



Firefly 20PRO 4S

DJI O4 Wide · ExpressLRS 2.4 GHz
User manual



Read the whole manual before the first flight and keep it for future reference.

www.rotorama.cz

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1. Safety instructions

Read the whole manual before the first flight. The Firefly 20PRO is a racing and freestyle unmanned aircraft with exposed propellers that accelerates in an instant. Improper handling can cause serious injury, property damage and a breach of aviation regulations.

1.1 General rules

- The drone is intended for **persons over 16 years of age**. A younger pilot may fly only under the direct supervision of a person who meets this requirement and is familiar with this manual.
- Never fly over people, animals, vehicles or assemblies of people.
- Do not fly near airports, power lines, industrial premises, hospitals or at the scene of an emergency service operation.
- Do not fly in rain, snow, fog or strong wind. The drone is not waterproof.
- Before flying, make sure there are no bystanders in the area and keep at least 5 m clear of the drone during take-off and landing.
- After a crash, disconnect the battery first and only then approach the drone.
- If the link to the radio is lost, the drone **stops the motors immediately and falls to the ground** (DROP failsafe, chapter 5.5). Choose your flight path so that a falling drone cannot endanger anyone.

1.2 Propellers and motors

- The propellers spin up as soon as you **Arm** the drone. Never Arm the drone while holding it.
- Always connect the battery with the drone on the ground and the radio switched on.
- Switch the radio on **before** the drone and off **after** the drone.
- Replace cracked, chipped or deformed propellers immediately. A damaged propeller disintegrates in flight and its fragments fly off at high speed.
- Do not touch the motors right after a flight, they may be hot.

1.3 Li-Po and LiHV batteries

The battery is not included. Use only undamaged batteries of the recommended type (chapter 4.2).

- Charge only with a balance charger, on a non-flammable surface and **always under supervision**. We recommend charging in a LiPo-safe bag.
- A fully charged cell is at **4.20 V** (Li-Po) or **4.35 V** (LiHV). For a 4S pack this is 16.8 V or 17.4 V.
- End the flight at **3.5 V per cell** at the latest, that is 14.0 V for a 4S pack. Deeper discharge damages the battery permanently.
- The storage voltage is **3.8 V per cell**, that is 15.2 V for a 4S pack. Bring the battery to this level if you are not going to use it for several days.
- Do not use or charge a swollen, punctured, soaked or crash-deformed battery.
- Do not short-circuit the battery, do not expose it to temperatures above 60 °C and do not leave it in a closed vehicle.
- Do not use water on a burning battery. Move the pack to a non-flammable surface and let it burn out, or use an extinguisher approved for lithium batteries.

✳ **Detailed rules are available at www.rotorama.cz in the article on safe LiPo battery handling.**

2. Product description

The **Flywoo Firefly 20PRO 4S** is an assembled and test-flown 2" FPV drone with **DJI O4 Wide** digital video transmission and an **ExpressLRS 2.4 GHz** receiver. It is intended for fast freestyle, racing in tight terrain and flying in confined spaces.

The top plate carries the entire video transmitter (VTX) assembly including the antennas and can be transferred to a Firefly 25MINI frame by undoing four screws, with no re-soldering. The powertrain stays bolted to the bottom plate.

