Bison 22.5-7 1800KV

RCinPower brushless motor
User manual



Read the entire manual, especially the safety instructions, before installation and first start-up.

Rotorama, s.r.o. · www.rotorama.com

Contents

1. Safety instructions

2. Product description

2.1 Intended use

2.2 Package contents

2.3 Parts description

2.4 Specifications

2.5 Dimensions and mounting

2.6 Manufacturer's thrust tests

3. Legal notes on operation

4. Installation

4.1 What else you need

4.2 Mounting the motor on the frame

4.3 Connecting to the speed controller (ESC)

4.4 Flight controller (FC) settings

4.5 Direction of rotation

4.6 Fitting the propeller

5. Commissioning and operation

6. Maintenance and storage

7. Troubleshooting

8. Information for the EU and Czech Market

9. Warranty and rights arising from defective performance

1. Safety instructions

1.1 Before you start

The RCinPower Bison 22.5-7 1800KV motor is a power component of an FPV drone. Incorrect installation or operation may cause serious injury or damage to property. Read this entire manual before installation and first start-up, and keep it for future reference.

- This product is not a toy. It is not intended for children or for persons without experience in building and operating RC models.
- Carry out installation, soldering and configuration only with adequate knowledge and tools. If in doubt, ask an experienced modeller or the seller.
- The motor may only be operated with a suitable electronic speed controller (ESC) – never connect it directly to a battery.

1.2 Rotating parts and propellers

- The motor bell and the propeller rotate at very high speed. A spinning propeller can cause deep cuts.
- Whenever you work on the drone, configure it on a computer or test the motors, keep the **propellers removed**.
- Never reach into the propeller area while a battery is connected. Always treat a drone with a connected battery as ready to spin up.
- Before every flight, check that the propeller is fitted correctly and the propeller nut is tight. Always replace a damaged propeller.
- Hair, loose clothing or cables can be drawn into the motor. Keep them away from the bell and the propeller.

1.3 Power supply, current and temperature

- Operate the motor only within the supply range specified by the manufacturer: **Li-Po 5–6S**.
- Do not exceed the maximum current and power given in Chapter 2.4. Larger propellers or a higher voltage overload both the motor and the speed controller (ESC).
- Switch off a blocked motor (e.g. a propeller caught in grass) immediately – use Disarm (motors off). A blocked motor overheats very quickly and both the winding and the ESC may be damaged.
- The motor surface heats up during operation. In the manufacturer's thrust tests the motor temperature reached up to 76 °C at full throttle. After a flight, do not touch the motor until it has cooled down.
- Follow the instructions of the Li-Po battery manufacturer. Never charge batteries unattended and never use a damaged battery.

1.4 Operating environment

- The manufacturer specifies protection rating **IP34**. The motor is therefore not waterproof – do not fly in rain, snow or over water, and never immerse the motor.
- Metal particles and sand stick to the strong magnets in the motor bell. Do not land in sand or fine gravel; dirt damages the winding and the bearings.
- Do not expose the motor to high temperatures, open flame or solvents.

2. Product description

2.1 Intended use

The RCinPower Bison 22.5-7 1800KV is a brushless motor for FPV drones with 5-inch propellers powered by a 5–6S Li-Po battery. It is suitable for both racing and freestyle builds.

The stator has an unusual diameter of 22.5 mm and a height of 7 mm. The 4 mm shaft runs in two bearings of size 694 (4 × 11 × 4 mm). According to the manufacturer, the winding is made of single-strand copper wire with a temperature class of 220 °C.

2.2 Package contents

- 1× RCinPower Bison 22.5-7 1800KV motor
- 1× mounting hardware (screws for mounting the motor)

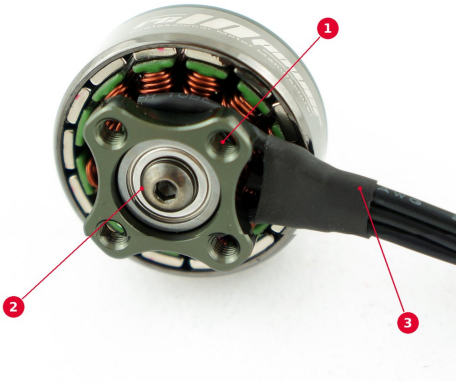
Not included: propellers, speed controller (ESC), flight controller (FC), frame, battery or tools.

