GTS V3 0802 22000Kv

RCinpower brushless motor for 1S quadcopters and Tinywhoops

User manual



Read the entire manual, especially the safety instructions, before installation and first use. Keep this manual for future reference.

www.rotorama.com

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1. Safety instructions

1.1 General principles

- The motor is a component for building or repairing an FPV quadcopter. Installation and wiring require basic soldering skills and experience with flight controller configuration. If in doubt, ask an experienced modeller for help.
- The product is not a toy and is not intended for children. Keep small parts (screws) out of the reach of children and animals – risk of swallowing.
- Use the motor only in accordance with the technical data in Chapter 2.3, in particular only with power from a **1S battery**.
- Do not modify the product beyond the procedures described in this manual. Do not continue to use a damaged motor (bent shaft, cracked bell, damaged winding).
- When operating a drone fitted with this motor, observe the regulations for unmanned aircraft (in the EU, Regulation (EU) 2019/947 and national regulations). The law of the country in which the product is operated always prevails.

1.2 Rotating parts and propellers

- The motor reaches very high speeds. The rotating bell and propellers can cause cuts or eye injuries.
- **Always remove the propellers** during installation, wiring, configuration on a computer and when checking the direction of rotation.
- Before connecting the battery, make sure the drone is disarmed (Disarm – motors off) and that nobody is near the propellers.
- Do not touch a rotating motor and do not stop it with your hand or any object.

1.3 Electrical connection and temperature

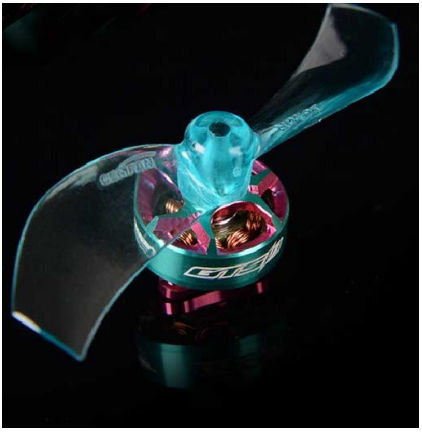
- Disconnect the battery before any work on the wiring.
- A short circuit of the motor wires or incorrect wiring can damage the motor and the electronic speed controller (ESC).
- The motor heats up during operation. After a flight, do not touch the bell or the winding until the motor has cooled down.
- A blocked motor (caught propeller, grass, hair) overheats quickly while armed. If anything gets caught, disarm immediately.

2. Product description

2.1 Intended use

The RCinpower GTS V3 0802 22000Kv is an outrunner brushless motor of size 0802 for small 1S quadcopters and Tinywhoops. According to Rotorama, it is suitable for propellers with a diameter of 30–40 mm. The motor has a unibell and two bearings which, according to the manufacturer, extend its service life and improve motor response.

The motor wires are soldered to a small printed circuit board (PCB) on the underside of the motor and terminate in a 1.25 mm connector which, according to the manufacturer, is compatible with most common AIO boards. If a wire is torn out, the winding is therefore not at risk – a new wire can easily be soldered to the PCB pads.



GTS V3 0802 motor with a propeller fitted (photo: RCinpower)

2.2 Package contents

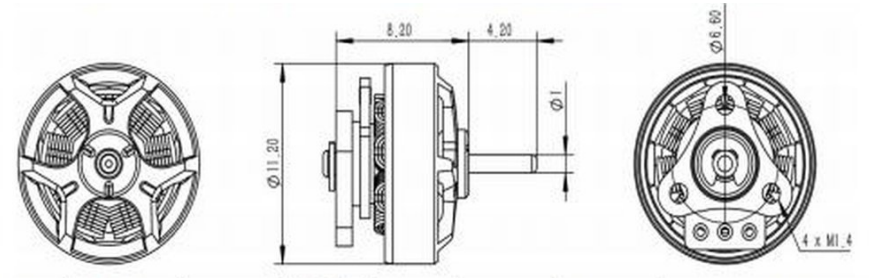
Qty	Item
1×	RCinpower GTS V3 0802 22000Kv motor with wire and connector
1×	Set of screws

Not included: propellers, flight controller (FC) with electronic speed controllers (ESC), frame, battery or charger.

