FLYING EYE

FLYSAFE KIT

DJI Matrice 4D and 4TD

FTS + Parachute + Optional geofencing
(EASA C5 certification)

5

User manual

Made in France

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About us

Flying Eye has been your specialist partner in drone technology since 2009. We have been developing parachute FTS systems since drone regulations came into force in 2012. With its pyrotechnic system derived from aviation technology, you have the most effective and lightweight system on the market.

We are at your disposal for any technical or commercial information you may require.

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Before handling the Flysafe system, read this manual carefully.

Warnings and precautions

Flying Eye reserves the right to suspend the warranty for any person who fails to comply with the basic safety instructions set out below.

Flying Eye accepts no liability for any damage or injury, whether directly or indirectly related to the use of pyrotechnic cartridges, or resulting from the use of pyrotechnic cartridges that do not meet safety requirements and standards.

The FlySafe kit is designed for a standard configuration, without accessories or additional payloads. Any flight performed with accessories is carried out under the sole responsibility of the user; Flying Eye declines all liability in the event of any incident, damage, or non-compliance related to such use.

Any handling other than that described in the manual is prohibited.

The device must be used only by (or under the supervision of) a responsible adult. Always keep the device out of reach of children.

Do not place the device in a damp or wet environment and keep it away from UV exposure.

Do not expose the system to low or high temperatures, significant vibrations, impact risks, contact with chemicals or acids, or long-term storage in an environment with high humidity or dust.

Improper use may cause pyrotechnic cartridges to explode and put you in danger. The maximum operating temperature is 50°C and the minimum operating temperature is –20°C.

Warnings and precautions

The proper condition of the parachute system must be checked before each use. Do not use the device if it is damaged or if the test procedure is not successful. If so, contact your reseller.

The parachute does not affect the drone's operation in any way.

Any drone flight involves a risk to equipment and to nearby people, with or without a parachute.

The use of a parachute must never increase your risk-taking.

The parachute must be deployed manually by the user. Regular training is required to react correctly in an emergency. For the safety of the equipment and third parties, carry out regular simulated ground-deployment exercises using the Test LEDs.

The ejection system works only once.

Once used, the pod containing the parachute and the charge must be replaced before any further use.

Technical description

Description

- System enabling compliance with the EASA C5 class
- Compatible with the DJI Matrice 4D / 4TD
- MoC2511 Declaration of Conformity
- C5 Declaration of Conformity
- Optional geofencing
- Optional speed limiter

Installation is carried out in our workshop (installation included in the price).

Even if drones are used and maintained properly, they can sometimes end up in severe weather conditions or encounter issues such as loss of GPS signal, a technical failure of the motors, or a remote controller malfunction.

In this kind of critical and emergency situation, it is crucial to be able to deploy a safety device immediately.

Technical description

Technical specifications

Weight	200 g
Range	2200 m
Triggering	• Manual deployment by simultaneous double press • Automatic deployment in case of leaving the flight area (optional geofencing) • Automatic deployment in case of overspeed (optional speed limiter)"
Autonomy	More than 30 hours of battery life for the remote controller (rechargeable 1800mAh Li-Po battery via USB-C).
Remote control	Automatic power-off after 30 minutes without a connection Secure power-on and power-off (short press, then long press)
Communication	Bidirectional link, FTS transmission frequency: 868 MHz Encrypted (256-bit) and authenticated data frames
Security	FlySafe kit power supply redundancy
Maximum impact energy	Without wind: 23 joules With maximum wind (43 km/h): 173 joules

Installation

Bring the FlySafe remote controller, the drone remote controller, and the screws.

Attach the FlySafe remote controller to the drone remote controller using the screw bracket.

Remove the USB-C protective cover.

Take the drone.

Installation

Place the FlySafe failsafe cut-off unit on the drone as shown above and screw it in place.

Then install the right-side part of the FlySafe kit and the cap, then screw them in place.

Insert the parachute pod by sliding it from left to right (make sure the
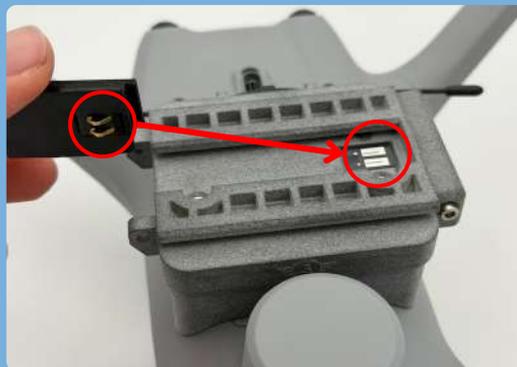electrical connector is on the correct side).

