



Mobula6 ELRS Race

Happymodel · Tiny Whoop FPV drone 65 mm, 1S
User manual



Read the entire manual carefully before first use, especially the safety instructions and chapter 3 on the legal conditions of operation.

Importer: Rotorama, s.r.o. · www.rotorama.com

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1. Safety instructions

1.1 Before you start

Thank you for choosing the **Happymodel Mobula6 ELRS 2.4G Race** drone. It is a small Tiny Whoop class FPV drone with protective ducts, intended for more experienced pilots, mainly for flying indoors and in small outdoor areas. Read this entire manual carefully before your first flight and keep it for future reference.

- This product is not a toy and is not intended for children without adult supervision.
- The drone is flown with FPV goggles and a radio transmitter, which are **not included** (see chapter 4.1).
- The Race version has high-speed motors – it is considerably livelier than the standard versions and requires experience in Acro mode or at least practice on a simulator.

1.2 Rotating propellers and mechanical hazards

- The propellers are protected by ducts but can still injure fingers, eyes or hair on contact. Do not reach into the ducts while a battery is connected.
- Before connecting the battery, make sure **Disarm** (motors off) is active on the transmitter and the throttle is at minimum.
- Do not fly near people, animals or faces. Keep the drone away from your body when connecting it and testing the motors.

1.3 Li-Po and LiHV batteries

- The batteries supplied with the drone are **1S LiHV** type (nominal voltage 3.8 V, fully charged 4.35 V). Charge them only with a charger that supports LiHV mode – for example the USB charger included.
- Never leave batteries charging unattended. Charge on a non-flammable surface, away from flammable materials.
- Do not discharge a battery below **3.5 V** – deep discharge permanently damages the cell.
- Do not use a swollen, dented, hot or otherwise damaged battery. Disconnect a damaged battery immediately and place it in a non-flammable location.
- Disconnect the battery after each flight and do not leave it in the drone or in the charger. Use a fireproof bag for transport and storage.

1.4 Operating environment

- The drone has no protection against water or dust – do not fly in rain, fog, snow or over water. Outdoors, fly only in calm conditions.
- Indoors, remove fragile objects and keep a distance from people. Radio interference may degrade the link and the video.

2. Product description

2.1 Package contents

- 1× Mobula6 ELRS 2.4G Race drone (flight controller with built-in ExpressLRS 2.4 GHz receiver, ESCs, video transmitter and camera)
- 4× 1S 300 mAh LiHV battery with PH2.0 connector
- 1× USB charger for 1S Li-Po / LiHV batteries
- 1× set of small parts (according to the manufacturer a propeller removal tool and Gemfan 1210 propellers)

Not included: radio transmitter with ExpressLRS 2.4 GHz protocol, analog 5.8 GHz FPV goggles and a USB cable for connecting to a computer.

2.2 Parts overview



Illustrative photo by the manufacturer – frame colour and motor markings may differ depending on the production batch.

- ① Camera
- ② Camera canopy
- ③ Flight controller (FC) with ESCs, ExpressLRS receiver and video transmitter (AIO)
- ④ SE0802 KV25000 motor
- ⑤ Gemfan 1210 propeller
- ⑥ Protective duct
- ⑦ 5.8 GHz video transmitter antenna

The ExpressLRS receiver uses a ceramic chip antenna (SMD) mounted directly on the flight controller board. The battery fits into the holder on the underside of the

frame.

2.3 Specifications

Manufacturer	Happymodel
Model	Mobula6 ELRS 2.4G Race version
Wheelbase (diagonal)	65 mm
Dimensions	80 × 80 × 37 mm
Weight without battery	18.7 g (manufacturer's figure)
Flight controller (FC)	ELRS F4 2G4 (AIO), MCU STM32F411CEU6
FC firmware	Betaflight, target CRAZYBEEF4SX1280
ESC	4-in-1, 5 A continuous, 6 A peak (3 s), BLHeli_S, DShot600
Receiver	ExpressLRS 2.4 GHz (SPI), ceramic SMD antenna
Video transmitter (VTX)	OpenVTX 5.8 GHz, 25–400 mW, SmartAudio
Camera	Caddx Ant (analog)
Motors	SE0802 KV25000
Propellers	Gemfan 1210, two-blade
Power supply	1S Li-Po / LiHV, 2.9–4.35 V
BEC	5 V / 1 A

► Supplied battery

Type	1S LiHV, 3.8 V, 300 mAh, 30C
Connector	PH2.0
Dimensions	57 × 12 × 7 mm
Weight	8 g

2.4 Flight controller (FC) and receiver

The flight controller combines on a single board the processor running Betaflight firmware, four ESCs, an onboard ExpressLRS 2.4 GHz receiver connected via the SPI bus, the video transmitter and the OSD (on-screen display). The battery voltage is measured directly on the board and shown in the OSD.

