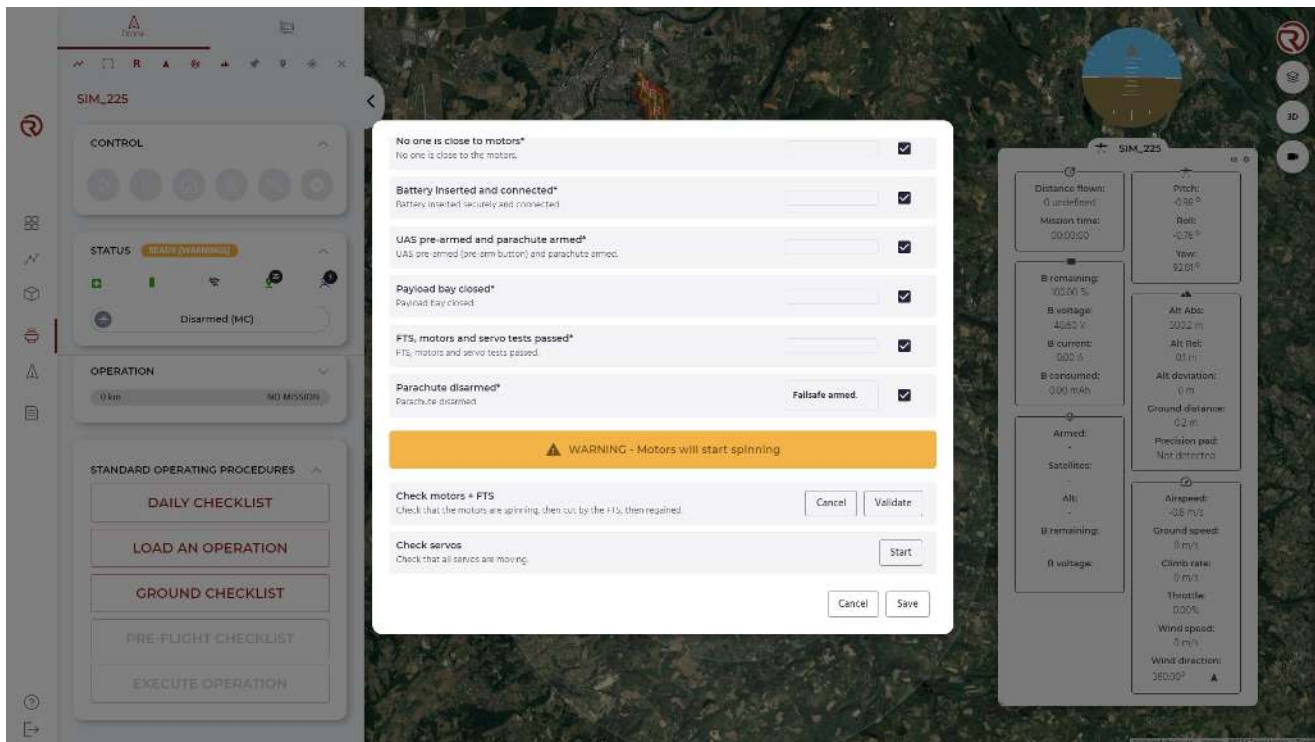
It is possible to clear the operation by clicking on "Clear Operation".

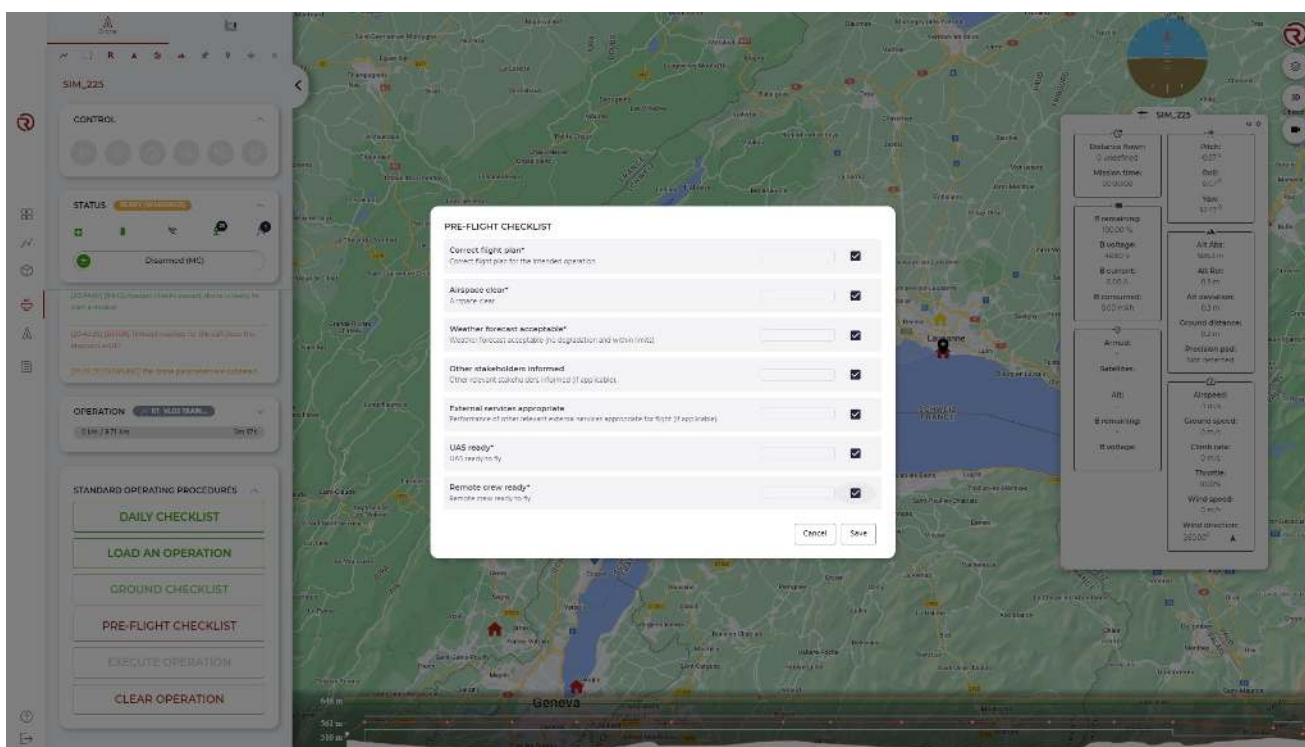
## Checklists

There are up to three levels of checklists, based on the Standard Operating Procedures of the UAS (as defined in its Flight Manual):

- Daily checklist: it needs to be executed at least once a day. It may include FTS, motors and servo checks.
- Ground checklist: it needs to be executed before every flight. It may be completed by ground personnel before uploading the operation.
- Pre-flight checklist: it needs to be executed before every flight. It needs to be completed after uploading the operation.

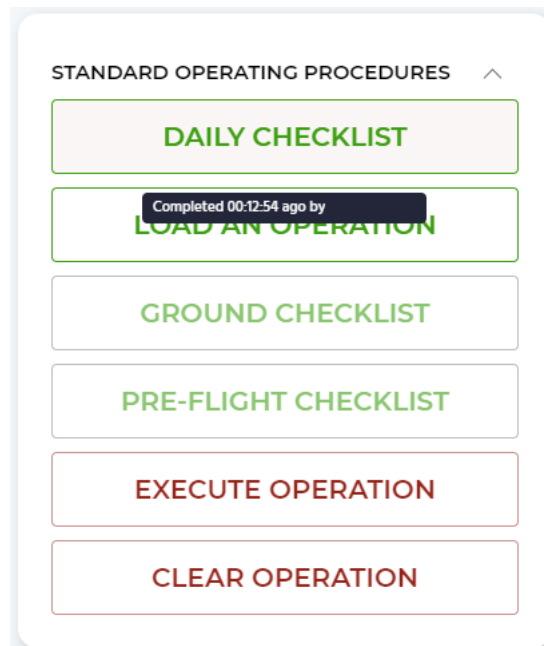
When configured for the project, the different checklists may appear. By clicking on any of them, a window will pop up with the specific checklist.





- **FTS, motors and servos checks:**

- FTS, motors and servos checks are particular checks that send commands to the UAS. SOPs, as defined in the Flight Manual of the UAS, possible complemented by the operator's needs, must be followed to ensure safety (e.g.: ensuring there is no one next to the motors, parachute armed, etc.)
- When clicking on "Start", the action will be executed by the UAS after a few seconds (depending on the model, it may beep before).
- It is possible to cancel them by clicking on "Cancel".
- Once they are validated, the user should click on "Validate".
- Checks with an asterisk next to them are mandatory. Others may be optional or depend on the operation.
- Some checks may include telemetry and/or indicator values to help verifying them.
- After completing all the mandatory checks, the user should click on "Save" to confirm the fulfillment of the checklist.
- Checklists passed will turn green. By hovering the mouse over a completed checklist, information on the user and the time of the validation will be displayed.

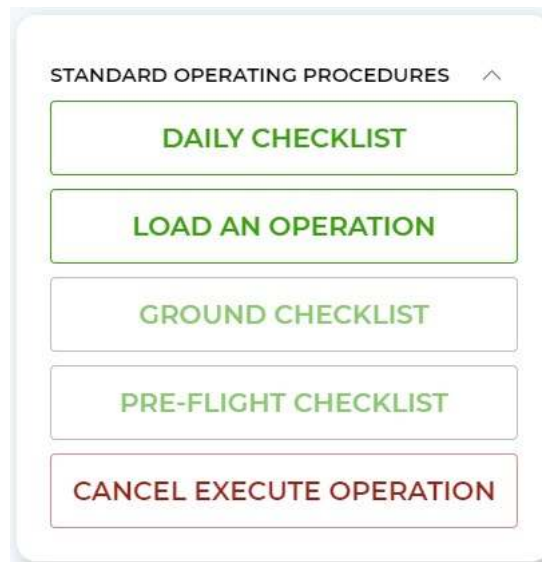


## Execute operation

Once the checklists are completed, the operation can start by clicking on **"Execute Operation"**, which will make the UAS (or simulated UAS) start its operation.

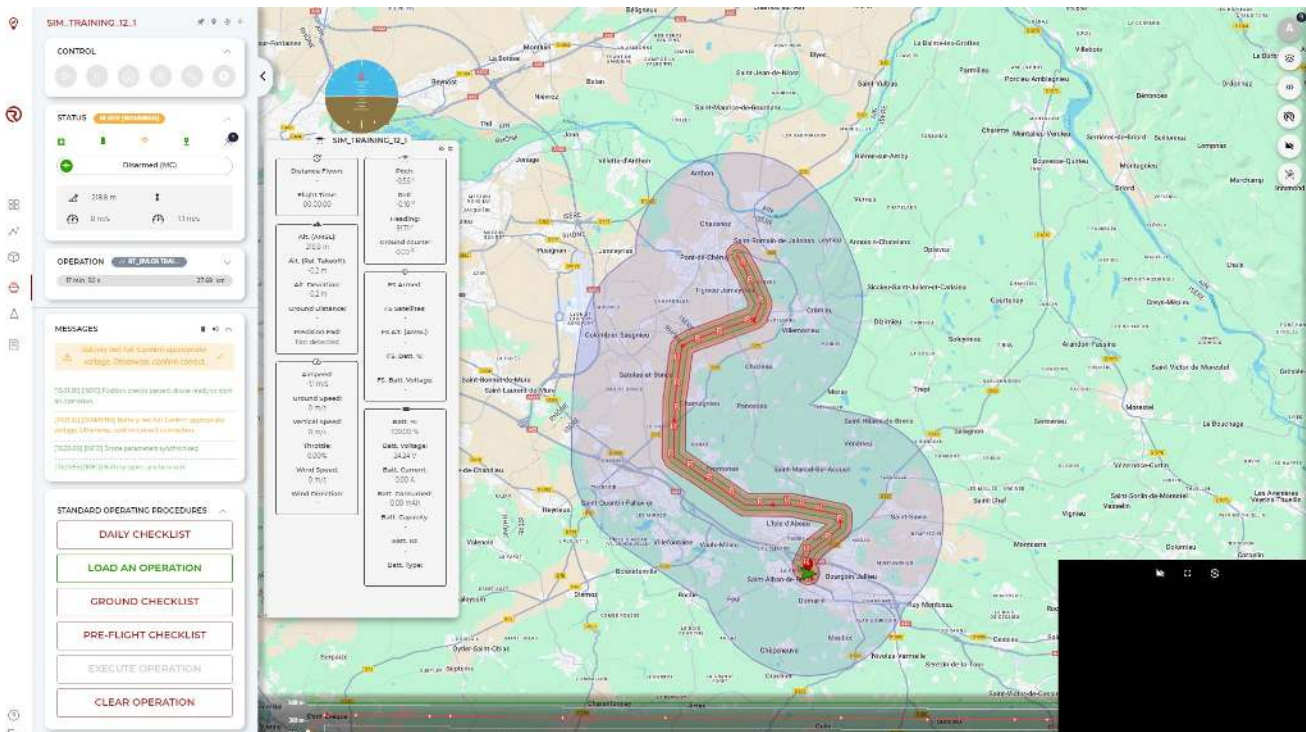
If the operation cannot be started for any reason, error messages will be displayed in the Messages box. The main reasons behind this could be an incorrect flight plan, an incorrect status of the vehicle (including, but not limited to, errors in sensors, communications or vehicle out of the geocage) or an incorrect positioning of the UAS compared to the takeoff position (vertical and horizontal).

It is possible to cancel the execution of the operation by clicking on "Cancel Execute Operation". Before executing the operation, the UAS will beep and a counter will be displayed in the Messages box.



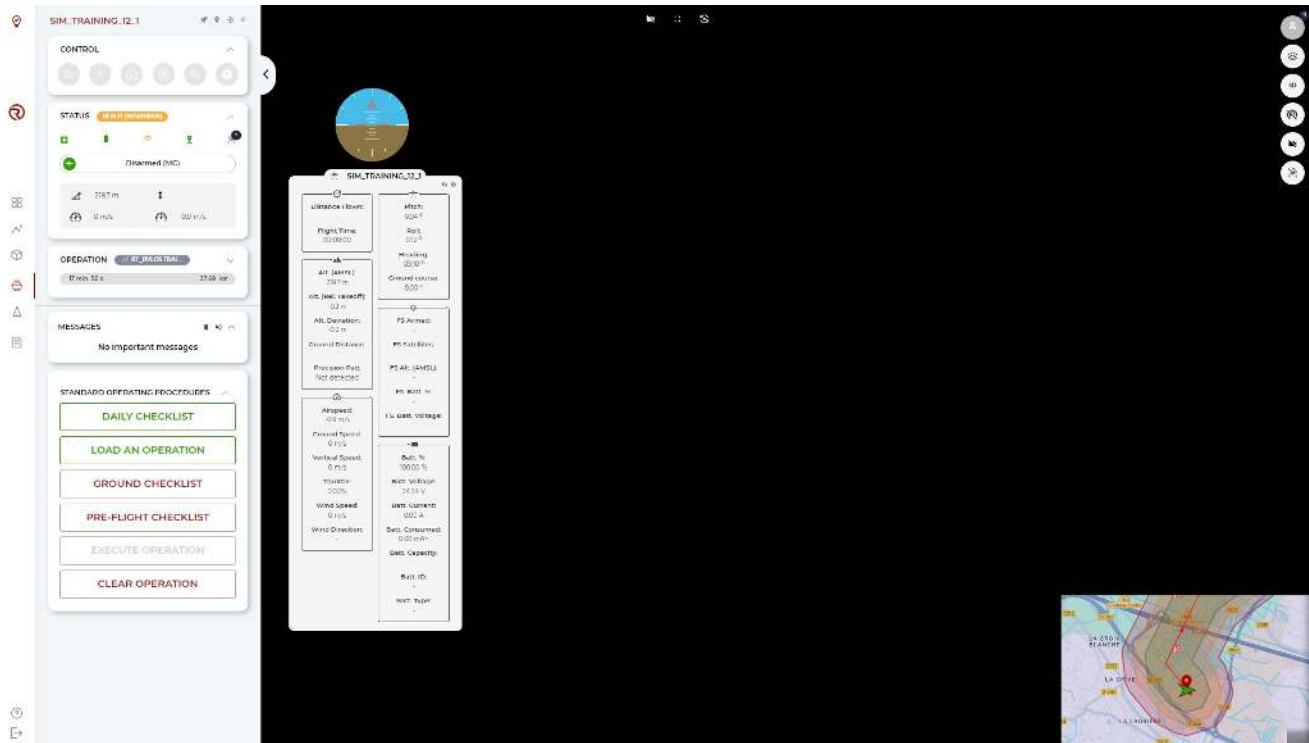
## Use of the camera

For UAS models with on-board cameras, live streaming of the camera/s can be shown/hidden by clicking on the "Open video player" button (top-right corner).



When the video player is available, it is possible to:

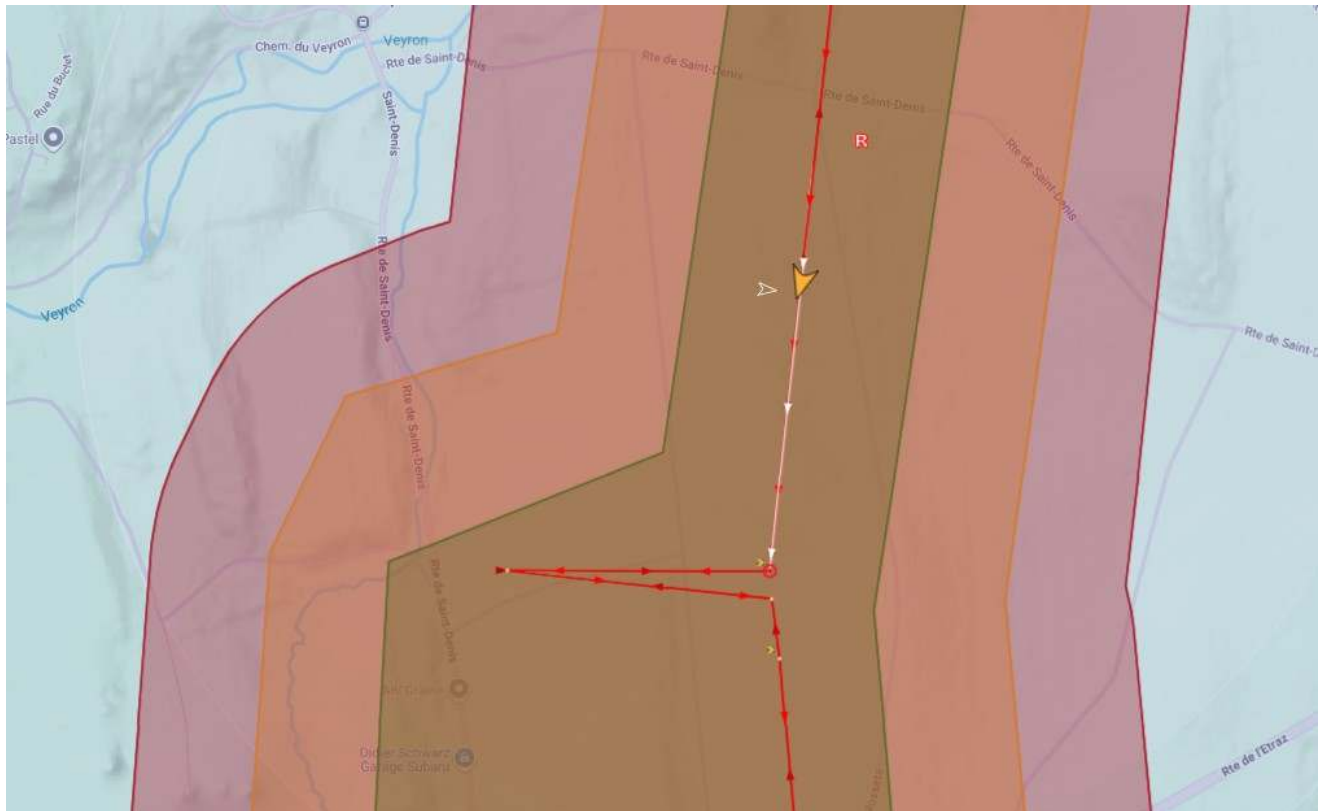
- Start streaming: sends signal to drone and starts video-proxy
- Full screen video
- Toggle camera (if more than one camera is available per drone model)



If Precision Takeoff (takeoff navigation supported by the camera) is enabled, the front camera cannot be accessed on ground or until takeoff is complete.

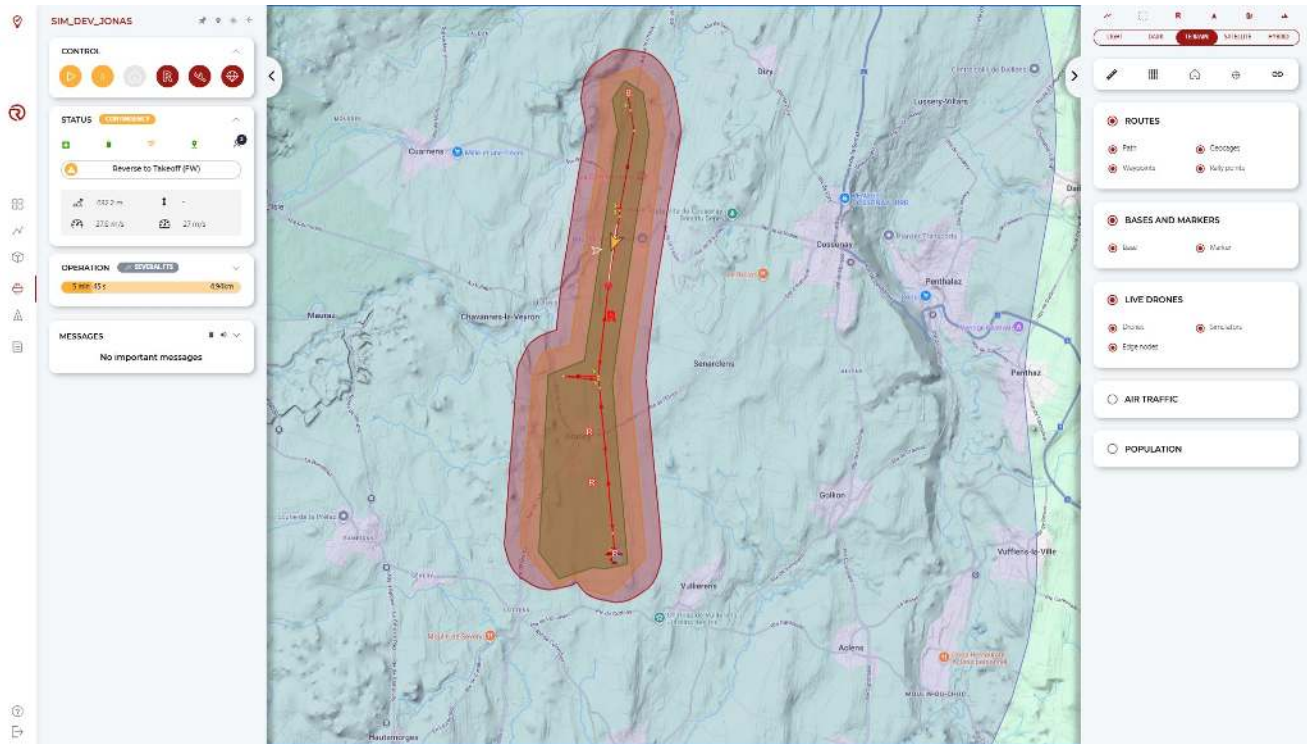
### Next waypoint/destination

In flight, the target waypoint/destination (e.g., during GoTo) is represented with a target icon, and white line with an arrow.



## Target Rally Point

In flight, the target rally point (i.e., the rally point towards which the UA will fly in the event of an SRP) is marked with a red "R", bigger than the others.



# Control commands

## Control commands

Control commands are used to trigger particular behaviours of the UAS during flight. The detailed performance after triggering each button may vary per UAS model. Additional details and particular precautions are given in the UAS Flight Manual. In particular:

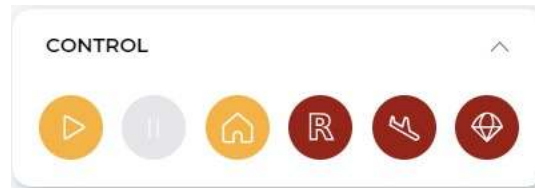
- Turn direction and space required
- Margins required with geocage/pregeocage
- Altitude requirements
- Any other applicable precautions or requirements



The colour of the buttons indicates the number of times a button needs to be clicked on in order to be executed. This is meant to avoid human errors when monitoring an operation. **Yellow buttons require two clicks and red buttons require three clicks.**

From left to right, the commands are:

- **Continue operation (yellow, double click):** cancels any contingency/emergency behaviour (except "Terminate") and continues the operation (returning to the nominal flight plan).
  - This button is only available when a contingency/emergency command is triggered.
  - Buttons triggered are disabled until the UAS switches to a different behaviour (e.g.: after continuing the operation or triggering another command).
  - Upon mission resumption following an automatic back transition (other than a quadchute linked to fixed-wing capabilities degradation), the drone will automatically retransition to fixed-wing rather than remaining in multicopter mode.
- **Hold (yellow, double-clicks):** enters in hover mode (multicopter configuration) or loiter (fixed-wing configuration).
  - If Hold is triggered manually while in fixed-wing mode and the resulting loiter would breach the pregeocage, the UA will automatically quadchute into multicopter mode. Note that failsafe-triggered Holds do not have this check.
- **RTO or Reverse to Takeoff (yellow, double-click):** returns to takeoff by following a reversed flight plan.
- **SRP or Smart Rally Point (red, triple-click):** the UAS goes to the closest Rally Point (takeoff and landing positions included) and lands in multicopter configuration (after doing a back transition, if applicable).
- **Land (red, triple-click):** the UAS lands as soon as possible (requires a back transition if the vehicle is flying in fixed-wing configuration).
- **Terminate drone with/without parachute (red, triple-click):** terminates the engines (and triggers the parachute, only if enabled).
  - This action is definitive.
  - Depending on the safety configuration of the flight plan, the icon will show a cross (termination without parachute) or a parachute (termination with parachute).



## GoTo command

The GoTo command directs the UAS to a specific geographic point. Upon arrival, the aircraft will Hold within its vertical and horizontal limits until a subsequent manoeuvre is triggered.

