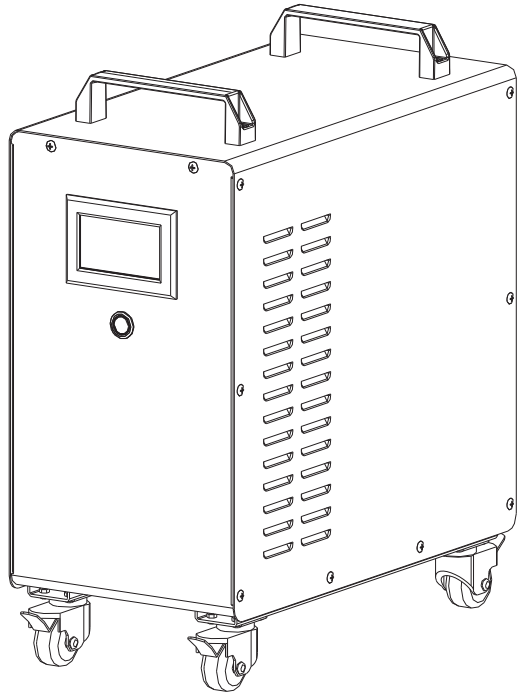
Portable Solar Power Battery Pack User's Manual



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1. Brief Introduction

1.1 Foreword

This manual will offer detailed product information and instructions for this Energy Storage System(ESS) series product. Please read this manual carefully before using this product.

1.2 Applicable Personnel

Adults should use and install this system. Keep out of the reach of children.

1.3 Safety Precautions

1) Please read the “Safety Precautions” before using to ensure safe operation.
2) Please note the warnings and follow the manual during operation.
3) Keep the product away from sun, rain and humid conditions.
4) Keep the product away from heat sources, such as ovens and furnaces.
5) Keep a safe distance for ventilation and follow the manual for installation.
6) Keep clean.
7) In case of a fire, use a dry powder extinguisher and not a fluid extinguisher.
8) Please do not disassemble any part inside.
9) Contact the manufacturer in case of questions.

2. Product Overview

2.1 Function Overview

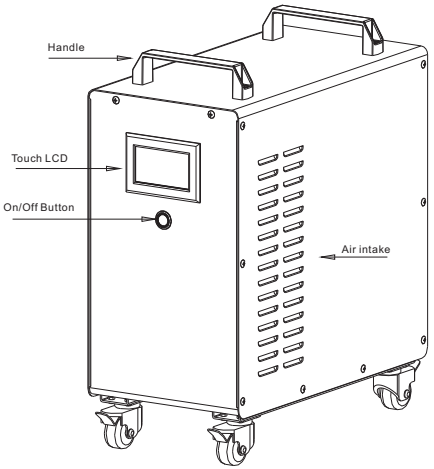
This unit is a small off grid household energy storage system. The unit includes an integrated solar charge controller, system controller, inverter and LiFePO4 (lithium iron phosphate) battery with BMS (Battery Management System), and converter.

This system is suitable for energy storage and provideds clean energy or as a backup power supply. It is also suitable for disaster applications. The system is reliable, safe, and easy to use.

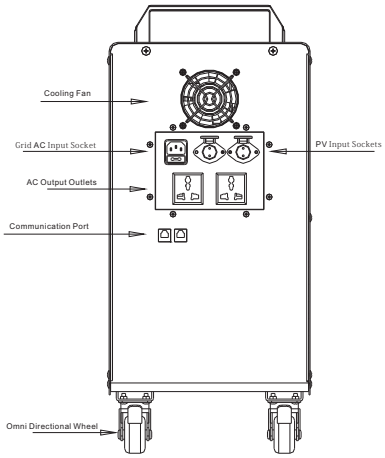
2.2 Naming Convention

BPLI-4K indicates an off grid energy storage system with a built-in 4KWh LiFePO4 (lithium iron phosphate) storage unit and AC110V 2000W output.

