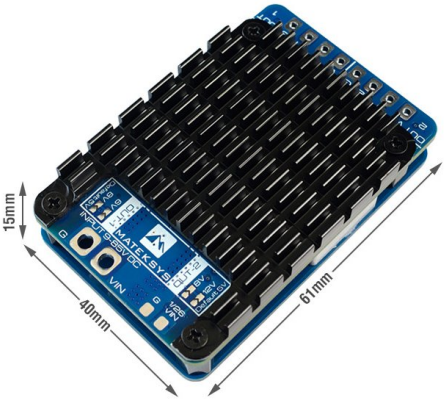
ROTORAMA

PM20S-2

Matek Power Module – 2× BEC
Input 9–85 V DC (4–20S Li-Po) · 2× 15 A



The module has no input reverse-polarity protection. Before connecting the battery, check the polarity and the set output voltage.

User manual · www.rotorama.com

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1. Safety instructions

1.1 Before you start

Read this manual carefully before installing the module and keep it for future reference. The module is an electronic component intended to be built into a model or drone. Installation must be carried out by a person with basic knowledge of electronics and soldering.

- This product is not a toy. It is not intended for children or for persons who are not familiar with handling electronics.
- Do not use the module if it is mechanically damaged, deformed, has been exposed to water or shows signs of overheating.
- Always disconnect the battery before doing any work on the wiring.

1.2 Electrical safety

The module has NO input reverse-polarity protection. Connecting the battery with reversed polarity will destroy the module. Always check the polarity before connecting it for the first time.

- Do not exceed the permitted input voltage range of **9–85 V DC**. The input is protected by an 85 V TVS diode, but this does not replace choosing the correct battery.
- Take extra care at voltages above 60 V (approximately from 15S Li-Po). Do not touch live solder pads or bare wires.
- Connect loads only to an output whose set voltage matches their permitted supply voltage. An unsuitable voltage can destroy the connected device.
- Do not short-circuit the outputs. An output withstands a short circuit only briefly (1 s).
- Insulate the solder joints and secure them against pulling out and vibration.

1.3 Temperature and cooling

At full continuous load, the board temperature stabilises at **80–90 °C** according to the manufacturer's measurements. The heatsink and the board may remain hot after switching off.

- Do not touch the heatsink during operation or shortly afterwards – risk of burns.
- Position the module so that the heatsink is exposed to airflow and does not touch flammable or heat-sensitive materials (foam, plastics, cables).
- Do not cover or remove the heatsink.

1.4 Li-Po and LiHV batteries

The module is powered from the model's battery. The battery is not included. When handling Li-Po and LiHV batteries, follow their manufacturer's instructions:

- Charge only with a charger designed for the given cell type and never leave charging unattended.
- Li-Po: fully charged 4.20 V/cell, end the flight at 3.5 V/cell, store at 3.8 V/cell.
- LiHV: fully charged 4.35 V/cell, end the flight at 3.5 V/cell, store at 3.8 V/cell.
- Do not use a damaged, swollen or overheated battery.
- **Mind the maximum input voltage:** a fully charged 20S Li-Po has 84.0 V and is within the range. A fully charged 20S LiHV has 87.0 V and **exceeds the 85 V range** – do not use it with the module.

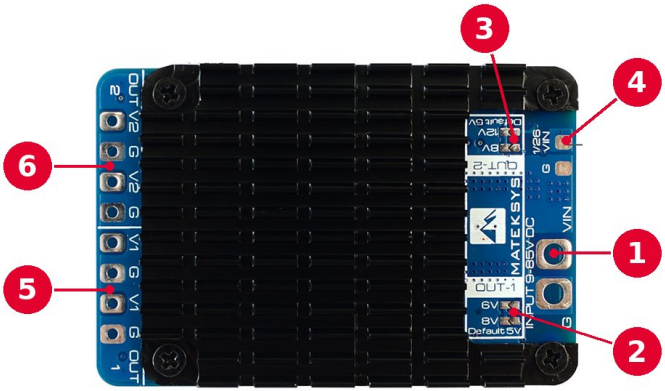
2. Product description

2.1 What the module is for

The Matek Power Module PM20S-2 contains **two independent step-down voltage regulators (BEC)**. From a 9–85 V DC battery (4–20S Li-Po) it produces two stabilised voltages for on-board electronics – for example the flight controller (FC), servos, cameras, video transmitters or gimbals. It is mainly used in larger aircraft and drones and in camera carriers (cinelifters).

Each regulator delivers up to 15 A continuously and up to 22 A peak. The output voltage is selected by bridging solder pads. The module also contains a 1K:25K voltage divider that allows the flight controller to measure the battery voltage via its 3.3 V analogue input.

2.2 Parts description



Top view (heatsink side)

① **VIN / G** – input solder pads for connecting the battery (VIN = positive, G = negative).

