



T1-S VTOL

HEEWING · PNP + F405 stabilizer version
Assembly and operating manual



**Read this entire manual carefully before assembly and the first flight.
The product may be used only by persons aged 14 and above.**

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

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1. Safety instructions

1.1 Before you start

Before operating, adjusting or flying this model, carefully read this manual and follow all precautions, limitations and recommendations provided. Once using the product, you acknowledge and accept all contents of this manual. Strictly adhere to this manual for the installation and operation of this product.

WARNING: Improper use of this product may result in property damage, serious injury, or even death.

- The product must be used by users **aged 14 and above**.
- RC aircraft, including the HEEWING T1-S, require operating experience or guidance by someone with more experience. This product is intended only for adults with prior fixed-wing model experience or those under the direct supervision of a skilled operator.
- Operate the model only where this is permitted — the manufacturer recommends legally permitted RC airfields.
- When using the model, strictly comply with local laws and regulations. Users shall bear all consequences arising from modifications, improper operation, or engagement in illegal activities.
- Keep the model out of reach of children. Fly it away from crowds and hazardous objects.
- Do not operate the model under the influence of alcohol, when fatigued or in an impaired mental state.
- Military use is strictly prohibited.

1.2 Rotating propellers and electronics

- Before connecting the flight battery, ensure the radio is powered on and the throttle stick is at its lowest position.
- Install the propellers only after completing the flight controller (FC) setup and radio calibration. Never have propellers fitted while the model is connected to a computer.
- Never assemble or disassemble the wing while the model is powered on — the electronics may be damaged.
- Never attempt to catch the model mid-flight or during landing. Wait until it has fully landed before retrieval.

1.3 Li-Po batteries

- The model is designed for a **4S Li-Po** flight battery, which is not included. Charge it with a charger intended for Li-Po cells, under supervision and on a non-flammable surface.

- A fully charged battery has a voltage of **4.20 V/cell (16.8 V)**. End the flight at the latest when the voltage drops to **3.5 V/cell (14.0 V)**. For storage, set **3.8 V/cell (15.2 V)**.
- Do not use or charge a damaged, swollen or overheated battery.
- There is no battery level display during flight — estimate the battery level and return in time.

1.4 Operating environment

- Before flying, ensure the surrounding environment is safe.
- Always operate within sight.
- Do not fly in thunderstorms, strong winds, heavy snow, or other extreme weather conditions.
- Properly dispose of all waste (e.g. packaging, damaged parts) after flying. Do not litter or incinerate the model or its components.

2. Product description

2.1 Package contents

This manual applies to the **HEEWING T1-S VTOL PNP + Stabilizer** version with the F405 flight controller (FC) running ArduPilot (ArduPlane) firmware.

Item	Qty
Storage & transportation foam case	1
Fuselage	1
Left wing	1
Right wing	1
Horizontal tail	1
Vertical tail	1
Tail boom	1
Fuselage CF rod	1
Accessories bag	1
Propeller bag	1
GPS and cable of stabilizer	1
Battery mounting plate	1



Fuselage, wings, tail surfaces, tail boom and carbon rod



Battery mounting plate, accessories bag, GPS and cables bag, propeller bag

2.2 What else you need

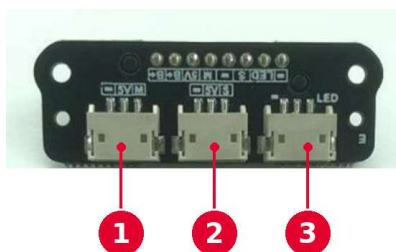
The VTOL PNP with Stabilizer version **does not include a radio, receiver or 4S Li-Po flight battery** — these need to be provided by the user. You will also need:

- a receiver with the CRSF (ExpressLRS) or SBUS protocol — the 4-pin connector for it is included in the GPS and cables bag,
- a computer with *Mission Planner* and a USB-A to USB-C cable — the USB adapter for the flight controller is included in the GPS and cables bag,
- foam glue and adhesive tape.

The procedures in this manual use a **RadioMaster Pocket** radio in Mode 2 (throttle on left stick) as an example.

