



Firefly16 / 18 1S Nano Baby V3 O4 Wide

User manual

FPV drone with DJI O4 Wide digital video transmission



Read the entire manual before your first flight.

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1. Safety instructions

Read the entire manual before your first flight. Improper use of the unmanned aircraft may cause personal injury or damage to property.

1.1 Before you start

The Firefly16 and Firefly18 1S Nano Baby V3 O4 Wide are unmanned aircraft (drones) designed for first-person view (FPV) flight with FPV goggles. They are not toys within the meaning of the toy safety regulations and are not suitable for children.

- The product is not sold as a toy and is not intended for children. Operation is subject to the age of the pilot and to meeting the conditions in chapter 3.
- The drone is supplied assembled and test-flown. To operate it you must add a **battery, an RC radio with an ExpressLRS 2.4GHz transmitter module and DJI FPV goggles** — see chapter 4.1. None of these are included in the package.
- Fly only when you are in good physical and mental condition. Never fly under the influence of alcohol, medication or other substances that affect attention.
- Before every flight, check the condition of the propellers, motors, frame and battery as described in chapter 6.1.
- Compliance with legal regulations is always the responsibility of the pilot and the operator, not of the manufacturer or the seller.

1.2 Rotating propellers and mechanical hazards

Rotating propellers can cause cuts. Never touch the propellers while the motors are running and never connect the battery with the propellers fitted unless you intend to fly.

- When configuring, testing motors, flashing firmware and during any work with the drone connected to a computer, **always remove the propellers**.
- By default the propellers spin up to idle speed after the Arm command (motors on). This is intentional — it makes it obvious at a glance that the drone is armed.
- The drone is factory-configured to allow Arm **in any attitude**, including upside down. Do not place the drone with the battery connected on its side or upside down and do not handle it until you have performed Disarm (motors off).
- Never fly over people or at head height near them. Prop guards reduce the risk of injury but do not eliminate it.
- During FPV flight you cannot see the surroundings. In the open category, always fly with an unmanned aircraft observer next to you (chapter 3.5).

1.3 Li-Po and LiHV batteries

Li-Po and LiHV batteries can catch fire if damaged, overcharged or short-circuited. Always charge them under supervision, on a non-flammable surface, and never leave them unattended.

- Use only single-cell (1S) batteries with an **A30** connector, as recommended in chapter 4.2. The battery is not included in the package.
- Charge with a charger intended for 1S Li-Po and LiHV and **always set the correct cell type**. Charging a Li-Po cell to LiHV voltage will damage it permanently.
- Fully charged cell: **4.20 V** for Li-Po, **4.35 V** for LiHV. End the flight at **3.5 V** per cell at the latest. Storage voltage is **3.8 V** per cell.
- Charge at a temperature of 5–35 °C. After a flight, let the battery cool down before charging it.
- A swollen, punctured, deformed or visibly damaged battery **must never be charged or used again**. Take it to a collection point (chapter 8.3).
- Do not short-circuit batteries, do not expose them to temperatures above 60 °C and do not store them in a car in the sun.
- If you are not going to use the drone for a longer time, discharge or charge the batteries to storage voltage.
- Never put lithium batteries in checked baggage on an aircraft. They may be carried in hand baggage only, with insulated contacts and according to the carrier's rules.

1.4 Operating environment

- The DJI O4 Wide Air Unit video transmitter has a manufacturer-specified operating temperature range of **–10 °C to 40 °C**. Do not use the drone outside this range.
- The video transmitter **gets very hot** during operation and after landing. Do not touch it until it has cooled down.
- After power-up the video transmitter switches to a power-saving mode so that it does not overheat. Do not leave the drone standing powered on the ground for a long time, especially at temperatures above 25 °C.
- The drone is not water- or dust-resistant. Do not fly in rain, snow, fog or over water.
- With a weight below 40 g the drone is very sensitive to wind. Outdoors, fly only in calm or light wind.
- Do not fly near strong sources of radio interference — transmitters, overhead traction lines, substations and large metal structures.

2. Product description

This manual applies to the **Firefly16 1S Nano Baby V3 O4 Wide** and **Firefly18 1S Nano Baby V3 O4 Wide** models in the version with an integrated **ExpressLRS 2.4GHz** receiver. Both models share the frame, the flight controller and the video transmitter, and differ only in their motors, propellers and prop guards.

