SmartLi Series

Introduction

SmartLi is a battery energy storage system developed by Huawei for UPS, which has the features of safety and reliability, long lifespan, space saving and easy maintenance. LFP is the safest cell of Li-ion battery. The unique active current balance control technology supports the mix use of new and old batteries, which reduces Capex (Capital Expenditure). Three-level BMS system realizes intelligent battery management with Huawei UPS and Network management system, which reduces Opex (Operating Expense).

SmartLi 3.0 ST

Application Scenarios

- Data centers in headquarter or disaster recovery data centers
- Internet data centers
- Large cloud computing data centers

Features & Value

Reliable

- Long cycle lifespan, cycle lifetime can be up to 5000 times
- Highly stable LFP cell, no fire after thermal runaway
- Three-level BMS system ensures reliability
- Battery Module-level fire extinguishing, precise and quick fire fighting

Efficient

- High power density, saving 70% footprint
- Smart BMS system, saving 80% routine O&M costs

Simple

- Active current balance control, supporting new and old battery cabinets mixed using, flexible to expand
- Smart active voltage balance control, Battery strings of different numbers of lithium batteries can be connected in parallel ①
- Automatic grouping and capacity check, reducing manual capacity test costs and avoiding power failure risks

①If a single module is faulty, remove the faulty module and connect the other modules in series to restart the system.

