HOPEWIND

Stock Code: SSE-603063

Energy Storage Product Brochure

www.hopewind.com

Shenzhen Hopewind Electric Co., Ltd. (Stock Code: 603063) focuses on the R&D, manufacturing, sales and services of renewable energy & electric drive products, with main products of wind power generation products, photovoltaic generation products, energy storage products, power quality products and electric drive products. Furthermore, Hopewind owns integrated independent R&D and testing platforms of high-power power electronic equipment and monitoring system. Through innovation in technology and service, Hopewind continuously creates value for customers, and has become one of China's most competitive enterprises in the renewable energy field.

In the field of power conversion system, Hopewind provides competitive common AC/DC energy storage overall solutions, including power conversion system (PCS), PCS station, and complete energy storage system. Relative PCS and ESS products have obtained certifications and test reports from CGC, TUV, CQC, IEC, CEPRI HLVRT (including ZVRT), etc.

【Honors】

National Science and Technology Progress Award

Laboratory Qualification Approved by CNAS

National High-Tech Enterprise

【System Certifications】

ISO 9001:2015

ISO 14001:2015

ISO 45001:2018

Headquarter · Shenzhen

4 R&D and manufacturing bases: Shenzhen, Suzhou, Xi'an, Heyuan

30+ global service bases: Deployed worldwide to provide comprehensive services for global customers

Contents

Grid side, Generation side, User Side

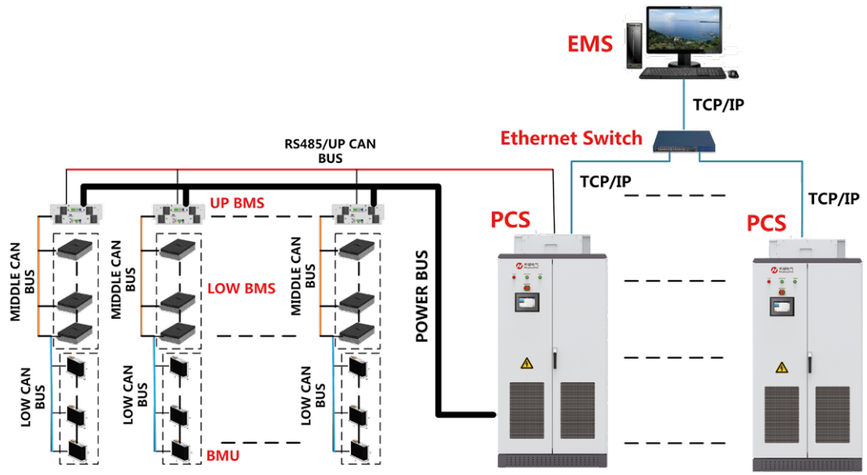
By adding the energy storage system in the power grid, it can realize peak load shifting, frequency and peak adjustment, smooth the power generation and user side's energy as well as improve the quality of the power grid.

Specifically including:

1. Realize primary frequency modulation and secondary frequency modulation control, monitor load fluctuations in real time, respond quickly to grid dispatching, improve grid frequency stability, and improve grid quality.
2. Improve the instability of the output power of wind power/photovoltaic power stations, especially the impact of transient power on the power grid, thereby improving the power quality of new energy power stations and power grids.
3. Reduce the fluctuation instability of the user side power, smooth the power, improve the utilisation of user side capacity, and reduce the transformer capacity and the basic electricity cost of the user side.
4. According to the difference between the peak and lowest electricity prices, the PCS charges when the electricity price is low, and discharges when the electricity price is high to obtain certain economic benefits.

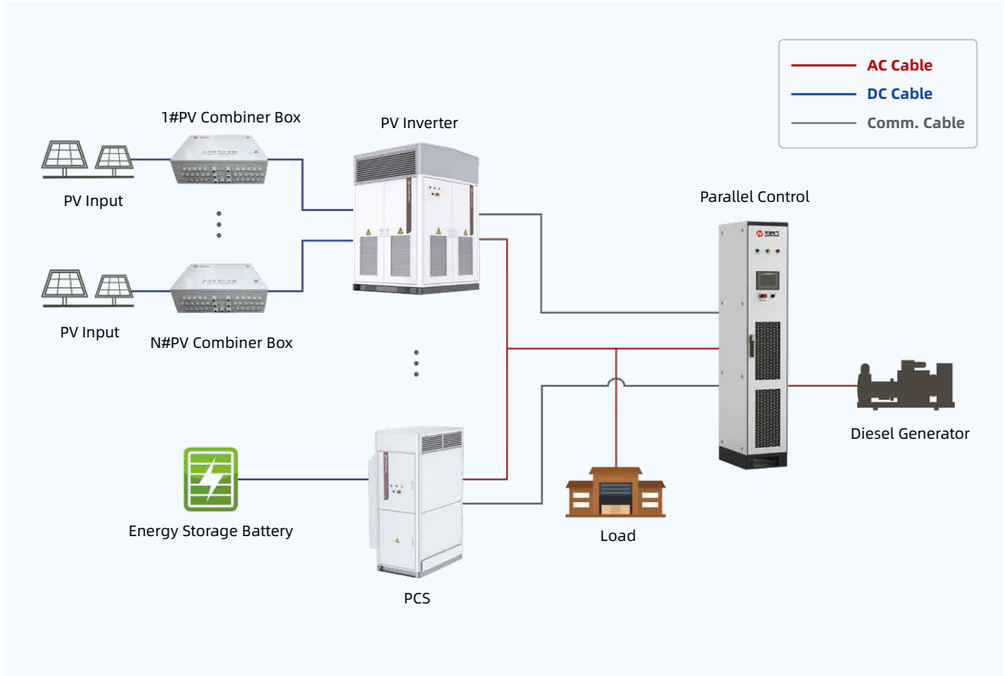
An energy storage system includes an energy storage battery, a power conversion system (PCS), a box-type transformer, an energy management system (EMS), and a battery management system (BMS).

