



Firefly16 / 18 1S Nano Baby V3

Analog FPV drone — ExpressLRS 2.4 GHz
User manual



Read the whole manual before the first flight. The factory setting of the video transmitter does not comply with the conditions valid in the Czech Republic — see chapter 5.2.

Importer: Rotorama, s.r.o., Okrajová 1351, 674 01 Třebíč, Czech Republic · www.rotorama.cz

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1. Safety instructions

1.1 Before you start

Read the whole manual before you connect the product to a battery for the first time. Keep the manual; if you sell or hand over the drone, pass the manual on to the new owner.

The Firefly16 and Firefly18 1S Nano Baby V3 is an **unmanned aircraft (drone) for sport flying in FPV mode**. It is not a toy and it is not intended for children. The recommended minimum age of the user is 16 years; a younger person may control the drone only under the constant supervision of an adult who is responsible for the safety of the flight.

- The drone is supplied **without a battery, without an RC set and without FPV goggles**. You buy these parts separately — see chapter 4.1.
- Flying a drone is governed by both aviation and radio regulations. Before you take off for the first time, read chapter 3 and meet the obligations that apply to you.
- The factory setting of the video transmitter **does not comply with the conditions valid in the Czech Republic**. It must be changed according to chapter 5.2 before the first flight.
- The remote pilot is always responsible for the safety of the flight. Never rely on automation — the drone has no GPS, no barometer and no return-to-home function.

1.2 Rotating propellers and mechanical hazards

✱ **Propellers spinning at full speed cause cuts and can permanently damage an eye. Never work on a drone that has the battery connected and the propellers fitted.**

- Connect the battery **always as the last step**, after checking the propellers and after switching on the RC set. Disconnect it first.
- When configuring, calibrating and testing the motors on a computer, **remove the propellers**.
- Never hold the drone in your hand when it is in the Arm state (motors switched on). Do not run the motors on a table, indoors, or near people and animals.
- Keep loose hair, cords, sleeves and fingers away from the propellers.
- Replace a damaged, cracked or deformed propeller immediately. Never straighten it or glue it.
- Prop guards (ducts) reduce the risk of injury and of damage to the drone, but they are **not a protection of people** — the same separation rules apply with them and without them.

1.3 Li-Po and LiHV batteries

The drone is powered by a single 1S cell. The flight controller accepts an input voltage of **3.0-4.35 V** and has overvoltage and overcurrent protection. Never connect a battery with more cells.

State	Li-Po (1S)	LiHV (1S)
Fully charged	4.20 V	4.35 V
End the flight	3.5 V	3.5 V
Storage	3.8 V	3.8 V

The voltages are per cell; with a single-cell battery the cell voltage is also the pack voltage.

- Use only **undamaged** batteries. Discard a swollen, punctured, dented or hot battery immediately.
- Charge only with a charger for the given cell type. A LiHV cell charged in Li-Po mode will not be full; a Li-Po cell charged in LiHV mode is **overcharged** and may catch fire.
- Charge under supervision, on a non-flammable surface, away from flammables. Use a protective bag or container.
- **Never discharge the battery below 3.5 V per cell.** Deep discharge permanently damages the cell and increases the fire risk when charging.
- After the flight let the battery cool to ambient temperature before charging it.
- For storage longer than a few days set the voltage to **3.8 V** per cell and store the battery dry at 15-25 °C.
- Do not throw the battery into fire or into mixed municipal waste — see chapter 8.3.

❖ Do not extinguish a burning lithium battery with water. Use sand, a fire blanket or a lithium-battery extinguisher and ventilate the area — the fumes are toxic.

1.4 Operating environment

- Do not fly in rain, snow, fog or above water. The drone is not water-resistant; moisture causes a short circuit.
- Do not fly in strong wind. The drone weighs a few tens of grams and a gust easily carries it out of range.
- Do not fly near transmitters, high-voltage lines or large metal structures — the RC link and the video may be disturbed.
- Observe the video transmitter operating range **-15 °C to +80 °C** (manufacturer's data). Battery performance drops sharply in the cold.
- Do not fly over people, roads or railways, or near airports and rescue sites.

