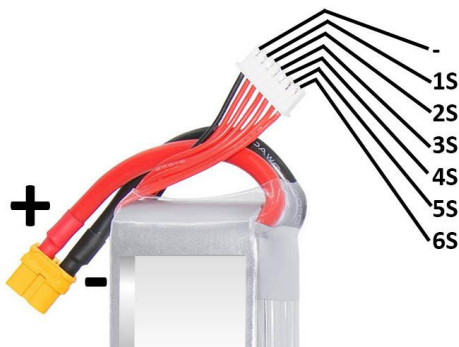




LiPo / LiHV Batteries

User Manual

Lithium-polymer batteries for RC models and FPV
drones



Read this entire manual carefully before first use and keep it for future reference. Incorrect charging, discharging or storage may cause fire or explosion. This product is not a toy - it is intended for persons aged 14 and over.

Universal manual for LiPo and LiHV batteries sold by Rotorama, s.r.o.

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1. General information and technical parameters

1.1 What is a LiPo battery

A lithium-polymer (LiPo / Li-Pol) battery is a rechargeable power source with high energy density and low weight. Thanks to its excellent power-to-weight ratio it is ideal for RC models, FPV drones and other model equipment. The battery does not suffer from the memory effect, can be recharged from any state of charge and has minimal self-discharge.

The **LiHV** (High Voltage) version is charged to a higher final voltage of 4.35 V/cell. Charge it only with the **LiHV** program of the charger. Never charge a LiPo battery with the LiHV program.

1.2 Construction and designation

Each cell has a nominal voltage of 3.7 V. The designation **S** indicates the number of cells connected in series (e.g. 4S = 4 cells × 3.7 V = 14.8 V nominal). The designation **P** indicates the number of cells connected in parallel (e.g. 6S1P). If there is only one cell in parallel, the P value is often omitted.

1.3 Technical parameters

Parameter	Value	Note
Nominal voltage (cell)	3.7 V	LiPo; LiHV: 3.8 V
Maximum voltage (cell)	4.20 V	LiHV: 4.35 V
Storage voltage (cell)	3.8 V	for storage of 14 days or longer
End-of-flight voltage (cell)	3.5 V	battery discharged – land
Minimum voltage (cell)	3.0 V	below this limit permanent damage may occur
Standard charging current	1C	safe for all LiPo batteries
Maximum charging current	3C	if the label states a lower value, the label applies
Maximum discharge current	as per label (C)	see chapter 1.4
Cell temperature when discharging	10–50 °C	recommended; limits –20–60 °C
Cell temperature when charging	10–40 °C	recommended; limits 0–45 °C, never charge below 0 °C
Storage temperature	5–30 °C	dry, dark; ideally 10–20 °C

1.4 Information on the battery label

The battery label shows the following information (numbers correspond to Fig. 1):

- ① **Capacity** in milliampere-hours (mAh), e.g. 2800 mAh. The stated capacity is nominal; the actual capacity varies with the discharge current and decreases with the age and wear of the battery.
- ② **Continuous discharge current** as a multiple of the capacity C. For the example in the figure: $100C \times 2.8 \text{ Ah} = 280 \text{ A}$. This is the current at which the cells are not damaged. The current of the complete battery may be further limited by the cross-section of the lead wires and by the connector used.
- ③ **Burst discharge current** – the current the battery can deliver for a maximum of 3 seconds (200C in the example).
- Both current values are nominal. The actual discharge current may be lower depending on the age and wear of the battery.
- ④ **Number of cells** in series and in parallel (e.g. 6S1P).
- ⑤ **Nominal voltage** of the complete battery = nominal cell voltage $\times$ number of cells in series ($6 \times 3.7 \text{ V} = 22.2 \text{ V}$).
- ⑥ **Energy** in Wh = capacity (Ah) $\times$ nominal voltage ($2.8 \text{ Ah} \times 22.2 \text{ V} = 62.16 \text{ Wh}$). This value is important for air transport (chapter 7.2).

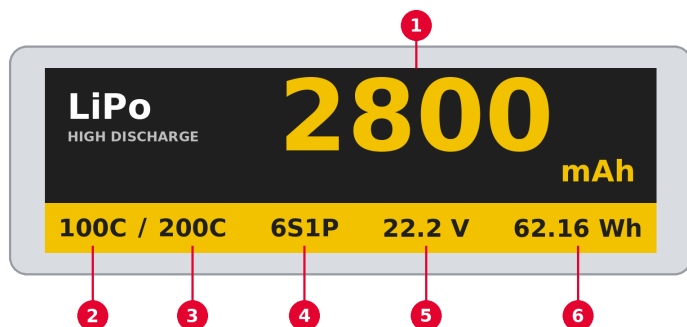


Fig. 1 – Illustrative label of a 6S 2800 mAh battery

2. Connectors

A battery with two or more cells has two connectors. The **main (charge/discharge) connector** is used to connect the battery to the model or to the charger and carries the full battery voltage. The **balance (service) connector JST-XH** makes it possible to monitor and balance the voltage of the individual cells during charging. Single-cell (1S) batteries have no balance connector, only the main connector.