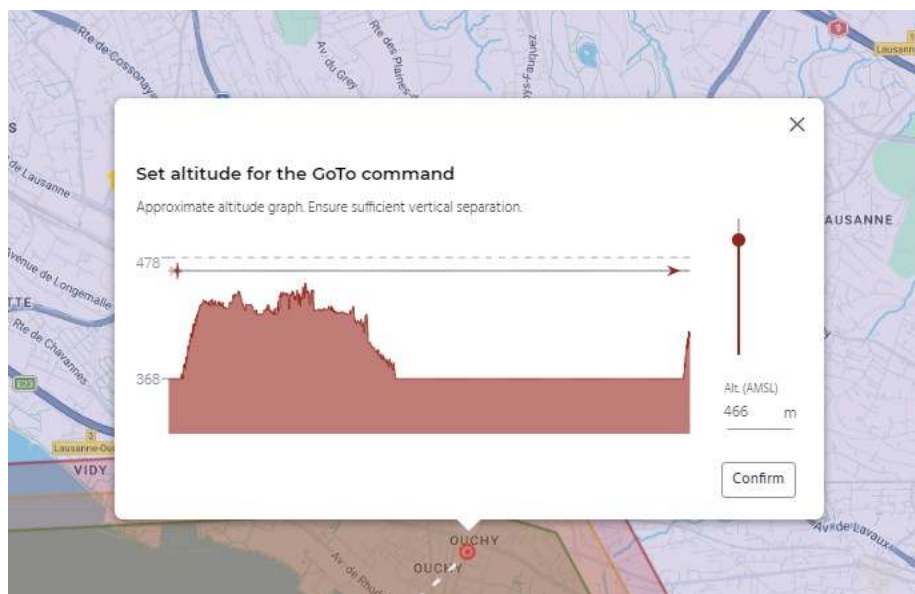
### Selection

1. **Choose destination:** Right-click on the map at the desired location and select "Go to".

Go to

2. **Review the confirmation window:** a window will appear above the selected destination (marked by a red dashed point). This window provides:

- **Expected terrain profile:** a cross-section based on the terrain model, current UAS position, and destination.
- **Altitude selector:** allows for manual adjustment of the target altitude.
- **Confirm button:** executes the command.

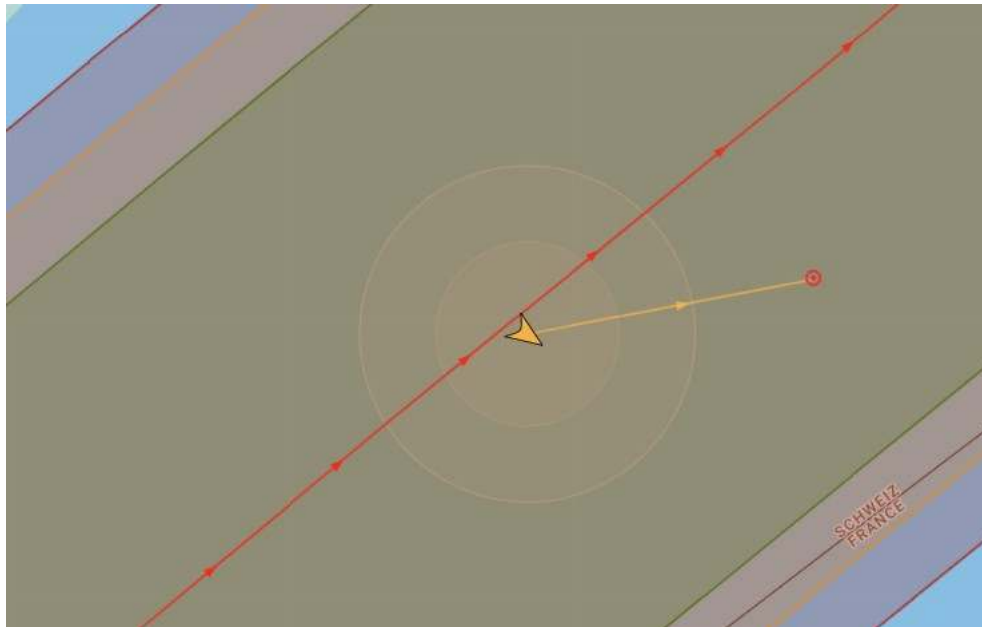


## UAS behaviour

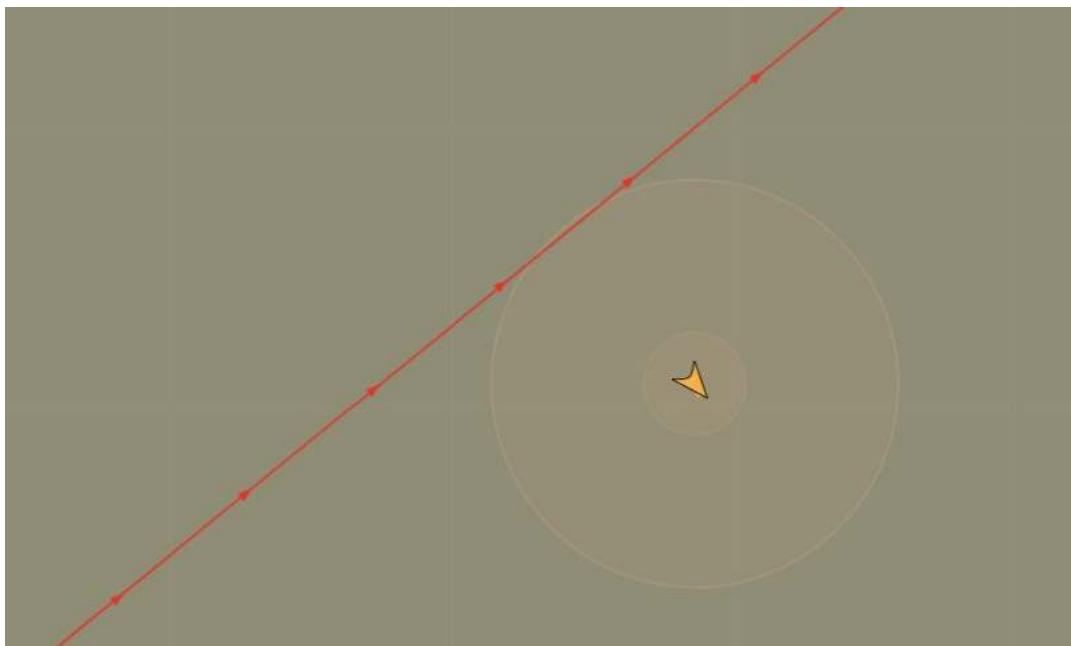
### Multicopter configuration

The UAS will deviate from its current flight path toward the destination point using a diagonal climb/descent.

- **Path visualization:** represented by an orange line on the ground control station (GCS).



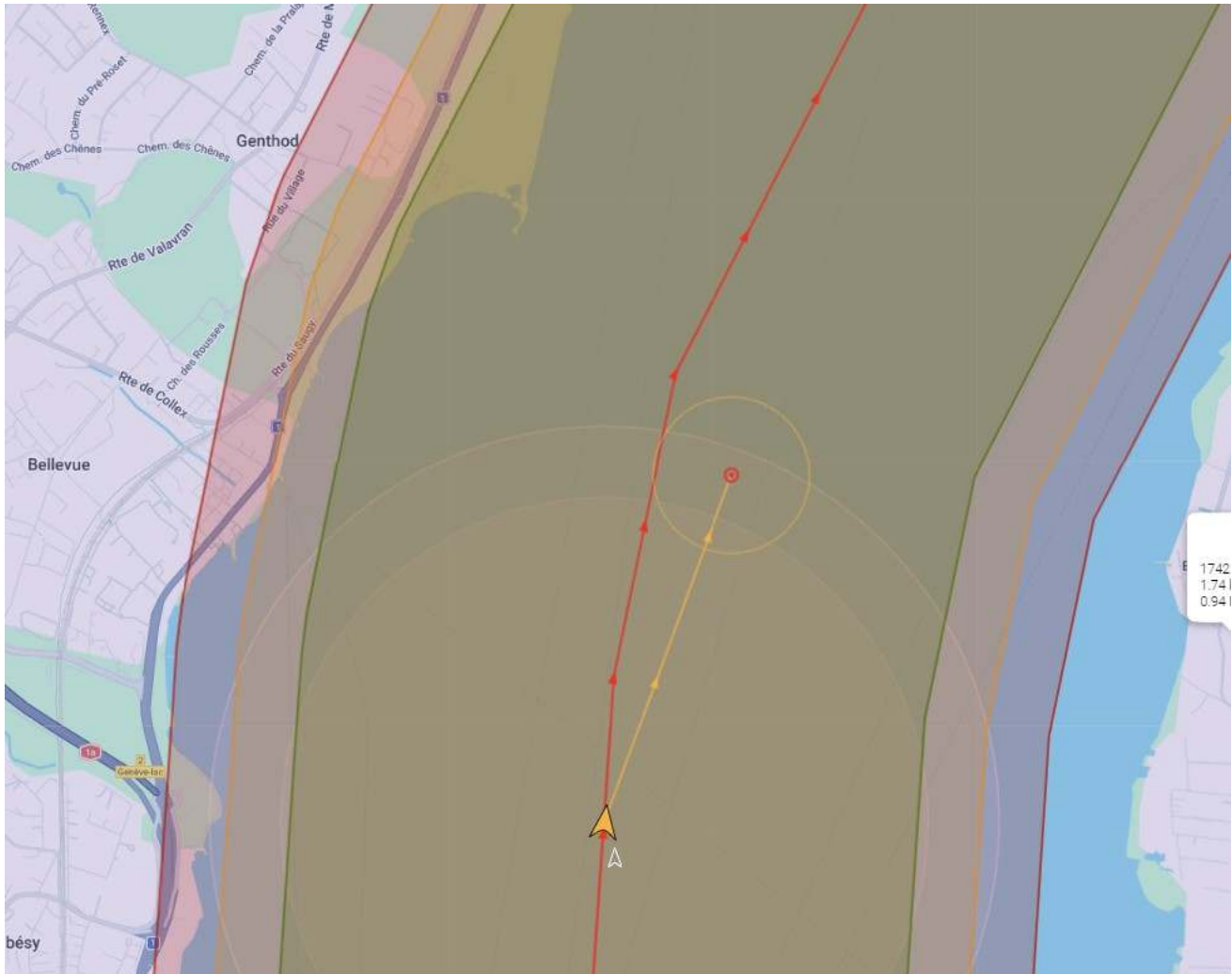
- **Arrival:** the UAS will maintain a stationary hover (Hold) at the destination point until a new command is issued.



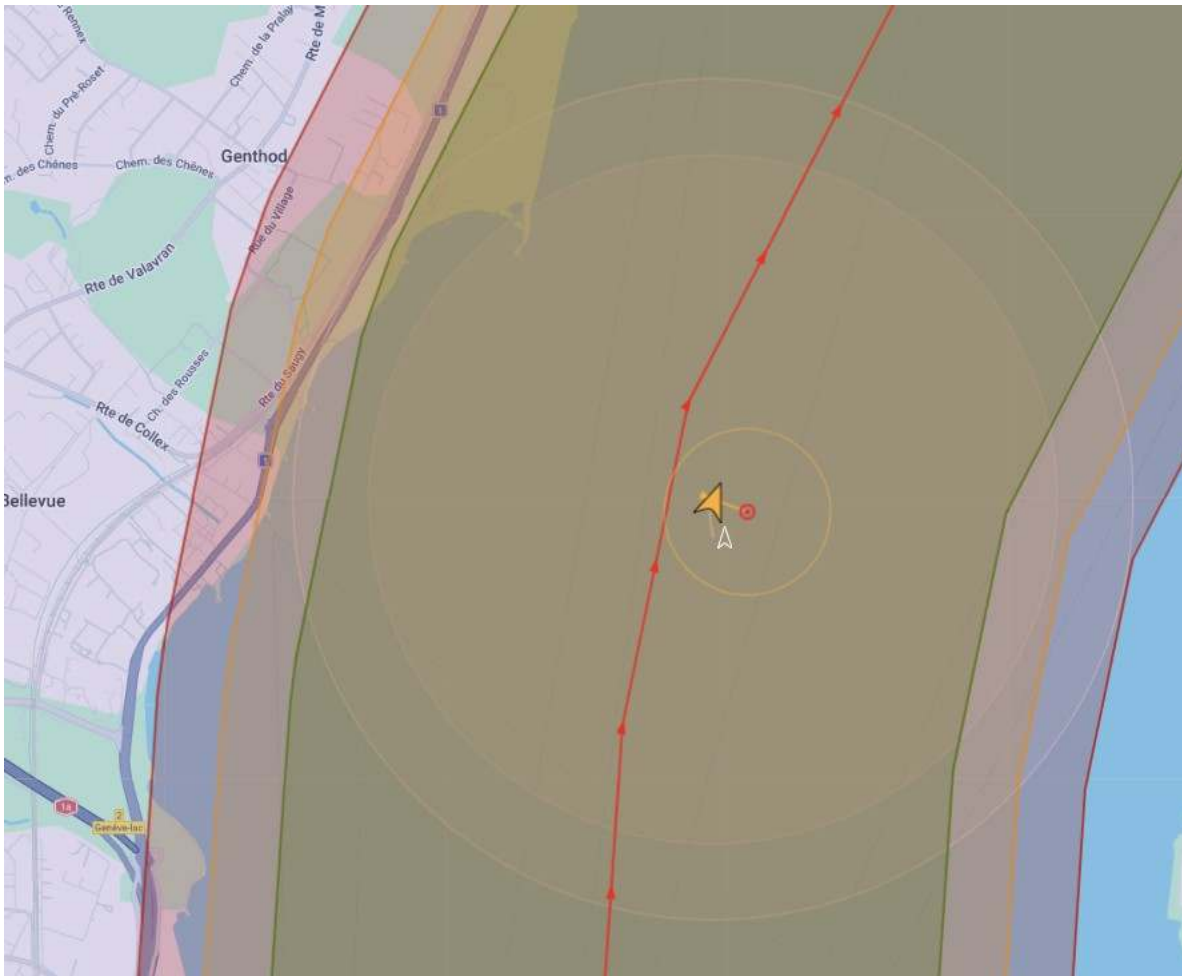
### Fixed-wing configuration

The UAS will deviate from its current flight path toward the destination loitering centre.

- **Path visualization:** Represented by an orange line.



- **Climb/Descent:** the UAS uses a diagonal path when possible. **If the required altitude change exceeds the aircraft's climb/descent gradient capabilities, it will perform a helical (spiral) manoeuvre upon reaching the target loitering position.**
- **Arrival:** the UAS will loiter clockwise around the centre point.
- **Loiter radius:** By default, the radius represented is 250 m (the maximum required turning radius). The UAS typically loiters within this boundary.



## Operational limits

- **Horizontal limits:** the destination point must be inside the pregeocage. Additionally, in fixed-wing configuration, the loitering radius (estimated automatically based on the wind conditions) must be inside the pregeocage as well.
- **Superior vertical limits:** the destination point must be below the pregeocage superior limits (represented with a dashed grey line).
- **Inferior vertical limits:** the destination point must be, at least, 30 m above the maximum altitude of the terrain within the flight path, as estimated by the terrain model.

Setting a destination point outside the limits will lead to an error message, as well as the impossibility to confirm the command.

### Disclaimer:

- The altitude data sources do not include artificial and natural obstacles.
- The operator shall consult with their competent authority what sources are acceptable to ensure proper obstacle avoidance.
- The operator shall evaluate the presence of obstacles in their operational volume and plan operations accordingly.
- RigiTech is not responsible for any decision taken by the operator due to the interpretation of the altitude data.

## Interaction with other commands

Triggering this manoeuvre will affect the operational information (remaining distance, expected time of arrival, expected battery at landing and in case of RTO).

- **CO and RTO:** if CO or RTO are triggered, the UAS will assess the automatically the best way to rejoin the planned flight plan and fly back to the branch-in point.
  - **Note:** similarly to regular Hold manoeuvres, to avoid unexpected flight plans, it is recommended to trigger CO or RTO when the UAS is flying in the same direction of the flight plan (or opposite for RTO).
- **Hold:** if a Hold command is sent while the UAS is already holding at a GoTo point (or loitering around it), it will start holding around the position in which it is triggered.
- **SRP:**
  - The UAS will fly back to the branch-in point (similar to what happens in the event of a CO or RTO), and then follow the normal SRP behaviour.
  - **Exceptions:** when the UAS is already within the acceptance radius of the rally point (10 m, by default), the UAS will go directly to the rally point.
  - **Note:** GoTo can be used to reposition the UAS closer to a preferred rally point, provided battery margins and obstacle clearance are maintained.
- **Land and Terminate:** these commands function normally and will override the GoTo/Hold state.
- **GoTo:** multiple GoTo commands can be used in sequence (e.g., to reposition the UAS in case of non-nominal landing). The operator should, however, account for potential uncertainties in the flight path, especially when using CO, RTO or SRP afterwards.



## Responsibility

RigiTech UAS are designed for predefined flight plans with rigorous risk assessments. GoTo should be used with caution, **especially in fixed-wing**, as the UAS may face unexpected risks, such as:

- Unplanned overflight of populated areas or other risks.
- Proximity to unmapped terrain or obstacles.
- Pregeocage breach.

It is the responsibility of the operator to understand the risks of the manoeuvre and to simulate these scenarios beforehand to ensure GoTo is the appropriate response for the situation (e.g., to avoid an incoming aircraft).

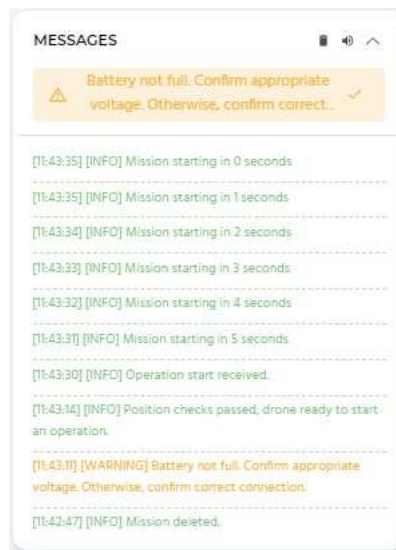
In particular, operators must understand that in fixed-wing configuration, this manoeuvre should be used only when the margins with the pregeocage are large enough.

# Messages, status and operation boxes

## Messages

The Messages box shows relevant messages sent by the UAS to RigiCloud. Their importance varies with their colour.

- Green messages: informative messages.
- Yellow messages: warning messages (caution advised).
- Red messages: critical messages (emergency situations and actions potentially required).



Messages can be deleted and/or hidden.

Additionally, relevant messages require to be acknowledged. They will stay at the top of the list, starting with the most recent ones, until they are acknowledged by the operator.

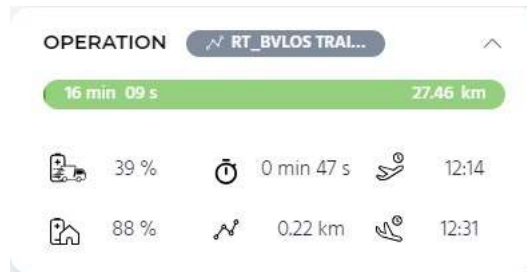
Warnings, alerts and errors are said aloud by RigiCloud (if the browser used and computer allow it). The messages are in English, but the navigator might be configured in another language, thus leading to barely understandable messages.

## Operation box

The Operation box shows operational information of the UAS.

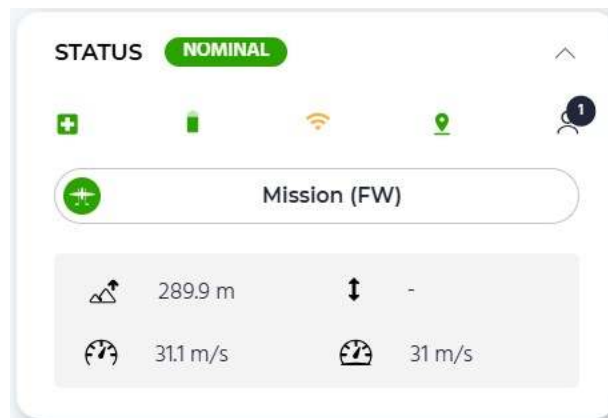
- Name of the operation
- Progression bar displaying the remaining time and distance to complete the operation
- Estimated battery percentage at landing

- Estimated battery percentage in the event of an RTO
- Time flown
- Total distance flown (from takeoff)
  - The distance flown gives only the distance covered within the flight plan. It excludes distance covered during contingency/emergency manoeuvres.
- Takeoff time
- Expected landing time



## Status box

The Status box shows the status of the UAS and provides a summary of its health, as well as its flight mode.

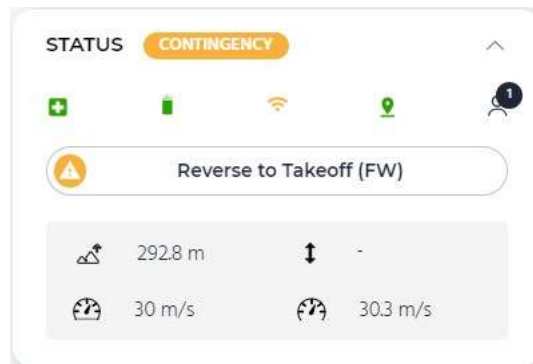


The status (and icons) may be green (nominal/ready to fly), yellow (contingency/ready to fly but with warnings), red (emergency/not ready) or grey (disconnected).

If there is any issue or warning, by passing the mouse over it, the nature of the issue or warning will be displayed.

Additionally, the following parameters are displayed:

- Altitude (AMSL)
- Ground Distance
- Airspeed
- Ground Speed



The colour of the different icons may vary between green, yellow, red or grey (as applicable), indicating nominal or degraded status. Detailed information for each icon can be displayed by hovering the mouse over it.

- **Safety nodes:** status of the system, sensors, estimators and failsafe. Detailed status can stay on/be removed from the screen by clicking on the icon.
- **Battery:** shows the status of the battery.
- **C2 Link:** shows the general status of the C2 link.
- **Position estimation:** shows the quality of the GNSS signal, as well as the number of satellites.
- **Operators:** shows the number of operators monitoring the operation.

## Safety nodes

The "Safety nodes" icon summarizes information on the status of the main systems, sensors and failsafe of the UAS. When passing the mouse over it, a window will pop up and show the specific status of the different systems, based on a green (status correct) or a red (status incorrect) light next to each item.

| Onboard computer     |                          |   |
|----------------------|--------------------------|---|
| Hardware manager:    | Navigator:               | ● |
| Arming manager:      | Safety manager:          | ● |
| Telemetry manager:   | System manager:          | ● |
| Commander:           | Video manager:           | ● |
|                      | Parameter manager:       | ● |
| Sensors              | Estimators               |   |
| Gyroscope:           | Attitude estimate:       | ● |
| Accelerometer:       | Horizontal velocity:     | ● |
| Magnetometer:        | Vertical velocity:       | ● |
| Barometer:           | Horizontal position abs: | ● |
| Airspeed sensor:     | Failsafe                 |   |
| GPS:                 | Failsafe found:          | ● |
| Ground sensor:       | Battery ready:           | ● |
| 2nd Gyroscope:       | GPS fix:                 | ● |
| 2nd Accelerometer:   | Fuse ready:              | ● |
| 2nd Magnetometer:    | Pyro ready:              | ● |
| Down Camera:         | GBS10 ready:             | ● |
| Front Camera:        | PX4 present:             | ● |
| Remote ID            | SBUS present:            | ● |
| Location active:     | LTE connected:           | ● |
| Radio active:        | AC present:              | ● |
| Firmware up-to-date: |                          | ● |

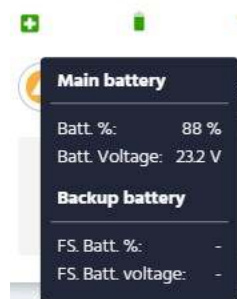
Depending on the UAS (or if it is a simulator), the nodes may change. In particular, for simulators, it is acceptable to have some of them red (such as cameras).

"Failsafe found", it evaluates if a failsafe is detected or not. When the vehicle is expected to have a failsafe, if it is not detected, it will not be possible to fly. However, when operating with vehicles that are not supposed to have a failsafe, this item will not prevent the UAS from flying. Finally, when a failsafe is detected, additional sensor/systems will be checked.

Particular SOPs might need to be followed to have all the nodes in nominal status.

## Battery

The "Battery" icon represents the status of the main and backup (if any) batteries. When passing the mouse over it, a window will pop up with the following information.



- **Main battery:**
  - Battery: remaining battery (in %)
  - Voltage (in V)
  - Current (in A)
- **Backup battery:**
  - Backup battery: remaining battery (in %)
  - Backup battery voltage (in V)

## Communication (C2) Link

The "C2 icon" provides a summary of the quality of the different links, represented by the following colors:

- **Green:** both "Main 3G/LTE" and "Failsafe 3G/LTE" links are working properly.
- **Red:** both "Main 3G/LTE" and "Failsafe 3G/LTE" links are disconnected.
- **Grey:** all links are disconnected.
- **Yellow:** all other cases.

There are also two small blips that appear to the left and right of the main icon:

- **S:** indicates that the "Satcomm" link is available (telemetry is being received by satellite).
- **E:** indicates that the "Edge Node Radio" link is available.



Available links are:

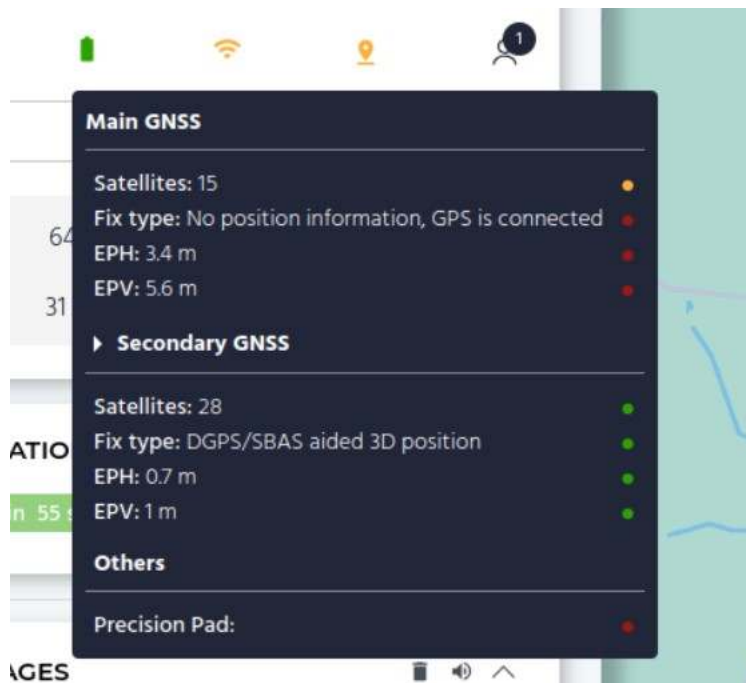
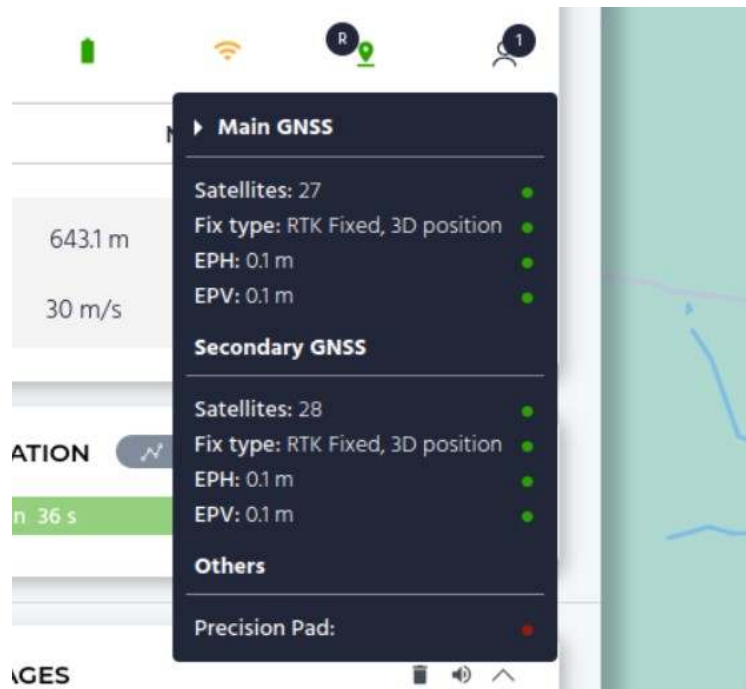
- **Main 3G/LTE:** C2 link corresponding to the main 3G/LTE modem and SIM card.
- **Failsafe 3G/LTE:** C2 link corresponding to the FS 3G/LTE modem and SIM card.
- **Edge Node Radio:** C2 link corresponding to the short-range 2.4 GHz radio (Edge Node).
- **Satcomm:** C2 link corresponding to the satellite communications (only for UA being equipped with the module).

