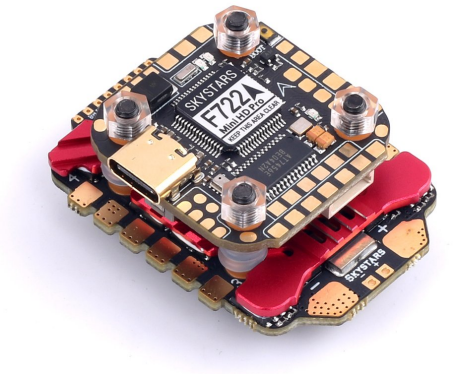
F722 Mini HD Pro + KM55A

Skystars · flight controller and ESC stack 20×20 mm
User manual



Read the whole manual carefully before installation and before connecting a battery for the first time, and keep it for future reference.

Importer: Rotorama, s.r.o. · www.rotorama.com

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1. Safety instructions

1.1 Before you start

The Skystars F722 Mini HD Pro + KM55A AM32 is a **stack** – a set consisting of a flight controller (FC) and a 4-in-1 electronic speed controller (ESC) – intended for installation in an FPV quadcopter. Installation requires soldering, basic knowledge of electronics and working with Betaflight Configurator. If you do not have this experience, have the installation done by an experienced modeller.

- Read the whole manual and study the wiring diagrams in chapters 2.5 and 4 before wiring.
- The product is not a toy and must be kept away from children.
- Solder in a well-ventilated area on a non-flammable surface. Never solder while a battery is connected.
- Before connecting a battery for the first time, use a multimeter to check that there is no short circuit between the positive and negative power leads.
- For the first power-up, use a current limiter (smoke stopper) or a laboratory power supply with current limiting.

1.2 Li-Po batteries and power supply

- The stack is designed to be powered from a **3–6S Li-Po** battery. A higher voltage will permanently damage both the flight controller and the ESC.
- Observe the polarity: red lead = +, black lead = −. Reversed polarity will destroy the ESC.
- Always solder in the capacitor supplied in the package (chapter 4.2).
- Never leave Li-Po batteries charging unattended and do not use a damaged or swollen battery.

Voltages of the battery powering the stack:

State	3S	4S	5S	6S
fully charged Li-Po (4.20 V/cell)	12.6 V	16.8 V	21.0 V	25.2 V
fully charged LiHV (4.35 V/cell)	13.05 V	17.4 V	21.75 V	26.1 V
end the 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

1.3 Rotating propellers

- Always **remove the propellers** while wiring, configuring and testing the motors.
- Fit the propellers only after you have verified the motor direction, the Arm/Disarm function and the failsafe setup.

- Once a battery is connected, handle the model as if the motors could start spinning at any moment.

1.4 Operating environment

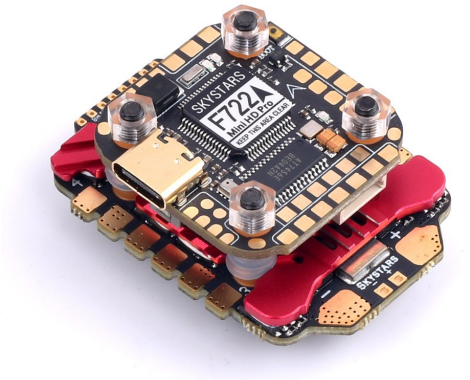
- The ESC is cooled by an aluminium heatsink and by the airflow from the propellers. Do not cover the heatsink and do not run the motors on the bench for a long time without airflow.
- Protect the electronics from moisture, water and metal objects that could cause a short circuit.
- A carbon fibre frame is electrically conductive – pads, wires and components must not touch it.

2. Product description

2.1 What the stack is for

The stack consists of the **Skystars F722 Mini HD Pro** flight controller with an STM32F722 processor and the **Skystars KM55A** 4-in-1 ESC with AM32 firmware for four brushless motors. Both boards have 20×20 mm (M3) mounting holes and are connected with an 8-pin cable.

The flight controller features Betaflight OSD, DJI HD OSD support (UART6) and a connector for DJI digital units, two regulated power supplies (BEC) 5 V/2 A and 10 V/2 A, a barometer, 16 MB blackbox memory and a USB-C connector. The ESC uses large MOSFETs under an aluminium heatsink and sends telemetry (voltage, RPM, current).