2. Product description

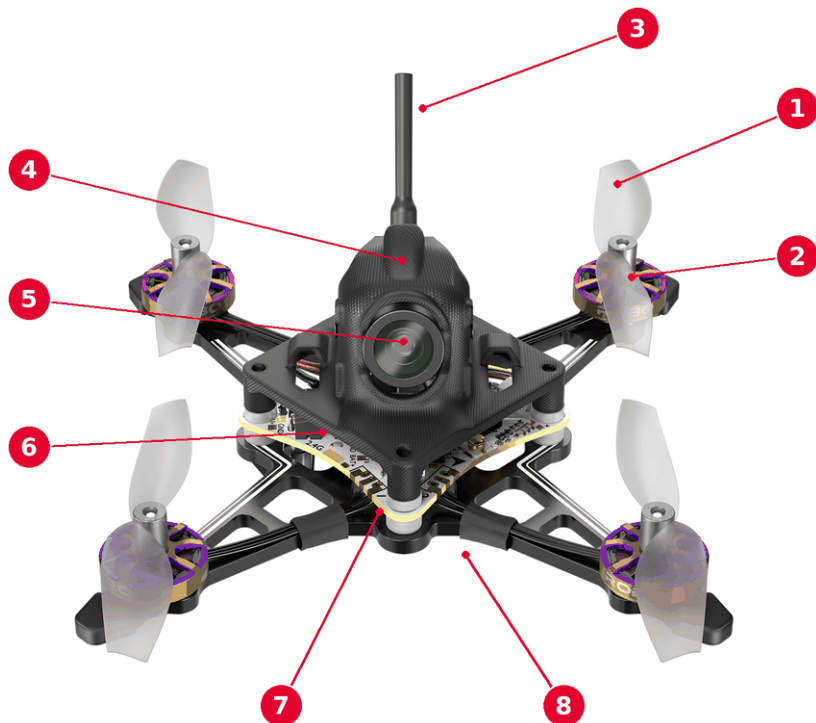
The Firefly16 / 18 1S Nano Baby V3 Analog is a fully assembled FPV drone of the „tiny whoop / nano" category with open propellers, a carbon frame and analog video transmission in the 5.8 GHz band. Both variants share the same frame, the same flight controller, the same camera and the same motors; they differ in propeller diameter and in the KV rating of the motors.

2.1 Package contents

Qty	Item
1×	Firefly18 (or Firefly16) 1S Nano Baby V3 Analog drone, assembled
8×	Propellers — HQ 45 mm two-blade (Firefly18) or HQ 40 mm three-blade (Firefly16), 1.5 mm shaft
4×	Prop guard (Ultralight Prop Guard)
1×	TPU battery holder for 450 mAh
1×	TPU battery holder for 750 mAh
1×	Screwdriver
1×	Propeller puller (paddle remover)
2×	Nylon standoff
2×	Silicone damper (shock absorbing ball)
1×	Acetate tape
—	Cable ties and a set of screws

❖ **The battery, RC set, FPV goggles and charger are not part of the package.**

2.2 Description of parts



Main parts of the drone (Firefly18 with two-blade propellers shown)

- ① **Propellers** — HQ 45 mm two-blade (Firefly18) or HQ 40 mm three-blade (Firefly16), 1.5 mm shaft.
- ② **Motor** — Flywoo ROBO 1002, 12 poles.
- ③ **Video transmitter antenna** — integrated pagoda-type antenna for the 5.8 GHz band.
- ④ **Camera cover (canopy)** — protects the camera and the antenna leads.
- ⑤ **Camera** — Flywoo 1S Nano Camera V3.
- ⑥ **Flight controller board** — GOKU F405 ERVT 1S 5A 5-in-1 AIO; it contains the flight controller (FC), a four-channel electronic speed controller (ESC), the video transmitter (VTX), an ExpressLRS receiver and the OSD. The 2.4 GHz receiver antenna is led out separately at the edge of the board.
- ⑦ **Silicone dampers** — flexible mounting of the board; they damp vibrations transmitted from the frame.
- ⑧ **Frame** — Firefly16 / 18 1S Nano Baby V3 carbon frame with printed parts.

