

DATA SHEET
SkelMod 170V
53F



- + Ultra-low ESR
- + Long lifetime - 1 million duty cycles
- + Integrated Ultracapacitor Management System for effective cell balancing
- + CAN bus communication
- + Liquid cooling
- + High Power output
- + IP66 Protection

SMA170V53FAF TECHNICAL SPECIFICATIONS

Electrical

	UNIT	VALUE
Rated voltage V_R	V	170
Surge voltage	V	180
Minimum monitoring voltage	V	30
Rated capacitance	F	53
DC 10 ms ESR (~AC100 Hz), rated	mΩ	10.3
DC 1s ESR (~AC 0.1 Hz), rated	mΩ	12.7
Maximum series voltage	VDC	920
Maximum peak current (for 1 s duration) ¹	A	2693
Short circuit current	kA	12.2
Maximum stored energy ²	Wh	212.7
Cells in total	pcs.	60
Cell type		SCA3200

Life

Life at 170 V and maximum operating temperature	1500 h
Shelf life @ RT, uncharged	10 years
Projected cycle life at RT between 170 V and 85 V	1 000 000 cycles
<i>Capacitance decrease 20% from rated value; resistance increase 100% from rated value</i>	

Temperature

Operating temperature range	-40 °C to +65 °C
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Ultracapacitor Management System

Cell balancing method	Controlled Resistive Balancing
Temperature reading	10 NTC sensors
Voltage monitoring/balancing	Individual Cell
Communication interface	CAN bus 2.0B
Nominal auxiliary supply voltage	24 V
Auxiliary supply voltage range	16-33 V
Auxiliary supply current	max. 0.02 A

Connectors

Power connectors	Amphenol Industrial PowerLok™ 300 (300 A continuous)
Auxiliary connector (IN)	Phoenix Contact Male M12 A coded 5-pos
Auxiliary connector (OUT)	Phoenix Contact Female M12 A coded 5-pos
Ground connector	M12 male thread
Liquid cooling connector	Hole G 3/8

Standards

International protection marking	IEC 60529, IP66
Isolation protection	IEC 60664-1, OV2
Vibration protection	ISO 16750-3, Table 14*
EMC immunity	IEC EN 61000-6-2
EMC emissions	IEC EN 61000-6-3

Energy

Max stored energy ²	Wh	212.7
Specific energy ³	Wh/kg	3.4
Energy density ⁴	Wh/L	3.9

Nominal Power (calculated from DC 10ms ESR, for comparison)

Power (matched impedance) ⁵	kW	701.5
Nominal specific power (matched impedance) ⁶	kW/kg	11.1
Nominal power density (matched impedance) ⁷	kW/L	12.7

Practical Power (calculated from DC 1s ESR, for engineering)

Power (matched impedance) ⁵	kW	568.9
Practical specific power (matched impedance) ⁶	kW/kg	9.0
Practical power density (matched impedance) ⁷	kW/L	10.3

Thermal Parameters (based on DC 1s ESR)**

Thermal resistance given at ΔT 30 °C (R_{th}) ⁸	°C/W	0.015
Thermal capacitance (C_{th})	kJ/°C	63.5
Maximum continuous current (ΔT 15 °C)	A	270
Maximum continuous current (ΔT 30 °C)	A	400
Maximum continuous current (ΔT 40 °C)	A	460

Physical Parameters

Typical mass	kg	63.0
Volume	L	55.2
Length x width x height	mm	820 x 550 x 183(207)*

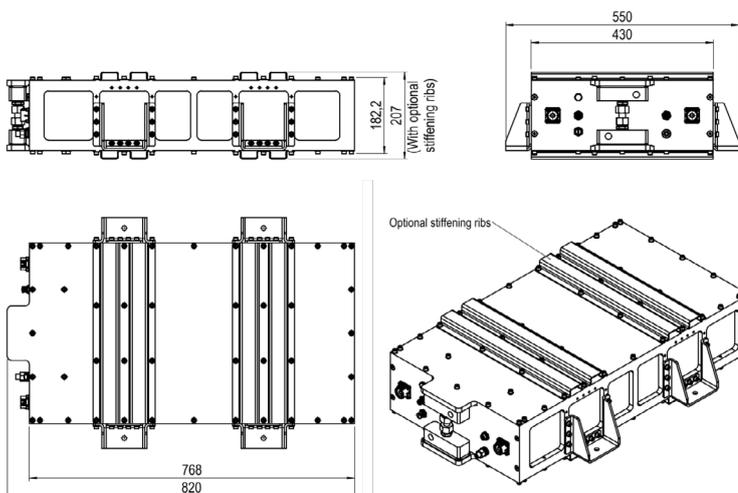
Package details

Package weight	kg	77.0
Package length x width x height	mm	920 x 630 x 370

* Height increase if optional stiffening ribs are used

** Thermal parameters given with coolant flowrate of 3 l/min

$$\begin{aligned}
 1 \text{ Maximum peak current (1s)} &= \frac{C \times \frac{1}{2} \times V}{C \times \text{ESR} + 1 \text{ s}} &
 2 \text{ } E_{\text{stored}} &= \frac{1}{2} \times C \times V^2 &
 3 \text{ } E_{\text{specific}} &= \frac{E_{\text{stored}}}{\text{mass}} &
 4 \text{ } E_{\text{density}} &= \frac{E_{\text{stored}}}{\text{volume}} &
 5 \text{ } P_{\text{max}} &= \frac{V^2}{4 \times \text{ESR}} &
 6 \text{ } P_{\text{specific}} &= \frac{P_{\text{max}}}{\text{mass}} \\
 7 \text{ } P_{\text{density}} &= \frac{P_{\text{max}}}{\text{volume}} &
 8 \text{ } R_{\text{th}} &= \frac{\Delta T}{\text{ESR} \times I^2}
 \end{aligned}$$



Standard markings

- + Name of Manufacturer, Part number, Serial number, Rated voltage
- + Negative and positive terminals, Warning marking
- + Rated current, Rated power, Short circuit current, Ambient temperature range, Auxiliary voltage and current, Weight

Notes

- + All information provided on this data sheet and all subsequent ultracapacitors sales and testing are subject to Standard Terms of Service (ToS) available on www.skeletontech.com, document *General Terms of Sale for Skeleton Technologies OÜ*
- + For ultracapacitors, the power values are often calculated using nominal resistance values (DC 10 ms ESR). For engineering purposes, practical values based on total resistance (DC 1s ESR) are preferred.
- + Mounting Recommendation: Please refer to the user manual for installation recommendations.
- + Rapid cooldown of the module using the liquid cooling needs to be avoided due to the risk of condensation within the module.

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