BESS-SPF-6000WH-3000W

Optical Storage Portable Energy Storage Power Supply

Product User Manual

PSC SOLAR (UK)
Africa's Solar Electricity Power

PSC SOLAR UK

Product Model

BESS-SPF-6000WH-3000W

Safety Instructions

Please keep this manual for future reference

This manual contains all the safety, installation and operation instructions of the BESS-SPF-6000WH-3000W Optical storage mobile energy storage power supply. Please read all instructions and precautions in the manual carefully before installation and use.

➢The power system contains unsafe voltage, to prevent personal injury, users should not disassemble it on their own, if maintenance is required, please contact our professional after-sale service team, unauthorized disassembly will result in no warranty and quality assurance.

➢There are unsafe voltages inside the power system, please keep children away from the power system and avoid any touch.

➢Do not install the power system in harsh environments such as humid, greasy, flammable and explosive, or where a large amount of dust gathers.

➢Power input, power output and photovoltaic input are with unsafe voltages, please do not touch the connectors and wiring harnesses during power system operation.

➢When working under high voltage and AC power, specialized tools must be used, non-specialized tools cannot be used at any time.

➢It is recommended to install the power system in a dark place and avoid direct sunlight on the power system.

➢Before installing and adjusting the wiring of the power system, be sure to turn off the power output, power input and photovoltaic input.

➢After installation, check all the wire connections to ensure they are tight, to avoid the danger of heat accumulation due to loose connections.

➢After unplugging the connectors of the power output, power input, and photovoltaic input, please promptly cover them with terminal protection caps to prevent accidental contact with the metallic conductors, thus avoiding the risk of electric shock.

➢The power system is prohibited from being used in parallel with other power systems to avoid damage.

The charging temperature range for the power system is 0 ° C -45° C. Charging out of this range may cause the battery overheated or damaged. Charging out of this temperature range can also impair battery performance or reduce the expected battery life.

➢The discharge temperature range of the power system is -20℃～60℃. Using the battery out of this temperature range may damage the battery's performance or reduce its life expectancy.

The power system contains coils and capacitors. Do not dismantle the power supply immediately after turning off the power output, let it stand for five minutes to wait for the capacitors and coils to finish discharging before dismantling to avoid the risk of electric shock caused by accidentally touching metal conductors.

Content

1.Introduction

1.1Basic information

The BESS-SPF-6000WH-3000W Optical storage mobile energy storage power supply adopts high-energy density lithium iron phosphate battery modules from BYD,which is known as its high safety and long cycle life. Through an advanced battery management system(BMS), there is real-time monitoring of battery voltage, current, temperature and system malfunction, it offers a complete and reliable control and protection system. The power system also includes a high-quality and stable solar hybrid inverter that supports 3000W of solar power generation,which converts solar energy into AC power and help store the electricity power in the battery of the power system. Additionally, the power system features UPS functionality.

When the utility input is regular, the power system stabilizes the utility power and supplies it to the load through bypass, functioning as an AC voltage stabilizer. The power system can be charged at the same time. When the utility input is cut off , the power system immediately switches to supply the load with 220V-240V AC power through an inverter, ensuring the normal operation of the load and protecting the load from software and hardware damage by cut. **Features:**

1、Adopt BYD large-capacity prismatic aluminum lithium iron phosphate battery module, which is safer and has a longer cycle life.

2、Advanced battery management system, real-time management, efficient and stable management , fast response.

3、Support 3000WP solar power generation.

4、Support 3000W pure sine wave inverter output power. 5、Dual USB fast charging for mobile phones (5V 3.6A).

6、LCD screen design, 3 LED operation indicators, real-time display of system data and operating status.

7、The ON/OFF metal round switch controls the power input and output (weak electricity switch) 8、It has a power-saving mode function to reduce idle power consumption.

9、Adopting high-current quick-release terminals for easy operation and high current-carrying capacity.

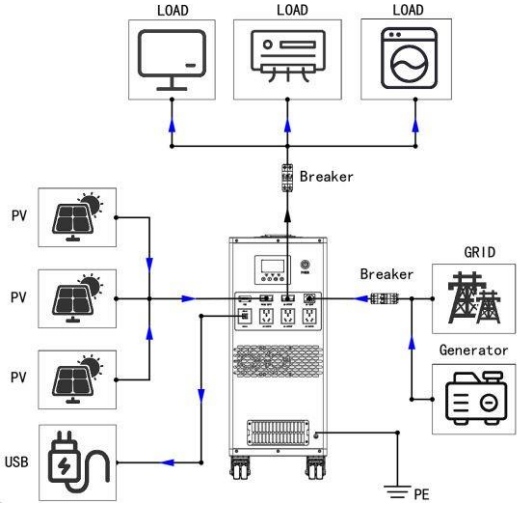
10、Equipped with universal steering wheels, it is convenient and flexible to move. 11、It has complete short-circuit protection, over voltage and under voltage protection, overload protection, reverse connection protection, etc.