2.3 Appearance

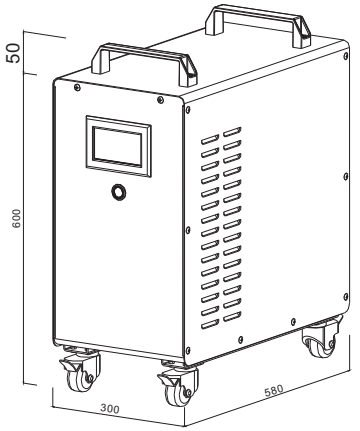


P1: Front&Side



P2: Back

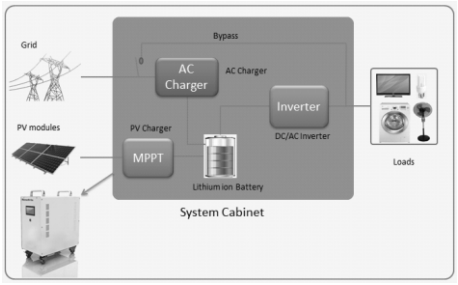
2.4 Outer Dimension (mm)



P3: Structure Dimension

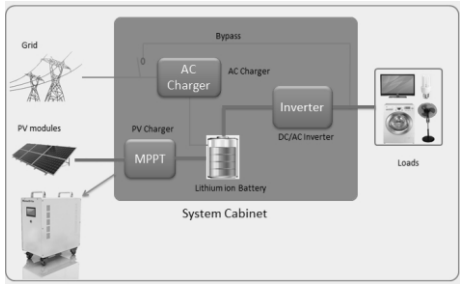
3. System Operation

3.1 System Sketch



3.2 System Energy Distribution

➢ Solar charges the battery, and battery provides power to the inverter and load

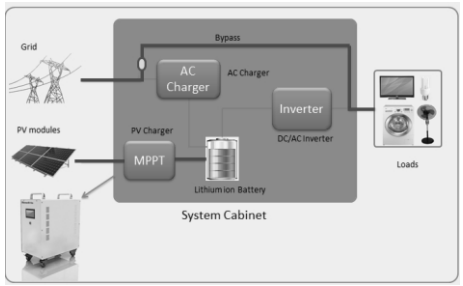


Inverter functions when battery capacity is sufficient or there is no grid power.

1) When solar power exceeds the need of the load and the battery is not fully charged, solar energy powers the load and charges battery at the same time.

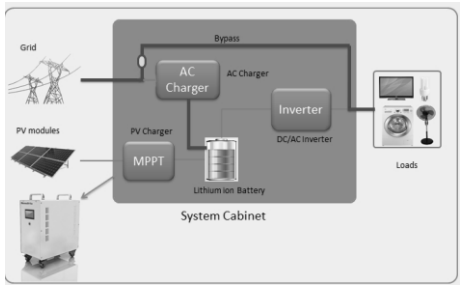
2) When solar energy is insufficient or there is no solar energy, both the battery and solar panels provide power to the inverter simultaneously until the battery runs out.

➢ Grid powers the load, and grid/solar panel charges the battery



1) Grid powers the load.
2) Grid and PV modules charge the battery.

➢ Grid powers the load, and the grid charges the battery.



1) When solar is not available,
grid charges the battery
and provides power to the load.

3.3 Working Mode

There are three working modes to meet user's needs: PV mode, UPS mode, peak-avoiding mode. Each mode is automatically controlled by the unit. Please note that "Eb = State of Charge of the battery".

3.1.1 PV Mode

System uses solar to power the load, and any redundant energy is used for charging the battery

Set customized parameter: minimum battery capacity retention percent---X; parameter setting range 30%~50%; default 30%

Condition 1: PV on or PV off, AC on
When Eb>X, battery and inverter provide power;
When Eb<X-10%, grid provides power to the load;
When Eb<10%, grid charges the battery until Eb > 15%.

Condition 2: PV on or PV off, AC off
Battery and Inverter provide power until Eb<10%, then cuts off output;
If no PV or grid power is available, unit turns off in 10 minutes, automatically

3.3.2 UPS Mode

Grid provides power to the load and charges battery normally.
Once AC power supply fails, system offers energy automatically as a UPS.
User can set the battery capacity value ---Y; from 50%~90%; default 80%

Condition 1: PV on or PV off, AC on
When Eb>Y+10%, battery and inverter provide power to load;
When Eb<Y, grid provides power to the load;
When Eb<Y-10%, grid charges battery;
When Eb>Y, charging stops.

Condition 2: PV on or PV off, AC off
Battery and inverter provides power until Eb<10%, then cuts off output;
if no PV or AC charging; system turns off in 10 minutes automatically.

3.3.3 Peak-Avoid Mode

This mode allows users to store electricity into the system when electricity is cheaper and use the stored energy when electricity is expensive.
Set customized parameter:
Charge Period: Start T1; Stop T2
Discharge Period: Start T3; Stop T4

Condition 1: PV on or PV off, AC on
PV and AC charge battery. Battery and inverter power load until Eb < 15%, then the grid provides power to the load. Grid charges until battery Eb is 12% and then switches to PV charging until Eb > 30%.

