ROTORAMA

330 µF / 25 V

Low-impedance electrolytic capacitor
Panasonic EEU-FR1E331 · Ø 8 × 11.5 mm



Read the entire manual before installation. The capacitor is polarised – it may burst or ignite if connected with reversed polarity or if its rated voltage is exceeded.

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1. Product description

1.1 What it is for

The 330 µF / 25 V low-impedance aluminium electrolytic capacitor is used to filter the input supply voltage. When driving the motors, electronic speed controllers (ESC) cause rapid current changes in the power wiring, which appear as voltage spikes and ripple. A capacitor connected to the power supply dampens these disturbances and thus protects the electronics of the drone.

Especially on powerful multirotors we recommend adding the capacitor to the power distribution board (PDB) or directly to the power pads of the ESC. The capacitor is connected in parallel with the power supply – positive lead to plus (+), negative lead to minus (−) – and soldered in place. The procedure is described in Chapter 3.



330 µF / 25 V electrolytic capacitor with radial leads

1.2 Technical data and package contents

Data according to the manufacturer's datasheet (FR-A series).

Product designation	**Panasonic EEU-FR1E331** (FR series)
Manufacturer	Panasonic Industry Co., Ltd., Toranomon Hills Station Tower 22F/23F, 2-6-1 Toranomon, Minato-ku, Tokyo 105-5523, Japan
Type	aluminium electrolytic capacitor, radial leads, low impedance
Capacitance	330 µF ±20 % (120 Hz, +20 °C)
Rated voltage	25 V DC
Dimensions (Ø × length)	8 × 11.5 mm (Ø ±0.5 mm, length ±1.5 mm)
Lead spacing / lead diameter	3.5 mm / 0.6 mm
Impedance (100 kHz)	0.056 Ω at +20 °C; 0.168 Ω at −10 °C
Rated ripple current	950 mA rms (100 kHz, +105 °C)
Dissipation factor tan δ	0.14 (120 Hz, +20 °C)
Operating temperature range	−40 °C to +105 °C
Endurance	6000 h at +105 °C
Package contents	1 capacitor
Not included	solder, soldering tools, wires, heat-shrink tubing and mounting material

※ The product name rounds the length to 12 mm; the nominal length according to the manufacturer is 11.5 mm.

2. Safety instructions

2.1 Polarity and voltage

The capacitor is polarised. Never apply reverse voltage to it and never exceed the rated voltage of 25 V. Doing so may cause rapid damage, electrolyte leakage, activation of the pressure relief vent and, in the worst case, explosion or ignition.

- Always check the polarity marked on the capacitor before connecting it.
- The sum of the DC voltage and the peak value of the ripple must not exceed the rated voltage. This also applies to short voltage spikes generated in the drone's power supply by the speed controllers – they can be considerably higher than the voltage of the battery itself.
- Do not exceed the rated ripple current. A capacitor loaded with excessive ripple current heats up and ages rapidly.

Voltage of a fully charged battery and suitability of a 25 V capacitor:

Battery	Li-Po (4.20 V/cell)	LiHV (4.35 V/cell)	25 V capacitor
2S	8.4 V	8.7 V	suitable
3S	12.6 V	13.05 V	suitable
4S	16.8 V	17.4 V	suitable
5S	21.0 V	21.75 V	not recommended – small margin for spikes
6S and more	25.2 V	26.1 V	**do not use** – rated voltage exceeded

2.2 Further rules

- Do not short-circuit the leads. The aluminium case is partly uninsulated and the outer sleeve has no guaranteed insulating function – the case must not touch conductive parts of the circuit.
- When the pressure relief vent activates, hot gas above 100 °C escapes (vaporised electrolyte, not smoke). Keep your face away and disconnect the power. Rinse affected eyes with water, rinse your mouth, and wash skin with soap.
- Do not use a capacitor that has been dropped on the floor, compressed, or previously installed in an energised circuit.
- Do not connect capacitors in series. Connect in parallel only capacitors with the same part number.
- Protect the capacitor from water, oil, condensation, direct sunlight and corrosive gases. Do not clean it with halogenated, alkaline or petroleum-based solvents, xylene or acetone.

3. Installation and use

3.1 Where to connect the capacitor

Connect the capacitor in parallel with the power supply as close as possible to the power pads of the speed controller (ESC) or the power distribution board (PDB). The shorter the leads and wires, the more effectively the capacitor dampens voltage spikes. If extension wires are needed, keep them as short as possible with an adequate cross-section and insulate the joints.

① Identify the polarity: the negative lead is marked on the capacitor sleeve with a stripe bearing a minus sign (−). On a new capacitor the positive lead is usually the longer one.

② Connect the positive lead (+) to the positive power pad and the negative lead (−) to the negative pad (GND).

3.2 Soldering

- When hand soldering, keep the tip temperature at 350 °C or less and the soldering time at 3 s or less per lead. The tip must not touch the case or the sleeve.
- Do not dip the capacitor body into molten solder – the heat raises the internal pressure and may destroy the capacitor.
- Form the leads so that no stress is applied to the capacitor body. Do not bend or twist the capacitor after soldering and do not hold the board by it. When desoldering, melt the solder completely first. Do not use highly active halogenated (chlorine- or bromine-based) flux.

3.3 Mounting and placement

- Secure the capacitor so that it does not move under vibration and impacts and the leads do not break off – for example with a cable tie or adhesive.
- Adhesives and conformal coatings must not contain halogenated solvents or chloroprene polymers; let them cure completely and leave at least 1/3 of the sealing part uncovered. Do not pot the capacitor in resin.
- Leave at least 2 mm of free space above the pressure relief vent on the top of the capacitor and do not route high-current wires above it. Do not place the capacitor near heat sources (power stage of the ESC, motors) or flammable materials.

3.4 Check before first power-up

- Before connecting the battery, check the polarity again and make sure that neither the leads nor the case touch other parts. For the first connection we recommend a short-circuit protector (smoke stopper). If the capacitor heats up noticeably during operation, disconnect the power immediately and check the polarity and voltage.

4. Service life, maintenance and storage

4.1 Inspection and replacement

The manufacturer specifies an endurance of 6000 h at +105 °C; at lower temperatures the service life is longer – a 10 °C reduction roughly doubles it. Due to the properties of the sealing rubber, however, the estimated service life does not exceed 15 years. At the end of its service life a capacitor may rapidly lose its properties, short-circuit or leak electrolyte.

Condition	What to do
bulging top or case, activated pressure relief vent	replace the capacitor immediately
traces of electrolyte, corrosion around it	replace the capacitor, clean and inspect the board
damaged or cracked sleeve, loose leads	replace the capacitor
capacitor heats up noticeably during operation	disconnect the power, check polarity, voltage and placement
sleeve turning brown after long operation at high temperature	according to the manufacturer, no effect on reliability

4.2 Storage

- Store at 5 °C to 35 °C and 45 % to 85 % relative humidity, away from direct sunlight.
- Do not store in environments with water, oil, condensation, corrosive gases, ozone or UV radiation, and protect the capacitor from impacts.
- During long-term storage without voltage, the leakage current may increase. For this series the manufacturer specifies a storage period of 12 months from the shipment inspection.

5. Information for the EU and Czech Market

5.1 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

5.2 Disposal



- 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.

6. 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 5.1.
- 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.