Energy Storage System Block Diagram



Off-grid/Micro-grid Application

The energy storage system can be combined with new energy power generation system (such as wind power and photovoltaic power) and diesel generator system to form an off-grid or micro-grid system to solve the electricity demand of users in islands or remote areas of power grids with unstable power supply.



In the above micro-grid system:

1. Select the capacity of the PCS according to the required power of the load. If the power of the load is large and multiple PCSs are needed for expansion, the parallel control cabinet is required.
2. The isolation transformer can be placed independently on the outside or built in the PCS.
3. When off-grid operation, PCS acts as a voltage source to supply power to the load, while it absorbs energy from the PV, the excess is charged into the storage battery.

(1) When the power of the PV input port of the PCS is less than the AC output power, the energy storage battery begins to discharge.

(2) When the energy storage battery is discharged to a certain extent and may be difficult to support the load, the diesel is turned on, and the PCS is switched from the off-grid operation to on-grid operation connected to DG and supply power.

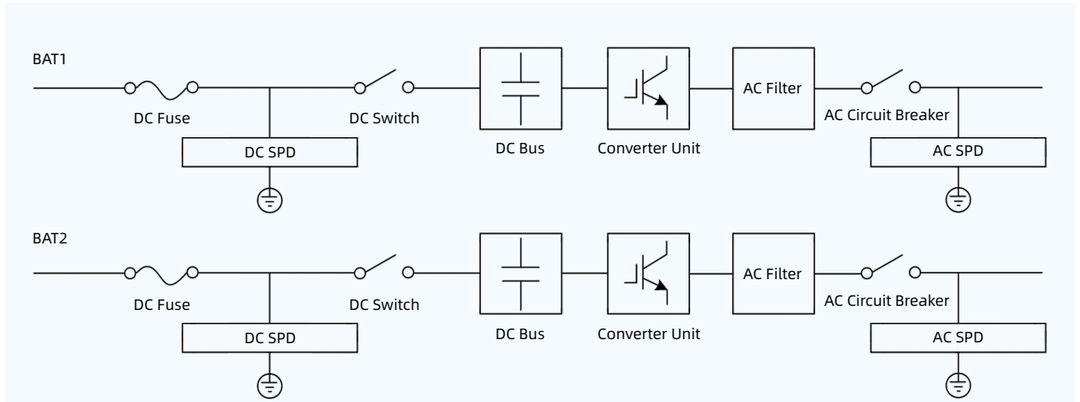
(3) When the power of the PV input is increased to above the load power, the diesel is turned off, and the PCS is automatically switched to the off-grid operation.

>> hopePCSHV Series Power Conversion System

Features

- Compact size, with a floor area of 1700 mm x 1000 mm, achieving a 45% reduction in size.
- Use of the three-level technology to achieve a highest efficiency of 99.01%.
- Intelligent heat exchange technology, enabling the equipment to operate without derating at an ambient temperature of 45℃.
- IP66 protection for the entire unit, with C3-C5 corrosion protection available.
- Support for multiple operation modes including PQ, VF, and VSG, along with grid-forming functions.
- That are compatible with various energy storage media such as lithium batteries, sodium-ion batteries, and flow batteries, Hydrogen fuel cells, and supercapacitors.