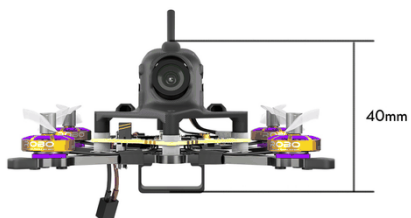
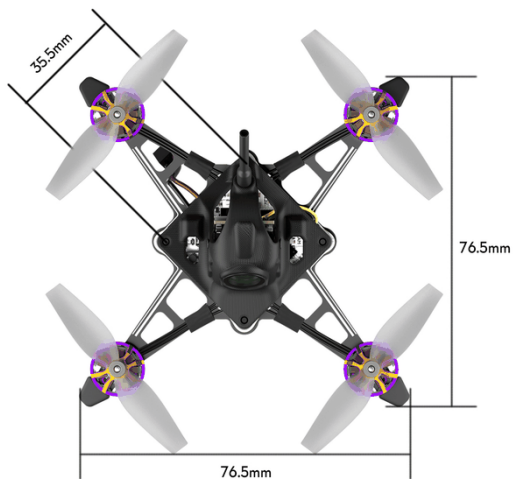
2.3 Technical data

Parameter	Firefly18	Firefly16
Dimensions (without prop guards)	76.5 × 76.5 mm	72 × 72 mm
Height	40 mm	40.5 mm
Mass without battery	27.1 g / 27.3 g depending on variant (the manufacturer does not state which figure belongs to which variant)	
Motors	ROBO 1002 19800KV	ROBO 1002 23500KV
Propellers	HQ 45 mm, 2 blades, 1.5 mm shaft	HQ 40 mm, 3 blades, 1.5 mm shaft
Flight controller	GOKU F405 ERVT 1S 5A 5-in-1 400mW ELRS AIO	
Camera	Flywoo 1S Nano Camera V3	
Video transmission	analog, 5.8 GHz	
Receiver	ExpressLRS 2.4 GHz (Flywoo EL24E)	
Battery	1S Li-Po or LiHV, A30 connector	
Frame	Firefly16 / 18 1S Nano Baby V3	

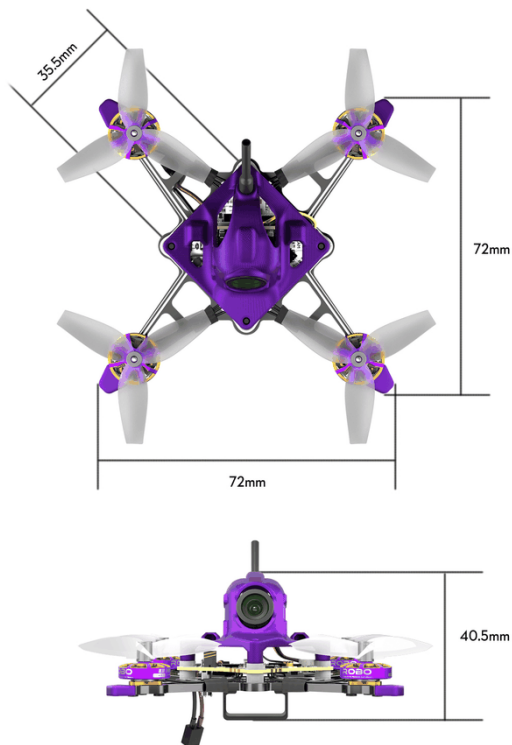
Flight times stated by the manufacturer

Battery	Firefly18	Firefly16	Throttle
Flywoo 1S 450 mAh	5 min 43 s	4 min 53 s	24 % / 26 %
Flywoo 1S 750 mAh	7 min 33 s	6 min 13 s	26 % / 29 %

✳ **The flight times are stated by the manufacturer as approximate. The actual flight time depends on flying style, temperature and the condition of the battery.**



Firefly18 dimensions



Firefly16 dimensions

2.4 Flight controller (FC) and receiver

The drone is built around an AIO board that combines the flight controller, the speed controllers, the video transmitter, the receiver and the OSD on a single board.

Processor	STM32F405BGA
Gyroscope / IMU	ICM42688P
Barometer	none
Blackbox	not on the board; an external module can be connected (up to 512 MB)
OSD	AT7456E
Serial ports	UART1 (VTX, IRC Tramp), UART2 (blackbox), UART3 (ExpressLRS receiver), UART4, UART5 (SBUS), UART6
Supported receiver protocols	CRSF, SBUS, iBus, Spektrum
BEC	5 V / 2.0 A max.

