Drone Harmony for DJI Dock //

User Manual

Drone Harmony for DJI dock - how to get started!

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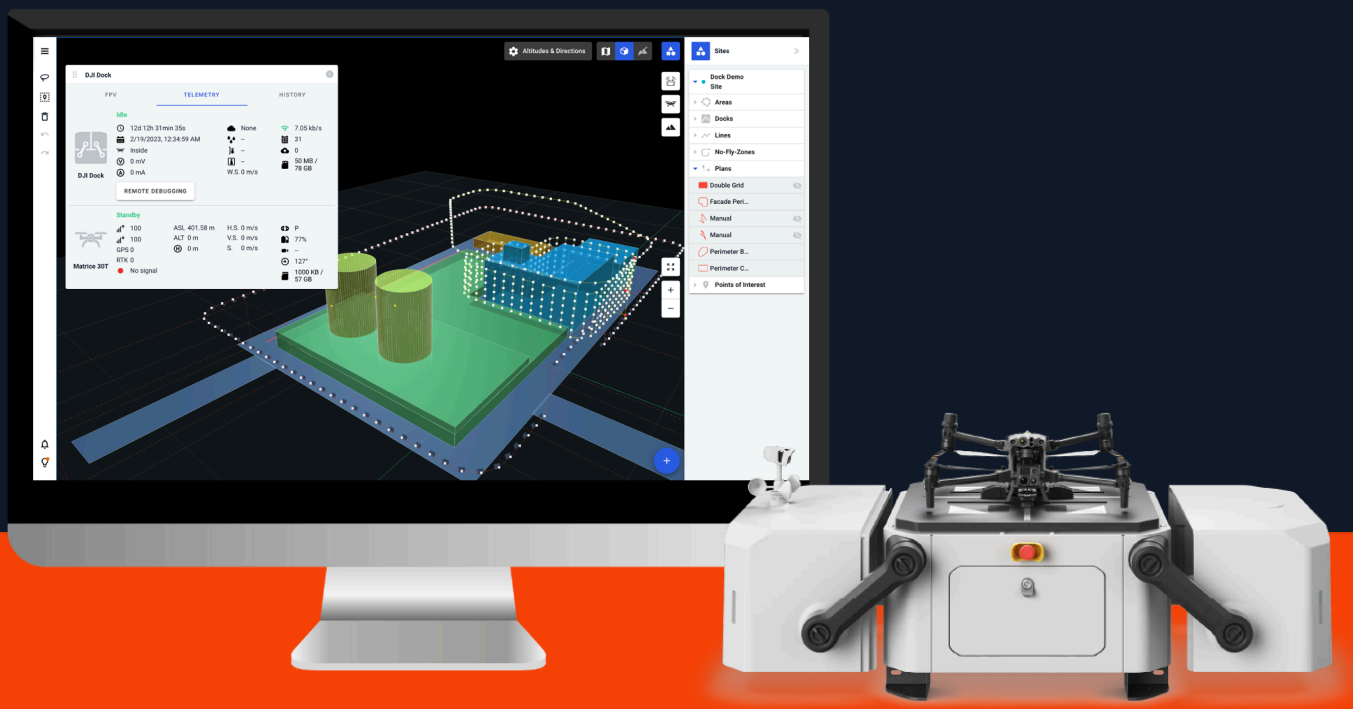


dh drone harmony
3d flight management platform

Table of contents

www.droneharmony.com
contact@droneharmony.com
support@droneharmony.com
+41 43 333 84 41

Drone Harmony AG
Sonnentalstrasse 8
Postfach 232
CH-8600 Dübendorf

1. Introduction

Welcome to Drone Harmony for DJI Dock, your comprehensive software-as-a-service (SaaS) solution for seamless drone-in-a-box systems control via a web-based interface. This cloud-powered service provides robust control and management of your DJI Dock systems. We cover everything from creating an account and configuring your setup to real-time telemetry and flight automation.

This manual will guide you step-by-step through the setup process and the various features, ensuring you make the most out of your drone systems.

2. Setting up the Drone Harmony account

2.1 Creating users & activating license

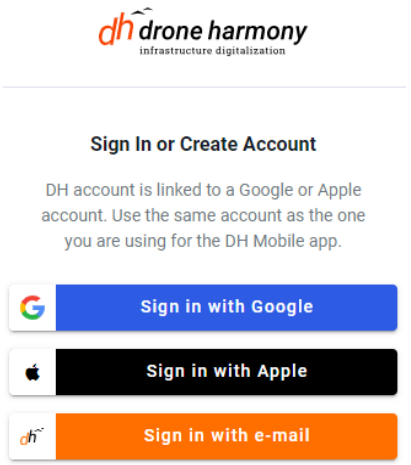
2.1.1 Creating the administrator account

The administrator account has specific unique responsibilities and privileges:

1. Configure your DJI dock(s) and link them with the Drone Harmony server
2. Add & remove additional users to your Drone Harmony Dock team
3. Assign roles & access rights to your users, and in particular, assign operator or observer roles

Let's start by creating your administrator account on Drone Harmony for DJI Dock.

1. Go to our DJI dock website dock.droneharmony.com or your private dock website URL if your company has a private Drone Harmony server installation.
2. If you are not signed in yet, you will be presented with our Sign In & Account creation page:

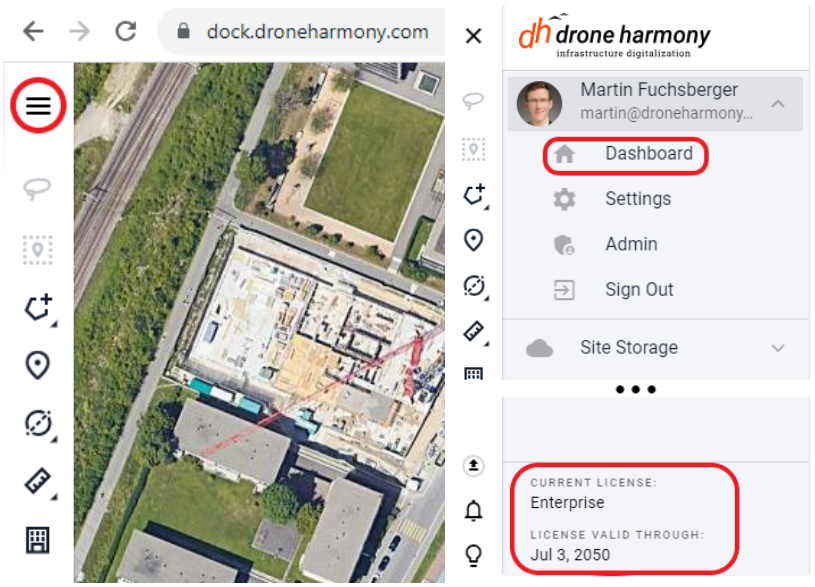


You may use your Google or Apple account to create an account or use your custom e-mail account to sign in. For the custom e-mail account, we will send you an e-mail to verify your account.

3. After you've signed in, your administrator account is ready for license activation (next step below).

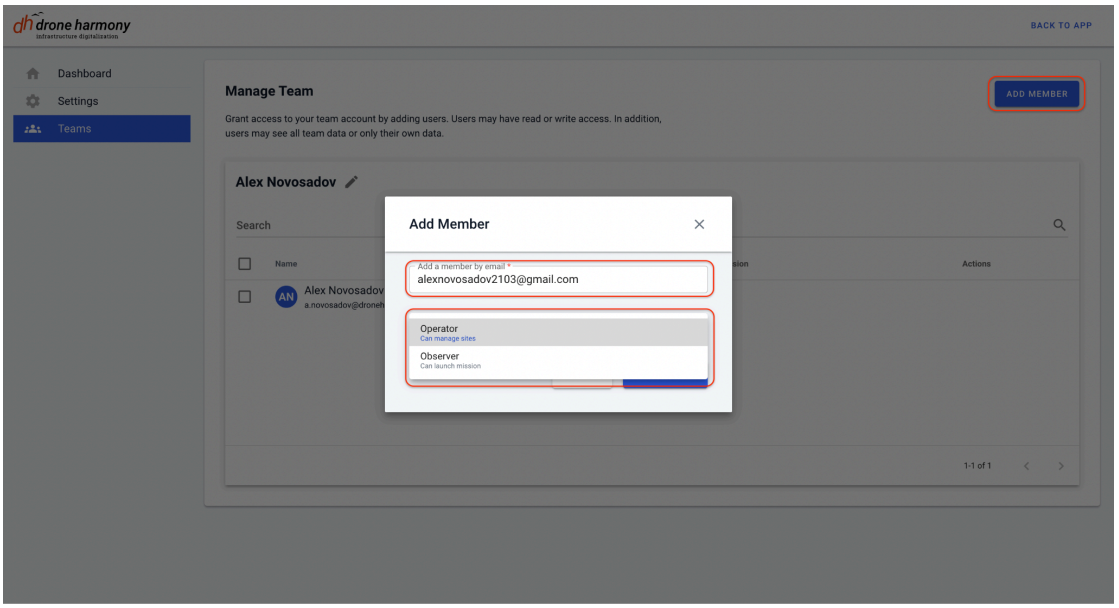
2.1.2 Activating the Drone Harmony License

After creating your account, contact your Drone Harmony customer success manager and provide him with the administrator e-mail account to activate your DJI Dock enterprise license. You can afterward verify your license in the main menu and your dashboard:



2.1.3 Adding additional users

To add a member to your team you should proceed to the 'Teams' tab in the left side menu and click on the `Add Member' button. As an administrator, you can define user roles at that 'adding member stage' already and then edit this after adding members in the Teams tab.



2.1.4 User Roles and Rights

In our system, user roles determine the range of actions and access rights available to each user. These roles are designed to streamline operations and enhance security by ensuring that users have only the permissions needed to perform their tasks. The matrix table below provides a detailed overview of the rights associated with each role—Administrator, Operator, and Observer. An "x" indicates that the role has the respective right, while a "-" indicates the absence of that right. Please review the table to understand the scope and limitations of each user role.

Roles & Rights	Administrator	Operator	Observer
Setup Dock Site: Link RC with DH Server	✅	✅	❌
Setup Dock Site: 3D Point Cloud	✅	❌	❌
Setup Dock Site: 2D Orthomosaic	✅	✅	❌
Setup Dock Site: Terrain (DEM GeoTiff)	✅	✅	❌
Setup Dock Site: 3D Geo-Fences	✅	❌	❌
Setup Dock Site: 3D No-Fly Zones	✅	❌	❌
Setup Dock Site: Configure UTM Airspace Data	✅	❌	❌

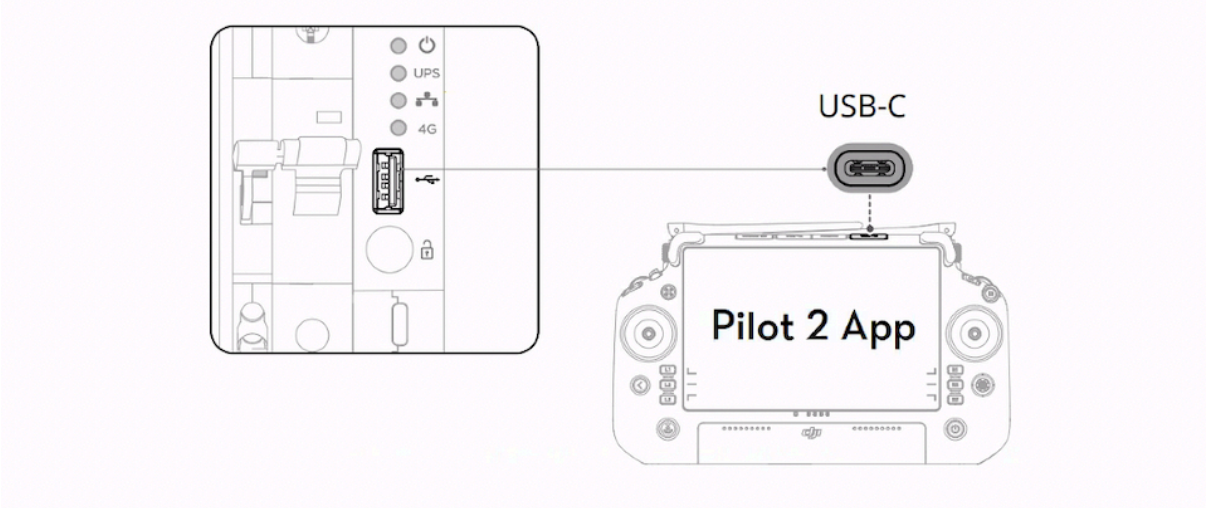
Manage Drone Harmony Users	✅	❌	❌
Edit Planning Site(s)	✅	✅	❌
Plan flights	✅	✅	❌
Schedule flights	✅	✅	❌
Start flights	✅	✅	❌
Trigger return to home	✅	✅	✅
View flight schedules	✅	✅	✅
Live Stream Access	✅	✅	✅
Live Telemetry Access	✅	✅	✅
Recorded Data Access: View images & videos	✅	✅	✅

2.2 Connecting the hardware

2.2.1 Linking the DJI remote controller with the DJI dock

The dock and remote controller linking stage requires the DJI Pilot 2 app and also connecting the DJI remote controller and DJI Dock via cable on-site, here are the steps to follow:

1. Connect the remote controller to the dock via cable.

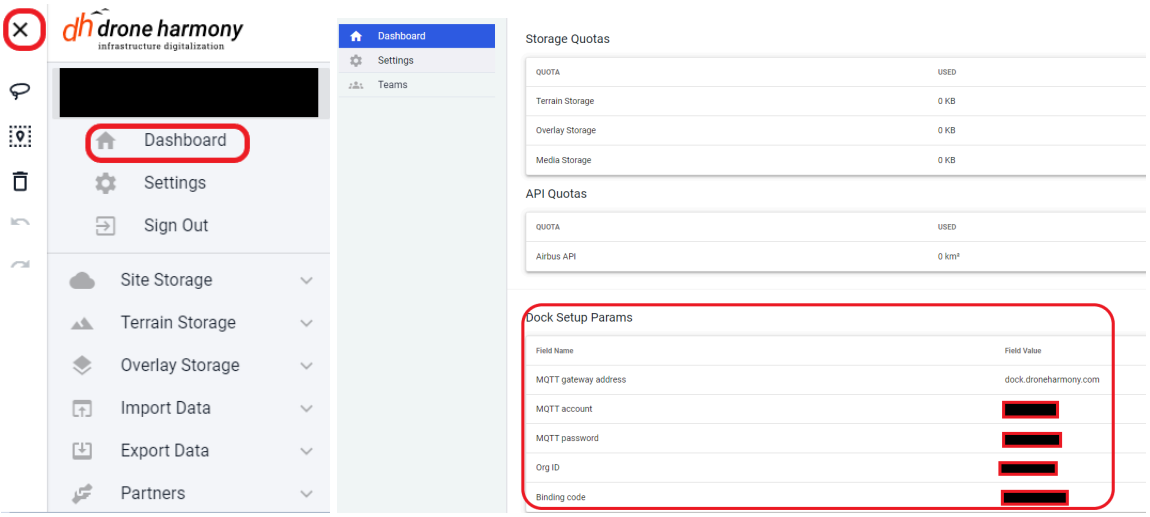


2. Run the DJI Pilot 2 app on your controller and tap open the dock cover. The dock will appear as a device in the same window that is used to represent aircraft.

