

Power Tether Manual

Sherpa 1/1.5 Platform

Last Updated; April 2, 2026 (V2.1)

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Pre-Flight Safety Checks

Before connecting power:

- Ground unit is **OFF**
- Generator is **OFF**
- Tether cable is **fully unspooled** (never operate coiled)
- Cables are not twisted, kinked, or damaged
- AS150U connectors are clean and dry
- Air unit connectors are dry and secure

What's Included

1. Ground Unit

Ruggedized enclosure with integrated power distribution and generator input.



2. Tether Line - 200 ft

Heavy-duty power tether (200 feet total length). pre-terminated for connection to:

- Ground unit (generator side)
- Air unit (drone side)

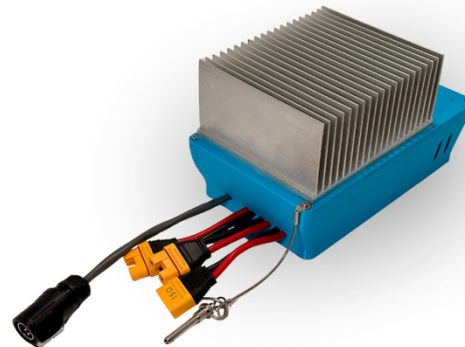
⚠ Must be fully unspooled during operation.



3. Air Power Module

Onboard power conversion module with:

- Integrated cooling heat sink
- AS150U drone power outputs
- Tether input connector
- Battery backup interface



Note: Every Power Tether system ships with a Lucid PDB Kit, if your drone already has one the kit will not be shipped. This kit must be installed on your Sherpa drone before operating the tether if it has not been pre-installed. The kit includes the updated Power Distribution Board, updated top plate with bumpers, rear corner cover, and required hardware. Installation instructions and a video walkthrough are available from your Lucid Bots support contact.

Not Included with Purchase

- Generator (10,000+ running watts required)
- Generator input extension cord

Required Equipment (But not included)

The following equipment was used for all validation and testing.

Use of other equipment may result in reduced performance or system faults.

Generator (Required)

Predator 13,000 Watt Tri-Fuel Portable Generator

(Harbor Freight – Model 71386)

- Must be a minimum of **10,000 running watts**
- Remote start capable
- CO Secure Technology

⚠ Lower wattage generators may cause voltage instability or insufficient power at altitude.



Scan QR to Purchase



Generator Input Cable (Required)

Heavy-Duty 50A Generator Extension Cord

(50 Amp, 125/250V, 4-Prong Locking – Model used in testing)

⚠ Cable must be:

- Rated for 50A minimum
- Outdoor rated
- Undamaged and fully uncoiled during use
- No more than 25 feet



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Important

- Generator must provide **10,000 running watts minimum**
- Do not substitute with undersized generators
- Do not use damaged or undersized cables

Suggested Equipment

Manual Hose Reel for Tether Management

NorthStar A-Frame Manual Pressure Washer Hose Reel

Using a manual reel for the 200 ft tether line is strongly recommended.

Benefits

- Faster job site setup
- Faster pack-up
- Prevents knots and tangling
- Reduces cable twisting and internal stress
- Extends tether lifespan
- Keeps job site organized and professional

⚠ Always fully unspool tether cable before flight, even when using a reel. ⚠

If you want it tighter for a quick-start guide:

Recommended: Manual Reel for Tether

Using a 300 ft-rated manual hose reel:

- Speeds deployment and pack-up
- Prevents knots and tangles
- Protects tether from damage



System Limitations

Understanding the limitations of the Power Tether system before your first flight will help you plan jobs accurately, set the right expectations, and operate safely.

Flight Height

The Power Tether does **not** provide the same maximum flight altitude as battery-only operation. Height is limited by the system's current ceiling, not the tether cable length.

The air unit's maximum continuous current is **~140A**. As altitude increases, so does current draw. When current approaches the ceiling, the firmware automatically reduces the altitude limit.

Maximum tested stable altitude is **~130–140 ft AGL** with spray active, wind below 10 mph, and a 1/4" hose. Real-world altitude will vary with hose size, payload weight, wind, and temperature.

The tether cable is 200 ft. This does not mean you can fly to 200 ft. The functional ceiling under load is significantly lower than the cable length.