Installation

Then install the left-side part of the FlySafe kit by first "hooking" the lower section.
Tighten the screws of the side parts onto the housing.

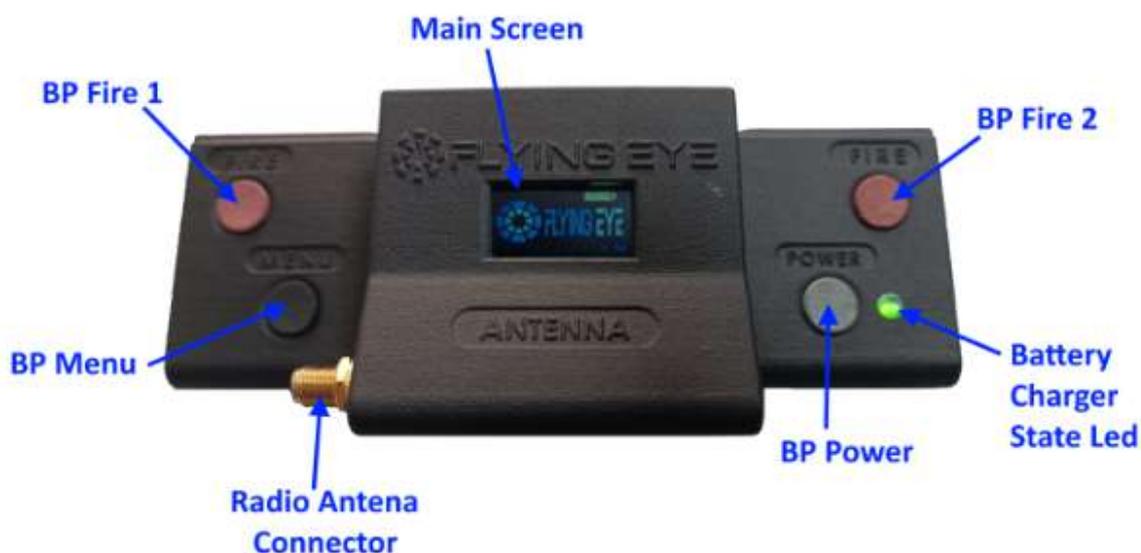The system is now correctly installed.

To test the system, remove the left-side part as well as the parachute pod, then insert the test LED by sliding it in as shown above.

After correctly installing the LED, power on the drone, start the motors, and switch on the FlySafe remote controller.
Once the green check mark is visible, press both red buttons simultaneously.
If the motors stop and the LED lights up, the system is working properly.
All that remains is to reinstall the parachute.

FlySafe remote controller

Main Screen
BP Fire 1
BP Fire 2
BP Menu
Radio Antena Connector
Battery Charger State Led
BP Power

START-UP

To switch on the FlySafe remote controller, press the power (black) button with a short press, then a long press.
The battery level is displayed on the screen.

USB TRANSFER MODE

To power on the FlySafe remote controller in USB transfer mode, connect it to a computer and switch it on while holding the Menu button. To exit USB mode, restart the remote controller.

DEPLOYMENT

Parachute deployment is triggered by pressing both "FIRE" (red) buttons simultaneously.

FlySafe remote controller

The main display provides telemetry feedback from the receiver and continuously reports its status. It is divided into four distinct sections:

- The strength of the radio link with the receiver
- The remote controller battery level
- The status of the onboard FTS cut-off system (detailed in the next section)
- The status of the receiver's onboard geofencing system (detailed in the next section)

FlySafe remote controller

FTS status

The FTS status (i.e., the cut-off system) is displayed on the left side of the main screen. The following icons may be shown and each corresponds to a specific status:

The cut-off system is fully operational. The user can trigger a manual cut-off.

The system has been cut off, either manually by the user or by the geofencing system.

The radio link with the receiver is lost. The drone is powered off or out of range.

The pyrotechnic charges are not connected. Please check the parachute installation.
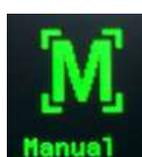
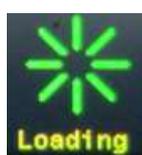The pyrotechnic charges are damaged—please contact your reseller.

