
MICRO CATEGORY DRONE
DGCA
TYPE CERTIFIED
RFLY
INNOVATIONS
RFLY- MICRO
User Manual
A TRENTIR COMPANY

Using this Manual

User Manual: version revision 00 I issue No: 01
Flight Manual: version revision 02 I issue No. 03

Thankyou for choosing RFLY- MICRO. Please read this user manual before operating the drone.

This Manual contains:

1. Classification of Drone Zones
2. Operation of the Drone
3. Safety Guidelines
4. Field Checklist
5. Drone Logbook
6. Battery Charging Logbook

Legends

Denotes critical safety warnings. Ignoring these warnings can lead to severe risks, equipment damage, or personal injury. Strict adherence is required.

Highlights important cautions. Paying attention to these cautions is advised to ensure safe operation and avoid potential problems.

Read the following Documents before using the drone:

1. User Manual
2. Field Checklist
3. Maintenance Manual

Maintain the following while operating the drone:

1. Drone Logs
2. Battery Charging Logs
3. Maintenance Logs

Disposal Warning

Do not dispose of this product as unsorted municipal waste.
This product requires special treatment and must be handled separately from regular household waste. Please take it to an appropriate recycling or disposal facility to ensure safe and environmentally responsible disposal.

Table of Contents

1. GENERAL OPERATION & SAFETY GUIDELINES

Remote Pilots or any other person involved in the operations of UAS are required to consider their fitness for duty prior to undertaking any duty under the authority of this RPC, including but not limited to the following:


General well being


Drugs and medication use


Adequately rested


Adversely affected by stress


No Alcohol consumption


Mental fitness

Accident and Incident Reporting

In case of an incident or accident during UAS operations:

1. Report the event to the Manufacturer- RFLY.
2. The Remote Pilot must preserve all relevant flight data, telemetry logs, and drone components.
3. Log minor incidents in the incident log form and record them in the flight and pilot logs.
4. If the same minor incident happens more than three times, it should be investigated.
5. Send all major incidents for investigation with a completed and signed incident log.

A minimum of two trained personnel is required for every mission.

Personnel - Drone Team members

Remote Pilot in Command → **Visual Observer**

Personnel Requirements for Drone Missions:

Team Composition:

- Minimum of two personnel required: Remote Pilot in Command (RPIC) and Visual Observer.
- A third optional person can serve as a crew member, site inspector, or observer.
- Both RPIC and Visual Observer must have equal training.

1. **Remote Pilot in Command (RPIC):**
   - Must develop safety documentation: Risk Assessment (RA), Flight Plan, and In-flight Emergency Response Plan.
   - Must have a Remote Pilot Certificate (RPC) from DGCA for commercial or governmental use.
   - Responsible for safety during flight:
     - Authority to refuse or discontinue a mission for safety/security reasons.
     - Finalize take-off and landing locations based on current field conditions.
     - Make necessary changes to the flight plan based on field conditions.

2. **Visual Observer:**
   - Responsible for assembling the UAS and performing preflight and post-flight checks.
   - Must follow safety procedures and have enough training to effectively communicate with the RPIC.

Roles	Essential Requirements
Remote Pilot (Holder of DGCA Approved RPC)	• Meet minimal flight hours for operating a rotary-wing UAS. • Be familiar with the specific UAS being used. • Have final authority and responsibility for the flight mission and UAS operation. • Ensure safe conduct of field operations. • Conduct a pre-flight inspection of the project area. • Perform pre-flight briefing and post-flight debriefing. • Inspect the UAS before and after each flight. • Maintain flight documentation. • Understand safety and emergency procedures.
Visual observer (Holder of DGCA Approved RPC)	• Meet minimal qualifying hours of observation time with the UAS & maintain mission documents. • Be familiar with the flight mission being conducted. • Understand the risks involved in UAS field operations.

Battery Handling

Handling and Use

- Handle batteries and battery-powered devices carefully to avoid damaging the casing or connections.
- Keep batteries away from conductive materials, water, seawater, strong oxidizers, and strong acids.
- Store batteries in a cool, dry place, away from direct sunlight, heat sources, and moisture.
- Inspect batteries for damage before use. Do not use damaged or puffy batteries; dispose of them properly.
- Keep flammable materials away from battery storage and operation areas.
- Allow batteries to cool for 30 mins before charging if they are warm from use, and let them cool for 30 mins before use if they are warm from charging.
- Use only compatible chargers and follow manufacturer guidelines for charging.
- Avoid overcharging batteries and unplug them once fully charged.
- Do not disassemble or modify batteries

Charging

- Use the charger provided by the manufacturer for charging.
- Follow the manufacturer's instructions for charging the battery.
- Avoid overcharging or undercharging, as it can damage the battery and reduce its lifespan.
- Charge the battery in a well-ventilated area away from flammable materials and liquids.
- Never leave the battery unattended while charging.
- Keep the battery away from heat sources and direct sunlight during charging.
- Allow the battery to cool before charging. Do not charge if it is too hot.
- Check the battery and charging cables for damage before use.
- Disconnect the battery from the charger once fully charged.
- If the battery is fully charged but not used within two days, discharge it to the storage voltage.

Storage

- Store batteries away from combustible materials.
- Remove batteries from devices for long-term storage.
- Keep batteries at temperatures between 5°C and 30°C.
- Always store batteries in a transit storage cabinet.
- Avoid bulk storage in non-laboratory areas like offices.
- Visually inspect battery storage areas weekly.
- Use storage mode for batteries that are idle for extended periods.
- Protect batteries with professional cases that meet military specifications to shield them from wind, rain, and impact.
- Proper storage will prevent battery deterioration.

	Following these safety precautions ensures that the UAS battery is charged safely and helps avoid potential accidents or damage.

2. CLASSIFICATION OF DRONE ZONES

GREEN Zone	**No Permission Required**
YELLOW Zone	**Permit Required**
RED Zone	**Not Allowed**

Red Zone: Drone operations are only allowed under exceptional circumstances and require Central Government permission. This includes defined airspace above land, territorial waters, or specified installations and port limits.

Yellow Zone: Drone operations are restricted and require permission from the air traffic control authority. This zone includes controlled airspace above land and territorial waters.

Green Zone: Drone operations are permitted up to 400 feet (120 meters) AGL, except near airports where the limit is 200 feet (60 meters) AGL. Exceeding these limits will require adherence to Yellow Zone rules.

Temporary Red Zone: A State Government, Union Territory Administration, or law enforcement agency may temporarily restrict drone flights in a specific area for up to 48 hours. This will be notified through the digital sky platform and marked on the airspace map.