⚠ Do not plan jobs based on the cable length. Plan based on the operational altitude figures above and your specific hose and payload configuration.

FAA Weight Limit & Altitude Impact

The FAA Part 107 rules impose a **less than 55 lb (<55 lb) weight limit** on small UAS operations without a waiver. The Power Tether air unit weighs more than a standard Sherpa battery, which directly reduces the usable altitude before the drone's total weight approaches that limit.

Your actual FAA-compliant operating altitude will depend on your specific configuration:

Configuration	Hose	FAA-Compliant Max Height
With Window Payload Filled	3/8" Softwash	~49 ft
With Window Payload Filled	3/8" Pressure	~42 ft
With Window Payload Filled	1/4" High Pressure	~66 ft
Without Window Payload Filled	3/8" Softwash	~68 ft
Without Window Payload Filled	1/4" Pressure	~91 ft

Configuration	Hose	FAA-Compliant Max Height
Software limited (no FAA cap applied)	1/4" High Pressure	~140 ft

⚠ Lucid Bots is required to inform all operators of the FAA 55 lb all-up weight limitation. It is the operator's responsibility to always remain compliant.

Hose Size Matters

Your choice of water hose directly affects how high you can fly. A heavier or larger-diameter hose increases drag and overall system weight, reducing usable altitude.

Recommendation: Use a 1/4" OD hose whenever possible.

Switching from a 3/8" hose to a 1/4" hose can add **25–30 ft of usable altitude**. This is the single most impactful operational adjustment available to you.

Hose	Diameter	Relative Performance
Powerhorse Ultra Flex (recommended)	1/4" OD	Best altitude performance
Flexzilla Soft Wash	3/8" OD	~25–30 ft less usable altitude
Standard pressure hose	3/8" OD	~25–30 ft less usable altitude

Battery Backup Is for Emergency Descent Only

When tether power is lost, the drone automatically switches to the onboard backup battery. **This battery is not intended for continued flight operations.** It provides enough power for a controlled descent only.

Do not attempt to continue a job on battery backup power.

Land immediately if the system switches to battery.

Inspect the tether connection and power source before relaunching.

Generator Extension Cord - 25 ft Maximum

If you need to extend the distance between the generator and the ground unit, the extension cord must be:

- Rated for **50A minimum**

- 25 ft maximum length longer cords cause voltage drop that can result in power instability or system faults
- Outdoor rated
- Fully uncoiled during use
- Undamaged

⚠ Do not use a standard household extension cord. Undersized or overlong cords are a safety hazard and will degrade system performance.

Compatible Platforms

The Power Tether is engineered exclusively for **Sherpa 1 and Sherpa 1.5** drone platforms. It is not compatible with any other aircraft.

⚠ Additionally, every Sherpa receiving the Power Tether must have the **updated Lucid PDB (Power Distribution Board)** and updated top plate installed before tether operation. This is required for proper power routing and compass function. Contact Lucid Bots support if you are unsure whether your drone has been updated.

Wind

Wind significantly reduces performance at altitude. At 130–140 ft with spray active, the system operates near its electrical capacity. Gusts above **15 mph** at altitude can push current draw above the 140A ceiling and trigger an automatic descent.

Monitor wind conditions carefully, especially at higher altitudes.

⚠ If gusts are forecasted above 15 mph, plan for reduced operational altitude, fly with batteries, or postpone the flight.

Wet Environments

Do not operate the Ground Unit in rain, fog, or wet conditions.

While the Air Unit is potted and weather-resistant, the Ground Unit must remain dry. This includes avoiding areas where spray-back from building surfaces may reach the unit or tether connectors. Always position the Ground Unit away from direct water exposure.

Startup Sequence

Step 1: Ensure the Ground Unit is OFF

Confirm ground unit is **powered OFF until Step 6****

Step 1.1: Connect tether cable to ground station (Thin gray power cable)

Step 1.2: Connecting the Main Power Cable to the Generator

Before you begin, ensure the generator is **turned off** and the main breaker on the generator is in the **OFF** position.