When hovering the mouse over the main icon, a tooltip window will pop up showing an icon either in *green*, *yellow*, or *grey* for each link. These colors represent the following:

- **Green:** the last telemetry received by that link was received less than 1000 ms from the newest received telemetry (by any link).
  - **For the "Satcomm" link, the value is 10000 ms (10 s).**
- **Yellow:** The last telemetry received by that link was received more than 1000 ms from the newest received telemetry (by any link).
  - **For the "Satcomm" link, the value is 10000 ms (10 s).**
- **Grey:** no telemetry has been received by that link within the timeout period. This period is:
  - **Main 3G/LTE:** 3 s
  - **Failsafe 3G/LTE:** 3 s
  - **Edge Node Radio:** 5 s
  - **Satcomm:** 60 s
- **Red:** (only "Failsafe 3G/LTE") No telemetry has been received by this link, but telemetry is present on the backup failsafe channel.

## Position estimation

The position estimation icon shows the number of satellites and the quality of the signal.



- The GNSS in used is marked with an arrow (in the detailed view).
- The use of the RTK fix is marked with an "R" (top left).
- The detection of the Precision Pad is marked with a "P" (top right).

In general, green and orange icons are safe for flight. Red icons are not. The limits for each UAS are defined in their Unmanned Aircraft Flight Manual.

## Operators

The "Operators" icon provides the number of operators having control of the vehicle.



By passing the mouse over the icon, a window will pop up and show the different operators, with their profile picture, username and user type.

## Flight modes

The different flight modes (as per the UAS Flight Manual) are:

- **Disarmed - Grey:** Disarmed in multicopter configuration.
- **Disarmed - Green:** Disarmed in multicopter configuration. Ready to start the operation.
- **Mission - Green:** Mission mode (nominal flight).
- **Disarmed - Yellow:** Disarmed in fixed-wing configuration. Unable to do pre-flight checks.
- **Hold - Yellow:** Hold mode (MC: hover; FW: loiter).
- **Reverse to Takeoff - Yellow:** Reverse to takeoff position.
- **Manual - Yellow:** Manual piloting with RC.
- **Smart Rally Point - Red:** Goes to the closest/next rally point (potentially including takeoff or land).
- **Emergency Landing - Red:** Emergency landing.
- **Flight Termination - Red:** Parachute triggered / drone dead.
- **Others/Unexpected Behaviour:** Something unusual happened. Abnormal behaviour. Contact support.

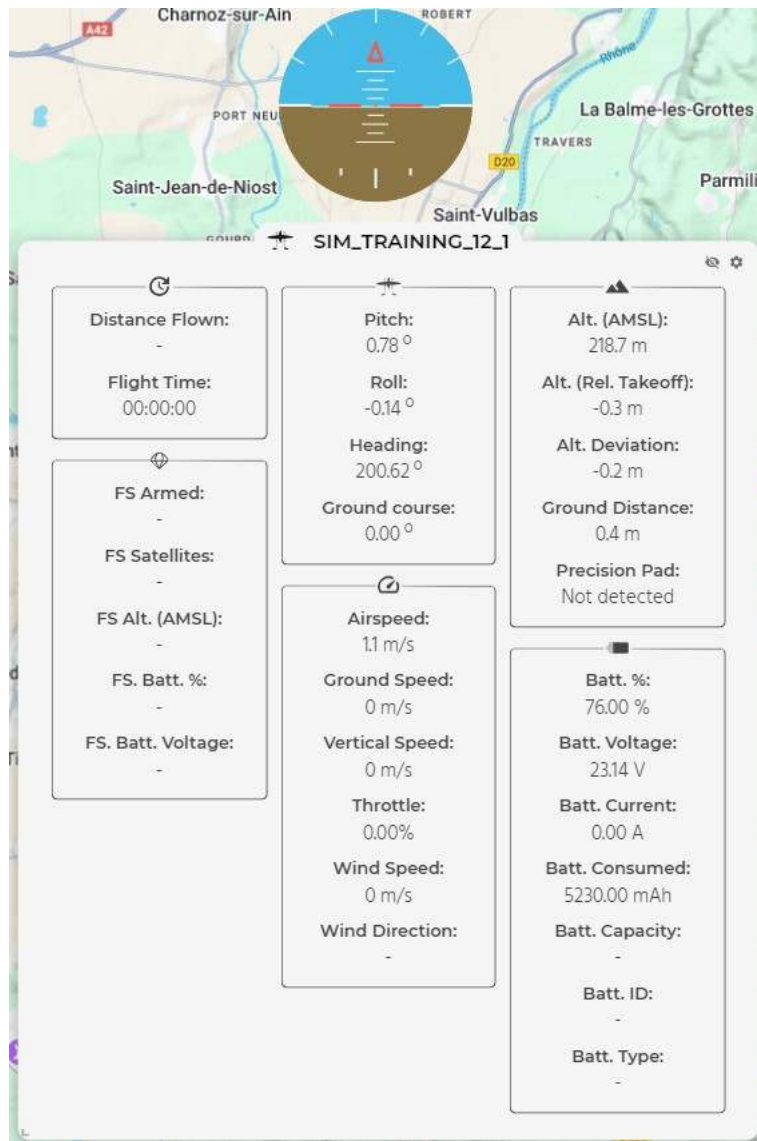
The flight mode may include the flight configuration:

- MC: Multicopter
- FW: Fixed-wing
- FT: Front transition
- BT: Back transition

# Telemetry

## Overview

The telemetry provides detailed information of the UAS behaviour, such as speeds, altitudes or weather information. The units are displayed in the box and may vary depending on the project settings.



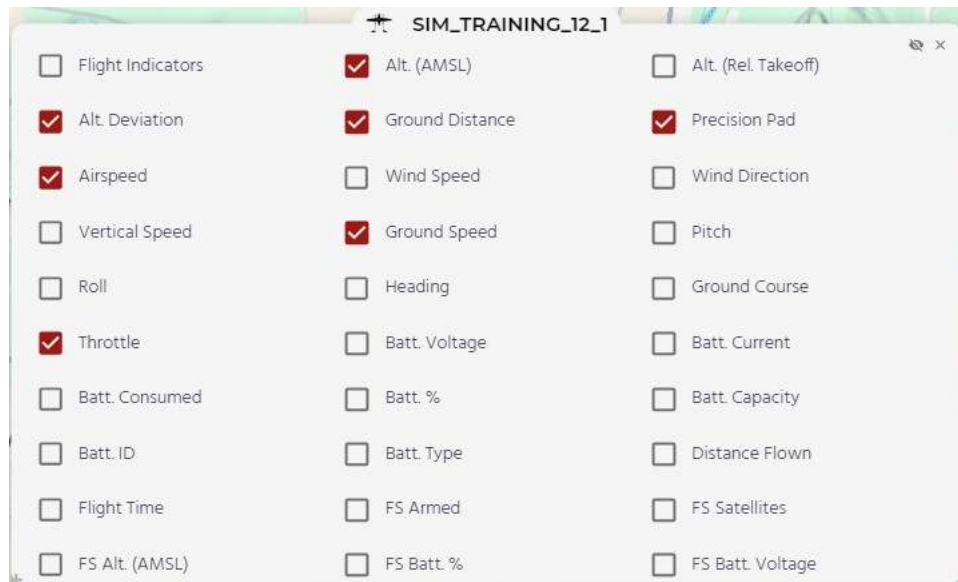
The telemetry box displayed on the map can be shown/hidden and edited (both in content, which depends on the selected settings, and size/position). The box and the indicator can be moved and the size of the box can be selected by the operator (by clicking on the bottom-left

corner of the box and dragging it).

If the size of the telemetry box is too small for the amount of information needed, a scrolling bar will appear at the right side of the box, allowing to navigate through it.

## Telemetry settings

After opening the telemetry settings, the following menu will be displayed.



Users can select how much information is displayed. The available settings are:

- **Flight indicators:** pictogram with the relative horizon (represents pitch and roll).
- **Alt. (AMSL):** absolute altitude, in AMSL.
- **Alt. (Rel Takeoff):** relative altitude, in "AGL" (referenced to the takeoff point, not to the ground level).
- **Alt. Deviation:** difference between the altitude of the UAS and the planned altitude.
- **Ground Distance:** when available, shows the distance to the ground (measured by the Lidar).
- **Precision Pad:** shows if the precision pad is detected or not.
- **Airspeed:** speed of the aircraft relative to the surrounding air.
- **Wind Speed:** estimated wind speed.
- **Wind Direction:** estimated wind direction. Also visible in the map (when enabled) as an arrow next to the vehicle (only while flying in fixed-wing).
- **Vertical speed:** rate of climb or descent.
- **Ground Speed:** actual speed over the ground, affected by wind.
- **Pitch:** angle of the nose up or down relative to the horizon.
- **Roll:** rotation of the aircraft around its front-to-back axis (wing tilt).
- **Heading:** direction of the aircraft's nose is pointing, relative to north.

- **Ground Course:** path followed by the aircraft over the ground, relative to north.
- **Throttle:** type of the battery.
- **Batt. Voltage:** main battery/ies voltage.
- **Batt. Current:** main battery/ies current.
- **Batt. Consumed:** main battery/ies consumption.
- **Batt. %:** estimated percent of remaining battery of the main battery/ies.
- **Batt. Capacity:** capacity of the battery.
- **Batt. ID:** identification number of the battery.
- **Batt. Type:** type of the battery.
- **Distance Flown:** total distance flown by the vehicle.
- **Flight Time:** total time of the flight. It starts when the vehicle starts its flight.
- **FS Armed:** shows if the failsafe is "Armed" or "Disarmed".
- **FS Satellites:** number of satellites detected by the failsafe GNSS.
- **FS Alt. (AMSL):** altitude measured by the failsafe, in AMSL.
- **FS Batt. %:** estimated percent of remaining battery in the failsafe battery.
- **FS Batt. Voltage:** failsafe battery voltage.

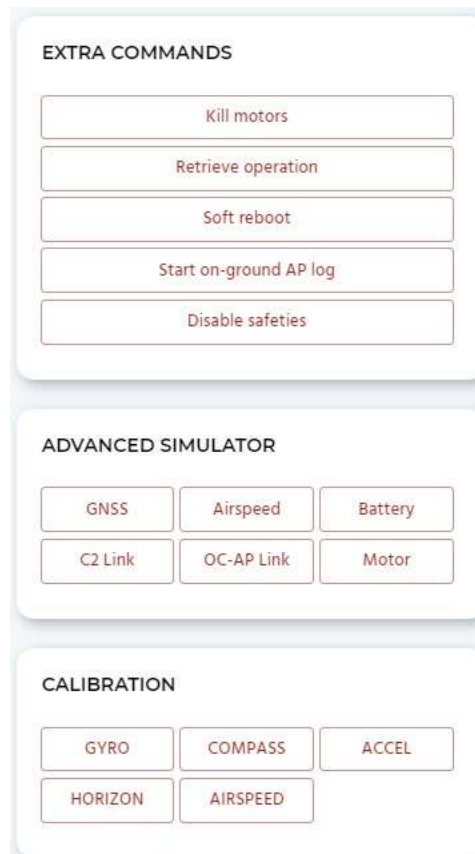
[Home](#) > [RigiCloud User Manual](#) > [Control Tower](#) > [Flight Control](#) > [Flight Control Tools](#)

# Flight Control Tools

## Overview

RigiCloud allows to calibrate the UAS and kill the motors during pre-flight procedures (in case of need), as well as executing other tools. In the "Drone control menu", the "Tools" tab should be selected (top side of the menu, right icon).





## Extra Commands

- **Kill motors:** kills the motors of the UAS (**WITHOUT TRIGGERING THE PARACHUTE**). It might be useful for some debugging procedures on ground, if, for example, the UAS keeps spinning them when during pre-flight procedures or after land, **but it should never be used while the UAS is flying**.
- **Retrieve operation:** downloads the current mission from the drone to the RigiCloud interface.
- **Soft reboot:** reboots the onboard computer software and the autopilot software.
- **Start on-ground AP log:** starts autopilot log on ground. This is useful to debug issues taking place on ground, before the UAS starts logging information.
- **Disable safeties:** allows operator to disable some takeoff safety measures, to enable takeoff when they consider that the UA is detecting a false positive or particular requirements do not apply for their operation. **The operator is responsible to understand and acknowledge the associated risks and responsibilities.**
  - Direct RemoteID check on takeoff: takeoff will be prevented if the RemoteID is not properly configured/updated or if it has any other issue. This option allows operators to takeoff without the need of a RemoteID.
  - Disable motor failure detection on takeoff: the spin of the motors is checked during FTS and takeoff sequence. If a motor is detected not to spin, takeoff will be automatically cancelled during the five seconds before lifting up. If the operator can confirm that all motors are spinning properly, this check may be disabled.
  - Disable vertical distance tolerance on takeoff: the UA compares its measured altitude with the planned takeoff Pad altitude. If the difference is higher than 5 m, then position checks will not pass and takeoff will not be possible. Operators should then:

- Measure the position and altitude of the UA at the desired takeoff and landing positions by keeping it on for at least 15 minutes, without nearby sources of interferences.
- Update the position and altitude based on the average observed in the flight plan.
- If the checks are still not passed, and interferences cannot be discarded/removed, by disabling this check the new tolerance will be set at 15 m instead of 5 m.
- Operators using this option must ensure that additional vertical margins are available and safe in their route (compared to the minimum and recommended values from the UFM, 10 m more should be considered, both below and above the planned altitude).
- Disable battery identification: useful when the battery to use has no BID, or the UA experiences issues with the BID. The operator must, however, select the battery type manually.

## Advanced Simulator (only available for simulators)

This feature allows to change the status and inject failures to different modules in the simulator, both for testing automatic manoeuvres and training of contingency/emergency situations.

- **GNSS:**

- **Module:** selects the affected GNSS module.

- All
- Main GNSS
- Back-up GNSS

- **GNSS status:**

- Nominal (no RTK)
- Bad data
- No data
- Nominal (RTK)

- **Airspeed:**

- **Airspeed readings:**

- Nominal
- Bad data (shifting value)
- Stuck (fixed value)
- Bad data (offset)
- No airspeed

- **Battery:**

- **Action:**

- Refill
- Increase consumption
- Decrease consumption
- Reset consumption

- **C2 Link:**

- **Main C2 Link Status:**

- On
- Off

- **OC-AP Link:**
  - **Status:**
    - On
    - Off
- **Motor:**
  - **Motor killed:**
    - 1 - MC Front Right Motor
    - 2 - MC Back Left Motor
    - 3 - MC Front Left Motor
    - 4 - MC Back Right Motor
    - 5 - FW Pusher Motor

## Calibration

Calibration should be used as instructed in the UAS Maintenance Manual.

From left to right and top to bottom:

- **Gyro:** Gyroscope calibration.
- **Compass:** Magnetometer/Compass calibration.
- **Accel:** Accelerometer calibration.
- **Horizon:** Level of the horizon calibration.
- **Airspeed:** Airspeed sensor.

## Messages

After clicking on any of the available tools, a list of messages may be displayed (with instructions or warnings).

See [Messages, status and operation boxes](#).

[🏠](#) > [RigiCloud User Manual](#) > [Control Tower](#) > [Telemetry thresholds](#)

# Telemetry thresholds

During operations, it is important to pay attention to telemetry and make sure that the values of the different measures are within acceptable thresholds.

In BVLOS flights, it is not always possible to anticipate a failure, but telemetry provides fundamental information for the remote crew and allows to detect some dormant failures or unexpected events, such as a degradation of the weather, incorrect centering of the payload, etc.

Telemetry thresholds for RigiTech UAS are available within the UAS Flight Manual.

# Air traffic detection

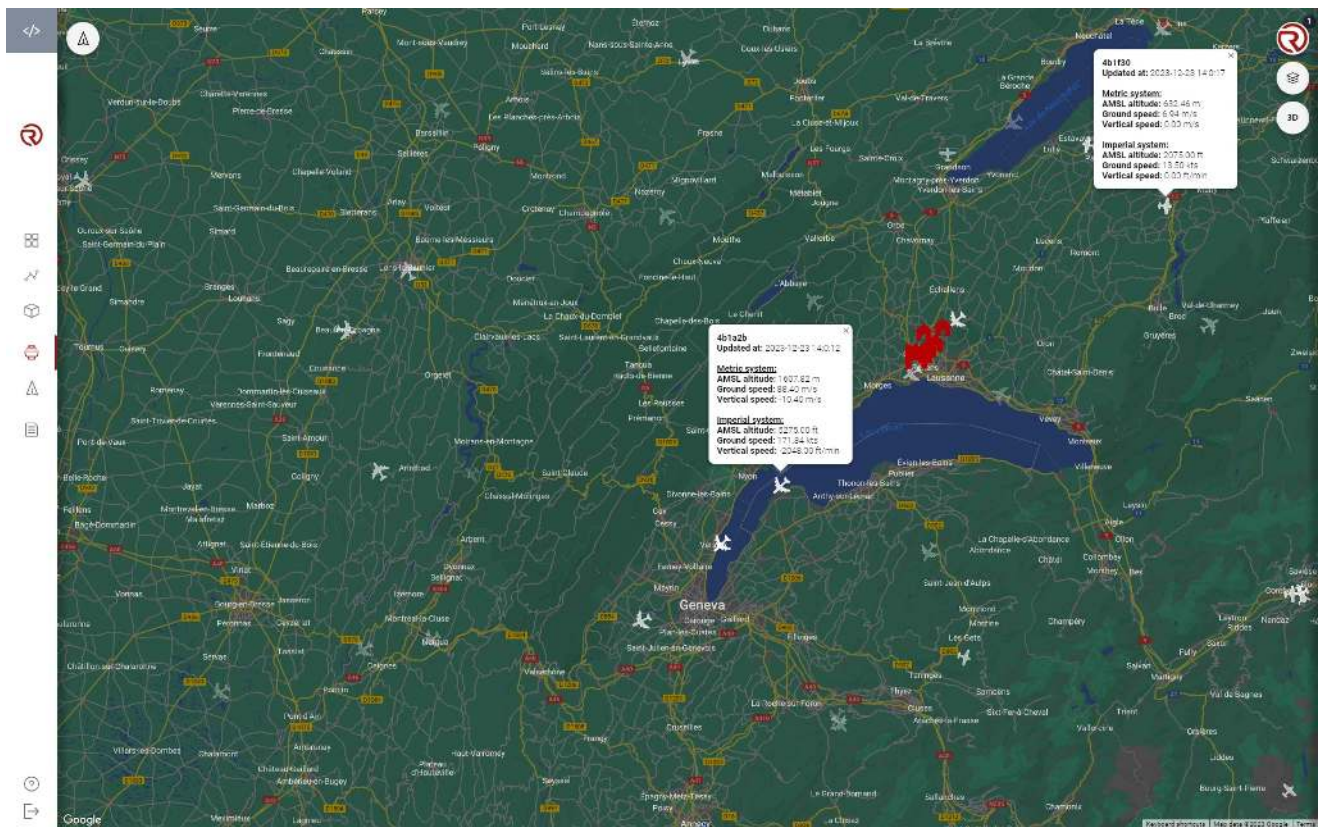
As defined in the Airbridge planner section, RigiCloud can represent air traffic in the map (as long as there are available means to detect specific traffic). Although this feature might be useful under specific cases while planning an operation, its main use is to provide detection capabilities during operations, which is why its use is presented in this section.

When the "Air traffic" filter is on, as long as there are aircraft detectable within the selected ranges (altitude and detection technology), a certain number of aircraft will be displayed in the map. Depending on certain parameters, their representation will be different:

- **Type of aircraft:** RigiCloud can separate between large aircraft, light aircraft, helicopters and sky divers.
- **Altitude:** Independently of the altitude range selected in the filter, aircrafts at low altitude will be displayed more intensely, while aircraft flying at high altitudes will be more and more translucent.
- **Heading:** The heading of the aircraft is represented on the map with the heading of the icon.

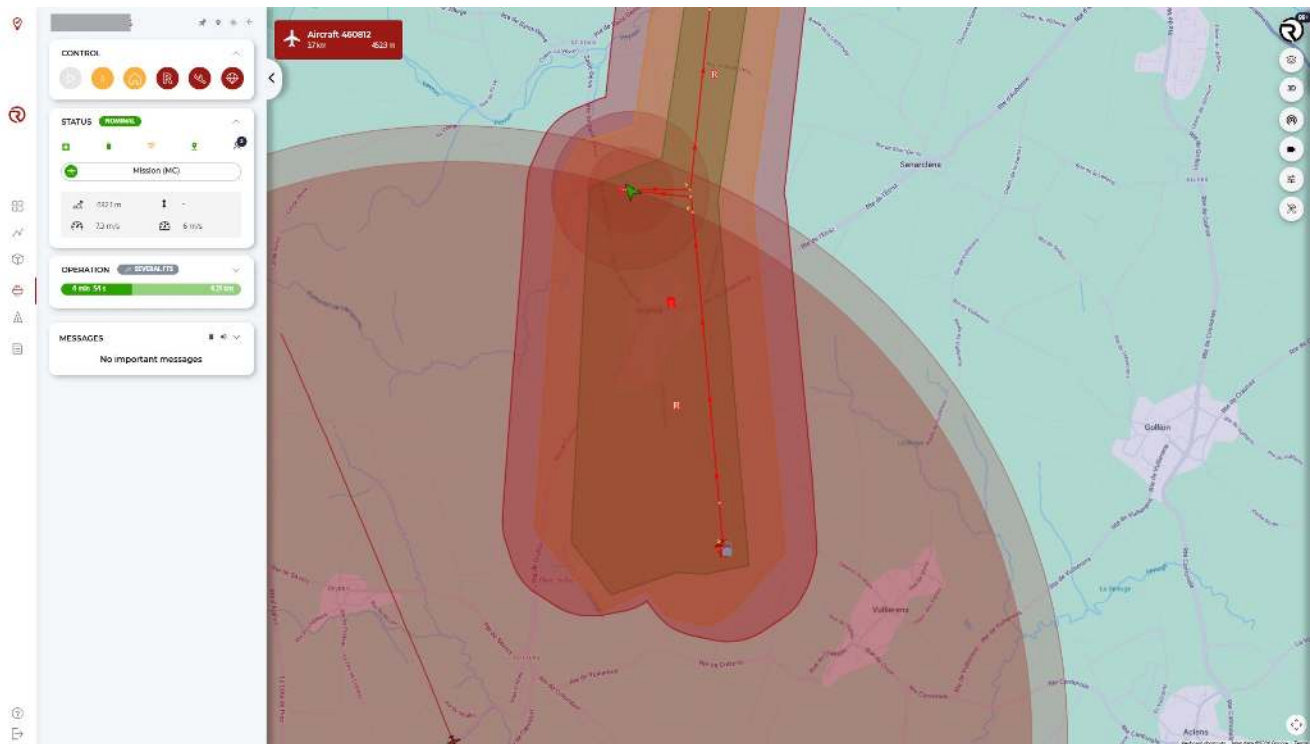
Additionally, when right-clicking on an aircraft, a box will be displayed with additional information. From top to bottom:

- **ID of the aircraft**
- **Time of the last update**
- **Information in metric and imperial system:**
  - **AMSL Altitude** (in m and in ft).
  - **Ground speed** (in m/s and in kts).
  - **Vertical speed** (in m/s and in ft/min).

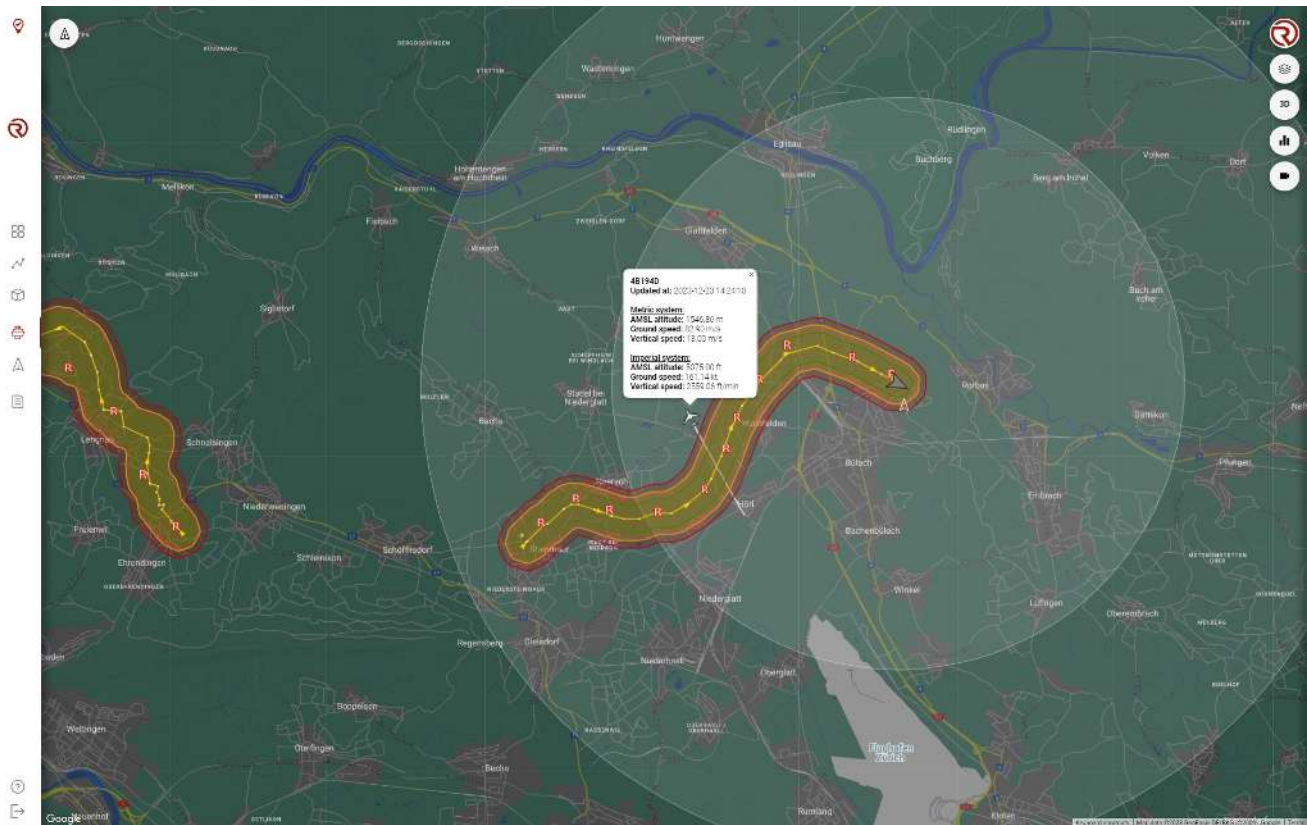


The information described above is shown with different examples in the picture.

