



SHERPA DRONE USER MANUAL

Exterior Cleaning, Pressure Washing & Window Cleaning

Hardware Versions: Sherpa 1.0 – 1.5

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Section 01

Manual Overview

Purpose of this Manual

Welcome to your Sherpa exterior cleaning drone from Lucid Bots. This manual is your authoritative reference for operating the Sherpa safely, efficiently, and in compliance with all applicable regulations. It explains every aspect of the drone – from its core components to best-practice cleaning workflows – so that you can get the most out of your investment while protecting your crew and your customers.

Why this Manual Matters

Efficiency & quality: The Sherpa is designed to streamline soft-washing and cleaning tasks. By following the proven workflows in this manual, you will reduce job times while achieving consistent, professional results.

Safety first: As Pilot-in-Command (the person responsible for the flight), you must protect the well-being of everyone on site. Carefully following the procedures in this manual and the Sherpa Safety Guide minimizes the risk of injury or property damage.

Regulatory compliance: Commercial drone operations in the United States require a valid FAA Part 107 Remote Pilot Certificate (a licence issued by the U.S. Federal Aviation Administration for drone pilots). Outside the U.S.A., you must comply with your local drone laws and regulations. Completing Lucid Bots' Sherpa Academy online training program is mandatory before flying the Sherpa.

Regulatory Compliance Notice

Commercial operations with the Sherpa drone in the U.S.A. require an FAA Part 107 Remote Pilot Certificate. In other countries, you must follow the drone regulations of your local civil aviation authority. Operating the Sherpa without the proper credentials can void your warranty and may violate the law.

Training & Certification Requirements

Before your first flight, you must:

1. **Earn your FAA Part 107 Remote Pilot Certificate** (or the local equivalent in your country)

2. **Complete the Sherpa Training Program (Sherpa Academy)** – an online course that covers drone theory, airspace rules, and Sherpa-specific systems.

3. **Ensure every crewmember** who will interact with the Sherpa – directly or indirectly – passes the Sherpa Academy using their own account.

Important: Operating the Sherpa without the proper certifications and training will void warranty coverage and may violate federal law.

- You have completed all required training in the Sherpa Academy.
- You accept full responsibility for the legal, safe, and proper operation of the Sherpa.
- You understand that Lucid Bots is not liable for any damage or injury resulting from misuse or non-compliance with this product.

When you see a term you're unfamiliar with (such as **FAA Part 107**, **Pilot-in-Command**, or **Sherpa Academy**), check the mini-glossary provided in the surrounding text.

Customer Acknowledgment

By operating the Sherpa drone, you acknowledge and agree to the following:

- You have read and understood the **Sherpa Safety Guide** and this manual in full.

Section 02

Introduction & Onboarding

What you will learn

This section introduces the Sherpa and lays the foundation for safe and effective operation. It covers key Sherpa components and terminology, pre-flight, in-flight, and post-flight procedures, routine maintenance and care, as well as the operational limitations of the drone and when to consider alternative cleaning methods.

- Demonstrates day-to-day operation, maintenance, and cleaning workflows.

All crewmembers who will interact with the Sherpa must pass the Sherpa Academy using their own account. In addition to the online coursework, you will receive printed quick-reference sheets, pre-flight checklists, workflow guides, and key excerpts for use in the field.

Training & Onboarding Overview

Sherpa owners receive access to the **Lucid Bots Academy portal**, a blended learning path that helps you get up to speed quickly. The online course:

- Walks you through the **FAA Part 107** requirements for operating a commercial drone in the United States and explains how to register the Sherpa. (The FAA Part 107 Remote Pilot Certificate is a license issued by the Federal Aviation Administration to commercial drone pilots.)
- Introduces core drone theory, airspace rules, and Sherpa-specific systems.

Quick Start Instructions

Start here: log in to the Lucid Bots Academy portal to familiarize yourself with terminology and procedures. You can access the portal at the web address provided in your purchase documentation.

What's in the Box

Your Sherpa drone basic package arrives fully assembled, tested, and ready for flight. It includes all of the hardware necessary for initial operations. The following table summarizes the contents:

Item	Quantity
Sherpa Drone	1
SiYi MK15 Remote Controller	1
Lucid Bots-branded Tattu Plus 1.0 10000 mAh 44.4 V 15 C 12 S1P Smart LiPo Batteries	4
TA3200 Smart Charger	1
Quick Disconnect Spray Nozzle	1
Twist Nozzle (assorted fan and stream options)	1
Angled Nozzle (upward and downward angled spraying)	1
Maintenance Kit (basic tools, spare fasteners, and prop hardware)	1

Additional items, such as extra battery packages, propeller replacements, cleaning payload upgrades, or window washing kits, can be purchased separately. Inspect all items upon arrival; if you notice any visible damage from shipping, photograph it and report it to Lucid Bots support before using the equipment.

Section 03

Safety

General Safety Disclaimer

This safety section outlines key precautions and operating procedures for the Sherpa drone. It is designed to prevent injury, equipment damage, and regulatory violations. Only individuals who have completed Sherpa Academy and have read the Sherpa User Manual are authorized to operate or interact with the drone. Never operate the Sherpa while under the influence of drugs or alcohol.

The Sherpa should always be powered on and armed in areas free of magnetic interference. If you move the drone after powering on to bypass a pre-arm check, the compass may misalign and cause the aircraft to take off with an incorrect heading. Restart the drone if you must reposition it to avoid interference.

Pre-Operation Safety Checks

Before every flight, ensure the following items are complete:

1. **Operator certification:** In the United States, all operators must hold a valid FAA Part 107 certification. Operators in

other countries must comply with their respective national certification or licensing requirements for commercial drone operations.

2. **Pre-flight checklist:** Complete the pre-flight checklist in the Auterion Mission Control app for the drone.
3. **Airspace authorization:** Obtain proper authorization from your local aviation authority before flying using approved tools such as LAANC in the U.S. or similar systems.
4. **Weather conditions:** Do not fly in rain, lightning, or high winds. Winds under 15 mph (24 km/h) are recommended.
5. **Battery status:** Make sure all batteries are fully charged, balanced, and show no signs of swelling or damage.
6. **Hardware inspection:** Check arms, propellers, antennae, nozzles, the drone body, and GPS antenna units for wear or cracks.
7. **Hose routing:** Ensure the hose is free of kinks and securely anchored to your rig to prevent entanglement.

Pre-Flight Safety Briefing

Conduct a safety briefing with your crew before every flight. The briefing should:

- Define and secure take-off and landing zones.
- Map flight boundaries and identify obstacles.
- Assign bystander-control duties to the Remote Pilot-in-Command (RPIC) and visual observer.
- Establish emergency procedures, including primary and alternate landing areas, radio call-outs, and loss-link protocols.
- Review environmental factors such as weather, airspace status, KP-index, and RF/EMI interference.
- Note the local point of contact, mission goals, and nearest hospital or emergency numbers.
- Review chemical safety, required personal protective equipment (PPE), spill response, and safety data sheets (SDS).
- Confirm that a minimum 30 ft (9 m) separation will be maintained around the aircraft during operations and that

bystanders and large metal objects remain at a safe distance during take-off.

Personal Protective Equipment (PPE)

The following PPE is required when operating the Sherpa:

- High-visibility vest
- Hard hat
- Eye protection
- Chemical-resistant gloves (for handling solutions)
- Chemical-resistant boots

Recommended site equipment includes a portable eye-wash station, a class ABC fire extinguisher suitable for LiPo battery fires, a first-aid and trauma kit, hands-free radios for RPIC/visual observer communication, traffic cones for marking operation areas, caution tape, and warning signage.

Never approach the Sherpa while the propellers are spinning, and never attempt to restrain the drone by hand or by pulling on

the hose. If operations become unsafe and the drone cannot be landed normally, the RPIC may use the emergency-stop function to perform a controlled crash.

Roles and Responsibilities

- **Remote Pilot-in-Command (RPIC):** The RPIC has absolute authority over every mission and is responsible for ensuring the safety of the crew and bystanders.
- **Crew members:** All crew members must comply with applicable laws and regulations.

Drone Flight Best Practices

- **Maintain line of sight:** Always keep the drone in direct visual line of sight.
- **Two-person team recommended:** A pilot and a visual observer improve situational awareness.
- **Altitude awareness:** Maintain a safe operational altitude in accordance with local aviation regulations and do not exceed 150 ft (45 m) above ground level in the United States

when a hose is attached. Always keep a safe distance from structures, power lines, and other hazards.

- **Manual mode training:** Practice flying and landing the drone in manual mode in open areas before performing cleaning tasks.
- **Avoid objects:** Keep a distance from cables, wires, trees, and other obstacles.
- **No autonomous features:** Sherpa currently does not support autonomous flight outside of failsafe functions; the pilot must maintain control at all times.

Emergency Protocols

- **Low battery behavior:** The Sherpa will automatically descend and land at a critical battery level (about 5 %). Always land the drone above 15 % battery to avoid accidents.
- **Controller Link Loss of signal:** The drone will hover for about 60 seconds before descending straight down; remain calm and regain control.
- **Emergency stop switches:** If the pilot loses control or detects a malfunction or safety hazard, power can be terminated immediately by engaging both emergency stop

switches on top of the remote controller simultaneously. This will perform a controlled crash; repairing the drone is less costly than injury or property damage.

- **Crash or incident:** Immediately power down the drone using the emergency stop, secure the area, and report the incident to Lucid Bots support and any applicable aviation authority.

Post-Flight Safety

After each flight:

- Use the balance cables on each battery to initiate storage mode and never charge hot batteries. Always store batteries in LiPo-Safe (Fire-Resistant) bags or cases.
- Inspect propellers for damage before the next flight.
- Record flight hours, battery cycles, and any incidents in a maintenance log.