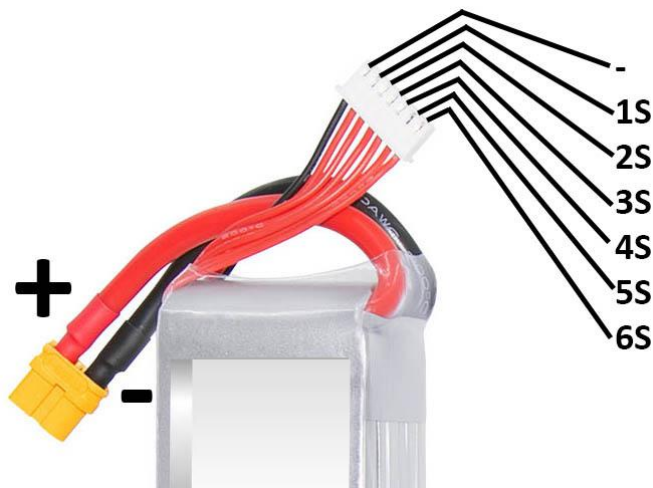


Fig. 2 – Main connector (here XT60) on the left and JST-XH balance connector of a 6S battery on the right

- The type of main connector differs from battery to battery (e.g. XT30, XT60, XT90; for 1S batteries e.g. PH2.0, BT2.0 or A30). Always use a mating connector of the same type on the model and on the charger.
- The balance connector always has one pin more than the number of cells (6S = 7 pins).
- Observe the correct polarity: red wire = plus (+), black wire = minus (-). Reversed polarity can destroy the model's electronics as well as the battery.

3. Safety

⚠ WARNING – FIRE HAZARD

- ▶ **Incorrect use of LiPo batteries may cause fire or explosion!**
- ▶ **Keep batteries away from flammable materials during charging and storage.**
- ▶ **NEVER leave batteries charging unattended!**
- ▶ **ALWAYS charge batteries with a professionally manufactured hobby charger designed for this type of battery and follow the instructions in the charger manual.**

3.1 Rules for safe use

- This product is not a toy. It is intended for persons aged 14 and over; keep it out of the reach of children.
- Do not use damaged, swollen or otherwise defective batteries.
- Never short-circuit the battery contacts – risk of fire or explosion.
- Never exceed the maximum voltage of 4.20 V/cell (4.35 V/cell for LiHV).
- Do not discharge the battery below 3.0 V/cell – this causes permanent damage.
- Do not throw batteries into fire or into general waste.
- Do not puncture, disassemble or modify batteries.
- Do not expose batteries to water, high humidity or extreme temperatures.
- Do not exceed the maximum discharge current – the permissible current decreases with the age and wear of the battery.
- Visually inspect the battery before each use – swelling, damage to the wrap, wires and connectors.
- Always charge the battery with the balance connector connected (if fitted).
- Monitor the condition of the battery continuously during charging – its voltage and temperature.

3.2 Damaged, swollen or burning battery

- Stop using a swollen, deformed or mechanically damaged battery immediately and do not charge it.
- Disconnect it and place it on a non-flammable surface or in a fireproof bag away from flammable materials, ideally outdoors. Let it cool down under supervision.
- Then hand it over for disposal (chapter 8.3). Never send it via a courier or parcel service (chapter 9.2).
- If the battery starts to smoke or burn, do not touch it, leave the area, do not inhale the smoke and call the fire brigade (112).

4. Voltage levels

4.1 Voltage per cell

Voltage / cell	State	Note
4.20 V (LiHV 4.35 V)	Fully charged	Disconnect from the charger
3.80–3.85 V	Storage	Ideal for storage of 14 days or longer
3.50 V	Discharged	Land; charge before the next flight
3.00–3.50 V	Critical	Charge as soon as possible, check the battery condition
below 3.00 V	CELL DAMAGE	The battery may be permanently damaged

4.2 Voltage of the complete battery

Voltage of the complete battery = voltage per cell × number of cells in series (S).