Product Principle



Specifications

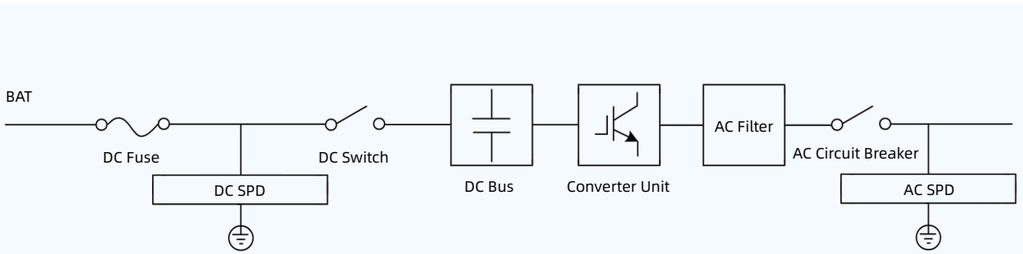
Model		2400kW	2750kW	3150kW	3450kW
DC Parameters	DC Voltage Range	696V~1500V	800V~1500V	920V~1500V	1000V~1500V
	Max. DC Current	1935A*2			
	Number of DC Input Channels	2			
AC Parameters	Rated Power	2400kW	2750kW	3150kW	3450kW
	Max. Output Power	2640kVA	3025kVA	3465kVA	3795kVA
	Q Range	0~2520kvar	0~2888kvar	0~3308kvar	0~3623kvar
	AC Rated Current	2886A			
	AC Connection	3W+PE			
	Isolation	No Isolation			
On-grid Mode	Rated Grid Frequency	50Hz / 60Hz			
	THDi	<3% (Rated Power)			
	Power Factor	-1~1			
	Switching T Charge/Discharge	<30ms			
	Voltage Regulation Accuracy	±1%			
	Current Regulation Accuracy	±2%			
Off-grid Mode	Rated Output Voltage	480V	550V	630V	690V
	Voltage Unbalance	2%, Short time <4%			
	THDu	3% (Without load or resistive load)			
	Voltage Transient Range	<10% (Resistive load/balanced load. Load change suddenly from 20% to 100% or from 100% to 20%)			
	Overvoltage Protection	Settable Value			
	Under-voltage Value	Settable Value			
Mechanical Parameters	Grid Type	IT			
	Max. Efficency	99.01%			
	Ambient Temperature	-40℃~+60℃ (Derating above 45℃)			
	Humidity Range	0~100% (No Condensation)			
	Altitude	<5000m (Derating above 3000m)			
	Noise	75dB			
	DI Port	4pairs			
	DO Port	1pairs			
	Anti-corrosion	C3 (C4 / C5 is optional)			
	SPD	Type II SPD (8 / 20μs)			
	Surge Protection	DC Type II / AC Type II			
	Wiring Method	Bottom in and bottom out			
	Protection Degree	IP66			
	Cooling Method	Intelligent Heat Exchange			
	HMI Interface	Touch Screen			
	Communication	Ethernet, RS485			
	Communication Protocol	Modbus TCP / RTU, IEC61850, IEC104			
	Dimensions (W*H*D)	1700*2633*1319mm (Heat exchanger included)			
	Weight	2300kg			
	Certification	CGC, HVRT / LVRT			

>> hopePCSHVS Series Power Conversion System

Features

- Fully compatible with the 5 MWh battery container.
- Use of the three-level technology to achieve a highest efficiency of 99.01%.
- Intelligent heat exchange technology, enabling the equipment to operate without derating at an ambient temperature of 45℃.
- IP66 protection for the entire unit, with C3-C5 Anti-corrosion class available.
- No derating required within an altitude of 4,000m.
- Support for 150% overload capacity for 10 seconds, along with grid-forming functions.
- Support for multiple operation modes including PQ, VF, and VSG.
- Adaptable to various energy storage media such as lithium batteries, sodium-ion batteries, flow batteries, hydrogen fuel cells, and supercapacitors.

