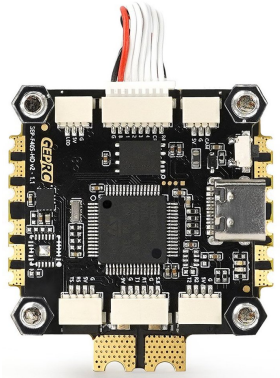
TAKER F405 BLS 50A

Flight controller (FC) and electronic speed controller (ESC) stack
User manual



Read the entire manual before assembly and before connecting a battery for the first time, especially Chapter 1 Safety instructions.

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1. Safety instructions

1.1 Before you start

The GEPRC TAKER F405 BLS 50A Stack is a component for building FPV drones. Assembly, soldering and configuration require experience with electronics and with Betaflight Configurator. The product is not a toy and must be kept away from children.

- Read the entire manual before assembly and keep it for future reference.
- Incorrect wiring may destroy the flight controller, the electronic speed controller and the connected devices. Damage caused by incorrect wiring is not covered by the rights arising from defective performance.
- The person who has built and operates the finished drone is responsible for its safe operation and for compliance with the regulations.
- Drone operation in the EU is governed by Regulations (EU) 2019/947 and 2019/945, but national implementing rules differ from country to country. **The law of the country in which the product is operated always prevails.**

1.2 Electrical safety and soldering

- Always solder and change the wiring **with the battery disconnected** and the USB cable unplugged.
- After soldering, use a multimeter to check that there is no short circuit between the positive and negative power terminals (BAT and GND).
- Observe the power polarity: red wire to positive (+), black wire to negative (−). Reverse polarity will destroy the ESC.
- The supply voltage must not exceed the range specified by the manufacturer: **3–6S LiPo**.
- When connecting a battery for the first time, we recommend using a short-circuit protection device (smoke stopper).
- The boards must not come into contact with a carbon frame or other conductive parts — carbon fibre is electrically conductive. Use the supplied silicone grommets and nylon nuts.
- Solder joints quickly and cleanly; overheating may damage the circuit board or components.

1.3 Propellers and motors

- During configuration, motor tests and firmware updates, **always remove the propellers**.
- Spinning propellers can cause serious injury. Fit the propellers only just before flight and only after you have verified the direction of rotation and the correct motor assignment.

1.4 LiPo batteries

The battery is not included. Use only LiPo batteries with 3S to 6S cells. The following battery voltages apply:

State	3S	4S	5S	6S
Fully charged (4.20 V/cell)	12.6 V	16.8 V	21.0 V	25.2 V
End flight (3.5 V/cell)	10.5 V	14.0 V	17.5 V	21.0 V
Storage (3.8 V/cell)	11.4 V	15.2 V	19.0 V	22.8 V

- Always insert a **fully charged** battery before flight.
- Charge batteries under supervision, on a non-flammable surface and with a charger designed for LiPo.
- Do not use a battery that is mechanically damaged, swollen or overheated.
- Always disconnect the battery after flight; a connected battery discharges even when idle.

1.5 Operating environment

- Protect the electronics from moisture, dust, metal chips and dirt.
- The ESC is cooled by airflow during flight. Running the motors under load on the ground for a long time may cause overheating.
- After a crash, inspect the boards, connectors and wires before connecting the battery again.

2. Product description

2.1 Intended use

The GEPRC TAKER F405 BLS 50A Stack is an assembly of the **GEP-F405-HD v2** flight controller (FC) and the **GEP-BLS50A-4IN1** 4-in-1 electronic speed controller (ESC) for building FPV drones with 30.5 × 30.5 mm mounting holes.

- Flight controller with STM32F405 processor, ICM42688-P gyroscope and 16 MB blackbox memory.
- Connector for direct plug-in of the DJI Air Unit digital system — no soldering needed.
- USB Type-C connector for connection to a computer.
- Two independent voltage regulators (BEC): 9 V / 2.5 A and 5 V / 3 A to power peripherals.
- Integrated LC power filter.
- ESC with 50 A continuous current and a current sensor.