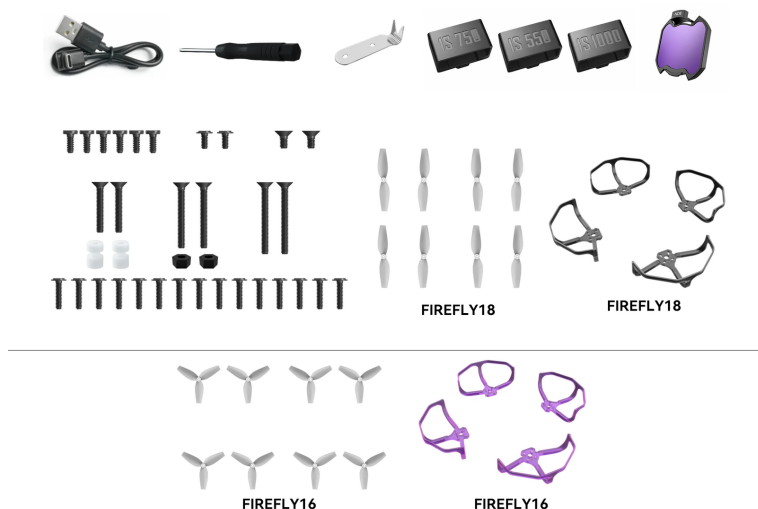
The manual does not cover the **BNF-DJI** version (without the ExpressLRS receiver, controlled by a DJI radio) or the **Drone Kit** version (supplied without a video transmitter).

2.1 Package contents

The packaging is common to both models and therefore contains propellers and prop guards for both sizes. The set for your model is shown in bold in the table below.

Qty	Item
1×	Firefly16 or Firefly18 1S Nano Baby V3 O4 Wide drone
1×	DJI O4 Wide V2 ND filter
1×	90° USB-C data cable for the O4 video transmitter
1×	TPU battery holder for 450mAh
1×	TPU battery holder for 750mAh
1×	TPU battery holder for 1000mAh
8×	HQ 45mmx2 propellers, 1.5mm shaft — Firefly18
4×	V2 prop guard, black — Firefly18
8×	HQ 40mmx3 propellers, 1.5mm shaft — Firefly16
4×	V2 prop guard, purple — Firefly16
1×	Screwdriver
1×	Screw set

The battery, charger, RC radio and FPV goggles are not included in the package.



Package contents — the accessories are common to both the Firefly16 and the Firefly18

2.2 Description of parts



Main parts of the drone (the Firefly18 model is shown)

① DJI O4 video transmitter antenna

- ② DJI O4 Wide camera with the ND filter fitted
- ③ TPU camera and video transmitter cover (canopy)
- ④ Flywoo ROBO 1002 motor
- ⑤ Propeller
- ⑥ GOKU F405 HD 1S AIO board — flight controller, speed controllers and receiver
- ⑦ 2mm carbon frame

The camera is housed in an **18mm case** that covers the otherwise exposed back of the camera board and secures the coaxial cable. The battery holder is replaceable and fits on from underneath the frame.

2.3 Technical data

The data is stated by the manufacturer FLYWOO unless indicated otherwise.

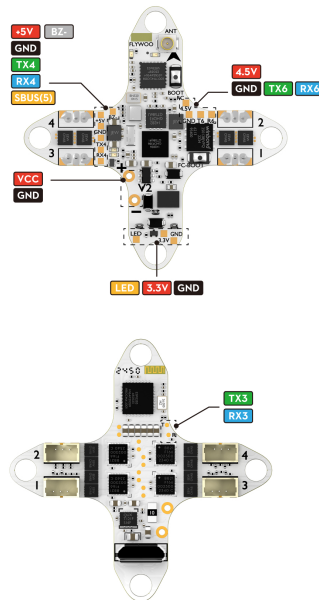
Parameter	Firefly16	Firefly18
Motors	ROBO 1002 23500Kv	ROBO 1002 19800Kv
Propellers	HQ 40mmx3 (three-blade)	HQ 45mmx2 (two-blade)
Weight without battery	approx. 39g	approx. 39g
Dimensions	72x72x51 mm	72x72x51 mm
Flight controller (FC)	GOKU F405 HD 1S 5A ELRS AIO V2.0	
Processor / gyroscope	STM32F405 / BMI270	
Barometer	SPL06 (for altitude measurement)	
Blackbox memory	8MB	
Speed controllers (ESC)	5A continuous, 8A peak, Bluejay firmware	
Motor protocol	DSHOT300, bidirectional	
Receiver	ExpressLRS 2.4GHz, integrated, with TCXO	
Video transmitter (VTX)	DJI O4 Wide Air Unit	
Power supply	1 Li-Po / LiHV cell (1S), A30 connector	
Frame	carbon, 2mm main plate, weight 8g	