System Specifications

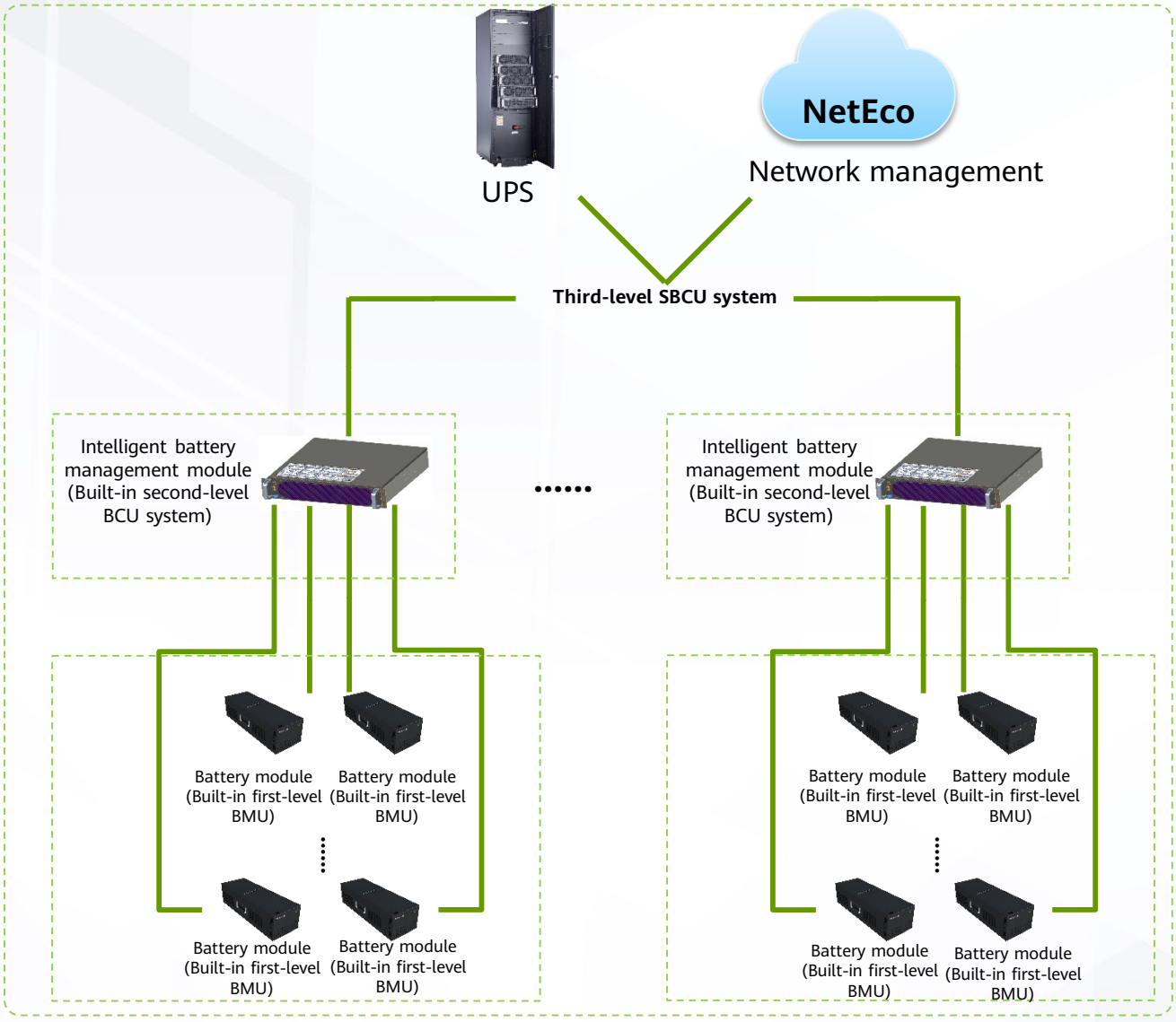
Item		Description
Basic Parameters	Product Model	SmartLi
	Battery Cell Material	LiFePO4(6C)
	Charging Current	≤ 1C, 0.5C by default
	Maximum discharge current (battery module)	459A
	Maximum discharge current (battery cabinet)	630A（6+6）（7+7）（8+8），315A（6+0）（7+0）（8+0）
	Cycle Life	5000 cycles @ 50% DOD
	Nominal Capacity	162Ah / 82.94kWh（8+8）；162Ah / 72.57kWh（7+7）；162Ah / 62.20kWh（6+6）；
	Capacity for calculating the backup time②	153Ah / 78.33kWh（8+8）；153Ah / 68.54kWh（7+7）；153Ah / 58.75kWh（6+6）；
	Weight	1100kg（8+8）；1000kg（7+7）；900kg（6+6）
	Dimension (W*D*H)	600mm*850mm*2000mm
	Self Discharge	≤5% (0-30℃/3 months)
	Fire protection	Module-level
	Communication Interface	FE, RS485, Dry contacts
	Protection	Over temperature, over current, short circuit, over charge/discharge, etc.
	Design Life	15 years
	Certification	UL1642，UL1973, UN38.3, UL9540A, IEC62619，IEC62133, ,IEC62477, IEC62040
	Compatibility	Huawei UPS, third-party UPS/HVDC
	Discharge capability	300 kW@10 minutes or 200 kW@15 minutes (7+7, 20-30° C)
	IP Protection Level	IP21 according to IEC60529 standard
Environment	Storage Temperature	0°C - 40°C
	Transportation Temperature	-40°C to 60°C
	Operating Temperature	0°C - 40°C (20-25° C is recommended)
	Relative Humidity	5% - 95%
	Max. Operating Altitude	0 - 4000m. Derating is required if the altitude exceeds 1000 m*

Battery Module and Cabinet Specifications

	Cell	Module	Full Cabinet	Half Cabinet
Configuration	Single cell	20S3P	2 groups	1 group
Nominal Capacity	27Ah	81Ah	162Ah	81Ah
Capacity for calculating the backup time	25.5Ah	76.5Ah	153Ah	76.5Ah
Nominal Voltage	3.2Vdc	64Vdc	512Vdc(8+8) 448Vdc(7+7) 384Vdc(6+6)	512Vdc(8+0) 448Vdc(7+0) 384Vdc(6+0)
Charging Voltage	3.4Vdc	68Vdc	544Vdc(8+8) 476Vdc(7+7) 408Vdc(6+6)	544Vdc(8+0) 476Vdc(7+0) 408Vdc(6+0)
Dimension(W*D*H: mm)	21*100*140	210*765*160	600*850*2000	600*850*2000
Weight	605g	50kg	1000kg@7+7	650kg@7+0

② The backup time is calculated based on the capacity 68.54 kWh and the capacity under different backup time or discharge rates. 68.54kWh=25.5Ah*3*2*3.2V*20*7 (The battery cell is 27 Ah. The margin is calculated based on the reserved 25.5 Ah. For details, refer to the battery cell certification report.)

