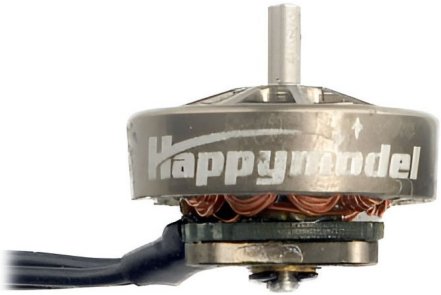
EX1002 20000KV

Happymodel
Brushless motor for 1S FPV drones



Read this entire manual before installation and first use, and keep it for future reference.

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1. Product description

1.1 Intended use

The Happymodel EX1002 20000KV is a small brushless motor for FPV drones powered by a single-cell (1S) battery – typically 75mm whoops with a protective duct and lightweight toothpicks. According to the manufacturer, it is compatible with the Mobula7 1S, Mobula7 HD 1S, Moblite7 HDZERO and Moblite7 Avatar drones.

The motor has a three-wire lead terminated with a JST 1.25 mm connector that plugs directly into the motor connector on a flight controller (FC) with an integrated electronic speed controller (ESC). Replacing the motor therefore usually requires no soldering. The motor is fastened with three M1.4 screws from the underside of the frame arm.

EX1002 20000KV motors (four pieces shown; the package contains one motor)

1.2 Specifications and package contents

Manufacturer	Happymodel
Marking on the product	EX1002-KV20000 (engraved on the motor bell)
KV	20000 KV
Stator (diameter × height)	10 × 2 mm
Configuration	9N12P
Shaft diameter	1.5 mm
Motor dimensions (diameter × length)	Φ 13.5 × 12.5 mm
Mounting	3× M1.4 thread on a Φ 6.6 mm bolt circle (according to the manufacturer's drawing)
Battery	1S Li-Po / LiHV only
Connector	JST 1.25 mm
Wire length (excluding connector)	40 mm
Weight	2.45 g
Package contents	1× motor
Not included	propellers, mounting screws, flight controller (FC) / electronic speed controller (ESC), battery

2. Use

2.1 Safety instructions

- The motor reaches very high speeds. Whenever you work on a drone with a battery connected, **remove the propellers** – especially when testing the motors in the configuration software.
- The motor is designed **exclusively for a 1S battery**. A higher voltage may damage the motor and the electronic speed controller (ESC) and cause a fire.
- Never test the motor with a propeller fitted while holding it in your hand or on a table. Spinning propellers cause cuts.
- The motor may be hot after a flight. Do not touch it until it has cooled down.
- The motor contains strong magnets. Keep it away from metal filings, small screws and small metal objects, and out of the reach of children.
- Operation of the drone in which you install the motor is governed by the regulations of the country in which you fly. In the EU, Regulation (EU) 2019/947 applies, but national rules differ from country to country.

2.2 Mounting on the frame

① Disconnect the battery and remove the propeller from the original motor.

② Unplug the original motor's connector from the flight controller and loosen the mounting screws.

③ Place the new motor on the frame arm with the wire pointing towards the centre of the drone and fasten it with three M1.4 screws.

④ Route the wire so that it cannot touch the propeller or get pinched between frame parts.

※ The screws must not be too long. A screw that touches the stator winding will damage the insulation and cause a short circuit. Tighten the screws gently – M1.4 threads strip easily.

2.3 Connecting to the flight controller

Push the JST 1.25 mm connector fully into the motor connector on the flight controller (FC). The connector is keyed – do not force it in the wrong way round. When unplugging, pull on the connector body, not on the wires.

Motor with a wire terminated by a JST 1.25 mm connector

If your flight controller has no motor connectors, the connector can be cut off and the wires soldered to the motor pads. The order of the three wires only affects the direction of rotation.

2.4 Direction of rotation and first start

The direction of rotation of a brushless motor is determined by the setting of the electronic speed controller (ESC), not by the motor itself. After replacing a motor, always check that it spins in the correct direction:

① **Remove all propellers** and connect the drone to the computer and to the battery.