2.4 Flight controller (FC) and receiver

The **GOKU F405 HD 1S 5A ELRS AIO V2.0** board, weighing 2.6g, combines the flight controller, four speed controllers, the ExpressLRS receiver and a voltage regulator (BEC) for the video transmitter. It is fitted with an STM32F405 processor, a BMI270 gyroscope, an SPL06 barometer and 8MB of blackbox memory. The mounting hole pattern is 25.5x25.5 mm.

The **Flywoo 1S O4 5V BEC** regulator supplies 5V/3A and keeps the video transmitter powered even when the cell voltage drops as low as **2.6V**. This deals with the fact that the manufacturer of the video transmitter requires at least 3.7V at its input.

The ExpressLRS receiver is connected internally to the flight controller on **UART3** using the **CRSF** protocol. The other ports are broken out to solder pads and are free for user extensions.



Solder pad layout of the AIO board (top and bottom side)

Port	Pads	Factory state
UART3	TX3 / RX3 (bottom side)	occupied by the internal ExpressLRS receiver
UART4	TX4 / RX4	free, used for the video transmitter OSD in the factory configuration

Port	Pads	Factory state
UART5	SBUS(5)	free, receive only
UART6	T6 / R6	free
UART1, UART2	—	not broken out

❖ **The specific port on which the video transmitter OSD runs differs between production batches (UART4 or UART6). Before making any change to the configuration, check the actual state in the Ports tab.**

2.5 Video transmitter (VTX)

The drone is fitted with a **DJI O4 Wide Air Unit** — a camera and a video transmitter in one. Compared with the basic DJI O4 unit it has a **wider lens with a 159° field of view** instead of 117.6°. It is a factory wide-angle version straight from DJI, not a subsequently replaced lens.

Sensor	1/2" CMOS
Field of view (FOV)	159°
Equivalent focal length / aperture	16 mm / f/2.8
Focused from	1 m to infinity
Recording resolution	3840x2160 (4K) at 30/50/60 fps, 1080p up to 120 fps
Recording format	MP4, bit rate up to 100 Mbps
Internal memory	23 GB; microSD cards are not supported
Live video	1080p at 30/50/60/100 fps, up to 60 Mbps
Lowest latency	20 ms (Racemode)
Transmission range	6 km according to CE
Image stabilisation	RockSteady in the camera, or Gyroflow in post
Input voltage	3.7–13.2 V
Operating temperature	–10 °C to 40 °C
Weight	13.3 g including the camera and the coaxial cable

The video transmitter cannot take still photographs and no camera of another brand can be connected to it.

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

3.1 The law of the country you fly in applies

Regulations (EU) 2019/947 and (EU) 2019/945 apply in all member states of the European Union, but the national implementing rules differ from state to state — registration portals, minimum pilot age, geographical zones, compulsory insurance, permitted frequency bands and maximum transmit powers. The information in this chapter describes the situation in the **Czech Republic as of the date this manual was issued**. If you operate the drone in another country, you must follow the rules of the state in which you fly.

Regulations change over time and this chapter is only an indicative overview. **Before your first flight, verify the current conditions** with the Czech Civil Aviation Authority at www.caa.gov.cz.

3.2 Drone classification

The drone **does not carry a class label C0 to C4** under Regulation (EU) 2019/945. For recreational flying the simplest route is operation in the **open category, subcategory A3**.

Subcategory A3 means flying in an area where no uninvolved persons are present, at a safe horizontal distance of **at least 150 m from residential, commercial, industrial and recreational areas**. The pilot must be registered as an operator and hold proof of completing the online training and the A1/A3 test.

Another option is operation within a **club or association of model aircraft flyers** holding an authorisation under Article 16 of Regulation (EU) 2019/947; in that case the organisation sets the rules.

Verify the classification of the drone and the conditions of operation with the Czech Civil Aviation Authority before your first flight. The obligations described in chapters 3.3 to 3.7 apply regardless of the route you choose.

3.3 Operator registration and pilot competency

The drone is equipped with a camera, i.e. a sensor capable of capturing personal data. **Operator registration is therefore mandatory regardless of the fact that the drone weighs less than 250 g.**

- The operator registers on the portal of the Czech Civil Aviation Authority dron.caa.gov.cz. Registration is free of charge.
- The **operator registration number issued must be displayed on the drone**.
- For operation in the open category you must complete the free **online training and A1/A3 test** on the same portal.