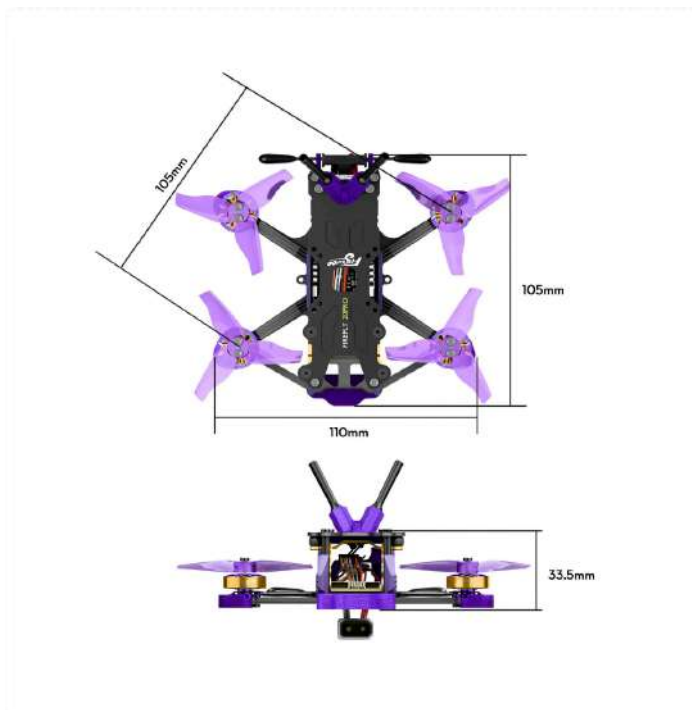


2.1 Specifications

Model	Firefly 20PRO 4S (O4 Wide, ELRS)
Wheelbase	105 mm
Dimensions	110 × 105 × 33.5 mm
Weight without battery	99 g
Flight controller (FC) and ESC	GOKU F405 SE 3-4S 20A AIO
Flight controller MCU	STM32F405
Gyro	BMI270
Blackbox memory	8 MB
FC firmware	Betaflight, target FLYWOOF405S_AIO
FC firmware (iNav)	FLYWOOF405HD
ESC firmware	Bluejay
Motors	ROBO 1303 6000Kv, 1.5 mm shaft
Propellers	Gemfan 2023-3, 3-blade, 1.5 mm shaft
Video transmission	DJI O4 Wide Air Unit
Receiver	ExpressLRS 2.4 GHz (external)
Battery connector	XT30
Voltage input	4S LiHV / Li-Po
Recommended capacity	450-750 mAh

✳ **The stated weight of 99 g is without the battery. Verify the maximum take-off mass (MTOM) before flying by weighing the drone with the battery and accessories you actually use - see chapter 7.**

2.2 Dimensions



Top and side view, dimensions in millimetres

2.3 Exploded view

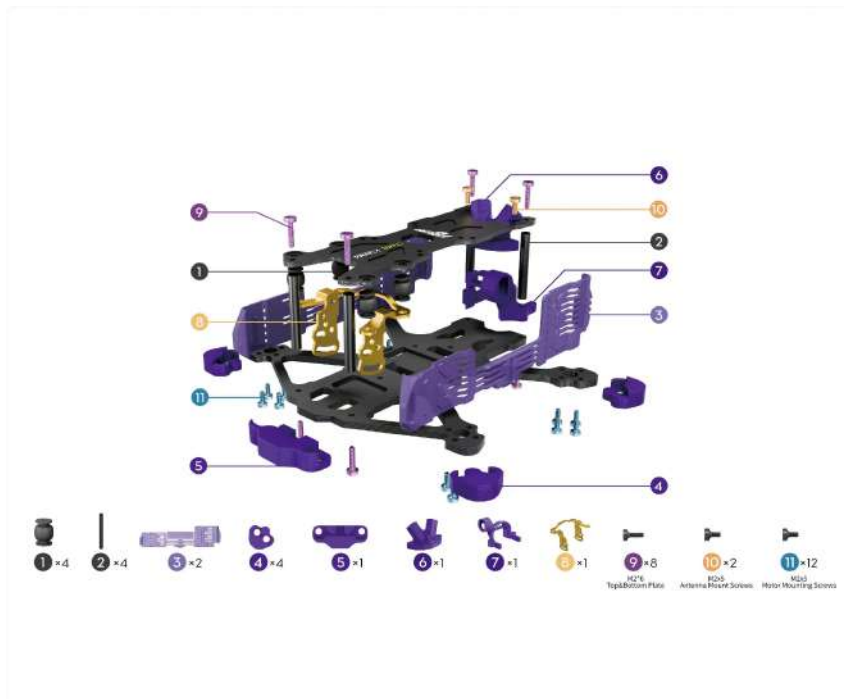
The drawings are a reference for maintenance and component installation. The fasteners used are marked ①–⑥.