12、Ultra-quiet cooling fan, real-time control of the internal temperature of the power system.

1.2 System diagram

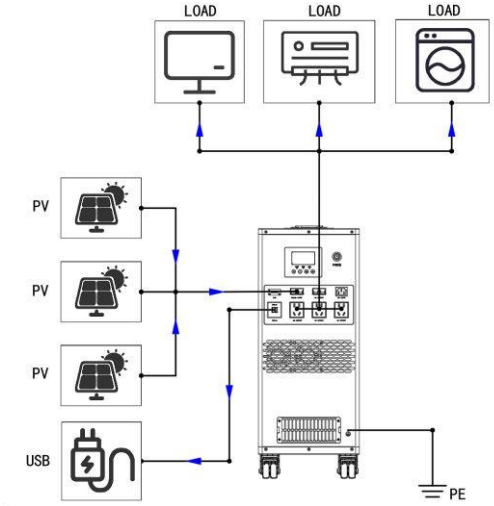
The BESS-SPF-6000WH-3000W Optical storage mobile energy storage power supply are off-grid energy storage power system suitable for two application scenarios: home off-grid photovoltaic energy storage and outdoor use. In the home off-grid photovoltaic energy storage scenario, please strictly follow the instructions in Figure 1 for installation and use. In this case, the utility is supplied to the load through bypass or charges the battery of the power system. In the outdoor scenario, the power system is used independently without relying on utility, following the instructions in Figure 2 for installation and use.

Figure 1:



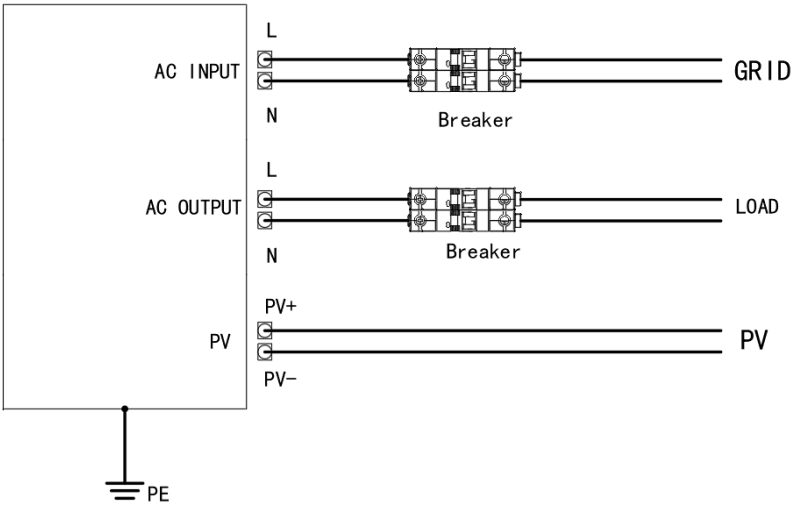
Notice!
Please keep the load power within the rated power range of the power system. Otherwis e, the inverter inside will shut down and emit an "overload fault" warning.

Figure 2:



Notice!
In outdoor mode, ensure that the load power of the AC output socket is within the rated power range of the AC output socket; otherwise, the AC output socket may be damaged due to excessive power heating.

1.3 Electrical wiring diagram



1.4 Operating mode

BESS-SPF-6000WH-3000W Optical storage mobile energy storage power supply is an off-grid energy storage power supply, which can provide multiple working modes according to different needs.

Working mode: off-grid (SUb)

1.Solar energy, batteries, and utility exist at the same time. A.Solar power is prioritized to supply the load, if the solar power is not enough to meet the power demand of all connected loads, the utility will be simultaneously supplied to the load. B.Solar power is prioritized to supply the load, if the solar power exceeds the power demand of all connected loads, the excess solar power will be used to charge the battery.

2.Solar power and battery are available at the same time, utility is disconnected.

A.Solar power is prioritized to supply the load, if the solar power is not enough to meet the power demand of all connected loads, the battery will simultaneously supply power to the load.

B. Solar power is prioritized to supply the load. If the solar power exceeds the power demand of all connected loads, the excess solar power will be used to charge the battery. 3. When utility and battery power coexist, solar power is disconnected.

A. Utility is prioritized to supply the load and simultaneously charge the battery.

4. Only battery power available, utility and solar disconnected

A. The battery supplies power to the load.

Working mode: off-grid (SbU)

1. Solar power, battery power, and utility coexist.

A. Solar power is prioritized to supply the load. If the solar power is not enough to meet the demand of all connected loads, the battery will supply power to the load simultaneously, and the utility will only be used to supply the load when the battery is exhausted.

