



# GTS V3 1002 22000KV

Brushless motor for 1S FPV whoops  
User manual



**Read the entire manual, especially the safety instructions, before installation and use.**

*Rotorama, s.r.o. · [www.rotorاما.com](http://www.rotorاما.com)*

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# 1. Safety instructions

Read the entire manual before installation and first use, and keep it for future reference. The motor is a component intended to be installed in an FPV drone or another RC model. Installation requires basic soldering skills and knowledge of setting up the flight controller (FC) and the electronic speed controller (ESC).

- This product is not a toy. It is not intended for children under 14 years of age; it contains small parts (screws) that could be swallowed.
- Do not use a motor that is mechanically damaged or has a bent shaft or damaged winding or wire insulation.
- Do not modify the motor in any way other than replacing a wire as described in Chapter 4.3.

## 1.1 Rotating parts

- The motor bell spins at very high speed. **Never have propellers mounted** while working on the model with a battery connected.
- When testing the motors with propellers, secure the model firmly and keep a safe distance from people, animals and objects.
- Do not touch the rotating bell or propeller, and keep fingers, tools and cables away from them.
- Before connecting the battery, make sure the model is in the Disarm state (motors off).

## 1.2 Electrical connection and temperature

- The motor is designed to be powered from a **1S LiPo** battery via an electronic speed controller (ESC). Never connect it directly to a battery or a DC power supply.
- Use an ESC rated for at least the maximum motor current given in Chapter 2.4.
- The motor gets very hot under full load. After a flight, do not touch the bell or the stator until they have cooled down.
- Charge, store and dispose of LiPo batteries according to their manufacturer's instructions. Do not use a damaged, swollen or overheated battery.

## 2. Product description

### 2.1 Intended use

The RCinPower **GTS V3 1002 22000KV** is a brushless outrunner motor of size 1002 (stator diameter 10 mm, stator height 2 mm). The manufacturer designed it for small whoop-type FPV drones with a motor-to-motor frame size of 65–75 mm, powered by a 1S LiPo battery.

The motor has two bearings and a unibell design. The wires are soldered to pads on the bottom of the motor, so a torn-off wire can easily be replaced without damaging the windings (Chapter 4.3). The wires are terminated with a connector with 1.25 mm pitch.



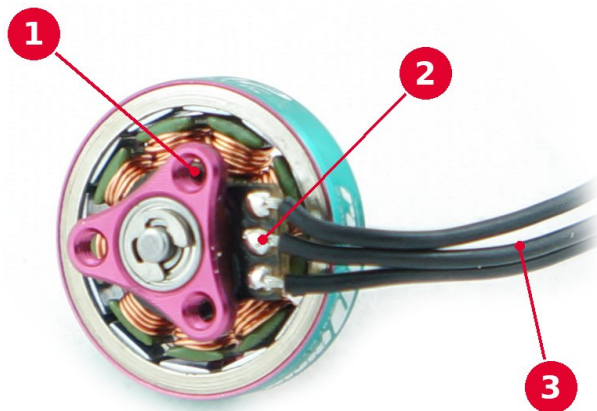
*RCinPower GTS V3 1002 22000KV*

### 2.2 Package contents

- 1× GTS V3 1002 22000KV motor with wires and connector
- 1× set of mounting screws

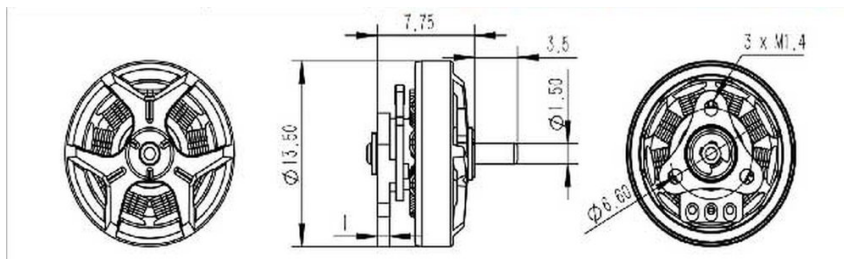
**Not included:** propellers, electronic speed controller (ESC), flight controller (FC), frame and battery. Motors are installed in a drone in sets of four; the package contains one motor.

