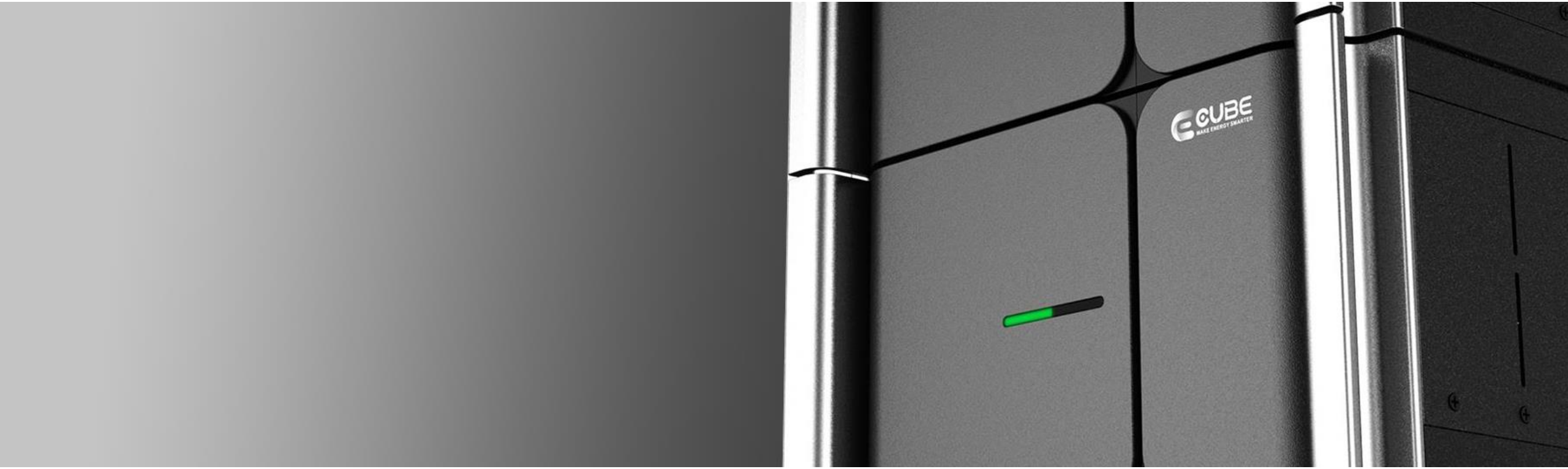

GRES System

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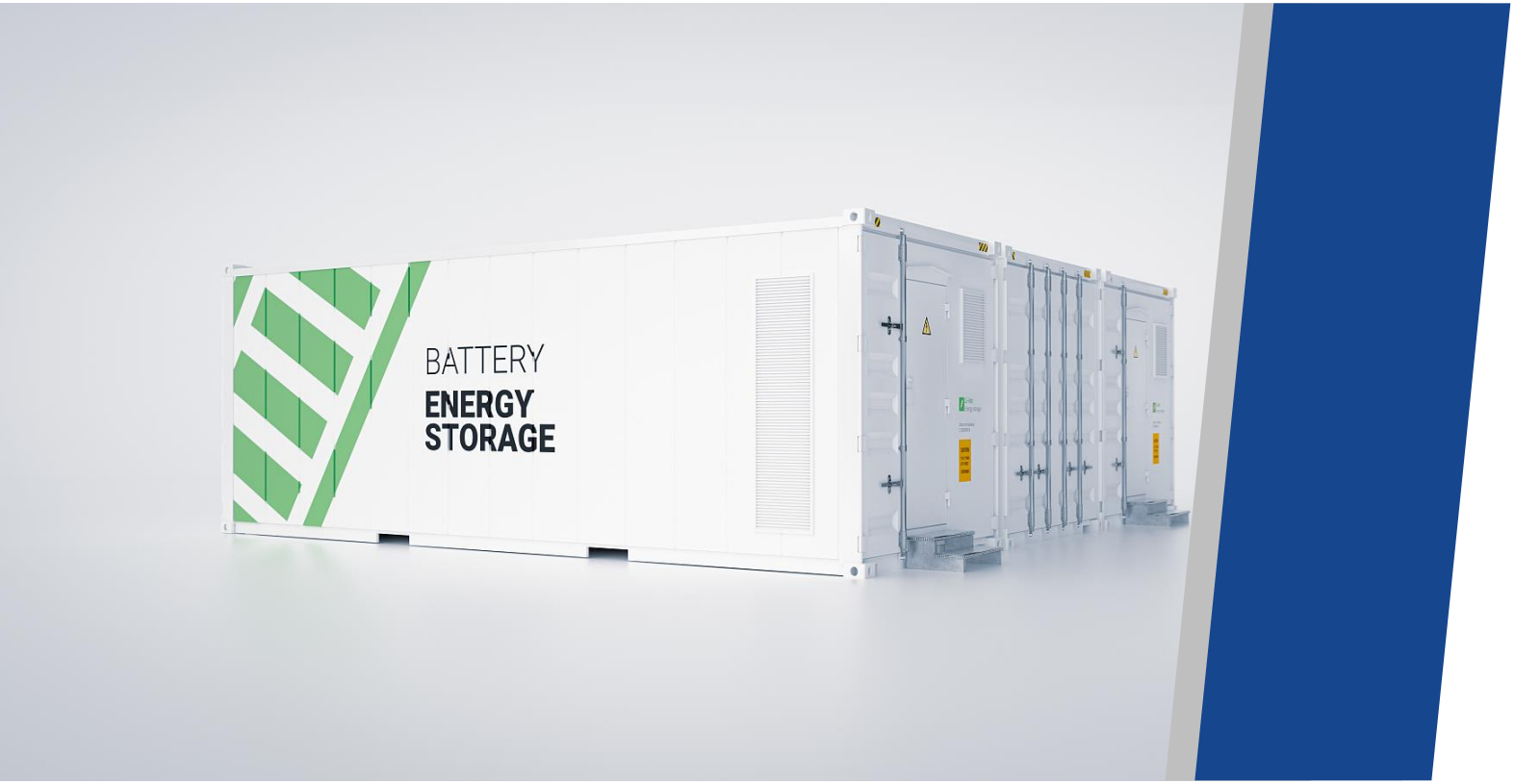
About US