Skystars F722 Mini HD Pro + KM55A AM32 stack

2.2 Package contents

1×	Skystars F722 Mini HD Pro flight controller (20×20 mm)
1×	Skystars KM55A AM32 4-in-1 ESC (20×20 mm)
1×	accessory kit



Package contents as shown in the manufacturer's photo: stack, connecting cables, power leads, XT60 connector, screws and capacitor

❖ The package does not include a battery, motors, propellers, frame, receiver, camera, video transmitter (VTX), GPS or buzzer.

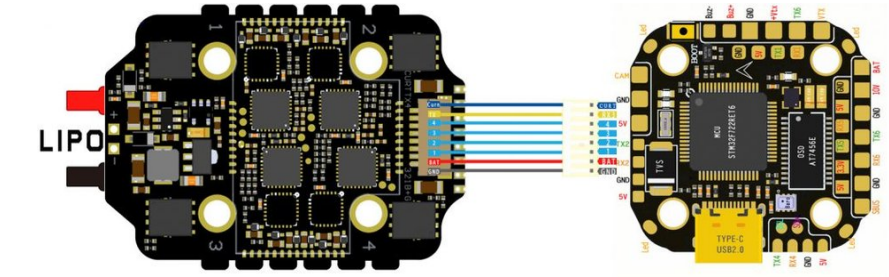
2.3 Specifications – flight controller

Parameter	Value
Processor (MCU)	STM32F722RGT6, 216 MHz
Gyro / accelerometer	BMI270 (SPI)
OSD	Betaflight OSD (AT7456E), DJI HD OSD (UART6)
Serial ports	6 hardware UARTs (UART1–6)
BEC	5 V / 2 A and 10 V / 2 A
Input voltage	3–6S Li-Po
Blackbox	16 MB
Barometer	yes
Protection	TVS diode
LED	pads for programmable WS2812 LEDs in all four corners
Receivers	serial (SBUS, iBUS, Spektrum, Crossfire); 3.3 V satellite receiver
USB	USB-C (USB 2.0)
Firmware (target)	Betaflight: SKYSTARSF7HDPRO INAV: SKYSTARSF722HDPRO
Mounting holes	20×20 mm, M3
Dimensions	35 × 28 × 7 mm
Weight	4.2 g

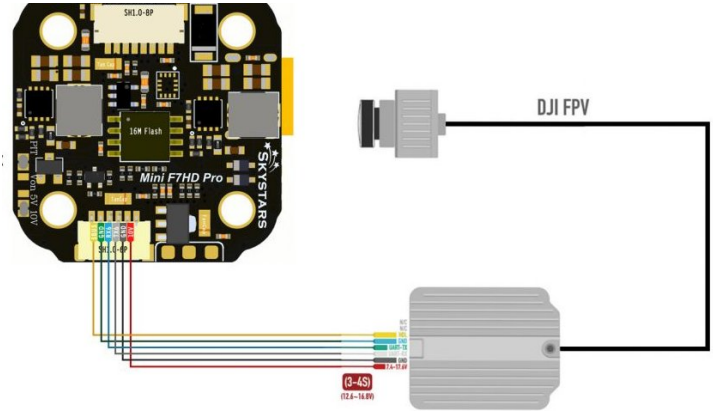
2.4 Specifications – ESC

Parameter	Value
Type	4-in-1, 32-bit
Input voltage	3–6S Li-Po
Continuous current	55 A
Peak current	70 A (10 s)
Firmware	AM32 (AM_32)
Protocol	DShot600
Telemetry	voltage, RPM, current
BEC	no
Mounting holes	20×20 mm, M3
Dimensions	35 × 47 × 6.5 mm
Weight	16.5 g

2.5 Pads and connectors



Top side: KM55A ESC on the left, F722 Mini HD Pro flight controller on the right (manufacturer's diagram)



Bottom side of the flight controller with the ESC connector (8 pins, top) and the DJI connector (6 pins, bottom)

▶ ESC connector – SH1.0, 8 pins

Pin	Function
CUR	current sensor signal
R3	ESC telemetry (UART3)
S1 – S4	motor 1–4 control signals
BAT	battery voltage
G	ground (GND)

▶ DJI connector – SH1.0, 6 pins

Pins in the order of the silkscreen: **SBUS, GND, RX6, TX6, GND, 10V**. The connector is used for a DJI digital unit; the 10V pin powers it from the flight controller's 10 V BEC.