Condition 2: PV on or PV off, AC off
When Eb < 10%, PV charges the battery until Eb>15%, and then the inverter will output again.

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4. Technical Specifications

Model	BPLI-4K	
Battery Capacity	4KWh	
OUTPUT		
Rated Output Power	2000W	
Peak Output Power(10s)	2250W	
Rated Output Voltage	100Vac-130Vac	
Nominal Frequency	50/60Hz	
Power Factor	1	
THDV	<3%	
Overload Ability	120%<load<130%@10min; 130%<load<145%@10s	
Quiescent Dissipation(No Load)	<20W	
Maximum Efficiency(>70%Load)	92%	
AC CHARGE		
Input Voltage Range	110Vac;88～140Vac	
Input Frequency Range	50/60H±5 Hz	
Maximum Charge Power	600W	
Maximum Efficiency	>92%	
PV CHARGE		
Maximum Input Power	1500W	
Start-up Voltage	75Vdc	
MPPT Input Amount	2	
MPPT Voltage Range	75-140Vdc	
Maximum Input Voltage	150Vdc	
MPPT Efficiency	99.50%	
Maximum Efficiency	>96%	
Solar Charge Controller	MPPT	

BATTERY		
Rated Voltage	51.8Vdc	
Rated Capacity(C_{20})	78Ah	
Battery Type	Li-ion	
Maximum Charge Voltage	59.5V	
Discharge Cut-off Voltage	42.0V	
Charge Temperature	0℃~45℃	
Discharge Temperature	-20℃~60℃	
GENERAL		
IP Protection	IP21	
Communication	RS485	
Working Conditions	Relative Humidity: 5%~90%	
	Temperature: 0~40℃	
Cooling	Fan Cooling	
Dimensions(mm)	580×300×600 mm (Product Size)	
	657×375×645 mm (Packing Size)	
Weight(Kg)	59Kg(N.W.)	
	60Kg (G.W.)	

5. Product Functions

5.1 Power On/Off

1) ON: press the button >3 seconds, button LED lights and system power on;
2) OFF: press the button >3 seconds, button LED lights and system power off;

3) Automatic On/Off: System cuts off automatically when battery capacity is less than 10% and no PV or grid power is available; PV panel charges the battery automatically until battery capacity is more than 15%, then system turns on automatically; after grid power is available, system charges battery automatically and system turns on automatically.

NOTE: If the system is turned off when battery capacity is less than 10%, system will charge battery automatically, but the system won't turn on automatically.

5.2 Battery Charge Function

5.2.1 Charge Battery after Power-On

When system is powered on, PV and grid charge battery automatically based on the working mode and battery capacity state.

5.2.2 Charge Battery after Power-Off

When system is powered off, PV and grid charge battery automatically based on the working mode and battery capacity state.

5.3 Display Function

The system has one touch LCD to display the information of the grid, PV, battery, loads, etc. User can touch the related area on the LCD to see system information in real time.

5.4 Output Protection & Alarm

The system will stop output when over-load, over-voltage,low-voltage, over temperature, etc are detected. When the system sets off an alarm, the related information will be displayed on the LCD or buzzer, and the user can find the failure information on the LCD and determine the cause.

5.5 System Settings

5.5.1 Working Mode

User can choose from PV mode, UPS mode and peak-avoiding mode. The system works automatically in different modes and switches power source based on PV input on/off, grid on/off and battery remaining capacity, etc.

5.5.2 Output Voltage

System output voltage can be set on LCD. BPLI-4K output voltage setting range is 100V~130V

5.5.3 Automatic Output Frequency Identification

The system will identify and set the output frequency automatically based on the input frequency of local AC power.

5.5.4 System Time

User can set the system based on local time and the system runs automatically on set time.

5.5.5 System Language

There are three optional system languages: 中文,English, 日本語

5.5.6 Buzzer

User can turn on or off the buzzer and it will buzz if it turns on and the alarm occurs.

6. Installation & Operation

6.1 Product Installation

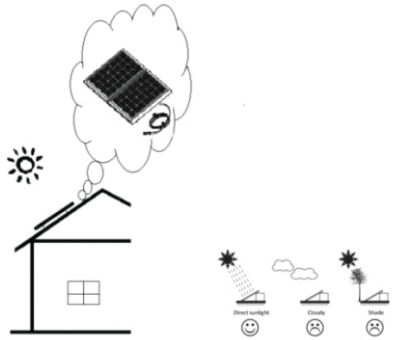
6.1.1 Installation Attention

1) The installation environment should be away from water, combustible gas, corrosive and other hazardous objects.