B. Solar power is given priority to supply the load, if the solar power exceeds the demand of all connected loads, the excess solar power will be used to charge the battery.

2. Solar power and batteries power exist at the same time, utility is disconnected.

A. Solar power is prioritized to supply the load, if the solar power is insufficient to meet the demand of all connected loads, the battery will simultaneously supply power to the load. B. Solar power is given priority to supply the load, if the solar power exceeds the demand of all connected loads, the excess solar power will be used to charge the battery.

3. Utility and battery power exist at the same time, solar disconnected

A. The battery gives priority to supplying power to the load, and after the battery is exhausted, it will be transferred to the utility to supply power to the load;

4. Only battery power is available, utility and solar disconnected

A. The battery supplies power to the load;

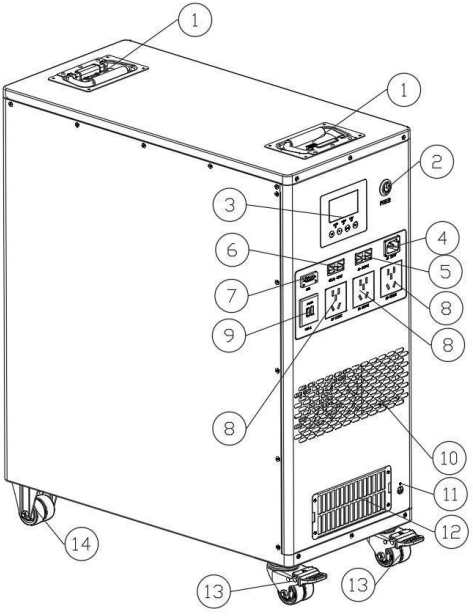
2.Packing list

When open the package, the internal components should match the following packing list.

			
BESS-SPF-6000WH-3000W Optical storage mobile energy storage power supply *1 PCS	AC power cord *1 PCS	AC Anderson plug harness *2 PCS	Solar energy adapter cable harness *1 PCS

3.Product description

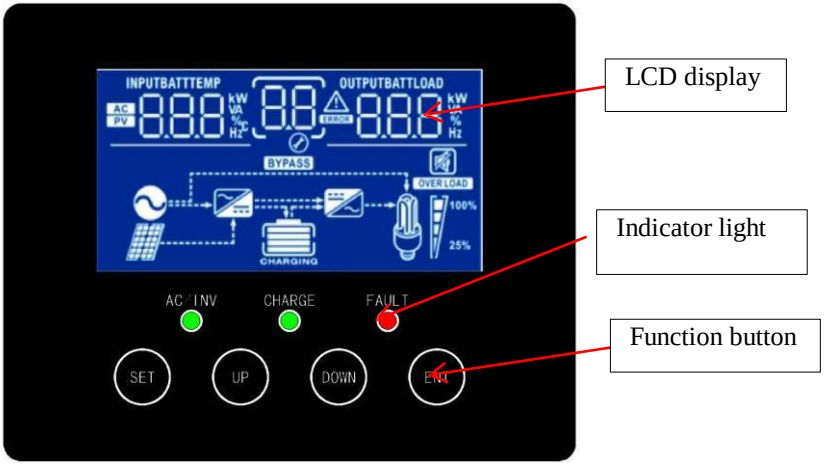
3.1 Product appearance



Item Number	Item Description
1	Stainless steel spring handle
2	Power switch (M19)
3	LCD operation display panel
4	AC utility input (16A\230VAC)
5	AC output (50A Anderson)
6	Photovoltaic input (50A Anderson)
7	BMS communication
8	Standard AC output socket (10A\230VAC)
9	Dual USB sockets (5V 3.6A)
10	Cooling outlet
11	Ground hole (M5)
12	Air inlet (dust-proof filter cotton is included, please replace it regularly)
13	Universal wheel (with brake)
14	Orientation wheel

3.2 Operation display panel

The operational display panel, as shown in the diagram below, is located on the front panel of the All in one Solar power system, it consists of three indicator lights, four function buttons, and an LCD screen that indicates the working status, input, output power, and other information.



LED indicator

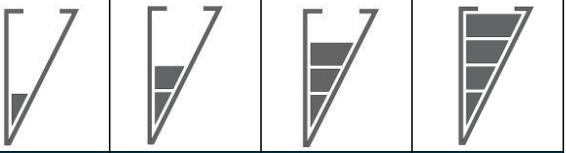
LED indicator			Notice
AC/INV	Green	On	Power supplied by utility when connected to the utility.
		Flash	Power supplied by battery or photostatic when there is no utility.
CHARGE	Green	On	Battery is fully charged.
		Flash	Battery is being charged.
FAULT	Red	On	Inverter malfunction.
		Flash	Alarm from inverter.