- 1. Identify the Plug:** Locate the large, heavy-duty plug with **four flat prongs** (three straight blades and one round/U-shaped pin). This is the **NEMA 14-50P** connector.
- 2. Align the Pins:** Look at the large outlet on your generator. Match the round/U-shaped pin on your plug to the corresponding round hole on the generator's outlet.
- 3. Insert Firmly:** Push the plug straight into the outlet. Because these cables are designed for high power, they fit very tightly. You may need to use a significant amount of force to ensure the plug is **fully seated** and flush against the generator panel.
- 4. Check the Connection:** Ensure there is no gap between the plug and the outlet. A loose connection can cause heat buildup or damage.

Step 1.3: Connecting the Twist-Lock Cable to the Ground Station

This connection uses a "Twist-Lock" system. Unlike a standard wall plug, this must be rotated to lock it into place and ensure a steady flow of power.

- 1. Locate the Connector:** Find the large circular end of the cable with four curved metal slots on the inside. This is the **SS2-50R** connector.
- 2. Align the "L" Pin:** Look closely at the pins on the Ground Station inlet and the holes on your cable. One of the pins has a small **"L" shaped tab** (the grounding pin). Align that tab with the matching "L" shaped slot on your cable.
- 3. Insert:** Push the connector firmly onto the Ground Station inlet until it is fully seated.
- 4. Twist to Lock:** Once fully seated, rotate the entire cable connector clockwise approximately a quarter turn until it clicks or stops. The connector is now locked and secured against accidental disconnection.

⚠️ **Threaded Ring:** Most of these cables have a large plastic threaded ring. You will **NOT** need to screw that ring.

⚠️ **Pro-Tip for First Timers**

To Disconnect: Remember that you cannot simply pull this cable out from the ground station. You must first **twist the connector counter-clockwise** (to the left) before pulling it away from the station.

Step 2: Connect Drone Power Inputs

Plug both **AS150U connectors** from the air unit into the drone power inputs. (Fig 1.6)

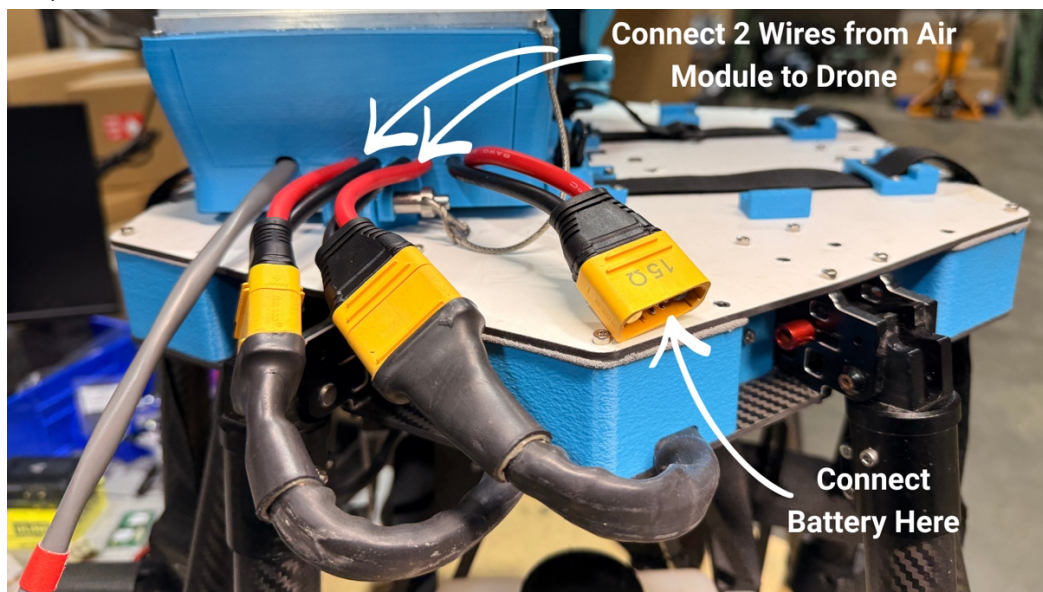


Fig 1.6

Step 3: Connect Tether to Air Unit

- Plug tether into the **air unit**. (Fig 1.7)

Confirm secure connection (You should here a click)