Firmware target	FLYWOOF405S_AIO
Board dimensions	30.5 × 30.5 mm, mounting pattern 25.5 × 25.5 mm
Board mass	4 g

Electronic speed controllers (ESC)

Power supply	1S only, 3.0–4.35 V (Li-Po and LiHV)
Current	5 A continuous, 8 A peak
ESC firmware	Bluejay
Protocol	DShot300, DShot600
Motor connector	JST 1.25
Battery connector	A30

The **ExpressLRS 2.4 GHz** receiver (Flywoo EL24E) is part of the board and is connected to UART3 using the CRSF protocol. According to the manufacturer it can be updated over the serial port as well as over the receiver's own Wi-Fi interface.

2.5 Video transmitter (VTX)

Band	5.8 GHz, 40 channels
Power levels	0 / 25 / 50 / 100 / 200 / 400 mW
Control protocol	IRC Tramp (UART1)
Raceband range	5658–5917 MHz
Operating temperature	–15 °C to +80 °C
Antenna	integrated pagoda-type antenna

❖ Power levels of 50 mW and higher, and channels outside the 5 725–5 875 MHz band, may not be used in the Czech Republic. Before the first flight proceed according to chapter 5.2.

The video transmitter can be switched on and off with a switch assigned to the *USER2* mode; this option was set by the manufacturer at the factory.

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

3.1 The law of the country where you fly is decisive

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

✳ **The legislation changes. Before the first flight, and repeatedly afterwards, verify the current situation with the Úřad pro civilní letectví (Civil Aviation Authority of the Czech Republic) at www.caa.gov.cz.**

3.2 Drone classification and category of operation

This unmanned aircraft system **does not carry a class identification label** (C0-C4) under Regulation (EU) 2019/945. According to statements of EASA and of the Czech Civil Aviation Authority, an unmanned aircraft without a class identification label whose **maximum take-off mass is below 250 g** may be operated in the open category, in **subcategory A1**.

- The maximum take-off mass (MTOM) is the mass of the drone **including the battery and all equipment**. For this drone it is in the order of tens of grams, that is far below the 250 g limit. Even so we recommend **weighing** the drone before the first flight and noting the value down — for a drone without a class label the MTOM is not officially established and the pilot has to know it.
- Subcategory **A2 is not available for this drone** — it is reserved for class C2 aircraft.
- Article 20 of Regulation (EU) 2019/947, on which the interpretation above relies, applies by its wording to unmanned aircraft systems placed on the market **before 1 January 2024**. The classification of newer drones without a class label is therefore not unambiguously resolved in the text of the regulation. We recommend verifying the current position with the Czech Civil Aviation Authority.

3.3 Operator registration and pilot competency

✳ **The drone is fitted with a camera, that is a sensor able to capture personal data. Registration of the operator is therefore compulsory regardless of the fact that the mass is below 250 g.**

- Register as an operator of an unmanned aircraft system at dron.caa.gov.cz. Registration is made in the country of residence and you cannot be registered in several Member States at the same time.

- **Mark the assigned operator registration number on the drone** so that it is legible without aids while the drone stands on the ground. If its dimensions do not allow this, the marking may be placed in the battery compartment, if accessible.
- Put the registration number on **all** unmanned aircraft that you operate.

Pilot competency

Under the regulation, the remote pilot in subcategory A1 must be **familiar with the manufacturer's instructions**, that is with this manual. The online theoretical knowledge examination is tied by the regulation to class C1 aircraft.

✳ **The interpretation of the Czech Civil Aviation Authority is stricter here. We strongly recommend completing the free online A1/A3 training and examination at dron.caa.gov.cz and carrying the proof of competency when flying. It is valid for five years.**

3.4 Operating limits of the open category

- Keep the drone **at a height of no more than 120 m** above the closest point of the surface of the earth.
- Keep **continuous unaided visual contact** with the drone (VLOS). For flying with FPV goggles, chapter 3.5 applies.
- In subcategory A1 you may fly over uninvolved persons, but **never over an assembly of people** — a gathering so dense that an individual cannot move away.
- The drone must not carry dangerous goods or drop anything in flight.
- Do not operate the drone under the influence of alcohol or psychoactive substances.
- Do not fly near or inside areas where rescue operations are in progress without the permission of the relevant emergency service.
- During **night operation** the drone must have a green flashing light switched on.
- Before the flight check the **geographical zones** at dronview.rlp.cz.

3.5 Flying with FPV goggles

The view through FPV goggles is **aided** visual contact and therefore does not meet the requirement of flight within visual line of sight.