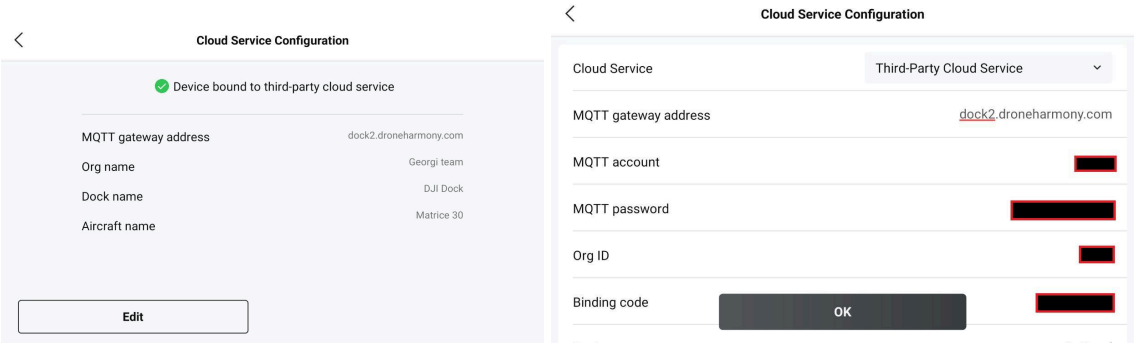
2.2.2 Connecting the Drone Harmony Cloud Service

Your administrator has to set up your DJI dock(s) with the Drone Harmony Cloud Service on the DJI remote controller.

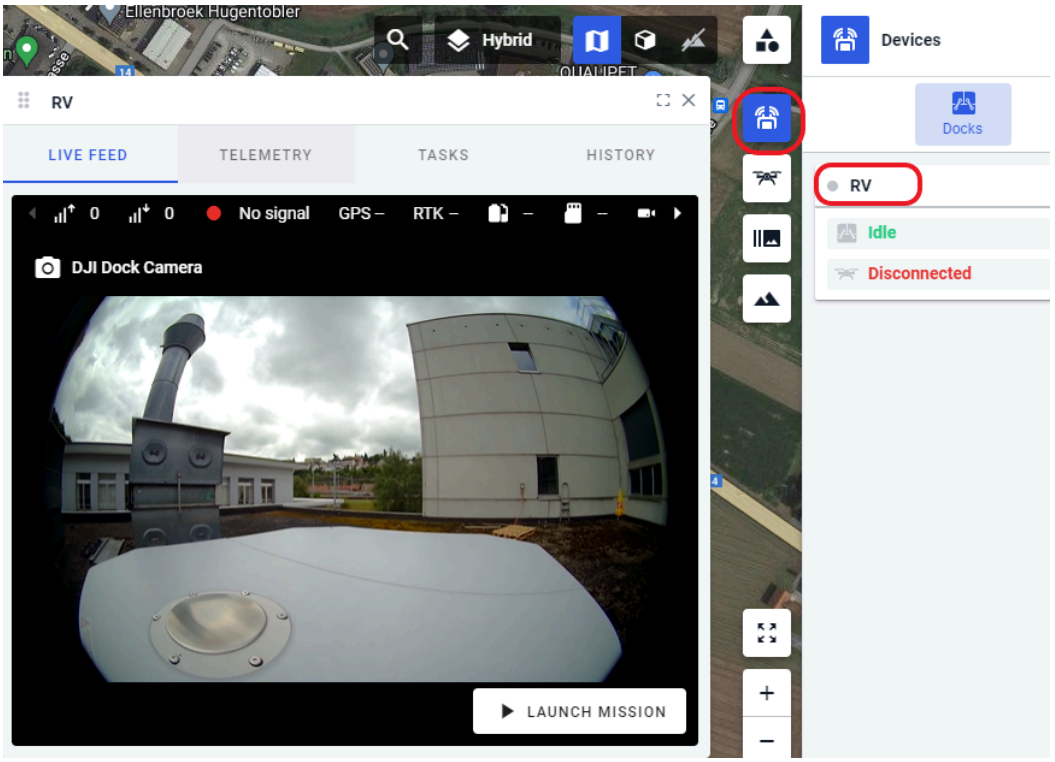
Once you receive your Drone Harmony Dock license, you will find the configuration parameters in the web dashboard of your administrator account:



To set up the DJI dock's communication with the Drone Harmony Cloud Service, these presented parameters need to be copied into the DJI Cloud Service Configuration of the DJI Pilot 2 application, which runs on the DJI dock remote controller:



Next, you may verify the successful setup of the cloud service by checking the live feed(s) and telemetry of your dock(s) and drones in the Drone Harmony dock application:

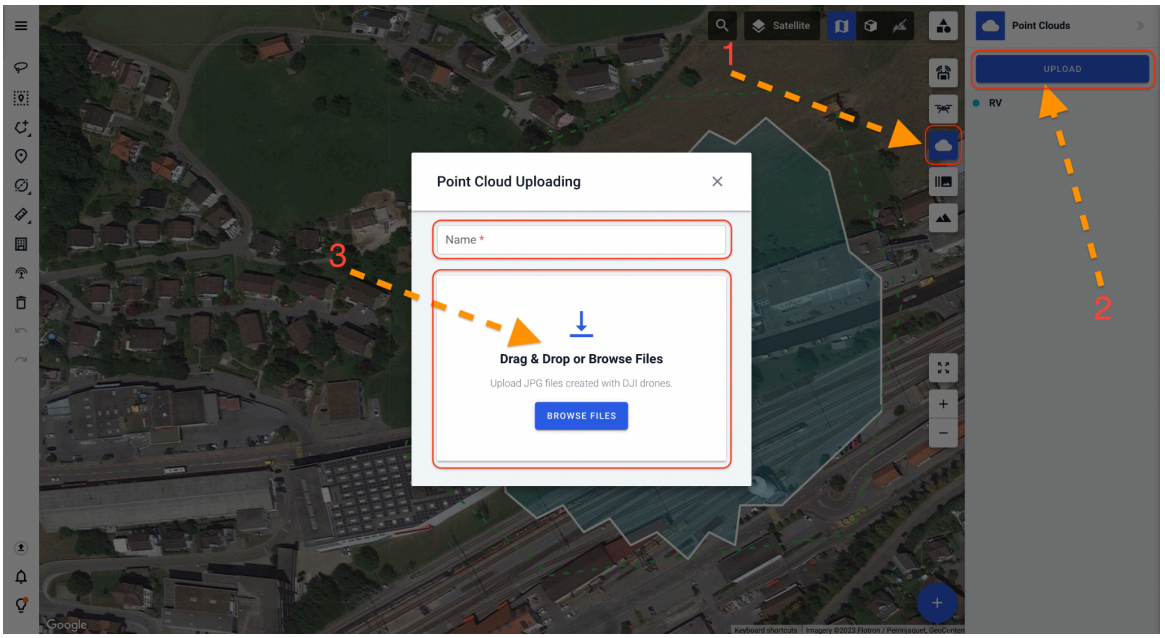


3. Setting up the planning site(s)

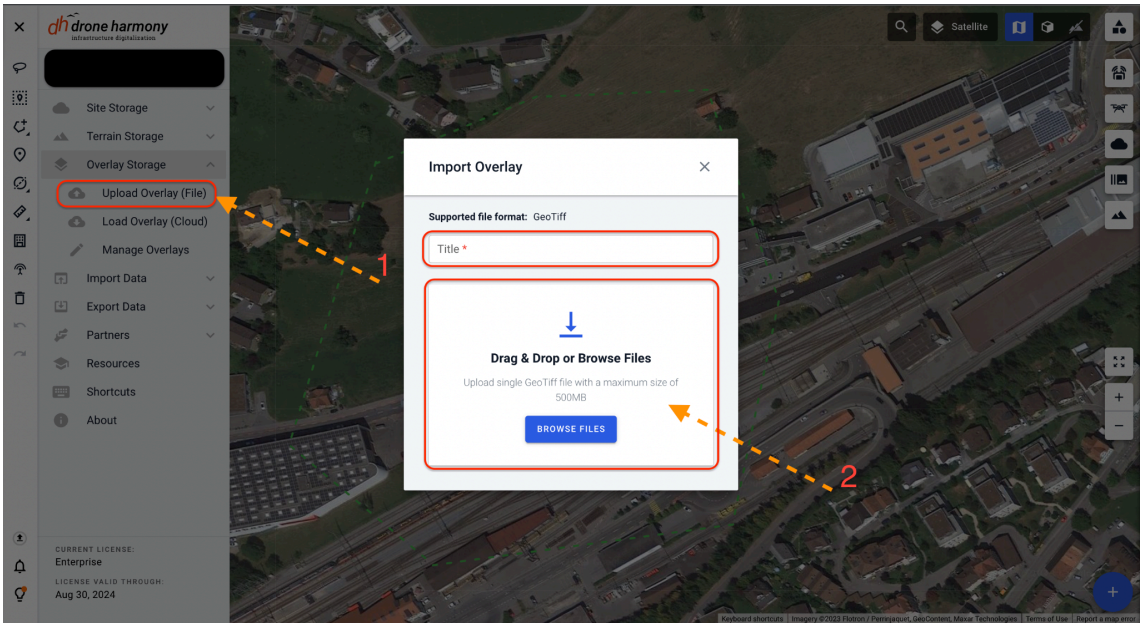
3.1 Setup tasks for the administrator

To truly tap into the power of FULL-3D flight planning and maximize your flights' safety, precision, and efficiency, it's crucial to set up each dock site properly. Here's some data you can provide through the Drone Harmony Web frontend:

1. **Geo-Referenced 3D Point Cloud:** Upload a *.las or *.laz file (LASer file format). These files provide detailed 3D representations of the site.



2. **Geo-Referenced 2D Ortho-Mosaic:** Provide a *.tiff file (GeoTiff file format). This gives a high-resolution, distortion-free 2D map of your site.



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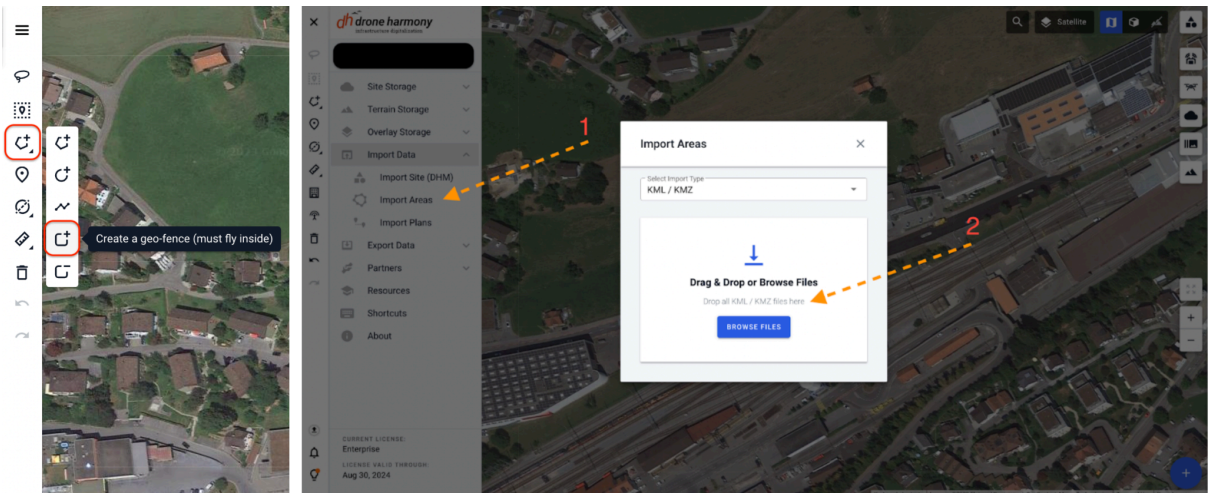
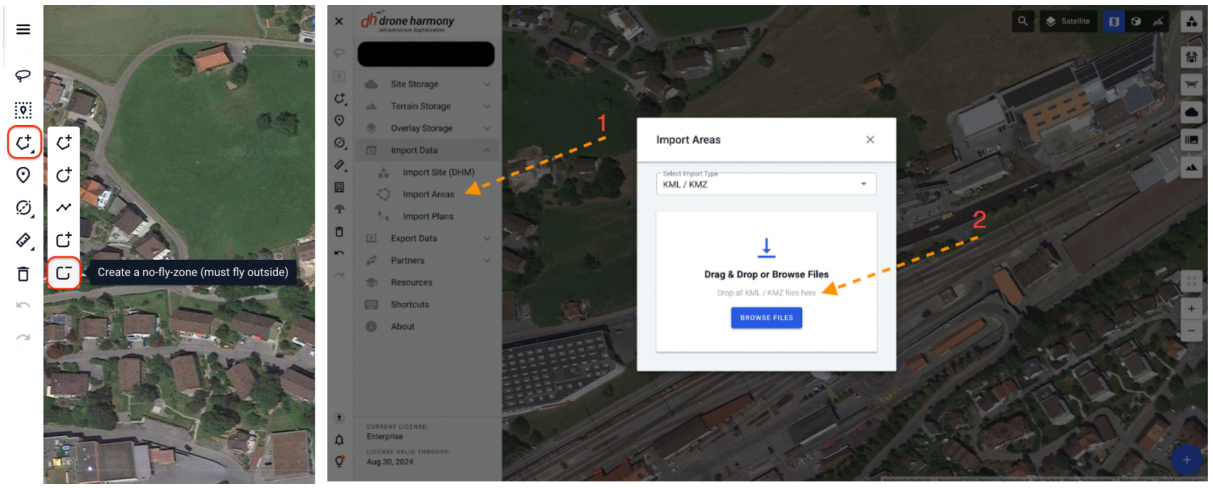
3. **Geo-Referenced 3D Geo-Fences:** You can upload *.kml files or draw directly in the app. These define the boundaries within which your drone can fly.



