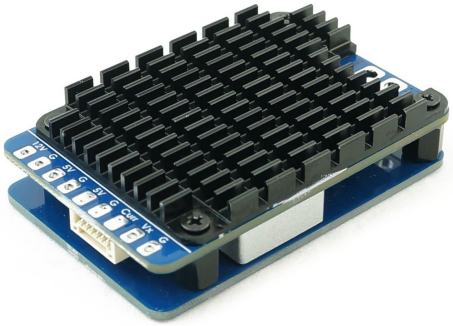
Matek PM12S-3

12S power module with three BECs
User Manual



Read the entire manual before installation. The module has no reverse input polarity protection.

www.rotorama.com

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1. Safety instructions

1.1 Before you start

The PM12S-3 power module is an electronic component designed to be built into RC models (multicopters, airplanes and other models). Installation requires soldering and knowledge of wiring electronics. Read the entire manual before installation and keep it for future reference.

- **Always disconnect the battery** before soldering, wiring or making any modification to the module.
- **The module has no reverse input polarity protection.** Swapping the + and − poles will destroy the module and the connected electronics. Always check the polarity before connecting the battery for the first time.
- Do not exceed the maximum input voltage of **55 V** (12S Li-Po).
- The outputs are short-circuit tolerant only briefly (2 s). Prevent short circuits of the outputs and the input – make sure the solder joints are of good quality and the wires are insulated.
- The heatsink and components heat up during operation. Do not cover the heatsink and ensure airflow.
- Protect the module from water, moisture and conductive dirt. A carbon fibre frame is electrically conductive – reliably insulate the module and wires from it.
- This product is not a toy. Keep it out of the reach of children.
- Operate the model in which the module is installed in accordance with the regulations. The law of the country in which you operate the model always prevails.

1.2 Manufacturer's warning about counterfeits

The manufacturer Matek Systems warns that counterfeit PM12S-3 modules are circulating on the market. Therefore buy only from authorized dealers. The manufacturer publishes their list at:
www.mateksys.com/?page_id=1212

2. Product description

2.1 What the module is for

Matek PM12S-3 is a power module with **three independent step-down voltage regulators (BEC)**. It is powered directly from the flight battery at 9–55 V (3–12S Li-Po) and provides regulated voltages for the on-board electronics of larger models, such as cinelifters or airplanes.

- **BEC 5V** (4 A) – powers the flight controller (FC), receiver, cameras and other accessories.
- **BEC 12V** (4 A) – powers the video transmitter (VTX) or a gimbal.
- **BEC Vx** (15 A, selectable 5.25 / 6 / 8 V) – powers servos or cinema cameras.
- **1/21 voltage divider** – allows the flight controller to measure the battery voltage.
- **Current sensor signal passthrough** – Curr pad for connecting an external current sensor.

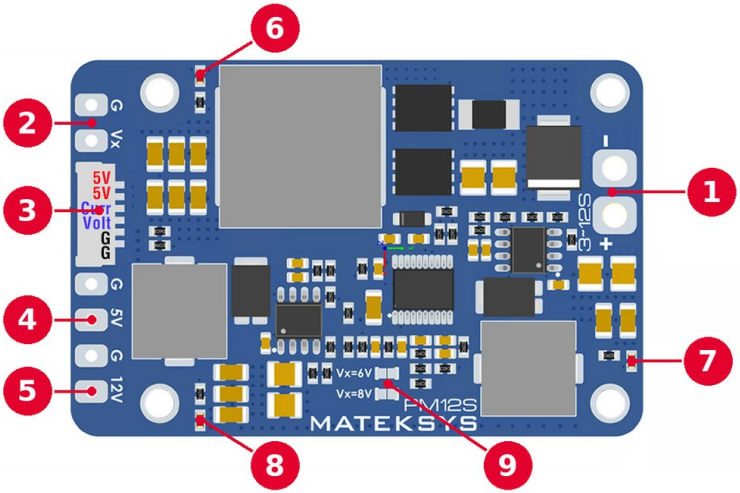
The module consists of a main board with an aluminium heatsink and a bottom board that makes installation easier. The input is protected by a TVS diode.