When a UAS/simulator connected, warnings will be displayed when there are close aircraft (within the flight detection area). The warning shows the ID of the aircraft, its distance to the UA and the difference in altitude with it.



When clicking on an aircraft, its trail will start to be shown, based on the position received in the last 30 s (by default).



## Precautions

- If no heading data is received, the aircraft will show a heading to the north (0°).
- If no data of the type of aircraft is received, the default icon is a large airplane.

## Detect and Avoid

This section shall be complemented with the UAS Flight and Technical Manuals. In particular, extreme precautions shall be taken when defining automated evasion manoeuvres based on the detection of other aircraft in the different conflict levels:

- NMAC: Near Mid Air Collision
- WC: Well Clear
- Augmented NMAC
- Augmented WC
- RigiCloud Warning



## Detect And Avoid (DAA) Overview

The DAA system follows the F3442 standard and aims to minimize the risk of mid-air collisions (MAC) with other aircraft by creating protective zones around each aircraft.

The system's effectiveness is measured using risk ratios defined as the quotient of the probability of a zone breach given an encounter with and without the DAA system.

### RigiCloud:

Warn operator prior to onboard automated actions (minimum 12 s).

### Onboard:

4 conflict levels: **Low**, **Medium**, **High**, **Critical**

4 automated actions defined in safety profile

- Disabled, Warn, Hold, SRP, Land, Terminate
- On the ground: Warning + Arming prevented if automated action
- No automated action for conflict de-escalation
  - *E.g. once all conflict resolved, if previously landing, will continue landing. Manual action required from operator to continue the mission.*
- Action based on priority: Hold < SRP < Land < Terminate.
  - *E.g. SRP not triggered if currently in Land*

| DETECT AND AVOID |         |
|------------------|---------|
| Critical breach: | Land    |
| High breach:     | SRP     |
| Low breach:      | Warning |
| Medium breach:   | Hold    |

Multi-conflict: save up to 5 conflicts in a buffer

- Conflict priority defined by conflict level and distance if same level
- If buffer full and new conflict not lowest priority, remove conflict with lowest priority
- Info in buffer (which is also logged):
  - ICAO address, conflict level, aircraft distance ( $\sqrt{\text{hor}^2 + \text{vert}^2}$ )
  - Last time update (used to remove stale conflicts)
- Remove existing conflicts if: not in conflict anymore, stale, or buffer is full.

Notifications to operator (RigiCloud message box)

- Notification rate defined by a parameter, default = 5 s
- Message info: conflict level, distance and ICAO
- Immediately notify if new traffic or conflict level change (escalation or de-escalation)



## DAA Volumes

Onboard: 4 levels of automated actions, one per zone breach

Cloud: Large zone for warning

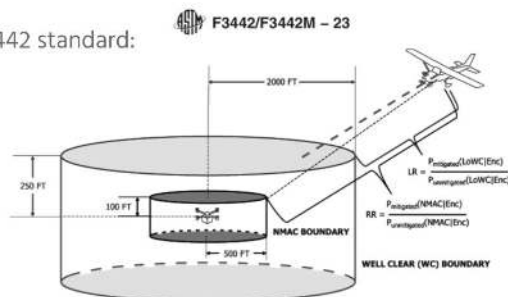
Fixed size cylinders follow F3442 standard:

### Critical: NMAC

- Radius: 250ft (77m)
- Half-height: 50ft (16m)

### High: WC

- Radius: 1000ft (305m)
- Half-height: 125ft (39m)



Time-based cylinders:  $\text{base\_volume} + \text{latency} * \text{speed}$

### Medium: Augmented NMAC

- Latency = 33 s
- If plane speed > 8m/s: Augmented NMAC > WC

### Low: Onboard Augmented WC

- Latency = 33 s

### Warning only: Cloud Augmented WC

- Latency = 45 s

### Vertical boundary for traffic

- Use default speed of 10m/s
- $33 \text{ s} * 10 \text{ m/s} = 330 \text{ m} \sim 1000 \text{ ft}$



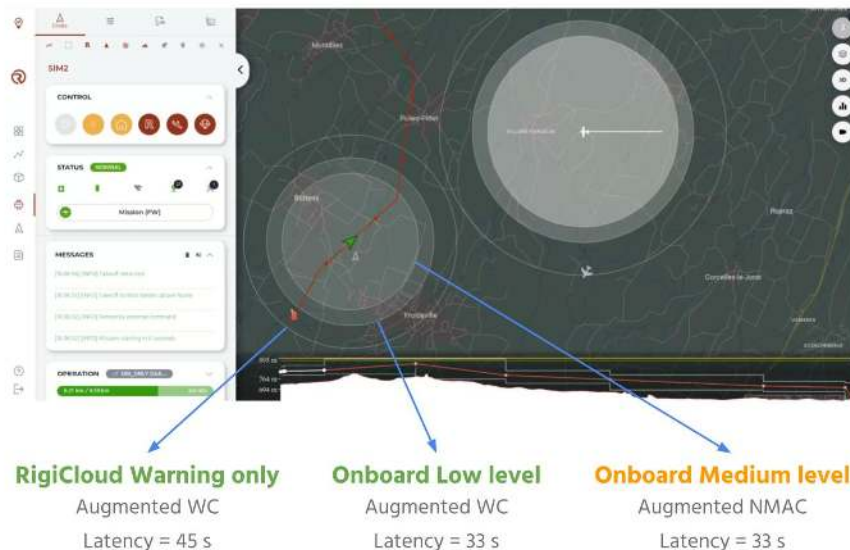
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box.

## No conflict



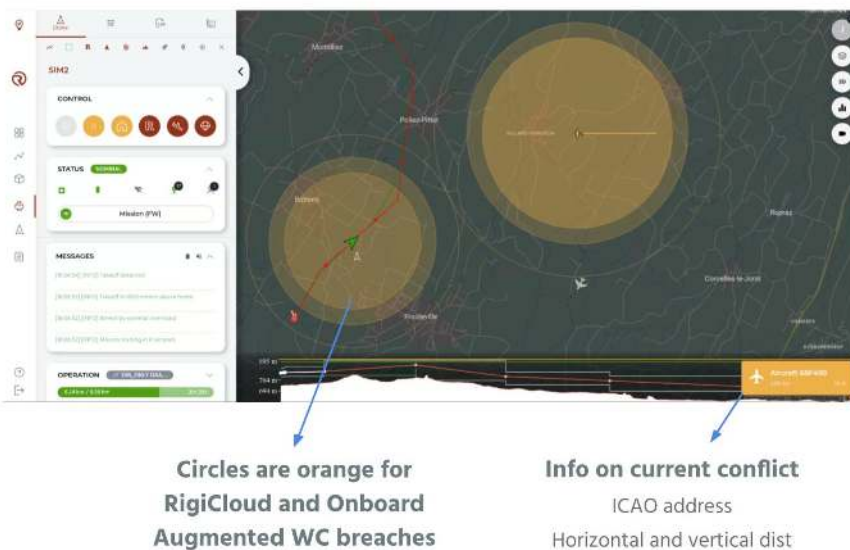
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box

## RigiCloud Augmented WC zone breach





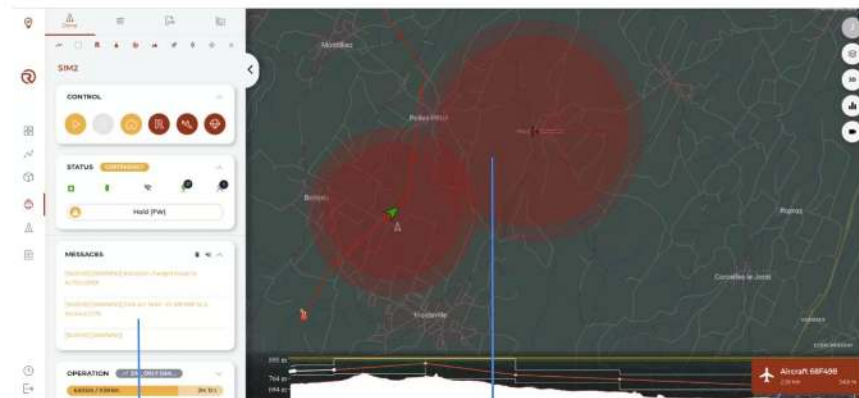
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box.

## Augmented NMAC zone breach



Automated action: Hold  
(set in safety profile)

Circles are red for  
Augmented NMAC  
breaches

Info on current  
conflict now red



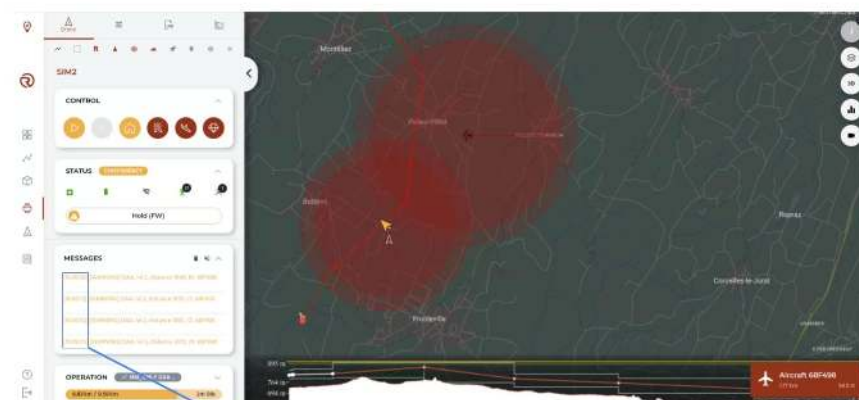
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box.

## Same conflict level, warning



Warning every 5 s (period  
defined by parameter)



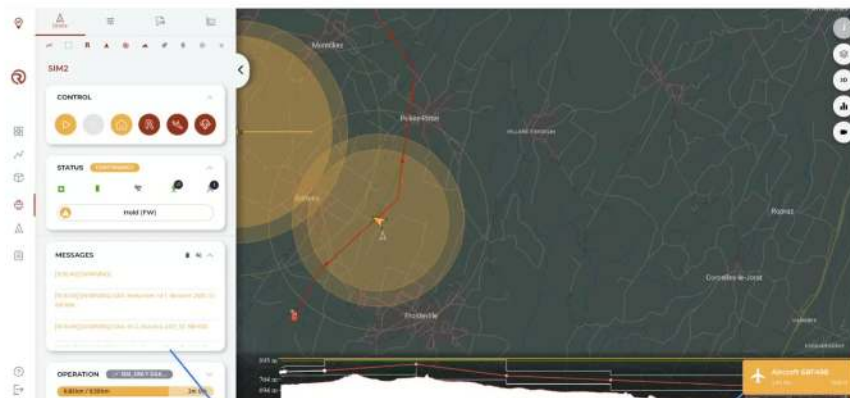
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box.

## Conflict level reduction



**De-escalation from level 2 to level 1.**  
No actions on de-escalations  
Notify immediately when level changes

**Info on current conflict back to orange**



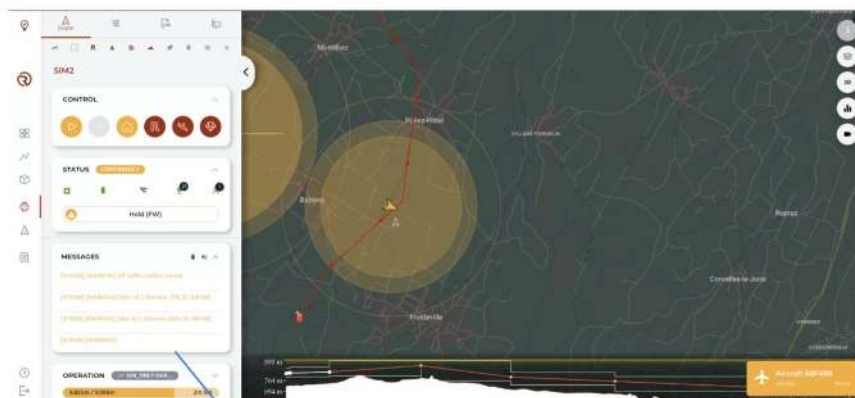
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box

## All onboard conflicts solved



**De-escalation, all traffic solved**  
No actions on de-escalations  
Notify immediately when level changes



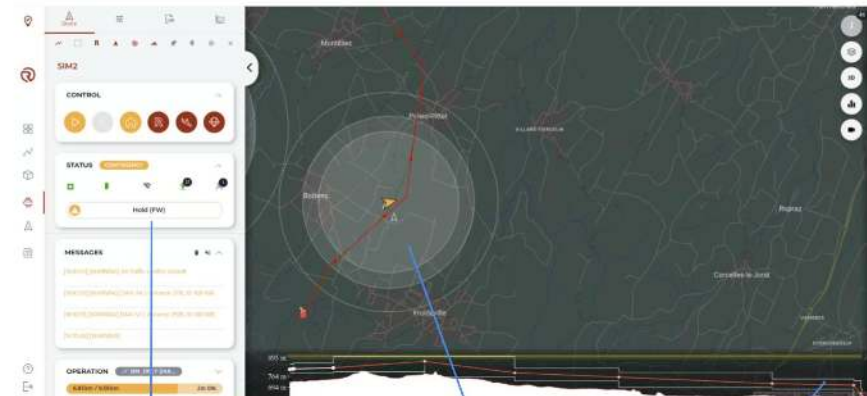
## Single aircraft conflict scenario

3 time-based zones displayed in RigiCloud.

Fixed-size WC and NMAC not displayed.

Warnings from onboard DAA appear in the message box.

## RigiCloud conflict solved



No actions on de-escalations  
Manual action from operator required to continue mission

No more conflicts,  
circles are now white

No more conflict

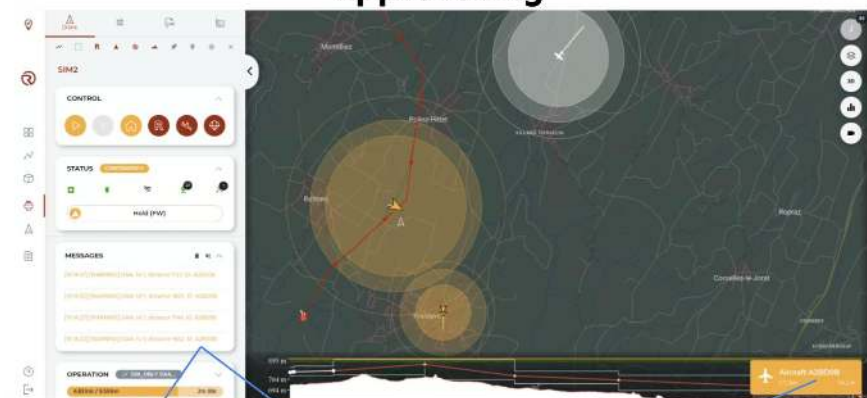


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

## In conflict with helicopter A2BD0B, airplane approaching



Onboard, if the ICAO address is not valid, the Call sign is used if valid (8 chars)

ICAO address displayed on RigiCloud and from the onboard warnings

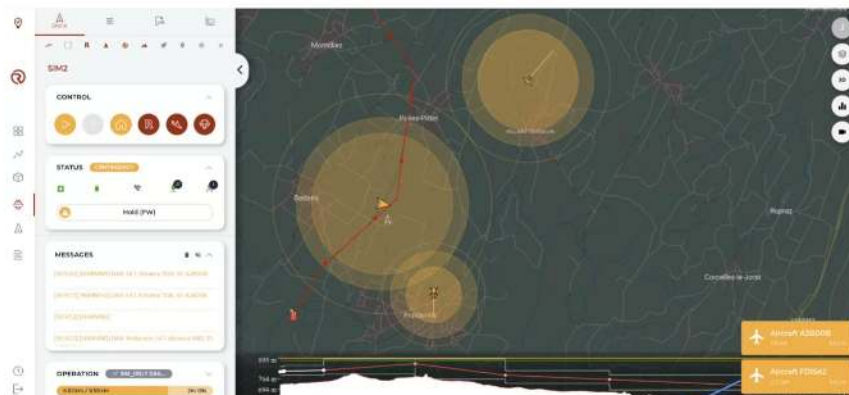


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Airplane FD15A2: Cloud Augmented WC zone breach



New conflict information displayed

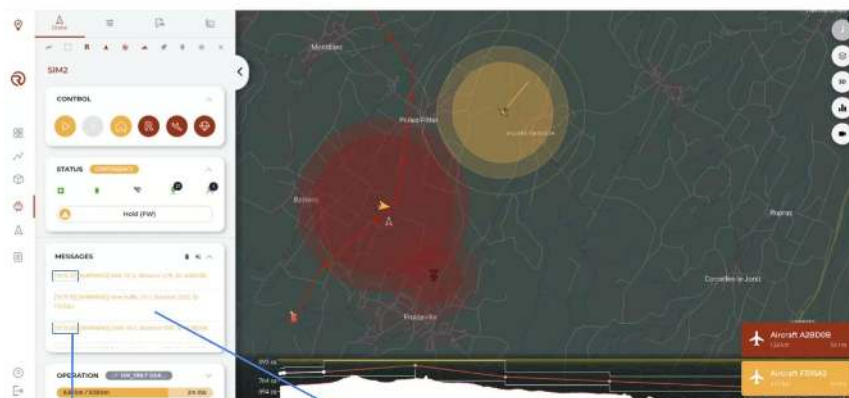


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Airplane FD15A2: Augmented WC zone breach



Warning every 5 s for highest priority conflict

New traffic immediately notified even if not highest priority

Orange for Augmented WC  
Red for Augmented NMAC

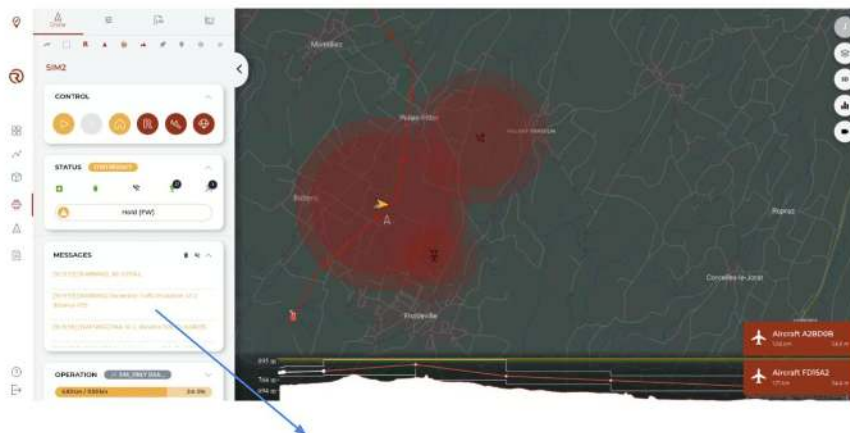


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Airplane FD15A2: Augmented NMAC zone breach



Secondary traffic immediately notified in case of conflict level change even if not highest priority

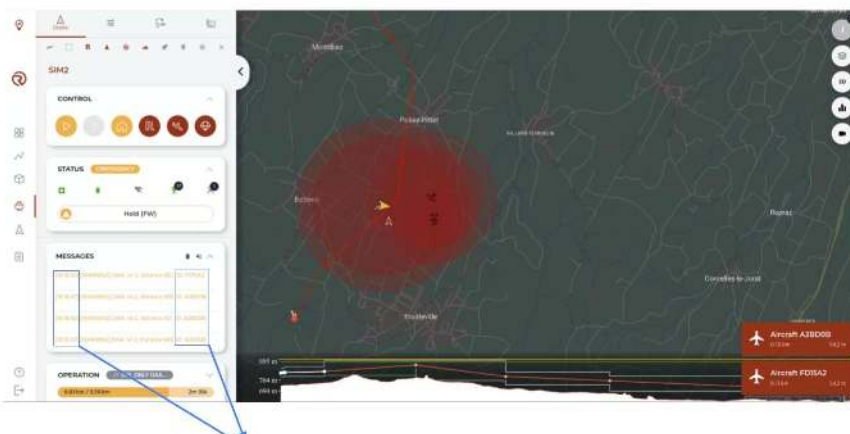


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Airplane FD15A2 is closer than helicopter A2BD0B



Closest traffic is now FD15A2. No immediate warning as the conflict level remains 2. Notify every 5 s.

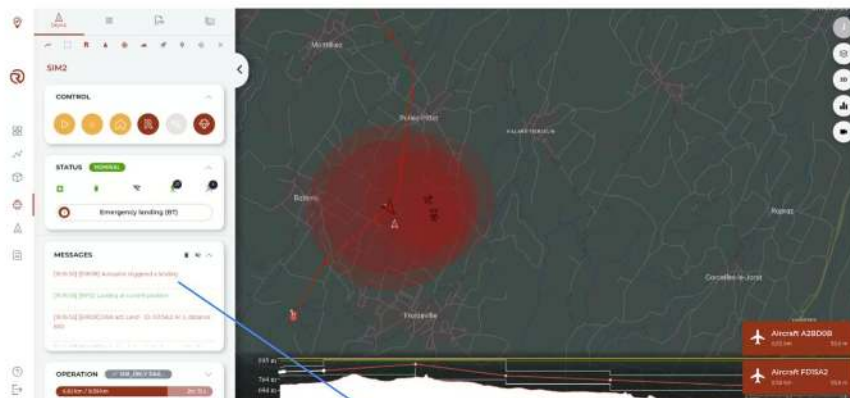


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Airplane FD15A2 escalation: WC zone breach



Automated action: Land  
(set in safety profile)

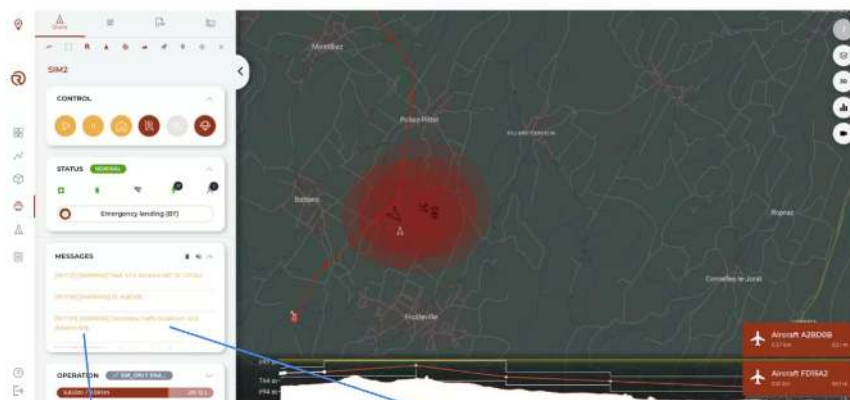


## Multi-aircraft conflict scenario

Conflict priority defined by conflict level and distance if same level.

Recurrent warnings only for conflict with priority.  
Secondary conflicts, warnings only on level change.

### Helicopter A2BD0B escalation: WC zone breach



**WC zone radius: 305m (1000ft)**  
Each aircraft has one zone, WC breach for horizontal distances below of 610m.

No automated action  
because not conflict with highest priority

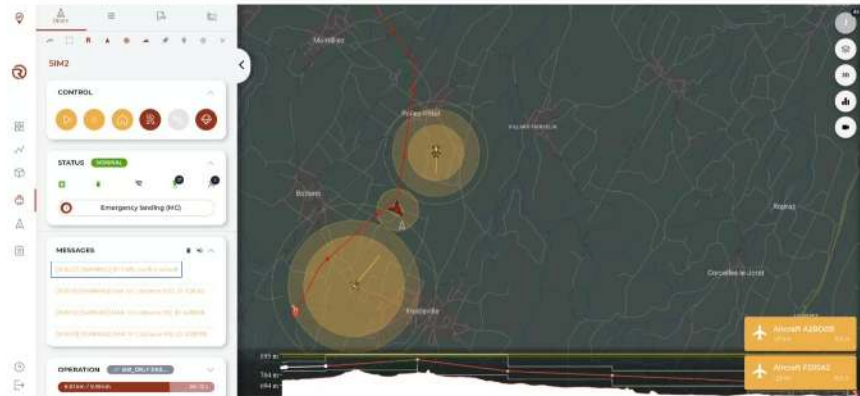


## Multi-aircraft conflict scenario

Conflict priority defined  
by conflict level and  
distance if same level.

Recurrent warnings only  
for conflict with priority.  
Secondary conflicts,  
warnings only on level  
change.