4. **Geo-Referenced 3D No-Fly Zones:** These can be provided via *.kml files or by drawing within the app. No-fly zones are areas where the drone should not enter for safety or privacy reasons.



Drone Harmony leverages all this data for optimal, obstacle-free flight planning and provides a Full 3D realistic preview visualization of your flights.

By spending some time on setup, you can ensure a smoother, safer, and more efficient flight every time.

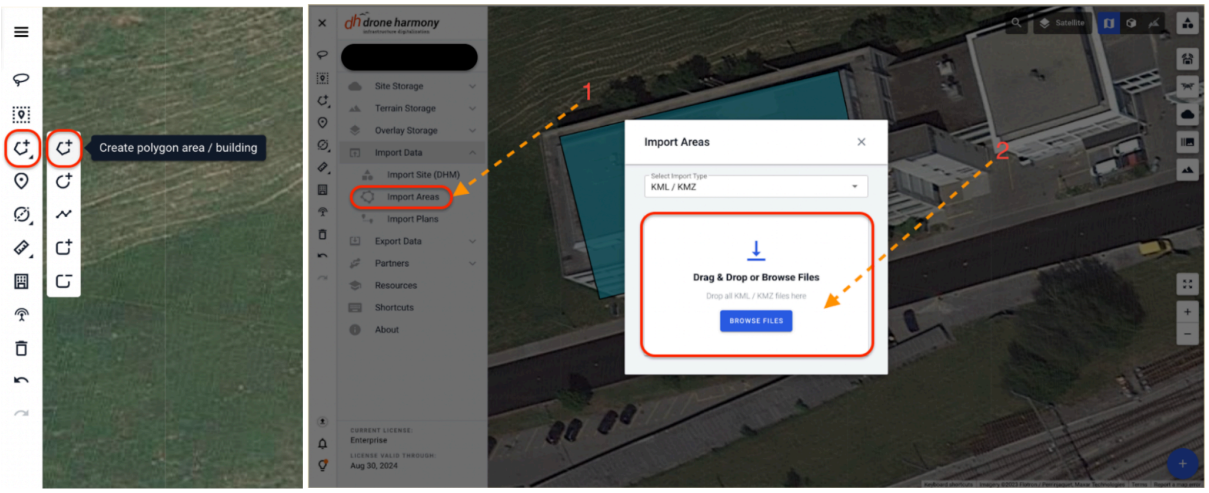
Do you need more clarification on how to gather such data? Don't worry - Drone Harmony support or your DJI dock provider is ready to lend you a hand.

Contact us anytime you need assistance, and we'll gladly guide you.

3.2 Adding additional objects to planning site(s)

3.2.1 2D polygons (i.e. areas)

To create a 2D polygon for flight planning you should choose the `Create polygon/building` option from the area creation tools in the left-side toolbar.
Also, Drone Harmony will allow you to import the KML/KMZ file that contains the area.



3.2.2 2D lines

2D lines were designed to mark any linear infrastructure like pipes, roads, etc. for flight planning and inspection purposes.

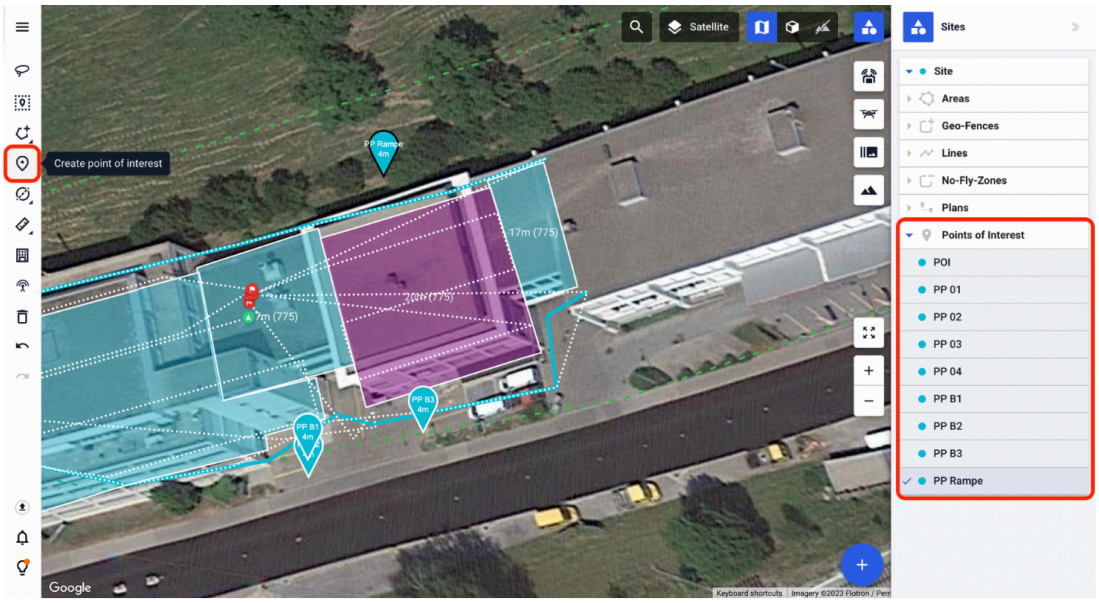
To create it you should proceed to area creation tools in the left-side toolbar and choose option ‘Create line’.

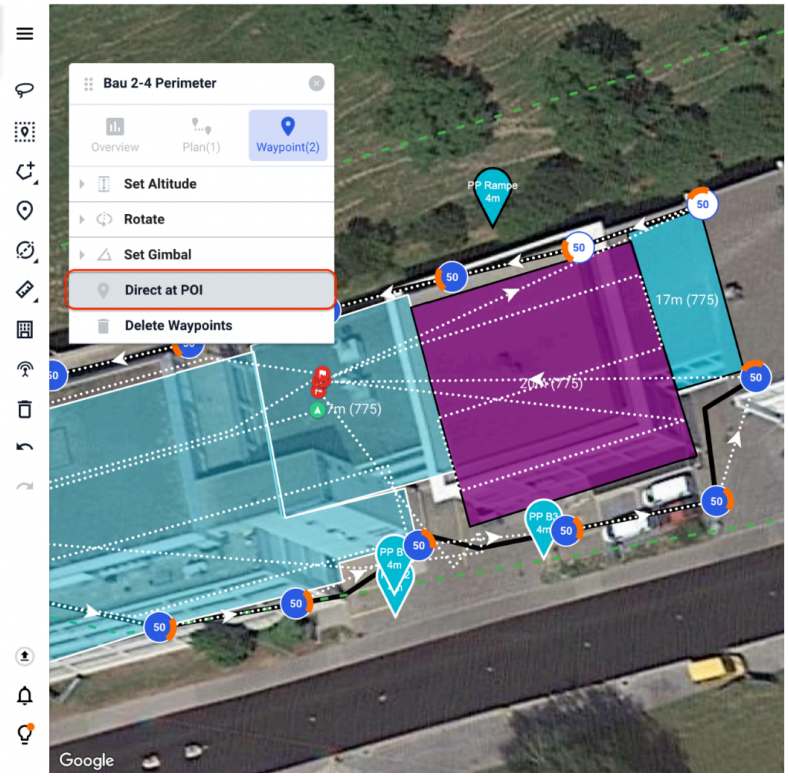
3.2.3 Points of Interest (POIs)

Points of interest (POIs) are points in space designed to mark landmarks in the scene. POIs can be created using the POI tool in both map and 3D views. Selecting POIs in 3D view is possible by clicking on a point on the point cloud.

The main function associated with POIs is the direction of the drone cameras at the POI at any chosen waypoint. To direct the drone camera at the chosen POI:

1. choose the waypoint(s), e.g., by using the lasso tool in Map or 3D views.
2. Navigate to the Waypoints Edit menu and choose “Direct at POI”
3. Choose the POI in the drop-down list

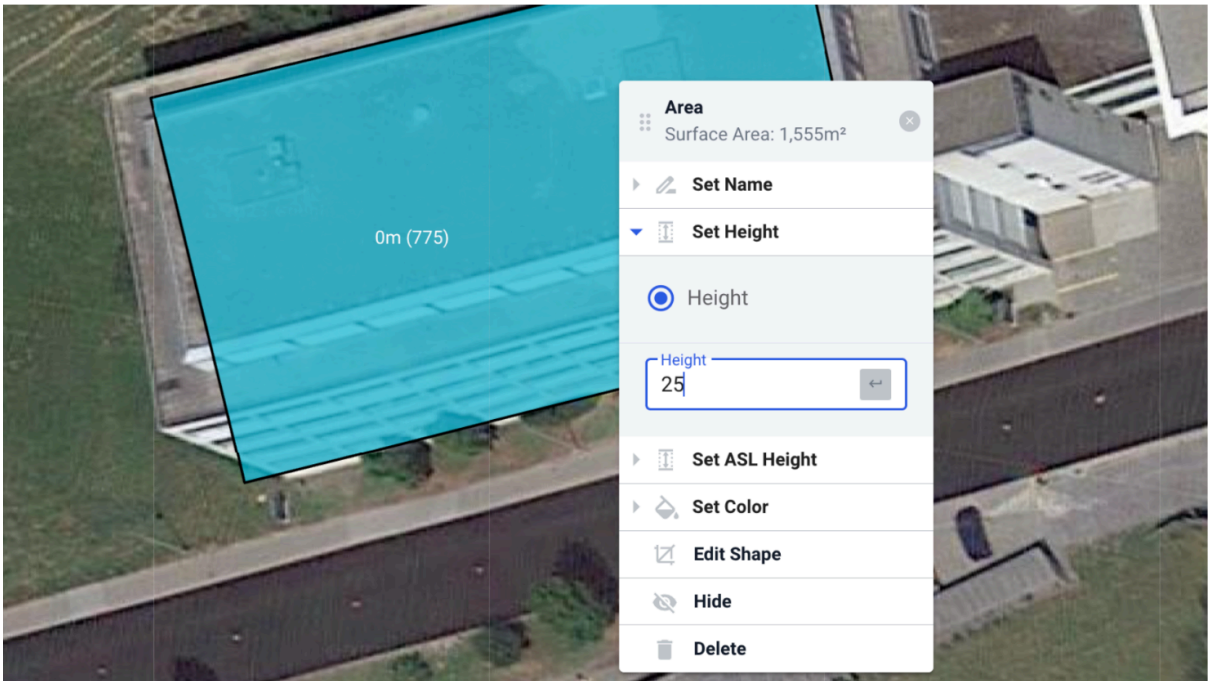




3.2.4 3D Polygons (i.e. buildings)

The creation of complex 3D structures in Drone Harmony could be achieved by providing your 2D polygon (area) with a height by right-clicking on the polygon or by

using the building import feature. It will allow you to import georeferenced 3D models of buildings in places where the data is available.



3.2.6 Terrain data

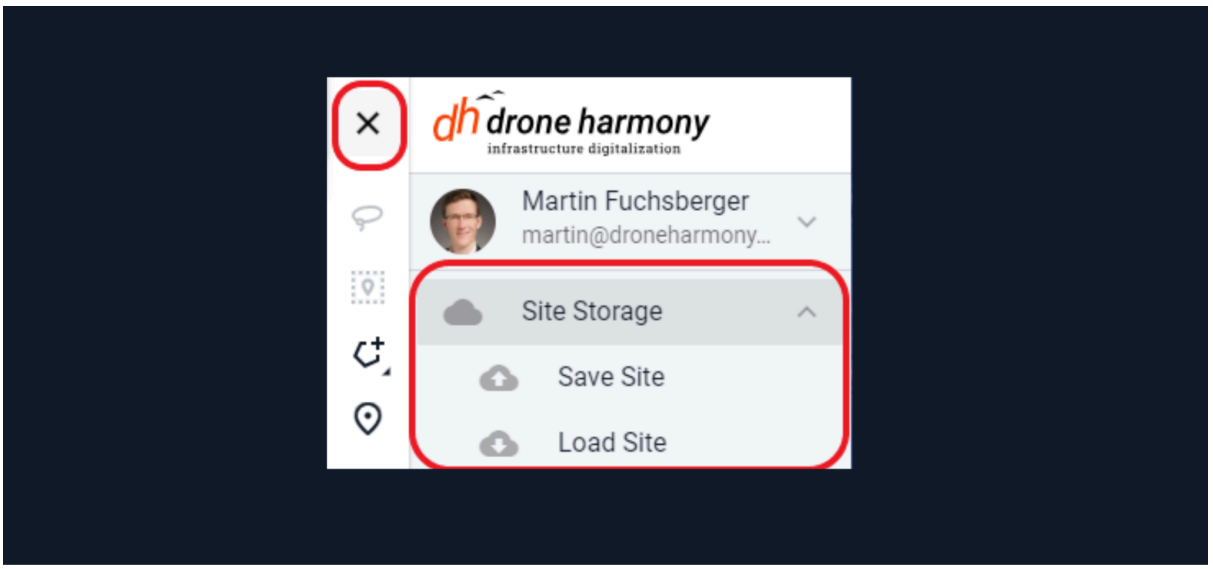
Drone Harmony provides you with the ability to plan terrain-aware flights with automated terrain mission plans based on the DEM/DTM in GeoTIFF format. You can use

terrain data that is already present in Drone Harmony, for 6 countries as of now, or it could be your terrain data which you will be able to import in GeoTiff format.

