M1 0803 19000KV

Sub250 M1 0803 19000KV – brushless motor for 1S micro drones
Installation and user manual



Disconnect the battery and remove the propellers before any work on the motors. The motors get hot during operation – do not touch them after a flight until they have cooled down.

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1. Safety instructions

1.1 Before you start

The motor is a spare part intended for installation in an FPV drone. Installation requires basic experience with building and setting up drones. Read the entire manual before installation and keep it for future reference.

- The product is not a toy and is not intended for children under 14. Keep screws and small parts out of the reach of children.
- Use the motor only in the setup it is intended for (chapter 2.1), within the specifications (chapter 2.3) and without any modifications.

1.2 Rotating parts

- The motor reaches very high speeds. Rotating propellers and the motor bell can cause injury.
- Carry out all tests, settings and work on the drone without propellers fitted and with the battery disconnected, unless the procedure explicitly requires otherwise.
- With the battery connected, keep fingers, hair and loose clothing away from the propellers.
- After a crash, do not load the motor until you have checked that it rotates freely and the shaft is not bent.

1.3 Electrical safety and heat

- The rated voltage of the motor is **4.2 V (1S)**; the manufacturer specifies it **for 1S only**. Do not connect it to an electronic speed controller (ESC) powered by a higher voltage.
- The motor gets hot during operation. Do not touch it after a flight until it has cooled down.
- Switch off a blocked motor (propeller caught in grass or branches, jammed bell) immediately – Disarm (motors off). The current of a blocked motor can destroy the motor and the electronic speed controller (ESC) or cause a fire.
- Make sure the wire insulation is intact; the wires must not rub against the frame or the rotating motor bell.

1.4 Li-Po batteries

- A drone with this motor is powered by a 1S battery. Charge Li-Po batteries only with a suitable charger, under supervision and on a non-flammable surface. A fully charged Li-Po cell has a voltage of 4.20 V (1S = 4.20 V).
- End the flight at the latest when the voltage drops to 3.5 V/cell (1S = 3.5 V). For storage, set the voltage to 3.8 V/cell (1S = 3.8 V).
- Do not continue to use a damaged, swollen or overheated battery.

2. Product description

2.1 Intended use and features

The Sub250 M1 0803 19000KV is an 0803-size brushless motor for single-cell (1S) FPV micro drones with 1.4–1.6 inch propellers. The manufacturer developed it mainly for toothpick drones with 1.6" (40 mm) propellers, such as its Nanofly16 drone.

- Small size and low weight – 2.2 g.
- Strong N52H magnets and a high-temperature resistant winding.
- According to the manufacturer, low losses, low heat generation and high efficiency.
- 1.5 mm diameter shaft.
- 30 mm wires terminated with a connector for solder-free connection to the electronic speed controller (ESC) (Rotorama data).

2.2 Package contents

- 1× Sub250 M1 0803 19000KV brushless motor
- 4× M1.4 × 3 mm screw

Propellers, frame, flight controller (FC) with electronic speed controllers (ESC) and battery are **not included**.

2.3 Specifications

Parameter	Value
KV	19000KV
Configuration	9N12P
Rated voltage	4.2 V (1S)
Li-Po cell count	1S only
Stator diameter	8.4 mm
Stator height	2.8 mm
Shaft diameter	1.5 mm
Motor dimensions (diameter × length)	Ø 12 × 14 mm
Weight	2.2 g
Magnets	N52H
Wire length	30 mm (Rotorama data)
Suitable propellers	1.4–1.6"
Recommended battery	1S Li-Po 380–530 mAh

The manufacturer does not publish the mounting hole spacing, connector type, maximum current and power or thrust data.

2.4 Motor views



Motor viewed from above (left) and the underside with the mounting base (right). Manufacturer's illustrative rendering.

3. Legal conditions of operation

3.1 The law of the country where you fly applies

The motor itself is not an aircraft, but it is part of a drone. 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, mandatory insurance, permitted frequency bands and maximum transmitting power. The information in this chapter describes the situation in the Czech Republic. If you operate a drone in another country, you must follow the regulations of the country in which you fly.

3.2 Motors as part of a drone

- Drone operation is governed by Regulation (EU) 2019/947. A drone equipped with a camera requires operator registration regardless of its weight; the registration number is displayed on the drone.
- In the open category, fly no higher than 120 m above ground, within visual line of sight (VLOS) and never over assemblies of people. When flying with FPV goggles, an unmanned aircraft observer must be present next to the pilot.
- Replacing the motors with motors other than those with which the drone was placed on the market may call into question the conformity of a drone bearing a class identification label (C0–C4) with that class. In case of doubt, contact the drone manufacturer.
- The operator and the pilot of the drone are responsible for compliance with the regulations during operation. We recommend taking out liability insurance.

4. Installation

4.1 What else you need

- a frame for 0803-size motors with M1.4 screw mounting (check that the hole spacing in the frame matches the motor base),
- a flight controller (FC) with 1S electronic speed controllers (ESC) and motor connectors matching the motor connector (chapter 4.3),
- 1.4–1.6" propellers with a hole for a 1.5 mm shaft,
- a 1S Li-Po battery (the manufacturer recommends 380–530 mAh), a screwdriver for M1.4 screws and a computer with Betaflight Configurator.

