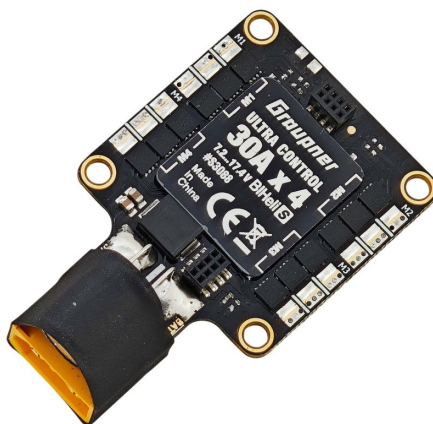




ULTRA CONTROL 4in1 30A

Graupner · electronic speed controller (ESC) 4in1 · 2-4S
· BLHeli_S

User manual and wiring diagram



Read the entire manual before installation, especially chapters 1 and 3. Always remove the propellers when soldering, configuring and testing the motors.

This manual is issued by the importer Rotorama, s.r.o. · www.rotorama.cz

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1. Safety instructions

1.1 Before you start

The Graupner Ultra Control 4in1 30A is an electronic speed controller (ESC) with four channels on a single board. It is a **component intended for installation in an FPV drone** (multicopter); it cannot be operated on its own. Installation requires experience in soldering electronics and building FPV drones.

- The product is intended for persons aged 14 and over.
- Before installation, read this entire manual and the manual of the flight controller (FC) you are connecting the ESC to.
- Operate a drone fitted with this ESC only in accordance with the regulations of the country in which you fly. The law of the country in which the product is operated always prevails.
- Do not modify the ESC in any way other than soldering wires to the pads intended for this purpose.

1.2 Electrical safety and soldering

- **Always solder with the battery disconnected.**
- Reverse polarity or a short circuit on the battery lead can destroy the ESC instantly and cause a battery fire. Before connecting for the first time, check the polarity and for short circuits with a multimeter.
- The pads on the bottom side are close together. After soldering, check that no solder bridge has formed between adjacent pads.
- Connect the battery for the first time through a current-limiting protector (smoke stopper).
- The ESC heats up during operation. Do not touch it immediately after a flight and do not cover it with material that prevents cooling.

1.3 Rotating propellers

- When soldering, configuring on a computer and testing the motors, **always remove the propellers.**
- Once a battery is connected, the motors may start spinning at any time — for example after a configuration error or a loss of signal. Keep clear of the propellers.

1.4 Li-Po and LiHV batteries

The ESC is designed for **2S to 4S** batteries. Never connect a battery with a higher cell count. The following values apply when handling batteries:

State	2S	3S	4S
Fully charged Li-Po (4.20 V/cell)	8.4 V	12.6 V	16.8 V
Fully charged LiHV (4.35 V/cell)	8.7 V	13.05 V	17.4 V
End the flight (3.5 V/cell)	7.0 V	10.5 V	14.0 V
Storage (3.8 V/cell)	7.6 V	11.4 V	15.2 V

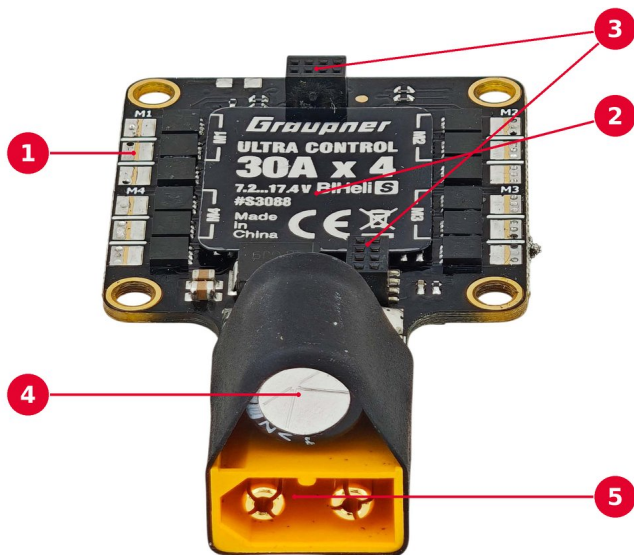
- Charge batteries only under supervision, on a non-flammable surface and with a charger intended for the cell type.
- Do not use a damaged, swollen or overheated battery.