## 2.3 Parts and dimensions



*View of the bottom of the motor*

- ① Mounting holes 3× M1.4 in the stator base (on a  $\varnothing 6.6$  mm bolt circle)
- ② Solder pads of the winding leads - the motor wires are soldered here
- ③ Motor wires (3 phases) terminated with a connector with 1.25 mm pitch



*Dimensional drawing (dimensions in mm): motor length 7.75, diameter 13.50, shaft protrusion 3.5, shaft diameter 1.50, mounting holes 3× M1.4 on a  $\varnothing 6.60$  bolt circle*

## 2.4 Technical data

| Parameter                     | Value                                                                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model                         | GTS V3 1002                                                                                                                                                                      |
| KV                            | 22000 KV                                                                                                                                                                         |
| Configuration                 | 9N12P                                                                                                                                                                            |
| Stator diameter / height      | 10 mm / 2 mm                                                                                                                                                                     |
| Shaft diameter                | 1.5 mm                                                                                                                                                                           |
| Motor dimensions (Ø × length) | Ø 13.5 × 7.75 mm                                                                                                                                                                 |
| Weight                        | 2.5 g (including 5 cm wires)                                                                                                                                                     |
| Number of cells (LiPo)        | 1S                                                                                                                                                                               |
| Idle current at 5 V           | 1.5 A                                                                                                                                                                            |
| Max. continuous power         | 52 W                                                                                                                                                                             |
| Max. current                  | 14 A                                                                                                                                                                             |
| Internal resistance           | 75 mΩ                                                                                                                                                                            |
| Max. efficiency current       | 2–4 A (efficiency > 84 %)                                                                                                                                                        |
| Wires                         | 28 AWG, length 5 cm, connector with 1.25 mm pitch                                                                                                                                |
| Mounting                      | 3× M1.4 on a Ø 6.6 mm bolt circle                                                                                                                                                |
| Recommended frame             | 65–75 mm (whoop)                                                                                                                                                                 |
| Manufacturer                  | RC-IN-POWER Co., Ltd, Floor 5, District A, Number 73 Xishan Road, Xishan Village, Sanxiang Town, Zhongshan City, Guangdong Province, China; RCINPOWER@163.com; www.rcinpower.com |

*Data provided by the manufacturer RC-IN-POWER Co., Ltd.*

## 2.5 Manufacturer's performance data

The manufacturer measured the motor with several Gemfan propellers at **3.7 V**. The temperature was measured after 3 s at full throttle. The data is intended as a guide when choosing a propeller; actual values depend on the battery, ESC and settings.

| Propeller         | Throttle | Current (A) | Thrust (g) | Power (W) | Efficiency (g/W) | Temperature    |
|-------------------|----------|-------------|------------|-----------|------------------|----------------|
| GF1610<br>2-blade | 50 %     | 2.2         | 31         | 8.1       | 3.808            | 61 °C          |
|                   | 100 %    | 7.9         | 72         | 29.2      | 2.463            |                |
| GF1635<br>3-blade | 50 %     | 2.7         | 33         | 10.0      | 3.303            | 66 °C          |
|                   | 100 %    | 9.4         | 75         | 34.8      | 2.156            |                |
| GF1635<br>4-blade | 50 %     | 3           | 36         | 11.1      | 3.243            | 67 °C          |
|                   | 100 %    | 10.4        | 79         | 38.5      | 2.053            |                |
| GF2015<br>2-blade | 50 %     | 3.5         | 44         | 13.0      | 3.398            | 71 °C          |
|                   | 100 %    | 10.9        | 93         | 40.3      | 2.306            |                |
| GF2023<br>3-blade | 50 %     | 4.4         | 42         | 16.3      | 2.580            | 84 °C<br>(hot) |
|                   | 100 %    | 14          | 76         | 51.8      | 1.467            |                |

Voltage 3.7 V; temperature after 3 s at full throttle. Source: manufacturer RC-IN-POWER.

✱ According to the manufacturer, with the GF2023 (3-blade) propeller the motor reaches its maximum current of 14 A and a temperature of 84 °C. Do not fly at full throttle for long periods with such a demanding propeller, and check the motor temperature after landing.

## 3. Installation and connection

### 3.1 What you will need

- a whoop frame with mounting holes for the motor 3× M1.4 on a Ø 6.6 mm bolt circle,
- an electronic speed controller (ESC) or a flight controller with an integrated ESC (AIO) with motor connectors with 1.25 mm pitch, or with solder pads,
- propellers for a 1.5 mm shaft (the manufacturer tested the propellers listed in Chapter 2.5),
- a 1S LiPo battery, a screwdriver matching the supplied screws, and a soldering iron if needed.

### 3.2 Mounting the motor to the frame

- ① Place the motor on the frame so that the three mounting holes ① (Chapter 2.3) line up with the holes in the frame and the wires point towards the centre of the frame.
- ② Fasten the motor with the supplied M1.4 screws. Tighten the screws gently and gradually in a crosswise pattern – the thread in the base is small and strips easily.
- ③ The screws must not be longer than the frame thickness and thread depth allow. A screw that is too long will touch the windings and damage them.
- ④ After mounting, spin the bell by hand. It must turn freely, without rubbing or a scraping sound.