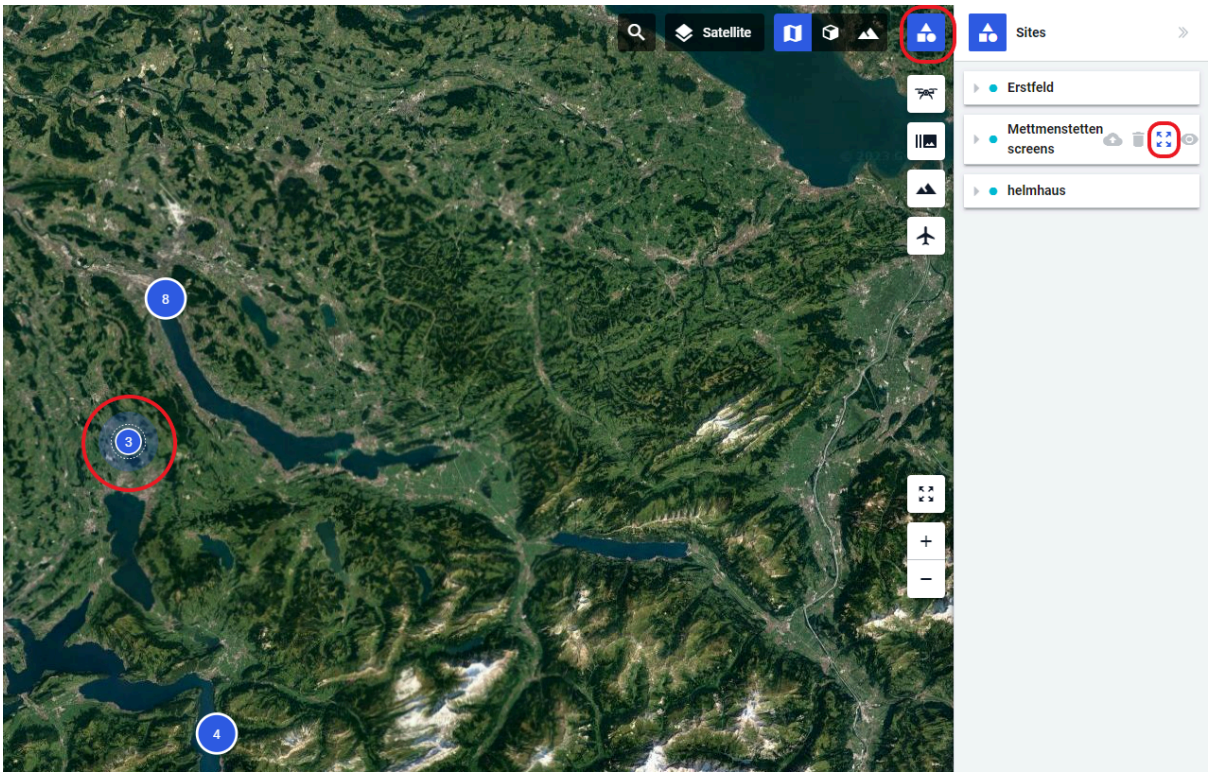
4. Planning flights

4.1 Accessing a Site for Flight Planning

Think of the '**site**' as a workspace for flight planning. It not only helps to distinguish your planning activities geographically but also provides a way to organize them effectively. Every site you create is stored on the Drone Harmony server and is accessible anytime, anywhere via the Menu in the web client:

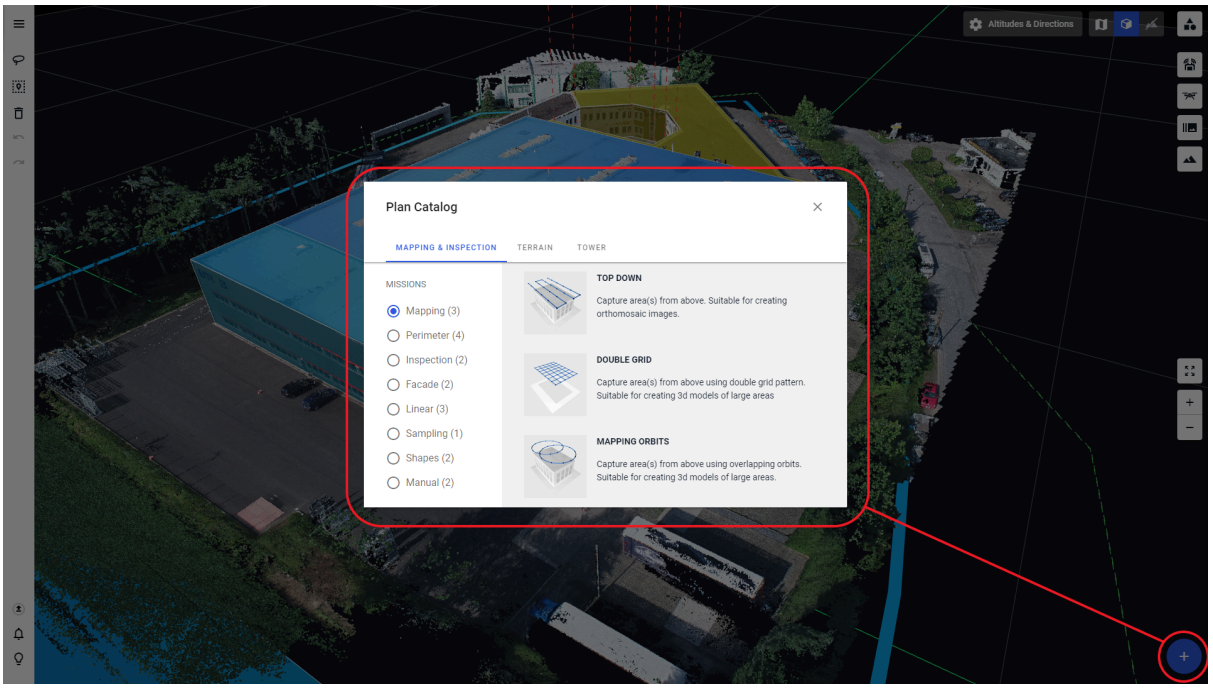


Feel free to load as many sites across the globe as you'd like. However, when creating new flight plans, you'll need to focus on one site at a time. To navigate between the loaded sites, simply double-click on the desired site on the 2D map or use the Sites panel located on the right-hand side of the screen:



4.2 Exploring the Flight Plan Catalog

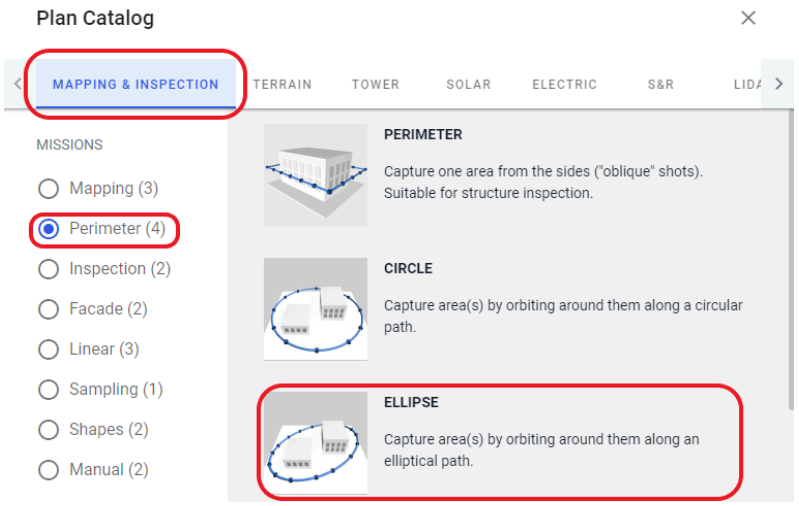
Drone Harmony boasts an impressive catalog of over 40 (and counting) flight plans, each tailored to suit various industries and use cases. To access this extensive collection, click on the blue plus icon at the web application's bottom right. If the plus icon appears gray, you haven't opened a planning site yet.



You can think of the flight plan catalog as a recipe book. Just as a recipe dictates the kind of dish you're making but allows you to adjust the servings or spice level, each flight plan defines the type of flight but allows you to choose which drone to use or what your images' ground sampling distance should be.

4.3 Planning a flight

When you've pinpointed the perfect flight plan for your needs, simply click on it to get your planning underway. Let's dive deeper now and examine as an example the 'Inspection Perimeter' flight plan, which plots out an elliptical path for your drone:



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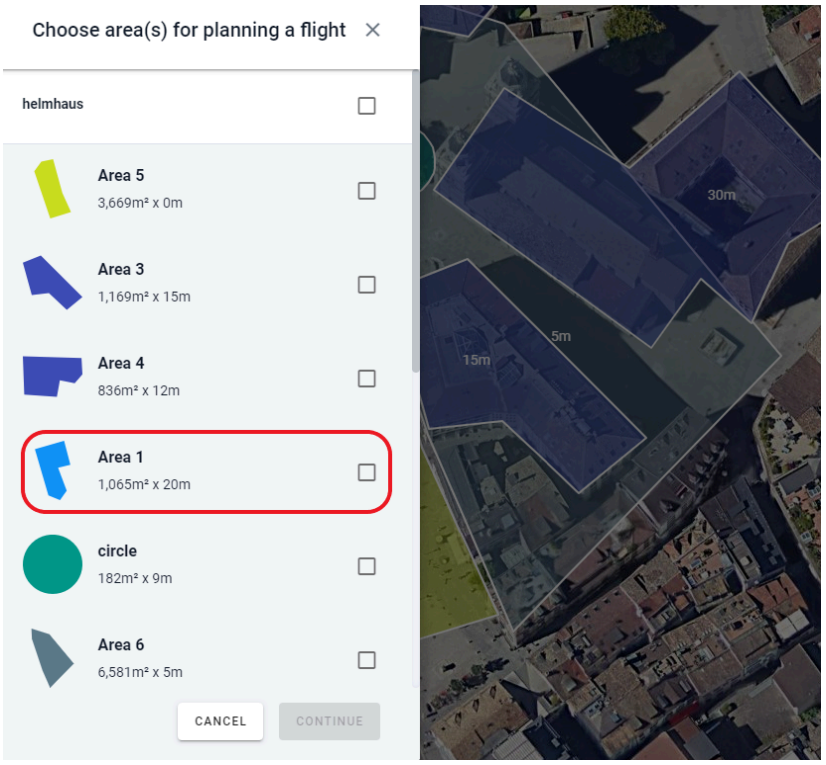
Please Note:

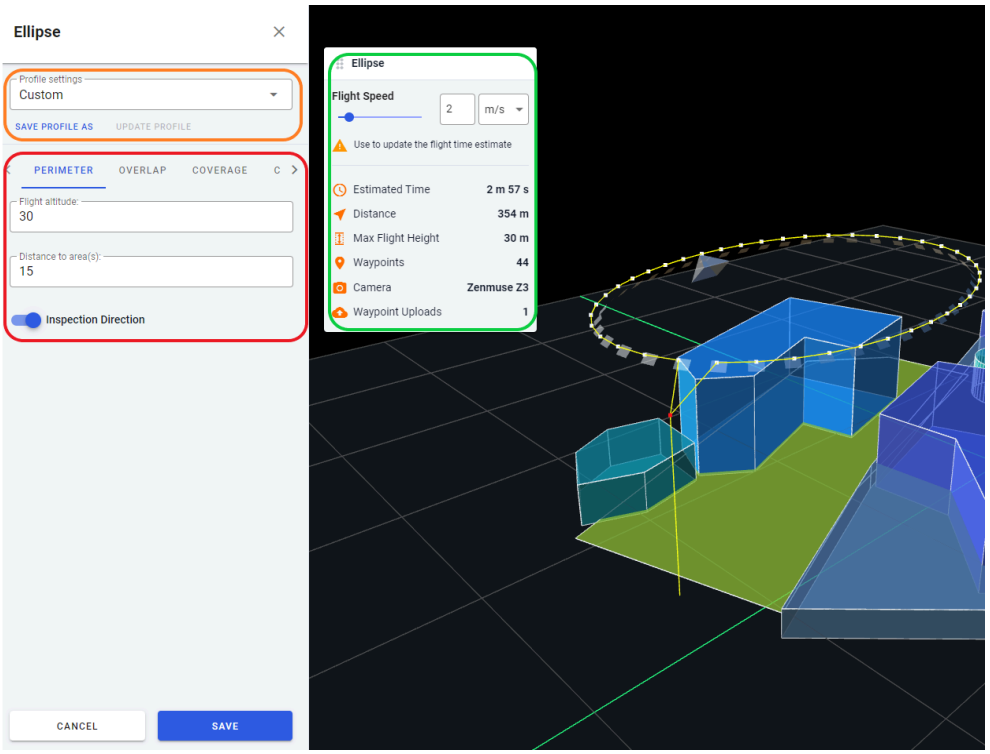
Certain flight plans necessitate having specific scene objects within your planning site before you can start planning. For instance, a Top-Down flight plan calls for the definition of at least one area, marked out as a 2D polygon. If these prerequisites aren't met, the plan catalog will alert you with a conspicuous red notice text, preventing you from proceeding with the planning process.