Monitoring


UPS
NetEco
Network management
Third-level SBCU system
Intelligent battery management module (Built-in second-level BCU system)
Intelligent battery management module (Built-in second-level BCU system)
Battery module (Built-in first-level BMU)
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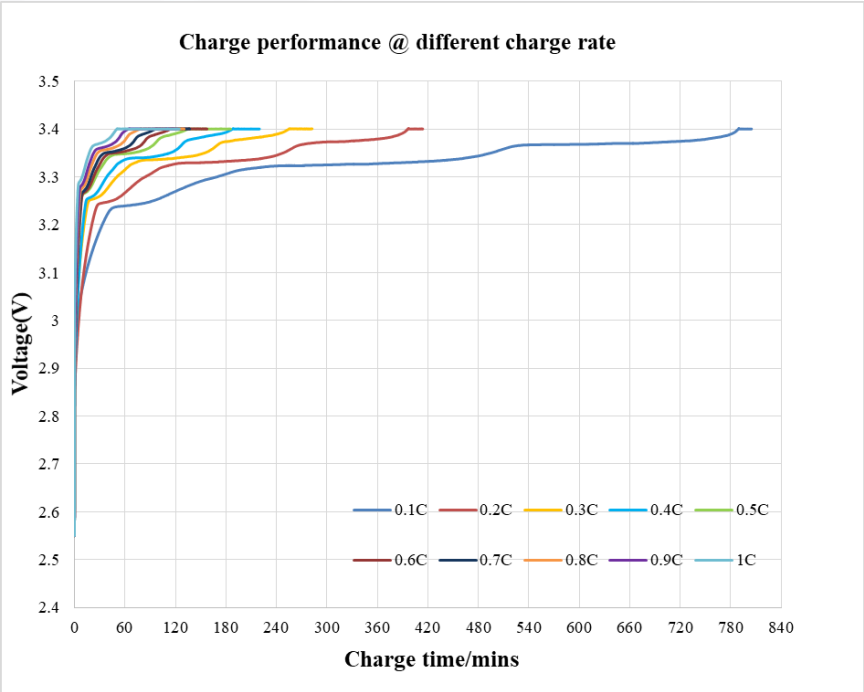
Monitoring

	BMU	BCU	SBCU
Monitored Object	Battery Pack	Battery Rack	System
Function Description	• Measure the cell voltage, temperature. • Electrochemical cell voltage equalization; • Communicates with the BMS. • Save the battery module fault information	• Manages all BMUs • Collects statistics on the battery voltage, temperature, SOC, and SOH, and reports the statistics to the SBCU. • Detects the charge and discharge currents of battery strings to adjust the parallel current sharing. • Protects the hardware and batteries against exceptions, disconnects the loop in a timely manner when an exception occurs, and reports the exception to the SBCU. • Save the battery cabinet fault information.	• Displays the total voltage, SOC, SOH, current, and temperature of the battery system, and battery information of each battery cabinet. • Receives common parameters reported by each BCU and saves local data. • Receives alarms and protection events reported by the BCU and saves the events locally. • Communicates with the UPS, provides human-machine interaction, communications ports, and permission management for local and remote operations, sets battery management system parameters, and upgrades programs.
Measurement Parameter	Cell voltage	Cabinet Voltage	System Voltage
	Cell temperature	Cabinet Current	System Current
Measurement Precision	±0.01V (Cell voltage) ±2℃ (Cell temperature)	±0.3V (Module voltage) ±2% (current＞40A); 3A (current＜40A)	±1% (voltage) ±5% (SOC)
Display information	Battery Module Cell Voltage	Battery Cabinet Voltage	Battery System Voltage
	Battery Module SOH	Battery Cabinet Current	Battery System Current
	Battery Module SOC	Battery Cabinet SOC	Battery System SOC
	Battery Module Maximum Cell Voltage	Battery Cabinet SOH	Battery System SOH
	Battery Module Minimum Cell Voltage	Battery Cabinet Maximum Cell Voltage	Battery System Maximum Cell Voltage
	Battery Module Maximum Cell Temperature	Battery Cabinet Minimum Cell Voltage	Battery System Minimum Cell Voltage
	Battery Module Minimum Cell Temperature	Battery Cabinet Maximum Cell Temperature	Battery System Maximum Cell Temperature
		Battery Cabinet Minimum Cell Temperature	Battery System Minimum Cell Temperature
		Discharge Times	Battery Capacity
		Discharge Capacity	Discharge Times
			Discharge Capacity