- ① M2×6 – top plate screws
- ② M2×10 – fixed screw for the DJI O4 unit
- ③ M2×5 – antenna mount screws
- ④ M3×8 – custom damping balls
- ⑤ M2×3 – lens fixing screw
- ⑥ M2 – nylon nut

❖ **The assembly drawing is shared by the Firefly 20PRO and Firefly 25MINI frames; the procedure and the fasteners are identical for both.**

2.4 Frame exploded



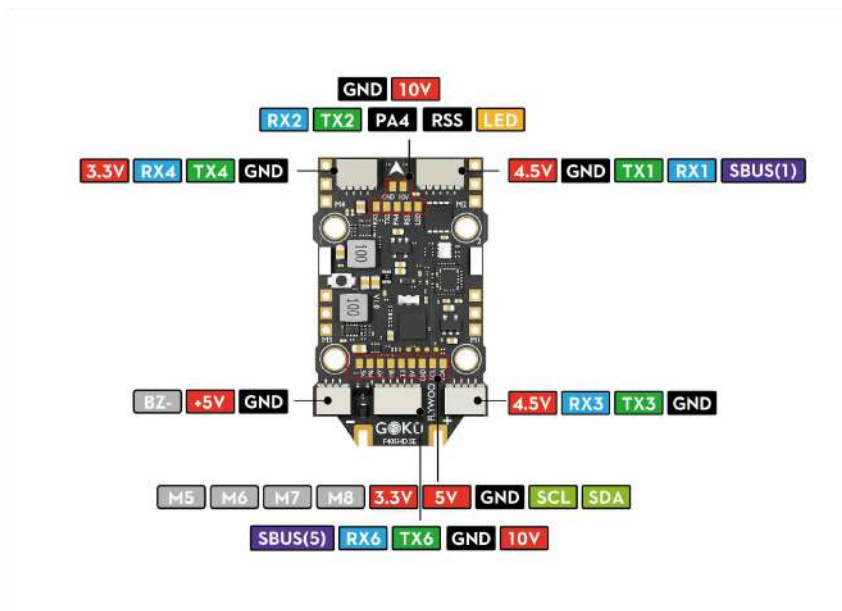
- ① ×4 damping ball
- ② ×4 standoff
- ③ ×2 side panel
- ④ ×4 motor wire protection tube
- ⑤ ×1 front guard
- ⑥ ×1 antenna mount
- ⑦ ×1 camera cage
- ⑧ ×1 VTX mount
- ⑨ ×8 M2×6 – top and bottom plate
- ⑩ ×2 M2×5 – antenna mount screws
- 11** ×12 M2×5 – motor mounting screws

3. GOKU F405 SE flight controller

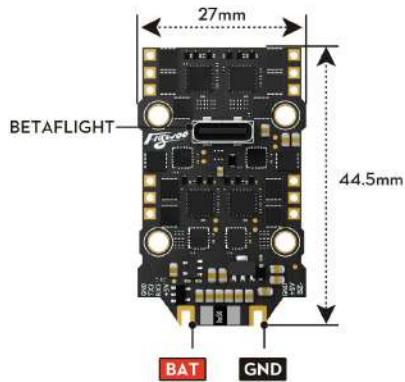
The drone is built around an AIO board that combines the flight controller (FC), a 4-in-1 20 A electronic speed controller (ESC) and the power supplies. All peripherals – video transmitter, RC receiver and GPS module – connect through plugs; only the motor wires require soldering.