—> Certain flight plans will prompt you to choose an area or object of interest. In our scenario, we need to define the area that the drone will orbit:



—> After setting the planned liftoff and landing spots on the 2D map, you'll be introduced to the powerful and unique FULL-3D flight planning environment of Drone Harmony. This environment offers a real-time preview of your drone's flight path.

You can tweak the flight plan parameters from the panel on the left side (highlighted in red in the screenshot below). Changes you make here are immediately reflected in the preview window, providing an instant view of your updated flight path.



For added convenience, you can also use flight parameter profiles to save your favorite parameter settings. This feature, marked in orange, allows for easy and efficient recall of your preferred settings in future sessions.

Finally, some flight plan statistics are automatically calculated for your flight (highlighted in green). These will provide you with useful data about your planned flight.

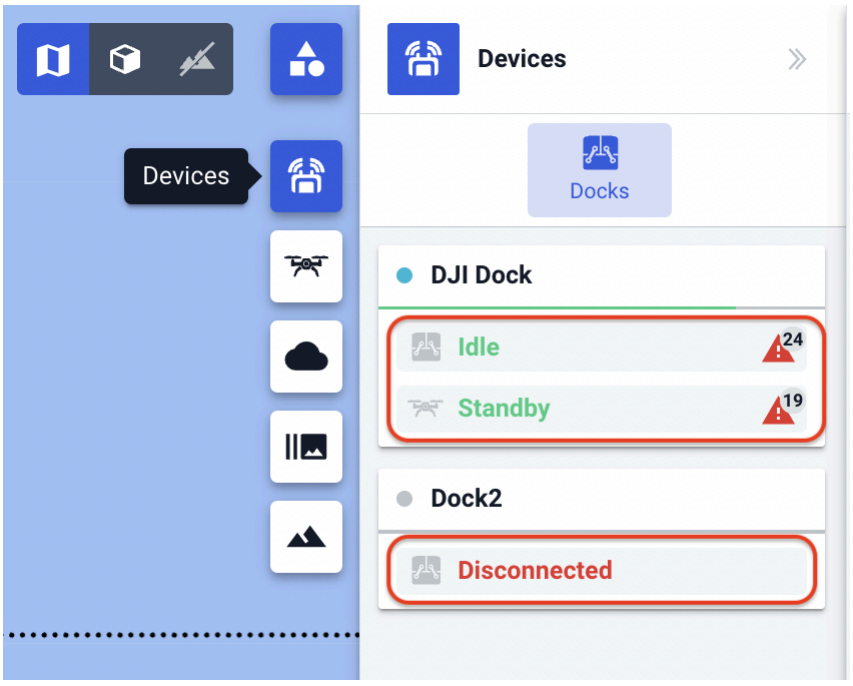
5. Executing flights

5.1 Remotely using the web client

In the devices tab from the right-side menu, you will see the status of your DJI Dock and Aircraft as well.
Here are all the statuses that you could familiarize yourself with.

Dock status

- Disconnected - The Dock is disconnected and not ready to operate
- Idle - The Dock is connected and ready to operate
- Debugging - RC is connected via cable to the Dock for debugging
- Remote Debugging - you can access remote debugging from the dashboard of the web interface
- Upgrading - The Dock is updating the firmware
- Working - Dock is completing a task



Aircraft status

- Standby - ready to take mission commands
- Preparing - checking the mission and other data for flight execution
- Ready - ready for flight execution
- Manual - it represents manual control flight mode
- Waypoint - the aircraft is executing the mission in a Waypoint mode
- ReturnToHome - the Aircraft is flying to the RTH location automatically
- Landing - the aircraft is landing
- ForcedLanding - the aircraft is low in battery, and the drone is forced to land
- Three Propellers Emergency Landing - emergency landing is ongoing with three blades working
- Upgrading - updating the aircraft`s firmware
- Disconnected - the aircraft is disconnected and not ready to operate.

5.2 Launching Automatic Missions

1. Prepare the Dock and Aircraft:

•Ensure the dock and aircraft are connected and in good working condition.

•Status Check: Verify that the dock status is "Idle" and the aircraft status is "Standby."

2. Select a Mission:

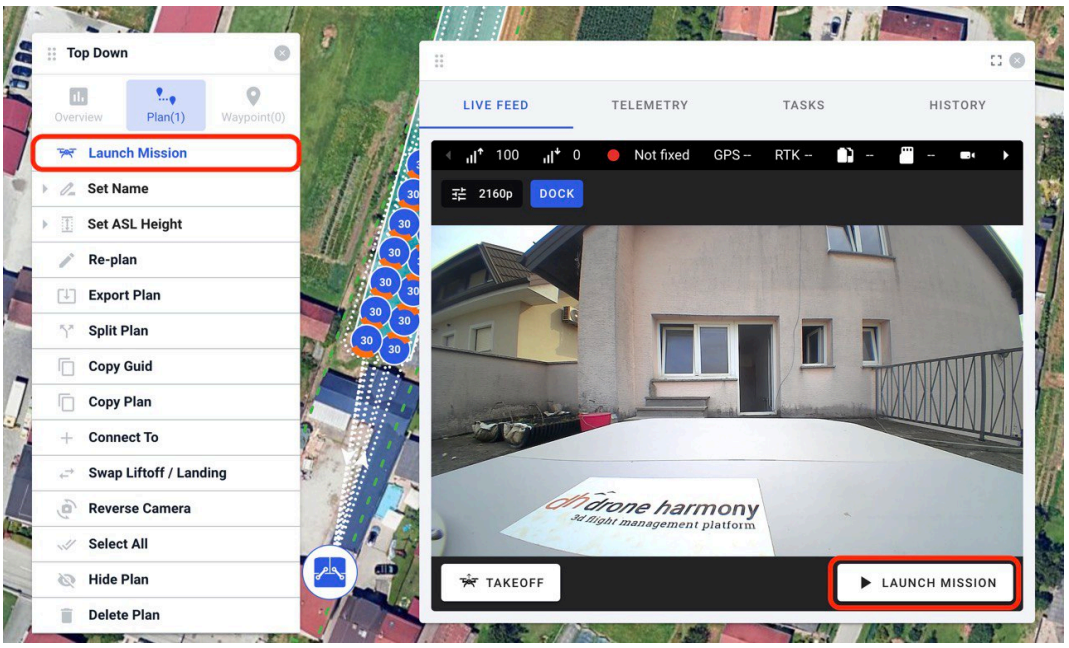
•Choose the pre-planned mission from the mission catalog.

•Ensure all prerequisites for the mission are met (e.g., required area marked as a 2D polygon).

3. Launch the Mission:

•Click the "Launch" button available in the live feed to start the mission

•You can also initiate the launch by right-clicking on the desired mission.



4. Monitor and Control:

•Keep an eye on the live feed from the drone's camera and the telemetry data.

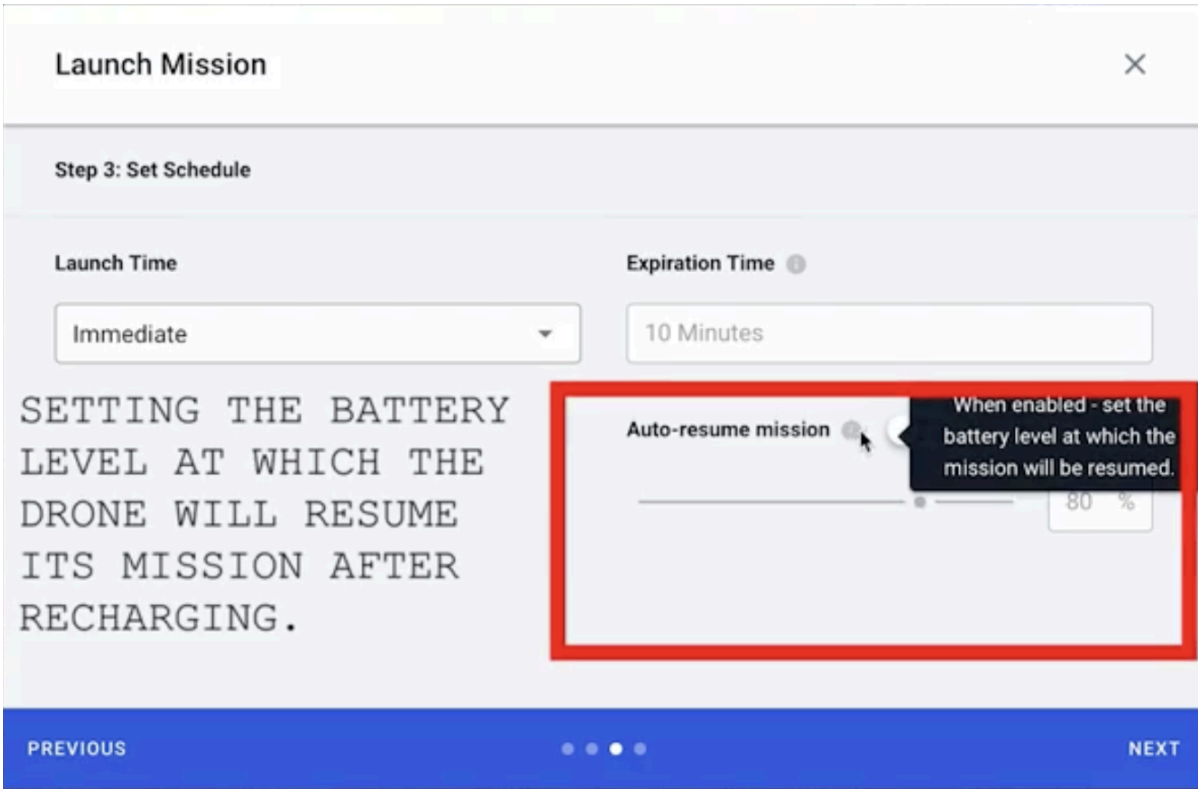
•If necessary, you can pause the mission or take manual control of the drone.

5.3 Automated mission resume

Recently, we have developed automated mission resume for our DJI Dock solution.

It means that now Dock and drone could stitch to the task automatically until the end of it, no matter how many times it requires to recharge the battery of the drone.

You can define the battery percentage level which drone should reach to automatically resume the mission in the third step of the pre-launch menu.



5.4 Manual control of the drone

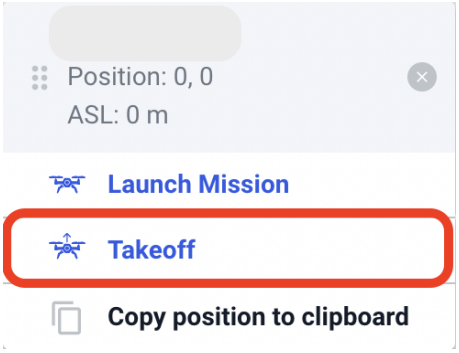
The Manual control feature allows you to operate your drone manually directly from the Drone Harmony for DJI Dock web interface.

You can enter manual control mode only if the drone hovers, Dock has a “working” status, and the drone is in “manual” status.

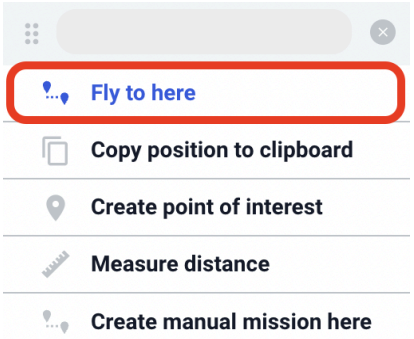
There are several ways to access the manual control mode:

1. If the mission was paused
2. Once the mission is complete and the drone hovers
3. If the “takeoff” feature was used
4. If the “fly to here” feature was used

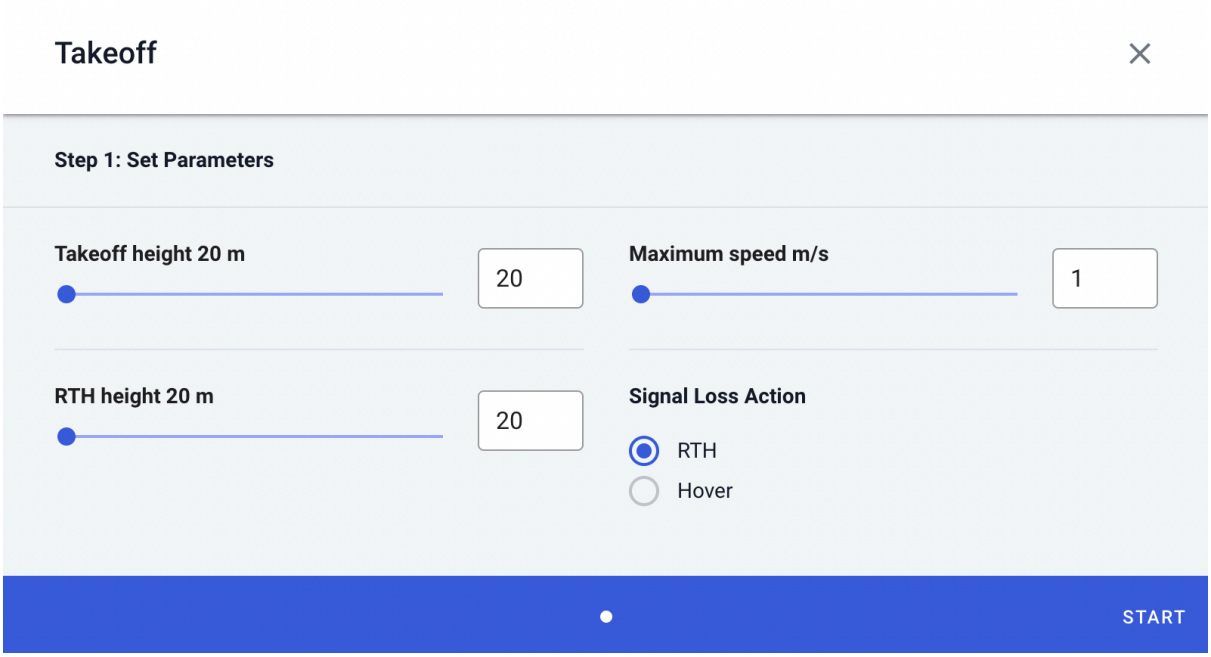
Choose the “take off” option when right-clicking on the Dock icon, and once the drone is hovering over the Dock you can enter the manual control mode from the Live feed.