Check and confirm the green, yellow, and red zones in the https://digitalsky.dgca.gov.in/airspace-map//app; if flight activities are not obtained in the Green zones, ask for approval

Environment/Complexity Assessment

The complexity assessment depends on the mission. Based on the mission, the complexity assessment is classified in to

Low complexity	The environment is clear with no obstacles, and only two personnel are needed for the mission.
Medium complexity	The environment has minor issues like slight fog, and more than two personnel are required for the mission.
High complexity	Challenging Environment with high winds, large obstacles, or proximity to densely populated areas, requiring a larger crew for site inspection and obstacle clearance

Weather Conditions

1.Wind Speed & Direction: High winds can affect the stability and control of the drone. RFLY-MICRO UAS can be operated in a maximum wind speed of 8 m/s. Always use a reliable weather source or an anemometer for real-time wind conditions.

2.Visibility: Adequate visibility is essential for safe drone operation. Ensure there is a minimum of 1 km of visibility, and avoid operating in fog, smoke, or any other conditions that may reduce clarity.

3.Temperature: Extreme temperatures can affect battery performance and overall drone function. Operate the drone within the recommended temperature range of 0°C to 45°C. Be mindful of rapid battery drain in cold weather and potential overheating in hot weather.

4.Rain: Flying in rainy or wet conditions should be avoided.

5.Potential Weather Changes: Continuously monitor weather updates during the mission, as sudden changes like wind gusts or storms can develop quickly. Always have a plan for landing safely in case of adverse weather.

3. UAS PROFILE

Description	Specification
UAS Model Name	RFLY- MICRO
UAS Category/ Sub- Category	ROTORCRAFT/ RPAS
Remote Controller (Transmitter)	1
UAS Class	Micro
UAS Configuration	Quadcopter
Type of Payload	Mapping & Surveillance 4k Camera
RPAS & Flight Parameters	
Endurance (minutes)	60 mins (Max Payload)
Max Flight Speed	8 m/s
Max Wind Speed	8 m/s
Ceiling Height (AMSL)	4500 m
Max AGL	120 m
Range	1300 m
Flight Type	Autonomous and Manual
Flight Modes	Auto mission, Position, RTL & Land
Mission features	RTL & RESUME
Geo-fencing capability	Yes, Enabled through software
Failsafe Features	• Battery Low Voltage - RTL • Communication Loss –RTL • Geo-Fence breach
Space required for Take-off & Landing	5 m x 5 m clear surface
Deployment time	10 min
GCS device	Integrated Display
Software / Version	Rfly-Navigator / V 1.0.6
UAS Dimensions Overall	926*926*356 mm
Maximum All up weight	1.89 kg
Operational envelop	VLOS Operations only
Motors type / Number of motors	BLDC / 04
Type of Launch	VTOL

Operation and Limitation

- Ensure the location is in a green zone on the air map. Avoid restricted or no-fly zones.
- Operate in wind speeds up to 8 m/s.
- Fly in moderate weather with temperatures between 0°C and 45°C.
- Keep the drone within your visual range.
- Fly in areas free from buildings and obstacles. Stay below 120 m altitude.
- Follow all laws and regulations. Obtain necessary authorizations.
- Maintain at least 50 m from people not involved in the operation. Reduce to 30 m during take-off and landing.

- Land before the battery drops below 20%. Start with a fully charged battery. Land immediately after any low battery warning.
- Allow components to cool before the next flight.
- Remove and store batteries according to manufacturer guidelines after the mission.
- Keep electrical components away from water.
- Avoid flying in areas with High-Intensity Radiated Fields (HIRF).
- The UAS does not have shock absorption. Land carefully.
- Avoid flying in environments with high dust or water droplets.

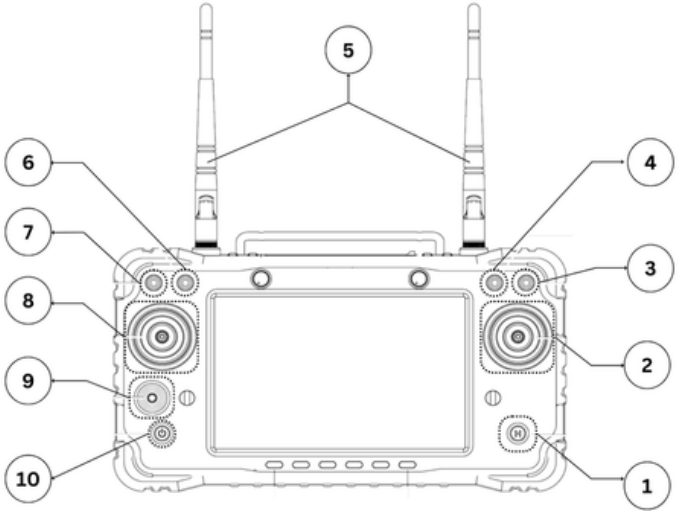
Do's	Don'ts
• Ensure the drone has a fully charged battery before each flight. • Plan your flight path in advance, considering potential obstacles and restricted areas. • Use the drone's mapping features to capture detailed images of the area. • Maintain a safe altitude, ensuring clear visual contact with the drone. • Keep the drone away from areas with heavy wireless interference. • Use the drone's GPS to track its position and maintain control. • Review and follow any local regulations specific to surveillance or mapping activities. • Regularly update the drone's software and firmware to ensure optimal performance.	• Do not fly the drone in areas where you do not have permission to conduct mapping or surveillance. • Avoid flying the drone in extreme weather conditions like high winds or heavy rain. • Do not conduct mapping or surveillance near sensitive locations, such as private residences or government buildings. • Avoid operating the drone over bodies of water unless necessary and with caution. • Do not rely solely on automated flight paths; always monitor the drone during flight. • Avoid using the drone in areas with poor GPS signals, such as dense forests or urban canyons. • Do not attempt to capture images or video of people without their consent, especially in private settings.

In the Package

No	Items	Quantity
1	RFLY- MICRO UAV	**1**
2	GCS - Transmitter	**1**
3	Survey Camera - Mapping Payload	**1**
4	4K Camera - Surveilllance Payload	**1**
5	Propellers	**2 -CW, 2-CCW**
6	Landing Gear	**4**
7	RTK Antenna	**1**
8	RF Antenna	**2**
9	Battery	**2**
10	Battery Charger	**1**
11	GCS Charger	**1**
12	Toolkit	**1**
13	User Manual	**1**
14	Maintenance Manual	**1**
13	Flight and Charging Logbook	**1**
14	Field Checklist	**1**
Spares		
13	Propellers Set	**1 -CW, 1- CCW**

UAS Components

#	Component
1	RTK Antenna
2	Propeller
3	Motor
4	RF Antenna
5	Payload
6	Landing Gear



#	Component	#	Component
1	Picture Capture	6	Toggle Switch
2	Control Stick	7	Mode Switch
3	Toggle Switch	8	Control Stick
4	Zoom Function	9	Camera Control
5	Antenna	10	Power Button

Operational Envelope

Normal flying activities require consideration of several factors, including a maximum operational wind speed of 8 m/s and a maximum take-off weight of 1.89 kg. These parameters are based on conditions at sea level and assume a clear sky for optimal performance. However, in emergency situations, it may no longer be possible to follow normal procedures. Such emergencies can arise from internal issues within the UAS, like data link failure or low battery, or from external factors. In these cases, the drone may behave unpredictably, and immediate actions, such as executing emergency protocols or landing the drone, may be necessary to ensure safety.