Number of cells	Nominal	Fully charged LiPo	Fully charged LiHV	End of flight	Storage
1S	3.7 V	4.20 V	4.35 V	3.5 V	3.8 V
2S	7.4 V	8.40 V	8.70 V	7.0 V	7.6 V
3S	11.1 V	12.60 V	13.05 V	10.5 V	11.4 V
4S	14.8 V	16.80 V	17.40 V	14.0 V	15.2 V
5S	18.5 V	21.00 V	21.75 V	17.5 V	19.0 V
6S	22.2 V	25.20 V	26.10 V	21.0 V	22.8 V
8S	29.6 V	33.60 V	34.80 V	28.0 V	30.4 V

5. Charging

⚠ IMPORTANT - NEVER LEAVE BATTERIES CHARGING UNATTENDED

- ▶ Use only a charger designed for LiPo batteries with the Balance Charge function.
- ▶ Always charge batteries in a non-flammable bag or on a fireproof surface.
- ▶ Always check the cell count and charging current settings before charging.
- ▶ The seller accepts no liability for damage caused by incorrect charging or by failure to follow the instructions in the charger manual.

5.1 Charging procedure

- ① Visually inspect the battery – it must not be swollen, damaged or otherwise defective.
- ② Connect the balance connector to the balance port of the charger (if the battery has one).
- ③ Connect the main connector to the charger.
- ④ On the charger, set the battery type (LiPo, or LiHV for LiHV batteries), the number of cells as per the label and a charging current of 1-3C.
- ⑤ Check the settings and start the *Balance Charge* mode.
- ⑥ Monitor the charging and check the battery temperature (max. 40 °C).
- ⑦ Disconnect the battery when charging is complete.

5.2 Recommended charging currents

Capacity (example)	Standard current (1C)	Max. current (3C)
450 mAh	0.45 A	1.35 A
850 mAh	0.85 A	2.55 A
1300 mAh	1.3 A	3.9 A
1500 mAh	1.5 A	4.5 A
2200 mAh	2.2 A	6.6 A
5000 mAh	5.0 A	15.0 A
6000 mAh	6.0 A	18.0 A

Current (A) = capacity (Ah) × C. Always observe the maximum charging C stated on the battery label.

6. Discharging and operation

- Land or stop the model as soon as the voltage drops to 3.5 V/cell. Set up a warning in the OSD, in the radio telemetry or on the electronic speed controller (ESC).
- The minimum cell voltage under load is 3.0 V – below this limit damage occurs.
- Do not exceed the maximum discharge current.
- Operate batteries at a cell temperature of 10–50 °C. In winter, preheat them to at least 15 °C before use.
- Insert a fully charged battery into the model before the flight.
- Check the battery temperature after the flight.
- Always disconnect the battery from the model after the flight.
- The seller accepts no liability for damage resulting from improper use of the battery.

7. Storage and transport

7.1 Storage

- Store at a voltage of 3.80–3.85 V/cell (storage voltage).
- If you do not plan to use the battery within 14 days, charge or discharge it to storage voltage (the *Storage* program of the charger).
- Storage temperature: +5 °C to +30 °C, ideally 10–20 °C.
- Humidity: max. 60 % relative humidity, dry environment.
- Protect from direct sunlight and heat sources.
- Do not store in a car parked in the sun – the temperature inside may exceed 60 °C.
- Store in a fireproof bag or box, away from flammable materials.

7.2 Transport

- Transport batteries at storage voltage (approx. 3.8 V/cell) with the contacts protected against short circuit (original packaging, a separate bag or taped connectors).
- Do not transport damaged or swollen batteries.
- For air travel, follow the IATA rules and your airline's conditions. Spare lithium batteries belong **in carry-on baggage only**, never in checked baggage. Rules change – check them with your airline before travelling.
- Up to 100 Wh no airline approval is needed, 100–160 Wh only with airline approval, above 160 Wh passengers may not carry batteries. Example: 6S 6000 mAh = 6.0 Ah × 22.2 V = 133.2 Wh – approval required.

8. Information for the EU and Czech Market

Chapters 8 and 9 describe the situation under the law of the Czech Republic, where you purchase the product. However, the law of the country in which the product is used is decisive – if you use it in another country, follow that country's regulations (e.g. on waste management and transport).

8.1 Importer and responsible person in the EU

The product is placed on the European Union market by the importer stated below, who is at the same time the responsible person within the meaning of Article 16 of Regulation (EU) 2023/988 of the European Parliament and of the Council on general product safety (GPSR).