2.3 Parts description



Side view

① Propeller nut
② Shaft with M5 propeller thread
③ Bell (rotor) with magnets
④ Stator winding
⑤ Motor base
⑥ Phase wires (3 pcs) for connection to the ESC



Bottom view

① M3 threaded mounting hole (4×, 16 × 16 mm pattern)
② Bottom bearing and shaft end
③ Phase wire exit

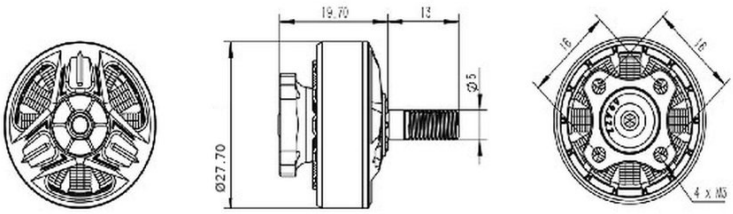
2.4 Specifications

Manufacturer	RC-IN-POWER Co., Ltd (RCinPower)
Model	Bison 22.5-7, 1800KV
KV	1800 rpm/V
Configuration	12N14P (12 slots, 14 poles)
Stator (diameter × height)	22.5 × 7 mm
Shaft	Ø 4 mm (semi-hollow)
Propeller thread	M5
Motor dimensions (Ø × length)	Ø 27.7 × 32.7 mm
Weight	33 g (with 3 cm wires)
Bearings	694 (4 × 11 × 4 mm)
Mounting	4× M3, 16 × 16 mm pattern
Li-Po cell count	5–6S
Idle current (at 10 V)	1.2 A
Internal resistance	79 mΩ
Max. continuous power (5S) ※	630 W
Max. current (5S) ※	25 A
Max. efficiency	> 85 % at 2–6 A
Protection rating	IP34

※ For maximum power and current the manufacturer states "5S" without further explanation (it may mean 5 cells or a duration of 5 seconds). Therefore treat the 25 A value as a short-term peak, not as a continuous load.

The manufacturer states the weight for a motor with the wires cut to 3 cm. The motor is supplied with longer wires, so its actual weight is higher.

2.5 Dimensions and mounting



Manufacturer's dimensional drawing (in mm): Ø 27.7 mm, body 19.7 mm, shaft protrusion 13 mm, mounting 4× M3 in a 16 × 16 mm pattern

2.6 Manufacturer's thrust tests

The manufacturer tested the motor with 5-inch propellers at **25.2 V** (fully charged 6S Li-Po battery). The motor temperature was measured after 5 seconds at full throttle.

Propeller	Throttle	Current (A)	Thrust (g)	Power (W)	Efficiency (g/W)	Temp.
HQ EthiX S3	50 %	4.1	552	103.3	5.343	66 °C
	100 %	17.1	1485	430.9	3.446	
HQ EthiX S4	50 %	4.6	603	115.9	5.202	68 °C
	100 %	18.5	1530	466.2	3.282	
HQ EthiX S5	50 %	5.4	673	136.1	4.946	72 °C
	100 %	21.5	1589	541.8	2.933	
DAL Fold F5	50 %	4.0	540	100.8	5.357	67 °C
	100 %	18.4	1433	463.7	3.090	
DAL 5147.5	50 %	4.3	621	108.4	5.731	67 °C
	100 %	18.2	1580	458.6	3.445	
HQ 5.1×3.1×3	50 %	4.4	616	110.9	5.556	69 °C
	100 %	19.3	1621	486.4	3.333	
GF 6045×2	50 %	5.4	781	136.1	5.739	76 °C
	100 %	23.5	1835	592.2	3.099	

The values are the manufacturer's data measured under laboratory conditions. Actual thrust and current draw in your drone depend on the battery, speed controller, propeller, temperature and state of charge.

3. Legal notes on operation

3.1 The law of the country of operation applies

The motor itself is not an unmanned aircraft. However, the drone you install it in is subject to the rules for operating unmanned aircraft. Regulations (EU) 2019/947 and 2019/945 apply in all member states of the European Union, but national implementing rules differ from country to country – registration portals, minimum pilot age, geographical zones, compulsory insurance, permitted frequency bands and maximum transmit power. The information in this chapter describes the situation in the Czech Republic. If you operate the drone in another country, you must follow the regulations of the country in which you fly.