FlySafe remote controller

Geofence status

The geofencing status is displayed on the right side of the main screen. The following icons may be shown and each corresponds to a specific status:

Manual mode only (geofencing not available)

Fence loading or verification in progress—this may take some time for large fences.

Geofence system initialization

Searching for a sufficient GPS signal

Geofence enabled and the drone is inside the fence.

Geofence enabled and the drone is inside a warning zone.

Drone outside the fence—flight will be interrupted within 0.3 seconds.

Note: Geofencing features are available only as an option. If not installed, the manual mode icon will always be displayed.

Web remote controller

Geofence status

An optional Web remote controller is also available when using the drone in its dock station.

The geofencing status is displayed in text on the right side of the screen, in the grey box. Displaying the geofence on the satellite view confirms that it is enabled.

The FTS can also be triggered manually by pressing the "FIRE" button.
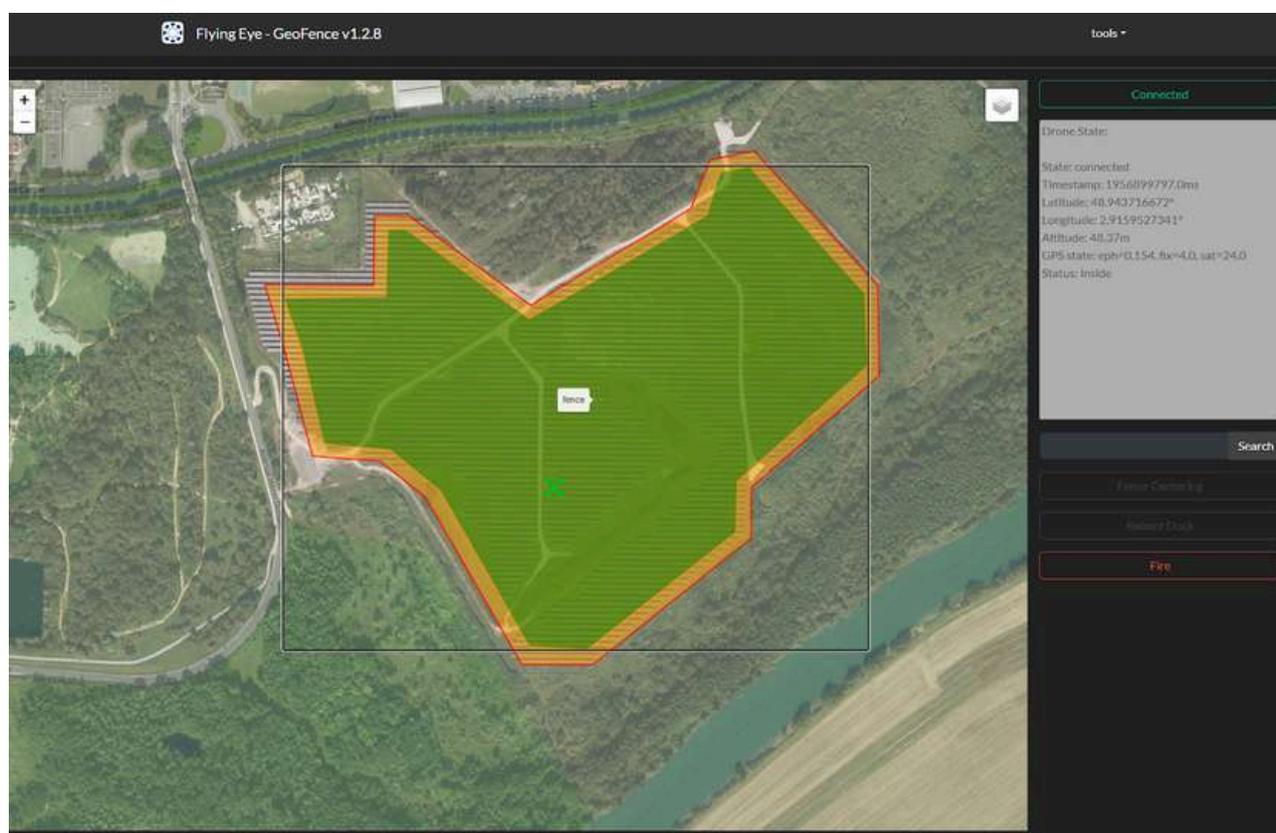
When using the FTS with the web remote controller, the geofence can only be configured during system installation. To modify it, please contact Flying Eye.