Parameters	Values
Maximum Speed	8 m/s (Max)
Maximum Endurance	60 min
Operating Altitude	120m AGL
Maximum Range	1.3 Km
Ceiling height	4500 AMSL
Operating Temperature	0oC to +45oC
Max Wind speed	8 m/s

If the UAS loses its data link or experiences a low battery condition, it will automatically return to land using failsafe mode (Return to Land - RTL). Ensure to monitor these conditions closely to prevent any unexpected behavior.

4. GETTING STARTED

- Ensure fitness for duty, including general well-being, adequate rest, and avoidance of alcohol, drugs, and stress.
- Report incidents and accidents to the manufacturer- RFLY; preserve flight data and documentation.
- Log minor incidents and document major incidents for investigation.
- Two personnel are required for all missions; the third is optional.
- RPIC has final authority over mission execution, safety, and compliance.
- Visual Observer must be trained, communicate safety issues to the RPIC, and assist in mission execution.
- Store batteries away from combustibles, in designated cabinets, and at temperatures between 5°C and 30°C; use protective cases.
- Handle batteries carefully, avoiding damage and contact with conductive materials or corrosive substances.
- Inspect batteries before use, and allow cooling before charging.
- Use only the manufacturer's charger and follow safety precautions.
- Charge batteries in well-ventilated areas, never leave unattended, and discharge if not used for two days.
- Maintain accurate maintenance records.
- Fly only in green zones; avoid red or no-fly zones.
- Operate within wind speeds up to 8 m/s and temperatures between 0°C to 45°C.
- Maintain visual line of sight within 1 km; avoid obstacles and manage flight heights and speeds safely.
- Comply with laws, maintain safe distances, and manage battery charge and cooling.
- Avoid water exposure and ensure controlled descent to prevent damage.
- Check the weather forecast before your mission.
- Do not operate in rain. Carry a waterproof tarpaulin for protection.
- Ensure visibility is clear with a minimum of 1 km. Check for fog or smoke.
- Use an anemometer and refer to wind speed limits in the specifications. Check wind forecasts here:
  https://en.allmetsat.com/metar-taf/

Charging

A. Drone Battery

The drone batteries are charged in two modes: **BalanceCharge** & **StorageCharge**.

- Connect DC 10-30V input at the back of the charger to Power it ON.

Battery Connectors

Balance Charge *This mode charges the battery while ensuring that all individual cells reach the same voltage level, which helps maintain battery health and performance. It properly charges all cells and increases the overall battery life.*	***Storage Charge*** *This mode charges or discharges the battery to an optimal level for long-term storage. If the battery is not used for more than 3 days, it should be charged in storage mode. This prevents over-discharge or degradation, preserving the battery's lifespan.*

- Connect Battery Balance leads and XT60 connectors to Charge.

- Select Charge to enter Charging menu.
- Set ***End Voltage*** as 4.22V
- Set ***Charge Current*** as 3.5A.
- Select Charge to begin charging.
- Select StoCHG for Storge Charge.

LiPo 6S	
Battery Type	LiPo
End Voltage	4.22 V
Cells	6
Charge Current	3.5 A
Discharge Current	2.0 A

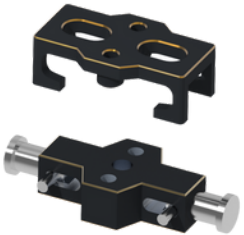
B. Transmitter

- Remove the protective flap on top of the remote controller.
- Connect the C-Type cable to the port.
- Use only the charger provided by the manufacturer.

- ***Do not charge the battery with a current greater than 3.5A under any circumstances.***
- ***Avoid leaving the battery fully charged for extended periods. Use storage mode to prolong battery life.***
- ***Keep the battery in a safe location, away from sharp objects, direct sunlight, and moisture. Store in dedicated LiPo safe bags.***
- ***Regularly ensure that the voltage in all cells is balanced and that all cells are active.***
- ***Do not use the battery if any cell shows unbalanced voltage or is inactive; replace the battery immediately.***
- ***Only dispose of the battery after it has been fully discharged. Do not dispose of it in regular trash.***
- ***Never leave the battery unattended while charging, and always use the charger provided by the manufacturer.***

Quick Release

The RFLY-MICRO is designed for efficiency, featuring a quick-release mechanism that simplifies attachment and removal of both propellers and payloads. This system minimizes preparation time, making it easier to transition between tasks and ensuring rapid deployment in the field. The quick-release design also enhances user convenience, reducing the need for tools and complex assembly steps.



Payloads

The RFLY-MICRO is equipped with two versatile payloads: Surveillance and Mapping. Both payloads are designed with user convenience in mind, offering a seamless plug-and-play experience. Whether you're capturing detailed aerial images for mapping or conducting surveillance, these payloads are incredibly easy to install and operate. With straightforward installation and intuitive operation, users can quickly switch between payloads, ensuring that the RFLY-MICRO is ready for any mission with minimal setup time.

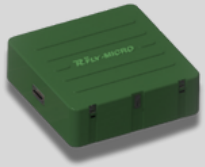
A. Surveillance Payload

- 1.7 inch Sony CMOS
- 8 Megapixel
- 6x Digital Zoom
- 3 Axis gimbal Stabilization
- 4K Video Recording
- 720/1080p Video Streaming

B. Mapping Payload

- 16mm Fixed Lens (Focal Length)
- 26.1 Megapixel
- 23.4mm x 15.7mm Sensor
- Fixed Mount Stabilization
- JPEG Image File Format
- Automatic Onboard Geotagging
- 6252 x 4168 Px Resolution
- Geo Tagged Images

Unboxing & Setup



RFLY- MICRO is delivered in a toughened carrycase/ backpack. The UAS Transit case helps in storage and transport of drone and sub-components from one location to another location without damage.

A

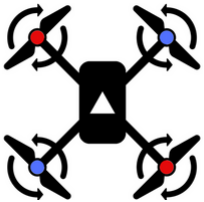
1. Remove the drone from the case and inspect for visual damages.
2. Install landing gears as indicated.

3. Install all 4 Propellers in their correct directions.

(OR)

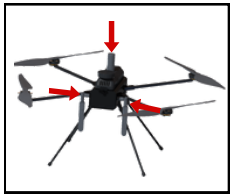
Socket head M3 bolt screws are used to mount the propeller. Hand-tighten them to approximately 2.20 Nm.