Operator Responsibility and Legal Compliance

Drone pilots must hold and maintain any required certifications or licences applicable to drone operation in their region and comply with all national, regional, and local laws and regulations. Obtain all required flight permits and property access permissions before operating the Sherpa. Operators must also carry appropriate insurance coverage, including liability protection, to fly the Sherpa commercially. Lucid Bots does not provide insurance coverage for customer operations.

Prohibited Operations

Do **not** attempt the following:

- Flying indoors or in enclosed spaces, under roofs or overhangs.
- Powering on the drone indoors: if power-on is required inside, remove all propellers.
- Modifying the drone's hardware or software.

- Operating near airports or in restricted airspace without proper authorization.
- Using unapproved chemicals or attachments.
- Operating without completing the Sherpa Academy.
- Touching the drone while it is armed or the motors are spinning.
- Attempting to restrain the drone during an uncontrolled event; instead, use the emergency stop feature.

Failure to follow the guidelines in this manual may result in immediate loss of warranty support, permanent equipment damage, personal injury or death, and legal consequences, including fines and regulatory penalties.

Operating Limitations

Stand-off distances and crowd control

Maintain a minimum horizontal and vertical buffer of 30 ft (9 m) between the Sherpa and any person during operations. Clearly mark the take-off and landing zone with cones and high-visibility tape. Do not fly over non-involved personnel; mark the entire

flight area to exclude foot traffic. Post signage (e.g., “Aerial Cleaning Operations in Progress, Stay Clear of Drone & Pilot”) to alert bystanders.

Operating Environment

The Sherpa is intended for outdoor operation only. Do not fly indoors, under deep overhangs, bridges, atriums, or between buildings closer than 30 ft (9 m). Maintain 30 ft separation from large metal objects during take-off to avoid compass error. Avoid areas with strong RF emitters such as cell towers, broadcast antennas, and high-voltage power lines. Except during take-off and landing, maintain a hover height greater than 10 ft (3 m) above ground to reduce ground-effect instability. Do not operate in enclosed courtyards, narrow urban canyons, or between buildings that are less than 30 ft apart and are four stories high, or less than 50 ft apart above four stories.

Tether (hose) Characteristics

The Sherpa uses a tethered hose to deliver cleaning solutions. For CE Mark compliance, the **tether length is 100 ft (approximately 30 m)**, and it should be connected to the

bottom of the drone. The tether is designed to withstand **100 % relative humidity** and a temperature range of **0 °C to 100 °C**. Always secure the hose to your rig to prevent entanglement and ensure the tensile load remains within its rated capacity. When calculating the aircraft's total mass, include the hose (about 3.256 kg for a 100 ft, 1/4 inch hose) and the weight of the water contained in the hose.

Weight and Regulatory Limits

In the United States, FAA Part 107 requires drones to weigh less than 55 lb (25 kg) at take-off. For European markets, the Sherpa's **Maximum Take-Off Mass (MTOM)** is **24.95 kg** (approximately 55 lb). It is classified as a **C3 UAS** under the EU regulations, and its maximum characteristic dimensions are **500 mm × 250 mm × 250 mm (L × W × H)**. These limits include the payload, batteries, accessories, and any attached equipment. Operating the aircraft above this mass is prohibited and will invalidate the product's C-class CE conformity. The Sherpa is shipped below these thresholds; adding payloads that exceed the weight limits is prohibited without the appropriate waivers.

The payload is considered part of the aircraft's weight. For

example, when operating with the window-washing payload and the tank full, a **100 ft (30 m) 1/4 inch hose** weighs approximately **3.256 kg**; you must also add the weight of water in the hose to determine the total aircraft mass. High-pressure cleaning payloads should also be included in your weight calculations.

To estimate the maximum cleaning height when using a hose, follow these steps:

1. Start with the drone base weight with batteries (approximately 38 lb).
2. Calculate hose weight per foot: divide the total hose weight by its length.
3. Add water weight per foot based on hose diameter (e.g., 3/8 in = 0.05 lb/ft; 1/4 in = 0.02 lb/ft; 1/2 in = 0.09 lb/ft).
4. Combine the hose and water weights to get the total weight per foot.
5. Compute the maximum altitude: (55 lb legal limit – 38 lb drone weight) ÷ total weight per foot. Always round down to the nearest foot for safety.

When flying with the window-washing payload tank full, add 4 lb to the drone weight in the calculation. This calculation ensures

you remain within legal weight limits and avoid overloading the drone.

Sound power level: The Sherpa's sound power level is **109.7 dB**. Depending on your local noise regulations, you may need to wear hearing protection and observe additional restrictions when operating in populated areas.

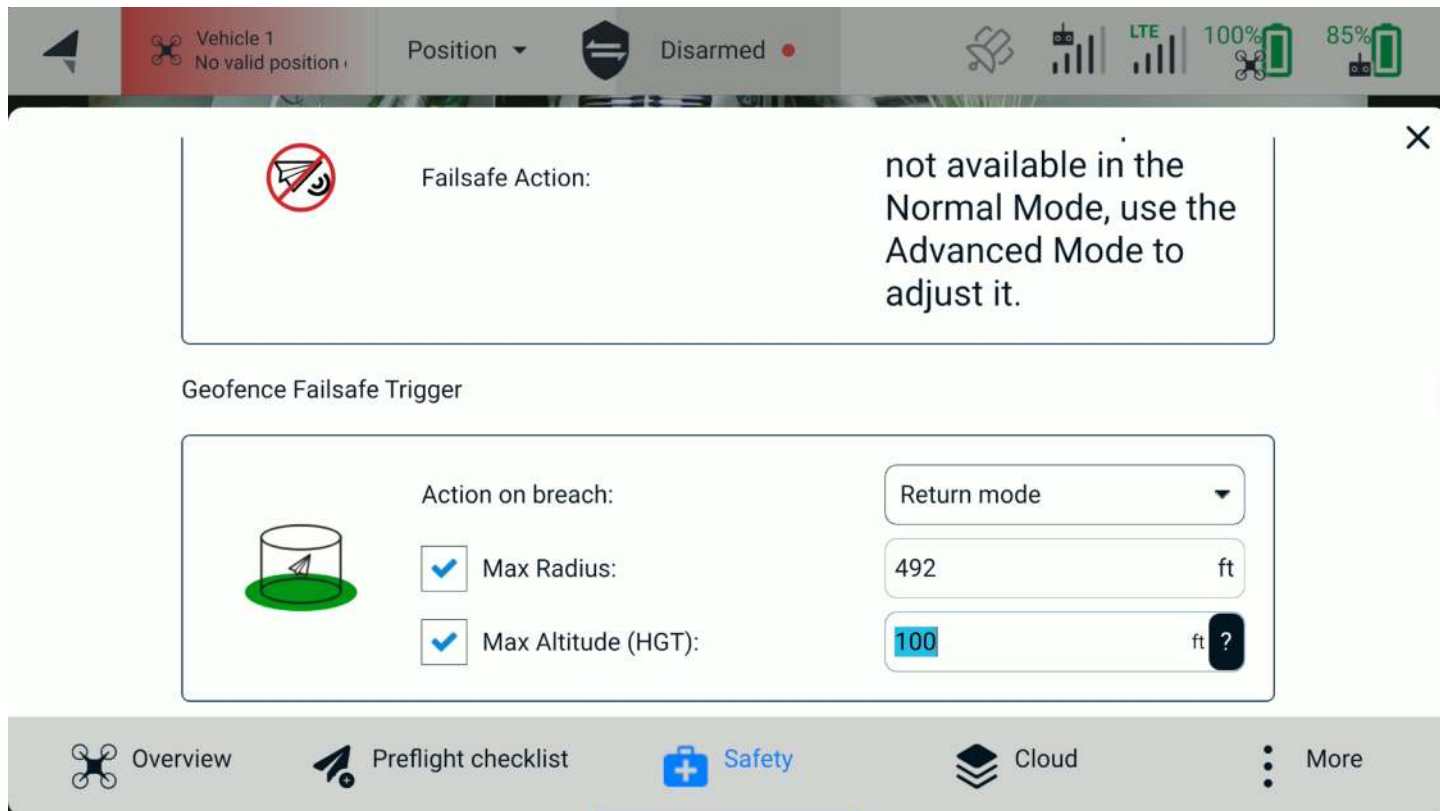
Max Altitude Setting

The Sherpa's maximum altitude limit can be configured in the flight-control application. There is no separate "guided" maximum altitude: once you set an altitude limit, the system enforces it across all flight modes. Setting a sensible maximum altitude helps ensure that you remain within legal airspace and within the drone's performance envelope.

To adjust the Geofence Failsafe Parameters:

1. Tap on "Vehicle 1"
2. At the bottom of the screen, tap "Safety."

3. Scroll to the bottom of the list to "Geofence Failsafe Trigger" and adjust as needed.



Weather Minimums

Respect the following weather limits:

Condition	Limit	Notes
Sustained wind	≤ 15 mph (24 km/h)	Higher winds reduce stability and cause overspray.
Peak gusts	≤ 25 mph (40 km/h)	Sherpa may drift slightly in gusts; it maintains position within ±3 ft in Position mode
Visibility/Fog	VFR only; no fog	Maintain visual line-of-sight and remain 500 ft below / 2,000 ft lateral to clouds.
Precipitation	Light rain only	Postpone operations during moderate or heavy rain.
Extreme Heat	Below 104 °F (40 °C)	Sherpa will warn the pilot if internal temperatures reach fail-safe levels.
Blow Freezing	Above 32 °F (0 °C)	Do not fly in freezing temperatures; ice may form on the propellers.