② In Betaflight Configurator, on the *Motors* tab, briefly spin up the replaced motor and compare its direction of rotation with the drone's diagram.

③ If the motor spins the wrong way, change its direction in the ESC configuration software (e.g. ESC Configurator for Bluejay / BLHeli_S firmware) or with the *Motor direction* function in Betaflight Configurator.

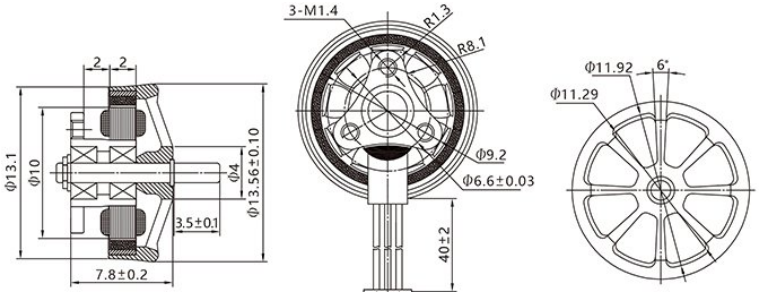
④ Fit the propellers in the correct direction and make a short test flight in a hover.

2.5 Battery and propellers

- Use **1S batteries only**, Li-Po or LiHV. Before flight, insert a **fully charged** battery: Li-Po 4.20 V, LiHV 4.35 V.
- End the flight at a voltage of 3.5 V at the latest. Store batteries at a voltage of 3.8 V.
- The motor is designed for small whoop and toothpick propellers mounted on a 1.5 mm shaft. The manufacturer measured the motor with a Gemfan 2015-2 two-blade propeller (see Chapter 3.2).
- Fit the propellers straight and all the way down; always replace a damaged or cracked propeller.

3. Dimensions and measured data

3.1 Dimensional drawing



Manufacturer's dimensional drawing (dimensions in mm)

3.2 Manufacturer's measured data

The manufacturer states the following values measured on a test bench with a Gemfan 2015-2 two-blade propeller. These are laboratory data; actual in-flight values depend on the propeller, the battery and the weight of the drone.

▶ No load

Voltage (V)	Current (A)	Speed (rpm)	KV
2	0.5	41820	20910

▶ Under load (Gemfan 2015-2 propeller)

Voltage (V)	Current (A)	Thrust (g)	Efficiency (g/W)	Power (W)
3.7	1.01	12.9	3.452	3.737
3.7	2.01	23.3	3.133	7.437
3.7	3	32.1	2.892	11.1
3.7	4	40.8	2.757	14.8
3.7	5	48.9	2.643	18.5
3.7	5.99	55.4	2.500	22.163

4. Maintenance and troubleshooting

4.1 Maintenance

- After every flight, check that the motor bell turns freely, without rubbing and without play.
- Dirt, grass and metal particles attracted by the magnets impair the running of the motor. Remove them carefully with compressed air or a soft brush.
- After a crash, check whether the shaft is bent. A motor with a bent shaft causes vibrations and must be replaced.
- Check the wire and the connector – damaged insulation or a loose contact cause motor dropouts.
- Do not lubricate or disassemble the motor.

4.2 Troubleshooting

Problem	Possible cause and solution
The motor does not spin or stutters	The connector is not fully inserted or the wire is damaged. Check the connector and the wire; if necessary, plug the motor into another connector to verify.
The motor spins in the wrong direction	Change the direction of rotation in the ESC settings (Chapter 2.4).
The motor gets excessively hot	Bent shaft, dirt in the motor, damaged propeller or a propeller that is too large. Remove the cause and let the motor cool down.
Vibrations, blurry video	Bent shaft, damaged or crookedly fitted propeller, loose motor screws.
The motor cannot be screwed on	Check that the frame matches the 3× M1.4 mounting on a Φ 6.6 mm bolt circle (Chapter 1.2).

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@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.com

5.2 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.

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.