- ESC: **20 A continuous, 25 A peak** per channel.
- Two independent BECs: **10 V / 2 A** for the video transmitter and **5 V / 2 A** for the other peripherals.
- The board has an integrated **buzzer** that can be triggered from the radio and makes the drone easier to find in the field.
- The **USB-C** port is on the bottom of the board, so no disassembly is needed to connect it to a computer.

3.1 Port layout - top view



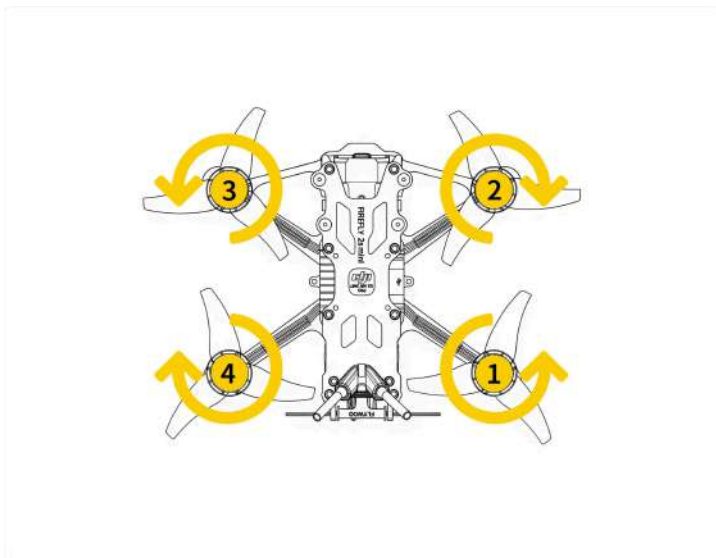
3.2 Bottom view and dimensions



4. Getting started

4.1 Propellers

The drone runs **props out** – the leading edges of the propellers point away from the centre of the drone. Install the propellers according to the motor sequence and rotation; each propeller is marked for the direction it is made for.



Motor numbering and direction of rotation, top view

- Tighten the motor nuts firmly, but do not use force.
- Fit the propellers last, immediately before the flight.

4.2 Choosing and connecting the battery

The recommended batteries are **4S LiHV or Li-Po, 450-750 mAh, with an XT30 connector**. The battery is not included.

- The battery sits on the top plate and is secured with the supplied strap over the anti-slip pad.
- Always fit a **fully charged** battery before flying.
- The drone can also be flown on a 3S battery. Power is lower and flight time longer; no changes to the settings are required.
- Route the battery lead so that it cannot be caught by the propellers.

4.3 Pre-flight check

- ① Check the propellers – they must not be cracked, chipped or deformed.
- ② Check that the motor nuts and frame screws are tight.
- ③ Check that the motor wires and the antennas are not damaged.
- ④ Switch on the radio and make sure the correct model is selected.
- ⑤ Put on the goggles and check the video link.
- ⑥ Fit a fully charged battery and connect it.
- ⑦ Wait for the drone to initialise and confirm the link to the radio.
- ⑧ Step back at least 5 m from the drone and only then Arm.

5. Betaflight configuration

The drone is configured and test-flown at the factory; the PID and filter settings are matched to its weight and power. You only need the procedures below if you are restoring the configuration after reflashing the firmware or connecting further accessories.

✳ **Always back up your configuration with the `diff all` command in the CLI tab before reflashing. The manufacturer publishes the official CLI dump on its website.**

5.1 DJI O4 Wide video transmitter

In the **Ports** tab, enable **MSP** for **UART6** and set *Peripherals* to **VTX (MSP + Displayport)**.

Port/Bit	Configuration/MSP	Serial No.	Telemetry Channel	Serial baud	Peripherals
USB VCP	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART1	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART2	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART3	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART4	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART5	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART6	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	VTX (MSP + D) ▼ AUTO ▼

5.2 ExpressLRS receiver

The external receiver is connected to **UART3**. In the *Ports* tab, enable *Serial Rx* for UART3.