Using the geofence
(Optional)

Start-up procedure

Using geofencing requires the following operating sequence. The remote controller must be switched on first so that the active fence is available. Then the drone is powered on, allowing a new fence to be loaded or confirming that the fence onboard the receiver matches the one on the remote controller. Once the fence is validated, the GPS signal is confirmed, and the icon indicates that the drone is inside the fence, the user may then take off and carry out the mission.

Fence update

- Create your own fence using the editing tool.
- Save the fence under the name "fences.json".
- Connect the remote controller via USB and start it in USB transfer mode.
- Copy the fences.json fence file to the root directory (make sure to keep the exact file name).
- Restart the remote controller (in normal mode).
- Restart the aircraft and wait for the fence to load.
- Once loaded, the geofence status confirms that it is active.
- The user can proceed with the flight.

Note: If the fence is not valid (incorrect structure or format—see the next section), the system will automatically switch to manual mode. You will then need to correct the fence using the tool.

Geofence editing

(Optional)

User access

Access the GeoFence Editor:
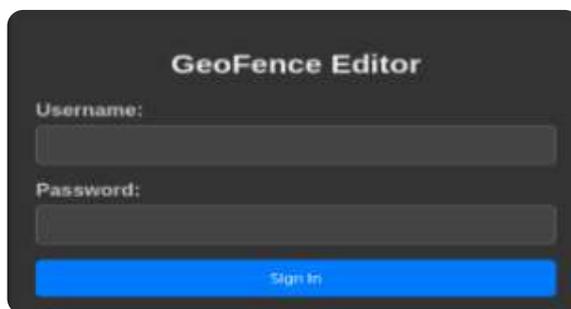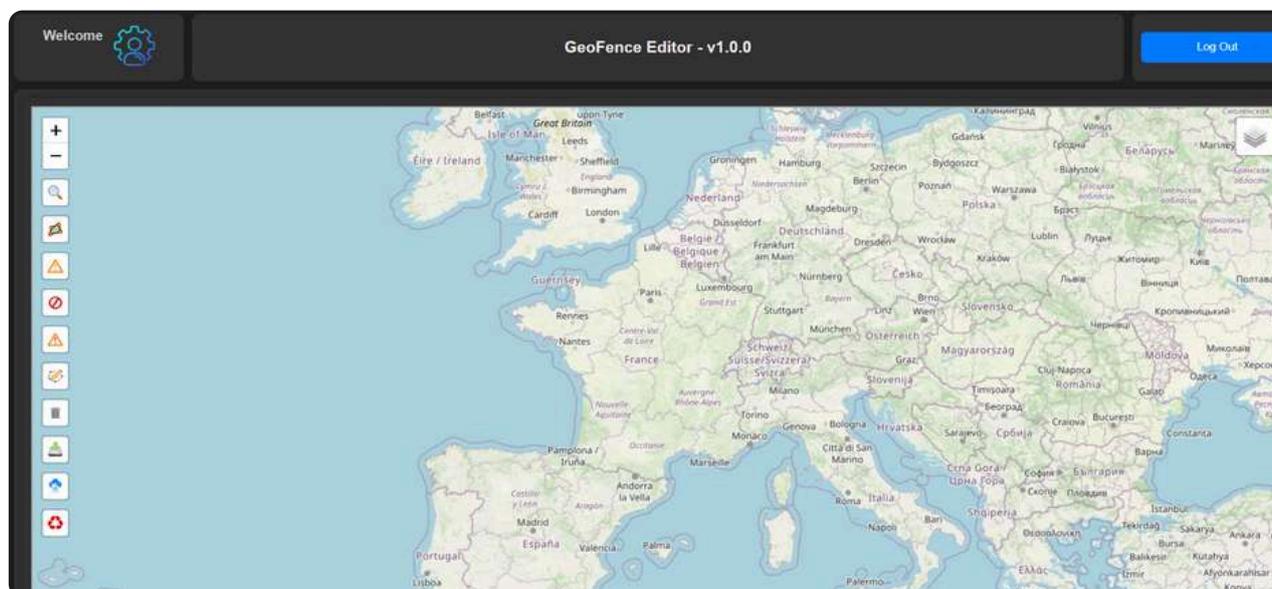
https://geofence-editor.flyingeye.fr/

Log in using the credentials you received beforehand.