2) Keep ventilated.

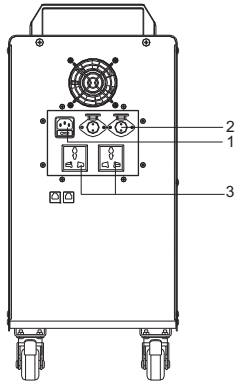
3) Keep dry.

6.1.2 Cable Connection



1) PV Module Installation

Please install the PV module in suitable position; the solar panels should be toward sunlight and avoid tree shade.

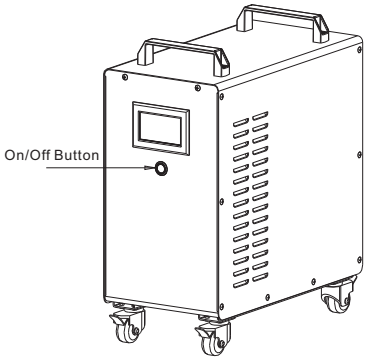


2) Cable Connection

Power off the system before connection

- AC input cable to Socket 1
- PV input cable to Socket 2
- AC Load to Outlet 3

6.2 Power On/Off

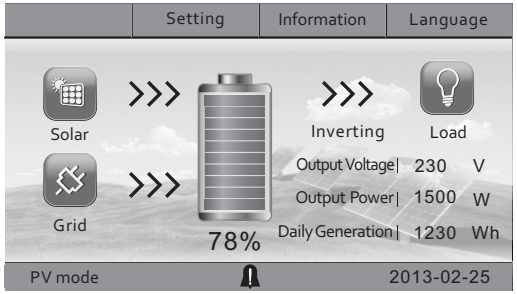


1) Power On: Press the On/Off Button for 3 seconds, then LCD and button indicator will light on.

2) Power Off: Press the On/Off Button for 3 seconds, then LCD and button indicator will light off and output stops. Please turn off the load before power off.

6.3 System Operation

6.3.1 System Main Operation Interface



LCD Main Display Interface

1) Charging Icon: Flashing >>> & No charge: >>>

2) Passby Output Icon: >>> Grid

3) Inverter output Icon: >>> Inverting

4) Alarm Icon:

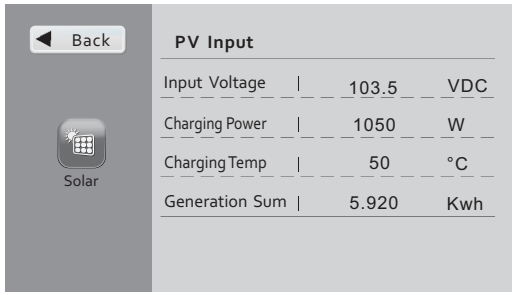
The alarm icon will flicker when system alarms (touch this icon to turn buzzer on/off) and no icon when system is working normally.