✳ **In the open category, flying with FPV goggles is permitted only if an unmanned aircraft observer stands beside the remote pilot, keeps continuous unaided visual contact with the aircraft and has clear and effective communication with the pilot.**

The observer watches the drone and the surrounding airspace and must be able to warn the pilot of an obstacle at once or tell the pilot to land. Even in FPV operation, the remote pilot is always responsible for the safety of the flight.

3.6 Radio frequencies and transmit power

The drone contains two radio devices: the video transmitter in the 5.8 GHz band and the ExpressLRS receiver with a return telemetry channel in the 2.4 GHz band.

Frequency band	Conditions in the Czech Republic
5 725–5 875 MHz (analog video transmission)	Czech Telecommunication Office (ČTÚ) general authorisation No. VO-R/10/05.2025-5, Art. 3, band k — max. 25 mW e.i.r.p.
2 400–2 483.5 MHz (ExpressLRS)	ČTÚ general authorisation No. VO-R/10/05.2025-5, Art. 3, band j — max. 25 mW e.i.r.p. ; under ČSN ETSI EN 300 328, VO-R/12/11.2021-11 applies with limit 100 mW e.i.r.p.

❖ **The e.i.r.p. figure includes antenna gain; it is not the transmitter output power. Max RF power is in the EU declaration of conformity — chapter 8.1.**

- Operate the equipment **only with the antenna supplied or specified by the manufacturer**. Power amplifiers are prohibited.
- The equipment must not cause harmful interference to radiocommunication stations and has no protection against such interference.
- The **5 875–5 935 MHz** band is designated in the Czech Republic for intelligent transport systems — transmitting in it is risky.

❖ **The factory video transmitter setting (E4, 5 645 MHz, 400 mW) is not permitted in the Czech Republic. Change it before the first flight (chapter 5.2).**

3.7 Personal data protection and insurance

The camera and personal data

- Footage may capture identifiable persons. Do not film into private land or windows.
- The exemption for a purely personal activity **does not apply once you publish the footage**. Publication needs a legal basis under the GDPR and consent of the persons concerned under Section 84 et seq. of the Czech Civil Code.
- Details are given in Recommendation No. 1/2024 of the ÚOÚ (Czech data protection authority) on camera systems of unmanned aircraft.

Liability insurance

Liability insurance **is not** compulsory in subcategory A1 (Section 54d of Act No. 49/1997 Coll., on Civil Aviation). It is compulsory in A2, A3 over 4 kg MTOM and the specific category.

❖ **Liability for damage exists even without insurance — we strongly recommend taking out a policy.**

4. Preparing for the first flight

4.1 What else you need

Equipment	Requirements
RC set	A radio transmitter with an ExpressLRS 2.4 GHz module. Without it the drone cannot be controlled.
FPV goggles or a monitor	An analog 5.8 GHz receiver. Digital systems (DJI, HDZero, Walksnail) are not compatible with this variant.
Battery	A 1S Li-Po or LiHV battery with an A30 connector, capacity 450, 750 or 1000 mAh. Each capacity has its own TPU holder.
Charger	A charger for single-cell Li-Po and LiHV batteries with a matching connector.
Computer	The Betaflight Configurator software and a USB-C cable for configuring the drone.

4.2 Choosing and connecting the battery

Choose the TPU holder matching the capacity of the battery and fit it to the underside of the frame. The battery must sit firmly in the holder — a loose battery will disconnect in flight.

- ① Check that the propellers are undamaged and properly tightened.
- ② Switch on the RC set and the FPV goggles. Always in this order — never the other way round.
- ③ Insert a **fully charged** battery into the holder and secure it with the strap.
- ④ Connect the A30 connector. The drone beeps briefly and the OSD appears in the video image.
- ⑤ Place the drone on a level surface and step back at least two metres.

❖ **Always insert a fully charged battery before the flight. Flying with a partly charged battery leads to deep discharge and permanent damage to the cell.**

4.3 Fitting the propellers

The propellers are fitted on a 1.5 mm shaft and secured with a screw. Each pair rotates in the opposite direction.

- ① **Disconnect the battery.**
- ② Pull the damaged propeller off with the supplied propeller puller. Never pull on the blades.
- ③ Fit a new propeller of the **same direction of rotation** and of the same type as the others.
- ④ Tighten the screw gently — overtightening strips the thread in the shaft.

- ⑤ Check that the propeller turns freely and does not rub against the frame or the guard.