Function button

Function button	Description
SET key	Confirm and exit setup mode
UP key	Go back to the previous selection
DOWN key	Go to next selection
ENT key	Confirm selection in setup mode or enter setup mode

3.3 LCD display introduction

Icon	Function description
Input information	
AC	Indicates AC input
PV	Indicates photovoltaic input
	Indicate input voltage, input frequency, solar input voltage, solar input power, charging current, charging power, battery voltage
Configuration program and fault information	
	Represent the setup program

	Indicates warning and ERROR codes Warning:  flashes with a warning code Fault:  On with ERROR code
Output information	
	Indicates output voltage, output frequency, load percentage, load power and discharge current
Battery information	
	Indicate battery level: Remaining battery power is 0-24% Remaining battery power is 25-49% Remaining battery power is 50-74% Remaining battery power is 75-100%
Loading information	
OVER LOAD	Indicates overload
	Indicates load level 0-24% / 25-49% / 50-74% / 75-100% 
Mode operation information	
	Indicates that the AC input is connected to an AC input source
	Indicates that the PV input is connected to a solar panel
	Indicates that the machine is in mains bypass mode

	Indicates that the mains is charging the battery
	Indicates that the inverter discharge circuit is working
Silent operation	
	Indicates that the alarm unit is disabled

4.LCD operation display panel parameter setting

4.1 LCD program parameter setting

To enter the settings menu and exit the settings menu, press and hold the "ENT" key for three seconds, after entering the settings menu, the parameter number [00] will flash, at this time, you can use the "UP" and "DOWN" keys to select the parameter code you want to set. Then press the "ENT" key to enter the parameter editing state, the value of the parameter will blink at this time, use the "UP" and "DOWN" keys to adjust the value of the parameter, finally, press the "ENT" key to complete the parameter editing and return to the parameter selection state. Press the "SET" key to set the parameters and exit the settings menu.

Parameter number	Parameter name	Setting options	Illustration
00	Quit	[00] ESC	Exit settings menu
01	Work first mode	[01] SUb default	Solar power takes priority in supplying power to the load, if solar power is insufficient to supply power to all connected loads, the grid power will also supply power to the load simultaneously, the battery only supplies power to the load in two specific situations.: ①Neither solar nor mains power available ②Insufficient solar energy and unavailable mains power.
		[01] SbU	The solar power is given priority to powering the loads, and if the solar power is not enough to power all connected loads, the battery will power the loads at the same time. Switch to mains power supply only when the battery is under-voltage or lower than the setting value of parameter [12]
02	Maximum charging	[02] 80A default	Setting range 10～80A, step 10A. The sum of the solar charging current and the

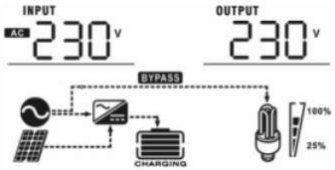
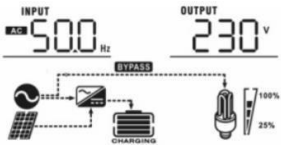
	current		mains charging current is the maximum charging current.
03	Voltage input range	[03] APL default	Input mains voltage range: 90 ~ 280V AC
		[03] UPS	Input mains voltage range: 170 ~ 280V AC
04	Energy saving mode	[04] SdS default	Disable energy saving mode
		[04] SEn	Turn on the energy saving mode, if the load is small or no load is detected, the inverter output will be turned off
05	Battery Type	[05] AGn default	AGM Storage battery
		[05] FLd	Gel lead acid battery
		[05] USE	User-defined, battery parameters can be set through [26], [27], [29]
06	Automatic restart on overload	[06] LTd default	Overload automatic restart is prohibited, if overload occurs and the output is turned off, the machine will no longer restart.
		[06] LTE	Turn on the overload automatic restart, if the output is turned off due to overload, the machine will restart the output after a delay.
07	Over temperature automatic restart	[07] KTd default	Disable over-temperature automatic restart, if over-temperature shuts down the output machine will no longer turn on the output
		[07] KTE	Turn on over-temperature automatic restart, if over-temperature occurs, the output will be turned off, when the temperature drops, it will restart and turn on the output.
08	The output voltage	[08] 220v	Output voltage 220V AC
		[08] 230v default	Output voltage 230V AC
		[08] 240v	Output voltage 240V AC
09	Output frequency	[09] 50Hz default	AC output frequency 50Hz
		[09] 60Hz	AC output frequency 60Hz
11	Maximum Mains Charging Current	[11] 60A default	Setting range 2～60A。Note: If the value set in [02] is lower than the value set in [11], the value set in [02] will be used as the maximum charging current from the mains.
12	Battery to mains	[12] 24.5v default	When parameter [01]=SBU, the battery voltage is lower than the set value, the output is switched from inverter to mains, the setting range is 22V～25.5V
13	mains to Battery	[13] 29.2v default	When parameter [01]=SBU, the battery voltage is higher than the set value, the output is switched from mains to