2. Product description

2.1 Package contents

- 1× Graupner Ultra Control 4in1 30A ESC with battery lead terminated by an XT60 connector

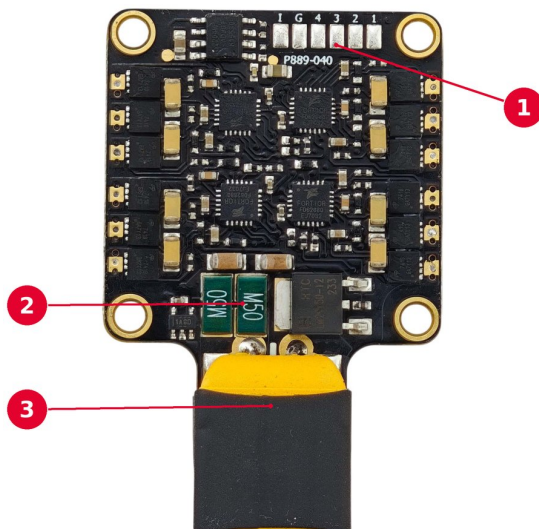
2.2 Top side



Top side of the ESC

- ① Pads for connecting motors M1-M4 — three pads per motor; the M1-M4 marking is printed next to the pads.
- ② Label with the type designation (S3088), voltage range and CE and WEEE marks.
- ③ Two 8-pin sockets (see chapter 3.5).
- ④ Capacitor on the battery lead (under the heat-shrink tubing).
- ⑤ XT60 connector for connecting the battery.

2.3 Bottom side



Bottom side of the ESC

- ① Pads for connecting the flight controller: **1, G, 4, 3, 2, 1** (wiring see chapter 3).
- ② Current sensor shunt resistors.
- ③ Battery lead with XT60 connector.

2.4 Specifications

Manufacturer's code	S3088
Number of channels	4 (4in1)
Input voltage	2-4S Li-Po (7.4-14.8 V nominal); on the label: 7.2...17.4 V
Continuous current	4× 30 A
Processor (MCU)	Silabs 50 MHz
Firmware	BLHeli_S
Input protocol	PWM (PPM), OneShot, Multishot, DShot
Current sensor	yes
Protection diode	yes (TVS diode)
BEC	no
MOSFETs	DFN 3.3×3.3 mm
PWM frequency	24 kHz
Power connector	XT60
Motor connection	solder pads
Mounting holes	30.5×30.5 mm
Dimensions	35×35×8 mm

3. Wiring diagram

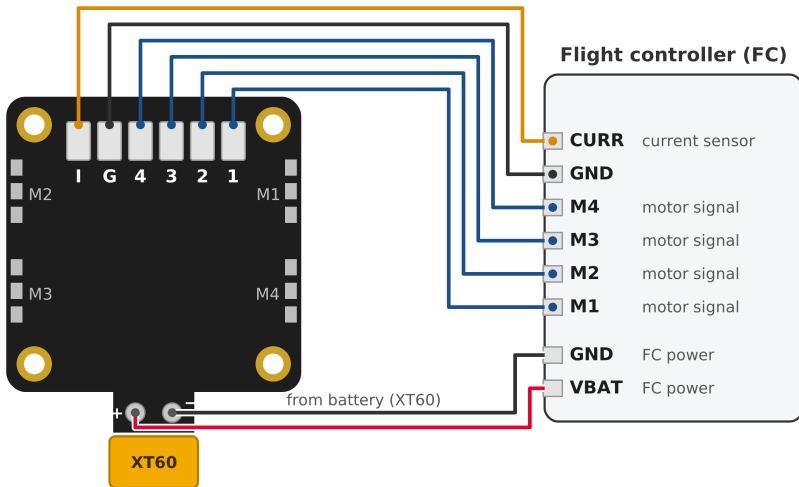
3.1 Pads on the bottom side

The ESC has no connector for a cable to the flight controller. The flight controller (FC) is connected with wires soldered to six pads on the bottom side of the board. The pad markings are printed directly on the board.

