



FLYABILITY ELIOS

BATTERY SAFETY GUIDELINES AND BEST PRACTICES

VERSION 1.4.2
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1 Elios Battery

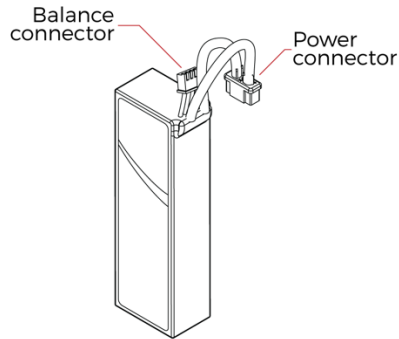


Figure 1.1: Elios battery overview

Battery Pack Chemistry:	Lithium Polymer
Battery Pack Weight:	182g
Battery Pack Capacity:	2800mAh
Battery Pack Energy	31.08Wh
Cell Count:	3
Dimensions:	33.5x22.8x113mm

2 Battery Handling Guidelines



Fire hazard



Explosive hazard



Toxic hazard



Corrosive hazard



Only use batteries provided by Flyability and approved for the system. To order additional batteries contact Flyability or a local sales representative.



To avoid fire, serious injury, and property damage, observe the following safety guidelines when using, charging, transporting, or storing your batteries.

2.1 Safety Guidelines

1. Batteries have a guaranteed lifetime of 6 months or 40 discharge cycles, do not use them beyond this limit. Track the cycles of each battery by marking the charge counting grid on the label.
2. After 20 cycles, check the cell balancing of your battery. The battery should not be used if the voltage difference between the cells is greater than 0.03V after recharging.
3. The battery should only be used in temperatures from 10°C to 50°C.
4. Do not allow the battery to come into contact with moisture, water, corrosive environments, or any kind of liquid as it may cause short circuits or chemical deterioration resulting in the battery catching fire and leading to an explosion. If the battery has been exposed to such environments, dispose of it as described in the Battery Disposal section below or contact Flyability for further assistance.
5. Never use or charge the battery if it shows sign of damage, leakage, swelling, or other abnormal indications. Damage can be but not limited to puncture, deformation, damage to the connectors and cables, or exposed conductive material.
6. Never use or charge a battery that was involved in an aircraft incident which caused damage to the battery, its connector or its enclosure.
7. Never use or recharge an over-discharged battery (If the battery voltage drops below 8V or 0% charge)
8. Never disassemble, puncture, drop, strike or place heavy objects on top of the battery in any way. This may cause the battery to leak, catch fire or explode.
9. Never let the battery be short circuited. Use individual plastic bags or protect the connectors when storing several batteries in the same safety bag. Make sure that there are no conductive foreign objects such as paperclips in the bag.
10. In case of battery leakage: do not allow the electrolyte to come into contact with clothing, skin, or eyes. Immediately wash the affected area with fresh running water and seek medical assistance if needed.
11. Avoid using the battery near strong electromagnetic sources or heating sources, such as microwave ovens.

12. In case of a battery fire, use sand or a fire extinguisher to put out the fire. Do not inhale the smoke coming off the battery. The smoke is toxic. Immediately seek for qualified emergency assistance (e.g. firefighters).
13. Do not place the battery in pockets, bags, or drawers in might come in contact with conductive or perforating items. If not in use, always keep the batteries in the provided battery safe bag.
14. Clean the battery using a clean, dry cloth.

2.2 Flight Operations

1. Make sure the batteries are fully charged before each flight.
2. In addition to the battery percentage, pay attention to the voltage displayed on Flyability Cockpit – land at 10.2V. At 10V, the aircraft should be on the ground, disarmed.
3. Land immediately the aircraft when the battery critical warning cues in Flyability Cockpit, i.e. at the 10% battery warning.
4. Do not let the aircraft in standby mode for too long after flight, as it will continue to discharge the battery until it is unplugged.
5. In the case of unusual behavior, keep the battery in a battery safe bag, store the LOG file for analysis, and contact Flyability.

2.3 Low Temperature Operations (between 0°C and 10°C)

1. Elios should not be used in environments where the ambient temperature is below 0°C. Use of battery below 0°C can lead to permanent damage.
2. Keep your battery temperature above 10°C by keeping it in a warm place before flight.
3. In addition to the battery percentage, pay attention to the voltage displayed on Flyability Cockpit.
4. Land at 20% or 10.2V, whichever comes first.
5. The aircraft should be on the ground, disarmed. at 10% or 10V, whichever comes first.
6. Expect shorter flight times in low temperatures.
7. Do not wait too long before unplugging the battery.
8. Immediately put the battery in a warm place after flight.