3.2 Operating a drone with this motor in the Czech Republic

- The operator of a drone with a camera must register with the Civil Aviation Authority (www.caa.cz) and display the registration number on the drone. The pilot must hold the appropriate competency.
- A self-built drone is operated as a privately built unmanned aircraft system. With a take-off mass of 250 g or more, subcategory A3 of the open category applies – flying far from people and 150 m from residential, commercial, industrial and recreational areas.
- The maximum flight height is 120 m above ground and flights are permitted only within visual line of sight. When flying with FPV goggles, an observer who watches the drone directly with their own eyes must stand next to the pilot.
- Respect geographical zones and flight bans. We recommend liability insurance even where it is not compulsory.

4. Installation

4.1 What else you need

- a frame for 5-inch propellers with a 16 × 16 mm (M3) motor mount,
- a speed controller (ESC) rated for 5–6S and for the motor current (Chapter 2.4),
- a flight controller (FC) with multicopter firmware, e.g. Betaflight,
- 5-inch propellers with a hole for an M5 shaft,
- a 5S or 6S Li-Po battery and a suitable charger,
- a soldering station, solder, heat-shrink tubing and a hex key for M3 screws.

4.2 Mounting the motor on the frame

① Place the motor on the frame arm so that the M3 holes in the base line up with the holes in the arm and the wires point towards the centre of the frame.

② Check the screw length: the screw must engage the thread in the base sufficiently but **must not protrude into the motor**. A screw that is too long touches the winding and damages its insulation – resulting in a short circuit and destruction of both the motor and the ESC. Choose the length according to the arm thickness.

③ Tighten the screws gradually in a cross pattern. You may use medium-strength threadlocker – only a small amount, so that it does not get into the bearing.

④ After tightening, turn the bell by hand. It must rotate freely and evenly, without rubbing and without resistance at any point.

4.3 Connecting to the speed controller (ESC)

The motor has three phase wires. Their order does not matter – the direction of rotation is set in a later step (Chapter 4.5).

① Route the wires along the frame arm and cut them to the required length. Leave a little slack so that they are not under tension.

② Strip and tin the ends and solder them to the ESC pads. Solder quickly with a sufficiently powerful iron so that heat does not spread into the winding.

③ Check that no two joints touch each other and that there are no solder balls nearby.

④ Secure the wires on the arm (with a cable tie or tubing) so that they cannot reach the propeller or sharp edges of the frame.

Before connecting a battery for the first time, we recommend using short-circuit protection (a so-called smoke stopper). A wiring fault will then show up without damaging the ESC.

4.4 Flight controller (FC) settings

The motor has a 12N14P configuration, i.e. **14 magnetic poles**. The flight controller needs this value to calculate the motor speed correctly (RPM filter, RPM telemetry from the ESC). In Betaflight enter it on the *Motors* tab in the *Motor poles* field, or in the CLI with the command *set motor_poles = 14*.

4.5 Direction of rotation

① Remove the propellers, connect the drone to a computer and check in the FC configurator (in Betaflight the *Motors* tab) which direction each motor should spin.

② Spin up each motor in turn at low speed and observe the direction of rotation.

③ If a motor spins the wrong way, change the direction in the ESC configurator (*Motor Direction* setting) or swap any two of the three phase wires.

4.6 Fitting the propeller

① Slide the propeller onto the M5 shaft down to the seating surface of the bell. Make sure you use the correct propeller type (CW/CCW) for the motor position.

② Screw on the propeller nut and tighten it firmly with a wrench. While tightening, hold the motor bell, not the propeller blades.

③ Do not overtighten the nut – you may damage the shaft thread or the propeller hub.

④ After every crash, check that the nut is tight and inspect the propeller.

5. Commissioning and operation

5.1 Test without propellers

- Before the first flight, spin each motor without a propeller at low speed. The motor must run smoothly, without stuttering, squealing or vibration.
- Check the direction of rotation of all motors (Chapter 4.5) and the motor order according to the diagram in the FC configurator.
- After a short run, check by hand that no motor has become warmer than the others. A noticeably warmer motor indicates a wiring or configuration fault.

5.2 Battery and propellers

The manufacturer specifies **Li-Po 5–6S** batteries for the motor. The manufacturer does not mention the use of LiHV batteries. Always fit a **fully charged** battery before flight.