Choose a new password and change it by clicking "Settings":

Familiarize yourself with the interface and explore the different features.
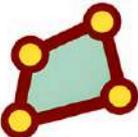
Geofence editing
(Optional)

Creating your flight area

The editing procedure is as follows:
- Search for the location of your operation using the search engine.
- Draw the main fence and validate it.
- Draw the warning fence and validate it.
- Add the No Fly Zones (NFZs) and validate them (optional step).
- Add the warning NFZs and validate them (optional step).

🔍	**Search tool:** The search function allows the user to easily find a specific location by entering the name of a city or an address. A dialog box appears in which the user can type the name in a text field and confirm by clicking the "Search" button.
	Main Fence editing: Allows drawing the **Fence** polygon (orange with a red outline). Click once to enter edit mode; the user clicks on the map to draw, then validates the outline by selecting the first point – either by clicking this button again.
⚠️	**Warning Fence editing:** Allows drawing the **warning** polygon associated with the Fence (green with an orange outline).
🚫	**No Fly Zone (NFZ) editing:** Allows drawing NFZ polygons (red with a red outline).
⚠️	**Warning NFZ editing:** Allows drawing **Warning** polygons associated with NFZs (orange).
✏️	**Polygon edit mode:** Switches to polygon edit mode. Allows the user to correct polygons already drawn, and to add and/or

Geofence editing

(Optional)

🗑	**Deletion of polygons.** Allows the user to delete a targeted polygon.
⬇	**Backup.** Allows saving the current Fence in json format expected by the Standalone remote control (geosjon standard with extended properties).
☁	**Loading of Fence.** Allows the user to reload a fence they previously edited.
♻	**Cleanup. Allows.** Alllows the user to reload a fence they previously edited.
	Cleanup. Allows the user to delete all fences currently being edited (resetting editing progress).

The criteria for invalidating a fence relate to the integrity of each element. There can be only one fence associated with one warning fence. By definition, each fence perimeter drawn must be a simple, non-self-intersecting, closed polygon. Likewise, there can be a maximum of five NFZs associated with up to five Warning NFZs. A warning fence must be defined inside the main fence, and similarly, a Warning NFZ must be defined outside its associated NFZ.

It is the user's responsibility to define a valid fence and ensure it is properly loaded. Likewise, the user must make sure to take off from within the active fence; otherwise, the geofence will not be enabled at startup and will only activate once the drone enters the fence.

Example of a complete, valid fence with NFZs.

Pre-flight test

Before the first flight of the day at a given operating site, check all components of the system and verify its integrity. If any anomaly is found, do not proceed with the flight and contact your reseller.

Ground functionality test:

1	Make sure the entire drone system is powered off. Battery disconnected, automatic module switched off.
2	Remove the parachute pod.
3	Insert the batteries.
4	Install the test LED (see page 11).
5	Switch on the drone remote controller.
6	Switch on the FlySafe remote controller.
7	Power on the drone.
8	The remote controller should display "No Pyro".
9	Start the drone's motors.
10	Trigger the FlySafe system by pressing both red "FIRE" buttons: all four motors stop and the test LEDs light up.
11	Switch off the drone.
12	Switch off both remote controllers.
13	Reinstall the parachute pod.

Flight preparation

Simplified checklist for preparing flights in the Specific category:

Volumes, limits and zones to define for your operations when using the automatic FTS:

Flight Geography: Planned flight volume for automated flights, or the volume intended for your trajectories in manual mode.

Contingency Volume: Flight volume within which you can initiate contingency procedures that allow you to return to the planned/intended flight area.

Contingency Volume Limit: If this limit is crossed, emergency procedures must be initiated. This is notably the case for the Flying Eye FlySafe automatic FTS.

Ground Risk Buffer: Ground-projected area where no third parties must be present in case of an aircraft crash, also known as the Third-Party Exclusion Zone (ZET).
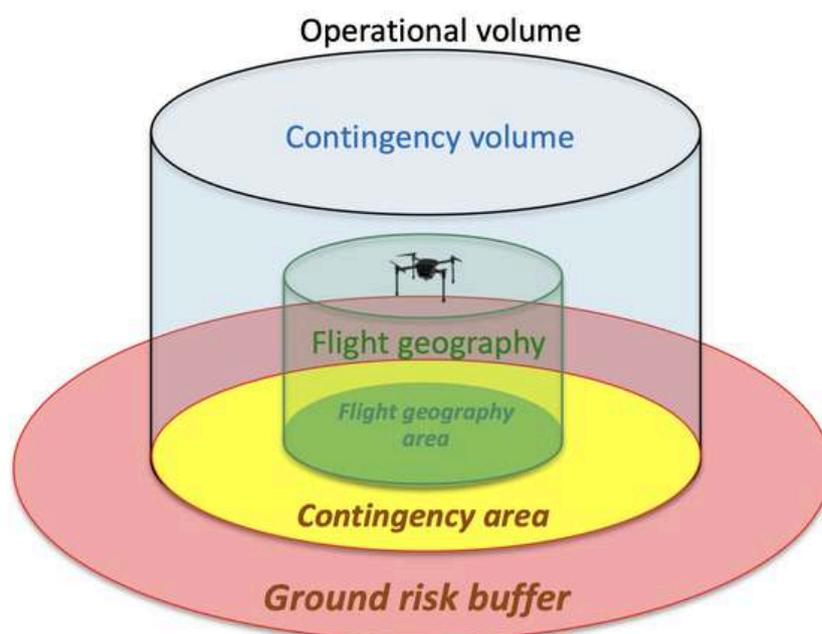
Operational conditions