- The receiver supports packet rates of 25, 50, 150, 250 and 500 Hz; telemetry output power is less than 12 dBm.
- The receiver is part of the Betaflight firmware – it is updated together with the flight controller firmware, not separately via the ExpressLRS Configurator.
- The manufacturer has changed board revisions over time (e.g. the gyro type). Default settings for each revision are published on its website (see chapter 5.6).

2.5 Video transmitter

The OpenVTX video transmitter operates in the 5.8 GHz band and its output power is adjustable from 25 to 400 mW. Channel and power are set from Betaflight (SmartAudio protocol) – in Betaflight Configurator on the *Video Transmitter* tab or from the OSD menu.

When operating in the Czech Republic, set the video transmitter power to 25 mW. Higher power levels are not permitted for this purpose by the ČTÚ general authorisation (see chapter 3.6).

3. Legal conditions of operation in the Czech Republic and the EU

3.1 The law of the country where you fly applies

Regulations (EU) 2019/947 and 2019/945 apply in all EU Member States, but national implementing rules differ from country to country – registration portals, minimum pilot age, geographical zones, mandatory insurance, permitted frequency bands and maximum transmitter power. The information in this chapter describes the situation in the Czech Republic. If you operate the drone in another country, you must comply with the regulations of the country in which you fly.

3.2 Drone classification and category of operation

- The drone **has no class identification label** (C0–C4) under Regulation (EU) 2019/945.
- The maximum take-off mass (MTOM) is well below 250 g. Verify the actual mass including the battery and any accessories by weighing.
- Drones below 250 g without a class label may, under the conditions of Regulation (EU) 2019/947, be operated in the open category, subcategory **A1**. For products without a class label placed on the market after 1 January 2024 the interpretation is not unambiguous – if in doubt, contact the Civil Aviation Authority (ÚCL) or fly according to the rules of subcategory **A3** (away from populated areas, at least 150 m from residential, commercial, industrial and recreational areas).
- Subcategory A1 does not allow flying over assemblies of people.

3.3 Operator registration and pilot competency

- The drone is equipped with a camera, so **operator registration is mandatory** regardless of its mass. Register on the ÚCL portal dron.caa.gov.cz.
- Display the assigned operator registration number on the drone.
- We recommend completing the online training and test for subcategories A1/A3 on the same portal.

3.4 Operational limits of the open category

- The maximum flight height is **120 m** above the surface.
- The drone must remain within visual line of sight (VLOS) – for flying with FPV goggles see chapter 3.5.
- Respect geographical zones (airports, protected areas, prohibited areas). The current map is available on the ÚCL website.
- Do not fly over assemblies of people.

3.5 Flying with FPV goggles

When flying with FPV goggles, the pilot cannot see the drone directly. Such a flight is possible only with an **unmanned aircraft observer** standing next to the pilot, watching the drone with the naked eye (without optical aids), warning of hazards and able to communicate with the pilot immediately. The pilot bears full responsibility for the flight.

3.6 Radio frequencies and transmitter power

Device	Band	Max. power stated by manufacturer	Limit in CZ (e.i.r.p.)
ExpressLRS receiver (telemetry)	2.4 GHz	< 12 dBm	25 mW
OpenVTX video transmitter	5.8 GHz	400 mW	25 mW

- The limits apply under the ČTÚ general authorisation No. VO-R/10 for the 2400–2483.5 MHz and 5725–5875 MHz bands.
- The user is responsible for setting the video transmitter channel and power. Use only channels within 5725–5875 MHz and a power of **25 mW**.
- Outside the Czech Republic, the frequencies and limits of the respective country apply.