- The minimum age of the pilot and other competency conditions are laid down by national rules; within a model aircraft organisation they may differ.

3.4 Operating limits of the open category

- The maximum flight height is **120 m** above the closest point of the surface of the earth.
- The drone must remain within the visual line of sight (VLOS) of the pilot at all times, or of an observer — see chapter 3.5.
- **Flying over assemblies of people is prohibited.** The pilot must not reasonably expect to fly over an uninvolved person.
- In subcategory **A3** you fly at least **150 m** horizontally from residential, commercial, industrial and recreational areas.
- When flying in the dark, a green flashing light must be switched on. This drone is not equipped with one.
- Before every flight, check the **geographical zones** in the digital map at dronemap.gov.cz. The vicinity of aerodromes, densely populated areas, protected areas and other zones have restrictions of their own.
- Verify the actual take-off weight of the drone including the battery and accessories.

3.5 Flying with FPV goggles

When flying with FPV goggles the pilot cannot see the area around the drone and cannot maintain visual line of sight alone.

- In the open category an **unmanned aircraft observer** is therefore required, standing **next to the pilot**, watching the drone and the surrounding airspace with the unaided eye and continuously informing the pilot.
- The observer **must not use binoculars or other optical aids** and must not serve to extend the range of the flight beyond the visual line of sight of the pilot.
- Clear and effective communication must be ensured between the pilot and the observer.
- The pilot is always responsible for the safety of the flight, even with an observer present.
- Within a model aircraft organisation, different conditions may apply to FPV.

3.6 Radio frequencies and transmit power

The drone contains two radio devices: the **DJI O4 Wide Air Unit video transmitter** and the **ExpressLRS 2.4GHz receiver**. Information on the frequency bands and the maximum transmit power is given below in accordance with Section 6(2) of Government Regulation No 426/2016 Coll.

Device	Frequency band	Limit in the Czech Republic
DJI O4 Wide video transmitter	5725–5850 MHz	25 mW e.i.r.p.
ExpressLRS receiver	2400–2483.5 MHz	100 mW e.i.r.p.

The limits are laid down by the general authorisations of the Czech Telecommunication Office **VO-R/10** and **VO-R/12**. No individual authorisation is required for operation.

- Once connected to a computer with DJI Assistant 2 running, the video transmitter **automatically sets the radio mode valid for the given region**. Carry out this step before your first flight (chapter 5.4).
- The ExpressLRS receiver must have the **EU_CE_2400** regulatory domain flashed. Set the transmitter module in the radio to **100 mW** at most; 25 mW is more than enough for flying within sight.
- Additional power amplifiers are prohibited. Do not replace the antennas with higher-gain types — the limit applies to radiated power including the antenna gain.

3.7 Personal data protection and insurance

- Recording images of people may constitute processing of personal data under Regulation (EU) 2016/679 (GDPR). Do not film people without their consent and do not record footage into private property or windows.
- The right to one's likeness and to privacy is protected by Section 84 et seq. of the Civil Code even where the GDPR does not apply.
- **Liability insurance is not compulsory for a drone of this weight in recreational operation**, but liability for any damage caused always remains.
- Ordinary personal liability insurance often excludes the operation of unmanned aircraft — check your insurance policy. We recommend taking out insurance.

4. Preparing for the first flight

4.1 What else you need

Equipment	Requirement
Battery	1S Li-Po or LiHV with an A30 connector, 450-1000mAh (chapter 4.2)
Charger	for 1S Li-Po and LiHV with cell type selection
RC radio	with an ExpressLRS 2.4GHz transmitter module, firmware series 3 or higher, EU_CE_2400 domain
FPV goggles	DJI Goggles 3 or DJI Goggles N3 ; DJI Goggles 2 or DJI Integra can also be used
Computer	with the Betaflight App and DJI Assistant 2 (for configuration and updates)

✳ **Goggles from other manufacturers are not compatible with the DJI O4 video transmitter. With DJI Goggles 2 and DJI Integra Racemode is not available and latency is higher (from 35 ms instead of 20 ms).**

The firmware versions of the transmitter module in the radio and of the receiver in the drone must match in the **first digit** — otherwise the devices will not bind. The receiver ships with series 3 firmware.