Operational conditions
Minimum altitude (for optimal parachute effectiveness): 18 m
Maximum transmission range: 2,200 m (flat, open terrain without interference)
Maximum wind speed: 43 km/h
Parachute opening time: 3 s
Descent rate under parachute: 4.7 m/s
Operating temperature: –20 to 50°C
Impact energy without wind: 23 joules

Frequency used: 868 MHz
LoRa 869 MHz is shared with other users and devices operating in the same frequency band, such as home automation remote controls, energy networks (Linky), home IoT networks, industrial communication systems, etc. These devices may interfere with the FTS system, causing disruptions in transmissions between the remote controller and the receiver, leading to transmission delays, data loss, or even complete communication interruptions.

It is therefore necessary to check the signal strength before the flight and monitor it throughout the flight.

It is also necessary to avoid flying near high-power radiofrequency transmitting sources or electrical installations.

Operational conditions

	Automatic	Manual
Minimum altitude	3 m	10 m
Maximum altitude	120 m	120 m

STS-01 scenario:

Ground Risk Buffer dimensions:

Maximum height above ground	Minimum distance to cover by the buffer zone for preventing ground risks for unmanned aircraft without onboard crew	
	of an MTOM less than or equal to 10 kg	of an MTOM greater than 10 kg
	of an MTOM less than or equal to 10 kg	of an MTOM greater than 10 kg
30 m	10 m	20 m
60 m	15 m	30 m
90 m	20 m	45 m
120 m	25 m	60 m

Operating authorization

General information:

The FlySafe system supports different operating modes:
- Manual deployment allows the pilot to cut off the drone when necessary, such as in the event of a fly-away. In this case, the pilot reaction time is considered to be $T_r = 3$ s.
- Automatic deployment stops the drone automatically in the event of a fly-away with a shorter reaction time, $T_r = 0.3$ s, which makes it possible to reduce the size of the GRB.
- The speed limiter cuts off the drone in the event of overspeed. This limits the drone's maximum speed and therefore reduces the GRB size even further.