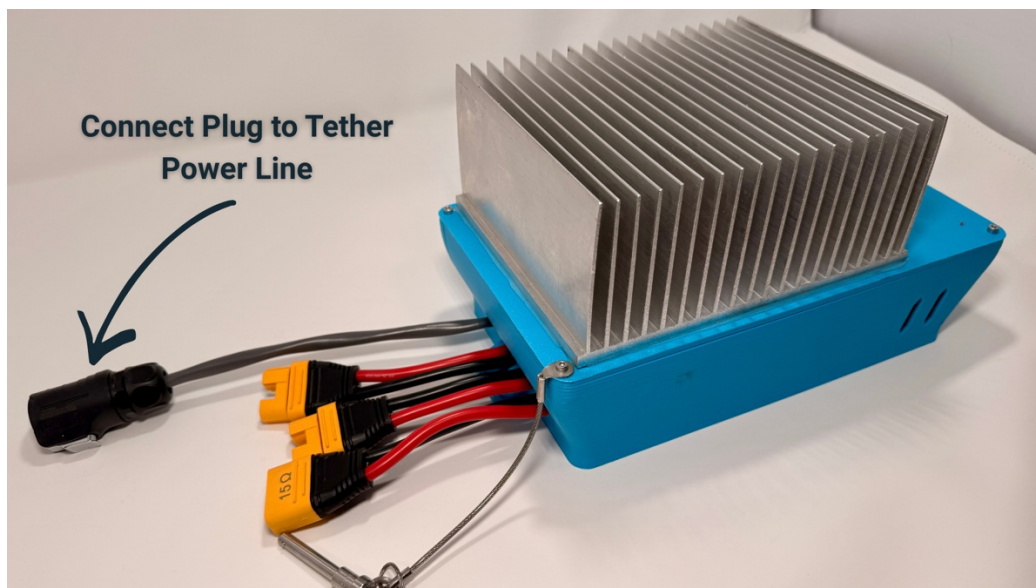


Fig 1.7

Step 4: Plug in battery to air module

- Drone will power ON.

⚠ Once the battery is connected, please wait 2 minutes before powering the generator ⚠

Step 5: System Check (Before turning on generator)

Confirm:

- Drone connects to controller
- GPS status is good (Check compass as well with a known heading)
- No warnings or fault messages

If any issue appears → **do not proceed**

Step 6: Power On Ground Unit


- Start generator
- Allow generator to warm up for **1-2 minutes****

- Power on the ground unit

Pre-Takeoff Verification

Once the ground unit is powered on, **verify the following on the controller before takeoff:**

- **Tether power detected**
- **System ready for takeoff**

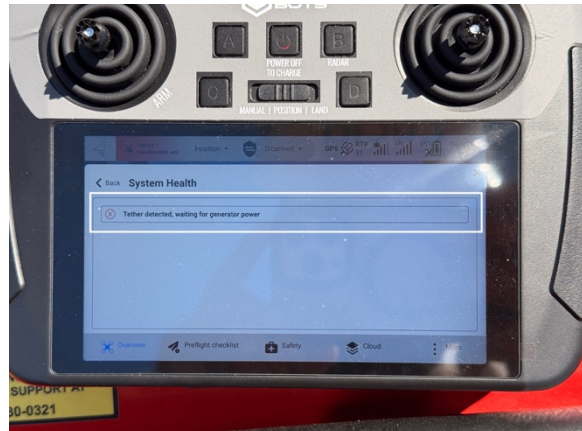
 *Do not initiate flight until both indicators are confirmed.*

Step 7: Takeoff

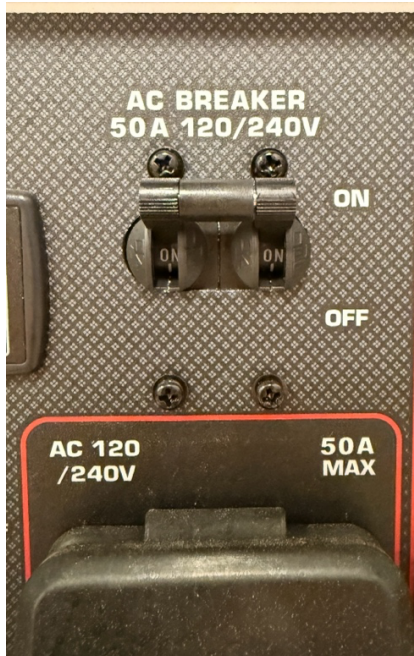
- Arm drone
- Take off normally
- Fly on tether power

Controller Messages

If the generator is **ON** but the top-left indicator is still red, if you click on it and you see *“tether detected, waiting for generator power”* the breaker on the generator may be off. Make sure the breaker switch is flipped up to the “on” position.