2.2 Package contents

Qty	Item
1	Flight controller (FC) GEP-F405-HD v2
1	Electronic speed controller (ESC) GEP-BLS50A-4IN1
1	Capacitor
1	DJI Air Unit adapter cable
1	Flight controller adapter cable (FC – ESC)
1	XT60 power cable
4	M3 × 30 screw
4	M3 × 24 screw
8	Nylon nut
8	Silicone grommet
2	SH1.0 4-pin silicone cable
1	Camera connection cable

※ Not included: battery, motors, propellers, frame, receiver, camera, video transmitter, DJI Air Unit, GPS module and buzzer. In the diagrams in Chapter 4 these devices are shown only as wiring examples.

2.3 Specifications — flight controller (FC)

Parameter	Value
Model	GEP-F405-HD v2
Processor (MCU)	STM32F405
Gyroscope (IMU)	ICM42688-P (SPI)
Blackbox	16 MB onboard
Barometer	no
OSD	Betaflight OSD, AT7456E chip
BEC	5 V / 3 A and 9 V / 2.5 A (two independent)
Input voltage	3–6S LiPo
Number of UARTs	6
Power filter	integrated LC filter
USB connector	Type-C
DJI Air Unit connection	direct plug-in
Firmware (target)	Betaflight, target **GEPRCF405**
Board size	36 × 36 mm (manufacturer's product page: 36.8 × 36.8 mm)
Mounting holes	30.5 × 30.5 mm (M3); the ⌀ 4 mm hole becomes ⌀ 3 mm with the silicone grommet
Weight	7.7 g

2.4 Specifications — electronic speed controller (ESC)

Parameter	Value
Model	GEP-BLS50A-4IN1
Input voltage	3–6S LiPo
Continuous current	50 A
Burst current	55 A (5 s)
Current sensor	yes
Supported protocols	Oneshot125, Oneshot42, Multishot, DShot150, DShot300, DShot600
Firmware (target)	BLHeli_S, target **G_H_30**
Size	42.9 × 39.7 mm
Mounting holes	30.5 × 30.5 mm (same as FC)
Weight	13.7 g

3. Assembly and power

3.1 Assembling the stack

① Insert the silicone grommets into the mounting holes of both boards. They dampen vibration and protect the gyroscope.

② Place the ESC in the frame as the bottom board and the flight controller (FC) above it. Orient the USB-C connector so that it is accessible in the frame.

③ Connect the boards with the supplied FC – ESC cable (8 pins, see Chapter 4.1).

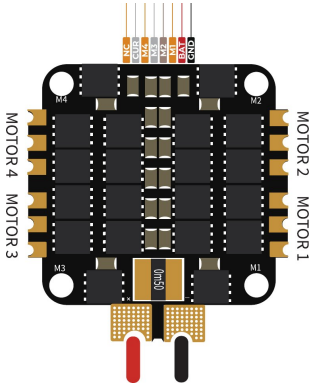
④ Secure the stack with M3 screws and nylon nuts. Choose the screw length (24 mm or 30 mm) according to the frame. Tighten the nuts only lightly — over-compressed grommets transmit vibration.

3.2 Power cable and capacitor

- Solder the XT60 power cable to the large power pads of the ESC: red wire to the positive pad, black wire to the negative pad.
- Solder the supplied capacitor in parallel to the ESC power pads, as close to them as possible and with the correct polarity (the negative lead is marked on the body). The capacitor suppresses voltage spikes and must not be omitted.
- After soldering, check that there is no short circuit between the positive and negative terminals (Chapter 1.2).