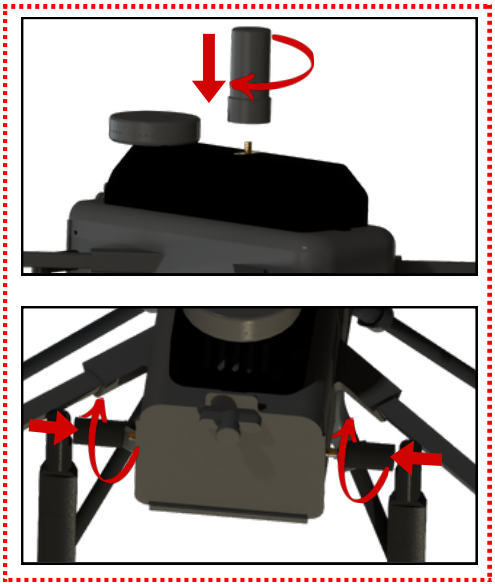
Ensure propellers are installed in the correct direction as indicated. Verify that all bolts are tightly secured to avoid any operational issues or damage to the drone.



B

1. Install RF Antennas on both sides as indicated and fold it to point down.
2. Install the RTK antenna on the designated spot on top of the UAS. Hand-tighten it securely to ensure proper connection and stability during operation.





C

1. Take Transmitter out of its box.
2. Press the Power button once, then immediately press and hold it to turn the device ON.

Connect the battery only after installing payload & switching on the remote controller. This helps prevent accidental motor activation and ensures safe start-up of the drone.

D

1. Use a battery checker to ensure each battery's voltage is around 25.2V.
2. Open Battery compartment and insert the battery in place.
3. Install the payload (Page - 14) and ensure Transmitter is switched ON.
4. Connect the battery & close the compartment lid securely to protect the battery and wiring.

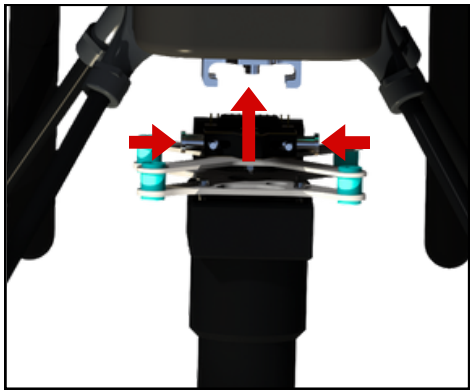
5. Operation of RFLY-MICRO

Payload Installation

Install Payloads only after all the above assembly steps are complete.

Follow these steps to install Mapping/ Surveillance payloads:

1.Ensure the SD card with sufficient storage space is installed in the payload.
2.Ensure the connecting pins are clean and free from debris.
3.Attach the payload to the UAS by securing it to the mount located at the bottom, ensuring the connecting pins are properly aligned.



Handle the payloads with utmost care. Do not attempt to move or shake them vigorously during installation. These sensors are highly sensitive and must be treated with extreme caution.

Flight Checklist

RFLY-MICRO must be assembled and inspected according to the relevant UAS assembly checklist. Adhere to the operational guidelines throughout the flight to ensure safe and effective operation.

- ***Skipping any pre- or post-flight checks can result in equipment failure or unsafe flying conditions.***
- ***Flying with damaged or defective components can lead to accidents or loss of control.***

Pre-Flight Inspections- Visual

No	Field Checks	Responsibility	Pass Criteria
1	Airframe Check	Pilot	No Structural defects visible
2	Antenna Check	Pilot	Antennas are secured
3	Propeller Integrity	Pilot	Free from scratch, minor chipping in edges and damage.
4	Propeller Direction	Pilot	CW & CCW propellers are mounted properly
5	Propeller Mount Check	Pilot	Propeller screws are tightened enough
6	Motors Check	Pilot	No gaps in motors and rotating free
7	Motor Mount Check	Pilot	No bend/ crack/ twist in motor mount
8	Landing gears Check	Pilot	Fixed firmly in place
9	Payload SD card	Pilot	SD card with sufficient storage installed
10	Payload Checks	Co-Pilot	Payload is mounted and its connection secured
11	Battery Connector	Co-Pilot	Connectors free from carbon deposit & no visible cracks
12	Battery Check	Co-Pilot	Battery shows no sign of bulging/ damage
13	Battery Placement	Co-Pilot	Battery is placed in compartment and secured

Pre-flight Checks

A. GROUND CONTROL SYSTEM (GCS)

- Remove the transmitter from the carry case.
- Ensure the transmitter antennas are intact and unfold them 45° for proper reception.
- Turn on the transmitter and app before the drone.
- Check the battery percentage on the transmitter (ideally 80% to 100%).
- Open the RFLY PRO application on the transmitter.

B. DRONE

- Take the drone out of the carry case & install landing gears.
- Ensure RTK and RF antennas are installed securely on the UAV.
- Place the drone on a level surface, free from aerial obstructions, ideally with a 5m x 5m take-off area.
- Install payload and confirm its mounting and connection.
- Install battery and secure the battery compartment.
- Wait for the drone and sensors to boot up, indicated by a beep sound from GPS.
- The connection will be established automatically.

- Ensure all sensors are normal (Page- 20)
- Ensure checklist is complete before flight.

C. TAKE-OFF

- Check the surroundings for any obstacles and assess the wind direction and speed.
- Switch to POSITION Mode.
- ARM the Drone.
- Increase the throttle and hold the drone at an altitude of 1.5m - 2m to achieve a position fix for a few seconds.

In flight Procedures

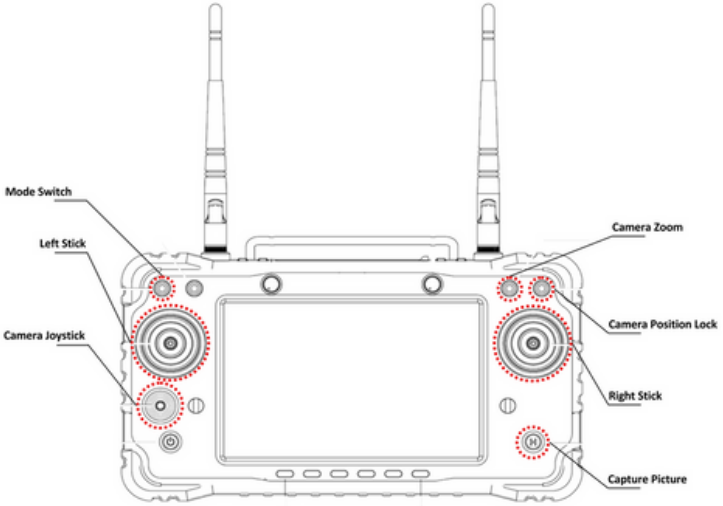
- Fly in POSITION Mode.
- Ensure there are no errors in flight.
- Verify that the drone holds position, then test movements: Roll left & right, Pitch forward & backward and Yaw left & right.
- Check for any shaking or abnormal vibrations.
- Continuously monitor flight screen parameters.
- Start the mission flight after uploading the mission and use the Mission mode switch to engage.
- Be aware of obstacles in the flight path and visually check that the flight mission altitude is safe.
- Once the mission is started, the Drone will engage and fly to first waypoint automatically.
- Observe that the drone covers the mission path.