Headquartered in Shijiazhuang,Hebei Ecube New Energy Technology Co., Ltd., with a registered capital of 100 million yuan, is a high-tech enterprise specializing in energy storage and lithium battery system integration. Relying on the technical team of the leading enterprises in the power electronics industry, Ecube has built a core technical team with more than ten years of experience in the development and application of lithium battery and power supply products, and independently developed the industry-leading battery management system with excellent security, stability and balance capabilities.

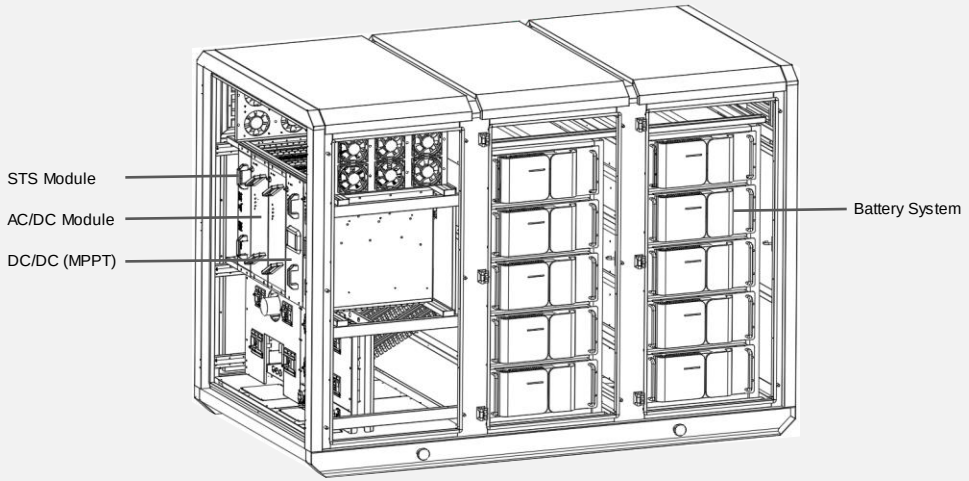
The products cover four business sectors: Industrial and commercial energy storage system, renewable integration, uninterrupted power lithium battery system and residential energy storage system. In recent two years, the project cases have spread to key overseas markets such as South Korea, Russia, the Netherlands, Germany, the Middle East, etc

Outstanding developers and suppliers of intelligent energy storage system.