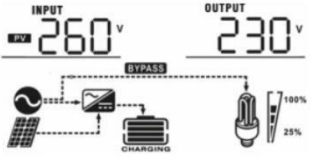
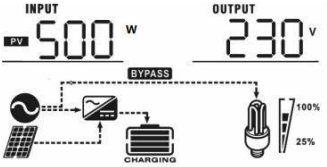
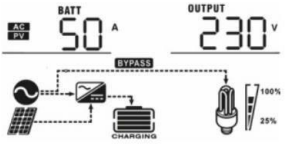
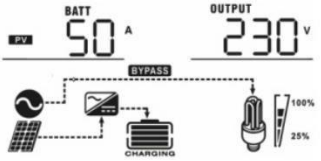
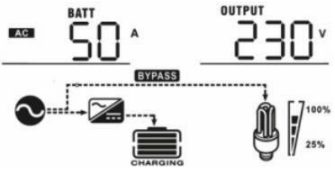
			inverter, and the setting range is 24V～29V
16	Charging mode	[16] CSO	Photovoltaic priority charging, only when the photovoltaic is invalid, the mains charging will be started
		[16]SnU default	Photovoltaic and mains hybrid charging, priority photovoltaic charging, when photovoltaic energy is insufficient, mains charging is supplemented. When the photovoltaic energy is sufficient, the utility power stops charging. Note: Only when the mains bypass output is loaded, the photovoltaic and mains can be charged at the same time, when the energy-saving mode and inverter work, only photovoltaic charging can be started.
		[16] OSO	Only photovoltaic charging, do not start mains charging.
18	Buzzer alarm	[18] bOn default	Turn on the alarm
		[18] bOF	Turn off alarm
19	Default interface	[19] ESP default	Automatically return to the default interface after one minute of button inactivity
		[19] TEP	Always stay on current page
20	Backlight control	[20] LOn default	Turn on the backlight
		[20] LOF	Turn off the backlight
22	Mode switch reminder	[22] AOn default	Activate alarm notification when the status of the primary input source changes
		[22] AOF	Disable alarm notification when the status of the primary input source changes
23	Inverter overload transfer to bypass	[23] bYd default	When the inverter is overloaded, it is forbidden to automatically cut off the mains
		[23] bYE	Automatically switch to mains when the inverter is overloaded
25	Record fault code	[25] FEn	Enable recording fault codes
		[25] FdS default	Disable recording of fault codes
26	Boost charging voltage	[26] 29.2v default	When parameter [05]=USE, the setting range is 25V～29.2V, step 0.1V
27	Float voltage	[27] 29.2v default	When parameter [05]=USE, the setting range is 25V～29.2V, step 0.1V
29	Battery discharge	[29] 24v default	When parameter [05]=USE, the setting range is 20V～24V, step 0.1V

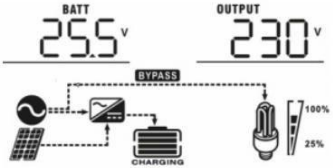
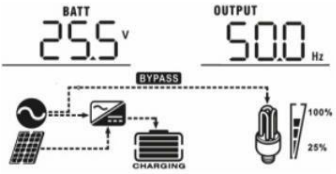
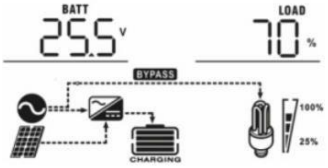
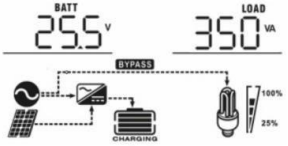
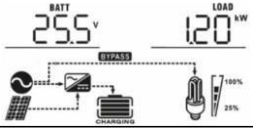
	limit voltage		
33	battery balancing	[33] EEn	Enable battery balancing when parameter [05]=USE, FLd
		[33]EdS default	Disable battery balancing when parameter [05]=USE, FLd
34	Battery balancing voltage	[34]29.2v default	Setting range 25V～29.2V, step 0.1V
35	Battery balancing time	[35]60 default	The setting range is 5 minutes-900 minutes, step by 5 minutes
36	Battery balancing timeout	[36] 120 default	The setting range is 5 minutes-900 minutes, step by 5 minutes
37	Balancing interval	[37] 30d default	The setting range is 0-90 days, step by 1 day
39	Initiate balancing immediately	[37] AEn	Initiate balancing immediately
		[37] AdS default	prohibit immediately initiating balance