2.3 Wing quick-release interface

The wing connects to the fuselage via a quick-release interface. The connectors on the interface board are defined as follows:

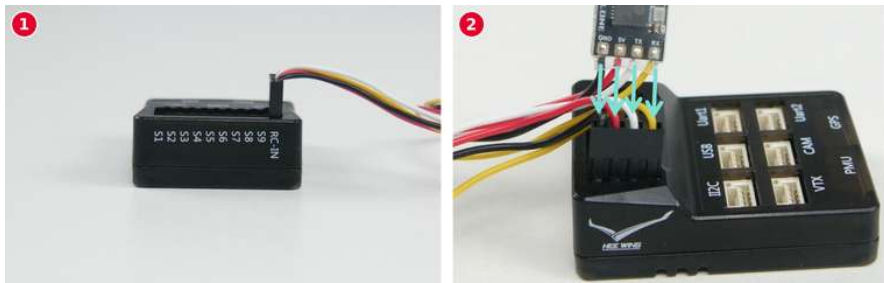


① electronic speed controller (ESC) · ② aileron servo · ③ motor tilt servo

3. Setting up the F405 flight controller (FC)

3.1 Connecting the receiver

Prepare the fuselage, USB cable, radio, receiver and flight battery. Plug the receiver into the **RC-IN** port on the flight controller (FC) using the 4-pin cable. Pay attention to the direction of the plug — the receiver's GND, 5V, TX and RX pins must match the cable wires.



① receiver plugged into RC-IN · ② direction of the plug

3.2 Batteries in the RadioMaster Pocket radio

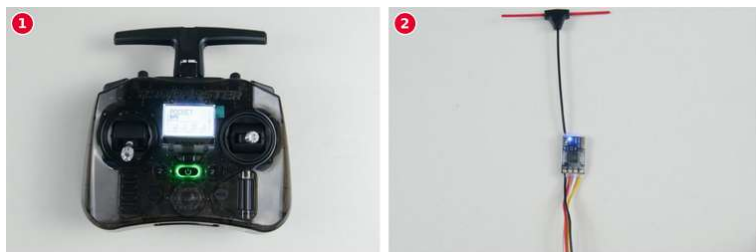
The Pocket requires **2 pcs of 18650 flat-top batteries**. Insert them as shown and note the battery polarity. The Pocket radio shows a green light during normal status; if the light is not on, check whether the batteries are installed.



Position of the 18650 batteries in the Pocket radio

3.3 Binding the receiver (ExpressLRS)

Turn on the radio (green light on) and power on the aircraft. If the receiver's light **remains constantly on**, the connection is successful and you may skip the binding steps.



① radio switched on · ② receiver indicator light

► Binding procedure (bind)

- ① Press the **SYS** button on the radio, then select *ExpressLRS* (press the scroll wheel to confirm/select).
- ② Wait for the progress bar to finish loading. Do not press any buttons or the scroll wheel during the process.
- ③ Plug and unplug the aircraft's power supply three times consecutively; on the third time, keep the battery connected. The receiver's indicator light should double-flash.
- ④ When the receiver light double-flashes, press *Bind* on the radio. It will connect automatically — if the connection is successful, the indicator light on the receiver remains constantly on.

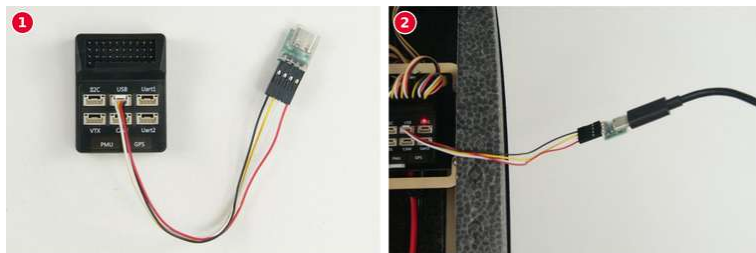


Steps ① to ④ of ExpressLRS receiver binding

3.4 Connecting to a computer

- ① Connect the USB adapter cable to the **USB** port on the flight controller.

② Connect the Type-C USB cable to the adapter and the other end to your PC.



① USB adapter in the FC's USB port · ② cable connection

✳ **Some dual Type-C cables may prevent the computer from detecting the flight controller. We recommend a USB-A to USB-C cable.**

Open *Mission Planner*. In the top right corner, select the flight controller's **COM** port (the number after COM varies by computer) and click **Connect**.