The top side of the flight controller also has the **BOOT** button (chapter 5.1) and solder pads for the receiver, camera, VTX, GPS, buzzer and LEDs (chapter 4).

2.6 Serial port (UART) assignment

The manufacturer specifies the following default port assignment:

UART	Pads	Use according to the manufacturer
UART1	TX1, RX1	receiver (Serial RX)
UART2	TX2, RX2	free (in the diagram, FrSky receiver S.Port on TX2)
UART3	R3 in the ESC connector	ESC telemetry
UART4	TX4, RX4	free (in the diagram, GPS)
UART5	TX5, RX5	free
UART6	TX6, RX6, DJI connector	DJI digital unit / VTX control

3. Legal conditions of operation in the Czech Republic and the EU

3.1 The law of the country where you fly applies

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, compulsory insurance, permitted frequency bands and maximum transmit 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 A drone built with this stack

The stack is a component and is not a drone by itself. A quadcopter you build with it has no class marking (C0–C4) and is operated as a **privately built unmanned aircraft system** in the open category – in subcategory A1 if its take-off mass including the battery is below 250 g, otherwise in subcategory A3 – or within the framework of a model aircraft club or association. Subcategory A2 is not available.

- If the drone carries a camera, the operator must be **registered** (in the Czech Republic with the Civil Aviation Authority) and the registration number must be displayed on the drone.
- The pilot must meet the competency requirements for the subcategory concerned.
- Fly no higher than 120 m above the ground, within visual line of sight and never over assemblies of people. In subcategory A3, keep a distance of 150 m from residential, commercial, industrial and recreational areas.
- When flying with FPV goggles, an observer who keeps the drone in direct sight must stand next to the pilot.
- We recommend taking out liability insurance covering damage caused by operating the drone.

3.3 Radio equipment

The stack itself does not transmit. The receiver, video transmitter (VTX) and digital video unit are not included in the package – the frequency bands and transmit power are determined by their manuals and by the regulations of the country of operation (in the Czech Republic, the general authorisations of the Czech Telecommunication Office). The user is responsible for the transmit power setting.

4. Installation and wiring

4.1 Installation procedure

① Mount the ESC in the frame so that the numbering of the motor pads matches the motor positions: **1 rear right, 2 front right, 3 rear left, 4 front left** (top view, front at the top – see the figure in chapter 4.3).

② Solder the motor wires to pads 1–4 (chapter 4.3).

③ Solder the power leads with the XT60 connector and the capacitor (chapter 4.2).

④ Connect the ESC and the flight controller with the 8-pin cable.

⑤ Mount the flight controller above the ESC on the rubber dampers. Tighten the nuts only lightly so that the damping works.

⑥ Solder the receiver, camera, VTX or digital unit and other accessories (chapters 4.4–4.6).

⑦ Use a multimeter to check that there is no short circuit on the power input, and connect the battery for the first time through a current limiter.

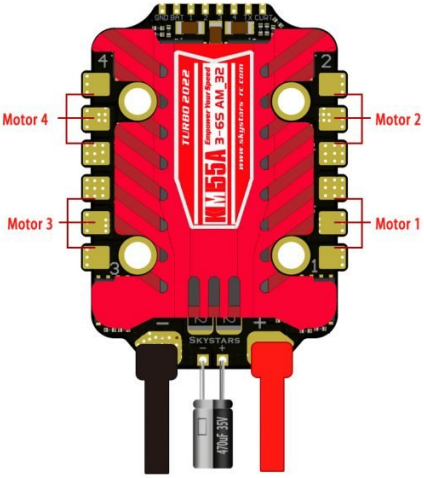
※ If the flight controller is rotated in the frame, set its actual orientation in Betaflight Configurator on the *Configuration → Board and Sensor Alignment* **tab.**

4.2 Power supply and capacitor

Solder the power leads to the large **+** and **−** pads at the rear edge of the ESC. Solder the capacitor from the package (470 µF / 35 V) to the smaller **+** and **−** pads between them – observe the polarity, the negative lead is marked with a stripe on the capacitor body. The capacitor suppresses voltage spikes that could damage the ESC.