Post Flight Checks

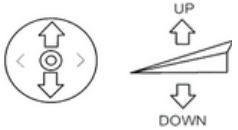
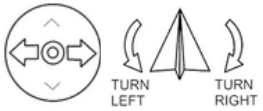
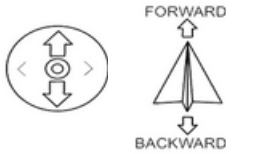
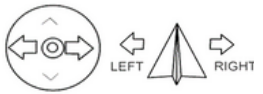
- Verify that mission objectives have been met. Repeat the necessary steps if the mission is incomplete.
- Open the battery compartment and disconnect the battery from the Drone.
- Remove the battery from the drone and allow it to cool down.
- POWER OFF the transmitter.
- Visually inspect the Drone body for any signs of damage.
- Use a cleaning cloth to remove any moisture or dust from the drone components.
- Remove the payload and its SD card.
- Inspect the payload for any signs of wear or damage & place back in its secure case.
- Store the drone, batteries, and GCS in their respective storage cases.
- If multiple flights are planned, repeat the checklist steps to prepare the aircraft for the next launch.
- For optimal battery life, set the aircraft battery to storage mode if no immediate flight is scheduled.

- ***UAS flight checks are mandatory. Always follow the UAS checklist to ensure safe operations. The UAS Flight Checklist can be found in the UAS Flight & Charging Logbook.***
- ***Maintain a safe operating distance from people, electric utility lines, and buildings (10m).***

Transmitter



Control	Function
Capture Picture	Capture Pictures during surveillance
Camera Position Lock	Position the camera and lock in place
Camera Zoom	Flip up for zoom in , Flip down for zoom out
Camera Joystick	Pan and tilt camera

Control Stick	Sticks Action	Controls	Drone Actions	
Left Stick	Stick UP	Throttle Increase	Altitude Increase	
	Stick Down	Throttle Decrease	Altitude Decrease	
	Move Right	Yaw Right	Turns Right	
	Move Left	Yaw Left	Turns Left	
Right Stick	Move Forward	Pitch Forward	Move Forward	
	Move Backward	Pitch Backward	Move Backward	
	Move Right	Roll Right	Move Right	
	Move Left	Roll Left	Move Left	

6. Ground Control Station (GCS)

RFLY PRO GCS is an indigenous application developed by RFLY Innovations Pvt. Ltd. for UAS operations, enabling communication with the UAS through wireless connectivity. It functions as a virtual platform to control and monitor UAS movement. The GCS software allows users to control the UAS, upload mission path files, set flight parameters, and download logs.

Ensure that the Transmitter and GCS app are switched ON before Powering ON the drone.

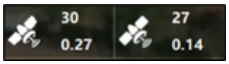
To Open GCS App, select “GCS PRO” icon on home screen.

- The GCS software and UAS will be establish an immediate auto connection.

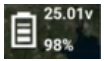
GCS Interface

The link between the GCS software and UAS will be establish immediately (auto connection). The above is the initial screen of the GCS software with the map.

This indicates that the drone is connected to the GCS and ready to fly. Also indicated current mode.



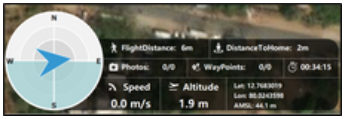
Satellite Count: Displays GNSS and GPS satellite counts.



Battery Status: Shows battery voltage and percentage.

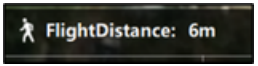
Notifications: Displays alerts from the GCS.

Landing Function: Used for landing the drone via GCS.

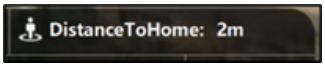


AHRS: Provides vital drone information during flight.

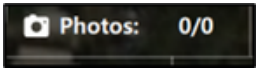
Wind & Heading: Shows wind direction and drone heading.



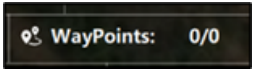
Flight Distance: Indicates the total distance covered by the drone.



Displacement: Shows the drone's distance from the home position.



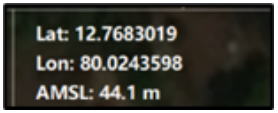
Photos Taken: Counts the number of photos captured by the payload.



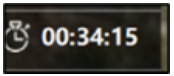
Waypoints: Tracks the number of waypoints the drone has covered.

Speed: Displays the drone's current speed.

Altitude: Indicates the drone's altitude from the ground.



Coordinates: Provides the drone's latitude and longitude.



Flight Time: Shows the duration of the drone's flight.

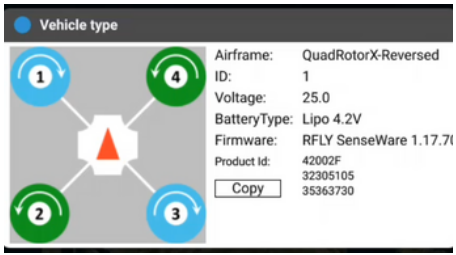
GCS Checks

Before each flight, the pilot must verify that all sensors are functioning normally. If any sensor shows to be “Disturbed”, it is essential to perform a calibration before proceeding.

- Select on the top right corner to enter settings.
- Select to enter **Vehicle parameter setting** and select **Summary.**

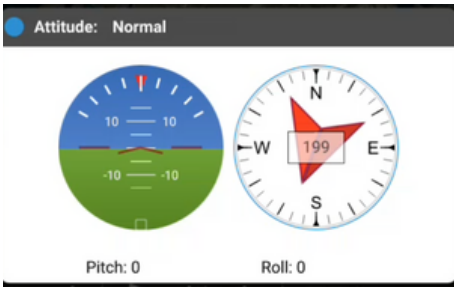
Check the following to ensure they are normal:

1.Vehicle Type - QuadRotorX-Reversed



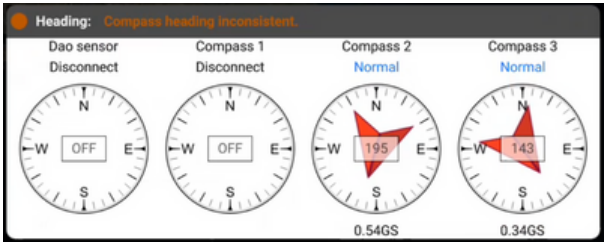
2.Attitude - Normal

Tilt and move around the UAV by hand and ensure attitude change is correct.

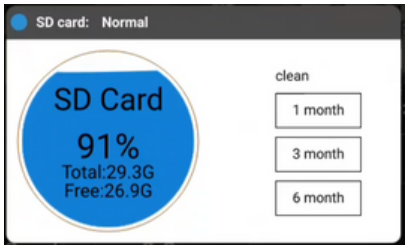


3.Heading - Compass Normal

If the compass is not normal, proceed with Compass Callibration.