① Mission Planner main window · ② selecting the COM port and connecting

❖ **Ignore any software error prompts after a successful connection.**

3.5 Setup for an SBUS receiver

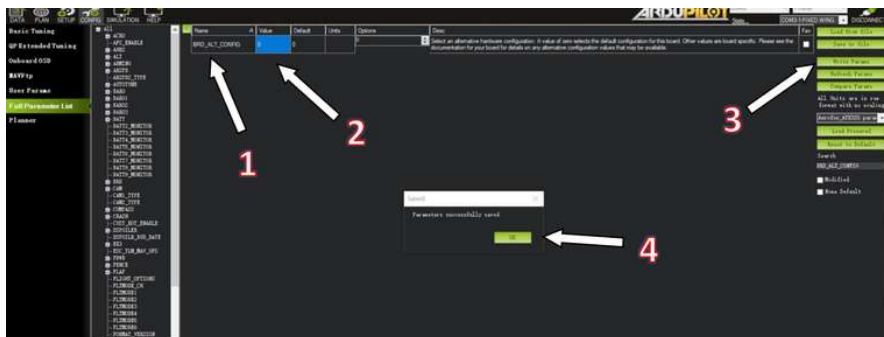
ArduPilot automatically recognizes ELRS (CRSF) input. If you use an **SBUS** receiver, change two parameters:

- Click **CONFIG** → **Full Parameter List** and enter **BRD_ALT_CONFIG** in the search box on the right.



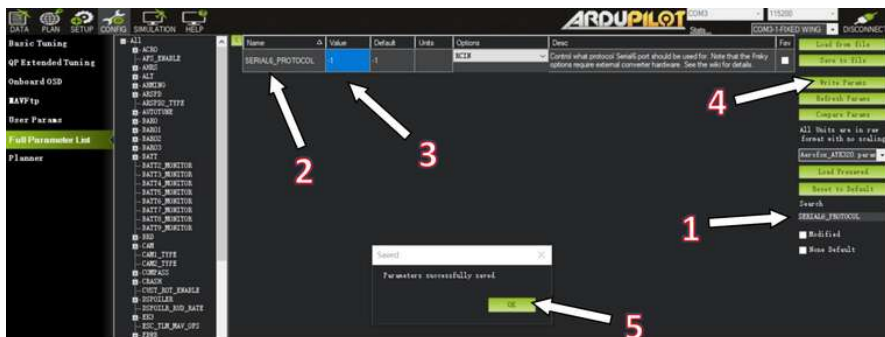
Full Parameter List

- ② Confirm the name is **BRD_ALT_CONFIG**, change the value from **1** to **0**, click *Write Params* and confirm with **OK**.



Changing **BRD_ALT_CONFIG**

- ③ Enter **SERIAL6_PROTOCOL** in the search box, confirm the name, change the value from **23** to **-1**, click *Write Params* and confirm with **OK**.



Changing SERIAL6_PROTOCOL

IMPORTANT: Before the next step, click **Disconnect** in the top right corner, disconnect the USB cable from the flight controller and the PC, and disconnect the flight battery. When you connect the battery again, the SBUS receiver will work.

► Parameters by receiver type

Receiver	BRD_ALT_CONFIG	SERIAL6_PROTOCOL
SBUS	0	-1
CRSF / ExpressLRS	1	23

3.6 Radio calibration

Turn on the radio, power on the aircraft, connect the flight controller to your PC with the USB cable and open *Mission Planner*. Perform the calibration **without** propellers.

- ① Click **SETUP**, ② *Mandatory Hardware*, ③ *Radio Calibration*, ④ *Calibrate Radio*, ⑤ and ⑥ confirm both windows with **OK**.



Starting the calibration, steps 1 to 5



Step 6

Move all sticks and toggle switches through their full range of motion to allow the flight controller to recognize the maximum input signals. The moving red lines in Mission Planner indicate that the flight controller is detecting and responding to the signals from your radio.

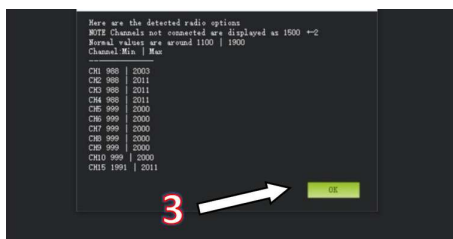


① moving the sticks and switches · ② response in Mission Planner

- ① Click *Click when Done* (the button changes to *Completed*), ② center the sticks, move the throttle down and click *OK*, ③ click *OK* in the window with the detected channel ranges.



Completing the calibration, steps 1 and 2



Step 3 — detected channel ranges

The flight controller records the current signals as the operational range of the radio. The F405 flight controller setup is now complete — click *Disconnect* and remove the USB cable.

