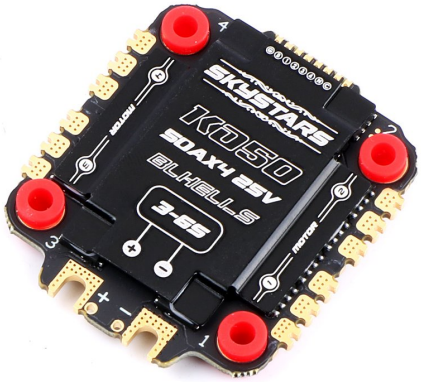
KO50A BLS

4-in-1 electronic speed controller (ESC) · 50 A · 3–6S
Skystars · BLHeli_S firmware · 30.5 × 30.5 mm



Read the whole manual before installation, especially the safety instructions in Chapter 1. Always remove the propellers when soldering and testing on the bench.

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1. Safety instructions

1.1 Before you start

The Skystars KO50A BLS is a four-channel electronic speed controller (ESC) for FPV drones and other multirotors. It works only together with a flight controller (FC), brushless motors and a battery. Installation requires soldering and basic knowledge of electronics.

- The product is not a toy and is not intended for children. Keep it out of the reach of children.
- Solder only on a non-flammable surface in a well-ventilated room. The battery must always be disconnected while soldering.
- Before connecting the battery for the first time, check the board for short circuits (solder bridges, wire clippings) and correct power polarity.
- Do not modify the ESC and do not use it if it is damaged, cracked or has burnt components.
- The ESC heats up during operation. Do not touch it or the motors after a flight until they have cooled down.

1.2 Rotating propellers

The ESC can spin up the motors whenever a battery is connected – e.g. due to wrong settings, during a motor test or after an accidental Arm (motors enabled). Rotating propellers can cause serious injury.

- **Always remove the propellers** when soldering, configuring on the computer and testing the motors.
- Mount the propellers only after you have verified the motor order and direction of rotation (Chapter 4.3).
- Connect and disconnect the battery only while disarmed (Disarm – motors disabled) and with nobody within reach of the propellers.

1.3 Batteries and power supply

The ESC is designed to be powered from a Li-Po battery with 3 to 6 cells (3–6S). The maximum voltage printed on the ESC cover is **25 V**.

- A fully charged Li-Po cell has 4.20 V; a fully charged 6S Li-Po battery has 25.2 V.
- LiHV batteries are charged to 4.35 V/cell. A fully charged **6S LiHV (26.1 V) exceeds the voltage printed on the cover** – with 6S, use only Li-Po batteries (4.20 V/cell).
- End the flight at the latest when the voltage drops to 3.5 V/cell (e.g. 21.0 V for 6S, 14.0 V for 4S). Store batteries at 3.8 V/cell.
- Never connect the battery with reversed polarity – this destroys the ESC. Do not use a swollen battery.

2. Product description

2.1 Package contents

- 1× Skystars KO50A BLS speed controller (4-in-1) with silicone dampers in the mounting holes
- 1× accessory set

According to the available documentation, the accessory set contains a low-ESR capacitor (35 V), a cable to the flight controller and rubber dampers for M3 screws. The exact contents may vary depending on the production batch.

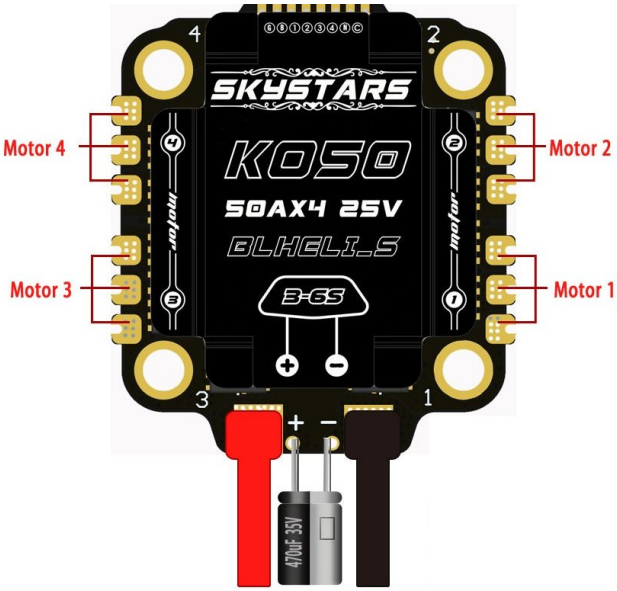
Not included: flight controller (FC), motors, propellers, battery or frame mounting screws.