Pad	Function	Connect to on the flight controller (FC)
I	current sensor output	current sensor input (CURR)
G	ground (GND)	GND
1	signal for motor M1	motor output M1
2	signal for motor M2	motor output M2
3	signal for motor M3	motor output M3
4	signal for motor M4	motor output M4

※ Pad numbers 1–4 correspond to the M1–M4 markings of the motor pads on the top side of the ESC.

3.2 Wiring diagram



Bottom view (pad side)

Viewed from below, + is on the left and – on the right. Verify with a multimeter.

Wiring of the ESC and flight controller — the ESC is shown from below

In the diagram the ESC is shown from below, i.e. from the pad side. The motor outputs are therefore mirrored compared with the top view: M1 is at the top right, next to pad 1.

3.3 Powering the flight controller

The ESC **has no BEC** and no pad for powering the flight controller. Connect the flight controller power (VBAT and GND) to the battery lead at the XT60 connector, as shown in the diagram.

- Check that the flight controller can handle the direct voltage of the battery you use (2S–4S).
- Viewed from below (pad side), the positive pole **+** **is on the left** and the negative pole **–** **on the right**. Before connecting for the first time, verify the polarity with a multimeter.
- Always connect pad **G** — it is the common ground for the motor signals and the current sensor.

3.4 Connecting the motors

- Each motor has three pads on the ESC. Solder the three motor wires to the three pads of the corresponding output (M1–M4).
- The order of the three wires does not affect function, only the direction of rotation. You can change the direction by swapping any two wires or in the ESC settings (chapter 5.3).
- Shorten the motor wires to the required length.

3.5 8-pin sockets on the top side

There are two 8-pin sockets on the top side of the ESC. The manufacturer does not specify their pinout in the available documentation. This manual describes only connecting the flight controller via the pads on the bottom side (chapter 3.1). Do not connect any device to the sockets unless its compatibility has been explicitly confirmed by the manufacturer.

3.6 Electromagnetic compatibility (EMC) guidelines

The ESC switches high currents and is a source of electromagnetic interference. To ensure that the assembled drone does not affect surrounding equipment or its own receiver and video transmitter, follow these guidelines during installation:

- Do not remove the capacitor on the battery lead (④ in chapter 2.2).
- Do not extend the battery lead. Route the power wires along the shortest possible path.
- Route the signal wires (I, G, 1–4) separately from the motor wires and the battery lead, ideally together with the G ground wire.
- Place the receiver, video transmitter and their antennas as far as possible from the ESC and the power wires.
- After assembly, check that the video and the RC link range do not deteriorate with the motors spinning.

4. Installation

4.1 What else you need

- temperature-controlled soldering iron, solder and flux
- multimeter and current-limiting protector (smoke stopper)
- silicone wires for the signals and the flight controller power
- screws and damping or spacer elements matching the mounting holes in the frame
- a flight controller with 30.5×30.5 mm mounting pattern, four brushless motors and a 2S–4S battery

4.2 Installation procedure

- ① Disconnect the battery. Inspect the ESC for mechanical damage.
- ② Solder the motor wires to pads M1–M4 (chapter 3.4).
- ③ Solder the signal wires to pads I, G, 1, 2, 3 and 4 on the bottom side and solder the other ends to the flight controller according to the table in chapter 3.1.
- ④ Connect the flight controller power to the battery lead (chapter 3.3).
- ⑤ Check that there are no solder bridges between adjacent pads.
- ⑥ Use a multimeter to verify that there is no short circuit between the + and – contacts of the XT60 connector.
- ⑦ Mount the ESC in the frame. The wires must not be under tension and must not touch the propellers or sharp edges.
- ⑧ Without propellers, connect the battery through a smoke stopper and continue with the setup (chapter 5).