### 3.3 Connecting to the electronic speed controller (ESC)

The motor has three phase wires. The order in which they are connected does not matter – it only determines the direction of rotation, which can be changed at any time (Chapter 3.4).

- **1.25 mm connector:** plug the motor connector into the corresponding socket on the ESC or AIO board. Do not use force, and do not pull on the wires when disconnecting.
- **Soldering:** you can cut off the connector and solder the wires directly to the ESC pads. Shorten the wires only to the length needed, strip, tin and solder them quickly so as not to damage the insulation.
- Route the wires so that they cannot get into the propeller or touch the rotating bell, and secure them against being torn off.

### 3.4 Checking the direction of rotation

- ① **Remove the propellers.** Connect the model to a computer and open the *Motors* tab in the flight controller configurator (e.g. Betaflight).
- ② Connect the battery, confirm the safety notice and spin up each motor in turn at low throttle.
- ③ Compare the direction of rotation with the frame diagram in the configurator (default or reversed direction – *Motor direction is reversed*).
- ④ If a motor spins the wrong way, change its direction in the ESC configuration (e.g. in the ESC configurator or via passthrough), or swap any two phase wires of the motor.

### 3.5 Mounting the propeller

- Mount the propellers only after checking the direction of rotation and only with the battery disconnected.
- Use a propeller with a 1.5 mm shaft hole and the correct direction of rotation for the motor position.
- Push the propeller straight onto the shaft all the way; support the bell while doing so to avoid loading the bearings.
- Check that the propeller sits firmly and does not touch the frame or the duct.

## 4. Operation, maintenance and troubleshooting

### 4.1 Operating guidelines

- Operate the motor only with a 1S LiPo battery. A fully charged LiPo cell has 4.20 V; end the flight at 3.5 V per cell at the latest.
- After the first flights and after every longer flight, check the motor temperature. If the motors are too hot to touch, use a less demanding propeller or shorten full-throttle sections.
- After a crash, always check the shaft, bell, mounting and wires before continuing to fly.

### 4.2 Maintenance and storage

- Dust, grass and metal filings easily get caught between the magnets and the stator. Remove dirt carefully with a dry brush or compressed air.
- Remove metal particles attracted by the magnets, otherwise they will damage the windings.
- Do not lubricate the bearings with ordinary oils or sprays, as they attract dirt.
- Do not wash the motor with water or solvents.
- Store the motor in a clean, dry place, out of the reach of children and away from metal filings and objects sensitive to magnetic fields.

### 4.3 Repairing a torn-off wire

The motor wires do not come directly from the windings but are soldered to pads ② on the bottom of the motor. A torn-off wire therefore does not have to mean the end of the motor:

- ① Disconnect the battery and remove the motor from the frame.
- ② Remove the solder of the remaining wire and clean the pad.
- ③ Solder on a new wire of a similar gauge. Solder quickly and with a small amount of solder so that the winding does not overheat and adjacent pads are not bridged.
- ④ Check that the pads do not touch each other and that the wire does not obstruct the rotation of the bell.

## 4.4 Troubleshooting

| Problem                                                      | Possible cause and solution                                                                                                                         |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Motor does not spin, only twitches or beeps                  | Connector not fully inserted or a cold solder joint on a pad – check the connection of all three phases. Check that the bell turns freely.          |
| Motor spins the wrong way                                    | Change the direction in the ESC configuration or swap two phase wires (Chapter 3.4).                                                                |
| Motor rubs or a scraping noise can be heard                  | Dirt between the magnets and the stator, a screw that is too long touching the winding, or a damaged bearing. Clean the motor and check the screws. |
| Motor overheats                                              | Propeller too demanding, long full-throttle sections or unsuitable settings. Choose a less demanding propeller (Chapter 2.5).                       |
| Strong vibrations                                            | Bent shaft, damaged or unbalanced propeller, loose screws. Replace the propeller, tighten the screws; replace the motor if the shaft is bent.       |
| After Arm (motors on) one motor does not spin, the others do | Torn-off or broken wire – repair as described in Chapter 4.3. Check the motor assignment in the configurator.                                       |

## 5. Information for the EU and Czech Market

### 5.1 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.com                             |

### 5.2 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 (GTS V3 1002 22000KV) is given on the product or on its packaging.

## 5.3 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](http://www.asekol.cz), [www.ecobat.cz](http://www.ecobat.cz) and also <https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu>.

## 6. 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 5.1.
- 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](http://www.coi.cz).