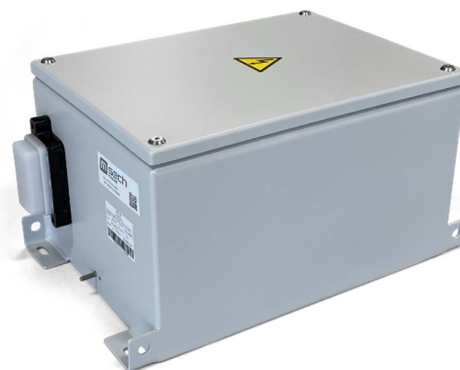


Product Datasheet

522V 2F module

- Rated voltage 522VDC
- 2F capacitance
- Resistive cell balancing
- Based on 360F hermetically sealed cells
- Robust and vibration proof design
- Typical use for wind turbine pitch-systems



ELECTRICAL SPECIFICATIONS

Type	M12S-522-0002
Rated Voltage V_R	522 V
Surge Voltage V_S^1	539 V
Rated Capacitance C^2	2 F
Capacitance Tolerance 3	0% / +20%
DC ESR ²	<360 mΩ
Leakage Current I_L^4	<31 mA
Constant Current ($\Delta T = 15^\circ C$) ⁶	TBD, cell 25 A
Max Current I_{Max}^7	TBD, cell 329 A
Short Current I_S^8	1.46 kA
Stored Energy E^9	78.3 Wh
Energy Density E_d^{10}	2.8 Wh/kg
Usable Power Density P_d^{11}	3.4 kW/kg
Impedance Match Power Density P_{dMax}^{12}	6.8 kW/kg

THERMAL CHARACTERISTICS

Type	M12S-522-0002
Working Temperature	-40 ~ 65°C
Storage Temperature ¹³	-40 ~ 70°C
Thermal Resistance R_{Th}^{14}	TBD °C/W
Thermal Capacitance C_{Th}^{15}	TBD J/°C

LIFETIME CHARACTERISTICS

Type	M12S-522-0002
DC Life at High Temperature ¹⁶	1500 hours
DC Life at RT ¹⁷	10 years
Cycle Life ¹⁸	1'000'000 cycles
Shelf Life ¹⁹	4 years

SAFETY & ENVIRONMENTAL SPECIFICATIONS

Type	M12S-522-0002
Safety	RoHS, REACH
Vibration	IEC60068-2-6
Shock	IEC60068-2-28, 29
Environmental Protection	IP54
Rated impulse voltage (IEC 60664-1)	4 kV
Insulation resistance	>100 MΩ

MONITORING AND CELL VOLTAGE MANAGEMENT

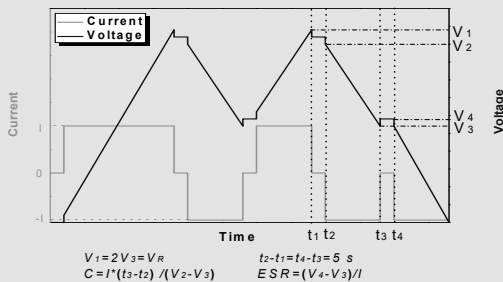
Type	M12S-522-0002
Cell Voltage Management	Passive balancing
Temperature monitoring	PT100 sensor

PHYSICAL PARAMETERS

Type	M12S-522-0002
Mass M	28 kg
Terminals ²⁰	Connector Harting, 6 – 16mm ²
Dimensions ²¹ Length	500 mm
Width	320 mm
Height	261 mm
Module Fixation Holes ²¹	4 x Ø11mm

NOTES:

- Surge voltage V_S : Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
- Capacitance C : The test current is 0.075 A/F, if the calculated current is >100A, then apply 100A.