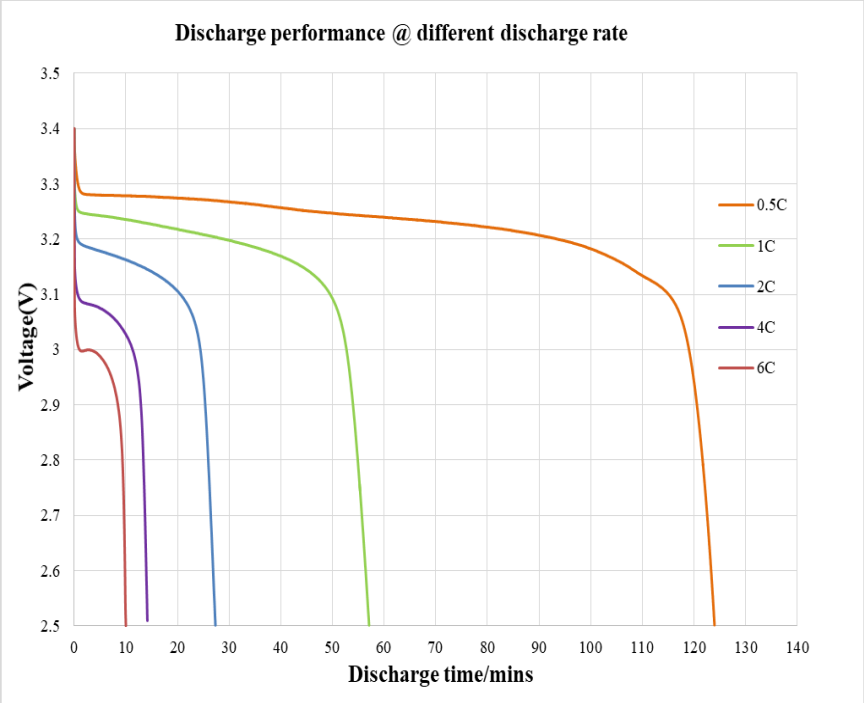
Protection Function

Alarm Type	Alarm Description	Alarm Cause	Alarm Acknowledgment Time	Solution
Battery charge protection	Battery charging low temperature protection	The battery temperature is lower than 0° C.	30 seconds	Alarm, charging stop
	Battery charge overtemperature protection 1	The battery temperature exceeds 60° C.	30 seconds	
	Battery overvoltage protection 1	The battery voltage is higher than 3.65 V.	1 second	Stop charging
	Battery string overvoltage protection 1	The battery string voltage is greater than 3.525NV.	1 second	
	Battery cluster overvoltage protection 1	The battery string voltage is greater than 3.525NV.	1 second	
	Battery overvoltage protection 2	The battery voltage is higher than 3.9 V.	1 second	Disconnect the battery switch.
	Battery charge overtemperature protection 2	The battery temperature exceeds 67° C.	30 seconds	
	Battery string overvoltage protection 2	The battery string voltage is greater than 3.65 N V.	1 second	
	Battery cluster overvoltage protection 2	The battery string voltage is greater than 3.625 N V.	1 second	
	Battery charging overcurrent protection	Greater than 300 A	20 ms	
Battery discharge protection	Battery low voltage protection 1	The battery voltage is lower than 2.5 V (the value range is 2.5 V to 2.8 V).	600 ms	Alarm, discharge termination
	Battery discharge overtemperature protection 1	The battery temperature exceeds 65° C.	20 seconds.	
	Battery string low voltage protection	The battery pack voltage is less than 2.55N V	2 seconds	
	Battery cluster low voltage protection	The battery cluster voltage is lower than 2.55NV.	2 seconds	
	Battery low voltage protection 2	The battery voltage is lower than 2.3 V.	700 ms	Turn off the battery switch.
	Battery discharge low temperature protection	The battery temperature is lower than 0° C.	30 seconds	
	Battery discharge overtemperature protection 2	The battery temperature exceeds 67° C.	10 seconds	
	Battery discharge overcurrent protection	Greater than 930 A (7 + 7 full cabinet)	12 seconds.	
Battery charge alarm	Battery charging low temperature alarm	The battery temperature is lower than 5° C.	30 seconds	Alarm
	Battery charge overtemperature alarm	The battery temperature exceeds 55° C.	60 seconds	
	Battery overvoltage alarm	The battery voltage is higher than 3.8 V.	5 seconds	
	Battery cluster overvoltage alarm	The battery cluster voltage is greater than 3.55 N V.	5 seconds	
	Battery string overvoltage alarm	The battery string voltage is greater than 3.60 N V.	5 seconds	
	Battery charge overcurrent alarm	Greater than 192 A	5 seconds	
Battery discharge alarm	Battery discharge low temperature alarm	The battery temperature is lower than 5° C.	30 seconds	Alarm
	Battery discharge overtemperature alarm	The battery temperature is higher than 60° C.	30 seconds	
	Battery low voltage alarm	The battery voltage is lower than 2.9 V and the SOC is less than or equal to 60%.	5 seconds	
	Low battery string voltage alarm	The battery string voltage is lower than 2.95 N V and the SOC is less than or equal to 60%.	5 seconds	
	Low battery cluster voltage alarm	The battery cluster voltage is below 2.8N V.	5 seconds	
	Battery discharge overcurrent alarm	Greater than 870 A (7 + 7 full cabinet)	10 seconds	
	cell voltage imbalance	The highest voltage of the cell is greater than or equal to 3.3 V and the voltage difference between the cell and the lowest voltage is greater than or equal to 500 mV.	60 minutes	Alarm
	Cell temperature imbalance	Difference between the highest temperature and the lowest temperature of the cell ≥ 20° C	5 minutes	Alarm
Battery health alarm	Battery string replacement alarm	Battery string SOH < 70%	Immediately	Alarm