② **OUT-1** – pads for selecting the voltage of output 1 (6V, 8V; 5.3 V when not bridged).

③ **OUT-2** – pads for selecting the voltage of output 2 (8V, 12V; 5.3 V when not bridged).

④ **1/26 VIN / G** – voltage divider output for battery voltage measurement by the flight controller.

⑤ **OUT 1** – output pads of regulator 1: 2× V1 (positive) and 2× G (negative).

⑥ **OUT 2** – output pads of regulator 2: 2× V2 (positive) and 2× G (negative).

2.3 Package contents

- 1× Power Module PM20S-2

Wires, connectors, battery, screws and standoffs are **not** included.

2.4 Technical data

Manufacturer, type	Matek Systems (MATEKSYS), PM20S-2
Input voltage	9–85 V DC (4–20S Li-Po)
Input protection	85 V TVS diode; no reverse-polarity protection
Components used	rated for 100 V DC
Output 1 (BEC1)	5.3 V / 6.1 V / 8.1 V
Output 2 (BEC2)	5.3 V / 8.1 V / 12.2 V
Output voltage tolerance	1.5 %
Current of each output	up to 15 A continuous, 22 A peak
Condition for 15 A continuous	input voltage ≥ 15 V
Regulator type	synchronous step-down (buck), typical efficiency 90–96 %
Output 1 ripple	25 mV (VIN 42 V, 5.3 V at 5 A); 35 mV (VIN 58 V, 5.3 V at 15 A)
Output 2 ripple	58 mV (VIN 58 V, 12 V at 5 A)
Standby current	10–30 mA (each regulator)
Protections	thermal shutdown 150 °C, overcurrent protection with self-recovery, output short-circuit tolerant for 1 s
Voltage divider	1K:25K, output 1/26 VIN (0–3.3 V)
Dimensions	61 × 40 × 15 mm
Mounting holes	48 × 33 mm spacing, 3 mm diameter
Weight	63 g

※ The manufacturer specifies ripple and standby current separately for each of the two regulators.

3. Setting the output voltage

The voltage of each output is selected by bridging (soldering together) one pair of pads on the top side of the module – see ② and ③ in chapter 2.2. Without a bridge (factory setting, “Default 5V”) the output supplies 5.3 V.

3.1 Voltage selection



OUT-1: not bridged / 6V bridged / 8V bridged



OUT-2: not bridged / 8V bridged / 12V bridged

Bridged pads	OUT-1 (V1)	OUT-2 (V2)
none (factory setting)	5.3 V	5.3 V
6V	6.1 V	–
8V	8.1 V	8.1 V
12V	–	12.2 V

3.2 Changing the voltage

① Disconnect the battery and disconnect all loads from the output.

② Bridge the selected pads with solder. On each output bridge **no more than one** pair of pads – bridging both at the same time is not described by the manufacturer.

③ When changing the selection, first remove the solder from the previously bridged pads so that they are reliably open.

④ Before connecting the loads, connect the battery and **measure the output voltage with a multimeter**. Connect the loads only when it matches the required value.

An incorrectly set output voltage can destroy the connected electronics. Always check it before connecting a load.

4. Installation and wiring

4.1 What else you need

- a soldering iron powerful enough for the large input pads, solder and flux,
- silicone wires and connectors rated for the current of the loads,
- M3 screws or standoffs for mounting, insulating washers if needed,
- a multimeter for checking polarity and output voltage,
- heat-shrink tubing to insulate the joints.

4.2 Mounting the module

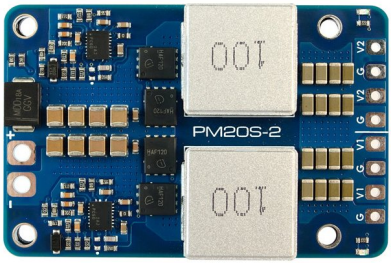
- Mount the module using the four 3 mm holes (48 × 33 mm spacing).
- Place it in a location with good airflow, with the heatsink facing the airflow (see chapter 1.3).
- The underside of the board must not come into conductive contact with a carbon frame or metal parts – use standoffs or an insulating pad.
- Make sure the components do not touch propellers, moving parts or sharp edges.

4.3 Connecting the power input

① Solder the input wires to the **VIN** (positive, marked + on the underside) and **G** (negative, marked −) pads.

② Connect the wires to the model's battery or power distribution board (PDB) so that the module receives the full battery voltage.

③ Before connecting the battery for the first time, check the polarity with a multimeter – the module has no reverse-polarity protection.



Bottom view – input pads marked + (VIN) and − (G)

※ The VIN / G input supplies both regulators of the module. The manufacturer does not state that the module is intended to distribute current to other loads, so power the electronic speed controllers (ESC) directly from the battery distribution, not via the module's pads.