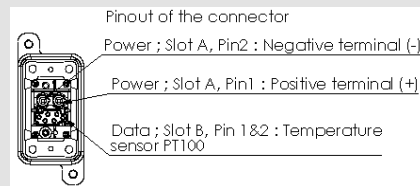
- Capacitance tolerance: Typical tolerance is +5%~+10%.
- Leakage current measurement procedure: 1) Charge the capacitor to the V_R with a constant current (0.075 A/F, if the calculated current is >100A, then apply 100A). 2) Hold the voltage at V_R for 72h. 3) The current to maintain V_R after 72 h is the leakage current.
- Self-discharge rate measurement procedure: 1) Charge the capacitor to V_R with a constant current (0.075 A/F, if the calculated current >100A, then apply 100A). 2) Hold the voltage at V_R for 3h. 3) Floating for 72h. 4) Measure the voltage after 72 h.
- Max constant working current: $I_{MCC} = \sqrt{\Delta T / (ESR \cdot R_{Th})}$
- Max current: $I_{Max} = 0.5C \cdot V_R / (\Delta t + ESR \cdot C)$, discharge from V_R to $V_R/2$ in 1 second.
- Short current: $I_S = V_R / ESR$
- Stored energy: $E = 0.5C \cdot V^2 / 3600$
- Energy density: $E_d = E / M$
- Usable power density: $P_d = 0.125V_R^2 / (ESR \cdot M)$
- Impedance match power density: $P_{dMax} = 0.25V_R^2 / (ESR \cdot m)$
- Storage temperature: Storage in discharge state.
- Thermal resistance: $R_{Th} = \Delta T / P$, where $P = ESR \cdot I^2$
- Thermal capacitance is indicated for the whole module.
- DC life at high temperature: Hold the module charged at rated voltage at 65°C for 1500h. The capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.
- DC life at RT: Hold the module charged at rated voltage at room temperature RT, the capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.

- Cycle life: Charge and discharged the module in the range between V_R and $V_R/2$. 5 seconds waiting period between charge and discharge. The constant test current is 0.075 A/F (if the calculated current >100A, then apply 100A).

- Shelf life: Discharged and no load applied at RT.

- Harting connectors:

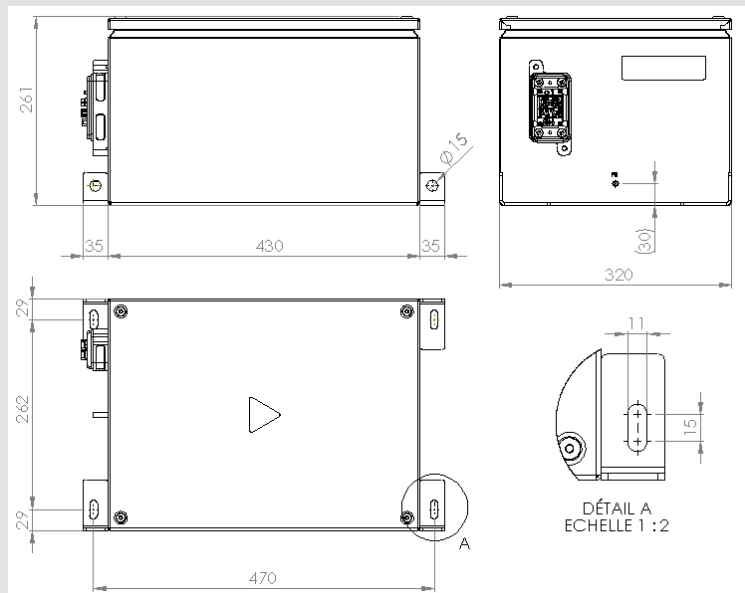
Module side PN: 09 40 006 0311 / 09 14 006 0371 / 09140022741 / 09140063001



Customer side (not included)

PN: 19 40 006 0511 / 09 14 006 0371 / 09 14 002 2642 / 09 14 006 3101

- Dimensions and position of fixation holes: See below drawing



Notes:

Standard markings:

- + Name of manufacturer, part number, serial number
- + Rated voltage and capacitance, negative and positive terminals, warning marking
- + Stored energy in watt-hours

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