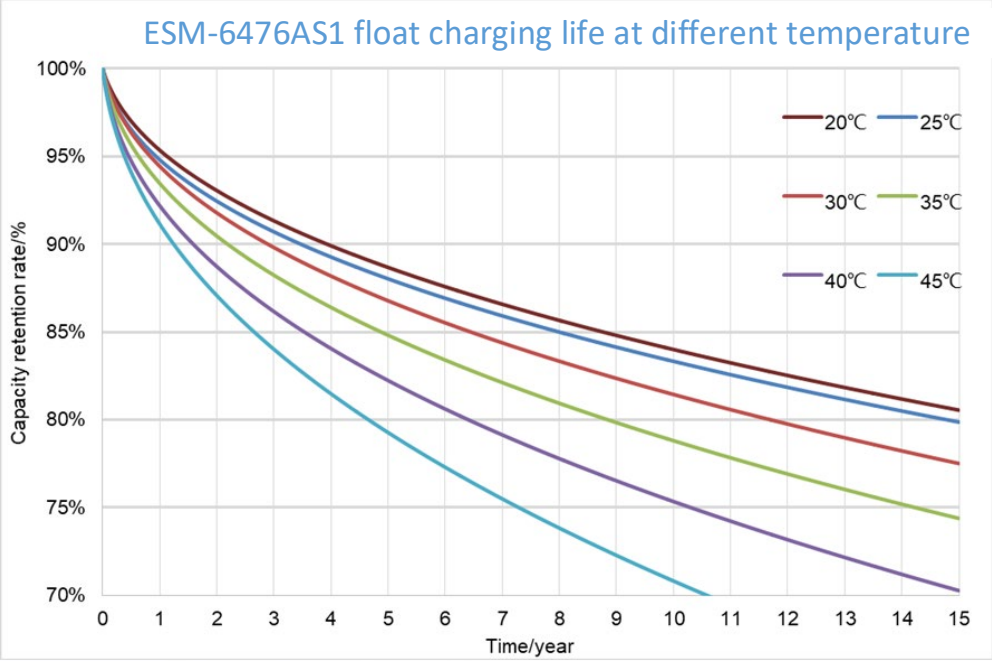
Charge at Different Charging Tate



Discharge at Different Discharge Rate



Lifetime at Different Temperature



Cycle Lifetime at Different Temperature and DOD