Caution: Architectural features such as roof edges, narrow urban canyons, dormers, and spires can create turbulent airflow; increase clearance or postpone flights on windy days.

Securing the Work Area

Delineate the work zone using cones, tape, barricades, or road-closure permits as required. Mark or monitor building exits that open into the flight area without blocking them for emergencies. Assign personnel to manage hose routing and control bystanders. Establish a clearly marked emergency landing zone.

Personal Safety and Chemical Exposure

Do not allow clothing saturated with cleaning chemicals to remain on skin; change immediately. Treat chemical splashes using an emergency eye-wash station and clean water, following the SDS guidelines. Always adhere to the chemical safety standards provided by the chemical manufacturer.

Remote ID Compliance

The Sherpa broadcasts Remote ID data automatically, and it cannot be disabled. Tampering with Remote ID hardware or firmware is strictly prohibited and violates FAA regulations, voiding the warranty. All U.S. operators must comply with Remote ID rules.

Equipment Responsibility

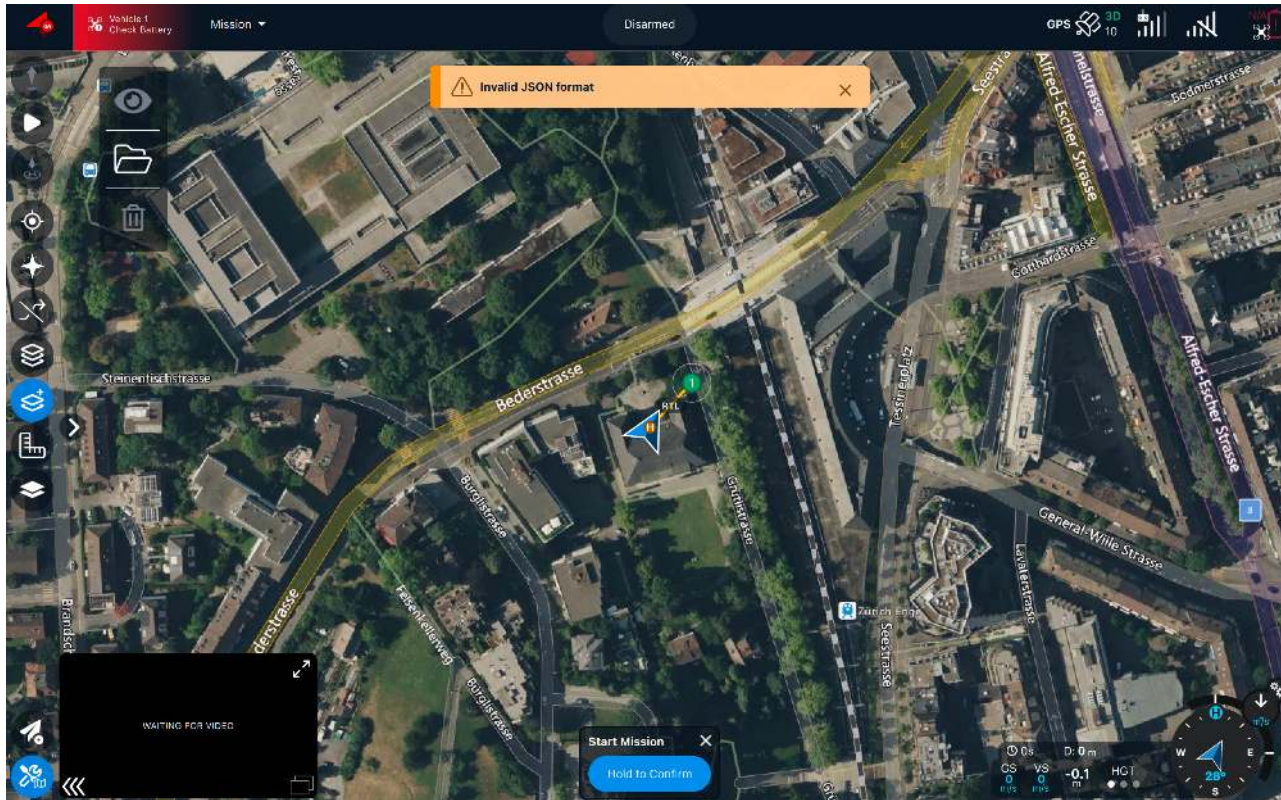
Customers are responsible for inspecting and maintaining their Sherpa drone in accordance with Lucid Bots' guidelines. Operate only with Lucid Bots-approved batteries, nozzles, attachments, and replacement parts; using unauthorized components voids the warranty and may result in injury or property damage. Do not modify the hardware or software. Unauthorized changes immediately void the product warranty and may violate aviation or regulatory laws.

Failure to follow maintenance and equipment guidelines can lead to loss of warranty support, equipment damage, personal injury or death, and legal consequences.

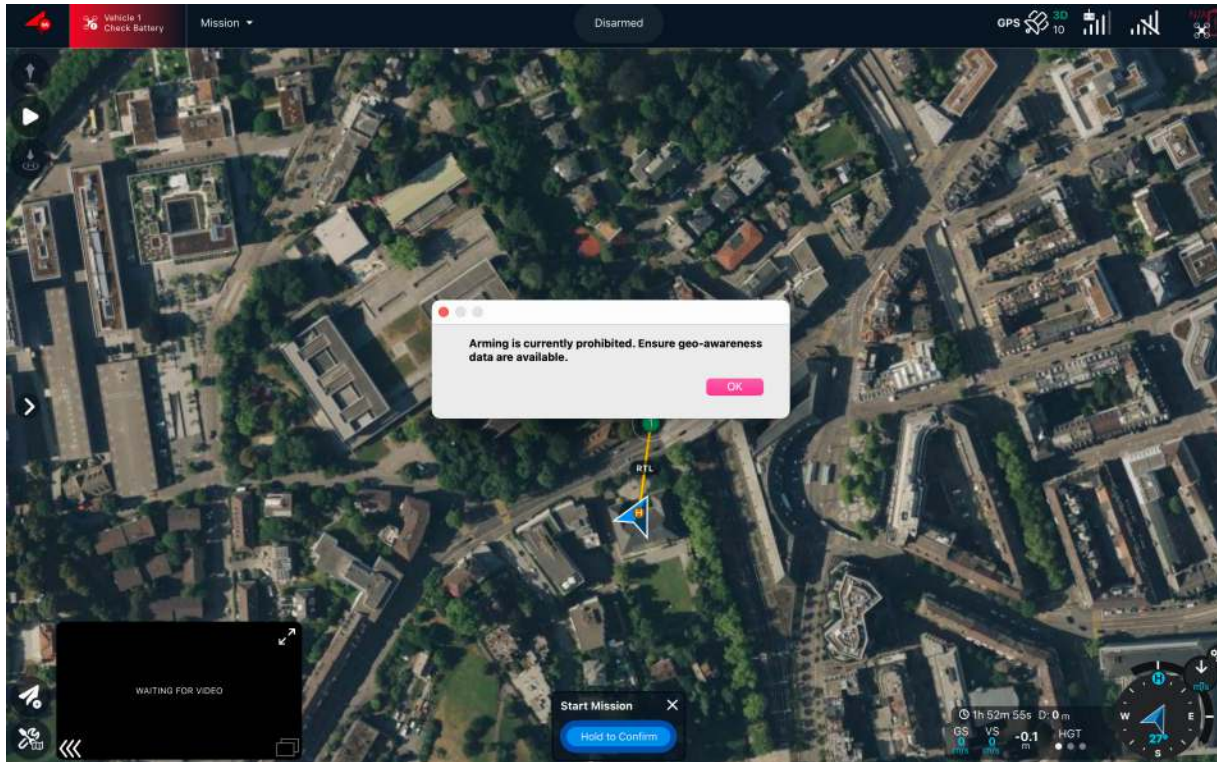
Geo-Awareness and Airspace Limitations

The Sherpa incorporates geo-awareness functions to help keep your operations clear of restricted or controlled airspace. You can import geofence boundaries by uploading **geo.json** files or **KML overlays** into Auterion Mission Control. The default buffer is set to **20 m** from a restricted area. When geo-awareness data are unavailable or invalid, the system will prevent the drone from arming and display an alert. Typical messages include:

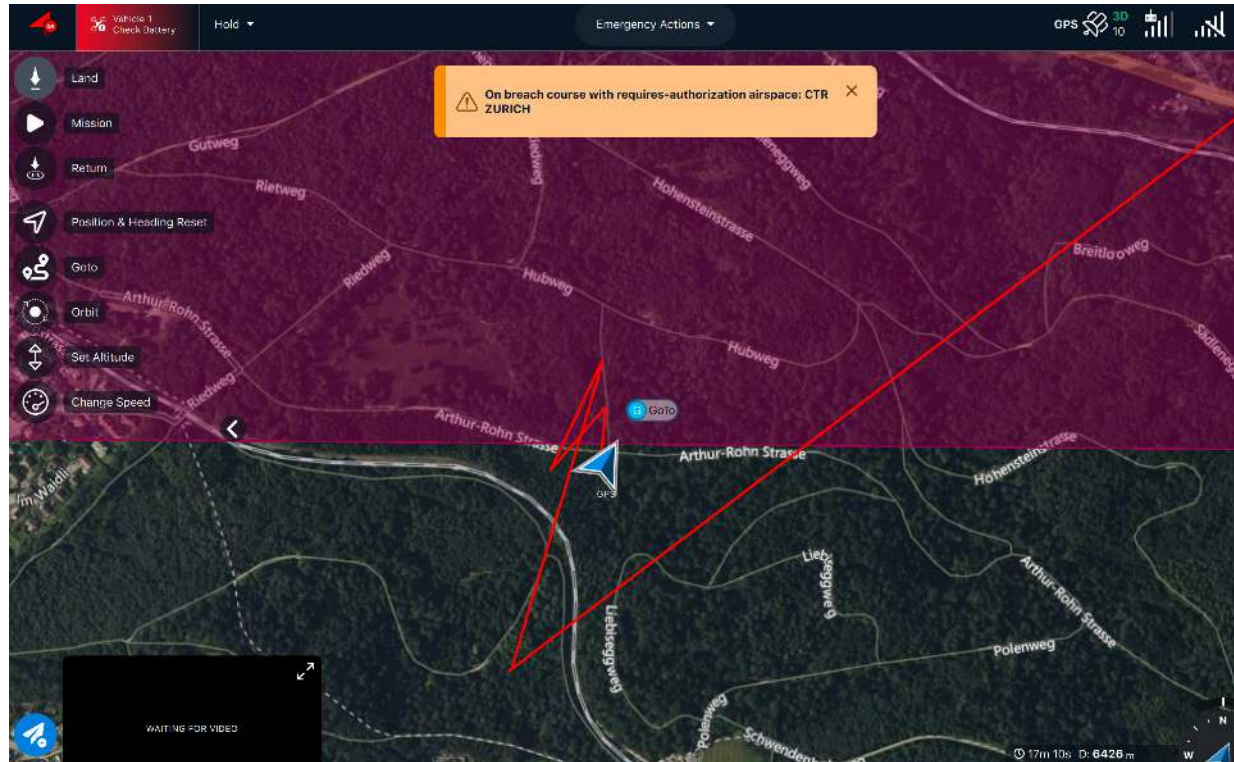
- “Invalid JSON format” – displayed when a geo map cannot be parsed.



- **“Arming is currently prohibited. Ensure geo-awareness data are available.”** – shown when attempting to arm the drone with missing or invalid geo-awareness data.



- **“On breach course with requires-authorization: 'airspace name'.** Example: **CTR ZURICH.** – displayed when approaching controlled or restricted airspace.



To upload geo-awareness data, follow the instructions provided by Auterion for importing geo-awareness data or KML overlays. After uploading, verify that the geo layer loads correctly and that the controller is set to maintain a 20 m buffer from restricted airspace.

Importing Geo-awareness Data and KML Overlays

Auterion Mission Control allows you to load custom geo-awareness data and map overlays from **.json** or **.kml** files. These files can define restricted airspace, buffer zones, and approved work areas so that the map view in Mission Control matches your local operating rules.

Loading geo.json or KML files

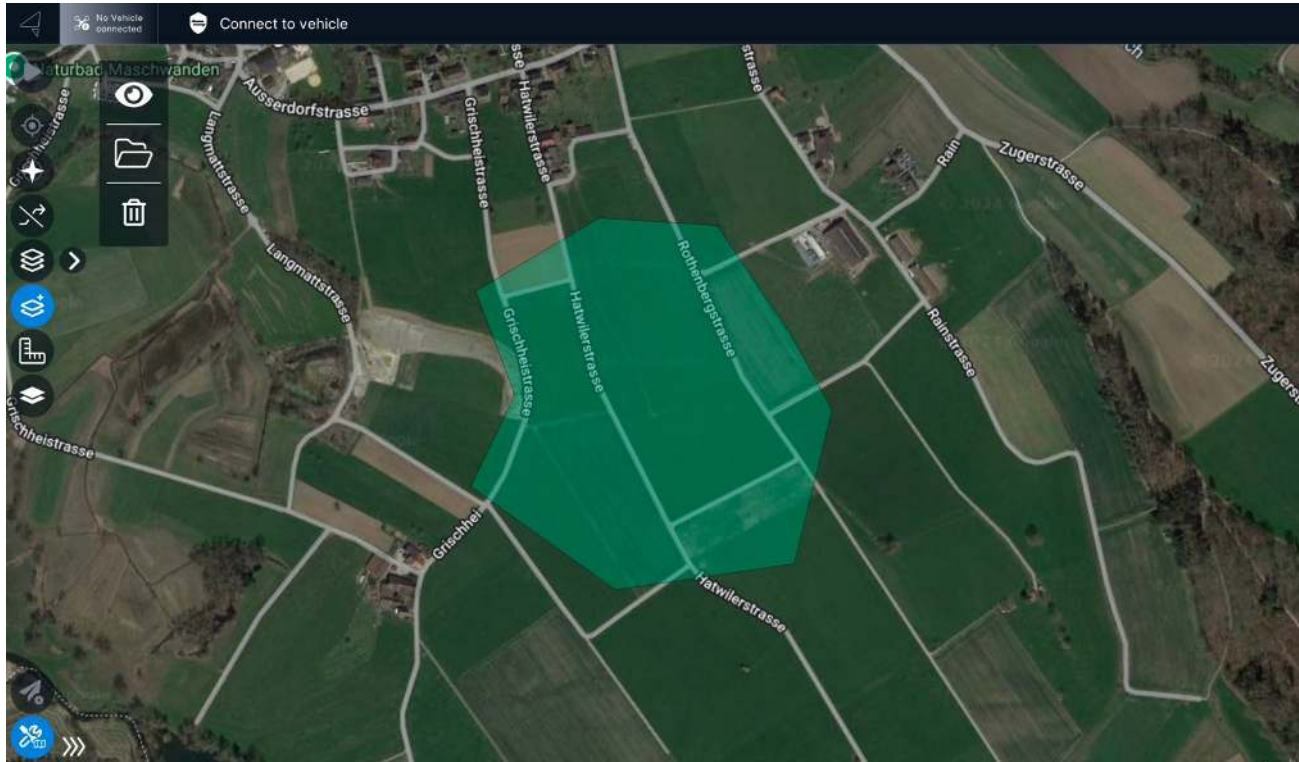
Use this workflow whenever you need to add or update geo-awareness data for Sherpa operations:

1. Download either a **.json** or **.kml** map overlay on your computer and move the file to a USB-A thumb drive.
2. Plug the thumb drive into the top USB port on the controller.

3. Open Fly View in Auterion Mission Control and open the Map Tools menu.
4. Select Map Overlays.
5. Choose the geo-awareness file you want to load (either a **.json** or **.kml** file) from the thumb drive.

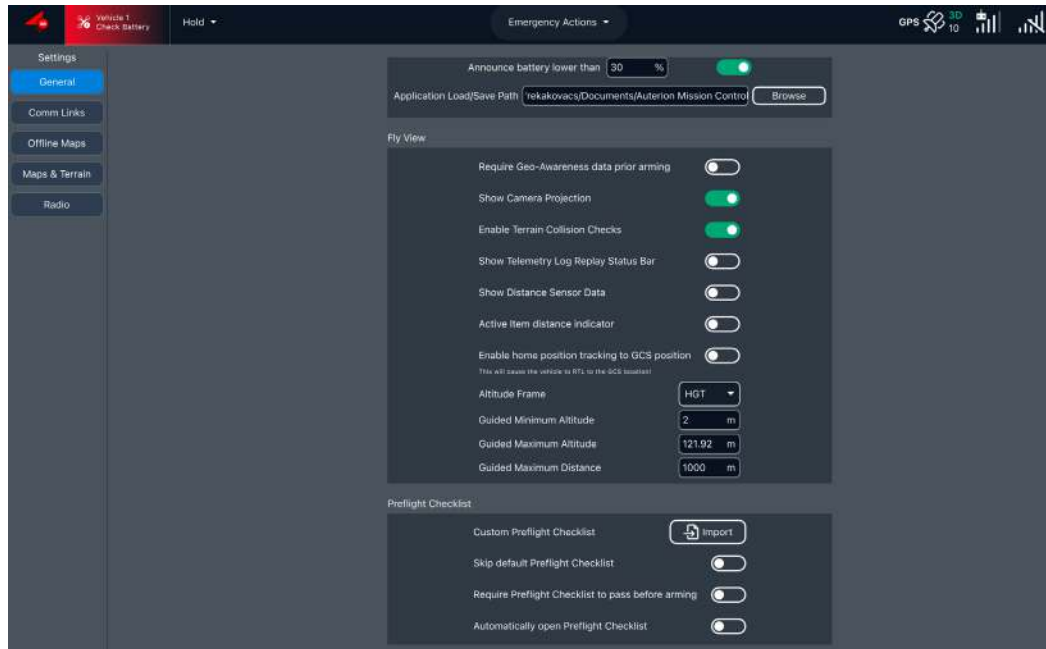


After import, KML overlays are shown in green and are centered on the map. Geo.json files are drawn according to how the file describes the geometry and styling.



How to Disable Geo-Awareness:

1. Open your settings menu in AMC
2. Under General - Fly View
 - a. Toggle off "Require Geo-Awareness data prior to arming."



Night Operations

Night operations add risk and are tightly regulated. Only conduct night flights where they are explicitly allowed by the local civil aviation authority, and only when you can maintain visual line of sight and situational awareness at all times. This manual does not replace national regulations; if local rules are more restrictive, you must follow them.

United States – FAA Part 107

In the United States, night operations may be conducted under FAA Part 107 when all applicable requirements for night flying are met, including training and lighting.

At a minimum:

- The Remote Pilot in Command must hold a valid Part 107 certificate and be current on night operations training.
- The Sherpa must be equipped with anti-collision and position lighting that meets FAA visibility and orientation requirements.
- The work site must be illuminated so the crew can clearly

see the aircraft, hose routing, take-off and landing zone, obstacles, and bystanders.