Correct

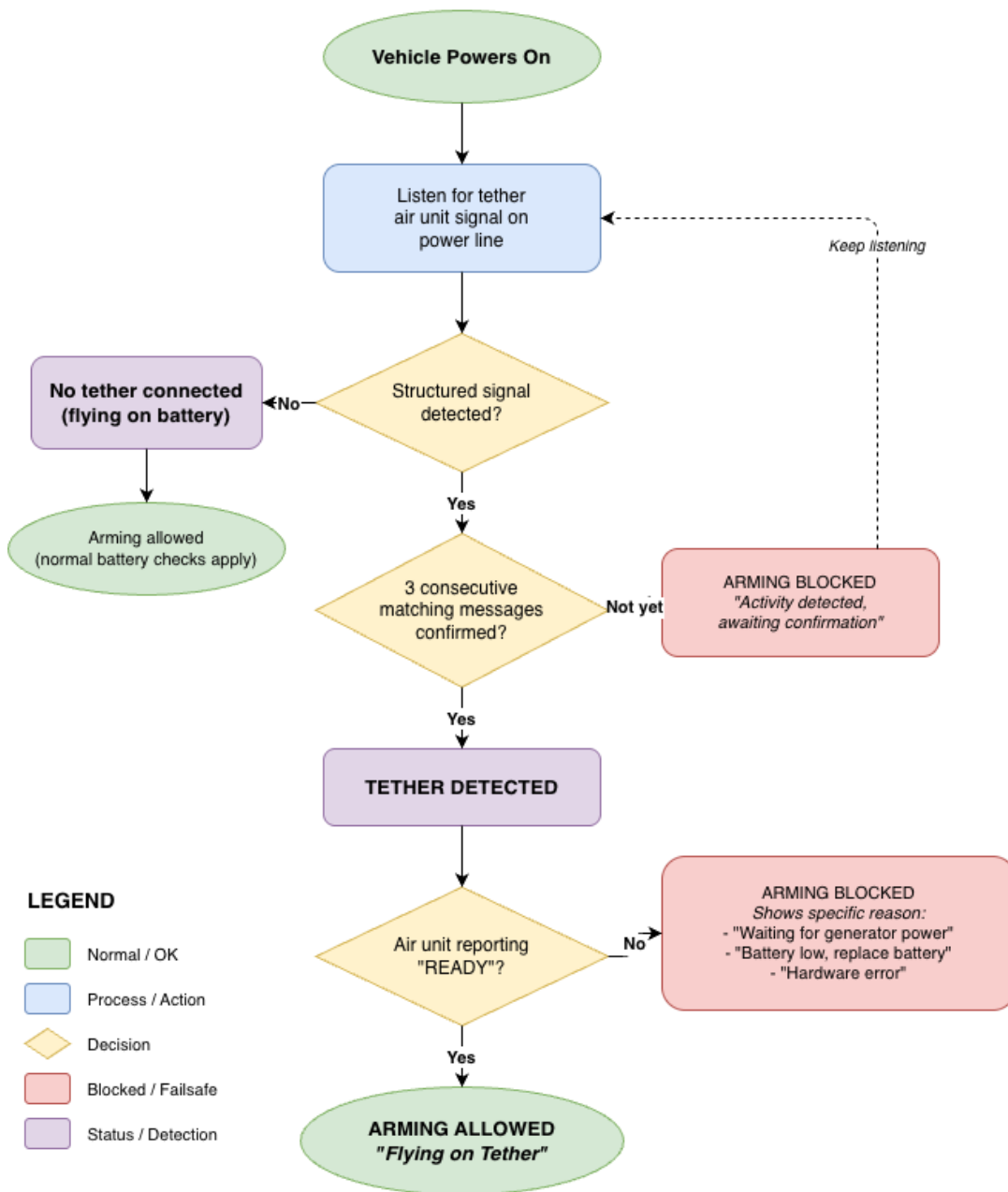


Incorrect



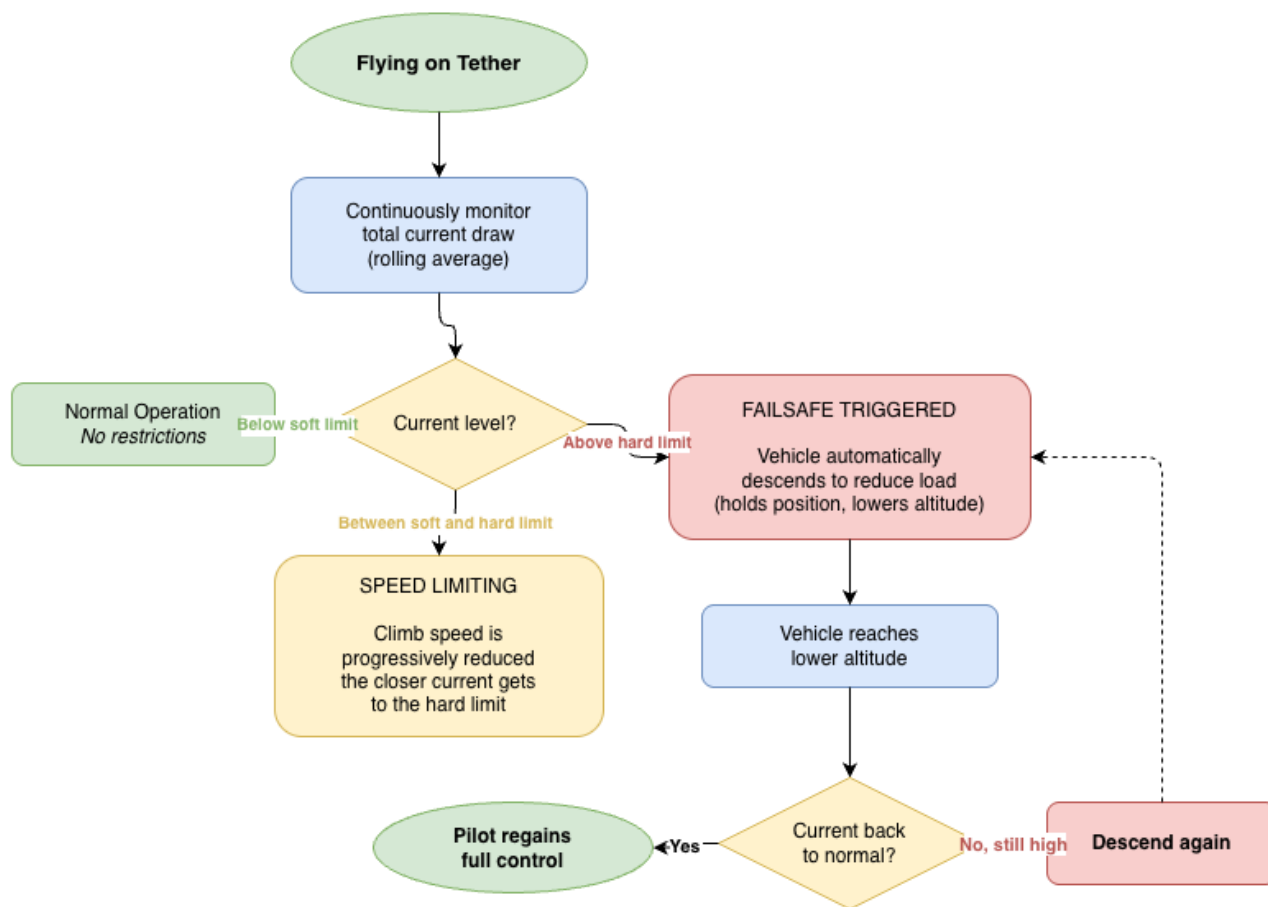
Tether Detection & Pre-Arm Checks (Flow Chart)

When the drone powers on, it automatically listens for a signal from the tether system. If it doesn't detect one, it assumes you're flying on battery and lets you arm normally. If it does detect a signal, it waits to confirm it's a real, stable tether connection before allowing arming. Once confirmed, it checks that the air unit is fully ready. If anything isn't ready yet, arming is blocked and the controller will tell you exactly why, whether it's waiting on generator power, a low battery, or a hardware issue. Only when everything checks out will the system allow you to arm and fly on tether power.