Port	Configuration	Serial Rx	Serial Tx	Serial Input	Serial Output
UART1	115200	☐	☐	Disabled	AUTO
UART2	115200	☐	☐	Disabled	AUTO
UART3	115200	☒	☐	Disabled	AUTO
UART4	115200	☐	☐	Disabled	AUTO
UART5	115200	☐	☐	Disabled	AUTO
UART6	115200	☐	☐	Disabled	AUTO

In the *Receiver* tab, change *Receiver Mode* to **Serial (via UART)** and *Serial Receiver Provider* to **CRSF**.

Receiver

Serial (via UART)

Receiver Mode

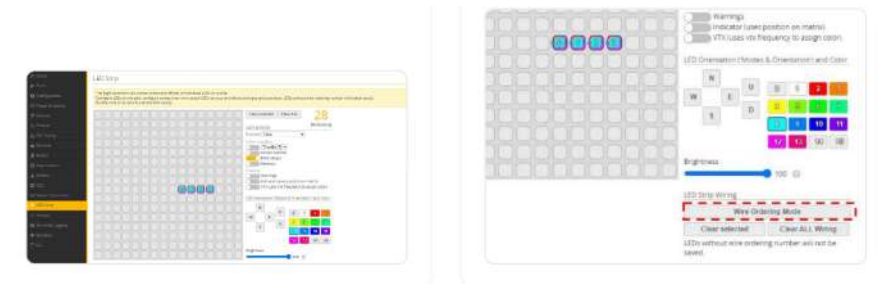
- The UART for the receiver must be set to 'Serial Rx' (in the Ports tab)
- Select the correct data format from the drop-down, below:

CRSF

Serial Receiver Provider

5.3 Onboard LEDs

In the *LED Strip* tab, select LEDs 0/1/2/3 and set the mode and colour on the right. After reflashing you have to add the LEDs manually using *Wire Ordering Mode* in the bottom right corner.



5.4 GPS module

The GPS module is not included. The board has a dedicated port for it; once fitted, you can use return to home and position data in the OSD.

- ① In the *Ports* tab, set *Sensor Input* for **UART3** to **GPS** and the baud rate to **Auto**.
- ② In the *Configuration* tab, enable the **GPS** feature.
- ③ In the *GPS* tab, select the protocol, usually **UBLOX**.



Important: On this version UART3 is occupied by the ExpressLRS receiver. Connect the GPS module to TX4/RX4 and configure UART4 instead.

Important: Keep the GPS module as far away from the video transmitter as possible, otherwise it may fail to acquire satellites.

5.5 Failsafe

Failsafe is what the drone does when the link to the radio is lost. The drone is set to **DROP** from the factory – as soon as the link drops, the flight controller stops the motors immediately and the drone falls to the ground.

On a small drone without GPS this is safer than attempting a controlled descent. The drone cannot drift away, continue flying out of the pilot's sight or wander uncontrolled over an area where people are moving.

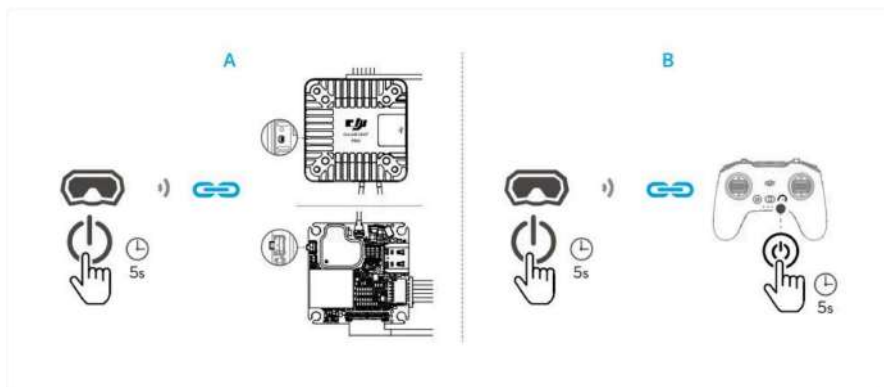
Important: Because of the DROP setting, always choose a flight path where a drone falling from any point cannot endanger anyone or cause damage. Do not fly over people, animals, vehicles or other people's property.