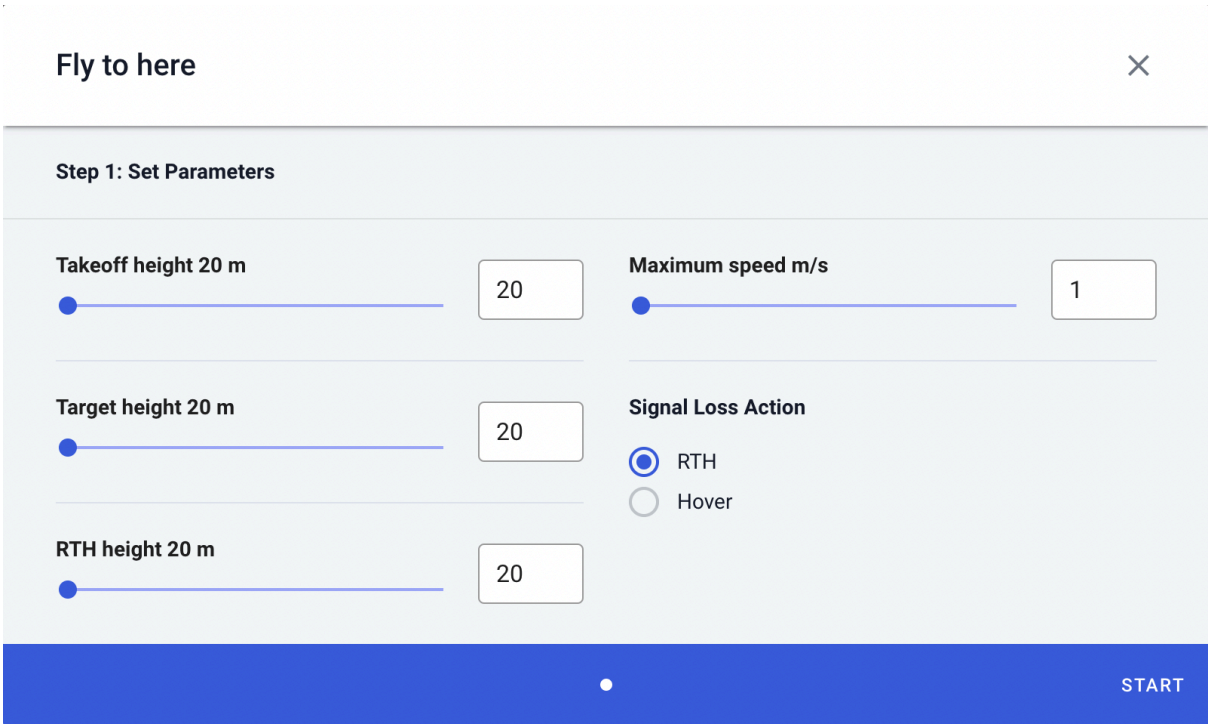


Choose the “fly to here” option when right-clicking on the desired location on the map, you can enter manual control once the drone gets to the chosen location and hovers.



Once you choose one of these options to proceed into manual mode you can set parameters for the flight as shown in the screenshots below:





As for now, if you are going to use manual control during the mission execution you should pause the mission execution, and then the “enter manual control” button will appear in the Live feed.

When you finish working with manual control mode you have two options, RTH before executing the mission again from the start, or resume if mission execution was paused

www.droneharmony.com
contact@droneharmony.com
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+41 43 333 84 41

Drone Harmony AG
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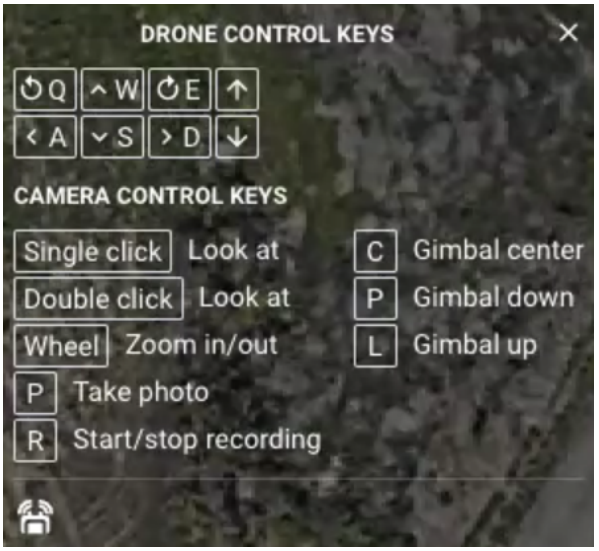
CH-8600 Dübendorf

before entering the manual mode.

Please note that the mission resume will not work if you do not pause the mission before entering the manual control mode and/or RTH.

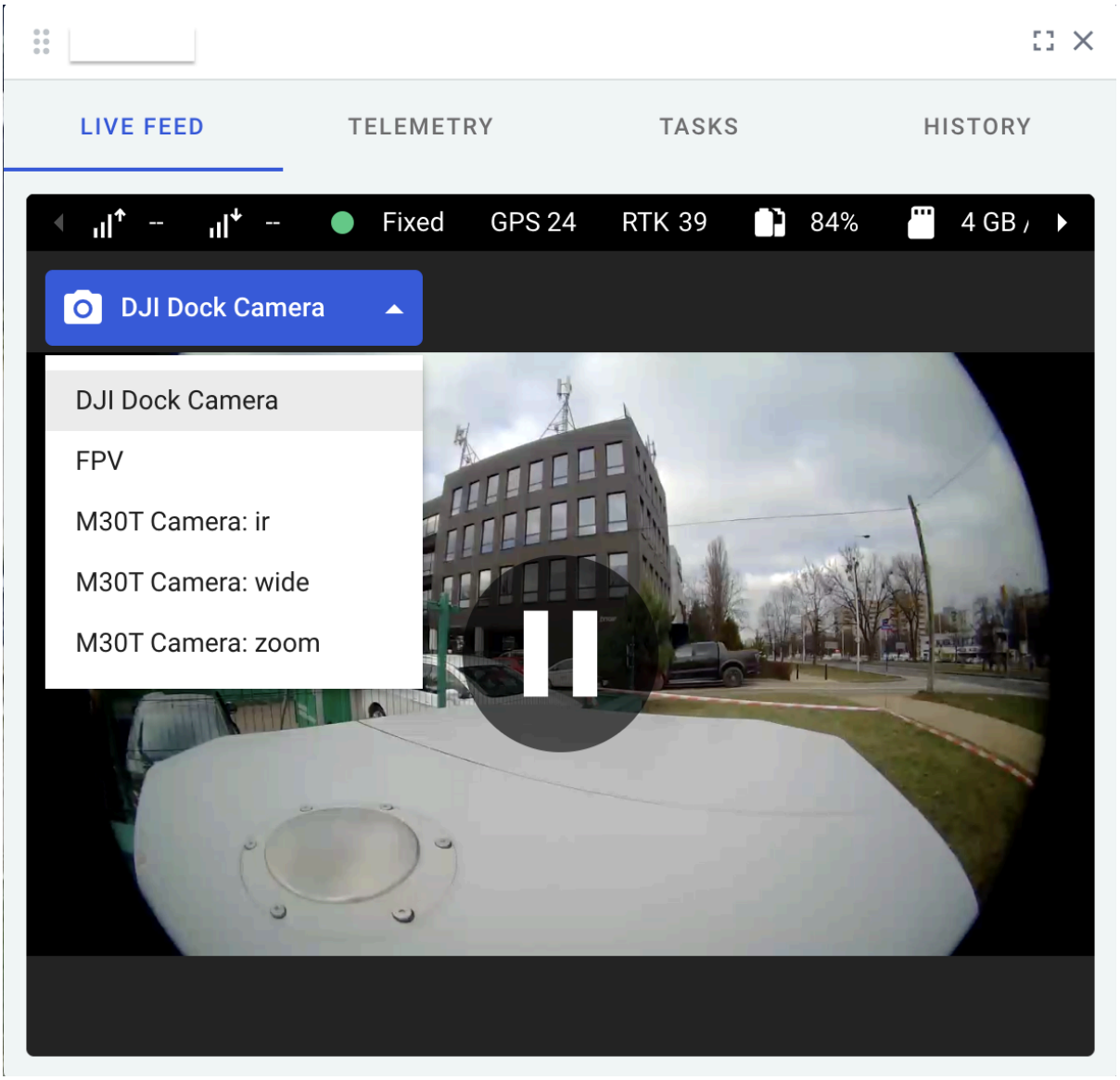
Manual Control keys for the drone & camera should appear on the screen once you enter the manual mode:



6. Monitoring flights

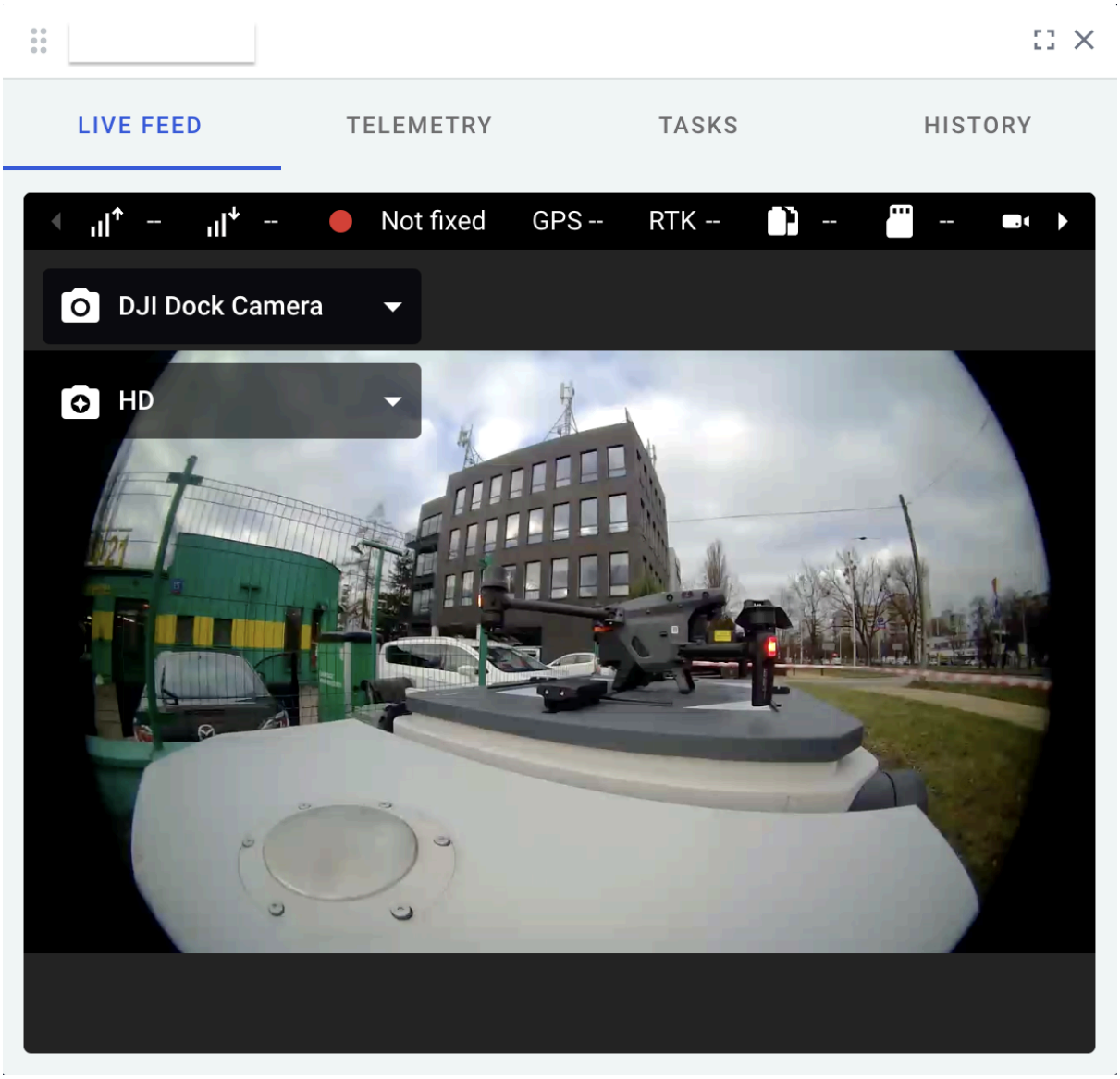
6.1 Camera feeds

Drone Harmony provides easy access to all live feeds available on the DJI Dock and the Matrice 30T: Dock Camera, Wide angle camera, Zoom camera, and Thermal camera. Switching between the different feeds is achieved by selecting the feed in the appropriate dropdown in the LIVE FEED tab in the Dock menu. The visible feed can be changed at any time, including during flight.