2.2 Package contents

1×	Matek PM12S-3 power module
1×	Low ESR capacitor ZLJ 63 V 390 µF

Not included in the package: battery, power connector (e.g. XT30), connecting cables and mounting screws.

2.3 Parts description



Component side of the PM12S-3 module

① Input pads **+** and **−** for a 3–12S battery (pitch matches the XT30 connector)

② **Vx** output and ground **G**

③ **JST-GH-6P** connector for the flight controller (5V, 5V, Curr, Volt, G, G)

④ **5V** output and ground **G**

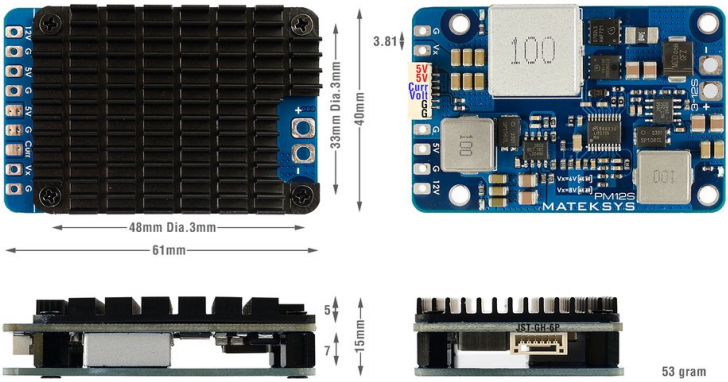
⑤ **12V** output and ground **G**

⑥ Vx output LED

⑦ 5V output LED

⑧ 12V output LED

⑨ Vx voltage selection pads (*Vx=6V*, *Vx=8V*) – see Chapter 4.2



Module dimensions; left: heatsink side, right: component side (dimensions in mm, weight 53 g)

On the heatsink side there are pads 12V, G, 5V, G, Vx and G, plus a set of three pads **5V, G, Curr** for connecting an external current sensor (see Chapter 4.3).

2.4 Technical data

Input voltage	9–55 V DC (3–12S Li-Po), TVS diode protection
Reverse input polarity protection	**no**
Regulators	3× independent synchronous step-down regulator
BEC Vx	5.25 V / 6 V / 8 V (selectable), tolerance 1.5 % 15 A continuous, 25 A peak
BEC 5V	5.2 V, tolerance 1.5 % 4 A continuous, 6 A peak
BEC 12V	12 V, tolerance 1.5 % 4 A continuous, 6 A peak
Output protection	thermal shutdown, short-circuit tolerant (2 s), overcurrent protection with self-recovery
Voltage divider	1K:20K, Volt output = 1/21 of the input voltage (0–3.3 V)
Current signal	Curr signal passthrough (0–3.3 V) from an external sensor
FC connector	JST-GH-6P
Mounting holes	48 × 33 mm spacing, 3 mm diameter
Dimensions	61 × 40 × 15 mm
Weight	53 g

2.5 Detailed regulator parameters

BEC	Parameters according to the manufacturer
Vx	Typical efficiency 90–96 %. Ripple 32 mV (input 50 V, output 5.25 V, 15 A), 43 mV (input 50 V, 5 A). Standby current 10–20 mA. **An input voltage of at least 15 V is required for a continuous current of 15 A.**
5V	Ripple 20 mV (input 24 V, 5 A), 50 mV (input 50 V, 5 A).
12V	Ripple 18 mV (input 24 V, 5 A), 32 mV (input 50 V, 5 A). **An input voltage of at least 13 V is required for a stable 12 V output.**

❉ A fully charged 3S Li-Po battery has 12.6 V (4.20 V/cell), i.e. less than 13 V. When powered from 3S, the 12 V output is therefore not stable.