4.4 Connecting loads

- Solder the loads for output 1 to the **V1** and **G** pads, for output 2 to the **V2** and **G** pads.
- Each output has two pairs of V/G pads. This allows you to connect two loads or to split a higher current between two pairs of wires. The total load on one output must not exceed its load capacity (chapter 5.1).
- Verify that the set output voltage matches the supply voltage of the connected devices (chapter 3).
- The G pads are the common ground of the module. Connect the ground of the powered electronics to the module's ground.

4.5 Battery voltage measurement by the flight controller

The **1/26 VIN** pad provides a voltage equal to 1/26 of the input voltage (range 0–3.3 V). It is intended for flight controllers with a 3.3 V analogue voltage-sensing input.

① Connect the **1/26 VIN** pad to the voltage-sensing input of the flight controller and the adjacent **G** pad to the flight controller's ground.

② In the flight controller firmware configuration (e.g. ArduPilot, INAV), set the voltage multiplier / scale corresponding to the 1:26 divider ratio according to the documentation of that firmware.

③ Compare the voltage shown by the flight controller with the battery voltage measured by a multimeter and fine-tune the scale if necessary.

※ The manufacturer does not specify a current sensor for this module. Current consumption must be measured with a different sensor.

5. Load capacity and protections

5.1 Continuous and peak current

Each output delivers up to 15 A continuously and up to 22 A peak. A continuous current of 15 A is only available at an input voltage of at least 15 V. The continuous load capacity decreases with increasing input voltage and higher output voltage. The manufacturer measured the following continuous current values for a single output (5 minutes of operation, room temperature 20 °C, no thermal shutdown):

Output	4–8S	9–10S	11–14S	15–20S
5.3 V	15 A	15 A	15 A	13 A
6.1 V	15 A	15 A	15 A	12 A
8.1 V	15 A	15 A	13 A	12 A
12.2 V	15 A	13 A	10 A	10 A

- Under continuous load, the board temperature stabilises at 80–90 °C after 5 minutes.
- The 22 A peak current is mainly relevant for servos, which are not continuously under high load. The continuous load must stay within the limits of the table.
- The values apply to loading a single output. When both outputs are fully loaded at the same time, provide the best possible cooling.

5.2 Protection functions

Thermal shutdown	at 150 °C
Overcurrent	protection with self-recovery
Output short circuit	tolerant for 1 s
Input overvoltage	85 V TVS diode
Input reverse polarity	**no protection**

※ The protection functions serve to limit damage in the event of a fault, not for normal operation. Do not overload the module; if the protections trip repeatedly, reduce the load or improve cooling.

6. Commissioning

6.1 First power-up and check

① Check all solder joints – no solder bridges between adjacent pads, no exposed wires.

② Use a multimeter to verify that the VIN and G input is not short-circuited and that the polarity of the wires matches the battery.

③ With the loads disconnected, connect the battery and measure the voltage at outputs V1 and V2. It must match the setting according to chapter 3.

④ If used, also measure the 1/26 VIN pad – the voltage should correspond to 1/26 of the battery voltage.

⑤ Disconnect the battery, connect the loads and power up again.

⑥ After a few minutes of operation under typical load, check the temperature of the module and the connected wires (carefully – risk of burns).

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Clean the module with a dry brush or compressed air. Do not use water or solvents.
- After a crash, inspect the board, heatsink and solder joints. Do not use a damaged module.
- The module has a standby current of 10–30 mA. Always disconnect the battery after use, otherwise it will gradually discharge.
- Store the module in a dry place, out of the reach of children, protected from dust and mechanical damage.

▶ Before each use of the model

- Check that the joints are not loose or damaged by vibration.
- Check that the heatsink is not covered or dirty.
- Verify that the battery voltage is within the 9–85 V DC range.

7.2 Troubleshooting

Problem	Possible cause and solution
No voltage at the output	The battery is not connected or its voltage is below 9 V. Check the input joints. If the input polarity was reversed, the module may have been destroyed.
Output voltage is wrong	Check the bridging of the OUT-1 / OUT-2 pads (chapter 3) – whether a different pad is bridged or solder residue remains.
Output switches off during operation	The thermal or overcurrent protection has tripped. Reduce the load, improve cooling and check that the load does not exceed the values in chapter 5.1. Below 15 V input, the full continuous current is not available.
Module is very hot	At full load a temperature of 80–90 °C is normal. Ensure airflow around the heatsink and do not cover it.
Flight controller shows wrong voltage	Set the scale for the 1:26 divider in the firmware and calibrate it against a multimeter (chapter 4.5). Check the ground connection.
Battery discharges even when the model is not in use	Standby current of the module. Always disconnect the battery after use.

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 manufacturer (MATEKSYS) and the type designation (PM20S-2) are printed directly on the printed 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

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.