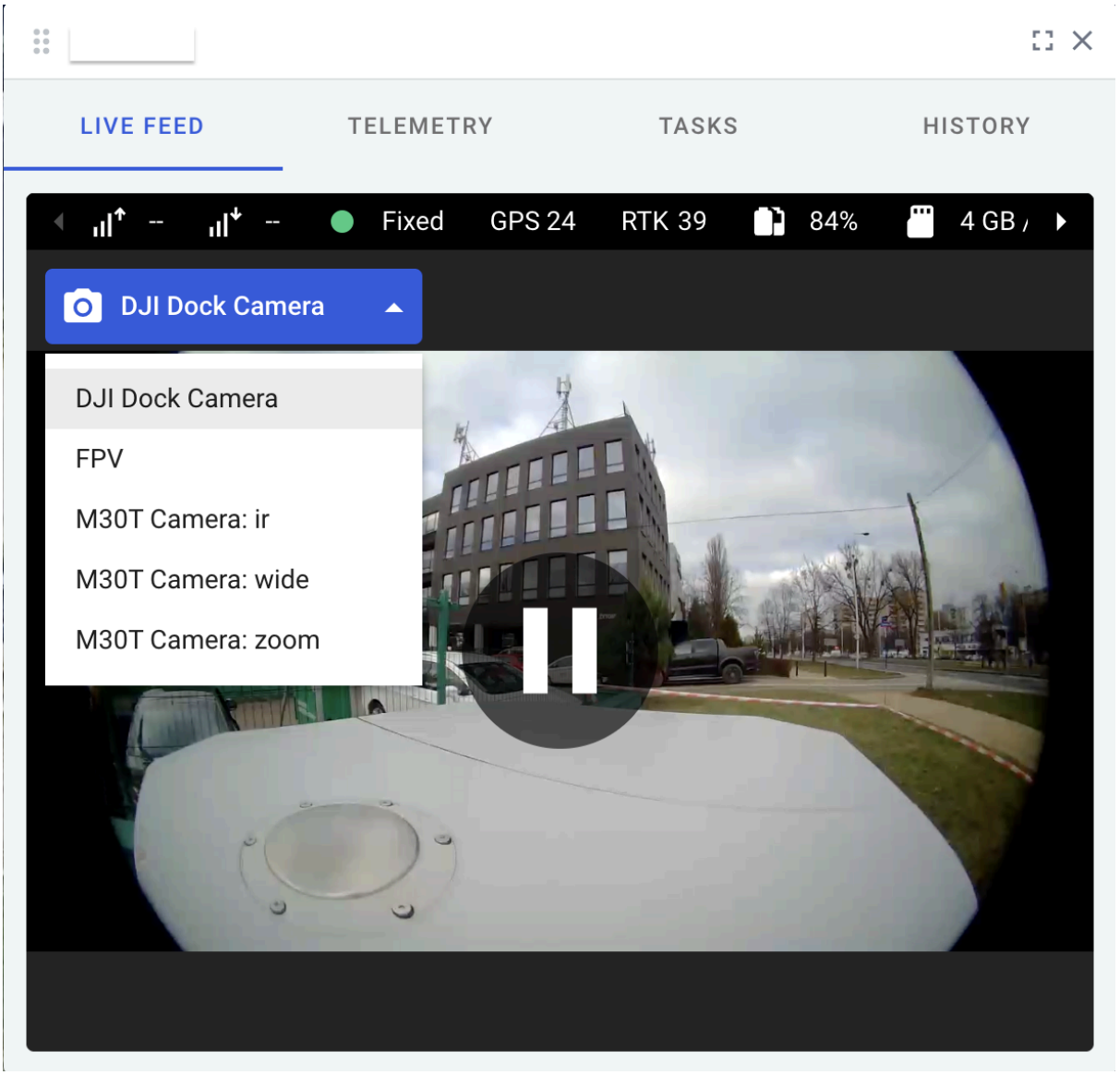
6.1.1 Dock Camera

The Dock Camera feed provides a view of the dock environment. This live feed is available when the Dock is idle and the drone is turned off.



6.1.2 Drone Payloads

The drone payloads (Wide-angle camera, Zoom camera, and Thermal camera) are all accessible as soon as the drone is powered up. Note that when the Dock is idle for a longer time (e.g., after completing a mission), the drone may power itself down.

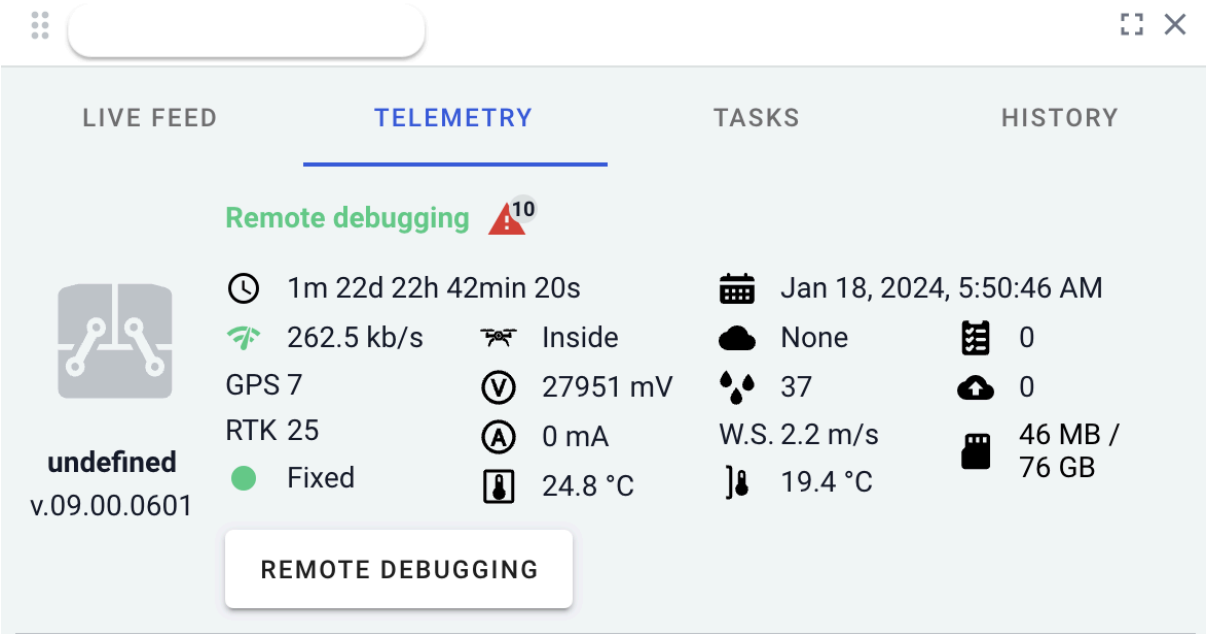


6.2 Live Telemetry

The TELEMETRY tab in the Dock panel provides complete live telemetry information from both the DJI Dock and the Matrice 30T drone. Hovering with the mouse over the telemetry items presents a tooltip shortly describing the information's meaning.

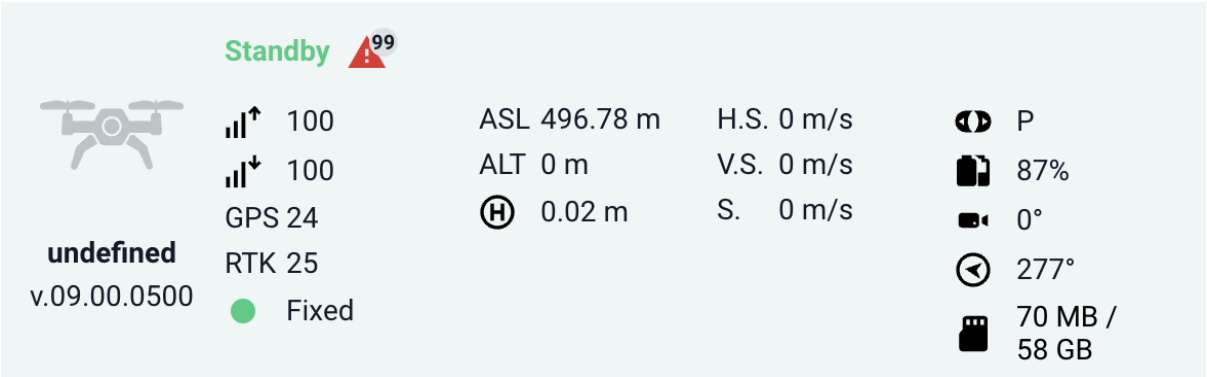
6.2.1 Dock Telemetry

The Dock telemetry contains all telemetry information directly linked to the Dock and the weather station. Errors and warnings that the Dock sends are highlighted as yellow or red exclamation marks. Clicking on them presents a specific error, or warning message.



6.2.2 Drone Telemetry

The drone telemetry is presented when the drone is powered on. The key telemetry information is also given on the top part of the LIVE FEED tab.

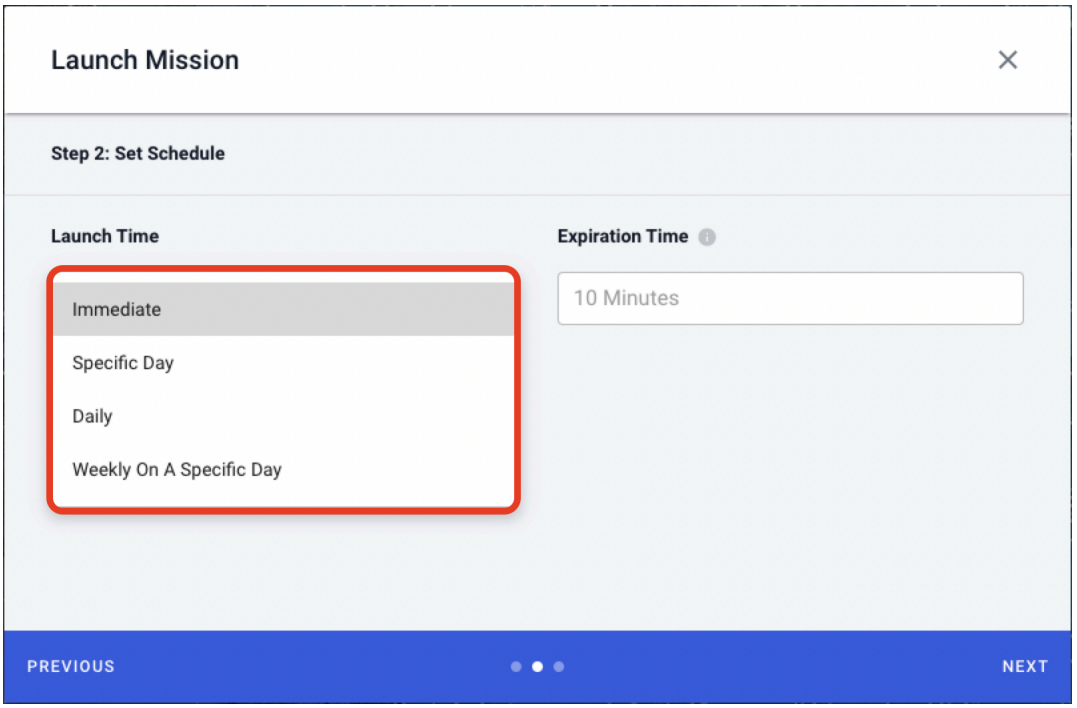


www.droneharmony.com
contact@droneharmony.com
support@droneharmony.com
+41 43 333 84 41

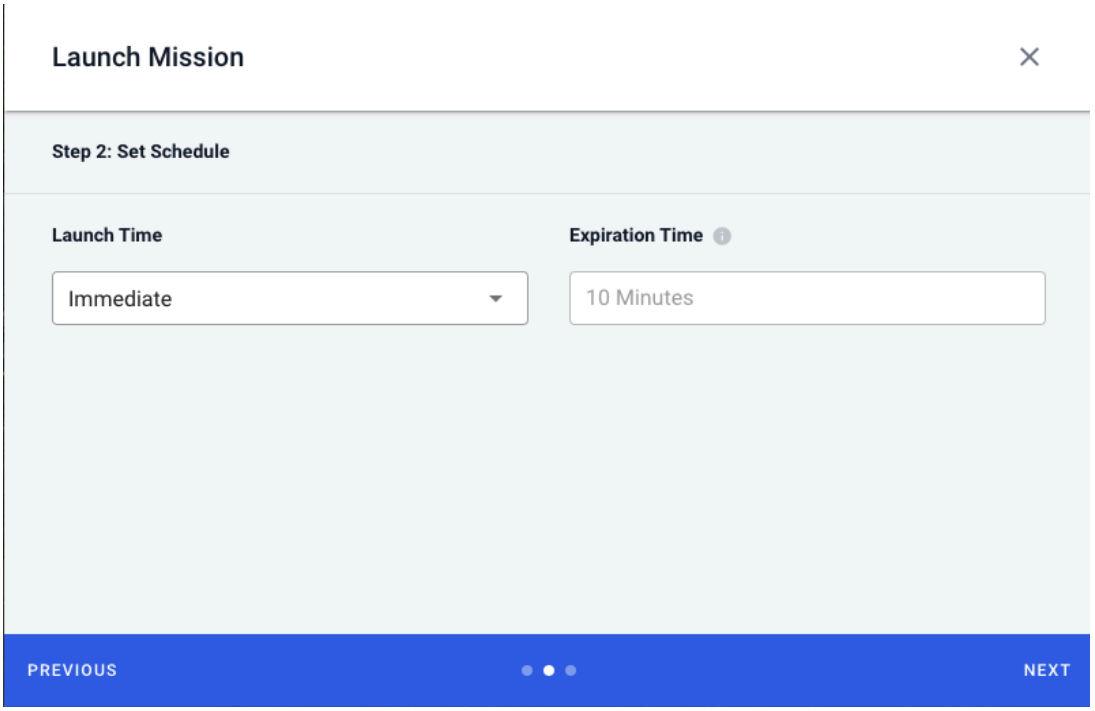
Drone Harmony AG
Sonnentalstrasse 8
Postfach 232
CH-8600 Dübendorf