2.2 Specifications

Parameter	Value
Designation	Skystars KO50A BLS (KO50 on the cover)
Type	4-in-1 speed controller for brushless motors
Input voltage	3–6S Li-Po (max. 25 V printed on the cover)
Continuous current	50 A per channel (50A×4 on the cover)
MCU	BB21, 48 MHz
Firmware	BLHeli_S, target Q-H-50
Supported protocols	DShot150, DShot300, DShot600, MultiShot, OneShot
Current sensor	yes
BEC (voltage regulator)	no
Board dimensions	41 × 46 mm
Mounting pattern	30.5 × 30.5 mm, ø 3 mm holes (M3)
Weight	13.3 g
FC connector	8-pin: CURN, NC, S4, S3, S2, S1, BAT, GND

※ The manufacturer does not specify a burst (short-term) current. Choose motors and propellers so that the continuous current of any channel does not exceed 50 A.

2.3 Board layout



Layout of the motor and power solder pads (based on Skystars documentation).

Motor 1–4 – three solder pads for each motor. The numbers 1–4 are also printed in the corners of the board and correspond to the default Betaflight motor order (Quad X).

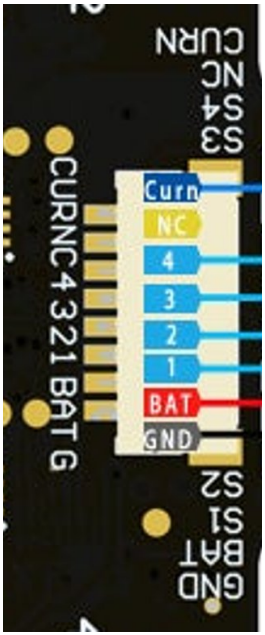
+ / − – battery power solder pads (plus and minus), on the edge of the board between motors 3 and 1.

8-pin connector – connection to the flight controller, on the opposite edge of the board between motors 4 and 2 (Chapter 2.4).

Mounting holes – 30.5 × 30.5 mm pattern with silicone dampers for M3 screws.

2.4 Connector to the flight controller

The ESC is connected to the flight controller with an 8-wire cable. Pin functions according to the board silkscreen:



8-pin connector on the underside of the ESC (manufacturer's documentation).

Pin	Function
CURN	current sensor output (to the CURR / CURT input of the flight controller)
NC	not connected
S4	motor 4 signal
S3	motor 3 signal
S2	motor 2 signal
S1	motor 1 signal
BAT	battery voltage for the flight controller (power supply and voltage measurement)
GND	ground

The BAT pin carries the full battery voltage. The ESC has no BEC of its own – low voltages (5 V, 10 V) must be generated by the flight controller.

3. Installation and wiring

3.1 What else you need

- a frame for the 30.5 × 30.5 mm mounting pattern and a flight controller (FC) with the same pattern,
- four brushless motors and propellers suitable for 50 A per channel and 3–6S voltage,
- power cables of adequate cross-section and a battery connector (e.g. XT60),
- a fine-tip soldering iron, solder with flux, M3 screws and a computer with Betaflight Configurator.

3.2 Mechanical installation

- Mount the ESC in the frame on the silicone dampers so that vibrations are not transferred to it and the board does not bend.
- Tighten the screws only gently – overtightening compresses the dampers and the board loses its isolation.
- Leave a gap between the ESC and the flight controller; neither the board nor the cover may touch the carbon frame or other parts. Carbon fibre is electrically conductive.
- The ESC needs airflow for cooling. Do not cover it with foam or tape.

