POWIN

BATTERY ENERGY STORAGE SYSTEM

Stack230

PRODUCT LINE: Powin Stacks

Powin Stacks are modular, flexible, purpose-built battery arrays that are easily and cost-effectively scalable from kilowatts to megawatts. Powin's patented StackOS™ — the only seamlessly integrated EMS and BMS platform in the energy storage industry — comes installed in every Stack module. This cutting-edge battery system utilizes LFP cell technology, minimizing system footprint while maintaining a high level of safety. Powin Stacks can perform a full spectrum of advanced applications to fulfill today's energy storage requirements, and are flexible enough to support future use cases as markets change.

Stack230 & Stack360

- Specially designed for stationary storage applications
- Can be flexibly scaled to accommodate any energy need
- Optional Energy Management System for intelligent battery dispatch
- Controls interface can connect directly to any SCADA system
- Range of converter options available depending on application and best possible price
- Battery pack design can utilize cylindrical or prismatic cells
- Available in indoor & outdoor configurations

StackOS™ SOFTWARE PLATFORM

StackOS™ CONTROLS

- A dynamic energy management system that can serve myriad revenue streams simultaneously.
- Provides behind and in-front-of-the-meter applications that can optimize cell-level and balancing awareness, all observable through Powin and/or customer NOCs.
- Can be configured with 3rd party EMS allowing customersto still enjoy Powin's industry leading cell fidelity, global monitoring, deep analytics and advanced balancing function.
- Advanced applications include primary response to react to grid conditions, firming to forecast, peak shaving, PV smoothing, demand response and microgrid support.
- MESA 802 / SunSpec 103 & 123 compliant.

StackOS™ BATTERY MANAGEMENT & SAFETY

- Unprecedented depth of real-time battery system monitoring down to the cell level
- Patented battery management system aggregates battery data collected from Stacks for reporting to other systems, such as the EMS.
- 3-levels of control executing balancing configurations for health & safety among battery strings, packs and cells.
- Uses a distributed intelligence approach to build its battery system control hierarchy.
- Ensures that DC components of the system operate within safe margins and core battery reporting is performed correctly.
- Includes a standardized API Modbus TCP and MESA 802/SunSpec for compliance.

POWIN STACK TECHNICAL SPECIFICATIONS

		STACK230P		STACK230E	STACK360E	
Electrical	DC Voltage	760 - 937 V			1,193 - 1,470 V	
	Duration	1.5+ hrs		3+ hrs	3+ hrs	
	Maximum DC Energy Capacity	230 kWh		235 kWh	365 kWh	
	Rated DC Power	150 kW		58.3 kW	90.8 kW	
	DC Energy Capacity @ Rated Power[1,2]	225 kWh		233kWh	363 kWh	
	Duration @ Rated Power	1.5 hrs		4 hrs	4 hrs	
	Aux Load per Stack (Standby/Peak)[3]	84 W / 1,221 W			168 W / 2,045 W	
	Daily Aux Energy per Stack[4, 5]	7.0 kWh		8.8 kWh	13 kWh	
	Daily Aux Energy per Stack, Net of Balancing[5]	5 - 6 kWh			6 - 7 kWh	
Performance & Safety	Cycle Life[6]	4,745 cycles	6,789 cycles	7,300 cycles	7,300 cycles	7,300 cycles
	Calendar Life	20 years			20 years	
	Cell Model	EVE LF280K	CATL CB2W0	CATL CB310	EVE LF280K	CATL CB310
	DC Round Trip Efficiency @ Rated Power	93%		95%	95%	
	Cell Chemistry	Lithium Iron Phosphate (LFP)				
	Cell Operating Temperature Range[7]	20 - 35° C				
	Depth of Discharge	100%				
	Codes & Compliance[8]	UL9540A, UL1973, UN3480, UN38.3				
Mechanical	Weight (Approximate)	5,000 lbs (2,273 kg)			7,500 lbs (3,409 kg)	
	Enclosure Dimensions	4'4" W x 3'2" D x 6'5" H (1,321 mm x 965 mm x 1,956 mm)			6'2" W x 3'2" D x 6'5" H (1,880 mm x 965 mm x 1,956 mm)	
	Enclosure Type / Rating	NEMA 1 / IP20				
	Ambient Operating Temperature Range	-10° C to +45° C				
Software	BMS + EMS + Solar + Environmental Controls	StackOS™				
	Reporting + Optimization + Data Warehouse	StackOS+™				
	First Responder HMI	Powin for First Responders™				
	Communications Interface	Modbus TCP (MESA/Sunspec) & REST API				

1 Energy capacity is recorded at the DC bus and varies by use case; contact Powin for an accurate estimate

2 Power / Energy for 3-hr applications: Stack230E = 77 kW / 231 kWh & Stack360E = 120.3 kW / 361 kWh

3 Peak values are atypical and assume maximum active cell balancing current within a Stack

4 Includes recoverable active balancing energy during charge / discharge

5 Assumes 1 full cycle per day; includes Stack-level fans but not HVAC

6 Assumes 1 full cycle per day and includes calendar aging for the day; cycle EOL SoH: EVE LF280L = 60.9% (1.5hrs+) or 60.9% (3hrs+), CATL CB2W0 = 60.9%, CATL CB310 = 66.6%

7 HVAC designed to maintain all cells near 25° C; full operating range 5 - 45° C; power derated at low temperatures

8 Current and expected