4.2 Choosing and connecting the battery

The drone uses a single cell (1S) with an **A30** connector. The manufacturer recommends the following batteries:

Battery	Weight
1S 450mAh LiHV	13.9 g
1S 750mAh LiHV	17 g
1S 1000mAh LiHV	21.6 g

A matching TPU battery holder is included for each capacity. Higher capacity means a longer flight, but also more weight and less agile handling.

- Fit a **fully charged** battery before flying. Check that it is not swollen or damaged.
- Fit the correct holder for the capacity and secure the battery in it so that it cannot move during flight.
- Connect the battery only when the drone is lying level on the ground and nobody is within reach of the propellers.
- Route the cable so that it cannot get into the propellers.
- **Always disconnect** the battery after flying. A connected battery slowly discharges even with the drone switched off, and deep discharge will destroy it.

4.3 Fitting the propellers

Always fit the propellers as the last step, with the battery disconnected.

The Firefly18 uses two-blade **HQ 45mmx2** propellers, the Firefly16 three-blade **HQ 40mmx3**. Both have a 1.5mm shaft bore. The propellers are fitted by pressing them onto the motor shaft.

The drone is factory-configured with the propellers turning **outwards away from the camera** (props out). Debris is therefore not thrown into the lens.

Motor position	Number in Betaflight	Direction of rotation
front left	4	counter-clockwise
front right	2	clockwise
rear left	3	clockwise
rear right	1	counter-clockwise

- Propellers come in two mirrored versions. Fit them so that the **rounded leading edge goes first as they turn**.
- A swapped propeller will flip the drone over immediately after take-off. Verify the directions according to chapter 5.6 before your first flight.
- **Always replace** a propeller with a chipped or cracked blade, even if the damage looks minor. An unbalanced propeller transmits vibration into the camera and ruins the recording.
- Propellers are replaced in sets of four.

4.4 Prop guards

The package contains four prop guards for each model — black for the Firefly18, purple for the Firefly16. They fit onto the frame arms and reduce the risk of propeller damage and of injury on impact.

- For flying indoors and near people we **recommend always using the guards**.
- The guards add weight and drag, which is noticeable in the way the drone handles.
- Replace a cracked guard — a loose fragment can jam a propeller.

4.5 ND filter

The supplied **DJI O4 Wide V2** ND filter fits onto the camera lens. It limits the amount of light reaching the sensor, so the camera can use a longer exposure time.

- In direct sunlight, motion in the recording looks smoother with the ND filter and the footage is not overexposed.
- At dusk, indoors and under an overcast sky, **remove** the filter — the image would be needlessly dark and noisy.

- Fit and remove the filter carefully so that the lens does not get scratched. Wipe off fingerprints with a lens cloth.

5. Setup

Carry out all the steps in this chapter with the propellers removed.

5.1 Connecting to a computer

- Connect the flight controller to the computer with a **USB-C data cable** plugged directly into the AIO board. Some cables are for charging only and do not carry data.
- Configuration is done with the **Betaflight App** (formerly Betaflight Configurator), available free of charge at betaflight.com.
- In the app, select the appropriate port and press *Connect*. Move the drone and check that the model on the screen moves the same way — the board is then in order.
- The supplied **90° USB-C** cable is for connecting the **video transmitter**, not the flight controller.
- While the Betaflight App is connected, the flight controller **blocks the Arm command**. Always disconnect the app before flying.

5.2 Binding the receiver (bind)

The drone is supplied unbound to any radio. The most reliable procedure is the **bind phrase** — a shared password flashed into both the transmitter module and the receiver.

► Method A — bind phrase (recommended)

- ① In the ExpressLRS Configurator, select the target matching your transmitter module, the **EU_CE_2400** domain and enter a bind phrase at least 8 characters long.
- ② Flash the same bind phrase and the same domain into the receiver in the drone as well — via the WiFi interface described in chapter 5.3.
- ③ After both devices restart, the link is established by itself. The receiver LED lights steadily.

► Method B — triple power cycle

- ① Switch off the radio.
- ② Connect the battery and disconnect it within **2 seconds**. Repeat twice more.
- ③ The receiver is in binding mode when its LED **blinks twice quickly and then pauses**.
- ④ Switch on the radio and press the *[BIND]* button in the ExpressLRS Lua script.
- ⑤ Once the receiver LED **lights steadily**, binding is complete.

The receiver can also be put into binding mode by holding the **BOOT/RC** button on the AIO board for about 1.5 seconds, or with the `bind_rx` command in the Betaflight App console.