✱ **The flight controller is set to the props out configuration — the propellers turn outwards, away from the camera. If you swap them between the arms, the drone will flip over on take-off.**

4.4 Prop guards

The prop guards are fitted onto the motor arms and reduce the risk of damaging the propellers in an impact. They add mass and slightly shorten the flight time.



The drone with the prop guards fitted

- Always fit the guards with the **battery disconnected**.
- After fitting them, turn each propeller by hand and check that it does not touch the guard.
- Replace a cracked guard — a fragment drawn into the propeller will destroy it.

5. Setting up

5.1 Connecting to a computer

The drone is configured in the **Betaflight Configurator** software. The drone is connected to the flight controller with a USB-C cable.

✱ **Before connecting to a computer, always remove the propellers and disconnect the battery.**

- ① Remove the propellers.
- ② Connect the drone to the computer with a USB-C cable. Do not connect the battery.
- ③ Start the Betaflight Configurator and press *Connect*.
- ④ Before you change anything, save a backup of the configuration: the *CLI* tab, the *diff all* command, and copy the output into a text file.

The drone is configured by the manufacturer at the factory. On the *Ports* tab, UART1 is set to the video transmitter (IRC Tramp) and UART3 to the serial receiver; the receiver works in the *Serial (via UART)* mode with the *CRSF* protocol.

Identifier	Configuration/MSP	Serial Rx	Telemetry Output	Sensor Input	Peripherals
USB VCP	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼
UART1	 115200 ▼		Disabled ▼ AUTO ▼	Disabled ▼ AUTO ▼	VTX (IRC Tran ▼ 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 ▼

Factory port configuration — the *Ports* tab

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

Receiver configuration — the *Receiver* tab

5.2 Video transmitter setup for operation in the Czech Republic and the EU

✳ **From the factory the video transmitter is set to channel E4 (5 645 MHz) with a power of 400 mW. Neither complies with the conditions valid in the Czech Republic. Change the setting before you first connect the battery outside an enclosed space.**

In the Czech Republic the video transmitter may work only in the **5 725–5 875 MHz** band with a radiated power of no more than **25 mW e.i.r.p.** The following table shows which channels of the factory channel table lie inside the permitted band.

Band	Channels inside 5 725–5 875 MHz	Channels outside the band
A	A1–A8 (5 725–5 865 MHz)	—
B	B1–B8 (5 733–5 866 MHz)	—
E	—	all (5 645–5 705 and 5 885–5 945 MHz)
F	F1–F7 (5 740–5 860 MHz)	F8 (5 880 MHz)
R	R3, R4, R5, R6 (5 732–5 843 MHz)	R1, R2, R7, R8

✳ **An analog video signal occupies a wide band around the channel. With channels lying close to the edge of the permitted band, part of the transmission may fall outside the band. We recommend choosing channels from the middle of the band, for example R4 (5 769 MHz), R5 (5 806 MHz) or F4 (5 800 MHz).**

► Procedure using the Betaflight Configurator

- ① Remove the propellers and connect the drone to the computer with a USB-C cable.
- ② Connect the battery — without power from the battery the video transmitter does not communicate.
- ③ Open the *Video Transmitter* tab.
- ④ Set *Band* and *Channel* to one of the permitted channels according to the table above.
- ⑤ Set *Power* to the lowest available level, that is **25 mW**.
- ⑥ Press *Save* and check that the OSD shows the selected channel and power.

► Procedure using the OSD menu

- ① With the battery connected and the RC set switched on, hold the throttle in the middle position, the yaw fully to the left and the pitch fully forward. The OSD menu opens.
- ② Select the video transmitter item and set the band, the channel and the power.

③ Save the setting and leave the menu.

✱ **Even the lowest level of 25 mW is the power at the transmitter output. With the antenna gain, the radiated power may exceed the 25 mW e.i.r.p. limit. The operator is responsible for compliance with the conditions of the general authorisation.**

5.3 Pairing the receiver (bind)

The ExpressLRS receiver on board the drone is paired with the ExpressLRS transmitter module in your radio. With ExpressLRS, pairing is done using an **identical bind phrase** set on both sides, or by the classic bind procedure.