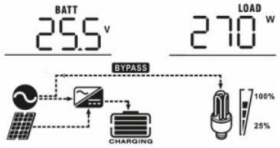
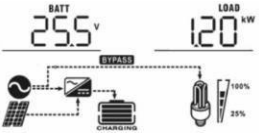
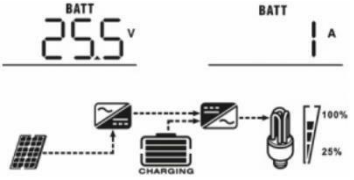
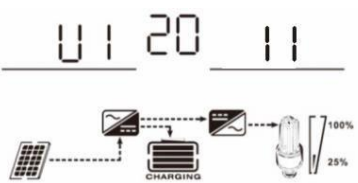
4.2 LCD display page introduction

On the LCD main screen, press the "UP" and "DOWN" buttons to turn pages to view various real-time data. Viewable information: input voltage, input frequency, photovoltaic voltage, charging current, photovoltaic power, battery voltage, output voltage, output frequency, load percentage, watt load, VA load, discharge current, program version.

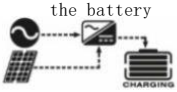
Displayable information	display examples
Input voltage/output voltage (default display screen)	Input voltage 230VAC, output voltage 230VAC 
Input frequency	Input frequency 50Hz 

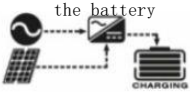
Photovoltaic input voltage	Photovoltaic input voltage 260VDC 
Photovoltaic input power	Photovoltaic input power 500W 
Charging current	Mains + photovoltaic charging current 50A 
	Photovoltaic charging current 50A 
	Mains charging current 50A 

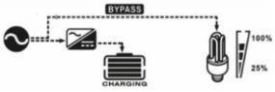
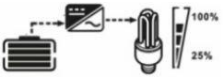
Battery voltage and output voltage	Battery voltage 25.5V, output voltage 230VAC 
Output frequency	Output frequency 50Hz 
Percentage of current load	Load percentage 70% 
Volt-ampere load	When the connected load is lower than 1KVA, the load in VA will display xxxVA, 350VA as shown in the figure below. 
	When the connected load is greater than 1KVA, the load in VA will display x.xKVA, as shown in the figure below 1.2KVA. 

Watt load	When the connected load is lower than 1KW, the load in W will display xxxW, as shown in the figure below 270W. 
	When the connected load is greater than 1KW, the load in W will display x.xKW, as shown in the figure below 1.2KW. 
Battery voltage/battery discharge current	Battery voltage 25.5V, battery discharge current 1A 
Program Version	Program version 2011 

4.3 Working mode display instructions

Operating mode	illustration	LCD display
Standby Mode/Energy Saving Mode Standby mode: the inverter is not turned	No output is provided in this mode, the inverter	Mains and solar power to charge the battery 

on yet, at this time the inverter can charge the battery without AC output Energy-saving mode: if the load is small or no load is detected, the inverter output will be turned off	can still charge the battery	Mains to charge the battery  Solar power to charge the battery  Battery not charged 
Failure mode: The failure is caused by internal circuit errors or external reasons, such as overheating, output short circuit, etc.	In this mode, solar energy and utility power can charge the battery	Mains and solar power to charge the battery  Mains to charge the battery  Solar power to charge the battery  Battery not charged 
Mains mode	This mode will provide output power from the	Charging the battery through mains power and solar energy 

	mains, and can also use the mains to charge the battery	Mains to charge the battery 
		Solar energy is not enough to provide the load, solar and utility power will provide the load and charge the battery at the same time 
Battery mode	This mode will provide output power from solar and battery, solar can also charge the battery	Solar and battery power the load simultaneously 
		Solar energy powers the load and charges the battery at the same time 
		The battery powers the load 

4.4 LCD fault codes and fault solutions

Error code	Failure time	Failure cause	Solution
01	Fan is locked when inverter is off	fan malfunction	Contact the after-sales maintenance personnel to replace the fan
02	Overheating	The internal temperature of the inverter exceeds 100° C	Check whether the air inlet and outlet are blocked and whether the ambient temperature is affected
03	Battery voltage too high	The battery is overcharged or the battery voltage is too high	Contact the after-sales maintenance personnel to test the battery
04	Battery voltage is too low	Low battery	Please charge the battery in time
05	An output short circuit or overheating inside the inverter has been detected	The output is short-circuited or the internal	Check the circuit and whether the air inlet and outlet are blocked