2.3 Technical data

Parameter	Value
Designation	GTS V3 0802 22000Kv
Manufacturer	RC-IN-POWER Co., Ltd (RCinpower)
Stator size	0802 – diameter 8 mm, height 2 mm
KV	22000 KV
Configuration	9N12P
Shaft diameter	1 mm (1.5 mm inside the motor)
Motor dimensions (diameter × length)	Ø 11.2 × 8.2 mm
Mounting	4× M1.4, bolt circle Ø 6.6 mm
Weight	1.97 g (including wire and connector)
Power supply	1S LiPo
Idle current (at 5 V)	0.2 A
Max. continuous power	21.5 W
Max. current	5.8 A
Internal resistance	117 mΩ
Max. efficiency current	1–2 A (efficiency > 82 %)
Bearings	2 bearings
Wires	approx. 3 cm, 1.25 mm connector

Data provided by the manufacturer RCinpower; wire length according to Rotorama.



Manufacturer's dimensional drawing (dimensions in mm): diameter 11.2 mm, motor length 8.2 mm, shaft protrusion 4.2 mm, shaft Ø 1 mm, mounting 4× M1.4 on a Ø 6.6 mm circle

2.4 Manufacturer's performance data

The manufacturer states the following measured values for the GTS V3 0802 22000Kv motor at a voltage of 3.7 V. The temperature is measured after 3 s at full throttle.

Propeller	Voltage (V)	Throttle	Current (A)	Thrust (g)	Power (W)	Efficiency (g/W)	Temperature at full throttle
GF1220×3	3.7	50 %	1	14	3.7	3.784	55 °C
		100 %	4	37	14.8	2.500	
GF1220×4	3.7	50 %	1.2	16	4.4	3.604	57 °C
		100 %	4.5	38	16.7	2.282	
GF1635×3	3.7	50 %	1.7	23	6.3	3.657	65 °C
		100 %	5.3	42	19.6	2.142	
GF1636×4	3.7	50 %	1.7	24	6.3	3.816	69 °C
		100 %	5.6	45	20.7	2.172	

Propeller designations are taken from the manufacturer's documentation. The values are laboratory measurements and may differ in actual flight.

3. Installation and connection

3.1 What else you need

- a frame for motors with 4× M1.4 mounting on a Ø 6.6 mm circle,
- a flight controller (FC) with electronic speed controllers (ESC) for 1S power, typically an AIO board with 1.25 mm motor connectors,
- propellers with a hole for a 1 mm shaft (according to Rotorama, 30–40 mm in diameter),
- a 1S LiPo battery and a suitable charger,
- a small screwdriver matching the supplied screws and, if needed, a soldering iron for wire repairs.

3.2 Mounting the motor on the frame

① Place the motor on the frame so that the holes in the motor base line up with the holes in the frame and the wire leads towards the flight controller.

② Use the screws from the package. The screw must not be longer than the thickness of the frame plus the thread in the base allows – a screw that is too long can damage the stator winding and cause a short circuit.

③ Tighten the screws gradually and gently. M1.4 threads are very fine and strip easily.

④ After mounting, check that the bell turns freely by hand without rubbing and that the wire does not interfere with the propeller.

3.3 Connecting to the flight controller

- Plug the 1.25 mm connector into the corresponding motor socket on the flight controller (FC). Do not use force; the connector fits in one direction only.
- The motor order (motor 1–4) and their positions on the frame follow the diagram of the flight controller firmware (e.g. Betaflight, *Motors* tab).
- Route the wires so that they do not touch the propellers or sharp edges of the frame.

3.4 Checking the direction of rotation

Always check the direction of rotation without propellers.

- In the flight controller configuration (e.g. Betaflight, *Motors* tab), spin each motor in turn at low speed and verify that it rotates in the direction shown in the firmware diagram.
- If a motor spins the wrong way, change its direction of rotation in the ESC settings (e.g. in ESC Configurator). No physical work on the wires is needed.
- If you select reversed motor direction in Betaflight (*Motor direction is reversed*), fit the propellers accordingly.