5) System Time at bottom right

6) Working Mode at bottom left

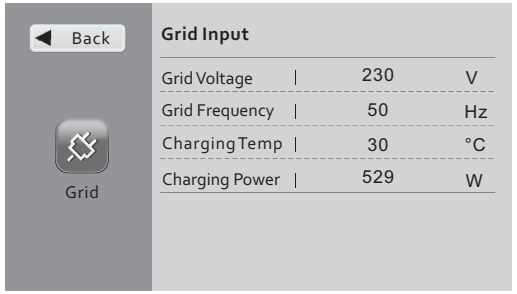
6.3.2 PV Input Information

Touch on main interface to see PV input parameters



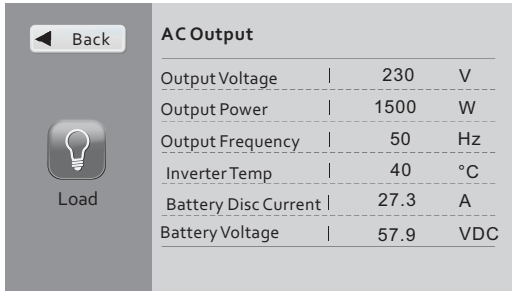
6.3.3 Grid Input Information

Touch on main interface to see grid input parameters



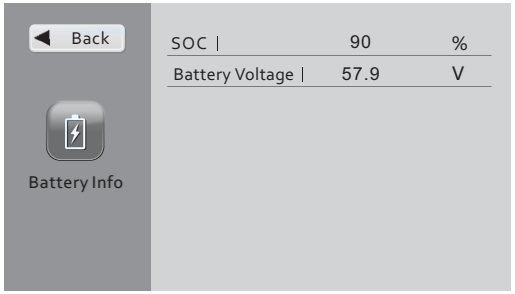
6.3.4 Load/Output Information

Touch on main interface to see AC output parameters



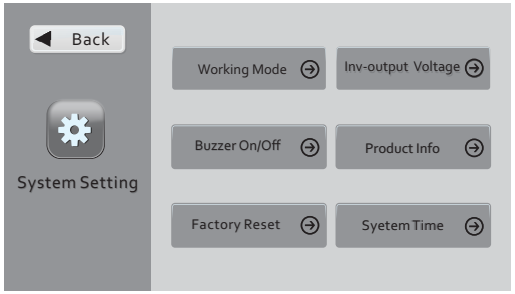
6.3.5 Battery Information

Touch on main interface to see battery parameters



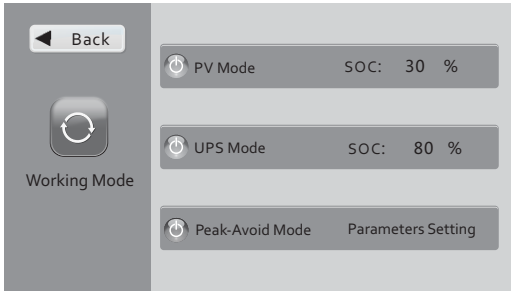
6.3.6 System Setting

Touch "Setting" on main interface to set system parameters



6.3.6.1 Working Mode Setting

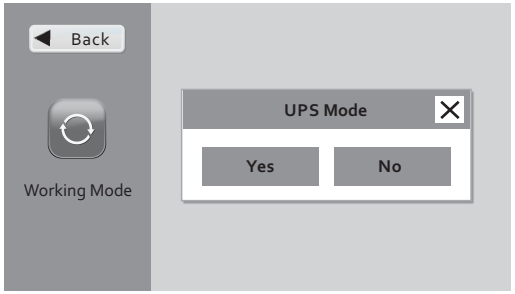
Touch "Working Mode" on main interface to working mode



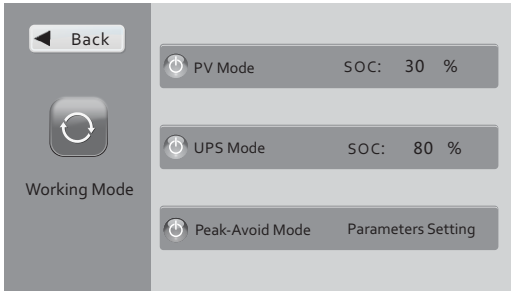
Touch the red number “30”or“80” to set the min battery capacity retention percent on PV and UPS mode based on user settings.

Note: Set range of min battery capacity retention: PV mode 30%~50%; UPS mode 50%-90%

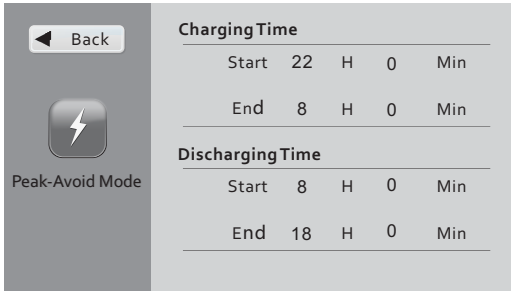
2. Touch , "PV Mode" "UPS Mode" or "Peak-Avoid Mode" to working mode setting page. For example, touch, "UPS Mode" next page as below.