- The setting is in the *Failsafe* tab in Betaflight. We recommend leaving it unchanged.
- After reflashing the firmware, always check the failsafe setting before the drone flies again.
- Test the loss of link between the radio and the receiver on the ground **with the propellers removed** before the first flight – switch the radio off and check that the motors stop.

6. Binding and flight modes

6.1 DJI O4 binding

The procedure is shown for DJI Goggles 3 and the DJI FPV Remote Controller 3.



A - goggles and air unit

- ① Power on both devices and select *Air Unit* in the goggles menu.
- ② Wait until the LED is solid red, then press the button on the unit – the LED starts to flash.

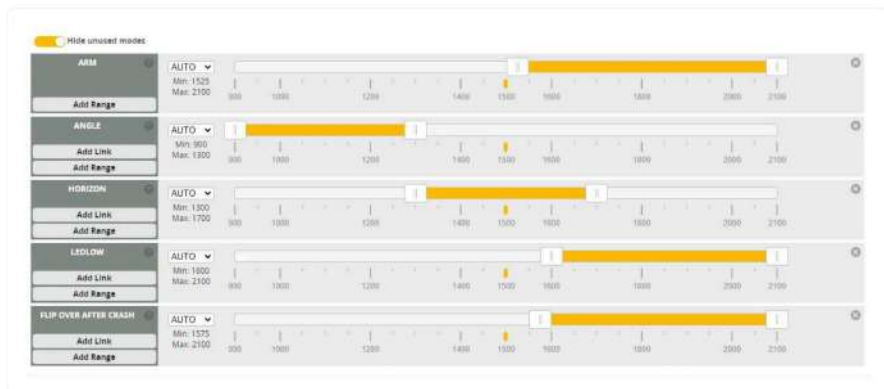
B - goggles and remote controller

- ① Hold the power button until the beeping starts.
- ② Binding is complete when the LEDs are solid and the video links up.

*** The ExpressLRS receiver is bound separately, following the instructions for your radio. The receiver ships with the factory configuration and the binding phrase has to be set.**

6.2 Flight modes

Modes are assigned to the switches on your radio in the *Modes* tab.



Mode	Description
ARM	Arms the drone. The motors spin at idle.
ANGLE	The drone auto-levels.
HORIZON	Auto-levelling with the ability to perform flips.
ACRO	No angle limits. The default mode for freestyle.
BEEPER	Triggers the buzzer to help locate the drone.
LEDLOW	Turns off the onboard LEDs.
FLIP OVER AFTER CRASH	Flips the drone back onto its feet after a crash.

6.3 AUX channel binding

- ① Every switch on your radio corresponds to one AUX channel on the receiver, for example AUX1.
- ② In the *Modes* tab, find the function you want, click *Add Range*, assign a channel and drag the sliders to set the range in which the function is to be active.
- ③ Toggle the switch on the radio and check that the yellow marker moves into the range you set and the name of the function is highlighted.

6.4 Flip over after crash

The *Flip Over After Crash* function turns an upside-down drone back onto its feet by temporarily reversing the direction of the motors.

- ① Activate the **TURTLE** switch.
- ② **Arm** the drone.
- ③ Move the pitch or roll stick to flip the drone over.

Important: If the motors are obstructed by grass or debris, do not force this mode - it may burn out the motors or the ESC. Always turn the mode off before flying again.

7. Operating an unmanned aircraft in the Czech Republic

Regulations (EU) 2019/947 and 2019/945 apply in all Member States of the European Union, but the national implementing rules differ from country to country – registration portals, the minimum age of the pilot, geographical zones, mandatory insurance, permitted frequency bands and maximum transmit powers. This chapter describes the situation in the Czech Republic. If you operate the drone in another country, you must follow the rules of the state you are flying in.