4. Aircraft assembly

4.1 Control horns

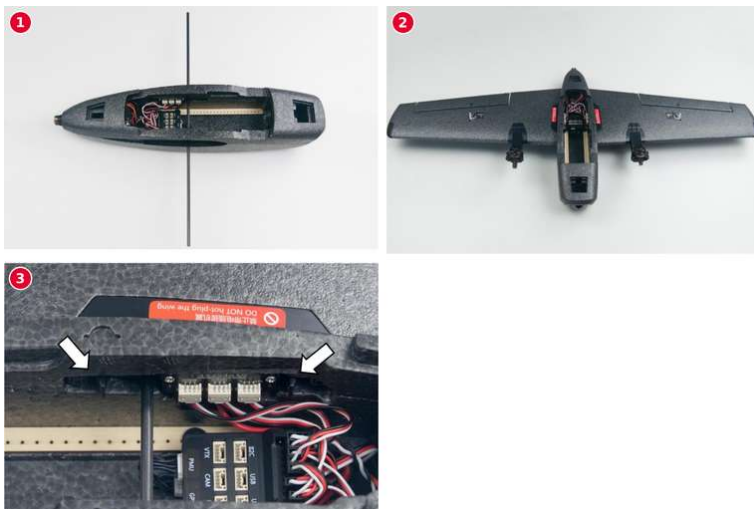
- ① Servo horns, linkage rods and horn chucks.
- ② Prepare the horn chuck for the aileron.
- ③ Install it into the hole in the control surface.
- ④ On the reverse side, install the horn buckle and secure it with glue.
- ⑤ Both wings are installed the same way.
- ⑥ Install the horn chuck onto the horizontal tail the same way as on the ailerons.



Installing the control horns ① to ⑥

4.2 Wing

- ① Insert the carbon rod into the round hole in the fuselage.
- ② Slide the wing onto the carbon rod and onto the fuselage until it clicks into place.
- ③ Make sure the buckle is properly snapped into place.

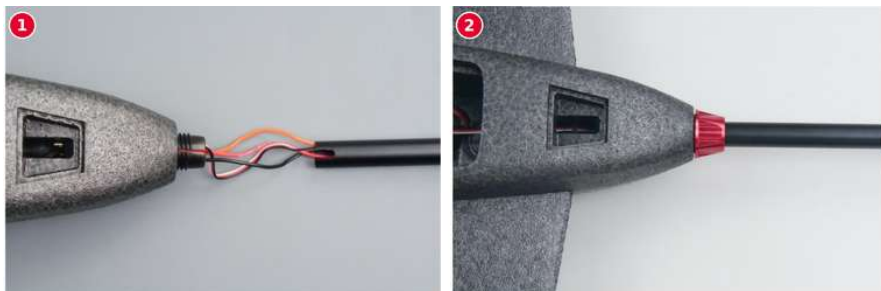


Mounting the wing ① to ③

Don't assemble or disassemble the wing while powered on, otherwise the electronics may be damaged.

4.3 Tail boom and horizontal tail

- ① Insert the tail boom into the fuselage. The tail boom cannot be rotated after being installed in place.
- ② Lock the nut. The nut needs to be pushed in while rotating.



① inserting the tail boom · ② locking the nut

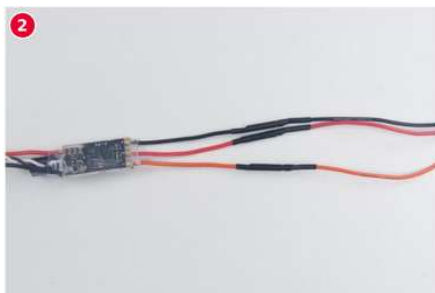
- ① Install the horizontal tail.
- ② The main aircraft assembly is complete.



① horizontal tail · ② assembled aircraft

4.4 Wiring and connection check

- ① Connect the tail servo signal cable to output **S2** of the flight controller. Pay attention to the positive and negative poles.
- ② Connect the electronic speed controller (ESC) according to the wire colors.