Touch “No” to back and touch “Yes” to set UPS mode. Icon from to red means setting working mode successfully and the page as below

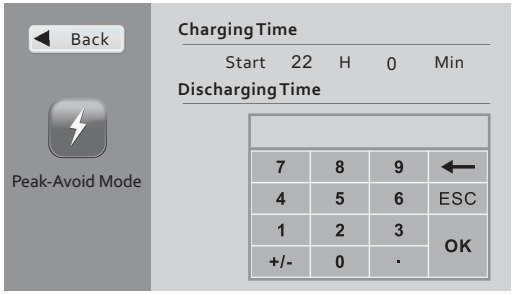


3. Touch "Parameters Setting" behind "Peak-Avoid Mode" to set the charge and discharge time as below.



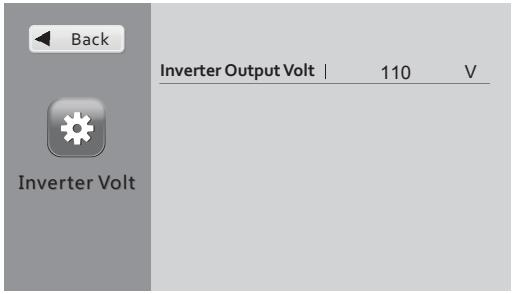
Note: Forced charging is only effective for grid AC charge and PV charge is out of the limits.

Touch the above red number to set charge and discharge time

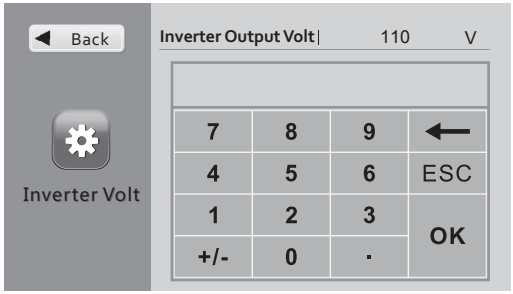


6.3.6.2 Inverter Output Voltage Setting

Touch "Inv Output Voltage" on System Setting Page to set inverter output voltage.
Touch “110” to set output voltage

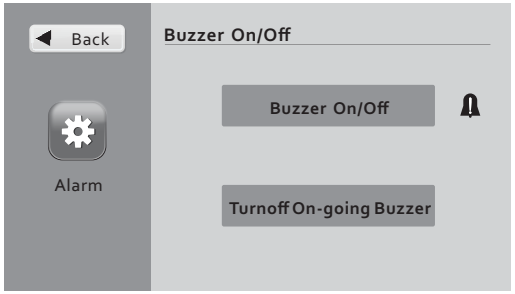


Please note the voltage setting rage for different product series.
110V series: 100V~130V

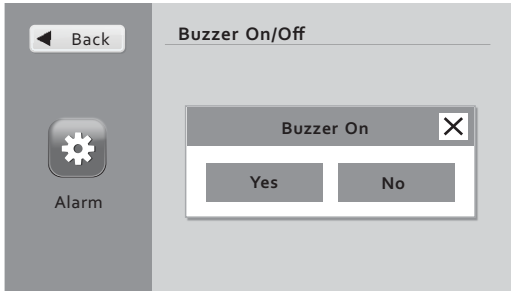


6.3.6.3 Buzzer Setting

Touch "Buzzer On/Off "on System Setting Page to set buzzer on/off



Touch"Buzzer On/Off" and next page as blow



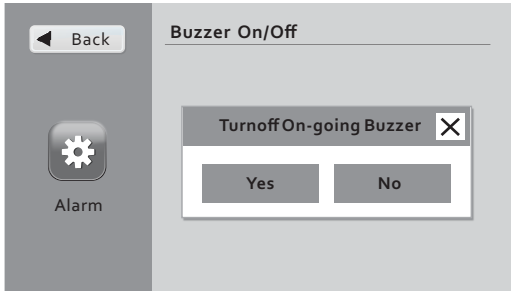
Touch “Yes” to set buzzer on and system buzzes when it fails
Touch “No” to set buzzer off.

: buzzer on : buzzer off

When buzzer buzzes, user can cancel the sound via first page of buzzer setting, touch, "Turnoff On-going Buzzer " then next page as below.

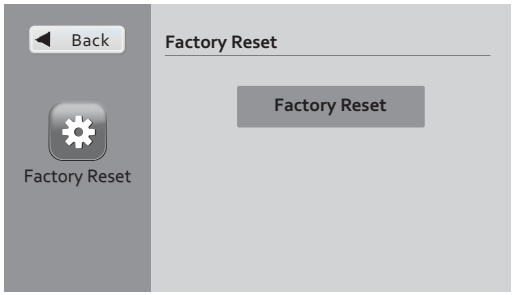
Touch “Yes” to turn off buzzer

Note: When system buzzes, touch on main interface can also enter into Buzzer Setting Page.