Operating authorization

Ground Risk Buffer (with parachute): determination / calculation
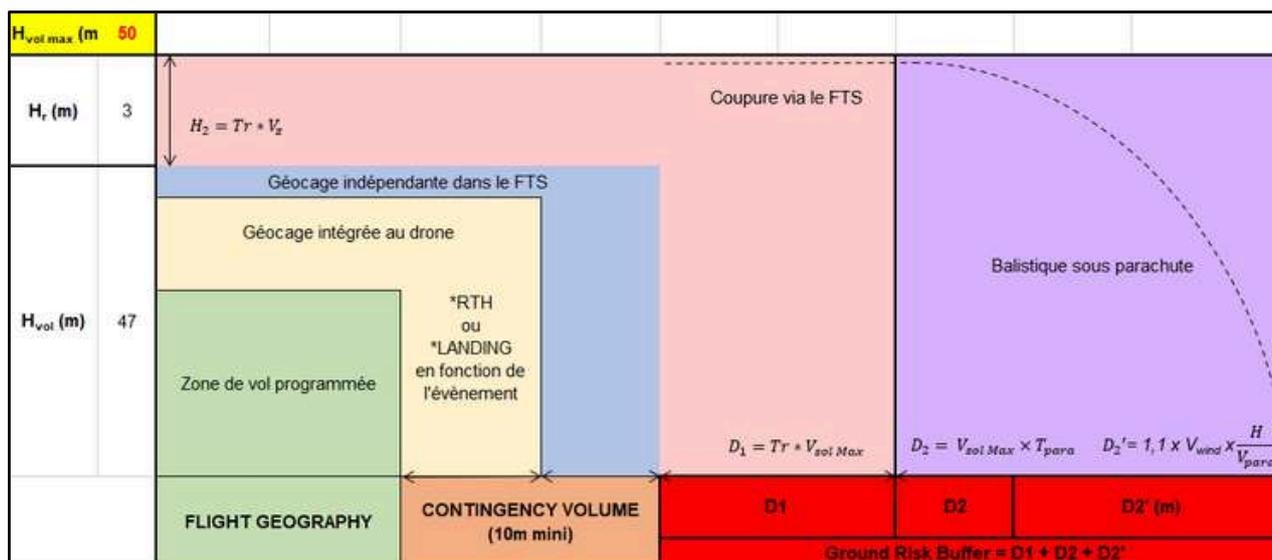
Buffer sizes based on operational height when using the FTS Flying eye in automatic mode				
Operational height (m)	Ground Risk Buffer (m)			
	FTS Manual	FTS Automatic	FTS Auto + Speed limiter to 10m/s	
10	155	98	62	62
20	183	126	100	90
30	211	154	118	118
40	239	182	174	146
50	267	210	202	174
60	295	238	230	202
70	323	266	258	230
80	333	294	322	286
100	407	351	351	314
110	435	337	407	370
120	435	351	435	437
130	463	394	473	399
140	520	435	463	427
150	548	491	520	455
150	548	491	528	455

Maximum vertical speed: Vz = 10 m/s

Reaction time:

- Automatic: Tr = 0.3 s
- Manual: Tr = 3 s

Maximum drone speed:
- Vmax = 21 m/s
- Speed limiter: Vmax to be defined with Flying Eye

Deployment time: Tpara = 3 s
Descent rate: Vpara = 4.7 m/s
Wind speed: Vwind = 12 m/s
(can be reduced by the operator)

This method is provided as an example. The operator can refine the GRB calculation by referring to Annex 1 of the SORA Implementation Guide.

Operating authorization

Ground Risk Buffer determination (without parachute)
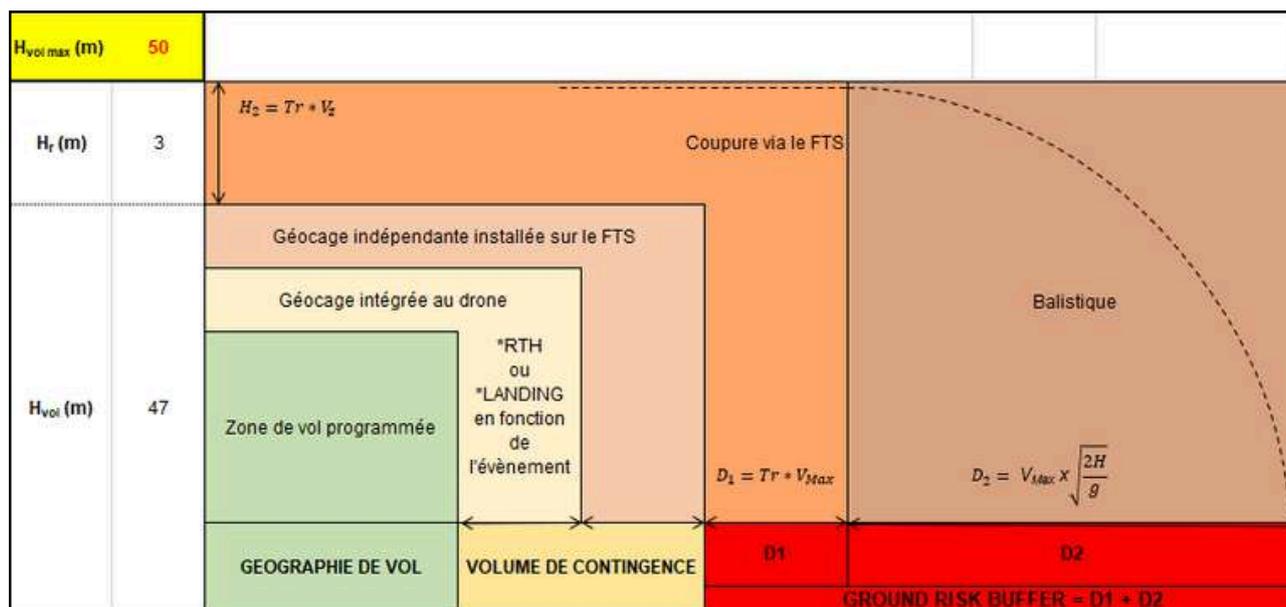
Buffer sizes based on flight height when using the FTS Flying eye			
Operational height (m)	Corresponding Ground Risk Buffer (m)		
	FTS Manual	FTS Automatic	FTS Auto + Speed limiter to 10 m/s
10	93	37	18
20	106	49	24
30	115	59	28
40	123	67	32
50	131	74	35
60	137	80	38
70	143	86	41
80	148	92	44
90	153	97	46
100	158	102	49
110	163	106	51
120	167	111	53
130	172	115	55
140	176	119	57
150	180	123	59