The manufacturer explicitly warns: use the supplied low ESR capacitor.

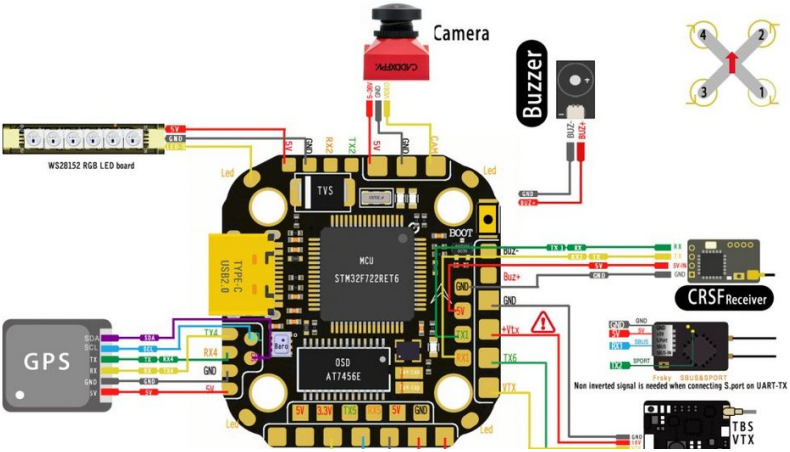
4.3 Motors



KM55A ESC: motor pads 1–4, power input and capacitor (manufacturer's diagram)

Each motor has three wires; solder them to the group of three pads next to the motor number. The order of the three wires does not matter – an incorrect direction of rotation is changed in the settings (chapter 6.2). Shorten the wires to the required length and do not overheat the pads.

4.4 Receiver



Wiring diagram of peripherals to the flight controller (manufacturer's diagram)

Receiver	Wiring according to the manufacturer
CRSF (Crossfire, ExpressLRS)	receiver TX → RX1, receiver RX → TX1, 5V, GND
FrSky SBUS + S.Port	SBUS → RX1, S.Port → TX2, 5V, GND

- On the *Ports* tab, enable *Serial RX* for UART1 and select the receiver protocol on the *Receiver* tab.
- The manufacturer points out that a non-inverted signal is required when connecting S.Port to a UART TX pad.
- Bind the receiver to the radio according to the receiver's manual.

4.5 Video transmission

▶ DJI digital unit

Connect the DJI unit with the cable to the 6-pin connector on the bottom side of the flight controller (figure in chapter 2.5). Communication runs over UART6, power is supplied by the 10 V BEC. On the *Ports* tab, enable *Configuration/MSP* for UART6.

▶ Other digital unit (e.g. Caddx)

The manufacturer's diagram shows a Caddx unit connected to the RX6, TX6, GND and power pads at the bottom edge of the flight controller. Always check the permitted supply voltage of the unit in its manual.

▶ Analogue camera and VTX

- Camera: pads **5V**, **GND** and **CAM** (video).
- VTX: pads **+Vtx** (power), **GND**, **VTX** (video) and **TX6** (VTX control, e.g. TBS SmartAudio). On the *Ports* tab, select the VTX protocol under *Peripherals* for UART6.
- On the bottom side of the flight controller there are labels Von, 5V and 10V next to the PIT pad. The manufacturer states: "Use 10V for +VTX" and "Use Pit mode for VTX".

Never power a VTX without an antenna connected and check its permitted supply voltage before connecting it.

4.6 GPS, buzzer and LEDs

- **GPS:** module TX → RX4, module RX → TX4, 5V, GND; compass wires SDA and SCL to the SDA and SCL pads. On the *Ports* tab, select GPS under *Sensor Input* for UART4 (the manufacturer specifies 57600 baud).
- **Buzzer:** pads **BUZ+** and **BUZ−**.
- **LEDs:** programmable WS2812 LEDs are connected to the **Led** pads in the four corners of the flight controller (signal) and to 5V and GND. LED functions are set on the *LED Strip* tab.

5. Setup in Betaflight Configurator

5.1 Connecting to a computer and firmware

Connect the flight controller to a computer with a USB-C data cable and start Betaflight Configurator. A battery is not needed for configuration; it is needed, however, for testing the motors and the ESC.