7. Scheduling flights

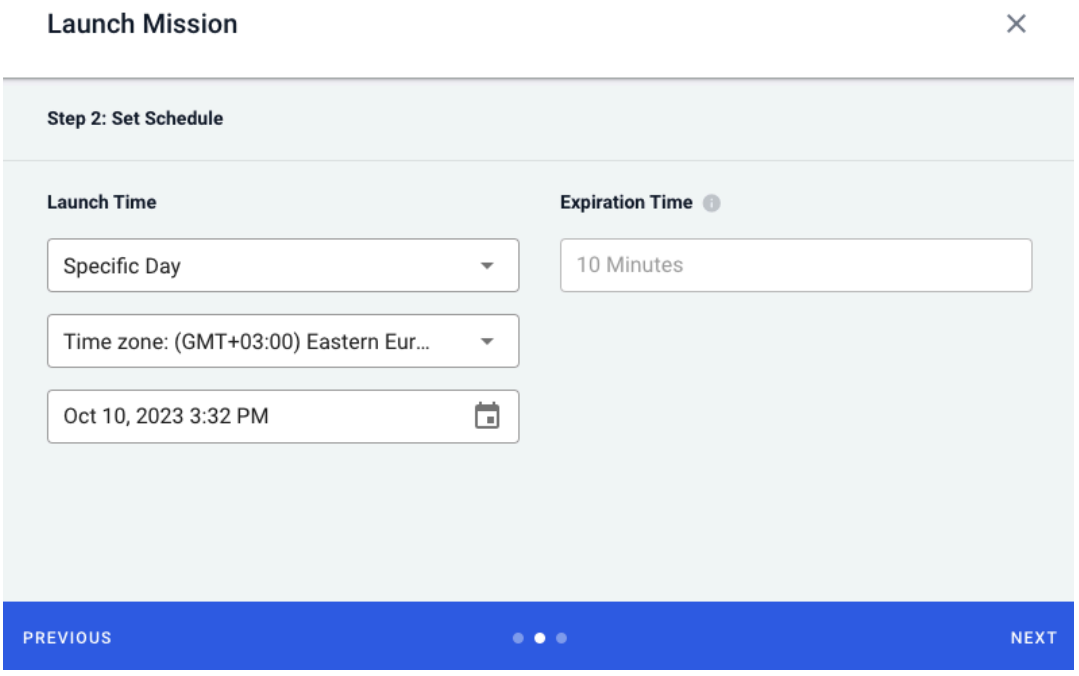
There are several options for how you can schedule the execution of the task by the Dock and aircraft, you can set these options from the drop-down list in the second step of the launching menu as shown in the screenshot below.



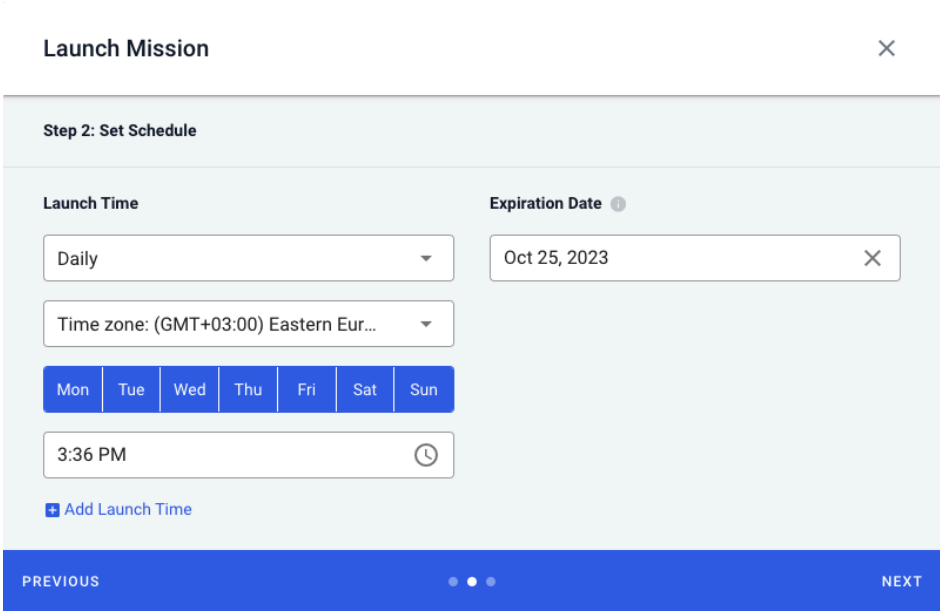
1. Immediate task - This will be executed immediately after you finish all launching steps. The task will expire in the timeframe that you have set in any option for scheduling including this one if it is not possible to complete the task for some reason such as weather conditions etc. (these tasks will appear in the history tab as failed)



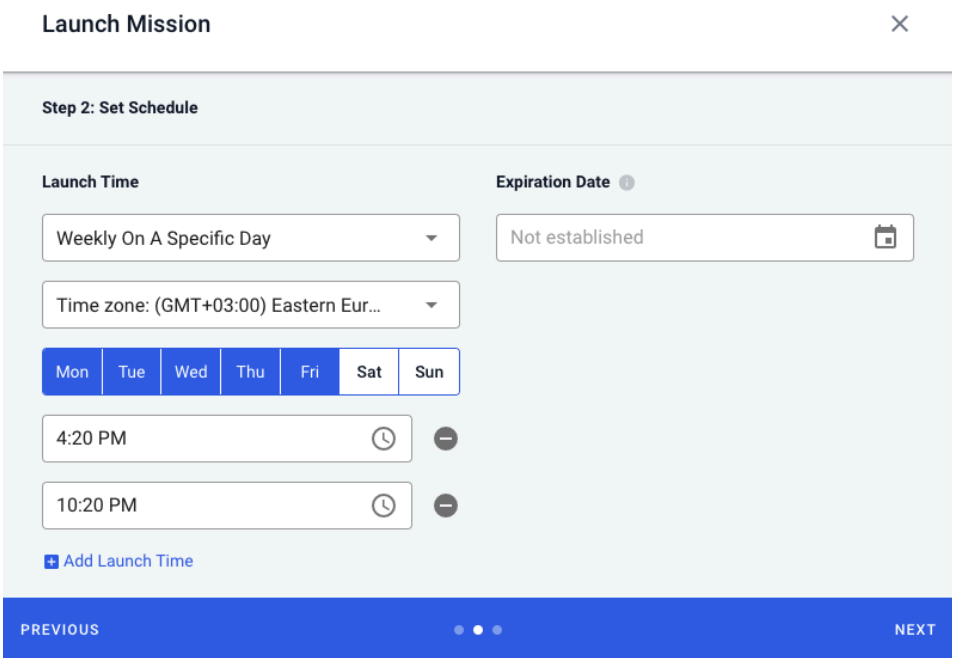
2. Specific day (executed once at a specific day and time)



3. The daily option will tell the drone to start a mission at a designated launch time on designated days of the week, you can add several launch times per day and vary the days of the week for your needs.



4. Weekly on a specific day



7.1 Task Conflict Resolution and Reattempt Protocol

When the Dock encounters two tasks scheduled for the same time or faces conditions (like weather) that prevent a task from being executed, the following protocol is followed:

1. Initial Delay:

- If the first task in the queue cannot be executed at its planned time, it will be delayed by 10 minutes.

2. Reattempt Execution:

- After the 10-minute delay, the Dock will attempt to execute the task again, provided there are no ongoing tasks or restricting conditions.

3. Reattempt Limit:

- The Dock will reattempt to execute the task every 10 minutes, up to a maximum of 5 times. (1 hour cycle)

4. Task Failure:

- If the task fails after 1 hour, it will be reflected in the History tab with a relevant message.

* In the near future there will be 2 additional to the above:

A. Ability to prevent retries when scheduling the mission. So that first fail will immediately fail the task.

B. Parameter to set the time to retry (instead of a fixed 1 hour period).

5. Priority of task execution:

1. Immediate task - the one that you can set to execute immediately, it will fail the planned task if you create it at the planned time of execution or before it.

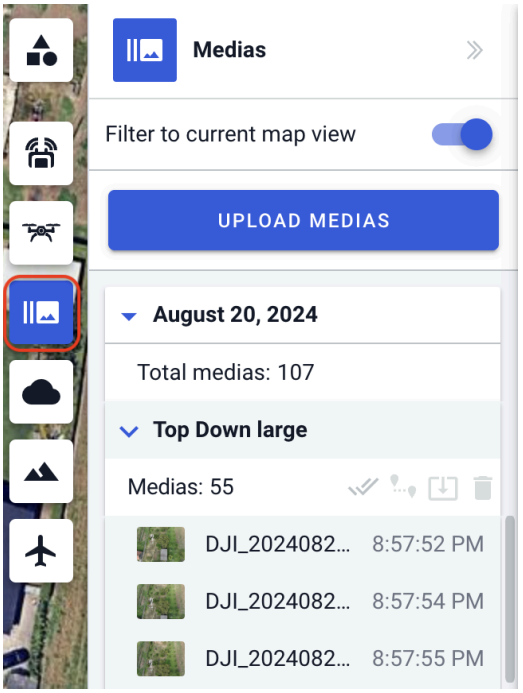
2. Timed task (which should be executed once) - If no success after one 10 minutes reattempt task will fail and no reattempt will happen.

3. Condition task (planned Daily or weekly) - reattempt every 10 minutes, 1 hour cycle.

*Please note that you will see only the planned time of the task in the task tab until it`s executed, in the history tab you will see the actual time of execution.

8. Medias

Media tab would allow you to better organize your interaction with the collected data, and download and review images that the drone has collected during mission execution.



Once you enter the media tab you will see a drop-down list sorted by the days when the data was collected. You can also review them sorted by the mission during which the data was collected, by the user that collected data, and by the payload that was used to make these photos.

`Filter to current map view` switcher will allow you to review all the images available for the account or filter to images that were made within the sites/flights in the map area which you can see visually at that moment on the screen.

It is possible to download/delete particular photos or download/delete them in bulk for the entire flight plan that was executed, or for an entire workday.

8.2 Videos

Video files are accessible in the same “Medias” tab, sorted by the day it was made, payload, and user, as well as images.

At this moment you can download videos only one by one, and there is no upload option available.
However, we are going to add the ability to bulk download and upload videos soon.

9 Exporting data

There are several types of data that you would be able to export/download from Drone Harmony.

This list includes Point Clouds and terrain files originally provided by the user, images, sites, flight plans, and flight logs.

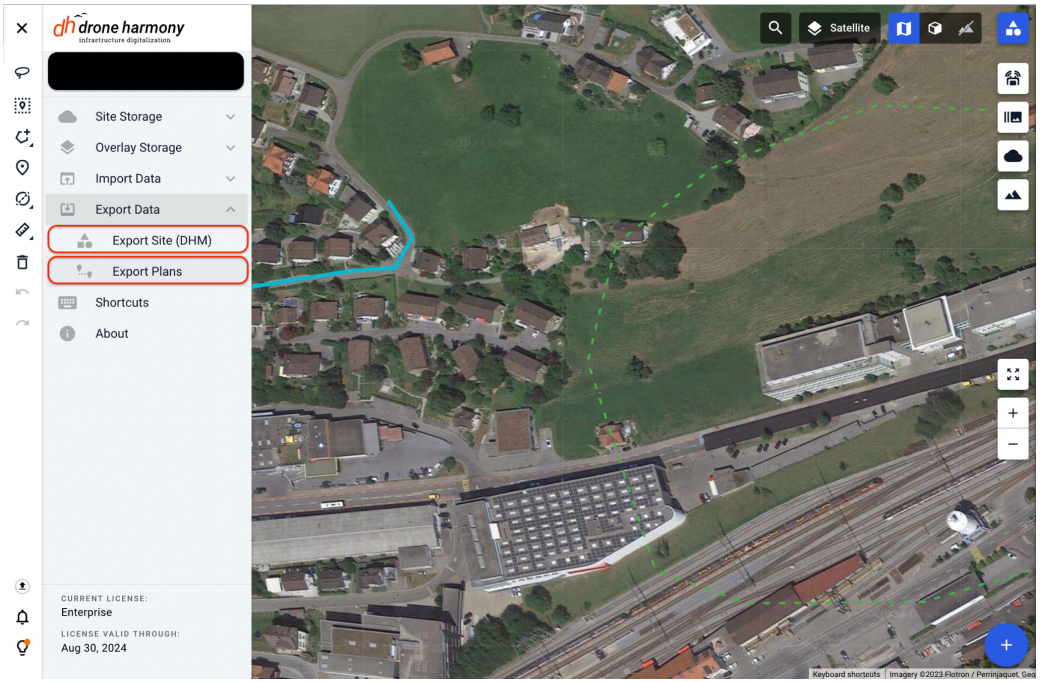
Please review the screenshots below to find out how to export each of them:

Download point cloud and terrain files (originally provided by the user)

www.droneharmony.com
contact@droneharmony.com
support@droneharmony.com
+41 43 333 84 41

Drone Harmony AG
Sonnentalstrasse 8
Postfach 232
CH-8600 Dübendorf

Menu -> Export Data



10 API Interface

To use API you need to get an API key from Drone Harmony.

Capabilities at the moment:

- Authenticate users
- Create/manage sites
- Download images collected by the drone

Capabilities soon:

- Webhooks (when media is ready to download)
- Ability to see the live feed from the dock and the drone
- Telemetry/drone status
- Captured video download
- Sensor integration (triggers, for example, to launch a mission)
- And more...

Here is the PDF file with the most detailed instructions on how DH API works, and also the Swagger link:

https://dock2.droneharmony.com/v1/swagger-ui/index.html#/

www.droneharmony.com
contact@droneharmony.com
support@droneharmony.com
+41 43 333 84 41

Drone Harmony AG
Sonnentalstrasse 8
Postfach 232
CH-8600 Dübendorf