		temperature of the inverter exceeds 120° C	
06	The output voltage is too high	Abnormal output	Reduce the load or contact after-sales maintenance personnel
07	Overload time out	Inverter overload of 110%	Reduce load
08	Busbar voltage is too high	Inverter internal component failure	Contact after-sales maintenance personnel
09	Bus soft start failed	Inverter internal component failure	Contact after-sales maintenance personnel
11	Main relay failed	Inverter internal component failure	Contact after-sales maintenance personnel
13	Over voltage protection for solar input voltage	Photovoltaic input voltage exceeds 450VDC	Reduce solar input voltage
51	Over current or surge	Over current or surge	Restart, if the fault reappears, contact the after-sales maintenance personnel
52	Bus voltage is too low	Bus voltage is too low	Restart, if the fault reappears, contact the after-sales maintenance personnel
53	Inverter soft start failed	Inverter internal component failure	Contact after-sales maintenance personnel
55	AC output exceeding DC voltage	Output voltage unbalance	Restart, if the fault reappears, contact the after-sales maintenance personnel
57	Fault in current sensor	Inverter internal component failure	Contact after-sales maintenance personnel
58	Output voltage is too low	Abnormal output	Reduce the load or contact after-sales maintenance personnel

4.5 LCD warning codes and solutions

Warning code	warning event	Sound alarm	solutions
1	Fan locks up when inverter is turned on	Three times per second	Contact the after-sales maintenance personnel to replace the fan
3	Battery overcharged	One beep per second	Contact after-sales maintenance personnel
4	Low battery	One beep per second	Please charge the battery in time
7	Overload	Beeps twice per second	Reduce load
10	Output power derating	Beeps twice every three seconds	Reduce load

4.6 Other problems and solutions

Problems	LCD/LED/Buzzer	Possible reason	Solutions
Automatic shutdown during device startup	LCD/LED/buzzer automatically turns off after three seconds of activation	Battery power is low	Connect to mains or solar power to charge the battery
No response after power on	No sign	Battery voltage is too low	1. Connect to mains or solar power to charge the battery 2. Contact after-sales maintenance personnel
Mains power present, battery still powering	The input voltage on the LCD is 0 Green LED blinks	The circuit breaker for the mains input trips	Check the mains input circuit and circuit breaker
	Green LED blinks	AC power is insufficient to support all loads	Check whether the AC input power or generator input voltage is correct
When starting up, the internal relay keeps opening and closing.	LCD display and LED lights blinking	Battery disconnected	Contact after-sales maintenance personnel

5.Product Specifications

Product Specifications		
Model	BESS-SPF-6000WH-3000W	
Battery Pack Parameters	Nominal voltage	25.8V
	Nominal capacity	235Ah
	Rated Energy	6016Wh
	Charge cut-off voltage	29.2V (cut-off current 5A)
	Standard charging current	100A
	Maximum charging current	150A
	Discharge cut-off voltage	20V
	Standard discharge current	100A

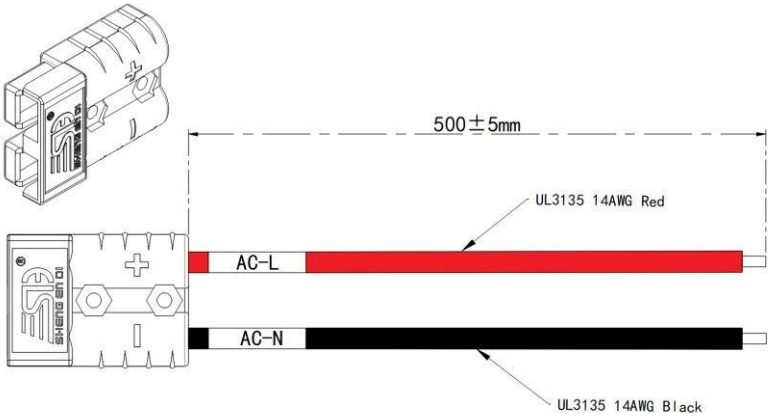
	Maximum charging current	150A
	Cycle life	>3000 Cycle @80%DOD, at 25° C
	Battery Type	Lithium iron phosphate
	Operating temperature	Charge: 0～55℃
		Discharge: -20～65℃
Inverter parameters	Rated power	3200VA/3000W
	Input voltage	170-280VAC
	Input frequency	50Hz/60Hz
	The output voltage	230VAC
	Output frequency	50Hz/60Hz
	Efficiency	93%
	Output waveform	Pure sine wave
PV parameters	Rated power	3000W
	Open circuit voltage	90V-450VDC
	Maximum charging current	80A
	Efficiency	98%
USB	5V3.6A	
Size	670*560*270mm	
Weight	86±0.5KG	
IP rating	IP50	
Cool down	Air cooling	
Shell material	SPCC cold rolled steel plate	