① connection to output S2 · ② ESC connection

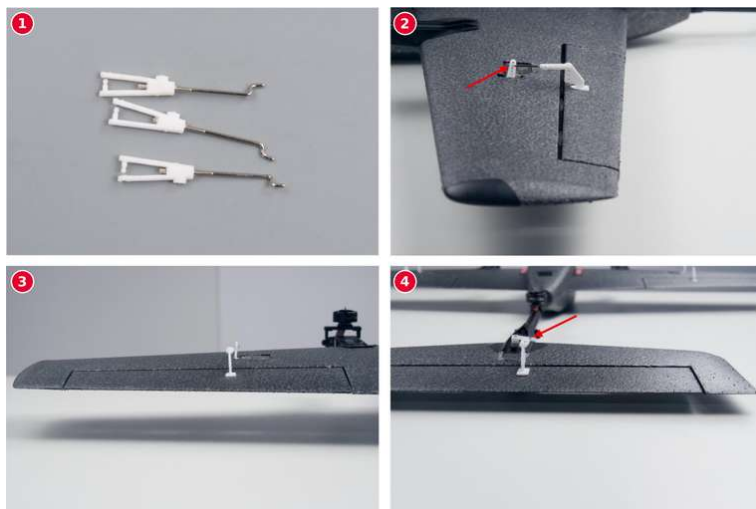
- ① Turn on the radio.
- ② Power on the aircraft and ensure the radio connects to it successfully.



① radio on · ② aircraft powered on

4.5 Linkage rods

- ① Thread the linkage rods into the servo horns.
- ② Install the linkage rods and servo horns. We recommend linking to the **second hole of the servo arm**. Ensure the clamp head is fastened tightly.
- ③ Install the linkages on both ailerons. After installation, ensure the control surfaces are flush with the wing.
- ④ Install the elevator linkage the same way (second hole of the servo arm) and ensure the control surface is flush with the horizontal tail.



Installing the linkages ① to ④

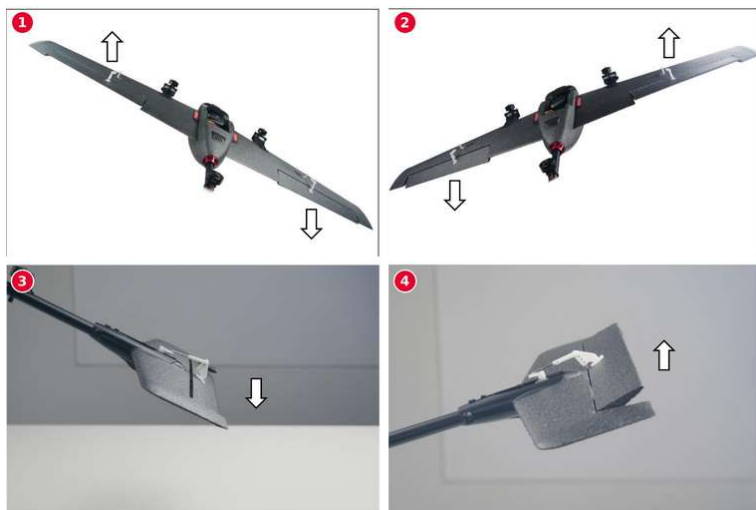


Servo horn and linkage installation completed

4.6 Control surface direction check

Turn on the radio and the aircraft and check that the flight controller stabilizes the aircraft correctly:

- ① Tilt the aircraft (left wing up, right wing down): the left aileron should deflect upward, the right aileron downward.
- ② Tilt the aircraft (left wing down, right wing up): the left aileron should deflect downward, the right aileron upward.
- ③ Lift the nose (tail goes down): the elevator should deflect downward.
- ④ Lower the nose (tail goes up): the elevator should deflect upward.



Stabilization check ① to ④

► Response to the radio sticks

- ① Aileron stick left → ② left aileron up, right aileron down.
- ③ Aileron stick right → ④ left aileron down, right aileron up.