GRES

Overview

GRES is an intelligent and modular power supply equipment integrating lithium battery and MPCS. According to different application scenarios, lithium battery, bidirectional DC / AC converter, bidirectional DC / DC converter, Static switch and Power management system can be arbitrarily combined to realize grid connected power supply, off grid power supply and off grid uninterrupted power supply power supply, static reactive power compensation, harmonic suppression and other functions. The system can have access to new energy, power grid, diesel generator and to rreasonable configuration, scientific utilization, to provide users with green, environmental protection, noise free, high reliability and high security power services.



Configuration

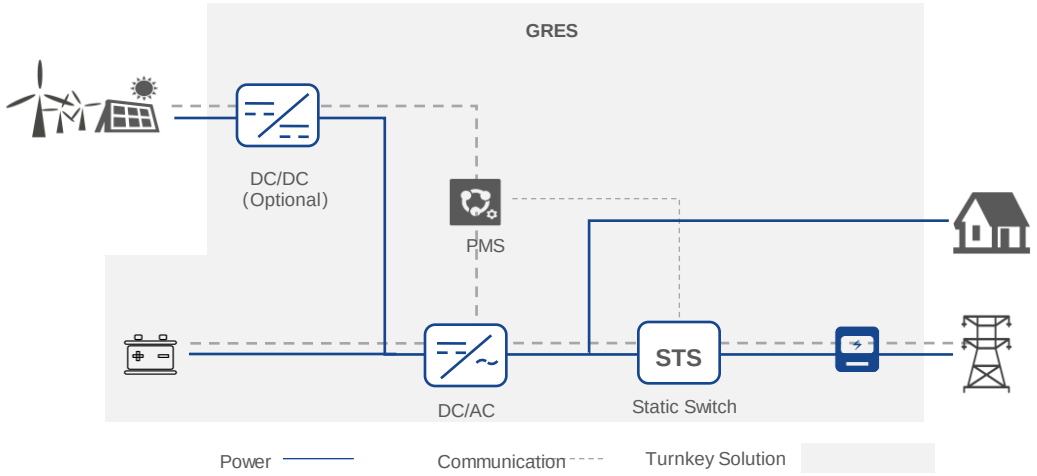
PCS
Bidirectional AC / DC converter can realize the bidirectional conversion from DC to AC and AC to DC. It can not only convert AC to DC to charge battery, but also convert DC to AC to supply power to load or feed back to power grid.

Battery System
The system mainly consists of safe, efficient and long-life lithium iron phosphate cells, which are connected in series to form battery modules, and multiple modules are connected in series to form battery clusters.

Battery management system
The core components of the system can effectively protect the battery from overcharge, overdischarge and over-current. At the same time, the balanced management of the cells can ensure the safe, reliable and efficient operation of the whole system.

Power Management System
System operation data monitoring, operation strategy management, historical data record, system status record, etc.

System topology



Applications

Industrial and commercial demand management, peak shaving

Power quality improving, and backpower supply at user side

Peak and frequency regulation, smoothing new energy generation

Building microgrid system

Key product features and benefits

| Safe and reliable |

- High quality li-ion cell from top manufacturer
- Intelligent air cooling design, long service life life, stable operation
- IP54, safe and reliable operation in outdoor environment
- Serially designed PCS and battery pack eliminates circulating current and improve system reliability.
- Integrated BMS,DC, AC multi-layer protection, maximum safety performance design

| Efficient and Convenient |

- No air conditioning design, high energy efficiency.
- Integrated system, standard modular power module and battery module, easy for installation, maintenance and capacity expantion
- Easy access to PV and diesel generator, intelligent muli-energy management.
- Fixed on the ground or mounted on vehicle, can be loaded and unloaded by forklift and hoisted by lifting ring
- Remote monitoring and equipment management, remote troubleshooting and data analysis

| Cost optimization |

- One investment, multiple benefits:Peak shaving, backup power supply, micor grid building,power quality improving and engergy storaging,etc.
- Small size, light weight, less space and installation cost
- Long cycle life, low failure rate, reduce operation and maintenance investment
- Maximize green energy utilization.

