SUN-AIR
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Energy Storage Systems

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Lead-Acid Battery Formation Device with 120kW Capacity

Parameter	Value
Input voltage	400 V – 3ph
Output voltage	0-360 V DC
Output power	120 kW
Control hardware	DSP (Texas Instruments- C 2000) ARM CortexM3
Input THD	Less than 5%
Cooling system	Air
No. outputs	6 units
Battery type	Lead-acid
Switching technology	IGBT
Battery charging methods	CC-CV

This device consists of six independent units with charge and discharge capacity of 120kW and 60kW, respectively.

The main features of this product are:

a) working in both constant-current and constant-voltage modes,

b) bidirectional power flow for delivering the discharging energy to the grid,

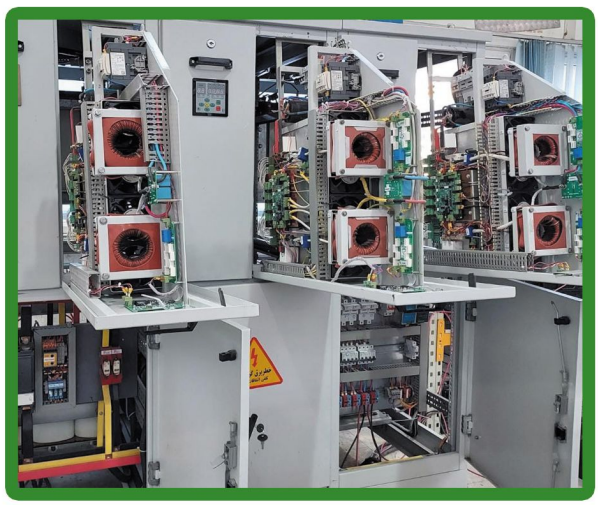
c) IGBT based structure,

d) meeting all standards related to grid-connection of distributed generation,

e) galvanic insulation,

f) satisfying all required protection protocols,

g) a user-friendly interface in order to manage formation process with capability of storing data with high rate and accuracy.



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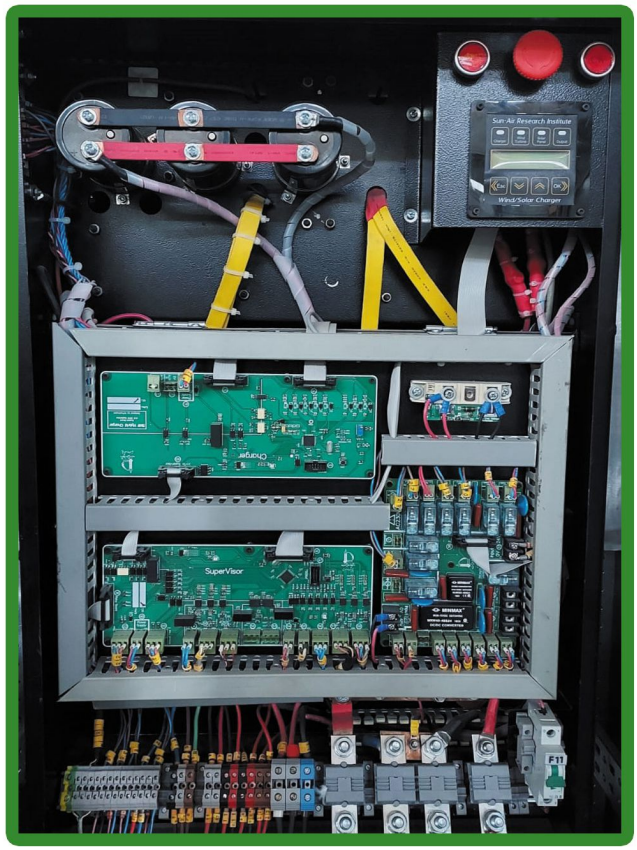
5kW Hybrid Charger

This charger is able to integrate a solar unit with 2kW power rating and a wind turbine with 3kW capacity. The maximum power point tracking of both sources is provided using this product. It is also able to provide a galvanic insulation and to work in both constant-current and constant-voltage modes.

Parameter	Value
Generator input voltage	100V – 220V RMS, 3ph
Solar panel input voltage	75-120V DC
Battery bank voltage	48V (42V-60V) DC
Output power of wind charger	3kW
Output power of solar charger	2kW
Control hardware	ARM CortexM3
Wind charge efficiency	86%
Solar charger efficiency	94%
Coolant	Air
Battery type	Lead-acid and Lithium-ion
Technology used in wind converter	IGBT
Technology used in Solar converter	MOSFET
Charging profile	CC-CV
Communication protocol	RS-485
Electrical insulation level	Galvanic insulation up to 2kV



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4kW Hybrid Charger

This product can also integrate solar and wind energy systems. The integrated wind and solar systems can have the power rating up to 3kW and 1kW, respectively. The maximum power point tracking of both sources is provided using this product. It is also able to provide a galvanic insulation and to work in both constant-current and constant-voltage modes.

Parameter	Value
Generator input voltage	100V – 220V RMS, 3ph
Solar panel input voltage	75-85V DC
Battery bank voltage	48V (42V-60V) DC
Output power of wind charger	3kW
Output power of solar charger	1kW
Control hardware	ARM CortexM3
Wind charge efficiency	84%
Solar charger efficiency	94%
Coolant	Air
Battery type	Lead-acid and Lithium-ion
Technology used in wind converter	IGBT
Technology used in Solar converter	MOSFET
Charging profile	CC-CV
Communication protocol	RS-485
Electrical insulation level	Galvanic insulation up to 2kV

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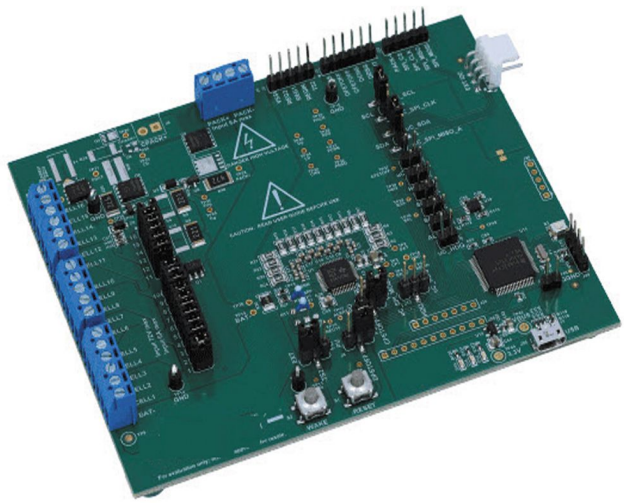
Battery Management System for Lithium-ion Battery Pack

A Battery Management System (BMS) for a 48V 50Ah lithium-ion battery pack is designed, which can be also used for managing 3 to 16 battery cells connected in series. To manage battery packs with higher voltage level, a few number of BMS can be stacked, creating a Master-Slave configuration.

The main features of designed BMS are:

- Managing variety of batteries such as: lithium-ion, lithium polymer, and lithium-iron –phosphate.
- Connecting 3 to 16 cell in series for each BMS board.
- Over-charge protection capability
- Over-discharge protection capability
- Over and under temperature protection capability
- Cell equalizing capability
- Graphical user interface
- State of charge estimation
- Voltage tolerant capability up to 80V.



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