2.4 High Temperature Operations (between 40°C and 50°C)

1. Elios should not be used in environments where the ambient temperature is above 50°C. Use of the battery in temperatures above 50°C can cause permanent damage, fire or explosion.
2. Keep the battery temperature below 40°C at the beginning of the flight by keeping them in a cooler place.
3. The aircraft should not be left switched on without propellers spinning in temperature above 40°C, the electronics needs to be cooled down by the airflow generated by the propulsion system.
4. Use gloves for changing the battery if necessary or wait for at least 10 minutes for the drone to cool down in a zone where the temperature is below 30°C.
5. Immediately put the battery in a cooler place after flight.
6. Expect the batteries to decay faster when they are systematically used in high temperature environments.

2.5 Battery Charging

1. Only use battery chargers for Elios Batteries provided by Flyability.
2. Never leave the battery unattended while charging.
3. Do not charge the battery on or near flammable objects such as wood or curtains.
4. Charge batteries fully only if you plan to use them in the three following days
5. Only charge the battery if its temperature is between 15°C to 35°C. Not doing so may lead to battery damage, leakage or explosion.
6. Do not charge the batteries immediately after flight, as the battery temperature may still be too high.
7. Charge the batteries in an open and ventilated area. Do not enclose or cover the charger as it may lead to overheating.
8. Keep a fire detection system and fire extinguishing equipment close to the charger while charging.
9. Always place the battery in the provided battery safety bag while charging.
10. The charger stops charging when the battery is fully charged, but it is good practice to monitor the charging process and disconnect the battery when fully charged.
11. Disconnect the charger when not in use. Regularly check the charger for damage to the cords, casing and connectors. Never use a damaged charger.
12. Clean the charger using a clean dry cloth.

2.6 Battery Storage

1. Keep the batteries out of the reach of children and animals.
2. Do not leave the batteries exposed to sun-light or near heat sources. Do not leave batteries inside a vehicle in hot weather. Store the batteries in temperatures from 15°C and 35°C. For best results, store the batteries at a temperature of 23°C.
3. Keep the batteries at 50% charge (11,4V to 11,6V) if they will not be used for more than three days. Doing this will greatly extend their service life. The discharge can be done by using your aircraft until the battery state of charge reaches 40%–60%.
4. Store the batteries in the provided battery safe bag max 5 per battery safe bag placed individually in plastic bags.
5. Have a fire detection system and fire extinguishing equipment installed in the area where batteries are stored.
6. Battery life may be reduced if not used for a long time. It is a good practice to use them at least every 3 months.
7. Keep the batteries dry.
8. Keep the batteries away from conductive objects.
9. Store the batteries in the provided battery safe bag max 5 per battery safe bag placed individually in plastic bags.
10. Have a fire detection system and fire extinguishing equipment installed in the area where batteries are stored.
11. Do not store a battery inside the drone.

2.7 Transport

1. When travelling by air with your batteries, please follow the latest IATA regulations. Do not hesitate to contact your airline before flying to get advice. Lithium batteries should always be kept in your carry on bag.
2. Secure all connectors against short circuits using insulation tape, place the batteries in individual plastic bags, then store them in the provided battery safe bag.
3. Never transport your battery with a state of charge higher than 30%. The discharge can be done by using your aircraft until the battery state of charge reaches 30%.
4. Shipping Lithium Batteries requires special permits, no not ship the batteries inside the Elios Pack.

2.8 Disposal

1. Before disposal, completely discharge the battery to 0%.
2. Place insulating tape on the connectors and store the battery in a fireproof container.
3. Dispose of the battery in specific recycling boxes. Do not place the battery in regular trash. Comply with the local regulations regarding the disposal and recycling of batteries.