Product Principle



Specifications

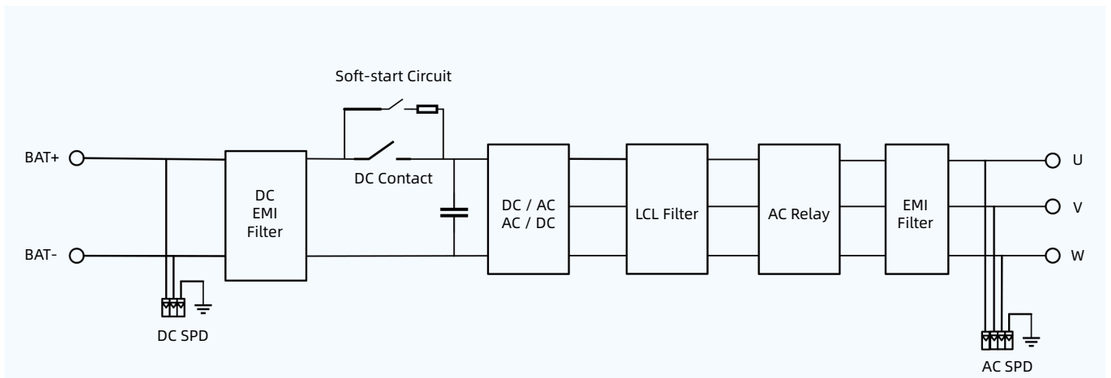
Model		1450kW	1740kW	1993kW	2283kW	2500kW	2750kW
DC Parameters	DC Voltage Range	580V~1500V	696V~1500V	800V~1500V	920V~1500V	1000V~1500V	1000V~1500V
	Max. DC Current	2551A					2806A
	Number of DC Input Channels	1					
AC Parameters	Rated Power	1450kW	1740kW	1993kW	2283kW	2500kW	2750kW
	Max. Output Power	1595kVA	1914kVA	2192kVA	2511kVA	2750kVA	3025kVA
	Q Range	0~1522kvar	0~1827kvar	0~2093kvar	0~2397kvar	0~2625kvar	0~2888kvar
	AC Rated Current	2301A					2531A
	AC Connection	3W+PE					
	Isolation	No Isolation					
On-grid Mode	Rated Grid Frequency	50Hz / 60Hz					
	THDi	<3% (Rated Power)					
	Power Factor	-1~1					
	Switching T Charge/Discharge	<30ms					
	Voltage Regulation Accuracy	±1%					
	Current Regulation Accuracy	±2%					
Off-grid Mode	Rated Output Voltage	400V	480V	550V	630V	690V	690V
	Voltage Unbalance	2%, Short time <4%					
	THDu	3% (Without load or resistive load)					
	Voltage Transient Range	<10% (Resistive load/balanced load. Load change suddenly from 20% to 100% or from 100% to 20%)					
	Overvoltage Protection	Settable Value					
	Under-voltage Value	Settable Value					
Mechanical Parameters	Grid Type	IT					
	Max. Efficency	99.01%					
	Ambient Temperature	-40℃~+60℃ (Derating above 45℃)					
	Humidity Range	0~100% (No Condensation)					
	Altitude	<5000m (Derating above 4000m)					
	Noise	75dB					
	DI Port	4pairs					
	DO Port	1pairs					
	Anti-corrosion	C3 (C4 / C5 is optional)					
	SPD	Type II SPD (8 / 20μs)					
	Surge Protection	DC Type II / AC Type II					
	Wiring Method	Bottom in and bottom out					
	Protection Degree	IP66					
	Cooling Method	Intelligent Heat Exchange					
	HMI Interface	Touch Screen					
	Communication	Ethernet, RS485					
	Communication Protocol	Modbus TCP / RTU, IEC61850, IEC104					
	Dimensions (W*H*D)	1700*2633*1319mm (Heat exchanger included)					
	Weight	2300kg					
	Certification	CGC, HVRT / LVRT					

>> ESHV Series Power Conversion System

Features

- Use of the three-level technology to achieve a highest efficiency of 99%.
- Compact size and high power density.
- Modular design for precise management of battery rack.
- IP66 protection, with C3~C5 anti-corrosion classes available for strong environmental adaptability.
- Support for parallel connection of multiple modules for flexible configuration.
- Support for PQ, VF, and VSG functions.