## Drone landed, all onboard conflicts solved

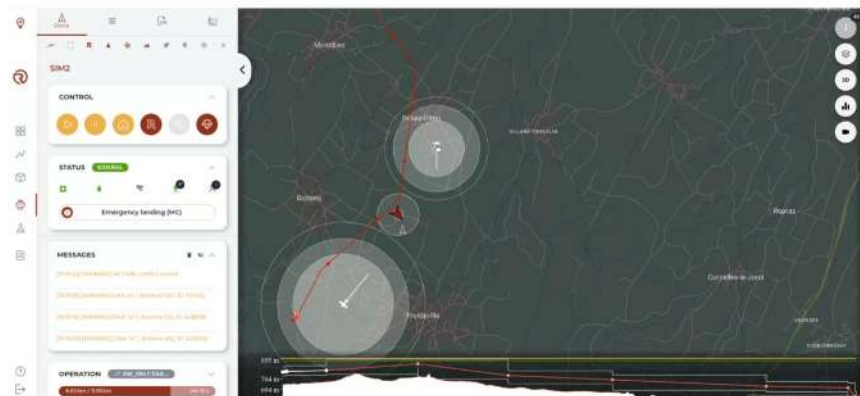


## Multi-aircraft conflict scenario

Conflict priority defined  
by conflict level and  
distance if same level

Recurrent warnings only  
for conflict with priority.  
Secondary conflicts,  
warnings only on level  
change

## Drone landed, all RigiCloud conflicts solved

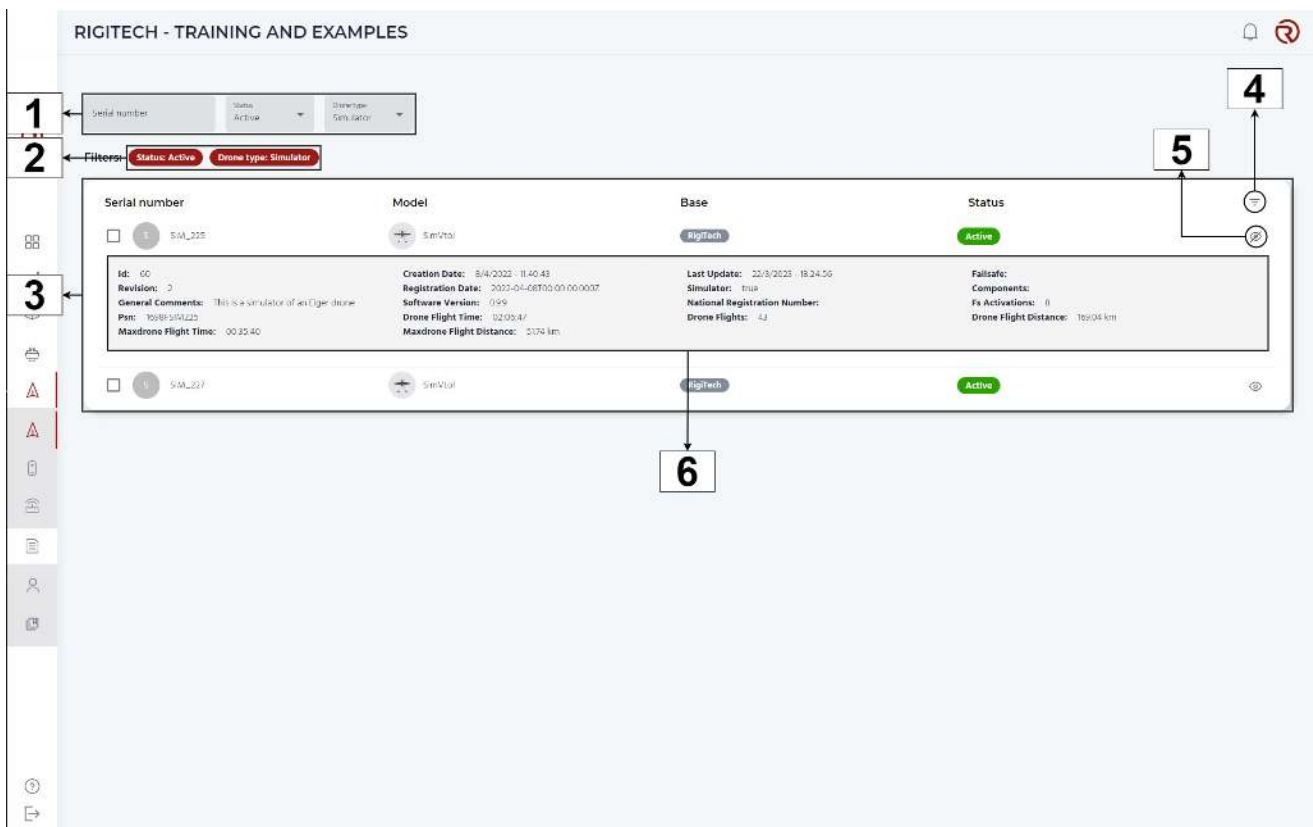


# Fleet Management

The Fleet management allows you to view the resources associated to your project (UAS, batteries and Edge Nodes).

## Drones

In the "Drones" module, you can see the UAS associated to your different bases. If you purchase a new vehicle or remove an old one, RigiTech will update this page.



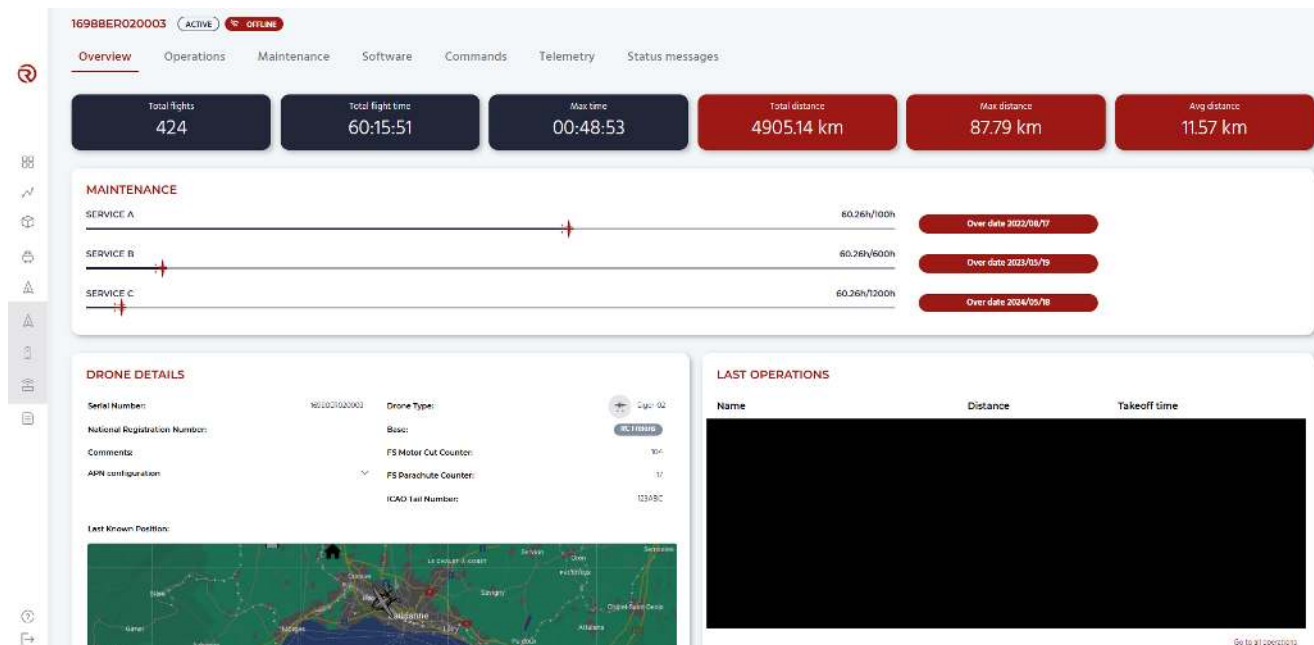
The screenshot displays the RigiTech - TRAINING AND EXAMPLES interface. On the left, a sidebar contains navigation icons. The main area shows the 'Drones' module. At the top, there is a filter menu (1) with options for 'Serial number', 'Status' (Active), and 'Drone type' (Simulator). Below this, a summary of active filters (2) is shown. The main table (3) lists drones with columns for Serial number, Model, Base, and Status. A detailed view of a specific drone (4) is shown below the table, displaying various attributes such as Id, Revision, General Comments, Creation Date, Registration Date, Software Version, Drone Flight Time, Maxdrone Flight Distance, Last Update, Simulator, National Registration Number, Drone Flights, and Fail-safe components. A sidebar on the left (5) contains icons for different drone types, and a bottom section (6) shows a list of drone models.

- Filter menu:** here you can filter your drones, from left to right, by serial number, status (active or inactive) and and type (simulator or drone).
- Active filters:** shows a summary of the active filters.
- Drone information:** here you can see all the drones within your project. From left to right, you can see the serial number, the model, the base to which it is associated and the status.
- Open filter:** opens/closes the filter menu (see above).
- Show/hide all attributes:** shows/hides all attributes of a drone.
- Example of all attributes:** shows generic information of the specific vehicle and model, including:

- Failsafe System: ID of the FS
- FS Motor Cut Counter number of times the FS has been used (including FS tests)
- FS Parachute Counter: number of times the parachute has been used (including fake tests in the production phase)
- ICAO Tail Number: Flarm/RemoteID identifier in hexadecimal
- ICAO 2: ADS-B Out tail number of the UA (if any)

## Drone information

When clicking on the Serial Number of a drone, an overview of its status, connection, statistics, maintenance requirements, details and last operations will be displayed.



The different tabs are:

- **Overview:** shows the general overview of the drone.
- **Operations:** shows the list of operations of the drone, as defined in [Operations](#).
- **Maintenance:** opens the maintenance centre of the drone. See [Maintenance Centre](#).
- **Software:** opens the software update centre of the drone. See [Software Update Centre](#).
- **Commands:** shows the last commands received by the drone. See [Commands](#).
- **Telemetry:** shows the last telemetry received by the drone. See [Telemetry](#).
- **Status messages:** displays the list of most recent status messages sent by the drone.

## Drone APN

When putting a new main SIM card, users should configure the UA's APN. This can be done in three ways:

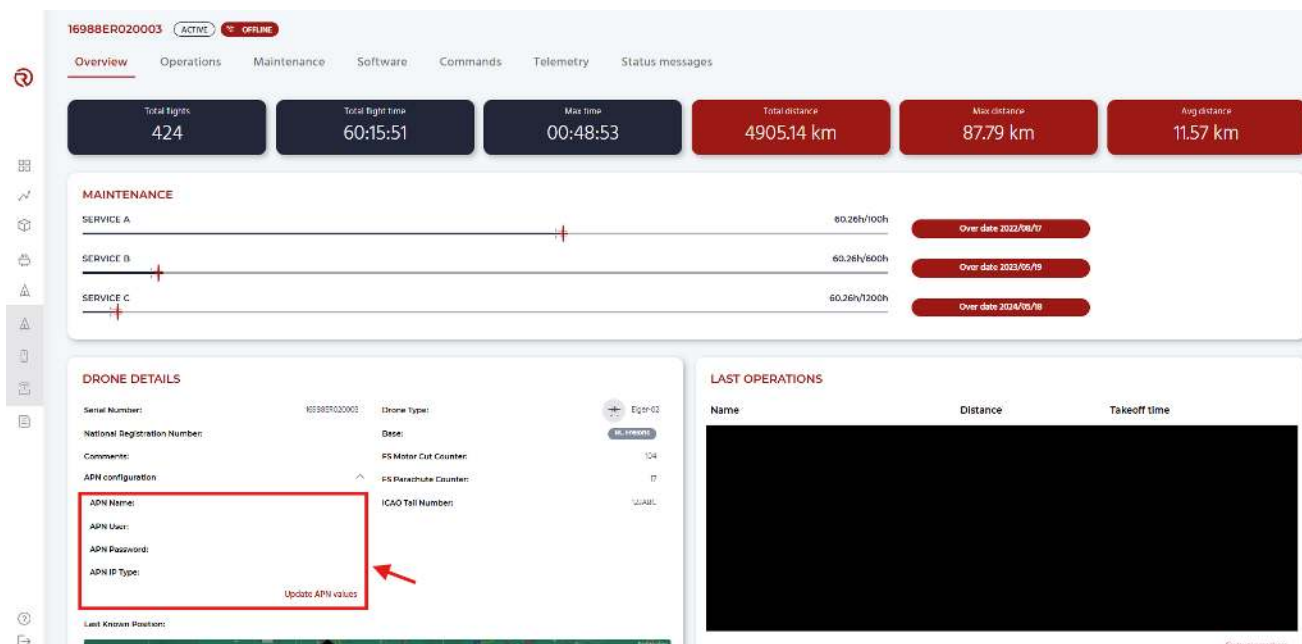
- **Through RigiCloud:**

- The UA needs to be connected to at least one of the 3G/LTE links (Main and FS).
- If the Main 3G/LTE link is connected, in prevision of changing the SIM card (this option is desired when possible). In this case, users should do it just before changing the SIM card (the link may be lost once updating the configuration).
- **Through the Edge Node:**
  - As long as there is communication between the UA and one Edge Node.
  - This option is desired when an Edge Node is available.
  - The configuration needs to be done through the Edge Node home page. See [Edge Node](#).
- **Through the UA's local WiFi:**
  - The UA needs to be on. When it boots, if Rigi WiFi is not available, it exposes a hotspot:
    - Name: RigiDrone\_XXXX with XXXX being a hexadecimal code (unique per UA)
    - Password: RigiDrones
    - This hotspot will be available until a FTS test is done, or a mission uploaded.
  - Once connected to the hotspot, head to <http://192.168.42.1:8080>
  - Note: in this page, a debug mode is also available. The use of this mode may be requested by RigiTech Support to get more information if there was any issue with the SIM card or APN configuration.

In order to configure the UA's APN, the user should enter the details of their SIM card provider into the "APN configuration" section.

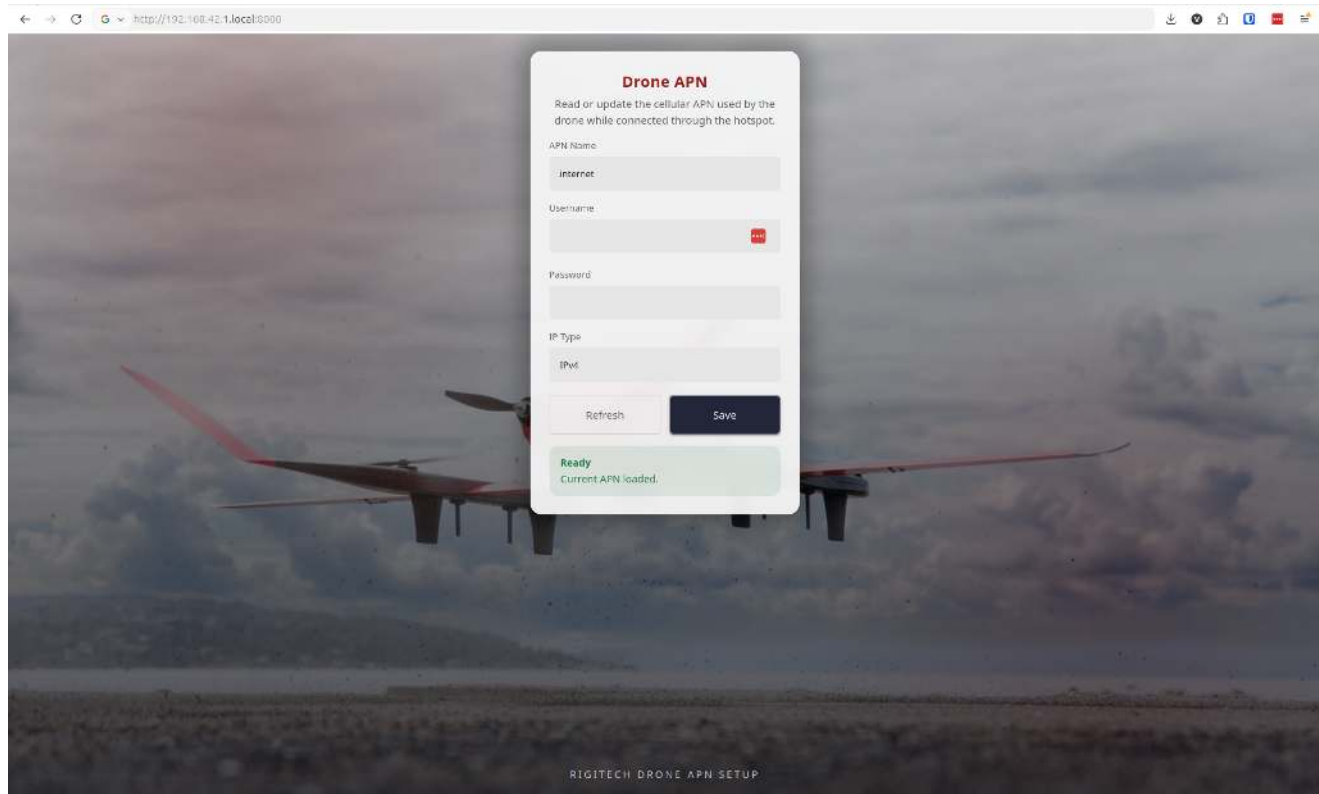
After expanding it, users should edit all parameters to match the SIM card provider information:

- APN Name
- APN User (may be left empty)
- APN Password (may be left empty)
- APN IP Type:
  - If IPv4 or IPv6 are used, users should put respectively 4 or 6 in the APN IP Type box.



The screenshot displays the RigiCloud web interface for a drone named '16988ER020003'. The interface is divided into several sections:

- Overview:** Shows key statistics: Total flights (424), Total flight time (60:15:51), Max time (00:48:53), Total distance (4905.14 km), Max distance (87.79 km), and Avg distance (11.57 km).
- MAINTENANCE:** Displays service intervals for SERVICE A, SERVICE B, and SERVICE C, each with a progress bar and an 'Over date' button.
- DRONE DETAILS:** A form for configuring the drone's APN. It includes fields for APN Name, APN User, APN Password, and APN IP Type. A red box highlights these fields, and a red arrow points to the 'Update APN values' button.
- LAST OPERATIONS:** A table with columns for Name, Distance, and Takeoff time, currently showing no data.



Once complete, users should click on "Update APN values" / "Save".

### Main link debug mode

In case of issues with the main link, the user should connect to the local WiFi of the UA and access <http://192.168.42.1:8080/?debug=1>. Then, click on "Refresh Debug" and, once ready, click on "Copy", and share the information with RigiTech Support Team.

**Drone APN**

Read or update the cellular APN used by the drone while connected through the hotspot.

APN Name

Username

Password

IP Type

**Ready**  
Current APN loaded.

**Connection Debug**

Hidden support view. Share this output only with support when asked.

**Disclaimer:**

- SIM cards should be unlocked (i.e. have no PIN code).

## Maintenance Centre

The maintenance centre shows the remaining time and/or flight hours until the next maintenance service (which depend on the drone model).

When clicking on the "+" icon at the bottom right corner of the window, a new maintenance service can be added, where users should define:

- Service: maintenance procedure executed (based on the drone model).
- Drone status: changes the status of the drone. Status are:
  - Active: the drone can be operated.
  - Grounded: the drone cannot be operated.
  - Maintenance: the drone needs to follow a maintenance service or procedure.
- Facility: where the maintenance procedure is being executed.
- Consumed time: time consumed during the service.
- Technician: person in charge of the service.
- Date: date of execution of the service.

- Comments: any relevant comment on the procedure or service. Procedures that are not part of a service should be described here.

16988ER020003

ACTIVE

OFFLINE

Overview

Operations

Maintenance

Software

Commands

Telemetry

Status messages

SERVICE A

60.26h/700h

Over date 2022/08/07

SERVICE B

60.26h/600h

Over date 2023/05/19

SERVICE C

60.26h/1200h

Over date 2024/05/08

NEW MAINTENANCE

Service\*

Drone Status

Facility

Completed Time

Technician

Date

Comments

Paragraph

Cancel

Add Maintenance

Event

Date

Drone Status

Only to broadcast

05.2022-06:50

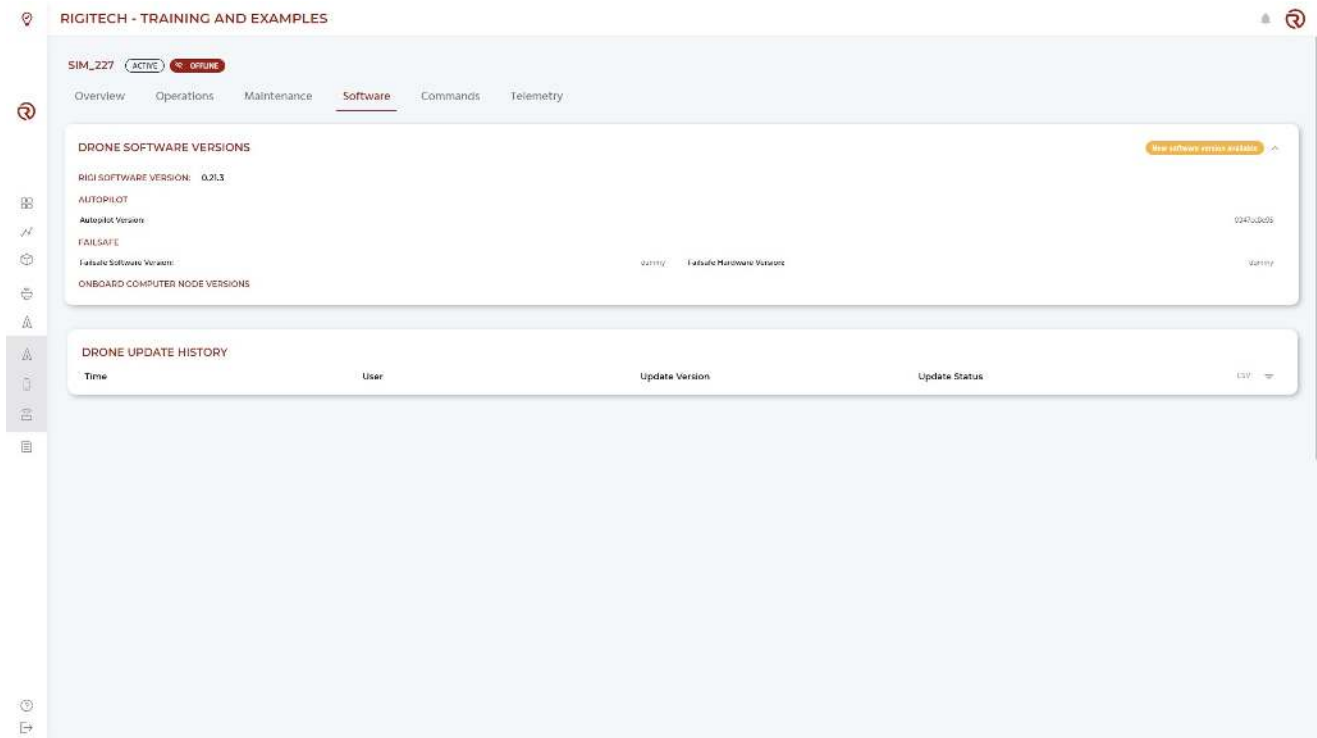
ACTIVE

## Software Update Centre

The software update centre shows the current software version of the UA and allows to update it when a new version is available.

- *Note: software updates of the Edge Node are currently not supported.*

It also shows the drone update history (only from version 1.10.0, released in January 3<sup>rd</sup>, 2024).



The screenshot displays the RIGITECH - TRAINING AND EXAMPLES interface. At the top, there's a header with a location pin icon, the title "RIGITECH - TRAINING AND EXAMPLES", and a user profile icon. Below the header, a sidebar on the left contains various icons for navigation. The main content area shows the "SIM\_227" status as "ACTIVE" and "ONLINE". The "Software" tab is selected, showing "DRONE SOFTWARE VERSIONS" and "DRONE UPDATE HISTORY".

**DRONE SOFTWARE VERSIONS**

RIGI SOFTWARE VERSION: 0.01.3

AUTOPILOT

Autopilot Version: 0247a2b09

FAILSAFE

FailSAFE Software Version: 0.01.1 / FailSAFE Hardware Version: 0.01.1

ONBOARD COMPUTER NODE VERSIONS

**DRONE UPDATE HISTORY**

| Time | User | Update Version | Update Status |
|------|------|----------------|---------------|
|------|------|----------------|---------------|

## Commands

In the Commands tab, the last commands sent to the UA (and the user sending them) can be seen. The database only stores the commands sent within the last 3 months.

**RIGITECH - TRAINING AND EXAMPLES**

**SIM\_225** ACTIVE OFFLINE

Overview Operations Maintenance Software **Commands** Telemetry

| Received At                                   | User                                                                                              | Command                                                                    | LLV                                                                                 |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 20-12-2023 9:19:28                            |  Collecting      | ModuleStart                                                                |  |
| 20-12-2023 9:19:33                            |  Collecting      | ModuleStart                                                                |  |
| <b>Rigi Id:</b> SIM_225<br><b>Rigi Id:</b> 00 | <b>Call Origin:</b><br><b>Response:</b> [Status:200,"value":"Action module start good success...] | <b>Preflight Checks:</b> Good<br><b>Postop Checks:</b> 1/3/4               |                                                                                     |
| 20-12-2023 9:19:21                            |  Collecting      | ipower01 start                                                             |  |
| <b>Rigi Id:</b> SIM_225                       | <b>Plan:</b>                                                                                      | <b>Op Id:</b> 705014408<br><b>Response:</b> [Status:200,"value":""]        |                                                                                     |
| 20-12-2023 9:19:05                            |  Collecting      | getFan                                                                     |  |
| <b>Rigi Id:</b> SIM_225                       | <b>Id:</b> 0                                                                                      | <b>Response:</b> [Status:200,"value":"Timeout reached for the fan. Ok...]  |                                                                                     |
| 20-12-2023 9:19:07                            |  Collecting      | isS                                                                        |  |
| <b>Rigi Id:</b> SIM_225                       | <b>Call Origin:</b>                                                                               | <b>Response:</b> [Status:200,"value":"Power fan launch success and its...] |                                                                                     |
| 20-12-2023 9:19:17                            |  Collecting      | isS                                                                        |  |
| <b>Rigi Id:</b> SIM_225                       | <b>Id:</b>                                                                                        |                                                                            |                                                                                     |
| 20-12-2023 9:19:55                            |  Collecting      | ModuleStart                                                                |  |
| <b>Rigi Id:</b> SIM_225<br><b>Rigi Id:</b> 00 | <b>Call Origin:</b><br><b>Response:</b> [Status:200,"value":"Action module start good success...] | <b>Preflight Checks:</b> Good<br><b>Postop Checks:</b> 1/3/4               |                                                                                     |
| 20-12-2023 9:19:28                            |  Collecting      | ipower01 start                                                             |  |
| 20-12-2023 9:19:37                            |  Collecting      | getFan                                                                     |  |
| 20-12-2023 9:09:30                            |  Collecting      | getFan                                                                     |  |

## Telemetry

In the Telemetry tab, the info of the telemetry sent to the UA can be seen. The database only stores the telemetry received within the last 3 months.

[illegible]

## Status messages

In the Status messages tab, the last messages sent from the UA are listed chronologically.