Battery state	Li-Po 5S	Li-Po 6S
Fully charged (4.20 V/cell)	21.0 V	25.2 V
End the flight (3.5 V/cell)	17.5 V	21.0 V
Storage (3.8 V/cell)	19.0 V	22.8 V

Use 5-inch propellers. The manufacturer tested the motor with the propellers listed in Chapter 2.6. Heavier and more aggressive propellers increase both the current and the motor temperature – with the GF 6045×2 propeller the current draw at full throttle reached 23.5 A and the motor temperature 76 °C.

5.3 Temperature check

- After the first flights (and after every change of propellers or battery), land, disconnect the battery and carefully check the motor temperature.
- If the motor is too hot to keep your finger on it, it is overloaded. Use a lighter propeller, check the FC and ESC settings or shorten your flights.
- A very hot motor may have a damaged winding – this shows as a smell of burnt insulation, discoloured winding or uneven running. Do not use such a motor any further.

6. Maintenance and storage

6.1 After every flight

- Turn the bell by hand. Rubbing, grinding or noticeable play indicate dirt in the motor or a worn bearing.
- Remove grass, dust and sand from the motor. Carefully remove metal particles caught on the magnets, e.g. with adhesive tape.
- Check that the shaft is not bent: spin the motor without a propeller and watch that the bell does not wobble and the motor does not vibrate.
- Check that the motor screws and the propeller nut are tight and that the insulation of the phase wires is intact.

6.2 Bearing replacement

The motor uses bearings of size **694 (4 × 11 × 4 mm)**. Worn bearings show as noise, vibration and a higher motor temperature. Replacement requires disassembling the motor and manual skill. Mechanical damage caused by improper disassembly is not a product defect.

6.3 Storage

- Store in a dry place at room temperature, away from dust and metal filings.
- Do not store the motor near magnetic data carriers, payment cards or sensitive instruments – it contains strong magnets.
- Store batteries separately, charged to the storage voltage of 3.8 V/cell (Chapter 5.2).

7. Troubleshooting

Problem	Possible cause and solution
Motor does not spin, ESC only beeps	Broken or cold solder joint on one of the phase wires – check the soldering. Check the ESC protocol and calibration in the FC configurator.
Motor spins in the wrong direction	Change the direction in the ESC configurator or swap two of the three phase wires (Chapter 4.5).
Motor stutters or stalls on start-up or on sharp throttle changes	Poor wire joint, short circuit between phases, dirt in the motor or unsuitable ESC settings. Check the wiring and the ESC settings.
Motor gets excessively hot	Propeller too large or too aggressive, wrong number of poles set (Chapter 4.4), worn bearings or a bent shaft.
Vibration, noise	Damaged or unbalanced propeller, bent shaft, worn bearing, loose motor screws or propeller nut.
Bell rubs, does not turn freely	Dirt or metal particles between the bell and the stator, mounting screw too long (Chapter 4.2), damaged bearing.
Burning smell, discoloured winding	Overheating or short circuit in the winding. Do not use the motor any further.

8. Information for the EU and Czech Market

8.1 Importer and responsible person in the EU

The product is placed on the European Union market by the importer stated below, who is at the same time the responsible person within the meaning of Article 16 of Regulation (EU) 2023/988 of the European Parliament and of the Council on general product safety (GPSR).

Importer / responsible person in the EU	Rotorama, s.r.o.
Company ID (IČO)	051 57 692
VAT ID (DIČ)	CZ05157692
Registered office	Okrajová 1351, 674 01 Třebíč, Czech Republic
E-mail	info@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.com

8.2 Product conformity

CE

- The product bears the **CE** marking and complies with the requirements of the applicable European Union harmonisation legislation.
- A copy of the **EU Declaration of Conformity** is available from the importer at the address stated above or at the e-mail address info@rotorama.cz.
- **Product identification:** the type designation (Bison 22.5-7 1800KV) is given on the product or on its packaging.

8.3 Disposal of electrical equipment



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

Through its contractual partner **ASEKOL a.s.**, the company ensures the take-back of waste electrical equipment from households and the separate collection of waste electrical equipment, batteries and accumulators in accordance with the applicable legislation. The customer is entitled to hand over old electrical equipment or a battery or accumulator at any collection point of the above contractual partner. The addresses of these take-back points are listed at www.asekol.cz, www.ecobat.cz and also https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu.

9. Warranty and rights arising from defective performance

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 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.