6.Wiring diagram

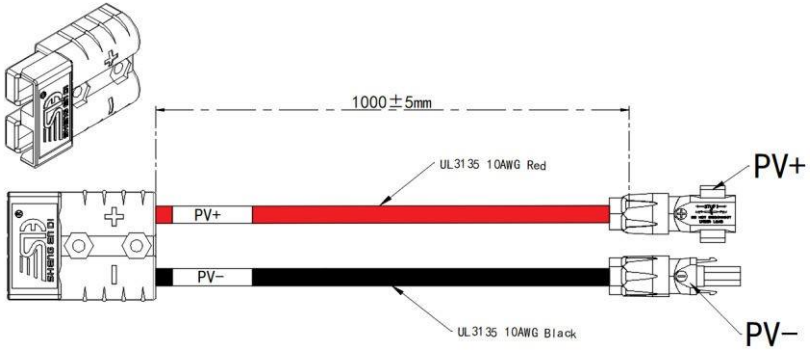
6.1Wiring harness

Please use the provided AC power cord with a minimum conductor cross-sectional area of 2mm²; The accompanying cable is shown in the diagram below. Please distinguish correctly the live wire (L) and the neutral wire (N), make sure connect the AC circuit breaker on both the mains power line and the household load bus to prevent overloading, short circuits, or damage caused by incorrect wiring.

AC input and AC output cable harness diagram:



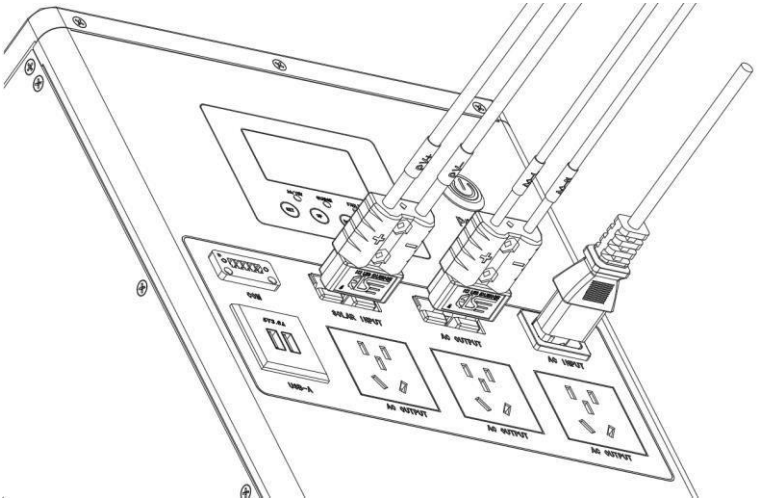
Solar energy cable harness diagram:



6.2Wiring diagram

Pls disconnect all power switches before connecting, do not operate with any power before wiring. As shown in the diagram below, connect the Anderson plug labeled "SOLAR INPUT" on the solar energy cable harness to the corresponding Anderson plug on the panel; on the other end, connect the MC4 terminals to the MC4 terminals on the solar photovoltaic panel, connect the Anderson plug labeled "AC INPUT" on the AC input cable harness to the corresponding Anderson plug on the panel; on the other end, connect it to the single-phase power grid with an AC circuit breaker (connect to the phase line L and neutral line N). Connect the Anderson plug labeled "AC OUTPUT" on the AC output cable harness to the corresponding Anderson plug on the

panel; on the other end, connect it to the bus of the household power grid with an AC circuit breaker (connect to the phase line L and neutral line N). After connecting the cable harness, check the circuit and start the power supply only when everything is accurate and correct.



7.Storage and Maintenance

7.1 Storage

Please charge the power supply for at least 3 hours before storing. Store the power supply upright in a cool, dry place. The recommended long-term storage temperature is 15° C-25° C. During storage, please charge the battery according to the following table:

storage temperature	charging frequency	charging time
0℃-40℃	every 3 months	2-3 hours

7.2 Maintenance

A. The power supply works under high voltage, and maintenance can only be performed by qualified maintenance personnel.

B. Even when the power is turned off, the internal components of the power supply are still connected to the battery, which is potentially dangerous

C. Only technicians who are familiar enough with the power supply can repair/maintain, and unauthorized personnel are not allowed to operate.

D. The power supply may cause electric shock, and the short-circuit current is large. Please remove watch, ring and metallic items etc before repair/maintenance.

E. Do not disassemble the power supply without permission.

8. Product Liability and Consulting

A. We are not responsible for accidents caused by violation of this specification and operation manual

B. Due to product quality improvement or technology upgrade, specifications subject to change without notice. If you want to know the latest information about this product, please contact us.

C. The warranty period for this product is 24 months from the date of delivery, if any product quality issues occur within the specified usage range in the warranty period,we will provide free maintenance. If the repair is unsuccessful, we will replace the relevant components with new ones to ensure continued use without performance degradation. Our after-sales personnel will provide specific maintenance and troubleshooting methods.

D. If you have any questions, please contact us.