Product Principle



Specifications

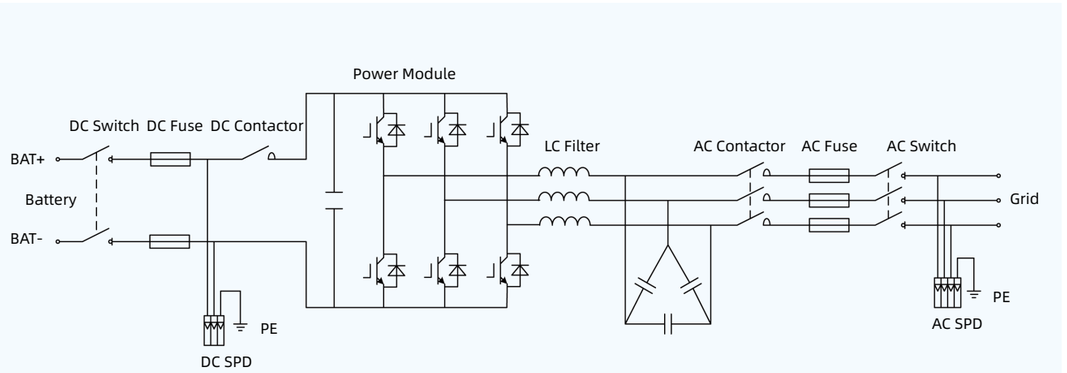
Rated Power		186kW	215kW	250kW
DC Input	DC Voltage Range	1000~1500V		
	Max. DC Current	209A	241A	281A
AC Output	Rated Power	186kW	215kW	250kW
	Max. Output Power	205kVA	237kVA	275kVA
	Q Range	0~195kvar	0~226kvar	0~263kvar
	AC Connection	3W+PE		
	Isolation	No Isolation		
On-grid	Rated Gird Voltage	690V		
	Voltage Range	586V~759V		
	Rated Gird Frequency	50Hz		
	Frequency Range	45Hz~55Hz		
	THDi	<3% (at rated power)		
	Power Factor	-1~1		
	Charge-Discharge Switch Time	<20ms		
Off-grid	Rated Output Voltage	690V		
	Voltage Imbalance	<2%, No more than 4% in a short period of time		
	THDu	<3% (No load or rated resistive load)		
	Voltage Transient Range	<10% (Resistive load/balanced load. Load change suddenly from 20% to 100% or from 100% to 20%)		
	Overvoltage Protection	Settable Value		
	Undervoltage Protection	Settable Value		
General Data	Grid Type	IT		
	Max. Efficency	99%		
	Ambient Temperature	-40℃~+60℃ (Derating above 45℃)		
	Humidity Range	0~100%		
	Altitude	<5000m (Derating above 3000m)		
	Noise	75dB		
	DI Port	4pairs		
	DO Port	2pairs		
	Anti-corrosion	C3 (C4 / C5 is optional)		
	SPD	Type II SPD (8/20μs)		
	Surge Protection	DC Type II / AC Type III		
	Wiring Method	Bottom in and bottom out (Quick plug terminal)		
	Protection Degree	IP66		
	Cooling Method	Smart air-Cooling		
	Indicator	LED Indicator		
	Communication	Ethernet, RS485, CAN, Local debugging WiFi (Optional)		
	Communication Protocol	Modbus TCP / RTU		
	Dimensions (W*H*D)	795*875*293.5mm (Excludes hanging board)		
	Weight	≤100kg (Net Weight)		
	Certification	CQC, HVRT / LVRT, IEC61000, IEC62477, EN50549		

>> hopePCS Series Power Conversion System

Features

- Use of the two-level technology to achieve a highest efficiency of 99%.
- Full reactive power generation at full load, with the power factor adjustable in full range.
- Support for long-term operation with 1.1 times overload and short-term operation with 1.2 times overload.
- Fast response, with power response time shorter than 30 ms.
- Low noise, with the overall noise lower than 70 dB.
- Complete certifications, including the CGC national standard, CEPRI HLVRT, IEC, and TUV.

Product Principle



Specifications

Model		hopePCS 500	hopePCS 630
DC Parameters	Max. DC Power	550kW	693kW
	Max.DC Volatge	850V	
	Max. DC Current	1200A	
	DC Voltage Range	460V~850V	580V~850V
	DC Voltage Ripple Coefficient	0.75%	
AC Parameters	Rated Power	500kW	630kW
	Max. Output Power	550kVA	693kVA
	Isolation	No Isolation	
	Q Range	0~500kvar	0~630kvar
On-grid Mode	Rated Grid Voltage	320V	400V
	Ated Grid Voltage	288V~352V	360V~440V
	Rated Grid Frequency	50Hz / 60Hz	
	THDi	<3%	
	Power Factor	-1~1	
	Switching T Charge/Discharge	80ms	
Off-grid Mode	Rated Output Voltage	320V	400V
	Voltage Deviation	±1%	
	Voltage Unbalance	<2%, No more than 4% in a short period of time	
	THDu	3% (Without Load or resistive load)	
	Rated Output Frequency	50Hz / 60Hz	
	Voltage Transient Range	<10% (Resistive load/balanced load. Load change suddenly from 20% to 100% or from 100% to 20%)	
	Overvoltage Protection	Settable Value	
	Under-voltage Value	Settable Value	
Mechanical Parameters	Max. Efficency	99%	
	Ambient Temperature	-40℃~+60℃	
	Humidity Range	0~95% (No Condensation)	
	Altitude	≤5000m (Derating above2000m)	
	Noise	70dB	
	Dimensions (W*H*D)	1000*2100*800mm	
	Weight	800kg	
	Protection Degree	IP20	
	Cooling Method	Smart air-cooling	
	Insulation Resistance	>1MΩ	
	HMI Interface	Touch Screen	
	Communication Protocol	Modbus TCP / RTU	
	Certification	CGC, HVRT / LVRT, TUV, IEC	

>> Turnkey PCS Station

Features

- Support for parallel connection of multiple PCSs on the AC side.
- Reactive power support capability to generate full reactive power.
- IP54 protection for the entire unit, with C3/C4/C5 anti-corrosion classes available.
- Reliable auxiliary power supply, supporting dual power supply redundancy design.
- Customizable configuration solutions to meet user needs.