Parameters

GRES-75-50

50KW/75kWh

GRES-150-100

100KW/150kWh

GRES-225-100

150KW/225kWh

GRES-300-200

200KW/300kWh

GRES-600-400

400KW/600kWh

GRES-900-600

600KW/900kWh

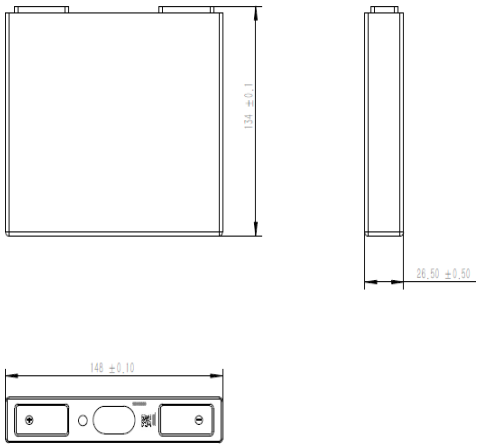
Parameter	GRES-75-50	GRES-150-100	GRES-225-150	GRES-300-200	GRES-600-400	GRES-900-600
AC parameters (grid connected)						
Rated output power (kW)	50	100	150	200	400	600
Max output power (kW)	55	110	165	220	440	660
Rated grid voltage (V)	3W+N+PE, 380					
Grid voltage range	±15%					
Rated grid frequency (Hz)	50					
Grid frequency range (Hz)	±2					
Current waveform distortion rate	<3%(Rated voltage)					
DC component	<0.5%In					
Power factor	>0.99(Rated voltage)					
Power factor adjustable range	1(lead)～1(lag)					
Overload capacity	110% Long term					

Parameter	GRES-75-50	GRES-150-100	GRES-225-150	GRES-300-200	GRES-600-400	GRES-900-600
AC parameters (off grid)						
Rated output power (kW)	50	100	150	200	400	600
Max output power (kW)	55	110	165	220	440	660
Rated grid voltage (V)	3W+N+PE, 380					
Current waveform distortion rate	<3%(Linear Load)					
Rated frequency （Hz)	50					
Overload capacity	110% Long term					
Battery						
Battery type	Lithium iron phosphate					
Energy of each module(kWh)	15.36					
Module qty	5	10	15	20	40	60
Total power (kWh)	76.8	153.6	230.4	307.2	614.4	921.6
Running Time (h)	1.5(Optional by Changing module qty)					
Cyclelife	25℃ 0.5C/0.5C 100%DOD EOL80% ≥2500次					
System efficiency						
Max efficiency	95%					
Protection						
DC Switch	Yes					
AC switch	YES					
Grid monitoring	YES					
Surge protection	DC /AC 2nd level					
Basic Parameters						
Dimension（W*D*H）(mm)	1300*1540*1600	1300*2300*1600	1300*3060*1600	2400*1540*2300	2400*2300*2300	2400*3060*2300
Weight （kg)	1060	1780	2470	3170	5300	7440
Isolated transformer	NO					
On/off grid switching	STS					
Protection	Outdoor IP55					
Working temperature	-20～55℃(>45℃derating)					
Relative humidity	0～95%（no condensing)					
Cooling	Intelligent air cooling (intelligent heating optional)					
Max working altitude(m)	4000(>2000 derating)					
Display	Touch screen					
Communication	RS485、CAN、LAN					
Communication Protocol	Modbus-RTU、Modbus-TCP、CAN2.0B					

Cell

The lithium battery system uses 3.2V 50ah PLF prismatic cell, which reduces the possibility of cell damage caused by mechanical damage on the cell surface and improves the safety performance of the product. The explosion-proof valve on the top ensure that in any extreme case (such as internal short circuit, battery overcharge and overdischarge), a large amount of gas quickly accumulated in the cell can be discharged through the riot valve,which highly improves the safety.