Aileron check ① to ④

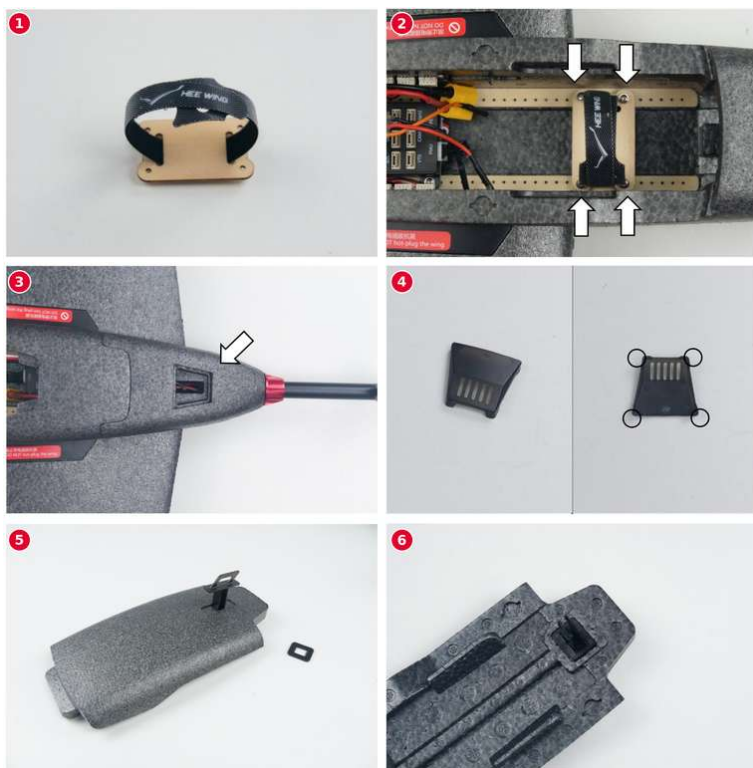
- ① Elevator stick down (towards you) → ② elevator up.
 ③ Elevator stick up (away from you) → ④ elevator down.



Elevator check ① to ④

4.7 Battery mount and hatches

- ① Install the battery Velcro strap into the battery fixing plate.
- ② Secure the plate to the battery fixing rails with PWA2×6 screws.
- ③ The rear fuselage port can be equipped with a cooling fan. Installing a GPS here is not recommended, as it may block heat dissipation and cause GPS interference.
- ④ Install the GPS hatch cover on the rear fuselage and apply foam glue at the circled areas for fixation.
- ⑤ Install the hatch cover handle into the hatch cover.
- ⑥ On the reverse side, secure the handle with the hatch cover lock. Note the lock orientation — the flat side must face outward.



Battery mount and hatches ① to ⑥

4.8 GPS module

- ① The GPS can be installed on the rear hatch cover — secure it with tape or glue.
- ② The other position is in the nose.

- ③ Connect the connector at the other end of the cable to the *GPS* port of the F405 flight controller.
- ④ Install the rear hatch cover first and clear the cables so that no cables are covering the carbon rod.

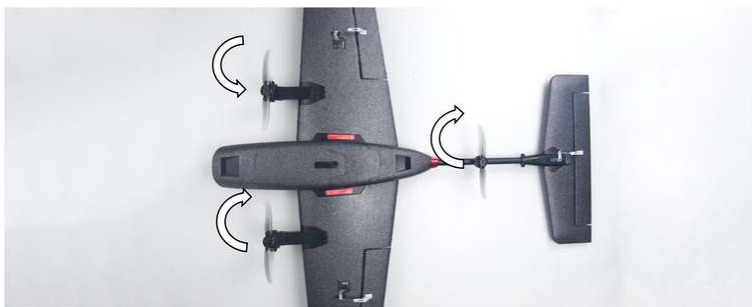


Installing the GPS module ① to ④

*** In both positions, apply a little foam glue along all four edges of the GPS module.**

4.9 Propellers

Install the propellers by securing them to the motors with screws, ensuring the side with the lettering faces upward.



Propeller rotation direction

Note the propeller rotation direction — install each propeller according to the direction of its motor.

5. Pre-flight preparation and flying

5.1 Pre-flight check

Before every flight, check (including but not limited to):

- quick-release parts are properly installed (wing, tail boom),
- linkage rods and connectors are secure,
- flight controller wiring is correctly connected and not loose,
- GPS installation,
- propeller tightness,
- radio battery charge and a **fully charged** 4S flight battery (4.20 V/cell, 16.8 V) installed.

Only proceed with flight operations after confirming the aircraft is fully functional and fault-free to prevent unnecessary damage or loss.