(1000V Dry Transformer Turnkey PCS Station)

(1st-generation 1500V Dry Transformer Turnkey PCS Station)

(2nd-generation 1500V Dry Transformer Turnkey PCS Station)

(5MW Dry Transformer Turnkey PCS Station)

Specifications

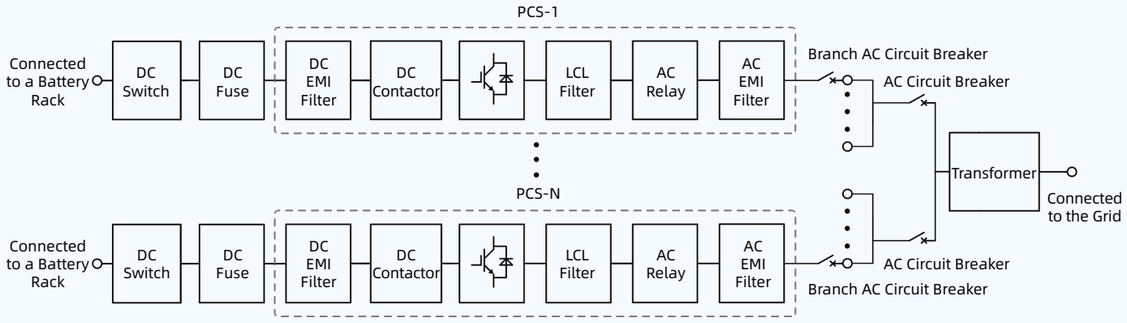
Model		HPPS 1000	HPPS 2500A	HPPS 2500B	HPPS 3150	HPPS 3450	HPPS 5000	HPPS 6250
DC Parameters	Max.DC Volatge	850V		1500V				
	Max. DC Current	1147A*2	1147A*4	1935A*2	1935A *2	1935A *2	2500A*2 / 1935A *4	1935A *4
	DC Voltage Range	580V~850V		1000V~1500V				
	Number of DC Inputs	2	4	1 / 2	2	2	2 / 4	4
AC Parameters	Rated Power	1000kW	2500kW	2500kW	3150kW	3450kW	5000kW	6250kW
	Branch Power*Number	500kW*2	630kW*4	2500kW*1 1250kW*2	3150kW*1	1725kW*2	2500kW*2 1250kW*4	1563kW*4
	Max. Output Power	1100kVA	2750kVA	2750kVA	3465kVA	3795kVA	5500kVA	6250kVA
	Isolation	Transformer Isolation						
	Q Range	0~1050kvar	0~2625kvar	0~2625kvar	0~3308kvar	0~3623kvar	0~5250kvar	0~6250kvar
On-grid Mode	Rated Grid Voltage	6kV / 10kV / 35kV						
	Rated Grid Frequency	50Hz / 60Hz						
	THDi	<3%						
	Power Factor	-1~1						
Transformer Parameters	Rated Capacity	1000kVA	2500kVA	2500kVA	3150kVA	3450kVA	5000kVA	6250kVA
	Transformer Type	Dry-type / Oil-immersed Transformer						
	LV/MV Voltage	0.4 / (6-35)kV		0.69 / (6-35)kV				
	No-load Loss	Meet the GB						
	Load Loss	Meet the GB						
	No-load Current	Meet the GB						
	Impedance	Meet the GB						
System Parameters	Ambient Temperature	-30℃~+60℃ (Derating above 40℃)		-30℃~+60℃ (Derating above 45℃)			-30℃~+60℃ (Derating above 50℃)	
	Humidity Range	0~100%						
	Altitude	<5000m (Derating above 2000m)		<5000m (Derating above 3000m)			<5000m (Derating above 4000m)	
	Protection Degree	IP54						
	BMS Communication	RS485						
	EMS Communication	Ethernet						
	Communication Protocol	Modbus RTU / Modbus TCP / IEC104 / IEC61850						
	Standard Compliance	GB / T 34120, GB / T 34133, GB / T 36547						
	Grid Support	HVRT&LVRT, Frequency Regulation, Voltage Regulation, Grid-forming, etc.						

>> String PCS Station

Features

- Single rack management for batteries to address the issue of circulating current in parallel connections of batteries.
- Modular design to prevent single point of failure.
- Use of the three-level technology to achieve a maximum efficiency of 99%.
- Strong environmental adaptability with C3-C5 anti-corrosion classes available, and no derating required at 45°C ambient temperature.
- Optional number of PCS modules at 6-35 kV with PCS station customizable.
- Multiple operation modes supported such as PQ and VSG.