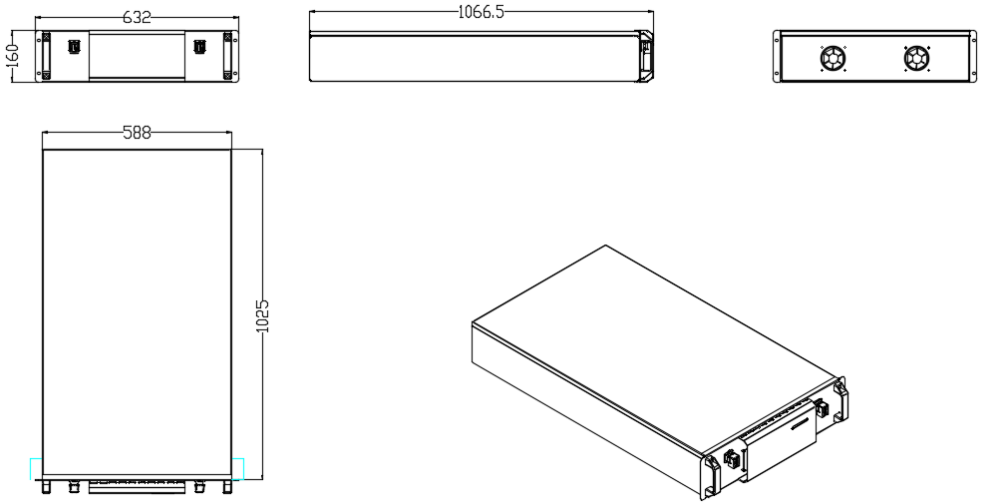
Parameters		
Battery type	LFP	
Rated capacity ☆	50.0Ah	1C@25℃
Rated voltage ☆	3.20V	
Average working voltage	2.5 ~ 3.65V	
AC-impedamce☆	≤1.0mΩ	
Weight	1110±20g	
Max charge current	1.5C	Continuous
	2C	50%SOC, 30s
Max discharge current	2C	Continuous
	5C	50%SOC, 30s
Max operating temperature range	-20℃/ + 60℃	
Charge	0℃ ~ 45℃	
Discharge	-20℃ ~ 60℃	
Optimal operating temperature range	15℃ ~ 35℃	
Storage temperature	-40℃/ + 60℃	<1 month -40℃ ~ 45℃ <6 month -20℃ ~ 35℃
Cycle life	≥4000 times	25℃ 1C/1C



Module

The battery module, 153.6V100Ah, consists of 96 pcs cells (3.2V, 50Ah) ,2 in parallel then 48 in series (2p48s) to form 153.6V 100Ah battery module. The module has a built-in BMU system, which can collect the voltage and temperature of each cell, and manage the cell balance, so as to ensure the normal operation of the whole module safely and efficiently.

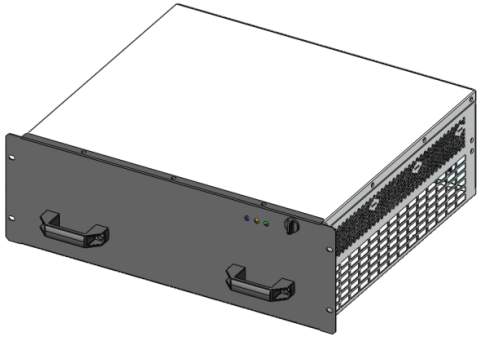
Parameters	
Rated capacity	100Ah
Configuration	2P48S
Rated voltage	153.6V
Rated energy	15.36kWh
Max continuous charge current	100A (1C)
Max continuous discharge current	200A (2C)
Working voltage range	134.4 ~ 175.2V
Operating temperature range	-20℃ ~ 55℃
Weight	150Kg
DImension (W*D*H)	632*1066.5*160
Cooling	Intelligent fan



AC/DC Module

Overview

Bidirectional AC / DC converter can realize the bidirectional conversion from DC to AC and AC to DC. It can not only convert AC to DC to charge battery, but also convert DC to AC to supply power to load or feed back to power grid. Bidirectional AC / DC converter uses SVPWM modulation , the conversion efficiency is up to 98%, and has a wider DC voltage range, which can cover 550-900VDC, and the AC side supports 380VAC input. Bidirectional AC / DC converter uses three-level design to ensure low noise, high operation efficiency and high voltage quality.



Key product features

- Standard modular, rack-mounted design, easy to install, easy to maintain
- The highest efficiency is 98.5%
- Wide range of input voltage, small temperature rise, high efficiency and stable output
- High performance in any climate
- Complete digital control, high performance
- Intelligent fan regulation, high reliability
- Perfect protection function, over temperature protection, short circuit protection, overload protection, input anti reverse protection
- Remote emergency shutdown (REPO)
- Multiple communication modes, CAN bus communication convenient for remote control