2.6 Measured efficiency of the Vx output

Manufacturer's measurement results for the individual Vx output settings:

Vx setting	Input (V)	Input current (A)	Output (V)	Output current (A)	Efficiency (%)	Ripple (mV)
5.25 V	12	2.3	5.26	5	95.3	13
	12	4.69		10	93.4	19
	24	1.16		5	94.5	18
	24	2.34		10	93.7	20
	24	3.56		15	92.3	22
	50	0.57		5	92.3	23
	50	1.14		10	92.3	24
	50	1.73		15	91.2	32
6 V	12	2.62	6.02	5	95.7	14
	12	5.35		10	93.8	15
	24	1.33		5	94.3	20
	24	2.67		10	93.9	20
	24	4.06		15	92.7	24
	50	0.65		5	92.6	24
	50	1.3		10	92.6	26
	50	1.97		15	91.7	33
8 V	12	3.5	8.07	5	96	53
	24	1.76		5	95.5	30
	24	3.54		10	95	30
	24	5.37		15	93.9	30
	50	0.87		5	92.8	37
	50	1.72		10	93.8	40
	50	2.6		15	93.1	43

3. Installation

3.1 Placement and mounting

- The module is mounted using four 3 mm holes with **48 × 33 mm** spacing. The total height of the module is 15 mm.
- Place it so that air can flow around the heatsink and the solder pads remain accessible.
- Mount the module securely and protect it from vibration and mechanical damage in the event of a crash.
- Neither the board nor the solder pads may touch a conductive carbon fibre frame directly. Use insulating standoffs and washers.

3.2 Connecting the battery

- Solder the power wires or connector (pad pitch matches the XT30 connector) to the input pads ① marked **+** and **−** (label *3~12S*).
- Choose the wire cross-section according to the total current draw of the connected electronics.
- **Observe the correct polarity** – the module has no reverse polarity protection.
- Insulate the joints after soldering (e.g. with heat shrink tubing).

3.3 Input capacitor

If the input voltage is noisy, the manufacturer requires the supplied low ESR capacitor (63 V, 390 µF) to be soldered to the input pads. In models with electronic speed controllers (ESC) the supply is commonly noisy, so we recommend always using the capacitor.

- The capacitor is polarized – connect the **−** lead (next to the stripe on the case) to the negative pad and the other lead to the positive pad.
- Keep the leads as short as possible and secure the capacitor so that it cannot move freely and break off.

4. Connecting the outputs

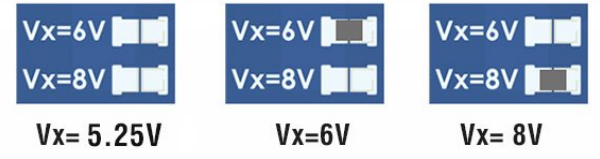
4.1 BEC outputs

Output	Voltage	Current continuous / peak	Typical use
5V ④	5.2 V	4 A / 6 A	flight controller (FC), receiver, cameras, accessories
12V ⑤	12 V	4 A / 6 A	video transmitter (VTX), gimbal
Vx ②	5.25 / 6 / 8 V	15 A / 25 A	servos, cinema cameras

- Each output has a ground pad **G** next to it. All G pads are a common ground.
- Before connecting a device, verify that its permitted supply voltage matches the output voltage. Connect 8 V only to devices that can withstand it (e.g. high-voltage HV servos).
- The total current draw of the connected devices must not exceed the continuous current of the given output.

4.2 Selecting the Vx output voltage

The Vx output voltage is selected by bridging the pads ⑨ on the board:



Vx voltage selection pads: no bridge 5.25 V, Vx=6V pads bridged 6 V, Vx=8V pads bridged 8 V

Pad state	Vx voltage
no pads bridged	5.25 V
Vx=6V pads bridged	6 V
Vx=8V pads bridged	8 V

- Change the setting only with the battery disconnected.
- The manufacturer does not specify other combinations – do not bridge both pairs of pads at the same time.
- After changing the setting, measure the Vx output voltage with a multimeter before connecting any devices.