Before any night flight in the U.S., complete a full pre-flight inspection, walk the site to identify hazards that may be difficult to see in low light, and review emergency procedures with the crew (including loss-link and emergency-stop use).

Night flights should use conservative altitudes and stand-off distances. Avoid narrow gaps, complex structures, and aggressive hose angles. If visibility degrades or any crew member loses sight of the aircraft, stop spraying and land as soon as it is safe.

Guidance on the placement of FAA-compliant night strobes or other lighting accessories is available from Lucid Bots on request. Only use lighting equipment that does not interfere with the aircraft's balance, RF systems, or collision-avoidance sensors.

European Union – night operations prohibited

For European markets, the Sherpa is CE-marked as a C3 UAS with an intended operating envelope that does not include night flight.

- Sherpa shall be operated only during daylight hours, in accordance with applicable EU drone regulations.
- Night operations with Sherpa are not permitted in EU member states under the current configuration and documentation.

Flying the Sherpa at night in the EU is considered use outside the intended conditions and may invalidate the product's C-class CE conformity. In that case, all liability for regulatory compliance and safety rests with the operator.

Other regions

Outside the USA and EU, operators must check and follow local aviation rules for night UAS operations, as well as customer policies and insurance requirements.

If local regulations are unclear or more restrictive than this manual, do not conduct night operations with Sherpa until you have written confirmation from the relevant authority and from Lucid Bots support.

Section 04

Drone Systems Overview

Airframe and Propulsion

The Sherpa is built around a **hexacopter layout**. Three motors spin clockwise, and the other three spin counterclockwise, which stabilizes the aircraft during flight. Each motor mounts a specific propeller orientation. Installing the wrong prop will cause the Sherpa to flip or crash on take-off, so check the rotation arrows molded into each propeller and match them to the motor's spin direction.



Motor and Propeller Pairing

The motors are numbered, and each arm uses a particular prop orientation. A brief table summarises where clockwise (CW) and counter-clockwise (CCW) propellers go. Inverted propellers are used to reduce vibrations; standard hobby-grade props are incompatible, and replacements must come from Lucid Bots.



Frame Arm Location	Motor Number	Rotation Direction	Required Prop Orientation
Front-Left	3	CCW	Inverted CW
Front-Right	5	CW	Inverted CCW
Mid-Left	2	CCW	Inverted CW
Mid-Right	1	CW	Inverted CCW
Rear-Left	6	CCW	Inverted CW
Rear-Right	4	CW	Inverted CCW

Important: The maximum take-off mass (MTOM) for the Sherpa is **24.95 kg (all-up weight)**. This includes the aircraft, batteries, payload and any attached equipment. It is classified as a **C3 UAS** for European markets. Exceeding the MTOM invalidates CE conformity. The aircraft's maximum dimensions are **500 mm × 250 mm × 250 mm (L × W × H)**. The tether/hose used for spraying or window washing is 100 feet long and weighs 3.256 kg when empty; the weight of water in the hose must be added when calculating all-up mass.

Propeller Brackets and Torque

Each motor has a propeller bracket held by four bracket bolts and two pivot bolts per blade. The pivot bolts should allow the blade to swing open smoothly but not flop around; over-tightening causes vibration, while under-tightening may make the blade too loose. After adjustment, apply a medium-strength thread-locker to prevent loosening during flight. The four bracket bolts secure the bracket to the motor shaft; ensure they are fully seated and retightened with thread-locker whenever removed. During routine inspections, spin the blades by hand to check for binding and adjust if necessary.

the button is lit, the radar is toggled off. Collision prevention must be on to arm the aircraft. After take-off, the responsible pilot-in-command (RPIC) may disable it, accepting responsibility for obstacle avoidance.

Sensors and Collision Prevention

A forward-looking radar provides the Sherpa's collision prevention. The radar projects a cone approximately 43° wide and 30° tall with a range up to 50 m. Within this zone, the flight controller will enforce a stand-off distance of roughly 3 m, slowing or stopping the Sherpa before it hits an obstacle. The radar can be toggled on or off with the B button on the controller; when



Limitations to be aware of:

- The radar brakes only forward motion; lateral slides are not detected.
- Thick overspray, spray lines, or nozzles not supplied by Lucid Bots may reflect radar pulses and cause twitchy flight.
- Thin objects (wires, cables) may be undetected.
- Strong winds pushing spray into the radar beam may trigger false positives.
- The radar only prevents the pilot from moving closer to an object; it will not force the drone to back away. Outside forces, such as strong tailwinds and spray-induced pressure changes, may cause the drone to drift closer to an object than the radar would allow. Always allow for more buffer space between the surface you are cleaning and the drone.
- If the drone drifts closer to an object than the radar would allow, you will not be able to move the drone forward or side to side. If this happens, move the drone backward away from the object.
- Be wary when cleaning structures like parking garages with gaps between features or levels, as the radar may allow you to move in while in front of those gaps.

If you choose to disable collision prevention, be aware that liability transfers entirely to the RPIC.

Failsafe and Safety Features

To protect the drone and reduce risk, the Sherpa incorporates several automated safety systems:

- **Low battery management:** When the battery state-of-charge drops to ~30 %, the controller announces a low battery warning every percentage point the drone battery drops. At ~15%, it will trigger a critical battery warning with "Return advised" on the controller screen. At 10%, it enters hold mode, maintaining position without accepting new navigation commands for 5 seconds, forcing unaware pilots to look at the controller screen and see the warning. After 5 seconds, the drone will enter land mode. If no input is given, the drone will land where it is. If the pilot moves the sticks, they will regain full control to reposition the drone. At 5%, the aircraft will start a forced vertical descent and land. The pilot will be able to move the drone horizontally while it is descending, but will not be able to increase altitude. (Warning: the drone is a bit harder to control in forced descent) Because the hose prevents a standard return-to-home, always plan to land manually when the first warning sounds.

- **Manual mode:** If the real-time kinematic (RTK) signal or GPS fix is lost, or if the RPIC engages manual mode, the Sherpa maintains altitude and heading but does not hold position.
- **Emergency stop:** Rolling both emergency stop dials outward simultaneously will immediately cut motor power.
- **Auto-disarm:** The motors disarm after the Sherpa remains stationary for 10 seconds on the ground.
- **GPS/RTK integrity:** The system performs integrity checks on its navigation sensors; without a good fix, arming is prevented.
- **RC link loss:** If radio communication is lost, the Sherpa enters hold mode and hovers up to 60 seconds or until battery reserves are low. It will then auto-land where it is if no link is regained.
- **Flip detection:** If the aircraft tilts beyond 60° for any reason, the flight controller cuts motor power to prevent further damage.
- **ESC/motor fault:** A continuous chirping sound indicates an electronic speed controller (ESC) or motor fault.
- **Fly-away failsafe:** If the drone travels more than 150 m horizontally from the take-off point with good GPS connectivity, it will ascend to 45 m and return along the tether line back to the launch area before landing.

The Sherpa also broadcasts a Remote ID signal as required by the FAA. This transmission cannot be disabled, and tampering is prohibited.

Payload Systems

The Sherpa supports a standard high-pressure spraying payload and a **window-washing payload (WWP)**. Both payloads mount to the bottom of the aircraft and include a hose connection to ground-based pumps.

- **Spraying payload:** Suitable for soft-wash chemicals or similar liquids. Do not mix chemicals without verifying compatibility. Use only approved nozzles and check for chemical compatibility with the hose and fittings.



- **Window-washing payload:** Designed to apply Lucid Clear or window cleaning detergents, followed by a spot-free rinse. The WWP tank must be emptied and rinsed after each job because chemicals can degrade tubing.



WWP Operating Limits

For the WWP, different injectors are available depending on your pump’s flow and pressure:

Injector Rating	Maximum Flow & Pressure	Notes
Soft-wash injector	Up to 500 psi	Use for low-pressure soft-wash pumps
High-pressure 3–5 GPM injector	<4,500 psi	For moderate flow high-pressure pumps
High-pressure 5–8 GPM injector	<4,500 psi	For high-flow high-pressure pumps

Select the injector that matches your pump. Flow rate and pressure directly affect chemical mix ratio and spray pattern. Empty and rinse the WWP tank after each job to prevent chemical build-up and damage.

Best-Practice Workflow for Window Washing

1. Plan to wash the windows early in the day or when the facade is shaded; direct sun can cause streaking if the chemicals dry on the windows.
2. Perform a three-step cycle: pre-rinse with deionised (DI) water to cool hot windows, apply Lucid Clear and allow a roughly two-minute dwell time, then rinse thoroughly with DI water. The final rinse should remove all detergent and particulates.
3. Check the total dissolved solids (TDS) of your DI water; it should read ≤ 10 parts per million.
4. Use dedicated hoses for DI water to avoid contamination and flush the lines before use. Pay special attention to window frames and sills during the final rinse.
5. Ground test the spray pattern before flight to confirm proper flow and nozzle function.

Electrical and Batteries

Only Lucid-supplied **12-cell Smart Batteries** are approved for

the Sherpa. Follow these practices for safe operation:

- Always fly with two battery packs of similar charge level. Inspect connectors regularly for corrosion or damage and clean with an appropriate contact cleaner.
- Store batteries in a fire-resistant LiPo-safe bag at temperatures between 40–80 °F ($\approx$ 4–27 °C) away from direct sunlight and chemicals.
- Clean battery contacts with a non-metallic wire brush and contact cleaner. Never bridge the positive and negative terminals or short the contact plates.
- Balance cables allow monitoring and equalising individual cell voltages. Use them when charging, especially if there is a significant voltage difference between cells.