16988ER020003

ACTIVE

OFFLINE

Overview

Operations

Maintenance

Software

Commands

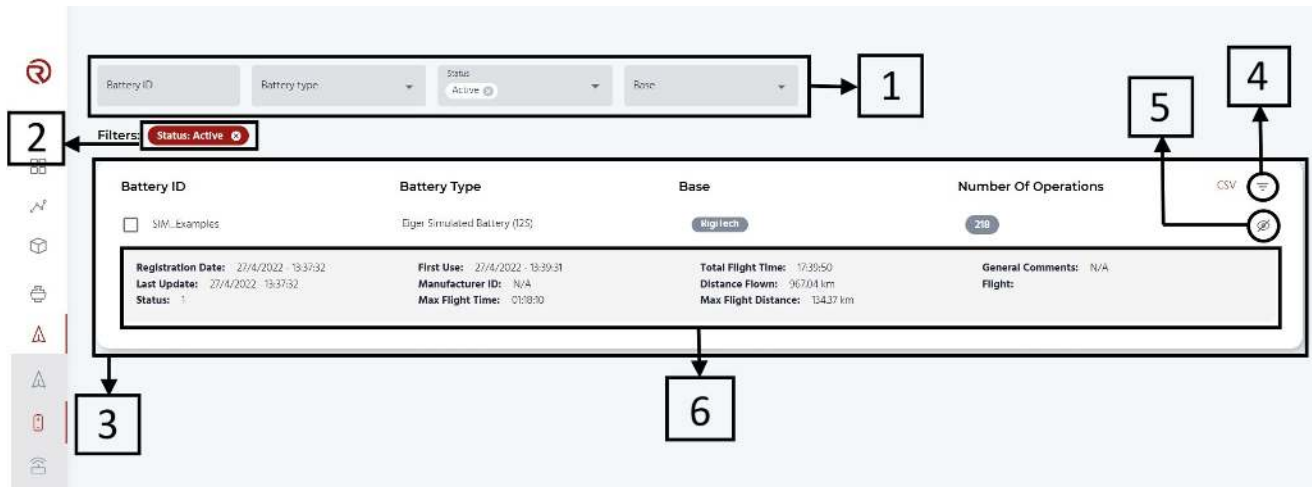
Telemetry

Status messages

| Emitted At          | Message Code | Message                                                          | Level    | CSV |
|---------------------|--------------|------------------------------------------------------------------|----------|-----|
| 14-10-2024 15:04:23 | 14331        | Deleting mission automatically at boot                           | INFO     |     |
| 14-10-2024 15:04:23 | 14332        | Mission deleted at boot                                          | INFO     |     |
| 14-10-2024 15:04:35 | 18004        | Down camera properly opened                                      | INFO     |     |
| 14-10-2024 15:04:35 | 18004        | Front camera properly opened                                     | INFO     |     |
| 21-10-2024 10:26:29 | 20007        | FS LFC ERROR: 221985                                             | CRITICAL |     |
| 21-10-2024 14:35:01 | 18004        | Down camera properly opened                                      | INFO     |     |
| 21-10-2024 14:35:10 | 10102        | All 20 fail-safe parameters sent to RpiCloud successfully        | INFO     |     |
| 21-10-2024 15:21:48 | 18004        | Down camera properly opened                                      | INFO     |     |
| 21-10-2024 15:21:57 | 18004        | Front camera properly opened                                     | INFO     |     |
| 21-10-2024 15:22:01 | 18004        | Down camera properly opened                                      | INFO     |     |
| 21-10-2024 15:22:23 | 18004        | Front camera properly opened                                     | INFO     |     |
| 21-10-2024 15:31:10 | 18004        | Down camera properly opened                                      | INFO     |     |
| 21-10-2024 15:31:15 | 18004        | Front camera properly opened                                     | INFO     |     |
| 21-10-2024 15:32:21 | 10100        | All 88 onboard computer parameters sent to RpiCloud successfully | INFO     |     |
| 21-10-2024 15:32:21 | 10101        | All 328 autopilot parameters sent to RpiCloud successfully       | INFO     |     |
| 21-10-2024 15:32:21 | 10102        | All 30 fail-safe parameters sent to RpiCloud successfully        | INFO     |     |

## Batteries

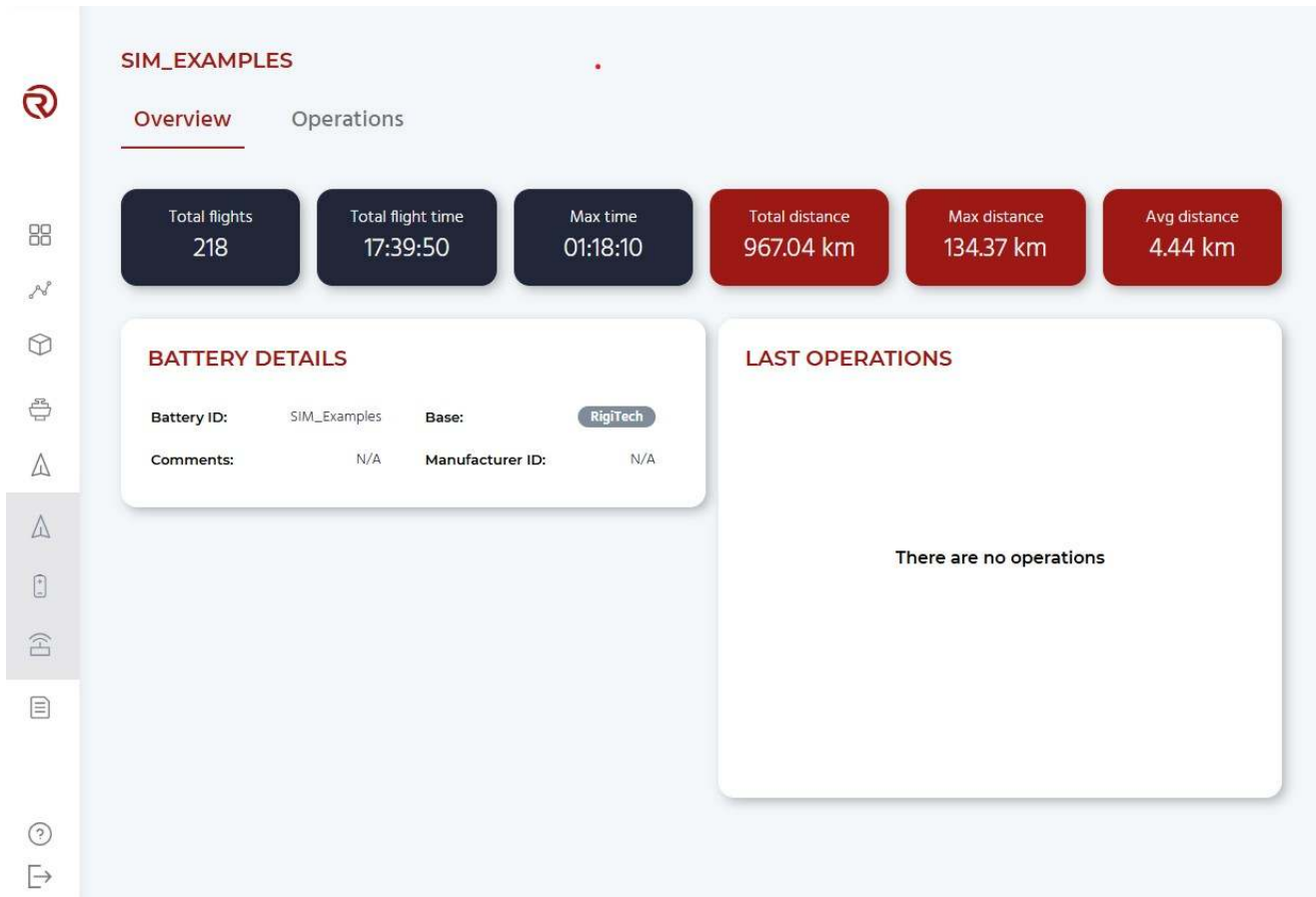
In the "Batteries" module, you can see the batteries associated to your project.



1. **Filter menu:** here you can filter your batteries, from left to right, by battery ID, battery type, status (active or inactive) and associated base.
2. **Active filters:** shows a summary of the active filters.
3. **Battery information:** here you can see all the batteries within your project. From left to right, you can see the battery ID, the battery type, the base to which it is associated and the number of operations of the battery.
4. **Open filter:** opens/closes the filter menu (see above).
5. **Show/hide all attributes:** shows/hides all attributes of a battery.
6. **Battery attributes:** shows generic information of the battery, including its Registration Date, Last Update, First Use, Total Flight Time, etc.

## Battery Information

When selecting a battery from the list, by clicking on the battery ID, a dashboard offers an overview of the selected battery. Informations such as statistics related to the battery, the battery ID (can be modified), the base to which the battery is associated, a comments section, the manufacturer ID and a list of the last operations executed with this battery.



The screenshot shows the 'SIM\_EXAMPLES' interface with the 'Overview' tab selected. The left sidebar contains a vertical menu with icons for home, settings, a list of items, a warning, a battery, a signal tower, a document, a question mark, and a right arrow. The main content area has a header with 'SIM\_EXAMPLES' and a red dot. Below the header are two tabs: 'Overview' (active) and 'Operations'. The 'Overview' tab displays six summary cards: 'Total flights' (218), 'Total flight time' (17:39:50), 'Max time' (01:18:10), 'Total distance' (967.04 km), 'Max distance' (134.37 km), and 'Avg distance' (4.44 km). Below these cards are two panels. The 'BATTERY DETAILS' panel shows 'Battery ID: SIM\_Examples', 'Base: RigiTech' (in a blue pill), 'Comments: N/A', and 'Manufacturer ID: N/A'. The 'LAST OPERATIONS' panel is empty and contains the text 'There are no operations'.

**SIM\_EXAMPLES**

**Overview** Operations

Total flights: 218

Total flight time: 17:39:50

Max time: 01:18:10

Total distance: 967.04 km

Max distance: 134.37 km

Avg distance: 4.44 km

**BATTERY DETAILS**

Battery ID: SIM\_Examples Base: RigiTech

Comments: N/A Manufacturer ID: N/A

**LAST OPERATIONS**

There are no operations

On the right of the "Overview" tab, the "Operations" tab displays the list of operations that were executed with the selected battery



SIM\_EXAMPLES

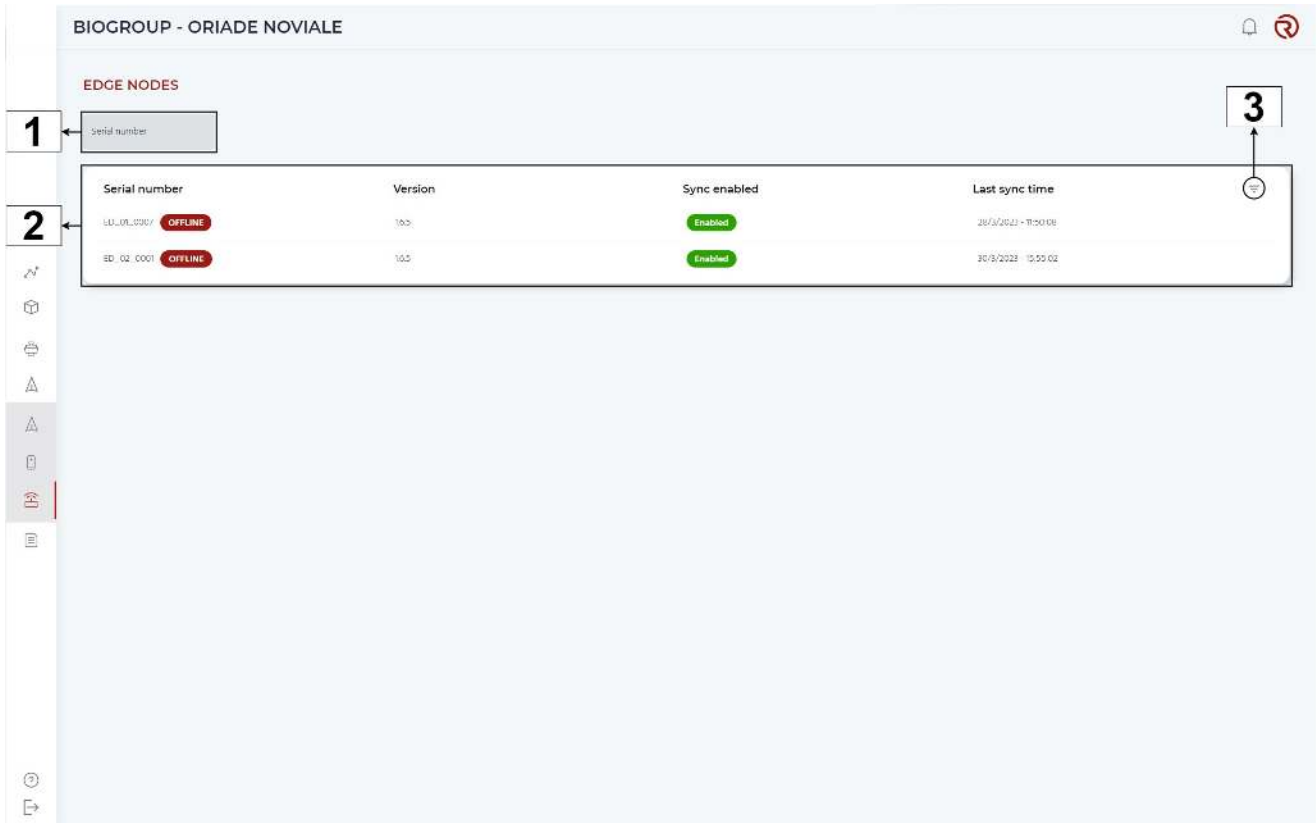
Overview

Operations

| Name                                                                             | Takeoff Time          | Delivery Time         | Status    | CSV                                                                                 |
|----------------------------------------------------------------------------------|-----------------------|-----------------------|-----------|-------------------------------------------------------------------------------------|
| 20250227 RigiTech - Testing field <span>SIM_TRAINING_12_1</span>                 | 27/2/2025 - 9:52:01   | -                     | Incident  |  |
| 20250224 Training test <span>SIM_TRAINING_12_1</span>                            | 24/2/2025 - 15:57:44  | 24/2/2025 - 16:05:56  | Delivered |  |
| 20250205 training 8-13 <span>SIM_TRAINING_12_1</span>                            | 6/2/2025 - 15:18:06   | 6/2/2025 - 15:24:20   | Delivered |  |
| 20250205 training 8-13 <span>SIM_TRAINING_12_1</span>                            | 6/2/2025 - 14:52:18   | 6/2/2025 - 14:56:33   | Incident  |  |
| 20250101 Online Training test <span>SIM_TRAINING_12_2</span>                     | 21/1/2025 - 15:50:45  | 21/1/2025 - 16:02:00  | Delivered |  |
| 20250121 Online Training test <span>SIM_TRAINING_12_2</span>                     | 21/1/2025 - 15:25:30  | 21/1/2025 - 15:36:47  | Incident  |  |
| 20250121 Online Training test <span>SIM_TRAINING_12_2</span>                     | 21/1/2025 - 14:59:25  | 21/1/2025 - 15:12:52  | Incident  |  |
| 20250714 Training 9a <span>SIM_TRAINING_12_1</span>                              | 14/1/2025 - 17:51:37  | 14/1/2025 - 17:54:43  | Incident  |  |
| 20241126 Training 9a <span>SIM_TRAINING_12_1</span>                              | 26/11/2024 - 15:39:22 | 26/11/2024 - 15:46:17 | Delivered |  |
| 20241126 Training 5a <span>SIM_TRAINING_12_1</span>                              | 26/11/2024 - 15:22:05 | 26/11/2024 - 15:27:37 | Incident  |  |
| 20241125 Lausanne training_VLOS loops_Monthichier <span>SIM_TRAINING_12_1</span> | 25/11/2024 - 15:23:32 | 25/11/2024 - 15:32:37 | Delivered |  |

## Edge Nodes

In the "Edge Nodes" module, you can see the Edge Nodes associated to your project. If you purchase a new Edge Node or remove an old one, RigiTech will update this page.



| Serial number | Version | Sync enabled | Last sync time     |
|---------------|---------|--------------|--------------------|
| UU-08-0201    | 10.5    | Enabled      | 28/3/2023 11:50:08 |
| ED-02-0001    | 10.5    | Enabled      | 30/3/2023 15:50:02 |

1. **Filter menu:** here you can filter your Edge Nodes by the serial number.

2. **Edge Nodes information:** here you can see all the Edge Nodes within your project. From left to right, you can see the serial number (and the status), the version, if synchronization is enabled and the time of the last synchronization.

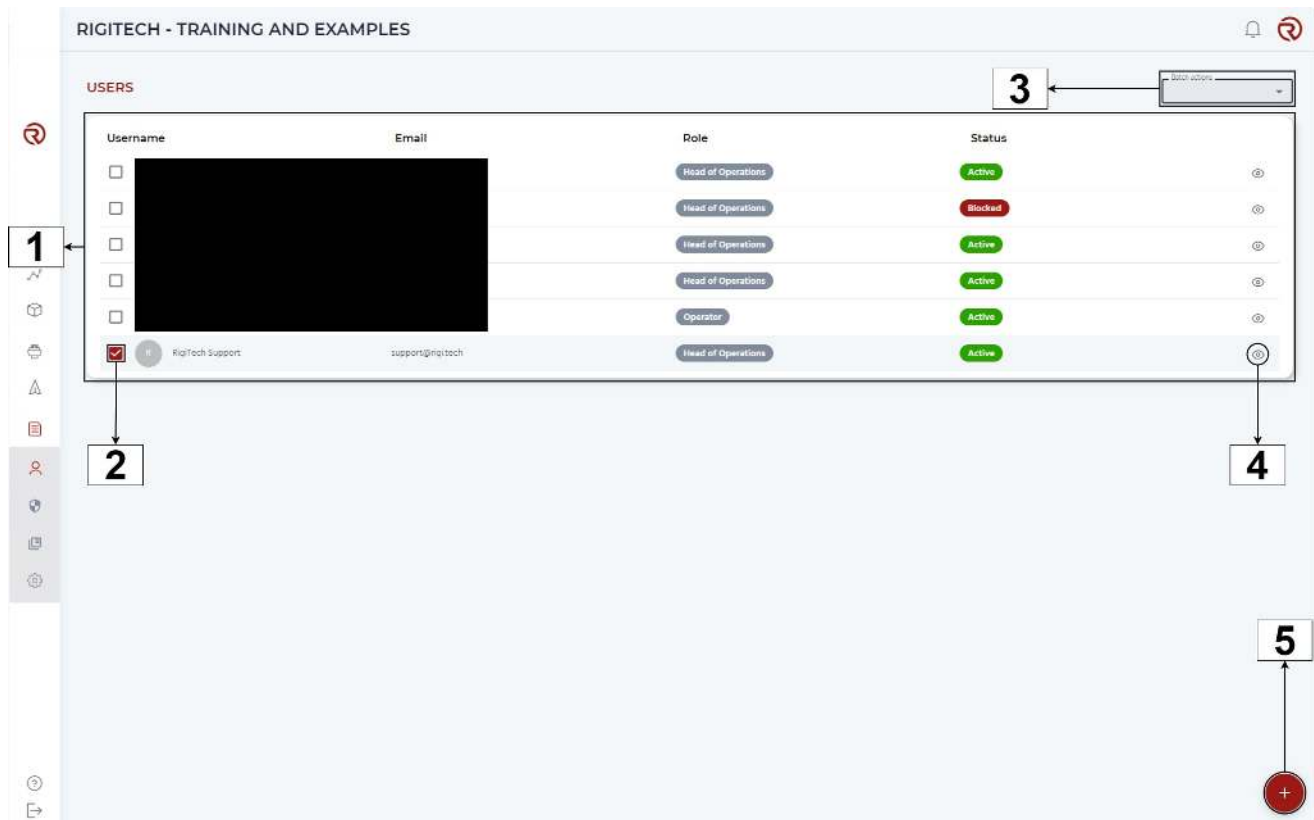
3. **Open filter:** opens/closes the filter menu (see above).

# Users

The compliance center includes information on users, documentation and settings.

## Users

The users page shows the users of a project, including their emails and roles.



**USERS**

| Username                            | Email            | Role               | Status  |
|-------------------------------------|------------------|--------------------|---------|
| <input type="checkbox"/>            |                  | Head of Operations | Active  |
| <input type="checkbox"/>            |                  | Head of Operations | Blocked |
| <input type="checkbox"/>            |                  | Head of Operations | Active  |
| <input type="checkbox"/>            |                  | Head of Operations | Active  |
| <input type="checkbox"/>            |                  | Operator           | Active  |
| <input checked="" type="checkbox"/> | RigiTech Support | Head of Operations | Active  |

- Users information:** for a specific user, from left to right, user's profile picture, usernames, emails, roles and status.
- Select user:** allows to select one or a group of users for batch actions.
- Batch actions (when multiple users are selected):** allows to perform specific tasks on the selected users (after clicking on "Apply"). This menu is only visible if at least one user is selected. This option is only available for "Head of Operations" users.
  - Change user status:** changes the status to "Blocked" or "Enabled".
  - Send reset password email**
  - Resend activate account email**
  - In order to remove users from projects, please contact [support@rigi.tech](mailto:support@rigi.tech).
- Show/hide additional information** (useful mainly for admin users).

5. **Add user** (only for "Head of Operations" users).

Clicking on any of the users' usernames leads to their [User Profile](#).

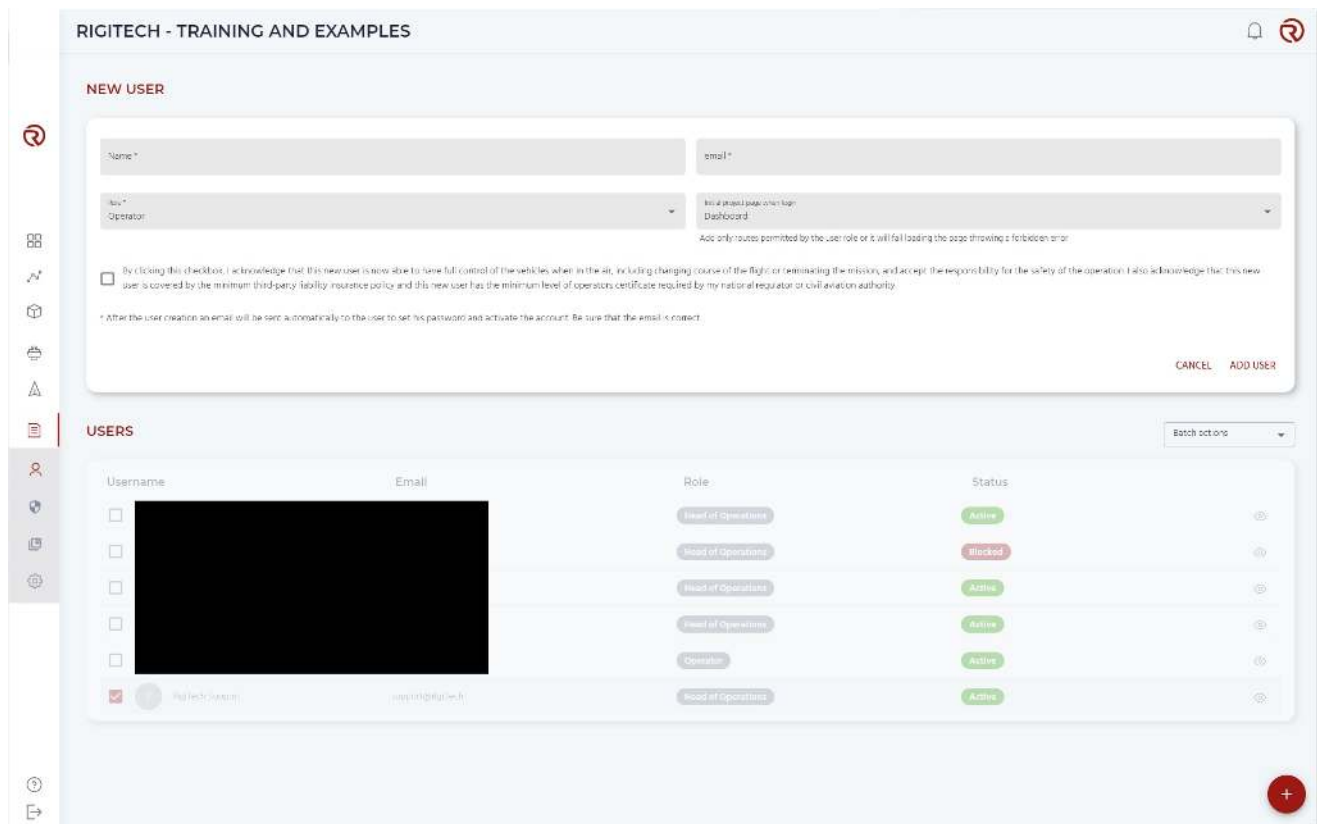
The types of users are described in [Getting started](#).

## User creation

"Head of Operations" users can add new users. After clicking on the button, a form will open with the following information:

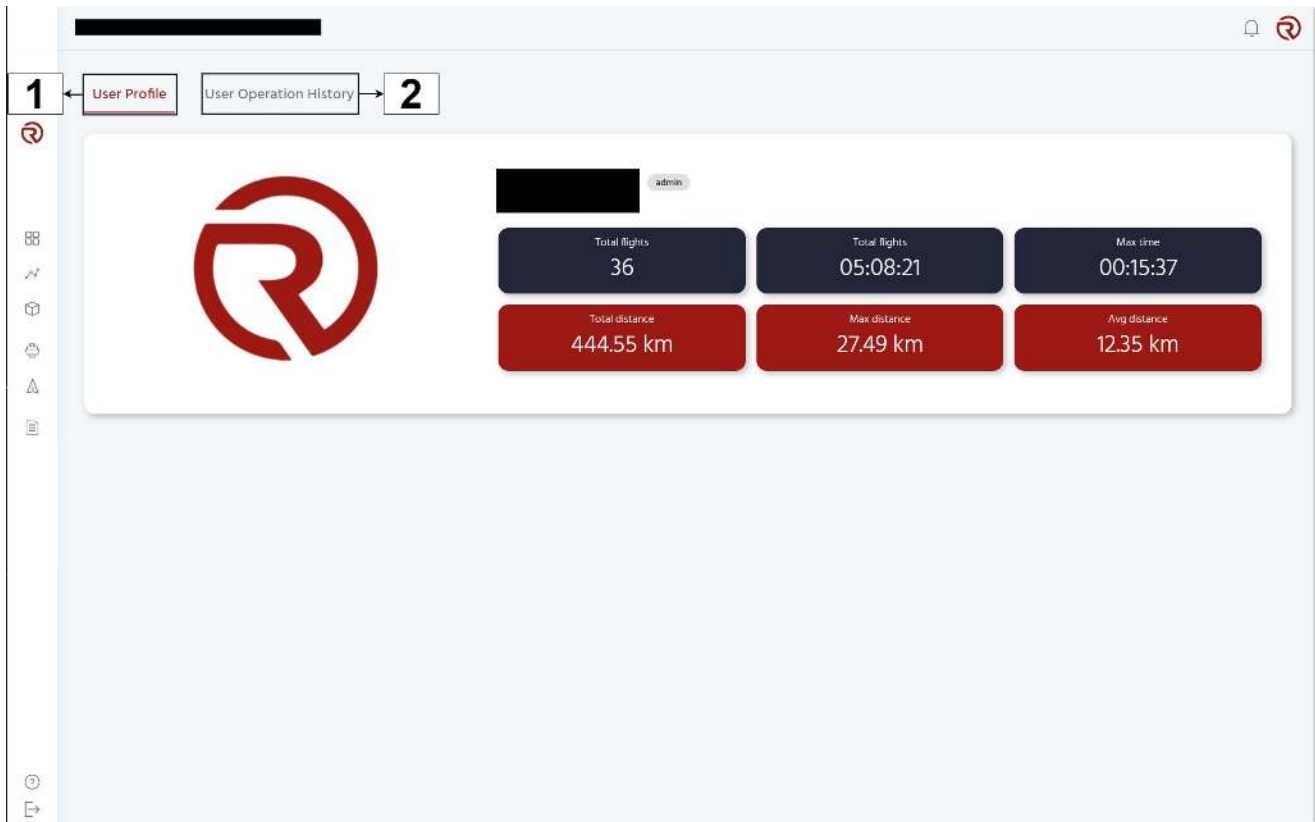
- **New user:** allows to create a new user.
- **Information of the user:** from left to right and top to bottom.
  - **Name:** username of the user.
  - **Email:** email of the user.
  - **Role:** role of the user.
  - **Initial project page when login:** module in which the user will log in (Dashboard by default).
- **Confirmation form:** by clicking this checkbox, the Head of Operations user acknowledges that the new user will be able to have full control of the vehicles when in the air, including changing course of the flight or terminating the operation, and accept the responsibility for the safety of the operation. the Head of Operations user acknowledges that the new user is covered by the minimum third-party liability insurance policy and has the minimum level of operators certificate required by the national regulator or civil aviation authority.
  - This form is required for all the users, although it is particularly relevant for Heads of Operations and Operators.