✱ **The manufacturer has not published a factory bind phrase or bind procedure for this drone. The most reliable way is to set your own bind phrase over the receiver's Wi-Fi interface.**

- ① In the ExpressLRS configurator, set your own **bind phrase** for the radio and flash the firmware into the transmitter module.
- ② Remove the propellers and connect the battery. Leave the drone switched on without a link; after several unsuccessful connection attempts the receiver starts **Wi-Fi mode**.
- ③ Connect a computer or a phone to the receiver's Wi-Fi network and open its web interface.
- ④ Enter the **same bind phrase** as in the radio and save the setting. The receiver restarts.
- ⑤ Switch on the radio. The link is established automatically; on the *Receiver* tab in Betaflight check that the channel bars move.

✱ **Always switch on the radio first and only then connect the drone's battery.**

5.4 Alternative receiver

According to the manufacturer, the on-board ExpressLRS receiver can be switched off and replaced with an external receiver. The board supports the CRSF, SBUS, iBus and Spektrum protocols.

- An external receiver using the **CRSF** protocol is connected to UART6, an **SBUS** receiver to UART5.
- The on-board receiver is switched off by changing the port setting in the configurator, or by physically disconnecting it according to the wiring diagram. Such an intervention into the board **is not a defect of the product**.
- The manufacturer publishes ready-made sets of CLI commands for switching to an external receiver.

- ③ Check the motor order against the diagram in the configurator and the **direction of rotation** — it must match the props out configuration.
- ④ If a motor turns the wrong way, reverse its direction on the *Motors* tab in the *ESC/Motor Features* section.
- ⑤ Listen for a motor that rubs or rattles — replace a bearing with play.

5.7 Arm, Disarm and failsafe

Arm (switching the motors on) and **Disarm** (switching the motors off) are assigned by the manufacturer to a switch on channel AUX1. A second switch on channel AUX2 changes the flight mode.

- The drone cannot be armed if the throttle is above minimum, if there is no link with the radio, or if a calibration is in progress. The reason for the block is shown by the OSD and by the *Setup* tab.
- Disarm the motors **immediately after landing** and before you approach the drone.
- In an emergency, switch the motors off with the Disarm switch — the drone will fall, but the propellers will stop.

Failsafe

Failsafe is the behaviour of the drone when the link with the radio is lost. From the factory it is set to **immediate switch-off of the motors** (the *Drop* procedure) after a short delay — on loss of signal the drone falls to the ground instead of flying away uncontrolled.

✱ **Test the failsafe function before the first flight: with the propellers removed and the battery connected, switch off the radio and check that the drone goes into the Disarm state.**

5.8 Firmware update

The firmware of the flight controller, of the speed controllers and of the receiver can be updated. Update it only when you are solving a specific problem — a new version may change the behaviour of the drone and will require a new configuration.

- Before updating, **always save** a backup of the configuration with the *diff all* command on the *CLI* tab.
- The firmware target of the flight controller is **FLYWOOF405S_AIO**. Flashing firmware intended for another board will render the flight controller inoperable.
- The manufacturer publishes a **factory CLI configuration file** for this drone. After the update you can restore the original configuration with it.
- The firmware of the ExpressLRS receiver is updated over its Wi-Fi interface or over the serial port.

6. Flight

6.1 Pre-flight check

	Check item
☐	The propellers are not cracked, they are tightened and fitted in the correct direction of rotation.
☐	The prop guards, if you use them, are undamaged and do not rub against the propellers.
☐	The motors turn freely, the bearings have no play, no grass is wound around the shaft.
☐	The frame is not cracked, the screws are tightened, the cables are not chafed.
☐	The video transmitter antenna is connected and undamaged.
☐	The battery is fully charged , undamaged and firmly seated in the holder.
☐	The channel and power of the video transmitter comply with chapter 5.2.
☐	The RC set and the FPV goggles are switched on and their batteries are charged.
☐	The operator registration number is legible on the drone.
☐	The flight site is not in a prohibited geographical zone and there are no uninvolved persons nearby.
☐	When flying with FPV goggles, an observer is present.

6.2 Take-off and basic control

Make the first flights in an open area without obstacles and without people, ideally in stabilised mode.

- ① Place the drone on a level surface with the camera pointing away from you and step back at least two metres.
- ② Switch the motors on with the Arm switch.
- ③ Add throttle smoothly and let the drone climb to a height of about one metre.
- ④ Test the response on all four axes and check that the drone does not turn or drift by itself. If it drifts, land and calibrate the accelerometer according to chapter 5.5.
- ⑤ At first fly slowly and low until you get used to the sensitivity of the controls.