Maximum vertical speed: Vz = 10 m/s

Reaction time:
- Automatic: Tr = 0.3 s
- Manual: Tr = 3 s

Maximum drone speed:
- Vmax = 21 m/s
- Speed limiter: Vmax to be defined with Flying Eye

Gravity: g = 9.81 m/s^2

This method is provided as an example. The operator can refine the GRB calculation by referring to Annex 1 of the SORA Implementation Guide.

Operating authorization

Operating procedures / Use procedures

Procedure to follow		
MANUAL FTS		
Context	**VLOS**	**BVLOS**
Loss of the FTS radio link	RTH	
Unable to keep the drone within the planned flight limits	Flight interruption by triggering the FTS	
Loss of position information, or doubt about its validity	Immediate landing	Flight interruption by triggering the FTS
AUTOMATIC FTS		
Loss of the FTS radio link	RTH	
Loss of GPS signal on the FTS	RTH	
Loss of GPS signal on the drone and the FTS	Immediate landing	Flight interruption by triggering the FTS

Maintenance

Maintenance after each deployment
Replacement of the pyrotechnic charges. Replacement of the parachute pod. Send the used pod back to Flying Eye.

Drone tracking
At the end of each flight day, the operator completes the provided flight log file (see Appendix 1) or any other tracking tool. In the event of a malfunction, they complete the "incident report" (see Appendix 2) and send it to Flying Eye.

Maintenance after 750 deployments (including the pre-flight test)
After 750 deployments of the Flysafe system, the drone must be sent to our facilities for inspection/overhaul.

Cleaning
Clean the accessory kit using a damp cloth. Do not use chemical products. Do not use a high-pressure washer.

Update
When using the drone with reinforced containment, please check version compatibility of the different components before updating them. Compatible versions are listed in the release note available at the following address:

Support and Warranty

Technical Support

If you experience any difficulties during installation or have additional questions about using the Flysafe kit, please contact Flying Eye's technical support.

Warranty

The Flysafe kit for DJI Matrice 4D/4TD comes with a 12-month warranty under the purchase terms and conditions. The warranty covers manufacturing defects, but does not apply in the event of damage caused by improper installation, an accident, or incorrect use.

Tracking tool (Appendix 1)

FLIGHT LOG

Date (yyyy/mm/dd)	Nature of Flight	Duration (min)	Phone	Location	Average Wind Speed (m/s)	Chute/FTS Monitoring			Remarks	Year for Annual Review
						FTS Activation	Activation Error	Involuntary FTS Activation		

Incident report (Appendix 2)

![FLYING EYE PARACHUTE · ELECTRONICS · DETECTION]	PARACHUTE SYSTEM TRACKING REPORT	Version : 01 Date of aplication: 23/06/2023

PARACHUTE SYSTEM TRACKING REPORT

1. UAS Identification

Date	
Drone s serial number	
Report number	
Number of flight hours	

2. Cut-off activation failure during pre-flight tests

Number of UAS flight hours	

3. Cut-off activation failure during flight

Number of UAS flight hours		
Remote control / drone cut-off distance		
Operation location		
High power transmitter present in the operational area	YES	NO

4. Cut-off activattion during flight

Number of UAS flight hours		
Commanded activation	YES	NO
Remote control / drone cut-off distance		
High power transmitter present in the operational area	YES	NO

4. Cut-off activation during flight

Number of UAS flight hours		
Activation commanded	YES	NO
Remote control / drone cut-off distance		
High power transmitter present in the operational area	YES	NO

You will find all the detailed information on how to operate the aircraft in the manual available for download on this page:
https://enterprise.dji.com/fr/dock-3/downloads

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400 AVENUE ROUMANILLE
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