- Betaflight firmware target: **SKYSTARSF7HDPRO**; INAV target: **SKYSTARSF722HDPRO**.
- Firmware is flashed on the *Firmware Flasher* tab. If the flight controller does not connect, hold the **BOOT** button while plugging in the USB cable – the unit then starts in firmware update mode.
- Back up your settings before updating the firmware (in the *CLI* with the *diff all* command).

5.2 Port setup

Settings of the *Ports* tab according to the manufacturer:

UART	Setting
UART1	Serial RX
UART3	Sensor Input: ESC
UART4	Sensor Input: GPS, 57600
UART6	DJI: *Configuration/MSP* enabled other VTX: *Peripherals* – VTX (TBS SmartAudio)

5.3 Voltage and current measurement

The flight controller measures the battery voltage automatically via the BAT pin. For the ESC current sensor, the manufacturer specifies **Scale 290** and **Offset 0** in the *Amperage Meter* section of the *Power & Battery* tab. Verify the accuracy by comparing with your charger or a wattmeter and adjust the Scale value if necessary.

5.4 Arm, Disarm and failsafe

- On the *Modes* tab, assign the **Arm** function (motors enabled) to a two-position switch on your radio. **Disarm** (motors disabled) must work immediately and reliably.
- On the *Failsafe* tab, set the behaviour on signal loss and verify (without propellers) that the motors stop when you switch off the radio.
- If Arm is not possible, the reason is shown on the *Setup* tab or in the *CLI* with the *status* command.

6. KM55A ESC and AM32 firmware

6.1 Protocol and motor test

The ESC is factory-flashed with AM32 firmware and supports the DShot600 protocol. On the *Configuration* tab, select DShot600 as the *ESC/Motor protocol*. Check the motors on the *Motors* tab – **without propellers**, with the battery connected and after confirming the safety notice.

6.2 Motor direction

Compare the direction of rotation of each motor with the figure on the *Motors* tab. If a motor spins the wrong way, change its direction in the AM32 configurator (connected through the flight controller in passthrough mode) or swap two of the three motor wires. Change AM32 settings only if you know what the parameter does.

6.3 ESC telemetry

The ESC sends telemetry (voltage, RPM, current) to the flight controller via the R3 pin – UART3. To use it, set *Sensor Input: ESC* for UART3 (chapter 5.2) and enable the *ESC Sensor* feature on the *Configuration* tab.

7. Maintenance and troubleshooting

7.1 Check before the first flight

- All joints are soldered firmly, without cold joints and without solder balls between pads.
- The capacitor is soldered with the correct polarity.
- The board orientation, motor order and motor direction match the *Motors* tab; the model's tilt is shown correctly on the *Setup* tab.
- Arm, Disarm and failsafe work (chapter 5.4).
- Insert a **fully charged** battery and fit the propellers only as the very last step.

7.2 Maintenance and storage

- After a crash, inspect the boards, connectors and wires, and remove dirt and moisture before the next flight.
- Re-solder loose or cracked joints and replace damaged cables.
- Store in a dry place at room temperature, out of the reach of children. Store batteries disconnected at 3.8 V/cell.

7.3 Troubleshooting

Problem	Possible cause and solution
The flight controller does not connect to the computer	Use a data (not charge-only) USB-C cable and another USB port; install the drivers; try connecting with the BOOT button pressed.
The receiver does not respond	TX/RX swapped, Serial RX not enabled for UART1, wrong protocol selected, receiver not bound.
The motors do not spin on the Motors tab	Battery not connected, 8-pin cable not plugged in, wrong protocol selected (DShot600).
A motor spins the wrong way	Change the direction as described in chapter 6.2.
The model flips over on take-off	Wrong motor order or direction, incorrect board orientation, propellers swapped.
No OSD in the DJI goggles	Configuration/MSP not enabled for UART6; check the DJI cable.
The measured current is wrong	Adjust the Scale value (chapter 5.3).
Arm is not possible	The cause is shown on the Setup tab or by the status command in the CLI.

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 (Skystars F722 Mini HD Pro + KM55A AM32) is printed directly on the circuit boards of the flight controller (F722 Mini HD Pro) and of the ESC (KM55A, AM_32).

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.