Parameters

Model		PCM50	PCM100
Battery interface parameters	Voltage range	DC550V～DC900V	
	Rated power	50KW	100KW
	Single channel maximum current	85A	170A
AC grid-connected parameters	Output line	3W+N+PE/3W+PE	
	Rated power	50KW	100KW
	Rated voltage	AC 380V/400V/415V	
	Rated Current	75A	151A
	Voltage range	-15%～+10%	
	Rated frequency	50Hz/60Hz	
	Frequency range	±2Hz	
	Power factor	1	
	Output harmonics	≤3%	
AC off-grid parameters	Output line	3W+N+PE/3W+PE	
	Rated power	50KW	100KW
	Rated voltage	AC 380V/400V/415V	
	Rated frequency	50Hz/60Hz	
	Rated Current	75A	151A
	Voltage accuracy	1%	
	Frequency accuracy	±0.2Hz	
	Output voltage harmonics	3%@ linear full load	
	Unbalanced load capacity	100%	
	Overload capacity	105%：running time≥10min；120%：running time≥1min	
Environment	Working temperature	-20℃～55℃（>45℃derating）	
	Storage temperature	-40℃～70℃（No battries）	
	Relative humidity	0%RH～95%RH，No condensation	
	Working altitude	45℃，2000m；2000m～4000m Derating	
	Noise	<75dB	
Others	Comminication	CAN/RS485	
	Isolation	no	
	Protection	IP20	
	Cooling	Air cooling, intelligent fan regulation	
	Maximum efficiency	98.5%	
	Dimension W*D*H	560*530*133	560*530*177
	Weight	30kg	50kg

Static Transfer Switch

Overview

The static switch can realize fast switching within 10ms from on to off grid state. Under the normal working state, the static switch is closed, and when the mains power is interrupted, the static Transfer switch is immediately disconnected, and the system turns to off grid power supply, and the battery is discharged for the load. The static transfer switch is controlled by silicon controlled rectifier, which has the characteristics of fast action, long service life and strong reliability.

Key product features

- Modular design, suitable for the whole range of energy storage converters
- It can realize fast switching within 10ms between grid connected / off grid state, and effectively protect important loads such as servers
- Cooperating with EMS and PCS, it can realize unattended automatic operation of energy storage system
- Small size, high power

Parameters

Model	STSD100	STSD150	STSD300	STSD600	STSD1000
Rated power	100kW	150kW	300kW	600kW	1000kW
Rated grid voltage	AC 380V/400V/415V				
Input voltage range	-20%～+15%				
Output voltage range	-20%～+15%				
Rated current	151A	227A	454A	909A	1515A
Overload capacity	110%				
Rated frequency	50Hz/60Hz				
Frequency range	±5Hz				
Switching time	≤10ms				
Output line system	3W +PE				
Efficiency	99.50%				
Noise	< 75dB				
Installation					
Communication	CAN/RS485				
Cooling	Air cooling, intelligent fan regulation				
Protection	IP20				
Dimension w * D * H (mm)	560mm*530mm*133mm		560mm*530mm*177mm	560mm*530mm*352mm	560mm*530mm*575mm
Weight	20kg	25kg	30kg	50kg	90kg

DC/DC PV Management Module

Overview

The function of DC / DC module is to filter the power from photovoltaic panel, increase its voltage for bidirectional DC / AC converter or store energy for lithium battery. The low voltage terminal of DC-DC converter is connected with photovoltaic panel, and the high voltage terminal is connected with lithium battery. The module contains a photovoltaic controller, which extracts the maximum power from the photovoltaic array by using the maximum power point tracking technology to ensure the maximum utilization of solar energy.

Key product features

- Standard modular, rack design, easy to install, easy to maintain
- Photovoltaic panel has three input channels at most, which can improve the energy efficiency and stability of photovoltaic system
- Photovoltaic seamless access, completely replace photovoltaic inverter, make ESS system design simple and flexible

Parameters

	Model	PDMD50
Electrical parameters	Voltage range	DC220V～DC900V
	Full load voltage range	DC350V～DC900V
	Rated power	50KW
	Single channel maximum current	142A
	MPPT Qty	1~3
	Voltage stabilization accuracy	<1%
	Output ripple	<0.5%
	Overload capacity	105% load, long term operation
Environment	Working temperature	-20℃～55℃（>45℃derating）
	Storage temperature	-40℃～70℃（No battries）
	Relative humidity	0%RH～95%RH，No condensation
	Working altitude	<45℃，2000m；2000m～4000m Derating
	Noise	< 75dB
Others	Comminication	CAN/RS485
	Isolation	No
	Protection	IP20
	Cooling	Air cooling, intelligent fan regulation
	Maximum efficiency	96.5%
	Dimension W*D*H	560*530*133
	Weight	30kg