✱ **The EU_CE_2400 domain is flashed when the firmware is built — it cannot be enabled afterwards through the web interface. For operation in the European Union both the transmitter module and the receiver must have this domain.**

5.3 Configuring the receiver over WiFi

The receiver has its own web interface for changing the bind phrase and updating the firmware.

- ① Switch off the radio. Connect the battery and **wait about 60 seconds** until the receiver LED starts blinking rapidly. Alternatively, hold the **BOOT/RC** button on the board for 5 seconds.
- ② On your phone or laptop, find the **ExpressLRS RX** WiFi network and connect with the password **expresslrs**.
- ③ In a browser, open the address **http://10.0.0.1/**. Enter the address manually; close any network sign-in window that appears.

✱ **The address 10.0.0.1 is also used by some home routers. If the page does not work, disconnect from other networks or use a different device.**

5.4 Activating and binding the video transmitter

The video transmitter must be **activated** before first use. Until then its transmit power is limited to 20 mW and the menu in the goggles cannot be controlled.

► Activation and radio mode setting

- ① Download **DJI Assistant 2** from the DJI support pages.
- ② Connect the video transmitter to the computer with the **supplied 90° USB-C cable** and power up the drone.
- ③ Launch DJI Assistant 2, sign in with your DJI account and follow the on-screen instructions.
- ④ At the same time the video transmitter is set to the **radio mode valid for your region**. Do not skip this step.

► Binding with the goggles

- ① Switch on the video transmitter, the goggles and the radio.
- ② In the goggles menu select *Status* and choose the product in the top right corner.
- ③ Check that the binding indicator on the video transmitter **lights red**. Press and hold the binding button for about **5 seconds** until the indicator starts blinking red.
- ④ Press the binding button on the goggles. The goggles will start beeping.

- ⑤ After successful binding the indicator on the video transmitter **lights green steadily**, the goggles stop beeping and the live image appears.

Bind the goggles and the radio to each other separately according to the goggles manual. Have all devices on the latest firmware before binding.

5.5 Accelerometer calibration

The accelerometer is calibrated at the factory. Repeat the calibration if the drone leans to one side by itself in Horizon mode.

- ① Remove the propellers and connect the flight controller to the computer.
- ② Place the drone on a **flat, level surface** and do not move it.
- ③ In the *Setup* tab press *Calibrate Accelerometer* and wait for it to finish.

5.6 Checking the motors and propellers

Carry out this test only with the propellers removed.

- ① Connect the flight controller to the computer and go to the *Motors* tab.
- ② Connect the battery and tick the confirmation box.
- ③ Slowly raise the *Master* slider. All four motors must spin up smoothly.
- ④ Check that each motor turns in the direction given in the table in chapter 4.3.
- ⑤ If a motor turns the wrong way, change the direction in the *Motor direction* menu.
- ⑥ Check that the motor numbers correspond to their positions on the drone.

The **E** column shows the error rate of the speed controller telemetry. A healthy speed controller shows 0 % or a value very close to zero; a persistently higher error rate indicates a fault.

5.7 Arm, Disarm and flight modes

Two switches are assigned at the factory:

Channel	Function	Description
AUX1	Arm / Disarm	motors on and off
AUX2	Horizon	up Horizon mode, down Acro mode

- **Acro** is a fully manual mode without self-levelling — the drone stays banked until the pilot levels it. It is intended for experienced pilots.
- **Horizon** levels itself when the sticks are centred, but still allows full flips. Use Horizon for your first flights.
- The Arm command will not be carried out if the throttle is above minimum, if there is no link with the radio, or if the Betaflight App is connected.
- Arm can be performed **in any attitude** — the angle check is disabled at the factory.

- After touching down, always lower the throttle and perform **Disarm** first, and only then approach the drone.

5.8 Failsafe

Failsafe is the behaviour of the drone when the signal from the radio is lost. The **DROP** mode is set at the factory.

Guard period (stage 1)	1.5 s — throttle to minimum, sticks centred
Once it elapses	immediate Disarm and the drone drops
Signal recovery	control returns after 0.5 s if the drone is still armed

- After the motors are stopped by failsafe, you must **move the Arm switch to the off position** before you can arm again.
- On such a light drone the DROP mode is safer than attempting to land — the drone weighs less than 60 g and a fall from a low height usually causes no damage.
- **Test failsafe on the ground with the propellers removed before your first flight:** arm the drone, briefly add throttle and then switch off the transmitter module in the radio. The motors must stop after 1.5 seconds.
- Never rely on the signal coming back. Fly at a distance where the link is reliable.