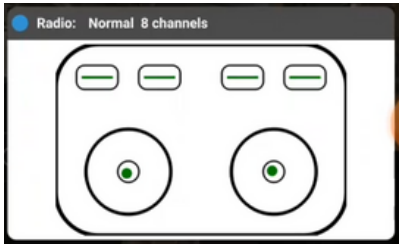


4.SD Card - Normal



5.Radio - Normal

Move around the control sticks on the transmitter and ensure the correct channel is responding



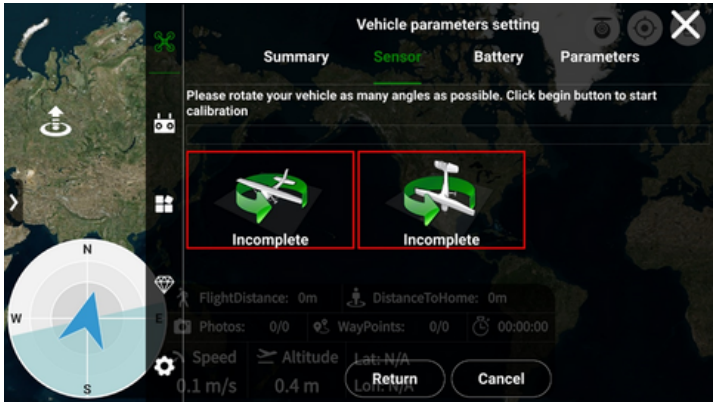
Compass Calibration

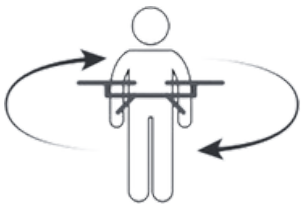
Compass calibration is done when compass is abnormal. It is recommended to calibrate the compass before first flight.

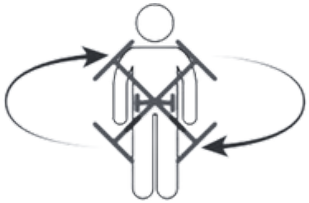
- Select  on the top right corner to enter settings.
- Select  to enter **Vehicle parameter setting** and select **Sensor**
- Select **Compass** & **Enter Calibration.**

Calibration Steps:

1. Ensure no obstacles are near the UAV.
2. Hold the UAV horizontally and rotate it 360° around the central axis. Monitor the LED indicator and GCS notifications.
3. Hold the UAV vertically, nose pointing down, and rotate it 360° around its central axis.
4. Turn the UAV off and then back on. Do not switch Off Transmitter.





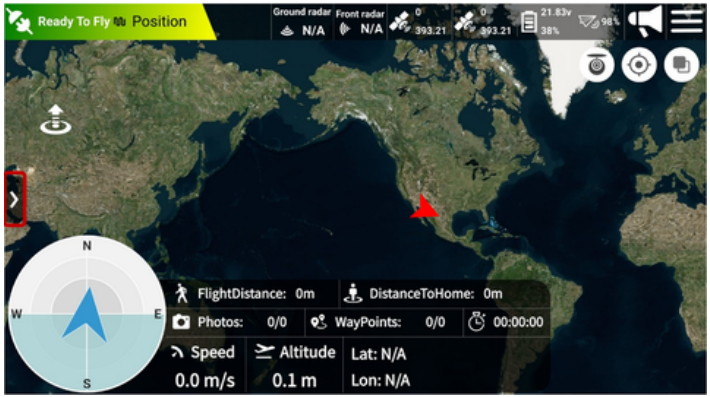


	• ***Avoid calibrating near strong magnetic fields or large metal objects.*** • ***Don't carry magnetic items during calibration.*** • ***Recalibrate outdoors if done indoors.*** • ***Always recalibrate in new mission areas.***

Mission Planning

1.To plan a mission, select  to open Mission Bar.

2. Next, select  to open a list of options.



3. Select Create new mission.

A. Mapping Area

1. Select  to plan Mapping area.

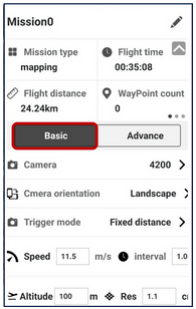
2. This will open a default grid on map.

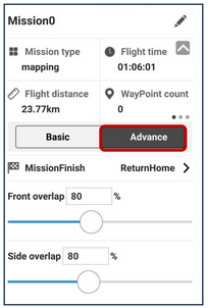
3. Drag  to adjust grid to the required planning area.

4. Select  on the right side to open mission parameters window.

5. Set the parameters according to the mission.

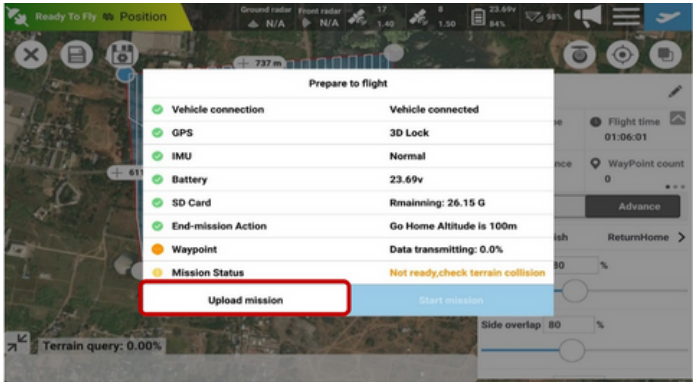
- Set S**peed** at 6m/s for mapping missions.
- Set **Front overlap** at 75%.
- Set **Side overlap** at 70%.





6. Once the grid is complete and parameters set, select  in the top right corner.

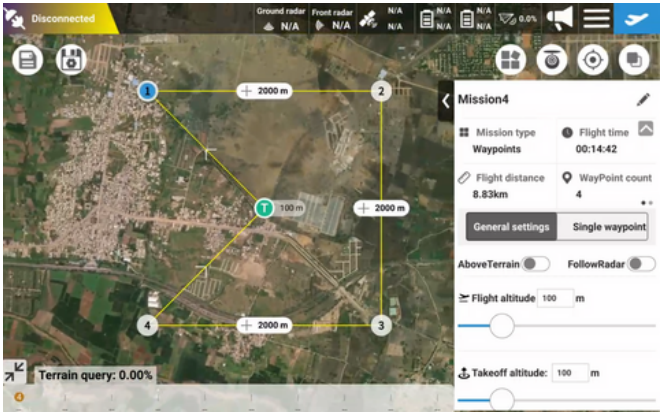
7. Select **Upload mission.**



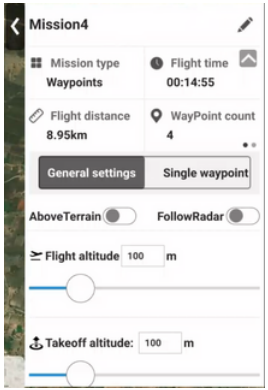
B. Way Points

1. Select  to plan Way Points.
2. Select the area to plot way points.

3. Drag and set  for take of point.



4. click on  to add new waypoint.
5. Drag Waypoints to desired positions.
6. Set parameters according to the mission.