3.7 Personal data protection and insurance

- The drone's camera may capture people. Respect the privacy of others, do not film people without their consent and comply with personal data protection rules (GDPR).
- Liability insurance is not mandatory in the Czech Republic for operation in subcategory A1. Nevertheless, we strongly recommend it.

4. Preparing for the first flight

4.1 What else you need

- A **radio transmitter** with an **ExpressLRS 2.4 GHz** transmitter module (internal or external).
- **Analog FPV goggles** or a monitor with a 5.8 GHz receiver.
- A **USB cable** and a computer with Betaflight Configurator for setting up the drone.

4.2 Battery and charging

- Always insert a **fully charged** battery before flying: 1S LiHV = **4.35 V** (1S Li-Po = 4.20 V).
- The recommended battery is a 1S 300 mAh with a **PH2.0** connector that fits the holder in the frame.
- Charge the battery with the USB charger included. Make sure the charger is set to LiHV mode when charging LiHV batteries and to Li-Po mode when charging standard Li-Po batteries.
- Slide the battery into the holder and plug the PH2.0 connector into the drone's lead. Observe the correct polarity – the connector must not be forced in.

4.3 Checking propellers and ducts

- Check that all propellers sit firmly on the motor shafts and are not cracked or bent.
- The propellers rotate in two directions (CW and CCW). When replacing, always fit a propeller of the same type and direction as the original one on that motor. You can check the direction of rotation in Betaflight Configurator on the *Motors* tab (without propellers).
- The ducts must not be cracked and the propellers must not touch them.

5. Setup

5.1 Connecting to a computer

- ① Install **Betaflight Configurator** (betaflight.com).
- ② Without a battery, connect the drone to the computer with a USB cable and click *Connect* in the program.
- ③ Before making any changes, back up the default settings with the *diff all* command on the *CLI* tab and save the output to a file.

✳ **Always test the motors without propellers.**

5.2 Binding the ExpressLRS receiver

The transmitter and the receiver must be compatible: **the major ExpressLRS version on the transmitter module must match the ExpressLRS version in the drone's Betaflight firmware**. If they do not bind, a version mismatch is the most common cause.

- ① Connect the drone to Betaflight Configurator and open the *Receiver* tab.
- ② If a *binding phrase* field is available, enter the same phrase as in your transmitter module and save. The drone will then connect automatically.
- ③ Otherwise, put the transmitter module into bind mode and click *Bind Receiver* in Betaflight Configurator (or enter the *bind_rx* command in the CLI).
- ④ A successful link is confirmed when the channels on the *Receiver* tab respond to the transmitter sticks.

5.3 Transmitter and mode setup

- On the *Receiver* tab, check that the sticks match the channels (Roll, Pitch, Yaw, Throttle) and move in the correct direction.
- On the *Modes* tab, assign **Arm** (motors on) to a switch on the transmitter. We also recommend a switch for *Angle* mode (self-levelling) and *Flip over after crash* (Turtle mode).
- Always save changes with the *Save* button.

5.4 Video transmitter and goggles

- On the *Video Transmitter* tab, set the band, channel and a power of **25 mW** (in CZ). Set the same channel in the goggles.
- After connecting the battery, the camera image with OSD data should appear in the goggles.

5.5 Accelerometer calibration

Place the drone on a flat, level surface and click *Calibrate Accelerometer* on the *Setup* tab. Calibration is required for Angle mode to work correctly.

5.6 Firmware update and further guides

- Betaflight firmware is flashed on the *Firmware Flasher* tab; the target is **CRAZYBEEF4SX1280**. Always back up your settings (*diff all*) before updating.
- Default factory firmware and settings dumps for the individual flight controller revisions are published by the manufacturer at www.happymodel.cn.
- Updating Betaflight also changes the ExpressLRS version in the drone – after an update it may be necessary to update the transmitter module as well.

Official documentation:



ExpressLRS – official documentation (setup, binding, updates).

www.expresslrs.org



EdgeTX – official documentation for transmitters running EdgeTX firmware.

edgetx.org

6. Flying

6.1 Pre-flight check

- The battery is **fully charged** (1S LiHV 4.35 V, 1S Li-Po 4.20 V) and undamaged.
- Propellers and ducts are intact, the propellers sit firmly.
- The transmitter is on, the Arm switch is in the Disarm position, throttle at minimum.
- The goggles are set to the same channel as the video transmitter and the image is clear.
- There are no people or animals in the flying area; outdoors there is no wind. The observer stands next to the pilot.