3.3 Power leads and capacitor

Solder the power cables to the **+** (red) and **−** (black) pads. The joint must be shiny, fully wetted and without solder spikes towards the neighbouring pads.

① Solder the **supplied low-ESR capacitor** to the power pads (or as close to them as possible). Observe the polarity: the stripe on the capacitor body marks the negative lead (−).

② The capacitor suppresses voltage spikes generated by switching the motors. Without it, the ESC and the electronics powered from the BAT pin may be damaged and the video may be disturbed.

③ Secure the capacitor (with a cable tie or heat-shrink tubing) so that vibrations do not break its leads.

④ Solder the battery connector to the other end of the power cables and check the polarity again.

The manufacturer expressly warns: use the supplied low-ESR capacitor (PLEASE USE LOW ESR CAPACITOR SUPPLIED!).

3.4 Connecting the motors

Solder the three wires of each motor to the three pads of the corresponding channel as shown in the figure in Chapter 2.3. The order of the three wires does not affect the function – it only determines the direction of rotation, which can later be changed in software (Chapter 4.3).

- Cut the motor wires to the required length, but leave some slack for the movement of the dampers.
- Make sure the solder joints of neighbouring pads do not touch and the wires do not run over sharp edges of the frame.

3.5 Connecting the flight controller (FC)

Plug the 8-pin cable into the ESC connector and into the ESC connector on the flight controller. The pin order on flight controllers from different manufacturers may differ.

- Before connecting, compare the ESC pinout (Chapter 2.4) with the pinout of your flight controller. In particular, the **BAT** and **GND** pins must lead to the identically labelled FC pins.
- If the order differs, rearrange the wires in the connector or use a cable with the matching pinout. Wrong wiring of the BAT pin can destroy the flight controller.
- If the flight controller has no 8-pin connector, the wires can be soldered directly to its M1–M4, CURR, VBAT and GND pads.

3.6 First power-up

① Remove the propellers. Use a multimeter to verify that there is no short circuit between the + and − power leads.

② If you have a current limiter (smoke stopper), use it for the first power-up.

③ Connect the battery. The motors beep after connection – the ESC has initialised.

④ If you smell burning, see smoke or a component heats up quickly, disconnect the battery immediately.

4. Betaflight setup

The following settings are made in Betaflight Configurator connected to the flight controller. Keep the propellers removed during all steps.

4.1 ESC protocol

On the *Configuration* tab, in the *ESC/Motor Features* section, select the **DSHOT600** or **DSHOT300** protocol. Leave *Bidirectional DShot* **disabled** – the BLHeli_S firmware as shipped does not support bidirectional DShot (RPM telemetry for the RPM filter) and the motors might not spin up correctly. Save the settings with *Save and Reboot*.

4.2 Current sensor

On the *Power & Battery* tab, set the *Current Meter Source* in the *Battery* section to *Onboard ADC* and enter the manufacturer's values in the *Amperage Meter* section:

Item	Value
Scale [1/10th mV/A]	290
Offset [mA]	0

※ The current sensor outputs its value on the CURN pin. For more accurate measurement, compare the consumption reported in the OSD after a flight with the amount of charge put back by the charger and adjust the *Scale* value if necessary.

4.3 Motor order and direction

① Remove the propellers and connect the battery.

② On the *Motors* tab, confirm the warning and spin up motors 1–4 one by one with the individual sliders. Check that the motor that spins matches the diagram on the screen.

③ If a different motor spins, correct the assignment (in Betaflight with the *Motor direction / Reorder motors* function or with the *resource* command in the CLI) or check the wire order in the cable.

④ Check the direction of rotation. Reverse a motor that spins the wrong way in the ESC configurator (Chapter 5.2) with the *Motor Direction* option, or swap any two wires of that motor.

⑤ Only then mount the propellers according to the selected direction of rotation (default or *Motor direction is reversed*).