6. Once the grid is complete and parameters set, select  in the top right corner.
7. Select **Upload mission.**

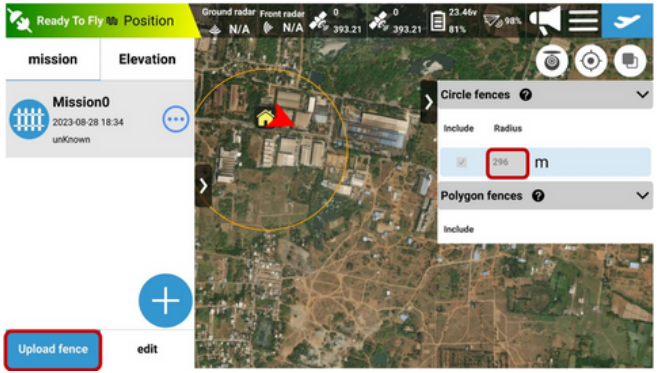
Geo Fence Creation

1.To create geo fence, select  to open Mission Bar.

2. Next, select  and select **Create new mission.**

3. Select  to create a fence.

4. A fence is created by default. Select  on the right to adjust radius of fence.
5.The type of fence can be selected as per requirement (Circle fence or Polygon fence).
6. Select **Upload fence** to complete fence creation.



9. Once the grid is complete and parameters set, select  in the top right corner.
10. Select **Upload mission.**

7. Emergency Handling and Failsafe Conditions

In emergency situations, the UAS's failsafe features are designed to prevent damage and accidents. Failsafe is a pre-programmed safety mode that activates when certain parameters are exceeded, triggering the Return to Launch (RTL) mode, where the UAS returns to the take-off point and lands. This system also helps prevent "fly-aways" if communication with the Ground Control Station (GCS) is lost. The GCS application alerts the pilot with visual and aural messages during these conditions. The key failsafe conditions are as follows:

Failsafe Conditions

Radio Failsafe

If communication between the GCS and the UAS is lost, the UAS will automatically trigger RTL mode. The UAS will ascend to a pre-defined clearance altitude and navigate back to the take-off point, where it will initiate landing. If communication is re-established during this process, the pilot can resume flight operations.

Battery Failsafe

When the UAS detects low battery voltage, it will automatically trigger RTL mode. The UAS will ascend to a specified safe altitude and return to the take-off point, where it will initiate landing. This ensures the UAS does not run out of power mid-flight, preventing crashes.

If the UAS loses communication or the battery drops to 21.6 V, it will automatically return to the take-off point and land. Always monitor communication and battery levels to prevent unexpected landings.

C2- Data Link loss Strategy

The UAS is equipped with a Command-and-Control (C2) data link loss strategy. If the C2 link is lost for more than 10 seconds, the UAS will automatically initiate RTL mode and return to the take-off location. The RC transmitter continuously sends signals to the UAS, and if it stops receiving a signal from the UAS for more than 10 seconds, the GCS will alert the user both visually (via the radio failsafe indicator on the GCS HUD) and audibly (from the GCS speaker), indicating that the data connection has been lost.

Actions During RTL:

1. Ensure the home point is correctly set in the GCS.
2. Keep the UAS in sight and monitor altitude, speed, and direction during RTL.
3. Take manual control if needed to avoid obstacles or other issues.
4. Pay attention to any alerts from the GCS about the drone's status.
5. Confirm the UAS initiates a safe and steady landing at the home point.

Post-Landing Precautions:

- Ensure a controlled descent during landing.
- Avoid slamming the throttle to zero at the final stage of landing.
- Inspect the landing gear for any damage after landing.

8. Trouble Shooting

Common Issues & Solutions

COMMON ISSUES	SOLUTION
Drone not turning ON	• Ensure the battery is connected properly. • Check battery voltage levels.
Position fix not available	• Check for satellite connections. If less number is available keep the drone in an open area without obstruction and try again.
Erratic Flight behaviour	• Calibrate the drone's compass and sensors. • Check for interference from nearby electronic devices or strong magnetic fields.
Drifting in flight	• Check for IMU Sensor status. If there are any errors calibrate the IMU sensor and check flight again. • Other causes might be poor Satellite signal. Take manual control and wait for drone to regain proper satellite count. • If satellite count not available for more than 2 minutes, bring the drone to home position and land it safely. • Once there is proper satellite count available continue with the mission.
Gimbal or Camera Malfunction	• Restart the UAS to reset the gimbal and camera systems. • Check for any physical obstructions or damage to the gimbal mechanism. • Ensure that the camera settings are correctly configured in the GCS software.
C2C communication not available	• Drone will enter RTL 10 seconds after connection loss. Wait for connection to be re-established and take manual control of UAS.

Error Codes & Indications

ERROR CODE	POSSIBLE ISSUE	SOLUTION
Level 1 Battery Warning (Voice Alert)	• Drone Battery voltage level has reached 22 V	• Pilot must take caution and keep the drone in VLOS to take manual control if required.
Level 2 Battery Warning (Voice Alert)	• Drone Battery voltage level has reached 21.8V	• RTL will be engaged. Prepare to land the drone and change battery. • In case an obstacle is observed around the drone, disengage RTL and land manually.
Disconnect	• UAS is disconnected from the transmitter/GCS. • C2C communication not available.	• Restart the GCS application. • Wait for UAS to engage RTL. Once connection is recovered, maintain drone in a proper range from Transmitter.

9. Flight Performance

Drone FLIGHT PERFORMANCE DATA						
BATTERY TYPE		**6S 6800 mAh**				
S.No	**State of Payloads**	**Weight (in Kg)**	**Altitude**	**Wind Speed**	**Temperature**	**Total Flight Times**
1.	Empty Weight with Battery	1.06	80 m	10 m/s	36°C	70 Min
2.	With Mapping Payload	1.86	100 m	8 m/s	38° C	60 Min
3.	With Surveillance Camera	1.84	120 m	8 m/s	38° C	60 Min