Once the form is filled, clicking on "Add User" confirm the creation. The user will then receive a mail to set the password and activate the account. Otherwise, the creation can be cancelled by clicking on "Cancel".



## User Profile

By clicking on a user's username, the user profile can be accessed, where a summary of the operation statistics of the user is displayed.



#### 1. Switch to User Profile

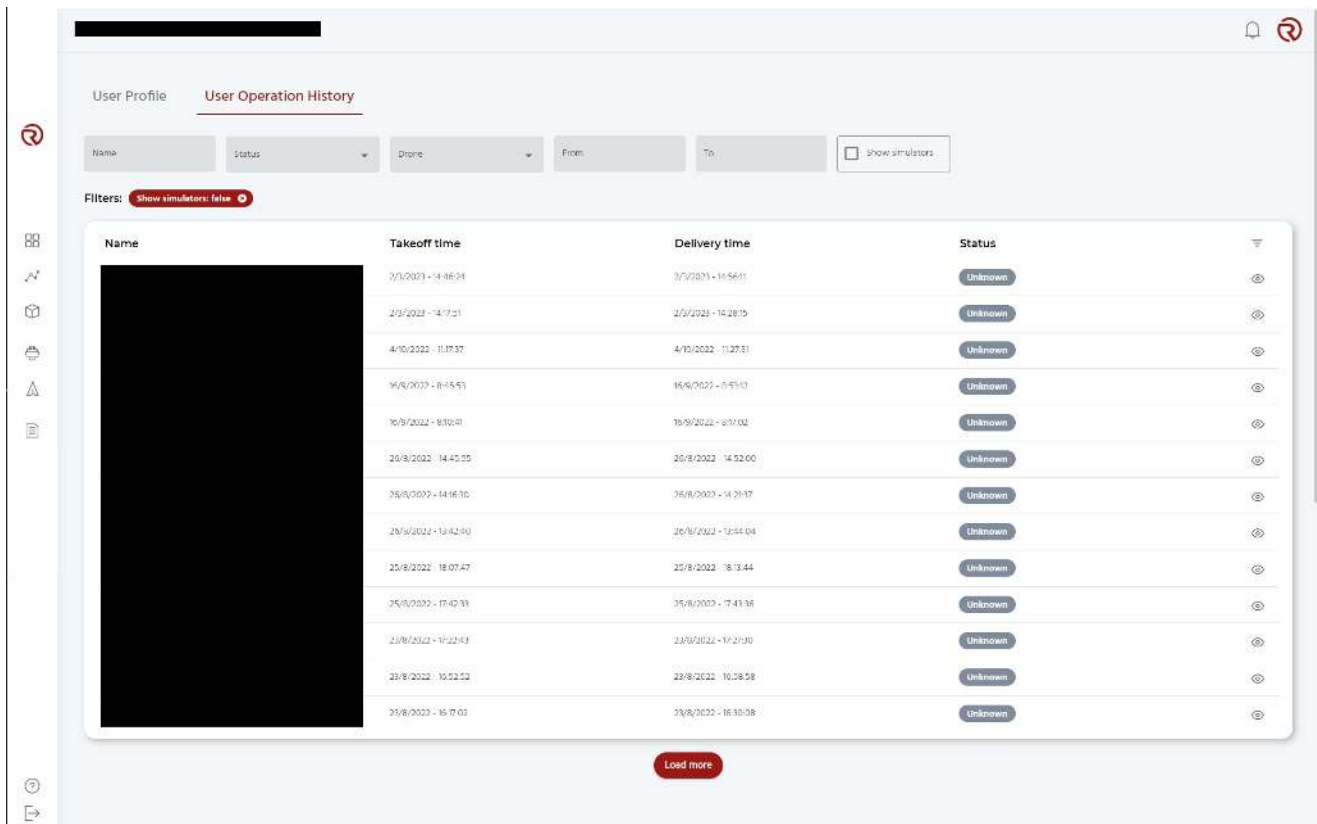
#### 2. Switch to User Operation History

From left to right, top to bottom, the available information is:

- **Total flights**
- **Total time:** Total time flown.
- **Max time:** Longest flight duration.
- **Total distance:** Total distance flown.
- **Max distance:** Longest flight distance.
- **Avg distance:** Average distance per flight.

## User Operation History

By accessing the User Operation History, the details of all the operations in which the user has participated will be displayed (as defined in [Operations](#)).



User Profile   **User Operation History**

Name   Status   Drone   From   To   ☐ Show simulator

Filters: **Show simulators: false**

| Name | Takeoff time         | Delivery time        | Status  |
|------|----------------------|----------------------|---------|
|      | 2/3/2021 - 14:46:24  | 3/3/2021 - 11:56:01  | Unknown |
|      | 2/3/2021 - 14:17:51  | 2/3/2021 - 14:28:19  | Unknown |
|      | 4/10/2021 - 11:17:37 | 4/10/2021 - 11:27:31 | Unknown |
|      | 16/6/2022 - 8:45:43  | 16/6/2022 - 8:45:13  | Unknown |
|      | 16/6/2022 - 8:10:40  | 16/6/2022 - 8:17:02  | Unknown |
|      | 26/8/2022 - 14:45:29 | 26/8/2022 - 14:52:00 | Unknown |
|      | 26/8/2022 - 14:16:10 | 26/8/2022 - 14:20:17 | Unknown |
|      | 26/8/2022 - 13:42:50 | 26/8/2022 - 13:54:04 | Unknown |
|      | 22/8/2022 - 18:07:47 | 22/8/2022 - 18:13:44 | Unknown |
|      | 24/8/2022 - 17:42:33 | 24/8/2022 - 17:43:36 | Unknown |
|      | 23/8/2022 - 17:22:43 | 23/8/2022 - 17:27:00 | Unknown |
|      | 23/8/2022 - 16:22:52 | 23/8/2022 - 16:28:58 | Unknown |
|      | 25/8/2022 - 16:17:03 | 25/8/2022 - 16:30:08 | Unknown |

Load more

1. Switch to User Profile

2. Switch to User Operation History

# Safety profiles

Safety profiles can be configured from the "Safety profiles" module. They are defined by their name and description, as well as if they are enabled or not. They can also be removed (only non-default RigiTech profiles) and cloned.

| Name                                                                                                                                                                                                                                                                                                                                | Description                                                                                           | Disabled                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> BVLOS - CDPY                                                                                                                                                                                                                                                                                               | Safety profile for BVLOS operations requiring enhanced containment (scope of the Design Verification) | <input checked="" type="checkbox"/>                                                                              |
| ID: <code>Cdnt-Bvlos-44de-wdrf-45302bce832</code>                                                                                                                                                                                                                                                                                   | Creation Date: 22/05/2023 - 09:47:34                                                                  | Last Update: 22/05/2023 - 09:47:34                                                                               |
| <b>Safety Values</b>                                                                                                                                                                                                                                                                                                                |                                                                                                       |                                                                                                                  |
| Note values mean that the value is inherited from the default setting and is not defined in the profile.                                                                                                                                                                                                                            |                                                                                                       |                                                                                                                  |
| <b>MAX FLIGHT ALTITUDE DEVIATION</b><br>Lower deviation warning: true<br>Upper deviation limit action: STOP<br>Lower deviation limit action: terminate<br>Lower deviation limit: 30 m<br>Upper deviation warning limit: 12 m<br>Lower deviation warning limit: 10 m<br>Upper deviation warning: true<br>Upper deviation limit: 80 m | <b>GLOBAL POSITION ESTIMATION</b><br>GNSS loss action: alert<br>GNSS loss action delay: 5 s           | <b>C2 LINK</b><br>Main C2 link loss action: STOP<br>Main C2 link loss time: 600 sec                              |
| <b>QUADRUITE</b><br>Quadrucute angle threshold roll: 20°<br>Low altitude quadrucute: 0 m<br>Adaptive quadrucute: 20 m<br>Quadrucute action: stop<br>Quadrucute angle threshold pitch: 30°                                                                                                                                           | <b>GEOCAGES</b><br>Geocage breach: CONTINUE<br>Pregeocage breach: CONTINUE                            | <b>DETECT AND AVOID</b><br>Medium breach: WARN<br>High breach: WARN<br>Critical breach: WARN<br>Low breach: WARN |
| <b>BATTERY</b><br>Low battery warning threshold: 32 %<br>Emergency landing level: 15 %                                                                                                                                                                                                                                              | <b>RTO TURN IN FIXED-WING</b><br>RTO turn maneuver: true                                              | <b>SATCOM SETTINGS</b><br>Minimum SDO sending mode: never<br>Minimum SDO usage for C2 link: true                 |
| <input type="checkbox"/> VLCS                                                                                                                                                                                                                                                                                                       | Safety profile used in VLCS flights (observational trainings and flight testing)                      | <input checked="" type="checkbox"/>                                                                              |
| <input type="checkbox"/> SVLOS                                                                                                                                                                                                                                                                                                      | Safety profile for SVLOS operations requiring enhanced containment (scope of the Design Verification) | <input checked="" type="checkbox"/>                                                                              |

New safety profiles can be created ("+" button). In the editor, users shall define its name, description and if they are enabled or not. Then the different actions and triggers shall be defined for each safety setting.

**NEW SAFETY PROFILE**

Profile name:

Decolation:   A standard profile will not be available when using a model.

**MAX FLIGHT ALTITUDE DEVIATION**

Lower deviation limit:  m

Lower deviation limit action:

Lower deviation warning: ☐

Upper deviation limit:  m

Upper deviation limit action:

Upper deviation warning: ☐

**GLOBAL POSITION ESTIMATION**

GPS loss action:

GPS loss delay:  s

**C2 LINK**

Main C2 link loss action:

Main C2 link loss time:

**WIND**

High wind action:

High wind action level:  m/s

Wind warning level:  m/s

**QUADCHUTE**

Adaptive quadchute:  m

Low altitude quadchute:  m

Quadchute action:

Quadchute single triggered pitch:  %

Quadchute single triggered roll:  °

**GEOCAGES**

Downsize breach:

Pregeocage breach:

**DETECT AND AVOID**

Obstacle breach:

Host breach:

Low breach:

Medium breach:

**ONBOARD COMPUTER**

Onboard computer loss action:

Onboard computer loss time:

**BATTERY**

Emergency landing level:  %

Low battery warning threshold:  %

**ITO TURN IN FIXED-WING**

ITO turn manoeuvre:

**SATCOM SETTINGS**

Industry 5G banding mode:

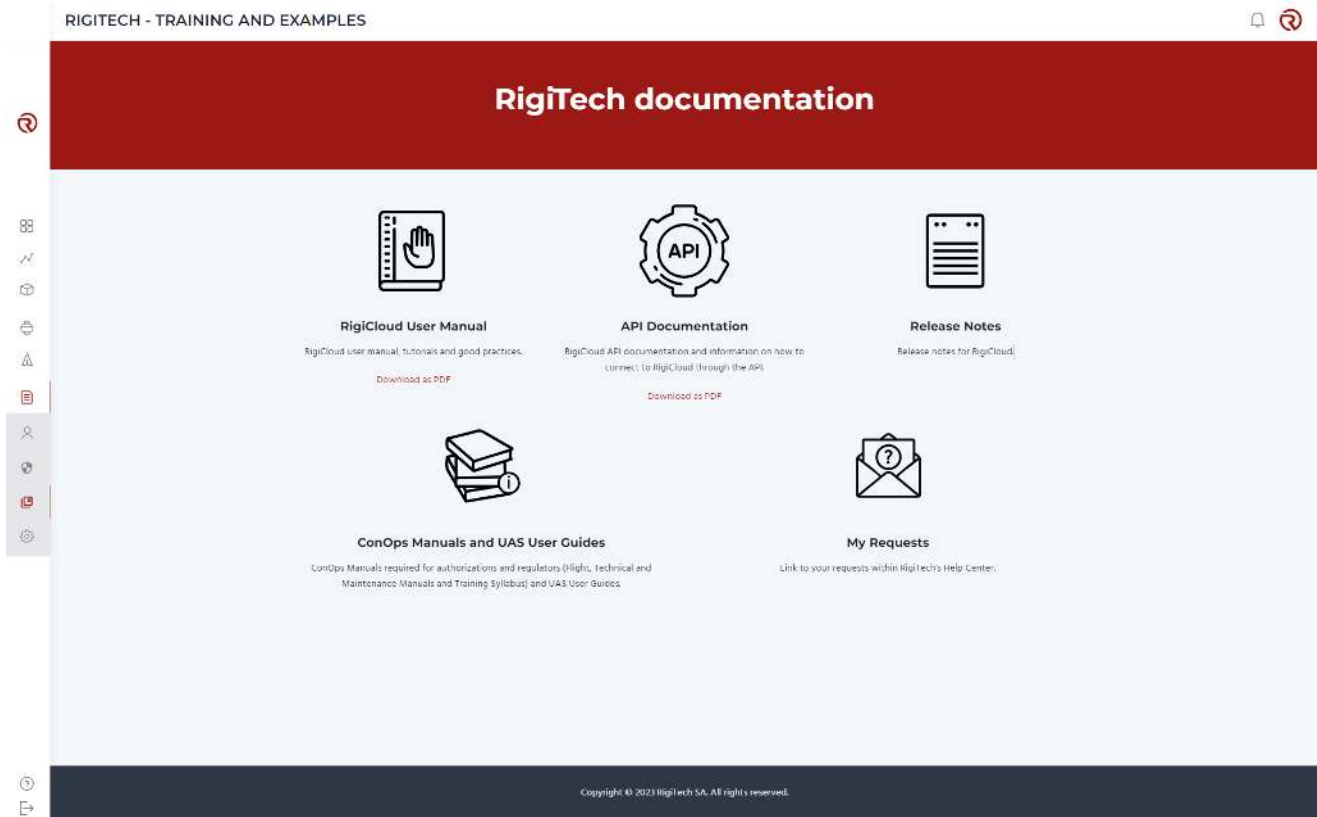
Industry 5G coverage for C2 link: ☐

The meaning of each safety setting, trigger and action are defined in the UAS Flight Manual.

# Documentation

## Documentation

Within the documentation module, it is possible to access the available documentation and manuals of RigiTech that are included in RigiCloud (RigiCloud User Manual, API Documentation and Release Notes) and the Help Center (ConOps Manuals and UAS User Guides and "My Requests"). See [Help Center](#).



The RigiCloud User Manual and the API Documentation can be downloaded by clicking on "Download as PDF".

### Disclaimer:

- The operator shall review the release notes and the updates of the documentation periodically to ensure that their knowledge on the system is up to date.

# Settings

Users can change some settings of their project within the "Settings" module, including, among others:

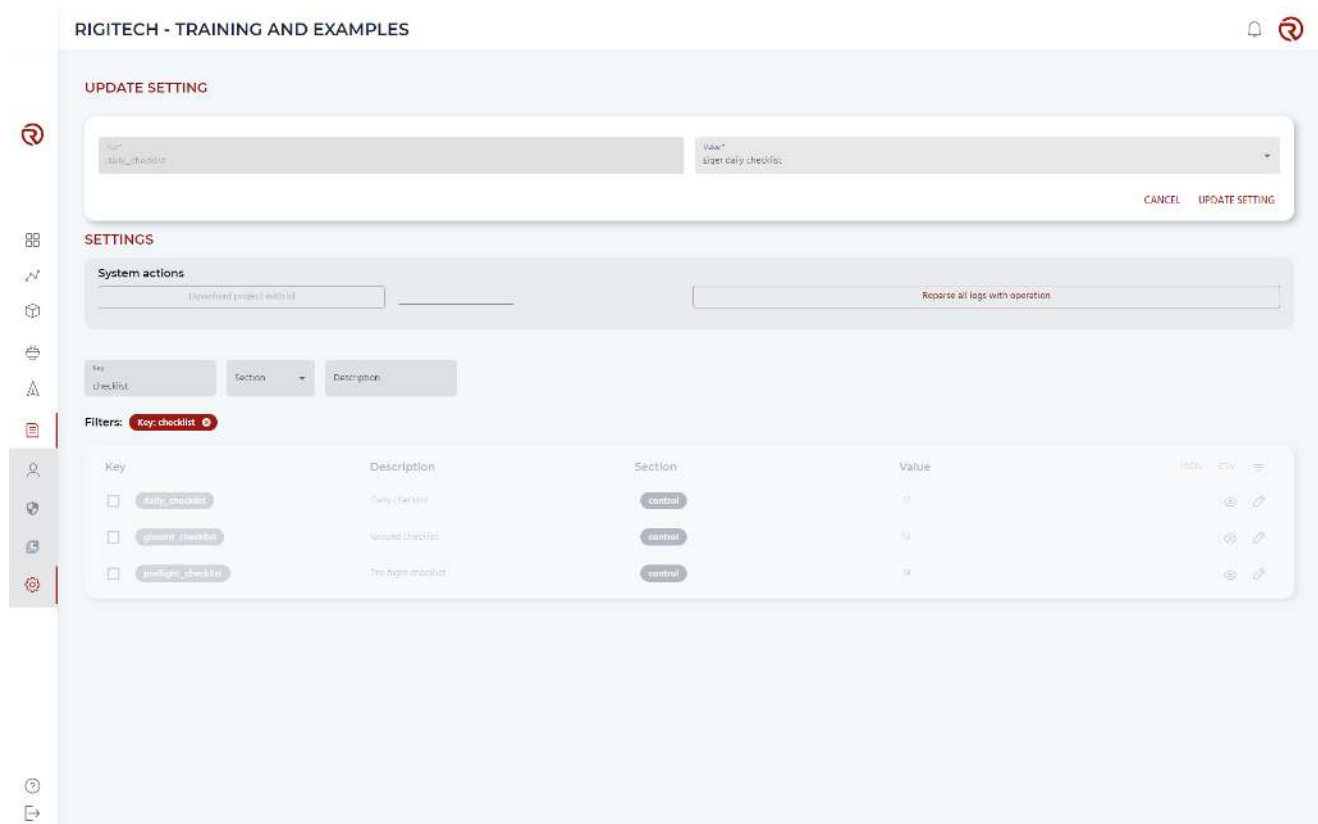
- Checklists
- Units

Settings are configured project-level instead of user-level. Only Head of Operations users can configure them. When a setting is different than default, its key will turn to red (instead of grey) and show the message "(set in project)".

Settings can be filtered based on their name ("Key"), section and description. Sections include: Planner, Map, General, Edge Node and Drone control.

## Checklists

In order to quickly identify settings related to safety, within the filter "Key", users may write "checklist".



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**UPDATE SETTING**

Key:  Value:

[CANCEL](#) [UPDATE SETTING](#)

**SETTINGS**

**System actions**

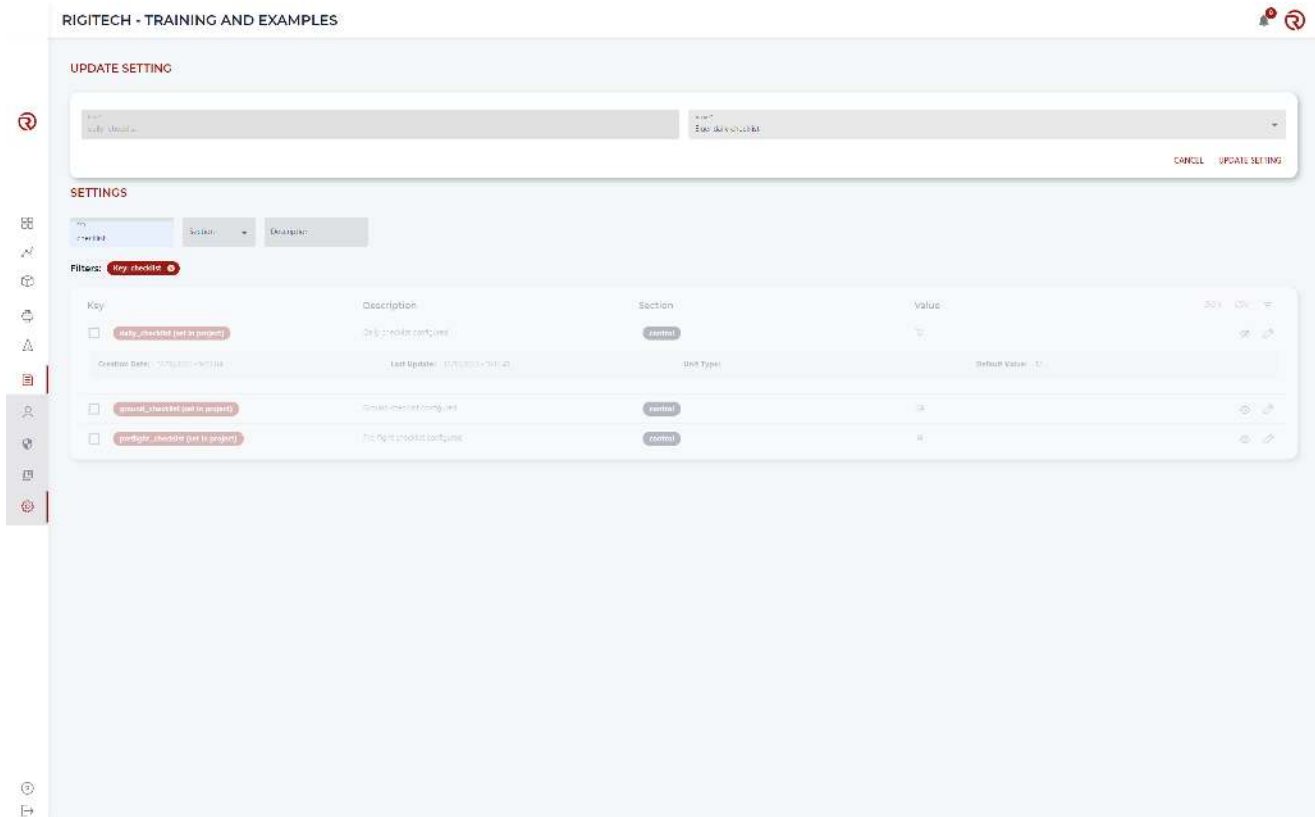
Key:  Section:  Description:

Filters: **Key: checklist**

| Key                                          | Description          | Section | Value | LOCK                     | EDIT                 |
|----------------------------------------------|----------------------|---------|-------|--------------------------|----------------------|
| <input type="checkbox"/> daily_checklist     | Daily checklist      | control | 13    | <input type="checkbox"/> | <input type="text"/> |
| <input type="checkbox"/> ground_checklist    | Ground checklist     | control | 13    | <input type="checkbox"/> | <input type="text"/> |
| <input type="checkbox"/> preflight_checklist | Pre-flight checklist | control | 14    | <input type="checkbox"/> | <input type="text"/> |

The daily, ground and pre-flight checklist used in the project are defined here. Their keys are:

- daily\_checklist
- ground\_checklist
- preflight\_checklist



Checklists can be selected from the list of available options by clicking on "Edit". A window will appear allowing to update the setting.

## Units

In order to quickly identify settings related to safety, within the filter "Key", users may write "unit".

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**SETTINGS**

**System actions**

Download project with id:

Key: unit Section: Description:

Filters: Key: unit

| Key                                                       | Description                                            | Section | Value                 | .JSON | CSV |
|-----------------------------------------------------------|--------------------------------------------------------|---------|-----------------------|-------|-----|
| <input type="checkbox"/> horizontal_speed_units           | Defines the unit used for horizontal speeds            | map     | m (m/s)               |       |     |
| <input type="checkbox"/> horizontal_square_distance_units | Defines the unit used for surfaces                     | map     | km (km <sup>2</sup> ) |       |     |
| <input type="checkbox"/> long_horizontal_distance_units   | Defines the unit used for (long) horizontal distances  | map     | m (m)                 |       |     |
| <input type="checkbox"/> short_horizontal_distance_units  | Defines the unit used for (short) horizontal distances | map     | m (m)                 |       |     |
| <input type="checkbox"/> vertical_distance_units          | Defines the unit used for vertical distances           | map     | m (m)                 |       |     |
| <input type="checkbox"/> vertical_speed_units             | Defines the unit used for vertical speeds              | map     | ms (m/s)              |       |     |
| <input type="checkbox"/> weight_units                     | Defines the unit used for weights                      | map     | kg (kg)               |       |     |

Users can change the units for:

- Horizontal speeds: horizontal\_speed\_units
- Vertical speeds: vertical\_speed\_units
- Surfaces: horizontal\_square\_distance\_units
- Horizontal distances: short\_horizontal\_distance\_units / long\_horizontal\_distance\_units
- Vertical distances: vertical\_distance\_units
- Mass (defined as weight): weight\_units

Available units are a mix between metric, imperial and aviation systems.

## Drone connected

- connected\_drone\_satellite\_threshold: defines the time that the drone is shown as connected when it has only satellite link (in ms). The default value is 60 s.
- connected\_drone\_threshold: defines the time that the drone is shown as connected without receiving any telemetry (in ms). The default value is 5 s.