✳ **The drone has neither GPS nor a barometer. It does not hold altitude or position by itself — when you release the throttle it descends.**

6.3 Monitoring the voltage and ending the flight

Watch the battery voltage in the OSD throughout the flight. A single-cell battery has a small capacity reserve and the voltage falls quickly towards the end of the flight.

- End the flight as soon as the voltage under load drops to **3.5 V**. Do not fly on.
- When you reduce the throttle the voltage rises again — that is not a reason to continue the flight.
- Land, disarm the motors and **disconnect the battery immediately**.
- You can adjust the OSD warning threshold in Betaflight on the *Power & Battery* tab.

6.4 Finding the drone after a crash

- Memorise the last image from the camera and the direction in which the drone disappeared — that is usually a more reliable clue than an estimate of the distance.
- Leave the battery connected only for as long as necessary. A jammed propeller blocks the motor, the motor overheats and can set grass on fire.
- If the drone is within range of the radio, arm the motors briefly — the sound of the motors helps to find it. If you are not sure where the drone lies, do not arm the motors.
- Once you have found it, disconnect the battery before you touch the drone.

7. Maintenance and troubleshooting

7.1 After every flight

- Disconnect the battery and let it cool down.
- Remove grass and dirt wound around the motor shafts.
- Check the propellers against the light — hairline cracks are hard to see.
- Check that the motor screws are tight and that the frame is intact.
- Inspect the cables and the battery connector for chafing or melting.

7.2 Replacing propellers and prop guards

The propeller replacement procedure is described in chapter 4.3 and the fitting of the prop guards in chapter 4.4. Always replace the propellers after a crash, even if the damage does not look serious — a cracked propeller breaks apart in flight and causes vibrations that disturb the control of the drone.

7.3 Replacing a motor

The motors are connected to the board with a JST 1.25 connector, so no soldering is needed.

- ① Disconnect the battery and remove the propeller from the motor being replaced.
- ② Undo the motor screws from the frame arm.
- ③ Disconnect the motor connector from the flight controller.
- ④ Fit a new motor **of the same type and the same KV rating** — ROBO 1002 19800KV for the Firefly18, ROBO 1002 23500KV for the Firefly16.
- ⑤ Tighten the screws, connect the connector and, with the propellers removed, check the direction of rotation according to chapter 5.6.

✱ **Mixing motors with different KV ratings on one drone results in unstable flight.**

7.4 Storage

- Store the batteries separately from the drone, charged to **3.8 V** per cell, in a dry place at 15–25 °C.
- Store the drone in a dry place, with no battery connected.
- Before a longer period of storage remove the propellers — this reduces the risk of them deforming.
- After a longer period of storage carry out the complete pre-flight check according to chapter 6.1.

7.5 Troubleshooting

Problem	Possible cause	Remedy
The drone cannot be armed	The throttle is not at minimum; there is no link with the radio; the drone is not level	Read the reason in the OSD or on the <i>Setup</i> tab and remove it
No link with the radio	The receiver is not bound; different bind phrase	Repeat the binding according to chapter 5.3
No picture in the goggles	A different channel in the goggles and in the drone; the video transmitter switched off by the <i>USER2</i> switch	Match the band and the channel; switch the video transmitter on
Grainy picture or short range	Low transmit power; damaged or disconnected antenna; an obstacle between the drone and the goggles	Check the antenna; fly within line of sight
The drone flips over after take-off	Propellers swapped between the arms; reversed direction of motor rotation	Check the direction of rotation according to chapter 5.6
The drone drifts to one side	Uncalibrated accelerometer; damaged propeller	Calibrate according to chapter 5.5; replace the propellers
Strong vibrations in the picture	Cracked propeller; play in a motor bearing; loose screws	Replace the propeller, check the motors and tighten the screws
Short flight time	Worn or cold battery; prop guards fitted	Use a new battery; warm it to room temperature before the flight
The motor overheats	Jammed propeller; damaged bearing; oversized propeller	Remove the dirt; replace the motor according to chapter 7.3

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 / 18 1S Nano Baby V3 Analog) is stated on the packaging and in this manual; the manufacturer code of the Firefly18 is FW19004358.

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 drone is supplied **without a battery**. Dispose of used batteries separately at battery collection points — never put them in mixed waste or into 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>.

9. Warranty and rights 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 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.