Marine module 48P

High power lithium-ion module 48 V – 20 kW

Saft's **high power capability** Marine module 48P is a lithium-ion module with a rapid discharge profile ideally suited to the demands of power applications.

The Marine module 48P is built using Saft's proven lithium-ion technology enabling high power battery solutions with maintenance-free operation at significantly reduced weight.

Combining high operational reliability over thousands of cycles with outstanding energy efficiency, the modular design adapts through series or series/parallel connection to supply high power. Such systems can be adapted for hundreds of kW to fulfil customer requirements.

Applications

- Hybrid-electric and/or full electric propulsion
- Auxiliary systems, hotel load
- Emergency back-up
- Actuators
- Container handling systems
- Electric cranes

Features

- Rack-mount ETSI format
- Adapted for discharge times of 1 s up to 15 min
- Compact module integrating SAFT VL P Li-ion cells, module supervision and cell balancing
- Advanced industrial design offering highest reliability and robustness
- 20 years design life
- 10 C high power capability enabling highly dynamic charge/discharge profiles from any state of charge
- State of charge and state of health indication through BMM (Battery Management Module)

Benefits

- Ten times lighter than VRLA
- Increased energy in given space
- Easy system integration and up-scaling (19")
- High operational reliability
- Very long life time
- Preventive but not premature replacement at end of life
- Minimum maintenance throughout life time
- Low total cost of ownership

Nominal characteristics	
Nominal Voltage (V)	46.2
Capacity (C/5) (Ah)	28
Rated energy (C/5) (Wh)	1294
Volumetric power density (W/l)	1209
Gravimetric power density (W/kg)	1095
Mechanical characteristics	
Width (mm)	448
Height (mm)	131
Depth (mm)	293
Weight (kg)	19
Electrical characteristics at + 25°C/+ 77°F	
Voltage (V)	35 to 53.2
Maximum continuous discharge current (A)	200
Peak discharge current in 10 sec (A)	450
Maximum continuous recharge current (A)	60
Maximum continuous recharge current at high rate (A)	120
Recharge time (h)	As fast as 30 min
Module consumption (active mode)	5 V – 0.45 W
Insulation resistance (1000 V – OC)	>100 MΩ
Dielectric	3 kV rms
Maximum power (in W)	
10 s	20 800
5 min	13 900
Operating conditions	
Operating temperature	– 20°C/+ 60°C (– 4°F to + 140°F)
Cycle efficiency	96% to 99%
Self-discharge	<5% per month
Calendar lifetime at + 25°C/+ 77°F	>20 years
Cooling	Natural convection

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System capability

- Saft BMM (Battery Management Module) included in any system configuration
- Series connection of up to 12 modules plus one BMM for string management and interfacing
- Multi-string paralleling through MBMM (Master Battery Management Module)

Functional characteristics

High power lithium-ion battery system contains VL P cells with advanced nickel-based lithium-ion technology:

- Outstanding calendar and cycle life and reliability
- Stable internal resistance
- High energy density cells

Mechanical & electrical interface

- Vertical or horizontal implementation
- Stackable up to 8 modules
- Optional 3 U rack-mount brackets
- Power connectors on the front panel
- Installation in dedicated cabinets or containers with adequate mechanical design and ventilation

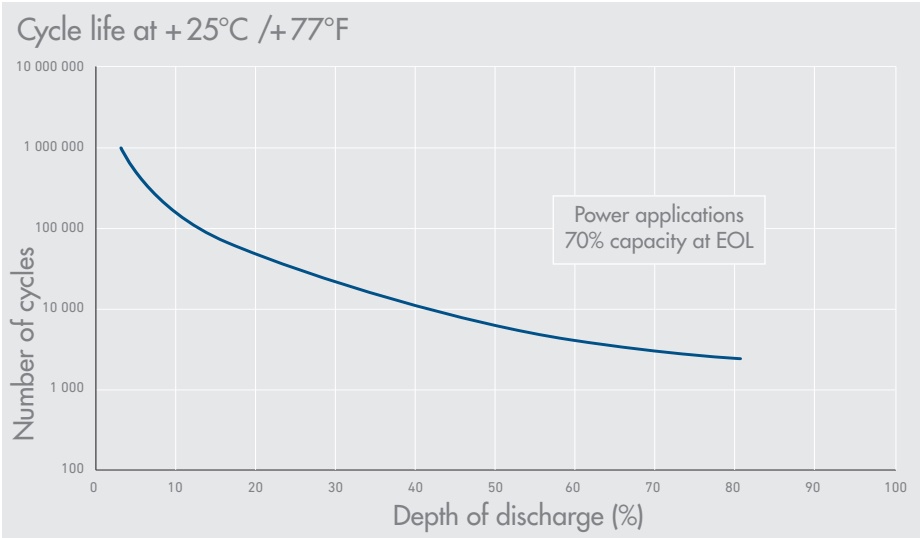
BMM communication

- 2 communication connectors on front panel
- CAN Open bus communication protocol carrying:
  - State of charge (SOC)
  - State of health (SOH)
  - Alarms
  - Operating conditions (voltage, temperature, identification number)
  - Operating limits (maximum voltage and current values in charge and discharge)
- Black box registering alarms (overcurrent, overvoltage, high temperature etc.) and the number of charge and discharge cycles.

Storage conditions	
Storage temperature	– 30°C/+ 70°C (– 22°F to + 158°F)
Storage duration	12 months (no electric maintenance)
Maximum altitude	3000 m above sea level
Maximum relative humidity	95% (non condensing)
Compliance to standards	
Cell safety	UL 1642
Module safety	EN 50178, cCSAus 60950, IEC 60950
United Nation Class	UN 3480
Hazard classification	Class 9
Transportation regulation compliance	UN recommendations for dangerous goods transportation, model regulations and manual tests and criteria 38.3
EMC	EN 61000-4-2 Class B / EN 61000-4-3 Class A / EN 614000-4-4 Class B / EN 614000-4-6 Class A / EN 55022 Class B
Protection class	IP 20

The Marine module 48P module has been developed and qualified along IEC 61508/SIL2 standards to suit the demanding requirements of performance and operational reliability of our customers, who are manufacturing or operating high-value, long life equipment.

Manufacturing plants comply with the legislation in force in each country and with international quality and environment standards (ISO 9001, QS 9000, ISO 14000).



Cycle life depends on both depth of discharge (DOD) and charging rates. The above results are based on testing at a fixed DOD and varying charging rates. The end of life (EOL) is reached when the remaining capacity is 70% of the initial capacity.

Safety

Safety driven design for cells, modules and systems guarantees safe behaviour in case of abuse usage or component failure. This includes:

- Stringent design rules and qualification processes
- Implementation of redundant safety features at cell level (e.g. shutdown effect separator, mechanical vent), at module level (e.g. electronic board, voltage and temperature monitoring, balancing), and at battery level (e.g. electronic board, power switch, current sensor).

Saft
Specialty Battery Group
12, rue Sadi Carnot
93170 Bagnolet - France
Tel. : +33 1 49 93 19 18
Fax : +33 1 49 93 19 69
www.saftbatteries.com

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