4.3 Flight controller connector

The JST-GH-6P connector ③ connects the module to the flight controller (FC). Pins in the order printed on the board:

Pin	Function
5V	5.2 V supply from BEC 5V
5V	5.2 V supply from BEC 5V
Curr	current sensor signal (0–3.3 V), passthrough from the Curr pad
Volt	battery voltage divided by 21 (0–3.3 V)
G	ground
G	ground

※ Before connecting, compare the pin order with the power connector of your flight controller. If it differs, re-pin the cable – swapped pins can damage the flight controller.

▶ External current sensor

An external current sensor (for example the current output of an ESC) can be connected to the module. Connect the sensor signal to the **Curr** pad on the heatsink side; the adjacent **5V** and **G** pads can be used to power the sensor. The signal is routed to the Curr pin of the JST-GH-6P connector. The signal voltage must not exceed 3.3 V.

5. Flight controller (FC) setup

5.1 Battery voltage measurement

The Volt pin carries the battery voltage divided by the 1K:20K divider, i.e. **1/21** of the input voltage. In the flight controller configuration (Betaflight, INAV, ArduPilot, etc.) set the voltage scale or multiplier to match the 1:21 divider ratio. The exact parameter name and how to enter it can be found in the firmware documentation.

- Measure the battery voltage with a multimeter and compare it with the value shown in the configurator or in the OSD.
- If the values differ, adjust the voltage scale until they match.

5.2 Current measurement

If you use an external current sensor, set the current scale and offset in the flight controller according to the sensor manufacturer's data and verify the result by comparing the consumed capacity with the amount the charger puts back into the battery.

6. Commissioning

6.1 First power-up

① Check all solder joints and the input polarity. Use a multimeter to verify there is no short circuit between the + and − input pads.

② Check the Vx voltage setting (Chapter 4.2).

③ Leave all devices disconnected for the first power-up.

④ Connect the battery. The Vx, 5V and 12V output LEDs (Chapter 2.3) light up to indicate voltage on the outputs.

⑤ Measure the voltage of all three outputs with a multimeter.

⑥ Disconnect the battery, connect the devices and test the wiring again.

6.2 Operation

- After the first flights check the heatsink temperature (only after disconnecting the battery). If the module is very hot, improve cooling or reduce the load.
- The Vx output has a standby current of 10–20 mA. Therefore always disconnect the battery after use so that it does not discharge.
- When powered from 3S Li-Po, keep in mind that the 12 V output is not stable and the Vx output cannot deliver 15 A continuously (Chapter 2.5).

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Regularly check the solder joints, wire insulation and the mounting of the module and the capacitor, especially after a crash.
- Remove dust and dirt from the heatsink with a dry brush or compressed air.
- Store the module in a dry place at room temperature, disconnected from the battery.

7.2 Troubleshooting

Problem	Possible cause and solution
No LED lights up	The battery is not connected or its voltage is lower than 9 V. Check the input connections. If the polarity was reversed, the module may have been damaged.
12 V output unstable or lower	The input voltage is lower than 13 V (e.g. 3S). Use a battery with a higher cell count.
Vx output drops out under high load	The input voltage is lower than 15 V, the load exceeds 15 A continuous, or the thermal or overcurrent protection has tripped. Reduce the load and improve cooling.
Output switched off and recovered after a while	The overcurrent or thermal protection has tripped. Check the wiring and the current draw of the devices.
OSD voltage does not match reality	Incorrect voltage scale in the flight controller. Follow Chapter 5.1.
Electronics restart or the video is disturbed	Noisy input voltage. Solder the capacitor to the input (Chapter 3.3).
Vx output has a different voltage than expected	Check the bridging of the voltage selection pads (Chapter 4.2).

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 (PM12S-3); the designation **MATEKSYS PM12S** is printed on the circuit board.

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.