3.3 Motors

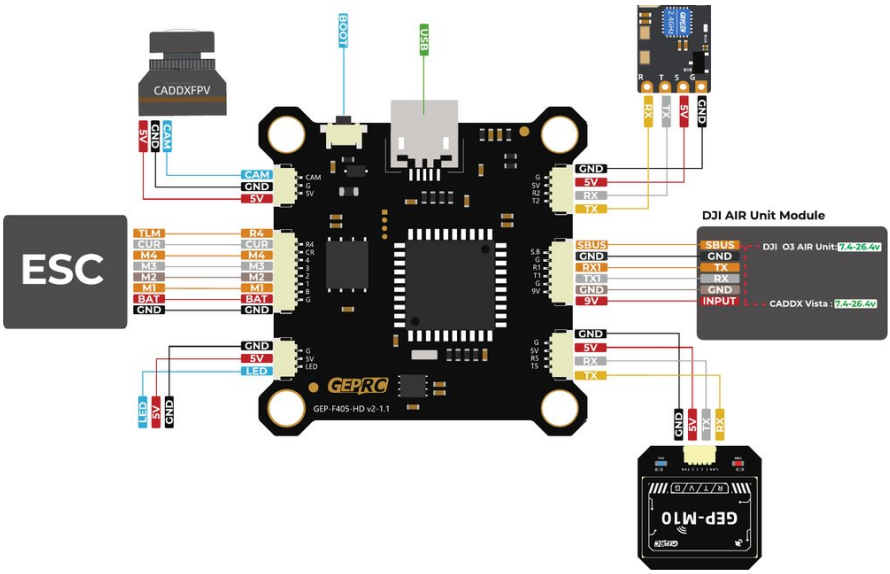
Solder the motor wires to the pad triplets MOTOR 1 to MOTOR 4 as shown in the figure. The order of the three motor wires only determines the direction of rotation; it can also be changed later in software (Chapter 5.6).



GEP-BLS50A-4IN1 ESC: motor pads M1–M4, power pads and the connector to the flight controller (NC, CUR, M4, M3, M2, M1, BAT, GND).

4. Connecting peripherals

4.1 Flight controller top side — connectors



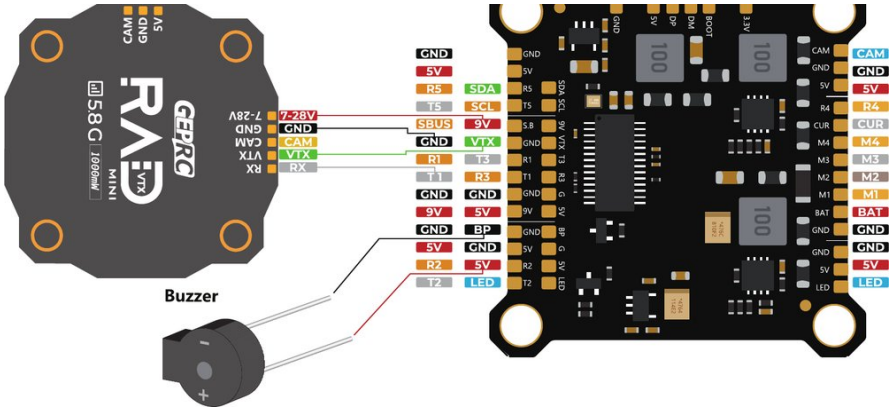
Manufacturer's wiring diagram — top side. The camera, receiver, DJI Air Unit (Caddx Vista / DJI O3 Air Unit) and GPS module are not included.

Connector	FC pins	Connection
ESC	R4, CUR, M4, M3, M2, M1, BAT, GND	ESC; the ESC TLM pin is not connected (NC)
Camera	CAM, G, 5V	analog camera (video, GND, 5 V)
LED	G, 5V, LED	addressable LEDs
Receiver (UART2)	G, 5V, R2, T2	receiver TX → R2, receiver RX → T2
DJI Air Unit (UART1)	S.B, G, R1, T1, G, 9V	SBUS, TX → RX1, RX → TX1, 9 V power
GPS (UART5)	G, 5V, R5, T5	module TX → R5, module RX → T5
BOOT	button	enters DFU mode for flashing firmware
USB	Type-C	connection to a computer

※ Data wires are always crossed: the TX output of a device goes to the RX (R) input of the flight controller and vice versa.

4.2 Flight controller bottom side — solder pads

Solder pads are available on the bottom side. The figure shows an example of wiring an analog video transmitter (VTX) and a buzzer.



Manufacturer's wiring diagram — bottom side. The video transmitter and buzzer are not included.