Current Overload Protection (Flow Chart)

While flying, the system constantly watches how much current the tether is carrying. If current is normal, nothing changes and you fly as usual. If it starts climbing toward the limit, the system begins slowing your climb speed as a warning. **If it hits the hard limit, usually from flying too high, into wind, or with a heavy payload, the drone will automatically descend to a lower altitude to reduce the load.** Once current drops back to a safe level, you regain full control. If it stays high, the drone will keep descending until it does.

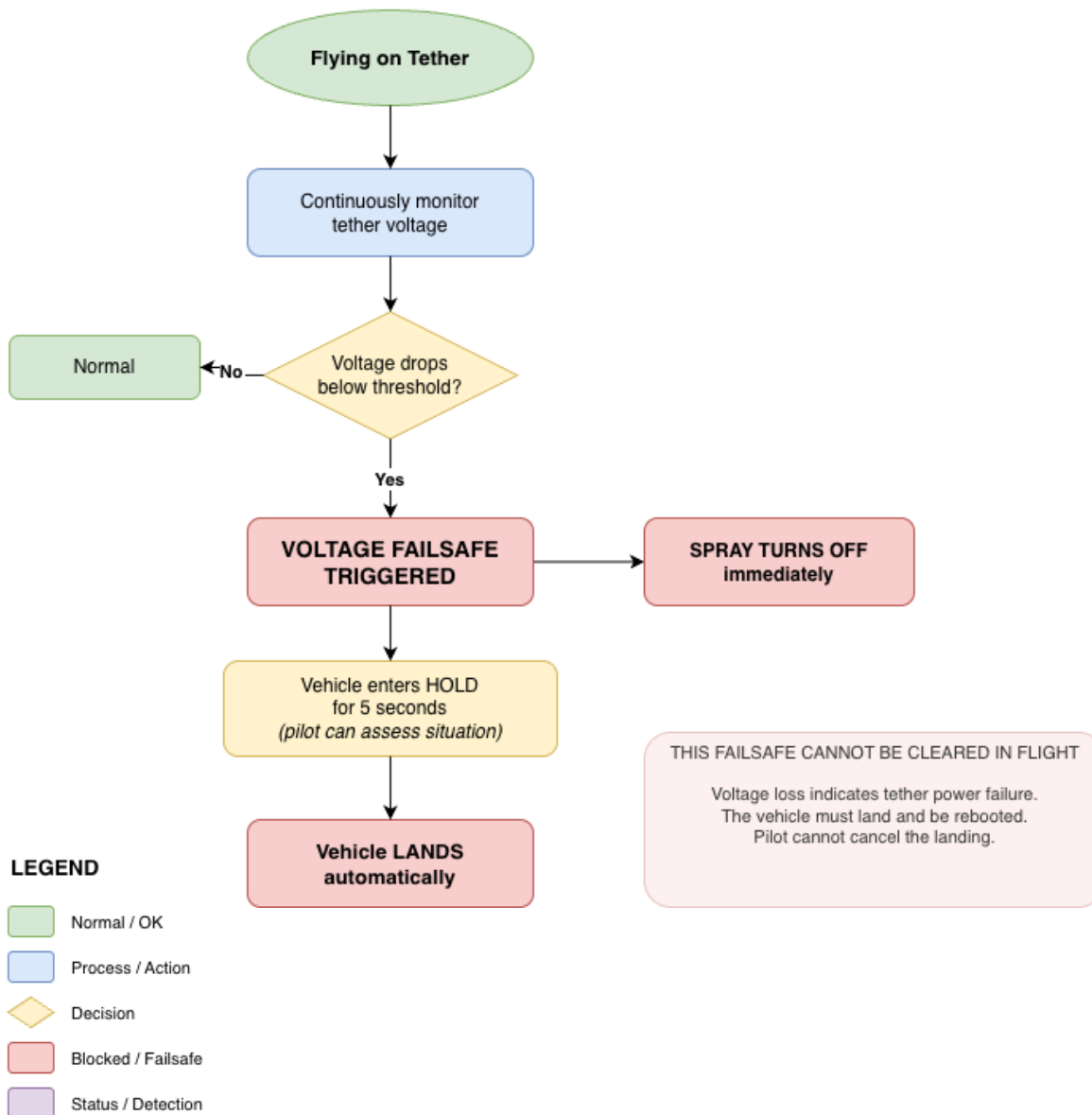


LEGEND

- Normal / OK
- Process / Action
- Decision
- Blocked / Failsafe
- Status / Detection

Tether Voltage Loss (Flow Chart)

If the tether loses power completely while you're flying, the system triggers a failsafe immediately. The drone will hold its position for 5 seconds so you can assess the situation, then it will land automatically. There is no way to cancel this landing in flight. The drone must land, and the system must be rebooted before you can fly again. This is designed to protect the drone when tether power fails, the backup battery is only there to ensure a safe landing, not to continue the job.