Incorrect wiring of the signals or power may damage both the ESC and the flight controller. Such damage is not a product defect.

5. Setup

5.1 Protocol in Betaflight

Setup is carried out in the flight controller configurator (e.g. Betaflight). The ESC recognises the PWM (PPM), OneShot, Multishot and DShot protocols.

- On the *Configuration* tab, select one of the DShot protocols in the *ESC/Motor Protocol* field.
- The BLHeli_S firmware does not support bidirectional DShot (RPM telemetry). Leave the *Bidirectional DShot* option disabled.
- The PWM, OneShot and Multishot protocols require throttle range calibration; with DShot it is not performed.

5.2 Checking the motor order

- On the *Motors* tab, confirm that the propellers are removed and spin up the motors one by one.
- The motor that spins must always match the position in the motor order diagram in the configurator.
- If the order does not match, swap the signal wires or remap the order in the configurator.

5.3 Direction of rotation and ESC settings

- You can change the BLHeli_S firmware settings (direction of rotation and other parameters) through the flight controller in a BLHeli_S-compatible program, e.g. BLHeliSuite or ESC-Configurator.
- The direction of rotation must match the diagram in the configurator. Alternatively, swap two motor wires.

5.4 Current sensor

- On the *Power & Battery* tab, set *Current Meter Source* to *Onboard ADC*.
- The manufacturer does not specify the sensor scale. Set it by calibration: fly a battery down, recharge it and compare the capacity put back by the charger with the capacity recorded by the flight controller.
- New scale = old scale × (capacity according to FC ÷ capacity according to charger). Repeat the procedure until the values match.

6. Operation

6.1 First power-up

- Connect the battery for the first time without propellers and through a smoke stopper.
- After the battery is connected, the ESC sounds a tone through the motors. If it does not, disconnect the battery immediately and check the wiring.
- Check the order and direction of rotation of the motors (chapter 5).

6.2 Before each flight

- Insert a **fully charged** battery within the 2S–4S range.
- Check that the wires are not damaged or loose and that the ESC is firmly held in the frame.
- Check the battery connection and the condition of the XT60 connector.

6.3 After the flight

- End the flight at the latest at a voltage of 3.5 V per cell (values see chapter 1.4).
- After landing, first Disarm (switch off the motors) and then disconnect the battery.
- Check the temperature of the ESC. If it is very hot, reduce the load (propellers, motors, flying style).

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Keep the ESC clean and dry. Remove dirt with a dry brush.
- After a crash, check the board, solder joints and wires. Do not use a damaged ESC.
- Store in a dry place, out of the reach of children, at room temperature.

7.2 Troubleshooting

Problem	Possible cause and solution
Nothing happens after the battery is connected	Check the battery, the XT60 connector and the flight controller power (chapter 3.3).
No motor responds	Check the G ground wire and the protocol on the <i>Configuration</i> tab (chapter 5.1).
One motor does not respond	Check the signal wire of that output (1-4) and the motor solder joints.
Motors spin up in the wrong order	Swap the signal wires or remap the motors in the configurator (chapter 5.2).
A motor spins in the wrong direction	Swap two motor wires or change the direction in the BLHeli_S settings (chapter 5.3).
The flight controller shows no current or the values are nonsensical	Check the wire from pad I, the <i>Onboard ADC</i> source and the scale calibration (chapter 5.4).
Video interference or reduced RC link range	Follow the EMC guidelines (chapter 3.6), especially wire routing and antenna placement.
The ESC overheats	Reduce the load: smaller propellers, weaker motors, lower cell count. Ensure airflow.

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@rotorاما.cz
Phone	+420 252 252 098
Website	www.rotorاما.cz

8.2 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 (S3088) is given on the label on the top side of the controller.

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.