5.9 Firmware updates and factory configuration

- The flight controller uses the **FLYWOOF405S_AIO** target, the speed controllers use **Bluejay** firmware.
- The factory configuration file (CLI dump) is published by the manufacturer on the support page for the model. It is created for the **major Betaflight version the drone was supplied with**.
- **Never load the configuration file into a different major version of Betaflight.** Parameter names and ranges change between versions and the configuration will be silently corrupted.
- Before any update, save your own configuration with the *diff all* command in the console.
- The video transmitter firmware is updated with DJI Assistant 2. Remove the propellers before updating.
- Only update when you are solving a specific problem. The drone is test-flown and configured at the factory.

6. Flight

6.1 Pre-flight check

- The propellers are intact, without cracks or chips, and are fitted the right way round.
- The motors turn freely, the shafts are not bent, and there are no hairs or grass in the motors.
- The frame is not cracked, the screws are holding, and the cables are not routed into the path of the propellers.
- The camera sits firmly in its case and the coaxial cable is not pinched.
- The receiver antenna is undamaged and points upwards.
- The battery is **fully charged**, is not swollen and is secured in the holder.
- The radio is charged, the link is established and the Arm switch is in the off position.
- The goggles show a live image and the OSD with the voltage is visible in it.
- The flight area is safe, there are no uninvolved persons nearby and an observer is present (chapter 3.5).
- The flight zone has been checked in the digital map and the operator registration number is on the drone.

6.2 Take-off and basic control

- ① Place the drone on a flat surface with the camera facing away from you.
- ② Switch on the radio and the goggles, then connect the battery and step back.
- ③ Wait until the flight controller has booted and the image appears in the goggles.
- ④ Flip the Arm switch — the propellers spin up to idle speed.
- ⑤ Smoothly add throttle to lift the drone to about half a metre and check that it does not drift to one side by itself.
- ⑥ After landing, lower the throttle, perform Disarm and only then approach the drone.

Practise your first flights in **Horizon mode**, in a larger open area without obstacles and without people. FPV flying takes practice — before you go out, we recommend spending a few hours in a simulator.

6.3 Monitoring voltage and ending the flight

The battery voltage is shown in the OSD in the goggles. With a single-cell battery the voltage drops significantly under load and rises again when the throttle is reduced — go by the value in steady flight, not by the peak.

- End the flight at **3.5 V** at the latest. Deep discharge significantly shortens the life of a 1S cell.

- The flight controller is factory-set so that it only warns at 3.3 V. **Do not rely on the warning** and land earlier, or raise the threshold to 3.5 V in the *Power* tab.
- The electronics keep the image running even when the voltage drops to 2.6 V, but that is not an operating value — it is only protection against losing the image at the moment when the voltage dips briefly.
- After landing, let the battery cool down before charging it.

6.4 Video recording

- Recordings are stored in the **23 GB internal memory** of the video transmitter. The unit does not support memory cards.
- Recording is controlled from the goggles menu. **While the drone is standing on the ground**, the power-saving mode is active and recording cannot be started — it begins after take-off.
- If the unit overheats, recording stops automatically and a warning appears in the goggles.
- Files are downloaded by connecting the video transmitter to a computer with a USB-C cable; the unit appears as a drive.
- Empty the memory regularly — recording stops once it is full.

6.5 Finding the drone after a crash

- Remember the last image from the camera before the signal was lost — it is usually the best clue.
- The drone has no GPS and no separately powered buzzer. After a fall into tall grass or bushes it is often difficult to find.
- If the link remains, the signal strength is shown in the OSD — as you get closer to the crash site it can be used as a clue.
- The drone is factory-configured to emit an audible signal on signal loss; it can only be heard while the battery is still connected.
- If you do not find the drone before nightfall, the battery will stay connected inside it and will discharge deeply. Expect it to be unusable once found.

7. Maintenance and troubleshooting

7.1 After every flight

- Disconnect the battery.
- Remove grass, dust and hair from the motors and the frame arms. A fibre wound around a motor can burn it out.
- Check the propellers and replace them if necessary.
- Wipe the lens or the ND filter with a lens cloth.
- Check that the screws are holding — but **do not tighten them fully**, see chapter 7.5.

7.2 Replacing propellers and prop guards

Propellers are pulled straight up to remove them; the supplied plastic tool helps. Always pull on the hub, never on the blades. Press the new propeller onto the shaft all the way down and check that it runs true.