Pads	Function
GND, 5V, DP, DM, BOOT, 3.3V	USB and BOOT service pads at the top edge of the board
R1, T1 / R2, T2 / R3, T3 / R5, T5	serial ports UART1, UART2, UART3, UART5
R4, CUR, M1–M4, BAT	ESC signals (mirror the ESC connector)
S.B	SBUS input
SDA, SCL	I²C bus
VTX	video output to the video transmitter
CAM	video input from the camera
9V, 5V, GND	BEC power for peripherals
BP	buzzer (negative lead)
LED	LED data output

4.3 DJI digital system

Connect the DJI Air Unit with the supplied adapter cable to the UART1 connector (S.B, G, R1, T1, G, 9V). The manufacturer specifies a supply range of **7.4–26.4 V** for both the Caddx Vista and the DJI O3 Air Unit; the connector powers them from the 9 V BEC.

- DJI unit SBUS → S.B; unit TX → RX1; unit RX → TX1; INPUT (power) → 9V.
- Before connecting for the first time, check that the wire order in the cable matches the connector of your unit.
- Settings in Betaflight Configurator — Chapter 5.3.

4.4 Analog camera and video transmitter

- Camera: connector CAM, G, 5V (video, GND, 5 V power).
- Video transmitter according to the manufacturer's example: power → 9V pad, GND → GND, VTX video input → VTX pad, VTX control input RX → T1 (UART1, IRC Tramp protocol).
- Check the supply range of the video transmitter in its documentation; the 9V pad supplies 9 V from the BEC.
- Settings in Betaflight Configurator — Chapter 5.4.

4.5 GPS, LED and buzzer

- GPS module: UART5 connector (G, 5V, R5, T5).
- LED: connector G, 5V, LED or the pads of the same name.
- Buzzer: negative lead (−) to the BP pad, positive lead (+) to the 5V pad.

5. Setup in Betaflight Configurator

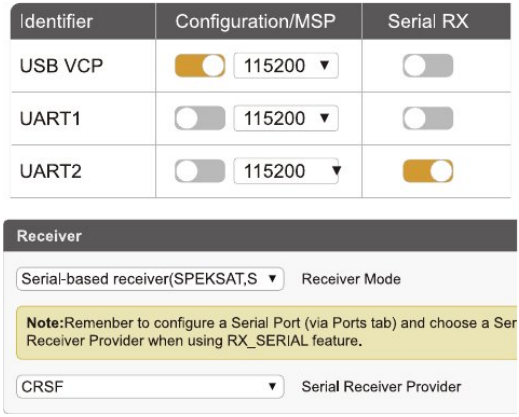
5.1 Connecting to a computer and firmware

Connect the flight controller to a computer with a USB-C cable and open **Betaflight Configurator**. A battery is not required for configuration; **always keep the propellers removed**.

- Flash Betaflight firmware using the **GEPRCF405** target.
- If the controller does not connect in firmware flashing mode (DFU), hold the **BOOT** button and only then plug in the USB cable.
- Save your configuration before updating the firmware (the *diff all* command in the *CLI* tab).

5.2 CRSF receiver on UART2

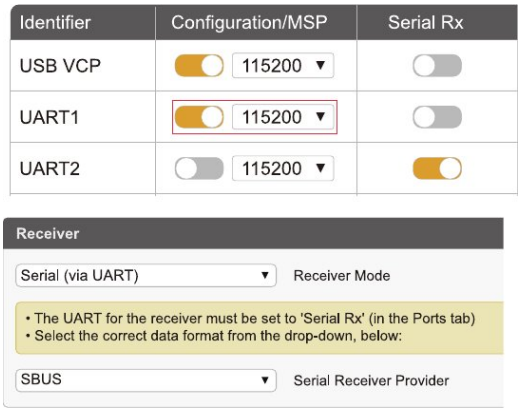
In the *Ports* tab, enable *Serial Rx* for **UART2**. In the *Receiver* tab, set *Receiver Mode* to “Serial-based receiver” and *Serial Receiver Provider* to **CRSF**.



Manufacturer's settings for a CRSF receiver on UART2.

5.3 DJI digital system

In the *Ports* tab, enable *Configuration/MSP* for **UART1** (for the OSD in DJI goggles) and *Serial Rx* for **UART2**. In the *Receiver* tab, set *Receiver Mode* to “Serial (via UART)” and *Serial Receiver Provider* to **SBUS**.