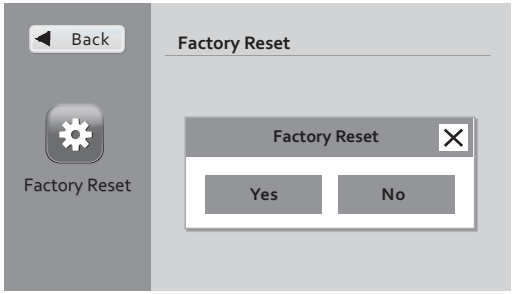


6.3.6.4 Factory Reset

Touch "Factory Reset" on System Setting Page and next page as below



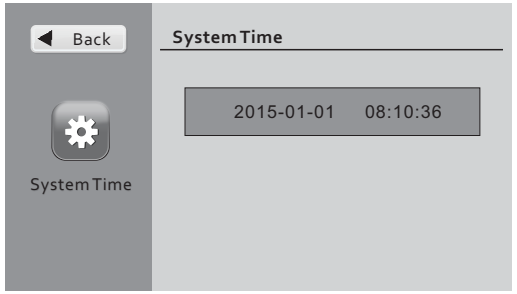
Touch "Factory Reset" in above page and next page as below



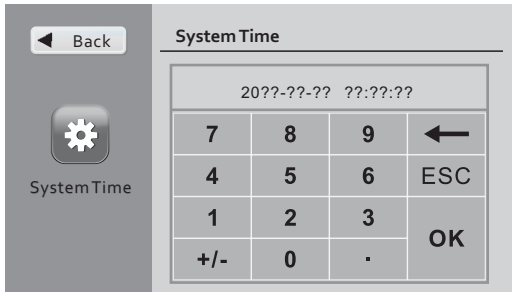
Working Mode: PV mode
- Output Voltage:
- 1) 110V series: 110V
  PV Daily Generation: 0
- Charge Time 1) Start: 22:00 2) End: 08:00
- Discharge Time 1) Start: 08:00 2) End: 16:00
-

6.3.6.5 System Time Setting

Touch "System Time " on System Setting Page and next page as below



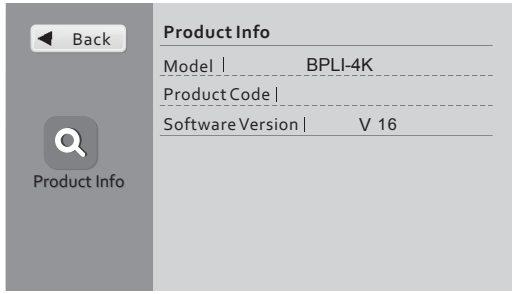
Touch "2015-01-01 08:10:36 " and next page as below



Please input the right date and time, then touch OK to confirm; and touch “ESC”to turn back.

6.3.6.6 Product Information

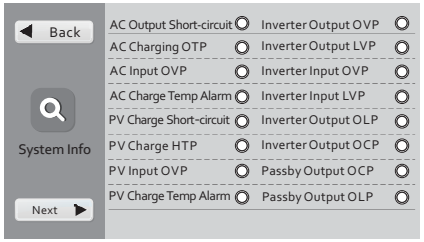
Touch "Product Info " on System Setting Page and next page as below

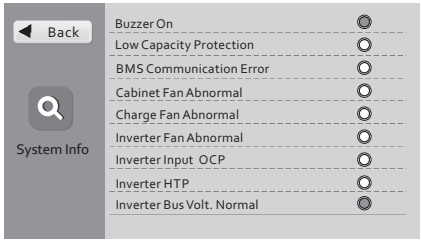


Product information: Product Model, Product Code and Software Version No.

6.3.7 Failure Information

Touch information on main interface to see system information.

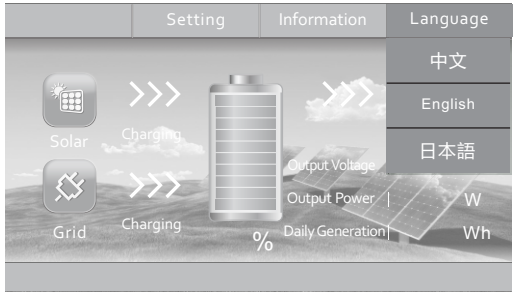




◉ : Yes ◎ : No

6.3.8 Language Setting

Touch "Language " in main interface to set system language.



7. Troubleshooting

The system has thorough protections and it will cut off output or charge automatically once a failure occurs. User can find the failure information from "System Info" Page and troubleshoot accordingly.