7.1 Category of operation

The drone does not carry a C0 to C4 class identification label under Regulation (EU) 2019/945 and is treated as a **privately built unmanned aircraft system** for the purposes of the operating rules.

A privately built unmanned aircraft system may be operated in subcategory **A1** only if its maximum take-off mass is below 250 g **and at the same time** its maximum operating speed is below 19 m/s, that is roughly 68 km/h. The Firefly 20PRO exceeds this speed, so its operation falls into subcategory **A3**.

Important: In subcategory A3, the remote pilot must hold a proof of competency for subcategories A1/A3. You must fly at least 150 m horizontally from residential, commercial, industrial and recreational areas, and no uninvolved person may be present in the area of operation.

- You obtain the proof of competency by completing the online training and test at dron.caa.gov.cz. It is valid for five years.
- The minimum age of the remote pilot is **16 years**. A younger person may fly the drone only under the direct supervision of a pilot who meets both the age and the competency requirement.
- The maximum flight altitude is **120 m** above the closest point of the surface of the earth.
- Flying over assemblies of people is prohibited.
- Check the restrictions at your flight location in the dronemap.gov.cz map before flying. Some zones require the operation to be marked in advance.
- You need the landowner's consent to take off from someone else's property.
- Weigh the drone with the battery you are going to use and verify its maximum take-off mass before flying.

7.2 Operator registration

The drone is equipped with a camera, and **operator registration is therefore mandatory regardless of its weight**. Registration is free of charge and is done at dron.caa.gov.cz.

- Display the registration number you are assigned on the drone so that it is legible to the naked eye while the drone is on the ground. On a drone of this size it is acceptable to place it inside the battery compartment.
- The last three characters of the registration number after the dash are confidential – never share them.
- Report any change of your details within 15 days.
- Operator registration and the remote pilot's proof of competency are two separate things.

7.3 Flying with FPV goggles

When flying with FPV goggles or with the image on a monitor, you do not have a direct view of the drone. The regulations allow such a flight only under these conditions:

- An **unmanned aircraft observer** stands next to you and keeps the drone under continuous visual observation with the naked eye. Corrective glasses and contact lenses are allowed, binoculars are not.
- You have clear and effective two-way communication with the observer and are able to land immediately at their instruction.
- The observer must not be used to extend the range of the flight beyond the distance at which you would see the drone yourself.
- The remote pilot is always responsible for the safety of the flight.

7.4 Frequency bands and transmit power

The drone contains two radio devices – the ExpressLRS receiver and the DJI O4 Wide video transmitter. The following limits apply to their operation in the Czech Republic:

Band	Limit	Use
2400–2483.5 MHz	100 mW e.i.r.p.	control – ExpressLRS
5725–5875 MHz	25 mW e.i.r.p.	video – DJI O4

- The devices must be set to the **CE** region. Switching to the FCC region raises the transmit power above the permitted limit and breaches the conditions of the general authorisation of the Czech Telecommunication Office.
- The 5.1 GHz band, which the DJI O4 unit also supports, is reserved for indoor use and **cannot be used** for unmanned aircraft systems. Keep only 5.8 GHz channels selected in the goggles and in the video transmitter.
- The user is responsible for the transmit power setting. In other countries, the limits of that country apply.
- Use only the antennas supplied or specified by the manufacturer. Additional amplifiers are not permitted.

7.5 Insurance

Liability insurance is mandatory in the Czech Republic in subcategory A2 and in subcategory A3 for unmanned aircraft with a maximum take-off mass above 4 kg. It is therefore not mandatory for this drone. Given its speed we strongly recommend it; some general third-party liability policies cover damage caused by a model aircraft.

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@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 type designation (Firefly 20PRO 4S) and the manufacturer's part number are stated on the label on the product packaging.

8.3 Disposal of electrical equipment



- 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 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.