Importer / responsible person in the EU	Rotorama, s.r.o.
Company ID (IČO)	051 57 692
VAT ID (DIČ)	CZ05157692
Registered office	Okrajová 1351, 674 01 Třebíč, Czech Republic
E-mail	info@rotorاما.cz
Phone	+420 252 252 098
Website	www.rotorاما.cz

8.2 Product conformity



- The product bears the **CE** marking and complies with the requirements of the applicable European Union harmonisation legislation.
- A copy of the **EU Declaration of Conformity** is available from the importer at the address stated above or at the e-mail address info@rotorاما.cz.
- **Product identification:** the manufacturer and the type designation (capacity, number of cells, C rating) are given on the battery label or on its packaging.

8.3 Disposal of batteries and accumulators



- The crossed-out wheeled bin symbol on the battery, its packaging or in the documentation means that the used battery **must not be disposed of together with mixed municipal waste**.
- Fully discharge a battery intended for disposal and cover the connector contacts with insulating tape to prevent a short circuit.
- Hand it over at a battery take-back point, at a collection yard, into a battery collection container or at the retailer. Take-back is free of charge for the end user and does not require the purchase of a new product.
- Lithium batteries contain a flammable electrolyte and compounds of lithium, cobalt and copper. Improper disposal may cause fires in collection vehicles and sorting lines and the release of substances harmful to the environment and human health.
- Correct charging, operation and storage according to this manual extend the service life of the battery and help prevent waste.
- The obligations under Act No. 542/2020 Coll., on end-of-life products, and Regulation (EU) 2023/1542 concerning batteries are fulfilled by the importer through a collective take-back system.

Through its contractual partner **ASEKOL a.s.**, the company ensures the take-back of waste electrical equipment from households and the separate collection of waste electrical equipment, batteries and accumulators in accordance with the applicable legislation. The customer is entitled to hand over old electrical equipment or a battery or accumulator at any collection point of the above contractual partner. The addresses of these take-back points are listed at www.asekol.cz, www.ecobat.cz and also <https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu>.

9. Warranty and rights arising from defective performance

9.1 Rights of the buyer under Czech law

The rights and obligations of the contracting parties are governed by Czech law, in particular by Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on consumer protection. The warranty terms set out below (Chapter 9.2) **do not in any way limit** the buyer's rights arising from these regulations.

- The seller is liable to the buyer for the product being free of defects on receipt. If the buyer is a consumer, a defect may be notified **within two years of receipt** of the product (Section 2165 of the Civil Code).
- If a defect appears within **one year** of receipt, the product is deemed to have been defective already at the time of receipt (Section 2161(5) of the Civil Code).
- When purchasing online, a consumer has the right to **withdraw from the contract within 14 days** of receiving the goods without giving a reason (Section 1829 of the Civil Code).
- Claims should be made with the retailer from whom you purchased the product. The importer's contact details are given in Chapter 8.1.
- The competent body for out-of-court settlement of consumer disputes is the **Czech Trade Inspection Authority**, Štěpánská 796/44, 110 00 Prague 1, www.coi.cz.

9.2 Warranty and claim terms for LiPo batteries

❖ **The following terms are set by the seller Rotorama, s.r.o.**

When making a claim for a defective battery, follow the instructions on the seller's website: www.rotorاما.cz/reklamace-a-vraceni-zbozi.

The seller provides a warranty of **24 months** on batteries. The warranty period begins on the day the consumer receives the goods. The warranty covers manufacturing defects in material and workmanship.

The warranty does not cover:

- damage caused by incorrect charging or discharging (exceeding the maximum voltage, current or temperature),
- damage caused by discharging below the minimum permitted voltage,
- mechanical damage (puncture, crushing, impact),
- damage caused by water, moisture or corrosion,
- natural wear of the cells and loss of capacity resulting from normal use,
- damage caused by using an unsuitable charger or charging program,
- batteries that have been modified, disassembled or repaired,
- damage resulting from failure to follow this user manual.

To make a warranty claim, you must present proof of purchase (receipt or invoice) and deliver the defective product to the seller's address. The claim can be made in person or by sending the product to the seller's address. The seller will settle the claim within 30 days of it being made. In the case of a justified claim, the consumer is entitled to free repair, replacement of the product or a refund of the purchase price in accordance with the Civil Code (Act No. 89/2012 Coll.) and Act No. 634/1992 Coll., on consumer protection.

Never send damaged or swollen batteries via a courier or parcel service. In such a case, please contact us first by e-mail at info@rotorama.cz.

A LiPo battery is a consumable product with a limited service life. Its capacity and performance naturally decrease depending on the number of charging cycles, the way it is used and the storage conditions. A gradual loss of capacity caused by normal use is a natural property of lithium batteries and is not considered a manufacturing defect; therefore it cannot be the subject of a warranty claim.