NO	Failures	Cause	Troubleshooting
1	AC Charge Short-circuit	AC charging short-circuit	Contact your supplier
2	AC Charging OTP OTP: over temperature protection	AC charging stops automatically because temperature > 70 deg C	1. Check the ambient temperature if higher than 50℃ . Charging will start again if charger cools down to 65℃ and no need to re-start the system. 2. Contact the supplier if step 1 doesn't work.
3	AC Input OVP OVP: over voltage protection	AC input voltage is too high	1. Cut off AC input and measure AC voltage to see if it' s higher than specified parameters and ensure it is low enou.gh. 2. Contact the supplier if step 1 doesn't work.
4	AC Charge Temp Alarm	AC charging over temperature alarm	Check the ambient temperature; check air intake if well unobstructed; check fan on cabinet if blocked
5	Inverter Output OVP OVP: over voltage protection	Inverter output voltage is too high	1. Cut off the load and restart the system 2. Contact the supplier if step 1 doesn't work.
6	Inverter Output LVP LVP: low voltage protection	Inverter output voltage is too low	1. Cut off the load and restart the system 2. Contact the supplier if step 1 doesn't work.
7	Inverter Input OVP OVP: over voltage protection	High battery voltage	Contact the supplier
8	Inverter Input LVP LVP: low voltage protection	Battery voltage is too low	1. Charge the system soon, inverter output recovers when battery capacity reaches > 10% 2. Contact the supplier if step 1 doesn't work.
9	Inverter Output OLP OLP: over load protection	Inverter's load is higher than its bearable load	1. Check if the load for system is too high and refer the system over load ability from Part 4, then restart. 2. Contact the supplier if step 1 doesn't work.
10	Inverter Output OCP OCP: over current protection	Short-circuit output or over load	1. Check load power or short-circuit output,then restart. 2. Contact the supplier if step 1 doesn't work.
11	Passby Output OCP OCP: over current protection	Short-circuit output or over load	1. Check load power or short-circuit output,then restart. 2. Contact the supplier if step 1 doesn't work.

12	Passby Output OLP OLP: over load protection	Short-circuit output or over load	1. Check load power or short-circuit output, then restart. 2. Contact the supplier if step 1 doesn't work.
13	PV Charging Short-circuit	PV/solar charging short-circuit	Contact the supplier
14	PV Charge HTP OTP: over temperature protection	PV charging stops automatically because temperature > 80℃	1. Check the ambient temperature if higher than 50℃. Charging will start again if charger cools down to 75℃ and no need to re-start the system. 2. Contact the supplier if step 1 doesn't work.
15	PV Input OVP OVP: over voltage protection	High PV voltage	1. Cut off PV input and measure PV voltage to see if it's higher than specified parameters and ensure it's lower than it. 2. Contact the supplier if step 1 doesn't work.
16	PV Charge Temp Alarm	High PV charging temperature	Check the ambient temperature; check air intake if well unobstructed; check fan on cabinet if blocked
17	Low Capacity Protection	Low battery capacity	1. Charge the system soon 2. Contact the supplier if step 1 doesn't work.
18	BMS Communication Error	Abnormal BMS communication	Restart and contact the supplier if it still doesn't work.
19	Cabinet Fan Abnormal		1. Check if the cabinet fan is stuck and clear it. 2. Contact the supplier if step 1 doesn't work.
20	Charger Fan Abnormal		Contact the supplier
21	Inverter Fan Abnormal		1. Check if the cabinet fan is stuck and clear it. 2. Contact the supplier if step 1 doesn't work.

8. Maintenance

In order to ensure the stable performance, please maintain the product frequently.

1) Please keep the product away from corrosive, dusty, high-temperature surroundings and keep any metal out of the cabinet.

2) Check the wires and wire connections.

3) Clean the cooling fan and check regularly.

4) Before opening the cabinet, the power source should be cut off thoroughly and reset at least 10 minutes or longer until capacitors discharge completely (there are large capacitors in this system). During disassembly, please try not to damage any part or component and note the wiring steps. Clean dust inside cabinet. Check wiring terminals inside cabinet.

5)If the cabinet is opened, please run the system before use to ensure the system's stable power supply.

6)When the product doesn't work, please deal according to this manual. If the problem can't be solved within this manual, please contact the distributor or manufacturer as soon as possible. And never disassemble the product by yourself!

9. Packing List

No.	Item	Pieces
A	PV Off Grid Energy Storage System	1
B	AC Cable	1
C	Solar Cable	2
D	Manual	1