Critical Operating Notes

- Never fly with tether cable partially coiled.
 - *If left coiled, this will damage your cable and create heat.*
- Always fully unspool the full 200 ft of cable before flight, even if you are not flying at full altitude.
- **Position ground equipment away from water hazards.** Place the generator and ground unit in an area where they will not receive direct spray from the drone or runoff from the building.
- Do not disconnect connectors under load.
- If ground power fails, battery backup will engage automatically, and the drone will hold position for approximately 5 seconds before initiating a controlled auto-descent.
- Land immediately if abnormal current, heat, or warnings occur.

Cable Handling & Storage

The tether cable is a 14 AWG shielded cable rated to carry up to 140A of 400VDC power. It must be treated as both an **electrical component and a structural one**, damage to the cable is a safety issue, not just a maintenance issue.

- Walk the full 200 ft of cable before you start your day and inspect the entire length for cuts, kinks, abrasion, or any damage to the outer jacket, do not fly with a damaged cable
- Never drive over, step on, or allow the cable to be pinched under equipment or sharp edges, abrasion is the leading cause of cable failure in field operations
- The cable must be fully unspooled before every flight, carrying high current through a partially coiled cable creates a heat buildup that will damage the cable and can cause a mid-flight failure

Connector Maintenance

The ground unit uses Amphenol PT02A-12-4S industrial circular connectors. These are field-rated connectors designed for repeated use in demanding environments, but they require inspection before every flight.

- Inspect all connectors before every flight, look for dirt, moisture, bent pins, discoloration, or any signs of arcing or burn marks
- Clean connectors with dry compressed air only, do not use water, spray lubricants, or solvents on the contacts
- Seat all connectors fully until they lock, a loose connection carrying high current will generate heat and can trigger a failsafe or cause a mid-flight power interruption

- Never force a connector, correct alignment requires minimal effort; resistance indicates misalignment or debris
- The air unit (airborne power module) is fully potted and non-repairable, if it fails, it must be replaced entirely; do not attempt to open or repair it in the field
- Replace any connector showing burn marks, pitting, discoloration, or physical damage before the next flight

Weather & Environmental Limits

- Do not operate in rain, snow, or fog.
- Suspend operations immediately if lightning is observed or a storm is approaching
- Wind significantly affects performance at altitude, field testing has shown that at 130–140 ft with spray active, the system operates near its electrical capacity; even moderate gusts at altitude can push current draw above the 140A ceiling and trigger a failsafe descent
 - Use extra caution in winds above 15 mph, particularly at altitude
- In cold conditions, allow the ground unit and air unit to warm up before flight, operating temperature range is still being confirmed by engineering

Emergency Procedures

Understanding how the system responds to problems will help you act quickly and avoid a hard landing.

- Approaching weight limit / descend recommended, this message appears as current draw increases with altitude, typically around 125-140 ft when spraying. It is a warning, not a failsafe. Descend slightly and monitor. Do not continue climbing after this message appears.
- Tether weight limit / auto-descend initiated, the system has hit its current ceiling. The drone will initiate a controlled descent automatically. Do not fight it. Let it descend and assess before relaunching.
- Tether base station not detected / ground station not detected, power cycle the generator and drone in the correct sequence (see startup procedure) before attempting to relaunch. Do not attempt takeoff if this message persists.
- Switch to battery / critical battery level, the tether has dropped out, and the backup battery has engaged. Land immediately, the battery is failover-only and is not intended for extended flight. Do not attempt to continue the job.
- If you see smoke, smell burning, or the ground unit triggers a heat warning, shut down power at the ground unit immediately, land, and do not reconnect until the source of the problem has been found and resolved
- If the cable becomes snagged or entangled, do not attempt to fly free. Power down and address the entanglement manually.

- Brief your ground crew on all emergency callouts before each flight so everyone knows their role if something goes wrong