7.3 Replacing a motor

The motors are connected to the AIO board with **JST1.25 connectors**, so replacement does not require soldering.

- ① Disconnect the battery and remove the propeller.
- ② Unscrew the motor screws from the underside of the frame.
- ③ Disconnect the motor connector on the AIO board.
- ④ Fit a new motor of the same type — **ROBO 1002 19800Kv** for the Firefly18, **ROBO 1002 23500Kv** for the Firefly16.
- ⑤ Plug in the connector and screw the motor down.
- ⑥ Verify the direction of rotation according to chapter 5.6; a new motor may turn the wrong way.

7.4 Storage

- Store batteries disconnected, charged to **3.8 V** per cell, in a dry and cool place.
- Store the drone in a dry place, out of the reach of children and out of direct sunlight.
- A longer break should be preceded by a battery check — every few months, check the voltage and top the batteries up to the storage value if necessary.

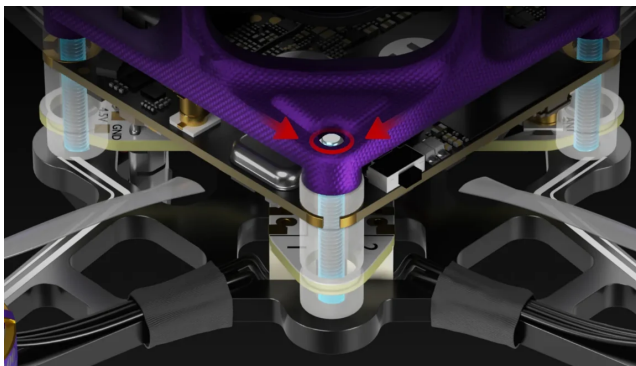
7.5 Troubleshooting

Problem	Possible cause	Solution
The drone does not respond to the radio	Not bound, or the major ExpressLRS firmware versions differ	Check that the first digit of the version matches, then bind according to chapter 5.2

Problem	Possible cause	Solution
No image in the goggles	The video transmitter is not bound or not activated	Carry out activation and binding according to chapter 5.4
No OSD in the goggles	The OSD runs on a different port than the configuration expects	In the <i>Ports</i> tab, check which port has <i>MSP DisplayPort</i> enabled
The motors do not spin up after the Arm command	The throttle is not at minimum, there is no link, or the Betaflight App is connected	Check the stick positions and disconnect the app
The drone flips over after take-off	Swapped propellers or reversed motor rotation direction	Verify according to chapters 4.3 and 5.6
The drone leans by itself in flight	Uncalibrated accelerometer or a damaged propeller	Calibrate the accelerometer (chapter 5.5), replace the propellers
Shaky image in the recording even though the live image is fine	Vibration is transmitted into the camera stabilisation	Loosen the canopy screws, check the propellers and the balance
Wobbling image in the live feed as well	Propeller vibration is transmitted through the frame	Replace damaged propellers, check the motor bearings
The video transmitter overheats	The drone stands powered on the ground for a long time, high ambient temperature	Do not leave the drone powered on the ground, fly at temperatures up to 40 °C
Short video transmission range	Low transmit power setting or an obstacle between the drone and the goggles	Check the settings in the goggles and observe the limits in chapter 3.6

► Vibration and shaky recordings

The most common cause of shaky recordings is the transmission of motor vibration into the camera stabilisation. The manufacturer gives a specific instruction for this: **check the four canopy screws and do not tighten them fully**. The whole canopy should stay slightly loose so that it damps vibration.



Canopy screws — leave them slightly loose

Replacing the propellers with new ones and checking whether dirt has got caught in a motor also helps. If the problem persists, do not stabilise the image in the camera but afterwards in Gyroflow.

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 (Firefly16 / Firefly18 1S Nano Baby V3 O4 Wide) is given on the packaging and in this documentation.

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 product contains a built-in rechargeable battery. Where possible, hand it over together with the device – do not dispose of the battery in mixed waste or in fire.
- 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>.

8.4 Radio equipment

The product contains radio equipment. The frequency bands and the maximum radio-frequency power transmitted are given in chapter 3.6, in accordance with Section 6(2) of Czech Government Regulation No. 426/2016 Coll., which implements Directive 2014/53/EU (RED) into Czech law.

The full text of the EU declaration of conformity is available on request from the importer listed in chapter 8.1.

9. Warranty and rights arising from defective performance

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 manufacturer's 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.