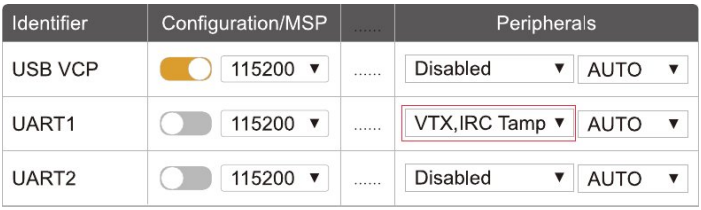


Manufacturer's settings for the DJI system with SBUS signal.

※ With these manufacturer settings, the flight controller processes the SBUS signal via UART2. Therefore do not use the UART2 receiver connector for another receiver at the same time.

5.4 Analog video transmitter

In the *Ports* tab, set **UART1** in the *Peripherals* column to “VTX (IRC Tramp)” with speed AUTO.



Manufacturer's settings for an analog video transmitter on UART1.

5.5 Other features

The manufacturer specifies the following features in the *Configuration* tab: **AIRMODE** enabled (permanently enable Airmode), **OSD** enabled (On Screen Display), **DYNAMIC_FILTER** disabled (dynamic gyro notch filtering).

5.6 ESC and motor check

- In the *Configuration* tab, select an ESC protocol supported by the ESC — DShot150, DShot300 or DShot600 (or Oneshot125, Oneshot42, Multishot).
- In the *Motors* tab (without propellers!), check that each motor spins in the correct position and in the correct direction. The direction of rotation can be changed in a BLHeli_S configuration program via the flight controller (passthrough), or by swapping two motor wires.
- The ESC sends the current sensor reading (CUR) to the flight controller. The manufacturer does not specify the sensor scale — verify the reading by comparing it with the capacity actually recharged and adjust it in the *Power & Battery* tab if necessary.

6. Before the first flight

6.1 Checks after assembly

- In the *Setup* tab, calibrate the accelerometer (the drone must be level) and check that the model on the screen follows the movements of the drone.
- In the *Receiver* tab, check that all channels respond correctly and in the correct direction.
- Assign a switch for **Arm** (motors on) and **Disarm** (motors off) in the *Modes* tab.
- In the *Failsafe* tab, set the behaviour on signal loss and test it without propellers by switching off the transmitter.

6.2 Pre-flight check

- Insert a **fully charged** battery (Chapter 1.4) and secure it firmly.
- Check the mounting of the propellers, motors and stack and the condition of all wires.
- Check that the motors are stopped when disarmed and that Arm works only from the selected switch.
- Monitor the battery voltage in the OSD and end the flight at 3.5 V per cell at the latest.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- After every flight, disconnect the battery and check the connectors, solder joints and wires.
- Remove dirt with a dry brush; do not immerse the boards in liquid.
- Replace worn silicone grommets — hard or cracked grommets transmit vibration to the gyroscope.
- Store the electronics in a dry place at room temperature, and batteries at 3.8 V per cell.

7.2 Troubleshooting

Problem	Possible cause and solution
The computer does not recognise the flight controller	Try another USB cable (with data wires) and another port. To flash firmware, use the BOOT button (Chapter 5.1).
The receiver does not respond	Check the TX/RX crossover, Serial Rx on the correct UART and the protocol in the Receiver tab.
No OSD in DJI goggles	Check that Configuration/MSP is enabled on UART1 and that the DJI cable is connected correctly.
The video transmitter cannot be controlled from the OSD	Check the VTX RX wire on T1 and the VTX (IRC Tramp) setting on UART1.
A motor spins in the wrong direction	Change the direction in the ESC configuration program or swap two motor wires.
The drone does not arm	In the Setup tab, find the reason for the arming block (e.g. tilt, throttle not at minimum, no signal).
Incorrect current reading	Adjust the current sensor scale in the Power & Battery tab (Chapter 5.6).

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 designation GEPRC TAKER F405 BLS 50A Stack; the flight controller designation (GEP-F405-HD v2) is printed on the circuit board. The firmware version is shown by Betaflight Configurator after connection.

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

Rights of the buyer under Czech law

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.