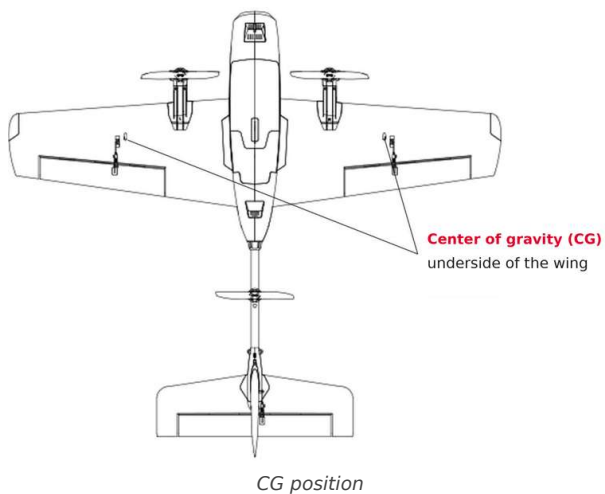
5.2 Battery and center of gravity

- ① Turn on the radio first. On the Pocket, the green light confirms it is in ready-to-connect status.
- ② Secure the flight battery properly.



① radio on · ② battery secured

The aircraft's center of gravity (CG) is at the bulge below the wing. Adjust the battery position to balance the CG.



5.3 Power-on and GPS satellite search

- ① Power on the aircraft and wait for the flight controller to complete its self-inspection. Do not touch or move the aircraft during this process.
- ② After the self-inspection completes, wait until the flight controller's **green LED** lights up, indicating that the GPS satellite search is complete.
- ③ Before flying, verify that all control surface directions are correct (chapter 4.6) and that the connection, flight controller stabilization, radio response and flight mode switching all work without problems.
- ④ and ⑤ — Arm and Disarm, see chapter 5.5.



Power-on ① to ③, Arm ④ and Disarm ⑤

5.4 Flight modes

Flight modes are switched with channel 6 (3-position switch on the radio):

Channel 6 position	Mode	Description
1	QLOITER	VTOL mode — wing motors vertical
2	FBWA	fixed-wing mode — wing motors horizontal
3	QRTL	return-to-home



Position 1 ① and ②, position 2 ③ and ④, position 3 ⑤, mode setup ⑥

In QRTL mode, the aircraft will autonomously return when unobstructed and free from interference. Activate it only in open areas.

Flight modes can be configured in *Mission Planner: SETUP → Flight Modes*.
Reference modes: VTOL — QLOITER, fixed-wing — FBWA, return-to-home — QRTL.

5.5 Arm and Disarm

- **Arm** (motors enabled): hold the left stick in the bottom-right corner for 5 s until the flight controller's LED lights up steady red. In VTOL mode, the motors idle after Arm (picture ④ in chapter 5.3).

- **Disarm** (motors disabled): hold the left stick in the bottom-left corner for 5 s until the flight controller's red LED flashes (picture ⑤ in chapter 5.3).

Ensure all trims are centered before Arm, otherwise Arm may fail.

5.6 Battery monitoring and ending the flight

- There is no battery level display during flight. Estimate the battery level and return in time — end the flight at the latest at **3.5 V/cell (14.0 V)**.
- After landing, Disarm and disconnect the flight battery. Never attempt to catch the model mid-flight or during landing.

6. Maintenance and troubleshooting

6.1 After every flight

- Disconnect the flight battery and let it cool down.
- Check the propellers, linkage rods, control horns, wing and tail boom mounting and the foam parts. Replace damaged parts before the next flight.
- Check that the cables in the fuselage are not loose or damaged.

6.2 Storage

- Avoid direct sunlight exposure for extended periods, as this may cause foam deformation, bubbling, or other damage.
- Use the supplied foam case for storage and transport.
- Store the flight battery disconnected, at a storage voltage of **3.8 V/cell (15.2 V)**.

6.3 Troubleshooting

Problem	Cause and solution
The computer does not detect the flight controller	Some dual Type-C cables prevent detection. Use a USB-A to USB-C cable (chapter 3.4).
Mission Planner shows errors after connecting	Ignore error prompts after a successful connection.
No green light on the Pocket radio	Check that 2 × 18650 batteries are installed with the correct polarity (chapter 3.2).
Receiver light is not constantly on	The receiver is not bound — follow chapter 3.3.
SBUS receiver does not respond	Set BRD_ALT_CONFIG = 0 and SERIAL6_PROTOCOL = -1, then disconnect the USB and flight battery and reconnect the battery (chapter 3.5).
Arm fails	Center all trims on the radio (chapter 5.5).
Control surfaces deflect in the wrong direction	Do not fly — check the wiring and setup according to chapters 3.6 and 4.6.

7. Information for the EU and Czech Market

7.1 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

7.2 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.

7.3 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>.

8. 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. Any manufacturer's warranty terms **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 7.1.
- 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.