6.2 Arm, Disarm and failsafe

- **Arm** (motors on) with the switch set up in chapter 5.3, only with the throttle at minimum. After Arm the motors start idling.
- Use **Disarm** (motors off) immediately after landing and after every crash or loss of control.
- **Failsafe:** if the signal from the transmitter is lost, Betaflight stops the motors and the drone falls. Test this before the first flight without propellers – switch off the transmitter and check that the motors stop. Settings are on the *Failsafe* tab.

6.3 Take-off and basic control

- Place the drone on a flat surface with the camera facing away from you, Arm and smoothly increase the throttle.
- Start in Angle mode and in an area without obstacles. The Race version responds very sharply to throttle – move the throttle stick gently.
- After hitting an obstacle, Disarm. A drone that has flipped over can be turned back with the *Flip over after crash* function, if set up.

6.4 Voltage monitoring and ending the flight

- Monitor the battery voltage in the OSD. End the flight at the latest at **3.5 V** (1S).
- A short voltage drop when applying throttle sharply is normal; the voltage in steady flight is what counts.
- After landing, Disarm and disconnect the battery. Let the motors and battery cool down before the next flight.

6.5 Finding the drone after a crash

Search for a lost drone using the last image in the goggles. In Betaflight you can assign motor beeping (*Beeper*) to a transmitter switch, which helps when searching in grass or under furniture.

7. Maintenance and troubleshooting

7.1 After every flight

- Disconnect the battery and check the propellers, ducts and camera canopy.
- Remove hair, dust and dirt from the motors – wrapped hair slows the motor down and may overheat it.
- Check that the video transmitter antenna lead and the camera cable are not loose.

7.2 Replacing propellers

- Remove a propeller with the propeller tool included – lever directly under the propeller hub, not by the blades.
- Push a new propeller of the same type and direction of rotation straight onto the shaft all the way.
- Replace a damaged duct or frame with an original spare part.

7.3 Storage

- Store batteries in a protective bag, charged to the storage voltage of **3.8 V** (1S).
- Store the drone in a dry place, out of direct sunlight, at room temperature.

7.4 Troubleshooting

Problem	Possible cause and solution
Receiver does not bind	Different major ExpressLRS version on the transmitter module and in Betaflight, or a different binding phrase. Align the version and phrase and repeat binding (chapter 5.2).
Motors do not start (Arm)	Throttle not at minimum, drone not level, no signal from the transmitter or USB cable connected. The reason is shown in the OSD and on the <i>Setup</i> tab in Betaflight Configurator.
Drone flips over on take-off	Propellers fitted on the wrong motor or wrong direction of rotation. Check the propellers and motor direction (chapter 4.3).
No image in the goggles	Different channel on goggles and video transmitter, damaged antenna or camera. Check the settings on the <i>Video Transmitter</i> tab.
Short flight time	Worn battery, damaged propeller or dirt in a motor. Replace the battery or propellers, clean the motors.
Strong vibrations, motor gets hot	Bent propeller, wrapped hair or damaged motor. Replace the propeller, clean or replace the motor.

8. Information for the EU and Czech Market

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@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.com

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@rotorama.cz.
- **Product identification:** the type designation (Happymodel Mobula6 ELRS 2.4G Race) is stated on the product packaging and in this manual; the firmware version is displayed by Betaflight Configurator when the drone is connected to a computer.

8.3 Disposal of electrical equipment and batteries



- The crossed-out wheeled bin symbol on the product, its packaging or in the documentation means that at the end of its service life the product **must not be disposed of together with mixed municipal waste**.
- Hand it over at a take-back point for electrical equipment – at a collection yard, at a take-back point of a collective system, or at the retailer when purchasing a new equivalent product. Take-back is free of charge for the end user.
- The package includes Li-Po (LiHV) batteries. Do not dispose of the batteries with mixed waste or in fire; hand them in at a battery collection point with the contacts insulated.
- The obligations under Act No. 542/2020 Coll., on end-of-life products, are fulfilled by the importer through a collective take-back system.
- Proper disposal helps prevent negative impacts on the environment and human health and contributes to the reuse of secondary raw materials.

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

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 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.