## Map styles

Settings allowing to change the map styles:

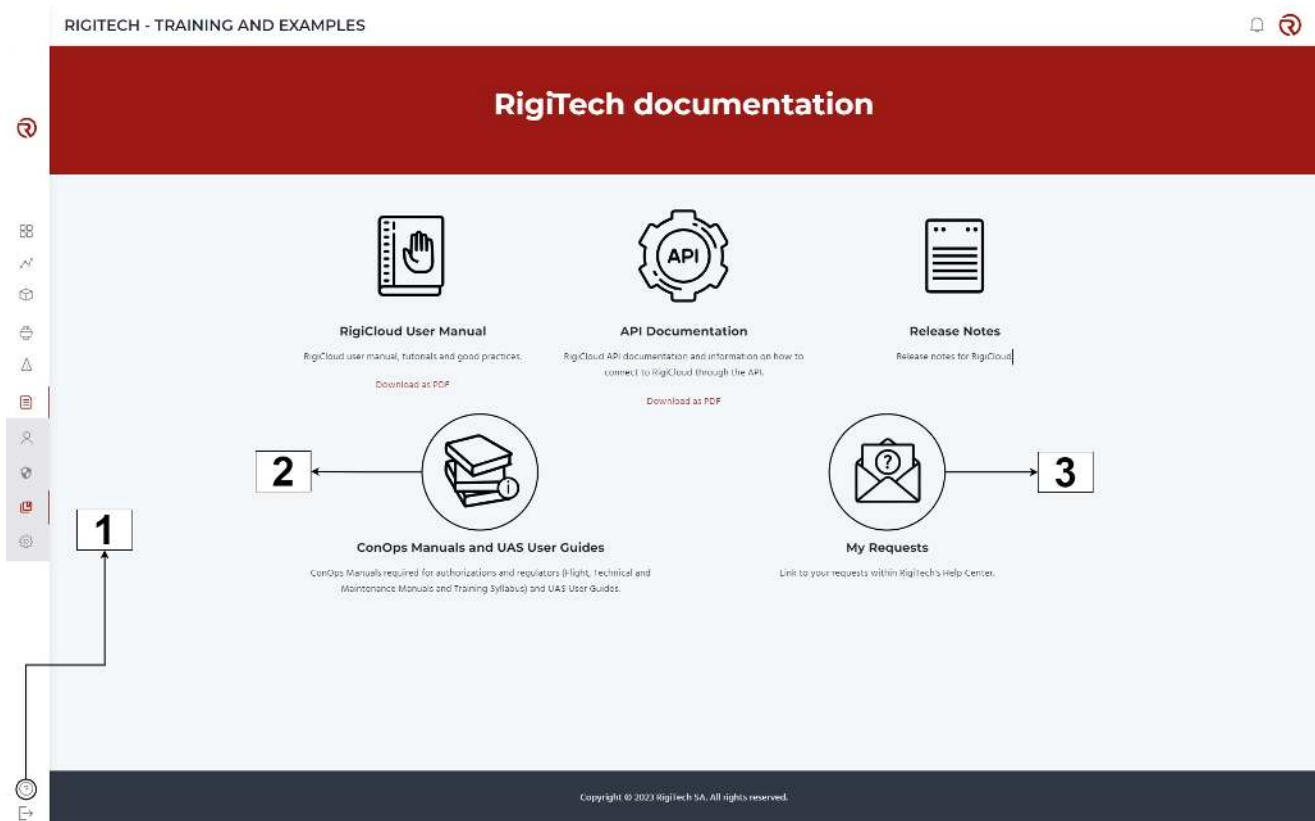
- rigi\_map\_selected\_style
- rigi\_map\_selected\_style\_light

# Help Center

RigiTech has a Help Center that shall be used by operators using RigiCloud and RigiTech UAS.

## Access to the Help Center

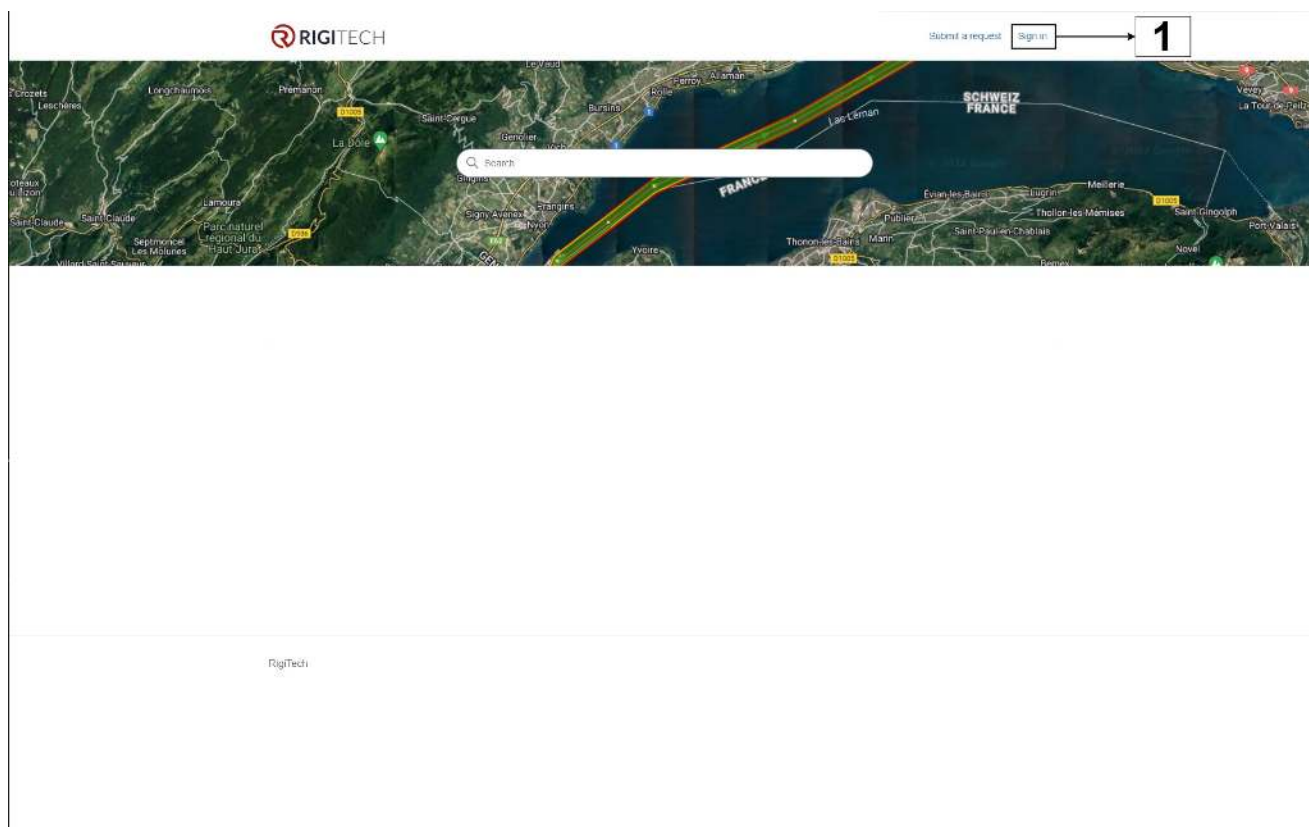
Within RigiCloud, it is possible to access the Help Center through the main menu or through the documentation page.



1. Access to the landing page of the Help Center
2. Access to the ConOps Manuals and UAS User Guides within the Help Center
3. Access to "My Requests" within the Help Center

## User creation and login

If the user is not logged in, the main landing page will be displayed.



### 1. Sign in

Click on "Sign in" in order to open the sign-in window and follow the instructions.

Sign in to RigiTech

Switch to agent sign-in >

 Sign in with Google

 Sign in with Microsoft

Email

Password

Forgot password?

Sign in

Emailed us for support? [Get a password](#)

New to RigiTech? [Sign up](#)

Without a user, it is required to sign up (click on "Sign up"). Only official e-mail addresses from RigiTech customers can be used. If a customer cannot sign up, the customer shall request RigiTech support to include the customer's organisation in the authorised list (by sending a mail to [support@rigi.tech](mailto:support@rigi.tech)).

Sign up to RigiTech

Please fill out this form, and we'll send you a welcome email so you can verify your email address and sign in.

Your full name \*

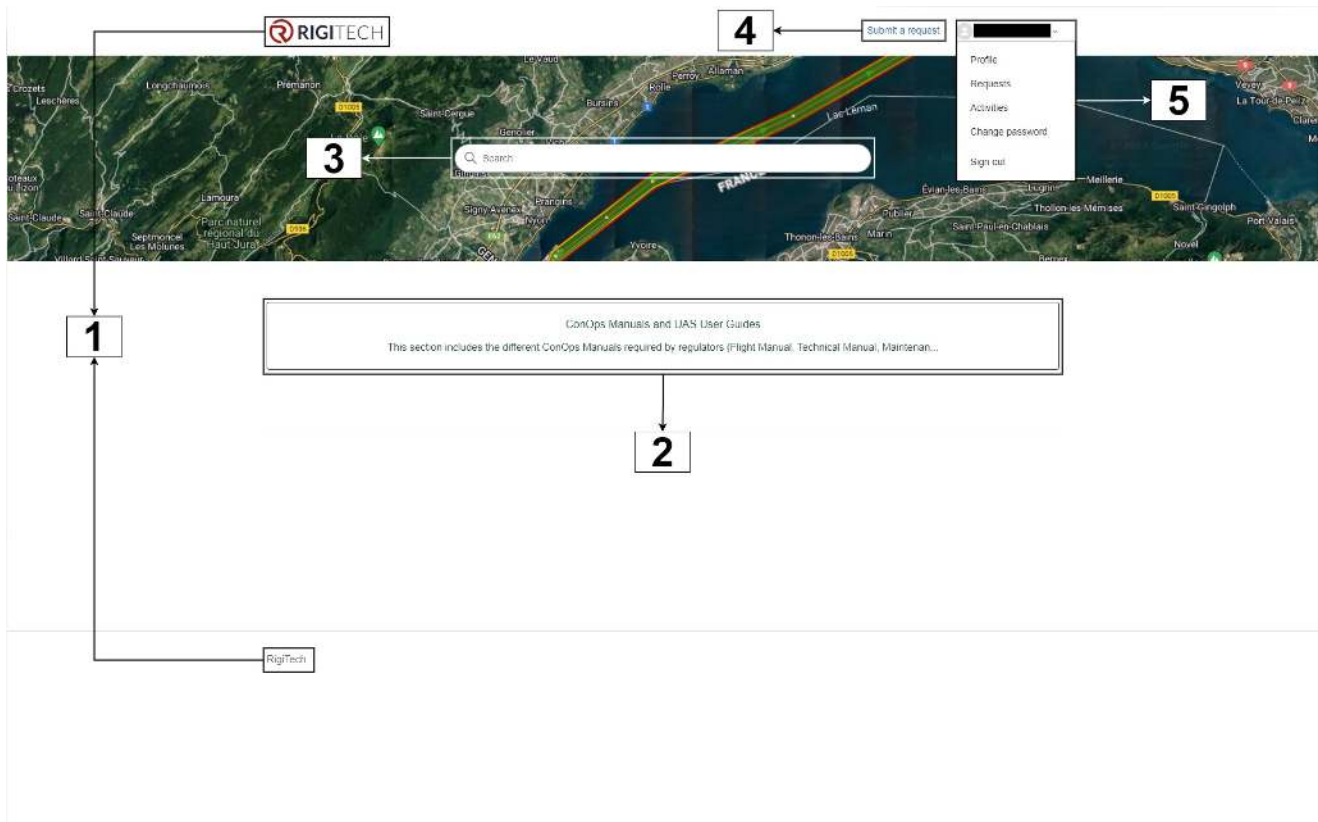
Your email \*

Sign up

Cancel

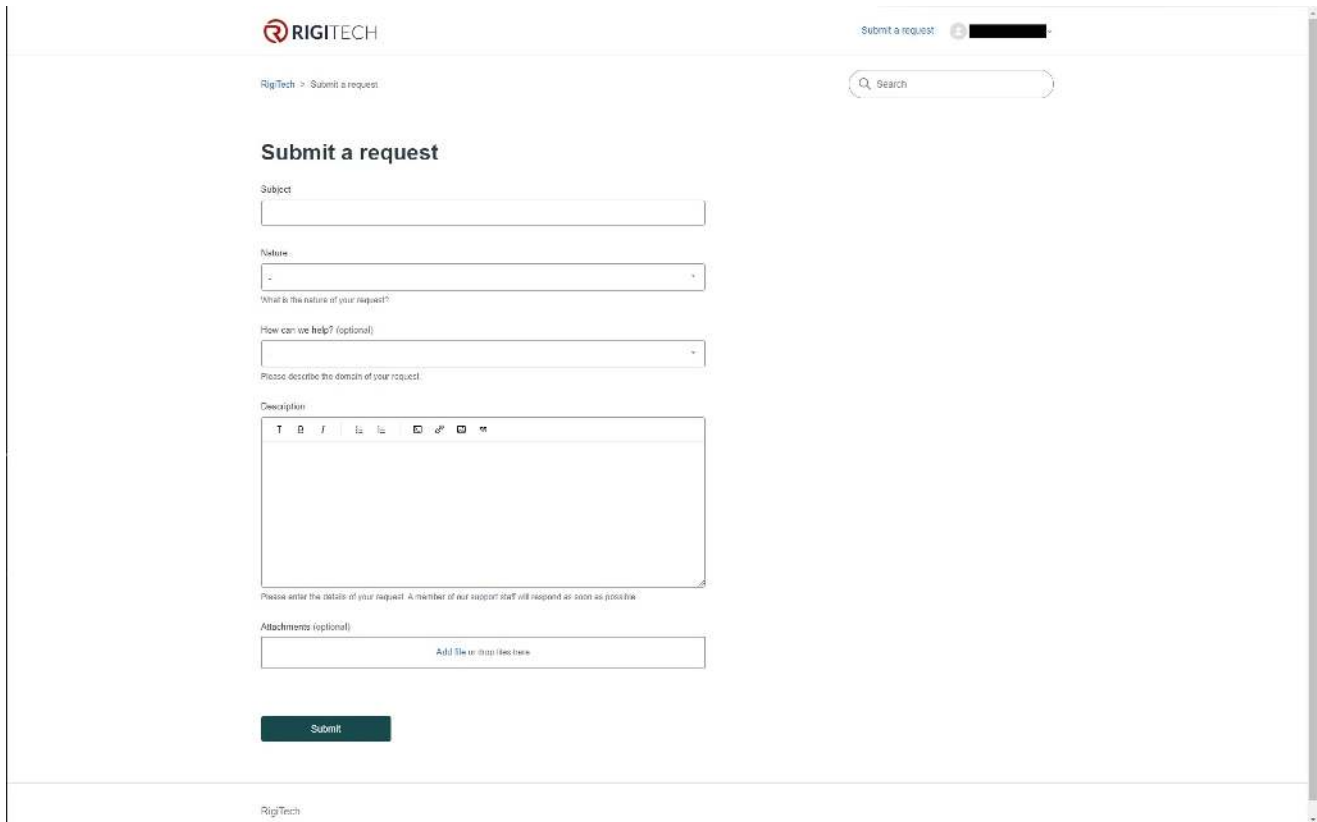
## Support requests

Once the user is logged into the Help Center, the landing page will be different.



1. **Links to the landing page**
2. **Links to articles and technical documentation**
3. **Search bar**
4. **Submit a request**
5. **Profile menu**

In order to submit a request, with a logged in user, click on "Submit a request", and fill the form.



The screenshot shows the 'Submit a request' page in the RigiCloud interface. The page has a header with the RigiTech logo and a 'Submit a request' button. Below the header, there is a breadcrumb trail 'RigiTech > Submit a request' and a search bar. The main content area is titled 'Submit a request' and contains the following fields:

- Subject:** A text input field.
- Nature:** A dropdown menu with a '-' icon.
- What is the nature of your request?:** A text input field.
- How can we help? (optional):** A dropdown menu with a '-' icon.
- Please describe the domain of your request:** A text input field.
- Description:** A rich text editor with a toolbar containing icons for bold, italic, underline, link, unlink, image, video, and code.
- Please enter the details of your request. A member of our support staff will respond as soon as possible:** A text input field.
- Attachments (optional):** A text input field with a placeholder 'Add files or drop files here'.
- Submit:** A green button.

The footer of the page displays the RigiTech logo.

The user's requests are available by clicking on "My Requests" in the RigiCloud Documentation module, or in "Requests" within the profile menu. Users have access to the conversations within the user's requests, those in which the user has been put in copy and those of the user's organisation.



Submit a request 

### My requests

My requests

Requests I'm CC'd on

Status  
All

| Subject                         | Id  | Created       | Last activity | Status |
|---------------------------------|-----|---------------|---------------|--------|
| <a href="#">Test attachment</a> | #42 | 8 months ago  | 8 months ago  | Solved |
| <a href="#">Test</a>            | #30 | 10 months ago | 10 months ago | Solved |

# Edge Node

## Edge Node

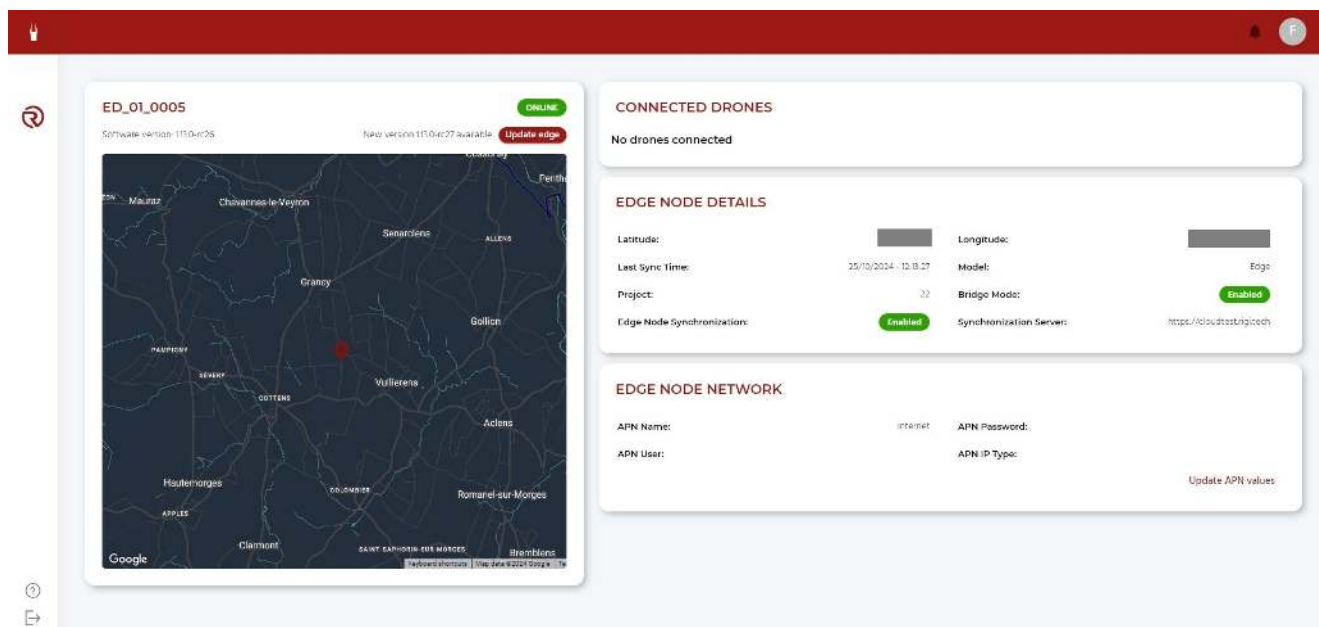
When being connected to an Edge Node local WiFi, the local version of RigiCloud of the Edge Node may be accessed from the browser through the address 192.168.100.1.

## Edge Node interface

The Edge Node presents a simplified interface with the following modules:

- Edge Node dashboard
- Airbridge planner
- Control tower
- Compliance center
- Help center

## Edge Node Dashboard



The Edge Node Dashboard presents the following information:

- Serial number of the Edge Node
- Software version of the Edge Node

- Connected drones: drones connected to the Edge Node.
  - APN of connected drones may be updated, as described in [Fleet Management](#).
- Edge Node details:
  - Coordinates
  - Last synchronisation time
  - Model
  - Project
  - Bridge Mode (bridge between the Edge Node and RigiCloud servers)
  - Edge Node synchronisation status (enabled/disabled)
- Edge Node Network

## Edge Node Software Update

When a software update is available, the option to update it will be displayed, as well as the new version available. To run the update, "Update edge" should be clicked.

*Note: Edge Nodes updates from version v1.13.X or earlier need to be done by RigiTech.*

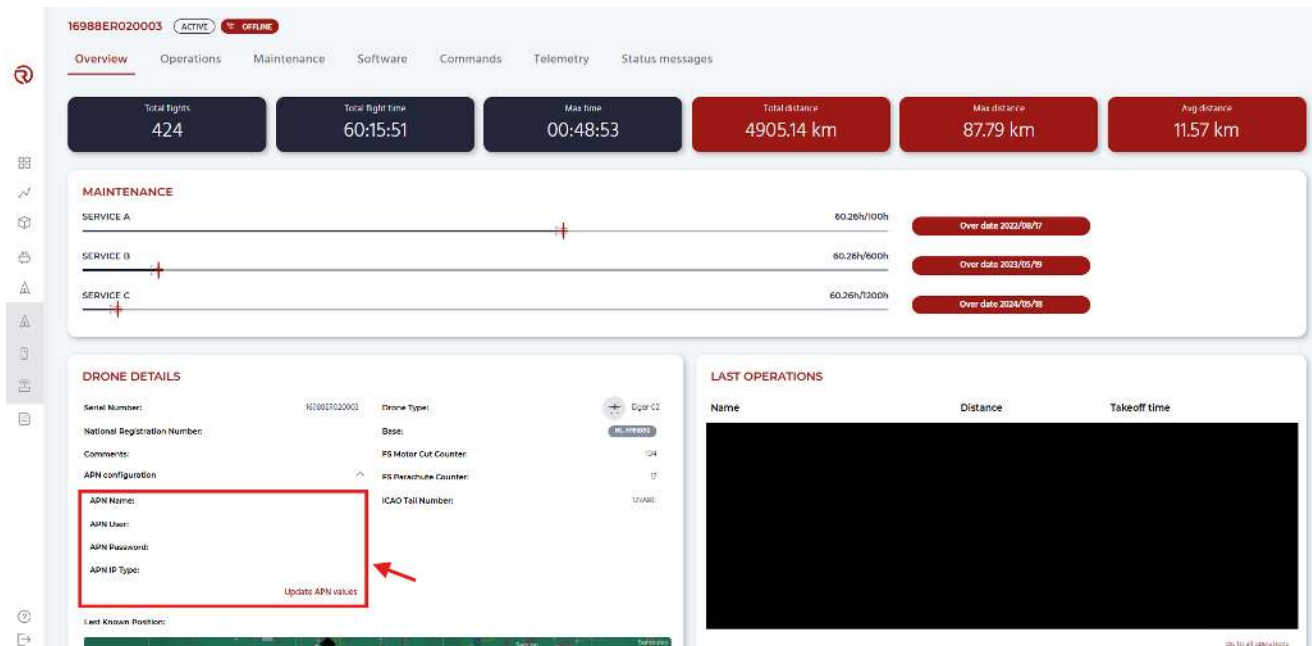
## Edge Node Network

Under "EDGE NODE NETWORK", users may change the Edge Node APN. The process is equivalent to the one described in [Fleet Management](#).

In order to configure the Edge Node's APN, the user should enter the details of their SIM card provider into the "APN configuration" section.

After expanding it, users should edit all parameters to match the SIM card provider information:

- APN Name
- APN User (may be left empty)
- APN Password (may be left empty)
- APN IP Type:
  - If IPv4 or IPv6 are used, users should put respectively 4 or 6 in the APN IP Type box.



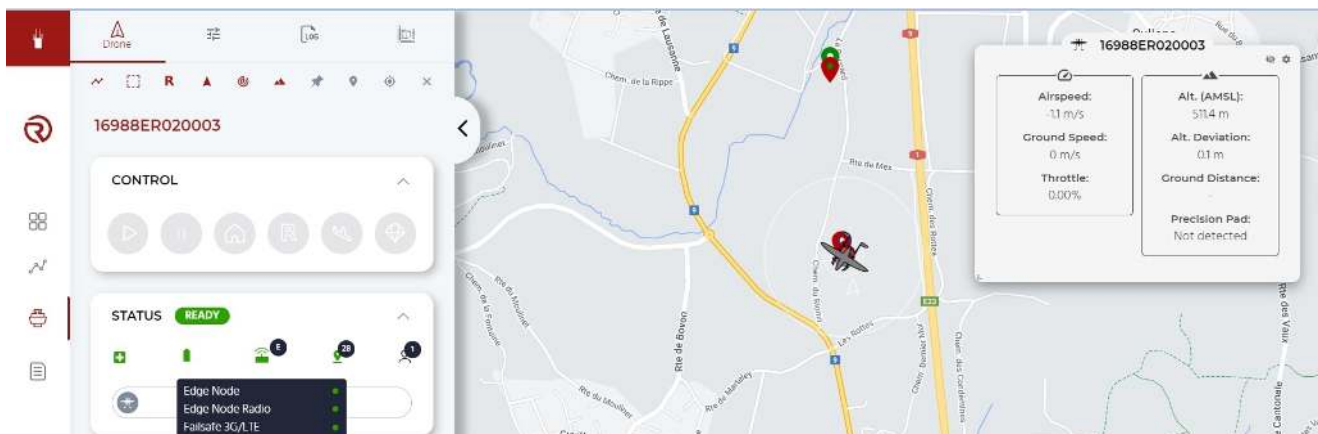
Once complete, users should click on "Update APN values".

#### Disclaimer:

- SIM cards should be unlocked (i.e. have no PIN code).

## Control tower

The Control tower interface is slightly different from RigiCloud's. In particular, the C2 Link status is slightly different.



Available links are:

- **Edge Node:** C2 link corresponding to the connection between the drone and the Edge Node through 3G/LTE.
- **Edge Node Radio:** C2 link corresponding to the short-range 2.4 GHz radio (Edge Node).

- **Failsafe 3G/LTE:** C2 link corresponding to the FS 3G/LTE modem and SIM card.

Other links described in **Messages, status and operation boxes** are not available in the Edge Node interface.

Otherwise, the behaviour of the C2 Link status information is equivalent to the interface from RigiCloud.

# FAQ and errors

## General RigiCloud errors

For any issue related to unknown errors or blank pages, users should try:

1. Refresh page
2. Log out and Log in
3. Check if the same issue happens in private browser mode
4. Refresh cache (Ctrl + Shift + R or Ctrl + F5 in Windows)

If the issue is not solved, users should contact RigiTech Support.

## Airbridge Planner

### Error fetching data

"Error fetching data" messages displayed are typically related to terrain altitudes not properly calculated. In these cases, users should try:

1. Hide the altitude graph
2. Check if waypoints, geocages and/or rally points do not have terrain altitudes and, if that is the case, move slightly the point/vertice or remove it.

If this is not enough, users should follow [General RigiCloud errors](#).

## Control Tower

### GNSS checks not passed before takeoff

When UA cannot takeoff because position checks are not passed, users should:

1. Confirm that the horizontal position of the UA is correct and within the limits
2. Confirm that the vertical position of the UA is correct and within the limits
3. Move if needed

Vertical position checks may be more sensitive than horizontal ones. In that case, as a general recommendation, when flying a route for the first time, users should:

1. Measure the position and altitude of the UA at the desired takeoff and landing positions by keeping it on for at least 15 minutes, without nearby sources of interferences.
2. Update the position and altitude based on the average observed in the flight plan.

3. Validate the flight plan through simulations.
4. Execute an operation (by following the standard operating procedures).

In areas where the vertical positioning on ground is not optimal, this might not be enough. In those cases, users may request RigiTech Support to increase their vertical margins.

## Synchronise parameters

If the parameters of a UA are outdated (a warning is displayed in the Control Tower), users should click on "Synchronize Parameters" (within Tools).

# Simulator

## Flight plans below takeoff terrain

The simulator assumes that the terrain is at the same level as the takeoff point.

This means that when simulating flight plans where the flight altitude becomes lower than the takeoff point, as soon as the altitude drops to this level, the simulator considers it a terrain collision and stops progressing.

We are aware of this limitation and are working on a solution. In the meantime, there are two alternatives:

- For flight plans where the takeoff point is significantly higher than the landing point, simulate the reverse route and, after executing the back transition (when the simulator is about to land), perform an RTO. In long operations, this may result in emergency landings due to low battery.
- Divide the flight plan (for simulation purposes only) into equivalent segments.