3.5 Mounting the propellers

- Fit the propellers only after the direction of rotation of all motors has been verified.
- Push the propeller onto the 1 mm shaft straight and without tilting. Support the motor from below while doing so to avoid damaging the bearings.
- Make sure the propeller is oriented correctly for the direction of rotation of the motor.
- Replace a damaged or loose propeller – an unbalanced propeller increases vibration and motor heating.

4. Operation

4.1 Power supply

According to the manufacturer, the motor is designed to be powered by a **1S LiPo battery**. Do not use a battery with a higher cell count. Insert a **fully charged** battery into the drone before flying.

1S LiPo battery state	Voltage
fully charged	4.20 V/cell (1S: 4.20 V)
end the flight	3.5 V/cell (1S: 3.5 V)
storage	3.8 V/cell (1S: 3.8 V)

4.2 Load and temperature

- Do not exceed the maximum current of **5.8 A** and the maximum continuous power of **21.5 W** stated by the manufacturer.
- Larger propellers or propellers with more blades increase both current draw and motor temperature (see the table in Chapter 2.4).
- Check the motor temperature after flying. If one motor is noticeably warmer than the others, find the cause (damaged propeller, dirt, bearing, FC settings) before continuing.
- Protect the motor from water, moisture, sand and fine metal particles, which are attracted by the rotor magnets.

5. Maintenance and troubleshooting

5.1 After every flight

- Disconnect the battery and let the motors cool down.
- Remove any hair, grass and dirt wound around the shaft and the bell.
- Turn the bell by hand: it must rotate freely, without rubbing and without play. Rough running or play indicates worn bearings.
- Check that the shaft is not bent, the screws are tight and the wire and connector are not damaged.

5.2 Replacing the motor cable

The motor wires are soldered to a printed circuit board (PCB) on the underside of the motor. If a wire is torn out or damaged, the wires can be soldered back onto the PCB pads.



PCB solder pads on the underside of the motor (photo: RCinpower)

- Disconnect the motor from the flight controller before soldering.
- Solder quickly so that heat does not transfer into the winding and bearings. After soldering, the pads must not be bridged with solder.
- The order of the wires does not matter; if the motor spins the wrong way after the repair, change the direction of rotation as described in Chapter 3.4.

5.3 Storage

Store the motor in a dry place at room temperature, away from dust and metal filings. Protect the shaft from bending.

5.4 Troubleshooting

Problem	Possible cause and solution
Motor does not spin or stutters	Check that the connector is fully inserted, the wire and the solder joints on the PCB. Verify that the ESC is working (try the motor on another output).
Motor spins in the wrong direction	Change the direction of rotation in the ESC settings (Chapter 3.4).
Motor overheats	Propeller too large, trapped dirt, worn bearings or unsuitable FC settings. Remove the cause and use a recommended propeller.
Vibration, noise, rubbing	Bent shaft, damaged propeller, dirt between rotor and stator or worn bearings. Replace the propeller, clean the motor; replace the motor if it is damaged.
Wire torn out	Solder the wires back onto the PCB pads (Chapter 5.2).

6. Information for the EU and Czech Market

6.1 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

6.2 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 (GTS V3 0802) and the KV value are marked on the motor bell.

6.3 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.

7. Warranty and rights arising from defective performance

The rights and obligations of the contracting parties are governed by Czech law, in particular by Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on consumer protection.

- The seller is liable to the buyer for the product being free of defects on receipt. If the buyer is a consumer, a defect may be notified **within two years of receipt** of the product (Section 2165 of the Civil Code).
- If a defect appears within **one year** of receipt, the product is deemed to have been defective already at the time of receipt (Section 2161(5) of the Civil Code).
- When purchasing online, a consumer has the right to **withdraw from the contract within 14 days** of receiving the goods without giving a reason (Section 1829 of the Civil Code).
- Claims should be made with the retailer from whom you purchased the product. The importer's contact details are given in Chapter 6.1.
- 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.