5. ESC firmware

5.1 BLHeli_S firmware

The ESC is supplied with **BLHeli_S** firmware, target **Q-H-50**. The factory firmware version may differ between production batches. The ESC is fully functional without any update.

Flashing a different firmware (for example Bluejay) is done at your own risk. Always choose firmware that exactly matches the MCU and target of the ESC. Unsuitable firmware can damage the ESC or the motors, and such damage is not a product defect.

5.2 ESC configuration

ESC parameters (direction of rotation, beep volume, timing and others) are changed through the flight controller in passthrough mode, without disconnecting the ESC:

① Remove the propellers, connect the flight controller to the computer with a USB cable and **connect the battery** – without battery power the ESC does not communicate.

② Open the web configurator esc-configurator.com (in Chrome or Edge) or the BLHeliSuite program.

③ Connect to the serial port of the flight controller and read the settings (*Read Setup*).

④ Change the required parameters and save them (*Write Setup*). After saving, disconnect both the battery and the USB.

※ Do not disconnect the power during configuration – an interrupted write can leave the ESC in a non-functional state.

6. Operation

6.1 Pre-flight check

- Insert a fully charged battery (Li-Po 4.20 V/cell).
- Check that the ESC, the capacitor, the power cables and the battery connector are firmly secured.
- Check the motor and power solder joints – they must not be cracked, blackened or loose.
- Check that neither the ESC cover nor the wires touch the carbon frame or the propellers.
- Verify that the OSD shows the battery voltage and current in the expected range.

6.2 During and after the flight

- Watch the voltage in the OSD and end the flight at the latest at 3.5 V/cell.
- After the flight, check the temperature of the ESC and the motors by touch. If the ESC is excessively hot after a normal flight, check the choice of motors and propellers and the cooling.
- After a crash or a fall, check the board, the capacitor and the solder joints before connecting the battery.
- Disconnect the battery after the flight; do not leave the ESC permanently connected to the battery.

6.3 Drone operation and regulations

The ESC is a component of an unmanned aircraft. The operation of unmanned aircraft is governed by Regulations (EU) 2019/947 and 2019/945, which apply in all EU member states; however, national implementing rules differ from country to country (operator registration, pilot competency, geographical zones, insurance). **The law of the country in which you operate the drone always applies.** In the Czech Republic, information is provided by the Civil Aviation Authority (www.caa.gov.cz).

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Keep the ESC dry and clean. Remove dust and dirt with a dry brush or compressed air.
- After flying in damp conditions, let the drone dry completely before connecting the battery again. Moisture and conductive dirt (grass, mud) can cause a short circuit.
- Check the capacitor during every major repair. Replace a swollen or damaged capacitor immediately with a low-ESR type rated for at least 35 V.
- Store in a dry place at room temperature, away from direct sunlight and disconnected from the battery.

7.2 Troubleshooting

Problem	Possible cause and solution
Motors do not beep after connecting the battery	No power – check the connector, the power joints and the polarity. If you smell burning or see smoke, disconnect the battery immediately.
Motors beep but do not spin or stutter after Arm	Wrong ESC protocol, or *Bidirectional DShot* is enabled – see Chapter 4.1. Check the S1–S4 signal wires.
A different motor spins than expected	Wrong signal order – correct the motor assignment or the cable wiring (Chapter 4.3).
A motor spins in the wrong direction	Change the direction in the ESC configurator or swap two motor wires (Chapter 4.3).
One motor stutters or does not start	Cold or cracked solder joint on the motor pads, damaged wire or faulty motor.
OSD shows no current or a nonsensical value	Check the CURN wire, the *Onboard ADC* source and the values Scale 290 / Offset 0 (Chapter 4.2).
The configurator does not find the ESC	Connect the battery (passthrough does not work without it), check the signal wires and close other programs using the serial port.
Video interference or unstable FC	Missing or damaged capacitor – see Chapter 3.3.

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 (KO50) is printed on the aluminium cover of the ESC; the trade name of the product is Skystars KO50A BLS.

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.