3 State of Charge Diagram

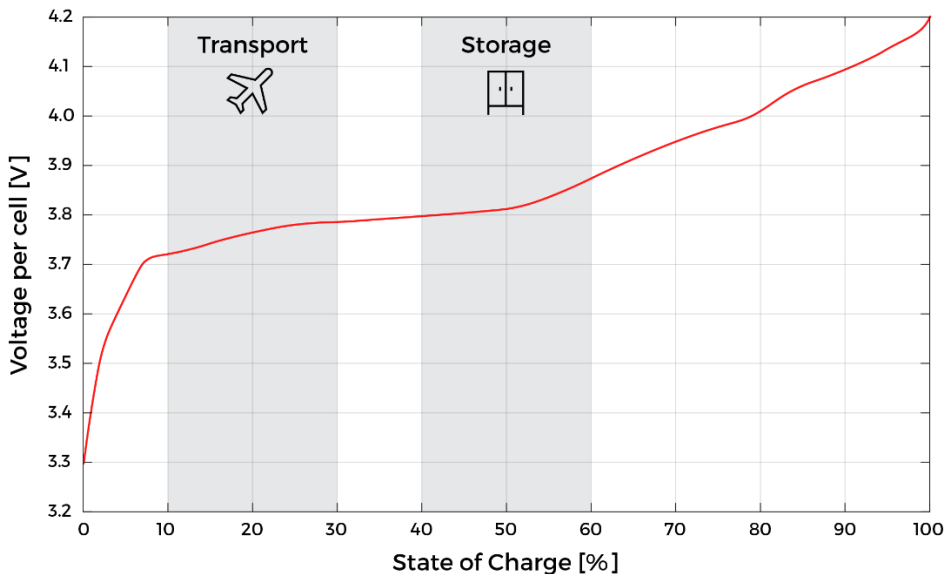


Figure 3.1: State of Charge vs Voltage per cell curve for the battery type Elios

State of Charge	Voltage per cell	Voltage of the battery
30% of charge	3.79 V/cell	11.37 V
25% of charge	3.77 V/cell	11.31 V

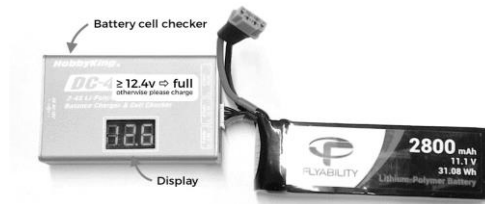
Notice: It is not possible to measure a perfect State of Charge (SoC). It is recommended to take a safety margin of 5%. E.g, if you aim to get a SoC of 30%, you should be looking for the 25% corresponding voltage on the diagram. Also, to make a good measurement, you should leave your battery at rest 30min before.

4 Battery Cell Checker



Do not use the Battery Cell Checker when the battery is connected to ELIOS or inside the cage

The Cell Checker is a voltmeter adapted for a LiPo battery. It allows to measure the voltage of the battery and its individual cells. With this tool, you can better monitor the condition of the battery.



1. Connect the balance connector of the battery to the middle slot located on the side of the Battery Cell Checker as shown above.
2. First value displayed is "ALL" which correspond to the main voltage of the battery. Note that, if the main voltage is below 12.4V, the battery will be considered as empty by Elios.
3. The other values displayed correspond to each individual cell. The voltage difference between the cells should not be greater than 0.03V after recharge. If not, please do not use this battery anymore and dispose of it.

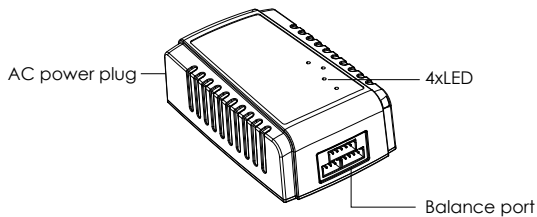
5 ELIOS Battery Chargers

Two types of battery chargers are issued by Flyability for use with ELIOS batteries.



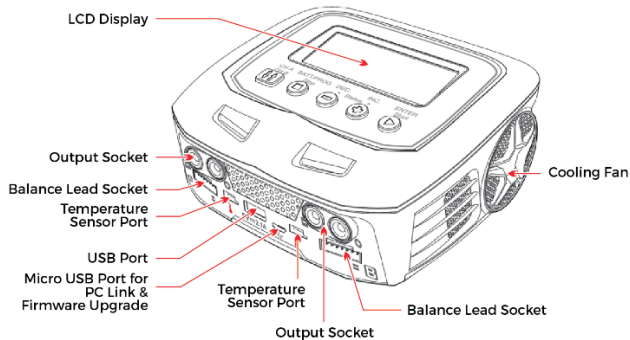
Refer to the device's dedicated user manual for detailed instructions and please **BE SURE** to read the **INSTRUCTIONS** in the device's User Manual **before you use the charger for the first time.**

5.1 ELIOS Balance Charger



5.2 Elios Charger/Discharger

The Elios Charger/Discharger offers additional features:



1. Charge, Discharge, and storage modes.
2. Possibility to power the charger from a car cigar lighter socket.
3. 2 channels, allowing the charger to charge or discharge 2 batteries simultaneously.
4. Internal resistance monitoring of individual battery cells

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