Product Principle



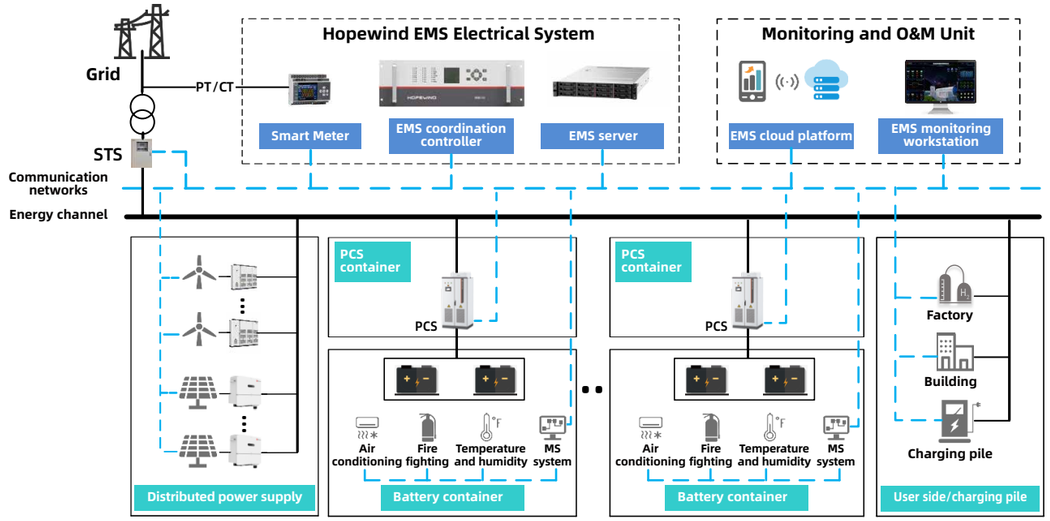
Specifications

Model		HPPS 2500B	HPPS 1750C	HPPS 2500C	HPPS 3500C
DC Parameters	Number of DC Input Channels	12	1	1	2
	Max. DC Current	209A*12	1962A	2810A	3934A
	DC Voltage Operating Range	1000V~1500V			
AC Parameters	Total Rated Power	2500kW	1750kW	2500kW	3500kW
	Max. Output Power	2750kVA	1925kVA	2750kVA	3850kVA
	Rated Voltage	690Vac			
	Isolation Mode	Transformer Isolation			
	Q Range	0~2625kvar	0~1837kvar	0~2625kvar	0~3675kVar
On-grid Mode	Rated Grid Voltage	6~35kV (Customizable)			
	Rated Grid Frequency	50Hz / 60Hz			
	THDi	<3%			
	Power Factor	-1~1			
Transformer Parameters	Rated Capacity	2500kVA	1750kVA	2500kVA	3500kVA
	Transformer Type	Oil-immersed Transformer			
	LV/MV Voltage	0.69 / (6~35)kV			
System Parameters	Dimensions (W*H*D)	6058*2438*2896mm			
	Operation Temperature	-40℃~+60℃ (Derating above 45℃)			
	Operation Humidity	0~100%			
	Operating Altitude	≤5000m (No derating within 3000m)			
	Protection Degree	IP54 (PCS IP66)			
	BMS Communication	RS485 / CAN			
	EMS Communication	Ethernet Interface			
	Communication Protocol	Modbus RTU / Modbus TCP / IEC104 / IEC61850			
	Standard Compliance	GB/T 34120, IEC62477, IEC61000, EN50549			
	Grid Support	CEPRI HLVRT, Frequency adjustment function, Voltage adjustment function, Inertia response, Etc.			

>> Overview of Storage EMS

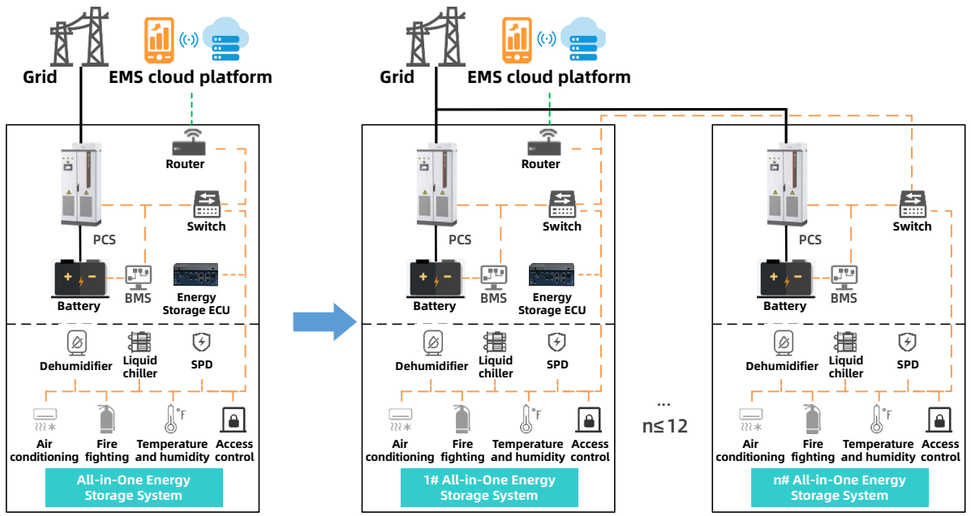
Topology of the Energy Storage/Micro-grid EMS

Hopewind EMS works in various scenarios like energy storage, distribution, and mirco-grid. It supports energy dispatching of multiple sources such as power supplies, grids, loads, and storage, and coordinated control of multiple equipment. In addition, the EMS provides comprehensive operation and maintenance solutions including local monitoring and cloud platform.