4.2 Mounting the motor on the frame

① Disconnect the battery and remove the propellers.

② Place the motor on the frame arm so that the holes in the motor base line up with the holes in the frame and the wire points towards the flight controller.

③ Screw the motor on with the M1.4 × 3 mm screws from the package. Tighten the screws gradually and gently – the thread in the motor base is small and strips easily.

④ After tightening, check that the motor bell rotates freely and does not rub anywhere.

※ Use only the screws from the package or screws of the same length. A longer screw can penetrate the stator winding, damage the insulation and cause a short circuit.

4.3 Connecting to the flight controller

- The motor wires are terminated with a connector. The manufacturer does not state the connector type – before installation, check that it matches the motor connectors on your flight controller (FC).
- Plug the connector into the corresponding motor socket on the flight controller. Do not force it.
- When disconnecting, pull the connector body, never the wires.
- If the flight controller does not have a matching socket, the wires can be soldered to the motor pads. Soldering requires experience; make sure the pads are not bridged with solder and the wires are not overheated.
- Route the wires so that they cannot get into the propeller or the rotating motor bell, and secure them against movement.

5. Setup

5.1 Motor test without propellers

① Leave the propellers removed. Connect the drone to the computer and start Betaflight Configurator.

② Connect the battery (the *Motors* tab requires the speed controllers to be powered).

③ On the *Motors* tab, confirm the safety notice and use the individual sliders to briefly spin each motor at low speed.

④ Check that the correct motor spins according to the diagram in the program and that it runs smoothly without unusual noises.

5.2 Direction of rotation

The direction of rotation is set in software – in the electronic speed controller (ESC) configuration or with the reversed motor direction option in Betaflight Configurator (*Motors* tab). For a motor soldered directly to the pads, the direction can also be changed by swapping any two wires. Compare the direction of each motor with the diagram of the selected motor layout in the program.

5.3 Mounting the propellers

- Fit the propellers only after a successful motor test and with the battery disconnected.
- Use 1.4–1.6" propellers with a hole for a **1.5 mm** shaft. Make sure each motor gets a propeller with the correct direction of rotation according to the motor layout diagram.
- Push the propeller onto the shaft straight and evenly; support the shaft so that it does not bend. The propeller must sit firmly on the shaft.

6. Operation

6.1 Pre-flight check

- Before the flight, insert a fully charged 1S battery (4.20 V/cell, 1S = 4.20 V).
- All motors are firmly screwed on, the bells rotate freely and the shafts are not bent.
- The propellers are undamaged, correctly oriented and firmly fitted.
- The wires and connectors are intact, plugged in and out of reach of the propellers.
- After Arm (motors on), all motors run smoothly; after Disarm, they stop.

6.2 Motor temperature and ending the flight

- After the first flights, check the temperature of the motors (carefully, they may be hot). A noticeably different temperature of one motor indicates a mechanical fault, a damaged propeller or a setup error.
- End the flight at the latest when the battery voltage drops to 3.5 V/cell (1S = 3.5 V).
- After a crash, Disarm immediately so that the motors do not try to spin blocked propellers.

7. Maintenance and troubleshooting

7.1 After every flight

- Remove grass, hair, dust and dirt from the motors and propellers – especially hair and fibres wound around the shaft.
- Check that the mounting screws are tight and that the wires and connectors are in good condition.
- Turn each motor by hand: it must rotate freely, without rubbing and without excessive play.

7.2 Motor replacement

- Replace a motor with a bent shaft, damaged bell, damaged winding insulation, or with noticeable play or rubbing.
- When replacing, disconnect the battery, unplug the motor connector from the flight controller (or unsolder the wires), loosen the mounting screws and install the new motor according to chapter 4.
- After replacement, always carry out a motor test and a check of the direction of rotation (chapter 5).

7.3 Storage

Store the motors in a dry, clean place, in the original box or otherwise protected against impact and dust. Protect them from moisture, metal filings and small metal objects that could stick to the magnets.

7.4 Troubleshooting

Problem	Possible cause and solution
Motor does not spin	Connector not plugged in or damaged – check the connection. Damaged wire or winding – replace the motor.
Motor spins in the wrong direction	Change the direction of rotation in the ESC configuration or in Betaflight Configurator (chapter 5.2).
Motor rubs, is noisy or vibrates	Dirt or hair at the shaft – clean it. Bent shaft or damaged bell – replace the motor. Replace a damaged propeller.
Motor overheats	Trapped dirt, damaged or unsuitable propeller, setup error. Check the propellers and the motor; use 1.4–1.6" propellers.
Motor stutters or does not start	Loose connector or damaged wire – check. If the fault persists, check the ESC settings.

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:** type Sub250 M1 0803 19000KV; the manufacturer (Sub250), size (0803) and KV (19000kv) are marked on the motor bell.

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

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.