10. Component Life

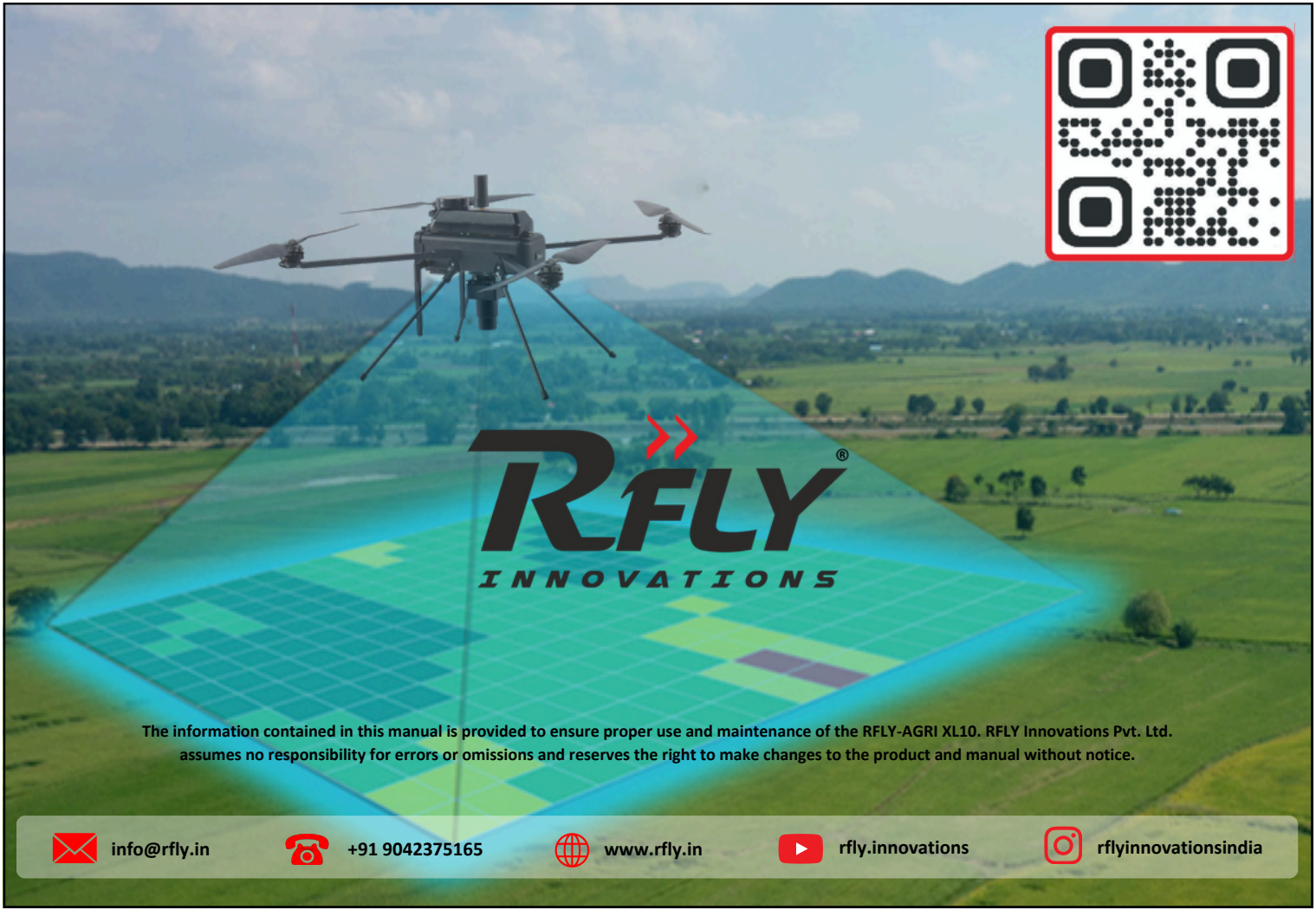
Component	Life
Battery	200 Discharge Cycles
Motor & ESC	1000 Hours
Propeller	800 Hours
Airframe	1000 Hours
Landing Gear	1000 Landings

Replace components as they reach their lifespan to ensure safe and reliable operation. Regularly inspect all parts for wear and tear.

UAS:	RFLY- MICRO	# UAS FIELD CHECKLIST		**Pilot:**	
UIN:				**Co-Pilot:**	
Date:				**Location:**	
Job #:				**Weather:**	

#	Pre Flight- Checklist	Acceptable Condition	☑
1	Airspace	Unrestricted or Flight Authorized Airspace	
2	Wind Speed Check	Record windspeed using Anemometer before flight	
3	Airframe Check	No structural defects visible	
4	RTK Antenna	Ensure proper mounting of RTK Antenna (Use Rubber washer)	
5	RF Antenna	Ensure proper mounting of RF Antenna (Use Rubber washer)	
6	Propeller Integrity Check	Propellers must be free from cracks or damages	
7	Propeller mounting check	Propeller screws/ mount not loose and rust free	
8	Propeller Rotation Check	Ensure CW and CCW propellers mounted properly	
9	Battery Voltage Check	Check Battery Voltage using LiPo checker/Multimeter	
10	Battery mounting status	Ensure Battery is mounted and secured	
11	Payload mounting Check	Check Payload is mounted, and connections are secure.	
12	Payload SD Card check	Check SD Card with sufficient storage is available in payload	
13	Remote Controller Power ON	Switch ON Transmitter	
14	UAS Power ON	UAS powering ON after Transmitter	
15	Remote Controller Battery %	Sufficient for planned flight, not less than 80%	
16	GCS App connectivity check	GCS software connected to UAS	
17	Flight Battery Percentage	Battery percentage as shown in GCS	
18	GNSS Signal check	Check GNSS signal strength is good for flying	
19	Satellite Count Check	Check if satellite count is good for Take-off.	
20	UAS Status Check	All systems in normal condition	
21	Compass Calibration	Compass calibration for current location	
22	Safe Clearance for Take off	Clear for 10m radius, no overhead obstructions	
23	Wind Direction Check	Identify wind direction. Face UAS in its direction	
24	Flight Mode Switch check	Check flight mode switch (Position, Mission, RTL)	
25	Geo-Fence Check	Apply or Remove Geo-Fence as required	
26	RTH Altitude Check	RTH altitude set as per mission plan and area	
27	Battery Failsafe check	Check Battery failsafe level set to RTL	
28	C2 Failsafe Check	Check Communication Loss is set to RTL	
29	Terrain Follow Check	Check if Terrain follows function is turned ON (if required)	
30	Mission upload check	Check proper mission is uploaded in the UAS	
31	Payload Powerup	Payload Initialization and feed visible in GCS.	
32	Payload SD card capacity	Ensure SD card capacity is enough for the mission	
33	Payload control check	Check Payload functionalities after take-off.	
34	AHRS Check	HUD response check	
35	Arming sequence Check	Check motors arming in sequence	
#	**Take-Off Checklist**	**Acceptable Condition**	☑
36	Vibration Check	No Visible shakes or abnormal vibrations	
37	Home Point	Home point updated during arming	
38	Hover Check	Flight control response normal in hover mode	
39	Payload control check	Check Payload functionalities after take-off.	
#	**Post Flight Checklist**	**Acceptable Condition**	☑
40	Mission Complete	Check Mission complete status	
41	Landing Location	Clear for 10m radius, no overhead obstructions	
42	UAS Power OFF	Turn OFF UAS	
43	Transmitter Power OFF	Turn OFF Transmitter	
44	Packaging	Pack the UAS and accessories in their carry cases	
45	Co-Pilot Signature	Final Sign-Off after every flight	

Remarks/ Comments			
Signature – Co-Pilot		**Signature – Pilot**	



The information contained in this manual is provided to ensure proper use and maintenance of the RFLY-AGRI XL10. RFLY Innovations Pvt. Ltd. assumes no responsibility for errors or omissions and reserves the right to make changes to the product and manual without notice.

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