Topology of the All-in-One Energy Storage EMS

The all-in-one solution integrates batteries, energy storage converters, auxiliary control devices, BMS, and EMS into a single cabinet. The energy of the energy storage unit can be controlled by configuring the ECU. The solution supports parallel connection and coordinated control of multiple units.



Hopewind Cloud Platform

Big Data Center

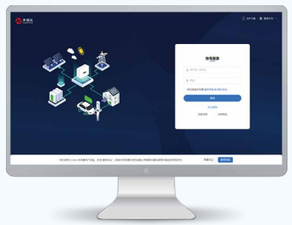
By establishing "analysis models" and "intelligent decision-making algorithms" for energy big data, the big data center deeply optimizes the accuracy and performance of algorithms through long-term mass data computation and training, providing precise decision-making support for energy operation enterprises.

Energy IoT Platform

The energy IoT platform supports fast connection with self-developed and third-party devices, implementing status perception, remote control, and data collection of energy equipment in areas such as wind, solar, storage, hydrogen, and energy consumption.

Energy PaaS Management Platform

Implementing functions such as platform application management, tenant management, system management, equipment management, and statistical analysis of data.



Energy SaaS Application Platform

Building energy solutions in niche areas such as distributed energy management, household energy consumption, micro-grid, and zero-carbon parks to meet users' energy operation needs.

Monitoring by Hopewind Energy Storage EMS Cloud Platform

>> Project Cases

> 50MW/100MWh Independent energy storage project in Wuzhong city, Ningxia

> 100MW/200MWh Energy storage peak regulation demonstrative project in Jining city, Shandong province

> 50MW/100MWh Generator-side energy storage project in Hulun Buir city, Inner Mongolia

> 40MW/80MWh Generator-side energy storage project in Jiuquan city, Gansu province

> 13MW/26MWh Grid-side energy storage project in Guangzhou, Guangdong

> 6.25MW/12.5MWh Grid-side energy storage project in Guangzhou, Guangdong

> 25MW/50MWh Generator-side energy storage project in Ledong county, Hainan province

> Industrial energy storage project in Karamay city, Xinjiang autonomous region

> 4MW/6MWh Generator-side energy storage project in Luohe city, Henan province

> 57.5MW/115MWh Generator-side energy storage project in Xiantiao city, Hubei province

> 5MW/10MWh User-side energy storage project in Taizhou city, Zhejiang province

> 1.5MW/3MWh User-side energy storage project in Changxing county, Zhejiang province

> 60MW/120MWh Generator-side energy storage project in Alxa League, Inner Mongolia

> 7.5MW/15MWh Generator-side energy storage project in Huhhot city, Inner Mongolia

> 6MW/6MWh Coal-fired power station energy storage project in Chongqing city

> Wind power DC-side energy storage project in Tianmen city, Hubei province

>> Project Cases

> 10MW/5MWh Thermal Power Plant Energy Storage Project in Hohhot, Inner Mongolia

> South Korea 12MW/36MWh Photovoltaic Energy Storage Project

> Yunnan Microgrid Project

> Supercapacitor Energy Storage

> 15MW/7.5MWh Thermal-energy Storage Frequency Modulation Project in a Power Plant in Shanxi Province

> Jiangsu Jiangnan 6MW/48MWh Chemical Distributed Energy Storage Power Station

> User-side Energy Storage + UPS Project

> 1MW Flywheel System Integration

> Jiangsu Zhenjiang 20MW/200MWh Heavy Industry

> 5MW/50MWh Energy Storage Project of a Paper Mill in Danyang, Jiangsu Province

> Energy storage EMS project in Jiangyin City, Jiangsu Province

> Wind power distribution and storage EMS project in Luohe City, Henan Province

> Huizhou 3MW/6MWh 973 National Major Project

> 3MW/31MWh Energy Storage Power Station in Changxing, Zhejiang Province

> Micro-grid EMS project in Fangshan District, Beijing

> Energy storage EMS project of a metal factory in Jiangyin City, Jiangsu Province

150 GW+

SHIPMENTS WORLDWIDE

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