Checking State-of-Charge

Press the button on the battery to check remaining charge. LED indicators represent charge percentage: four LEDs lit means 76–100 %, three LEDs 51–75 %, two LEDs 26–50 %, and one LED <25 %. Corrosion around the connector is a sign that the battery should not be used.

Charging Guidelines

Use the supplied charger in **Charge** mode. Seat the yellow power plug firmly in the charger output and ensure the charger display shows the correct voltage. If the charger does not display cell voltage, connect the balance cables. Press and hold the **Start/Stop** button to begin charging.

- Never leave charging batteries unattended or in direct sunlight.
- Remove any damaged batteries and do not attempt to charge them.
- These batteries are not airline-approved; do not transport them by air.
- Do not adjust charger settings mid-cycle and avoid using the **Balance** mode unless specifically required.

When the controller reports a low-battery warning at 30 %, land as soon as practicable, relying on the final failsafe descent is not recommended because the hose restricts horizontal movement and the auto-land function will descend straight down.

Sound Power Level: 109.7 dB (EU and US markets). Use appropriate hearing protection when operating the Sherpa.

Tether connection: Attach the tether (hose) to the bottom of the drone. Keep the tether clear of rotors and ensure it is not kinked or damaged before each flight.

Environmental limits: The tether (hose) is rated for temperatures between 0 °C and 100 °C and can handle 100 % relative humidity.

Section 05

Remote Controller

Overview

The Sherpa is controlled with a **SiYi MK15 smart transmitter**.

This Android-based unit features a built-in touchscreen that shows telemetry (altitude, speed, heading), GPS/RTK status, camera feed, and battery health. Handle the controller carefully and store it in its padded case to prevent screen damage or moisture ingress.

Controller Layout

The MK15's controls and indicators are arranged for intuitive access. The table below summarizes each major component and its function:



1. Power Button

The power button turns the controller on and off. To start the controller, tap the button once and then press and hold until the screen lights up. A quick tap puts the controller into sleep, and another tap wakes it. To shut down fully, press and hold and confirm the shutdown prompt on the screen. Always power the controller off before storing it or leaving the job site.

2. Drone Connection Status Indicator

This LED bar shows the link status between the controller and the Sherpa. A steady, normal indication means the controller is connected and ready. Flashing, red, or unlit LEDs mean the link is not established, and you must not arm the drone. If the indicator does not show a healthy link, power-cycle both the drone and controller and check again before flight.

3. Controller Battery Level Indicator

This indicator shows how much battery charge remains in the controller. More lit segments mean a higher state of charge. One segment or a low indication means it is time to charge. The

controller should begin each job with a high charge so it cannot shut down during a mission.

4. Antennas

The two antennas provide the control and video link to the Sherpa. They must be installed and snugged down before each flight. Keep them upright and clear of your body, vehicles, and metal structures to avoid blocking the signal. Do not fly with loose, missing, or visibly damaged antennas, and do not carry the controller by the antennas.

5. Three-Stage Spray Control

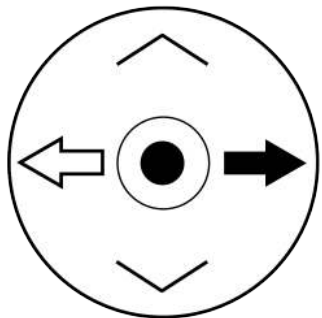
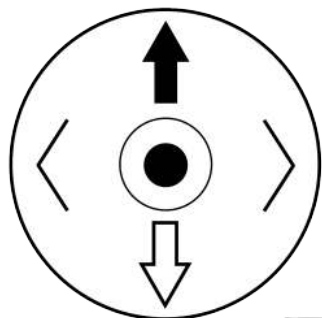
This switch on the top right controls the primary spray output from the drone. In the standard configuration, one position turns spray off, the middle position is used for normal cleaning, and the opposite position can be mapped to a higher flow or a job-specific setting. Start every flight with this switch in the off position. Change spray states only when the aircraft is stable and clear of the building surface so you do not shock-load the hose or the airframe.

6. Window Payload Injector On / Off

This switch controls the Window Washing Payload injector when that payload is installed. With the switch off, the drone rinses with DI or clean water only. With the switch on, the injector pulls window-cleaning chemical from the onboard tank into the flow. Leave this switch off whenever the window payload is not installed. Treat it as a dedicated chemical on / off control for glass work.

7. Left Stick - Throttle and Yaw

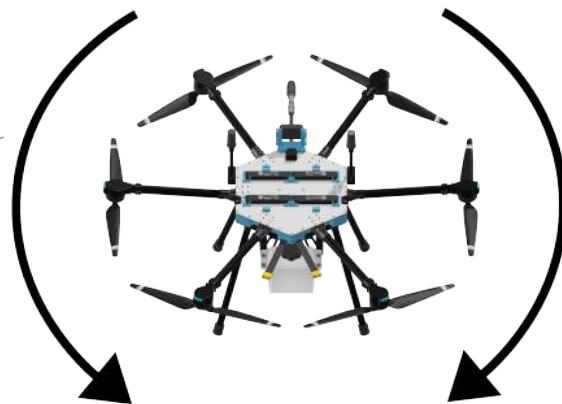
The left stick controls altitude and heading. Pushing the stick up or down makes the drone climb or descend. Moving the stick left or right rotates the drone around its vertical axis. Use small, smooth inputs when taking off, landing, or adjusting orientation near a building. After landing, hold the left stick fully down until the props stop and the HUD confirms that the drone is disarmed.



UP



DOWN

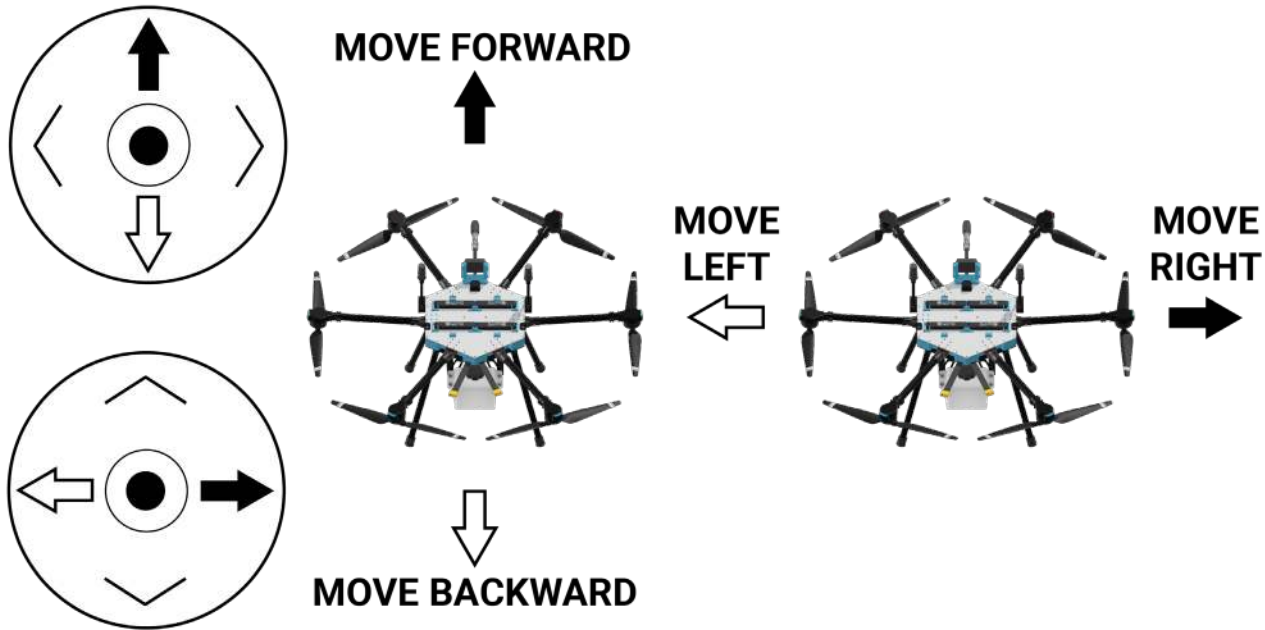


TURN LEFT

TURN RIGHT

8. Right Stick - Pitch and Roll

The right stick moves the drone forward, backward, and sideways. Pushing the stick forward or backward tilts the drone and makes it move nose-in or nose-out along the building. Moving the stick left or right causes sideways motion for trimming the stand-off distance or working along a facade. Most cleaning movements are made with this stick, while the left stick is used for fine altitude and heading control. Smooth inputs reduce hose swing and help the radar maintain a safe distance from the wall.



9. Flight Mode Switch - Manual / Position / Land

The three-position slider below the center of the controller selects the active flight mode. In Manual Mode, the Sherpa holds altitude with the barometer but does not hold position. This mode is intended for emergencies only, such as an RTK or GPS failure, and you should land as soon as it is safe. In Position Mode, the drone uses GPS and compass data to hold its location and heading. This is the primary mode for cleaning operations. In Land Mode, the drone performs a controlled vertical descent to the ground. When using Land Mode, you must watch the hose and ensure the landing area is clear, because the system does not provide obstacle avoidance during the descent. Automated return-home behavior is not used on Sherpa because of the attached hose.

10. Radar Toggle Button (B Button)

The B button on the front panel controls the forward collision-avoidance radar. For normal operations, radar must be on so that the drone can arm and enforce its stand-off distance. When radar is active, you will see distance indicators on the screen, and the

aircraft will slow or stop as it approaches the programmed limit. Turning the radar off removes that protection and places full responsibility for obstacle clearance on the pilot. Only disable radar when required for a specific task and only after confirming the path is completely clear.

11. Rolling Emergency Stop Switches

Under each antenna is a rolling emergency stop switch. Rotating these outward past the marked range cuts power to all motors immediately. This function is reserved for situations where a normal landing is not possible and the aircraft presents an immediate hazard to people or property. After an emergency stop, the drone must be inspected for damage and you must follow the restart procedure before the next flight. During normal operation, avoid resting fingers on these controls so they cannot be triggered accidentally.

Charging and Powering the Controller

- Use the supplied USB-C cable and 20 W adapter. Always power the controller off completely before charging.



- During charging, the LED next to the port glows red; it turns green when the battery is full or if no current is flowing.



- To power on, tap the power button briefly and then press-and-hold until the screen turns on. To put the controller to **sleep**, tap the button once; tap again to wake. To fully power **off**, press and hold and follow the on-screen shutdown prompt.

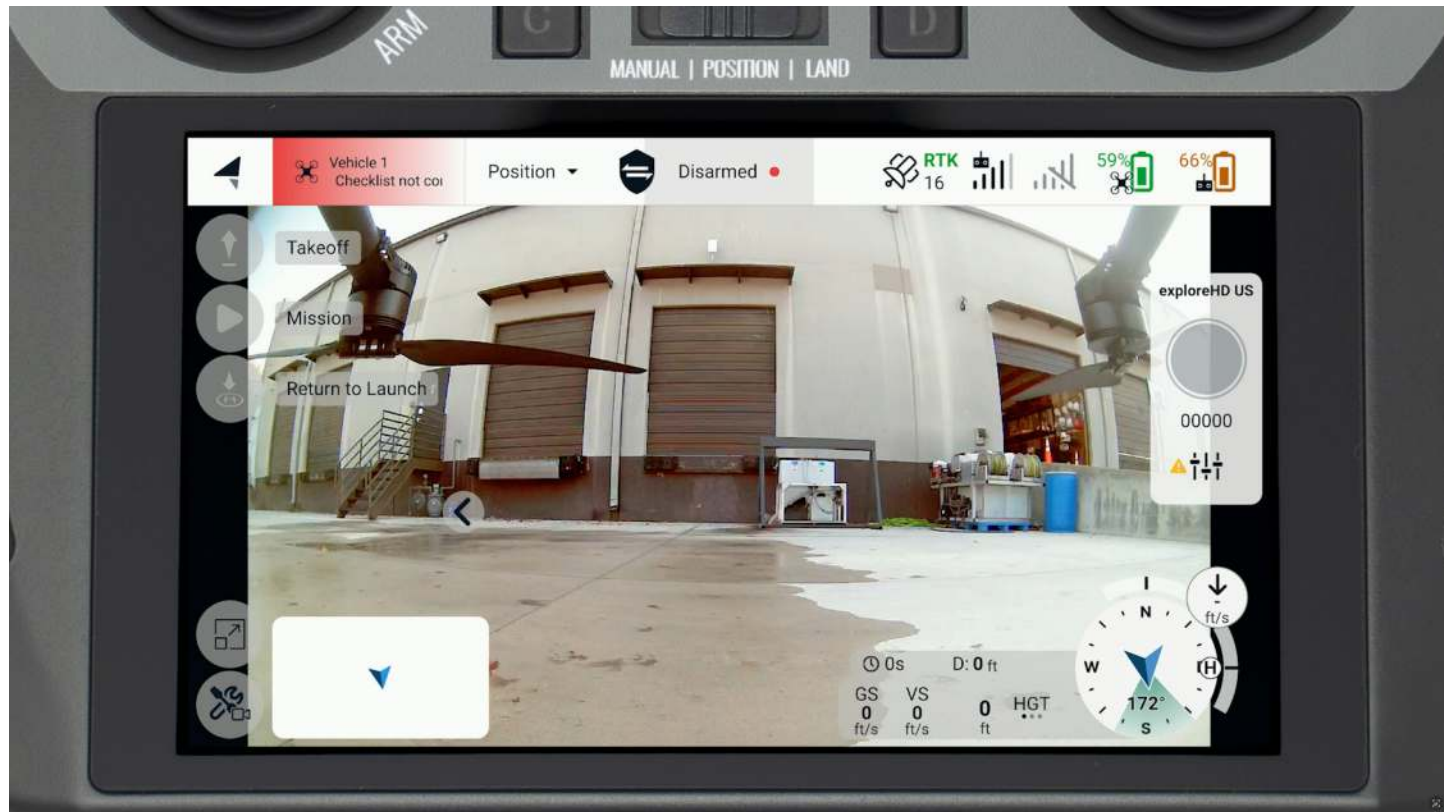
Linking to the Sherpa

1. Power on the controller and then the drone.
2. A green connection LED indicates a link has been established. If no link forms within one minute, power-cycle both devices.
3. Ensure Wi-Fi is turned off and Ethernet is turned on in the controller settings. Mismatched indicator colours may signal a version conflict.
4. The MK15 is factory-calibrated. Do not adjust system settings without contacting Lucid Bots support.

Mission Control Interface

- The controller runs Auterion Mission Control. This app provides a simplified user interface for piloting and monitoring the Sherpa:

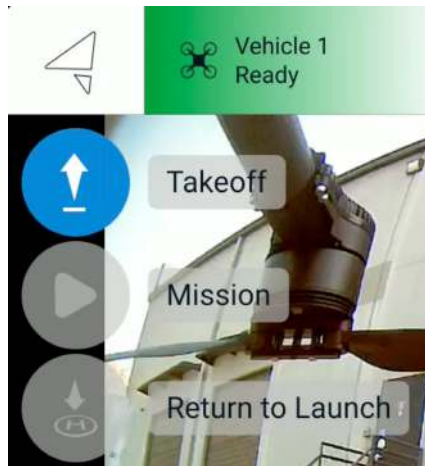




- **Status bar (top row):** shows GPS/RTK quality, RC link strength, battery levels (drone and controller), LTE status, selected flight mode, and whether the aircraft is ready to fly.



- **Fly tools:** virtual buttons for **Take-off** (auto-arms and climbs to a preset altitude) and **Land** (auto-descends and disarms).



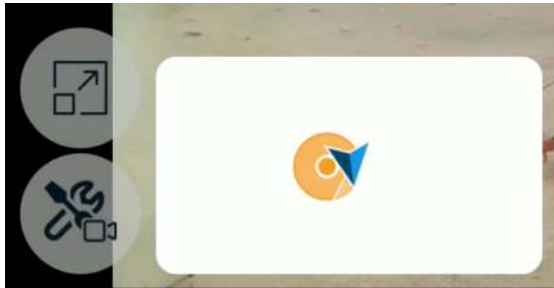
- **Telemetry panel:** displays real-time altitude, airspeed, flight time, and heading.



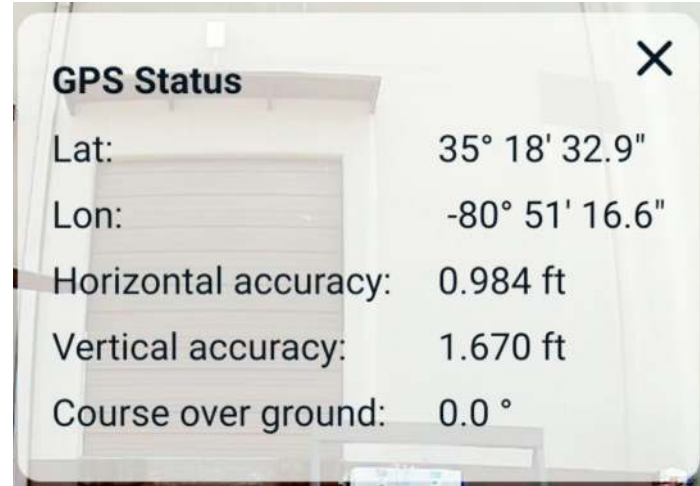
- **Battery pop-up:** tapping on the drone battery shows voltage, current draw, and remaining capacity for both batteries.



- **View switcher:** toggles between the first-person-view (FPV) camera and the base map.

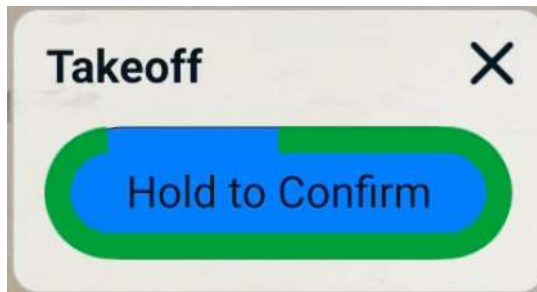
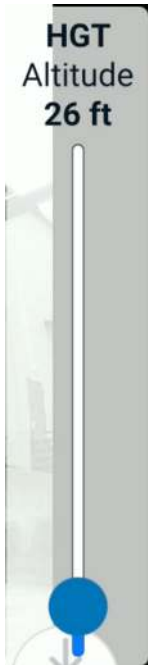


- **GPS positioning:** tapping the satellite count reveals horizontal and vertical accuracy.

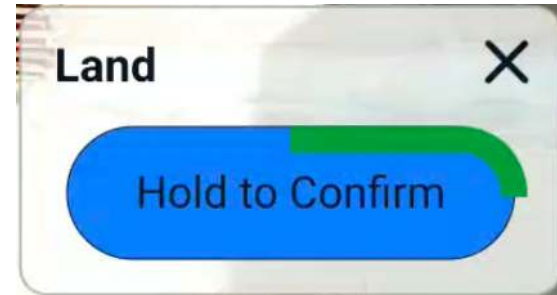


Take-Off and Landing Tools

- **Take-off:** When activated, the drone arms itself, climbs to about 8 feet (2.5 m) or a pilot-defined height, and hovers. Move either stick at any time to cancel the automation and regain manual control.



- **Land:** Commands a vertical descent and disarms the motors upon touchdown. There is no obstacle avoidance during descent; monitor the hose slack and ground hazards.



Section 06

Operations

Pre-Flight Setup

Proper preparation ensures safe and efficient cleaning operations. Follow these steps each time you deploy the Sherpa:

1. **Unfold and secure the arms.** Rotate each arm until its latch clicks; properly latched arms cannot be pushed back down.
2. **Remove propeller guards.** Stow the foam guards before flight.
3. **Inspect and unfold propellers.** Fully extend each blade and check for damage; flying with partially folded or damaged blades shortens service life.
4. **Connect the hose.** Attach the cleaning hose to the quick-connect fitting on the bottom of the payload.
5. **Attach the spray wand.** Use the front quick-connect above the camera to connect the spray wand.
6. **Insert batteries.** Install two fully charged batteries. Keep their cables clear of the centerline and seat them firmly between the bumpers. Secure using the provided Velcro straps.
7. **Plug in power leads.** Insert both power connectors until the red gasket is no longer visible; the order does not matter. Tight connections maintain the water seal.

After the hardware is set up, power on the remote controller and then the drone to establish the link. Complete the pre-flight checklist in Auterion Mission Control and verify airspace authorisation, weather conditions, battery status, and hardware integrity (arms, props, antennae, nozzles, body, GPS).

Flight Modes and Controls

The Sherpa's flight modes are selected with the flight-mode slider on the MK15 controller. Because the aircraft is tethered to a hose, automated return-home functions are disabled. Maintain manual control throughout cleaning operations.

- **Position Mode (default):** Uses GPS and compass sensors to hold position and heading. This is the standard mode for cleaning flights because it counters wind, spray thrust, and hose tension.
- **Manual Mode:** Uses the barometer to hold altitude without lateral stabilization. It engages automatically if RTK/GPS accuracy is lost or when the slider is moved fully left. The drone will drift like it is on ice; use gentle stick inputs to stabilise, land promptly, and do not continue cleaning.

- **Land Mode:** Commands a vertical auto-descent. There is no obstacle avoidance while descending, so monitor the area and hose.
- **Hold Mode:** Causes the drone to hover in place. It activates automatically if the RC link is lost, at the 10 % battery failsafe, or after auto take-off. Any stick input returns to Position Mode.
- **Return (Home):** Attempts to fly back to the take-off point. Because the Sherpa is tethered, this feature must not be used; automated return can snag the hose or cause a crash.

Use the **Take-off** button in Mission Control to auto-arm and climb to a preset altitude. Move either stick to cancel the automation and take over manually. Avoid using automated landing or return features because they do not account for the tether.

Collision Prevention and Failsafes

A forward-facing radar cone (about 43° wide by 30° tall) monitors obstacles up to 50 m ahead and enforces a 3 m stand-off distance in Position Mode. The radar must be on

to arm the drone and may be toggled off only once airborne; disabling collision prevention transfers responsibility for obstacle avoidance to the pilot. The radar only slows forward motion; yaw or lateral movement may bypass its protection. Spray mist, unusual nozzles, thin obstacles, or open spaces can cause false readings.

Key failsafe systems include low battery alerts and forced descent, emergency stop dials, auto-disarm when idle on the ground, GPS/RTK integrity checks, RC link loss hold, flip detection, and motor/ESC fault alarms. See the safety section for detailed descriptions of these functions.

Hose Management and Pressure Relief

Because the Sherpa is tethered, active hose management is essential. Before take-off, lay out the hose in the operating area and assign a crew member to monitor loops and tension. Lucid Bots recommends a 3/8-inch Flexzilla hose with compression fittings for soft-wash work or a single-wire non-heated pressure

hose. Avoid heavy hot-water-rated hoses; they reduce flight performance.

After landing, follow this sequence to relieve pressure and disconnect safely:

1. Land and keep the batteries plugged in.
2. Move the flight-mode slider to Land to prevent inadvertent re-arm.
3. Stop the pump.
4. Position the drone and nozzle so water can be discharged safely.
5. Toggle the spray switch until only a trickle flows.
6. Disconnect the hose.

An inline ball valve between hose sections can relieve pressure for quick swaps. Do not install a valve at the drone end—it can destabilize the aircraft during landing.

Landing Protocol

Select a flat, obstacle-free zone and keep the drone oriented away from the pilot. Manage hose slack with shallow S-turns, and for high-pressure hoses, slide the drone sideways before touchdown to prevent loops under the propellers. Approach the landing zone aligned with the pilot, descend steadily, verify that the hose is clear below 5 ft (1.5 m), and hold the left stick fully down until the propellers stop and the HUD reads **DISARMED**. Then unplug both batteries. Uneven terrain can delay disarm—choose level ground and wait until the motors stop.

Crew Coordination

Efficient operations depend on clear roles and communication:

- **Remote Pilot-in-Command (RPIC):** The final authority for safety and compliance. The RPIC completes the pre-flight checklist, monitors the mission, and halts operations if unsafe conditions arise.

- **Pilot Assistant / Visual Observer (PA/VO):** Watches the drone, hose, airspace, and bystanders; manages hose slack; and relays hazards. The PA/VO never stands beneath the aircraft.
- **Additional crew:** Large jobs may require extra hose handlers or lookouts. Use radios and regular briefings to coordinate.

Clear communication reduces confusion and helps manage the tether effectively.

Maintenance and Care

Routine Pre-Flight Inspection

Before each mission, inspect the drone to ensure it is airworthy:

Component	What to check
Airframe	Look for cracks in carbon-fibre arms, landing-gear legs, and mounting brackets; tighten any loose or missing bolts.
Motors	Check that each motor sits level and spins smoothly without unusual whines.
Propellers	Inspect for warps, chips, or cracks and replace damaged blades with the correct orientation.
Batteries	Ensure packs are not puffed, connectors are clean, pack temperature is warm (not hot), and cell voltages are within 0.05 V.
Wiring	Check that jackets are not pinched and that power cables and connectors are fully seated.

If any discrepancy is found, do not fly until it is rectified.

Post-Flight Cleaning & Storage

After each flight:

- Rinse away chemical residue, then dry the drone completely before placing it in its case.
- Keep the case open until the interior is dry. Avoid storing the drone in humid or hot environments.
- Never store or transport the drone with liquid in the window-washing payload tank.
- Remove the batteries and store them separately in a Li-Po-safe bag.

Maintenance Schedule

Follow this periodic service schedule to prolong the life of the Sherpa:

Interval	Service
End of Day	Flush each motor for 30 seconds with a garden hose; rinse the payload and quick-connect ports; low-pressure rinse the fuselage; towel dry.
Every 10 flight hours	Perform a full airframe inspection; tighten landing-gear and arm-hinge bolts; spin motors; clean thoroughly.
Every 50 flight hours	Check the airframe and motor sound; inspect frame locks, payload plate, cables, RC antennas, and GPS antennas.
Every 100 flight hours	Inspect the upper and lower plates; remove propellers and run motors to listen for bearing noise; replace propellers; conduct a comprehensive bolt check.
Annual (~200 h)	Repeat 100-hour service; replace propellers; send the drone to Lucid Bots for motor service; inspect the spray servo and window-wash solenoid.
Biennial (every 2 years)	Repeat the 100-hour inspection; replace propellers and ideally all batteries (if they have fewer than 150 cycles); renew your FAA Part 107 certificate.

When cleaning, use garden-hose pressure only and avoid spraying directly into arm hinges or wiring entry points.

Battery Care and Logging

Remove any battery with puffing, corrosion, or a cell imbalance greater than 0.1 V from service. Clean corroded contacts with DeoxIT® and a wire brush. Use balance cables when placing batteries in storage mode and follow the charge/storage cycle specifications provided by the battery manufacturer.

Battery state-of-charge can be read from the on-board LED indicator: four LEDs lit means 76–100 % remaining, three LEDs 51–75 %, two LEDs 26–50 %, and one LED 0–25 %. Always land when the battery reaches roughly 15 % to avoid relying on emergency failsafes and do not resume cleaning after the low-battery warning, even if the percentage rises after descent.

Transport and Storage

The Sherpa ships in a waterproof hard case. To protect electronics and propellers, always stow the drone inside its case during transport. Do not store the drone in its case while it is wet, with chemicals in the payload tank, or when chemical residue remains; doing so can cause damage. Remove the batteries and store them in Li-Po-safe bags, rinse chemical residue and dry the drone before packing, and secure loose tools separately.

Approved Components Only

Using non-Lucid parts can introduce safety risks. Always use approved components:

Component	Risk if non-approved
Propellers	Incorrect pitch or orientation can cause the Sherpa to flip or crash.
Spray wands	Unbalanced or incompatible wands can introduce vibration, trigger false radar hits, and void the warranty.
Third-party cameras/lights	May emit radio noise, alter weight balance, or cause excessive vibration.

Contact Lucid Bots before adding accessories. Guidance on placing FAA night-waiver strobes is available on request.

When to Contact Lucid Bots Support

Stop operations and reach out to Lucid Bots if any of the following occur:

- The drone emits repeated startup chirps or fails to initialise.
- The controller does not link after a restart, and all antennas are secure.
- A battery refuses to charge after cleaning the connectors and resetting the charger.
- The video feed remains blank after rebooting and checking the camera cable.
- You suspect damage to the motors, flight controller, or critical sensors.

Contact Information

- **Phone:** (704) 228-2085
- **Email:** support@lucidbots.com
- **Online knowledgebase:** lucidbots.com/knowledge
- Submit photos and your original order ID with your request.

Sherpa

Created by Lucid Bots
2026