

LiPOWER

User Manual



Product Name: Integrated Energy Storage System

Product Model: PH15000

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1. Information

This manual describes the installation, operation and troubleshooting of machine. Please read carefully before installation and operation. Please keep this manual properly for future reference.

1.1 Scope

This manual provides safety and installation instructions as well as tool and wiring information.

1.2 Target Group

This document is intended for qualified personnel and end users, and tasks that do not require any specific qualifications can also be performed by end users.

Qualified individuals must have the following skills :

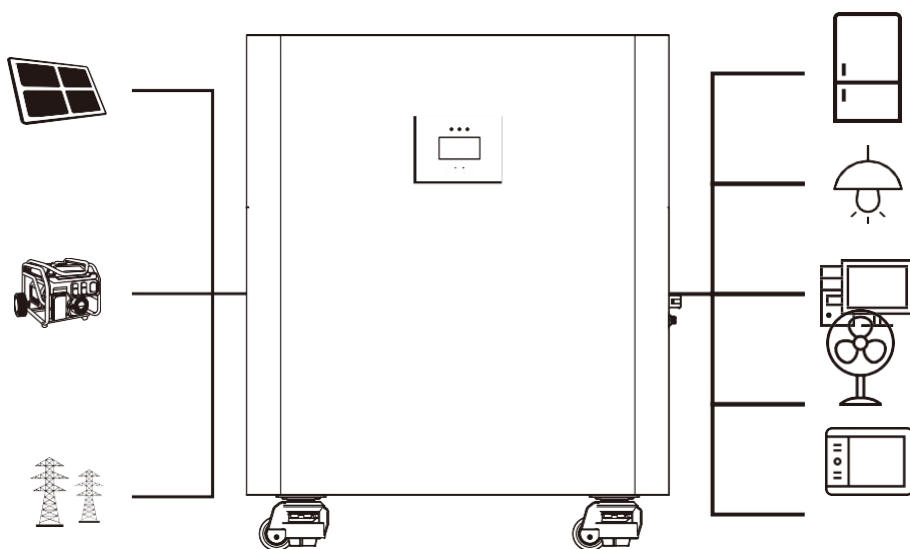
1. Understand the working principle and operation method of the inverter.
2. Be trained on how to deal with the hazards and risks associated with installing & using electrical equipment and installation.
3. Training on installation and commissioning of electrical equipment.
4. Understand the applicable standards and directives.
5. Understand and comply with this document and all safety information.

1.3 Safety Instructions

1. Before using the machine, please read all instructions, warning marks and all relevant chapters of this manual. The company has the right not to make quality guarantees if the machine is damaged due to failure to install according to the instructions in this manual.
2. Do not disassemble the machine. When maintenance or repair is required, please send it to a qualified service center. Improper reassembly may cause the risk of electric shock or fire.
3. All operation and connection should be performed by professional electrical or mechanical engineers. All electrical installations must comply with local electrical safety standards.
4. To reduce the risk of electric shock, please disconnect all wires before performing any maintenance or cleaning. Turning off the power does not reduce the risk of electric shock.
5. For the best operation of this machine, please select the appropriate cable size according to the required specifications. It is very important to operate the all-in-one machine correctly.
6. Grounding Instructions - This inverter should be connected to a permanently grounded wiring system. When installing this inverter, be sure to comply with local requirements and regulations.

7. It is strictly forbidden to cause short circuit between AC output and DC input. When DC input is short-circuited, it is strictly forbidden to connect to the mains.
8. Please do not install the machine in a damp, greasy, flammable, explosive or dusty environment.
9. **Warning!!** Only qualified maintenance personnel can repair this device. If the fault still exists after troubleshooting according to the troubleshooting table, please return the machine to the local dealer or service center for repair .
10. Before operation, please make sure that the all-in-one machine has been fully installed.

1.4 Application Introduction

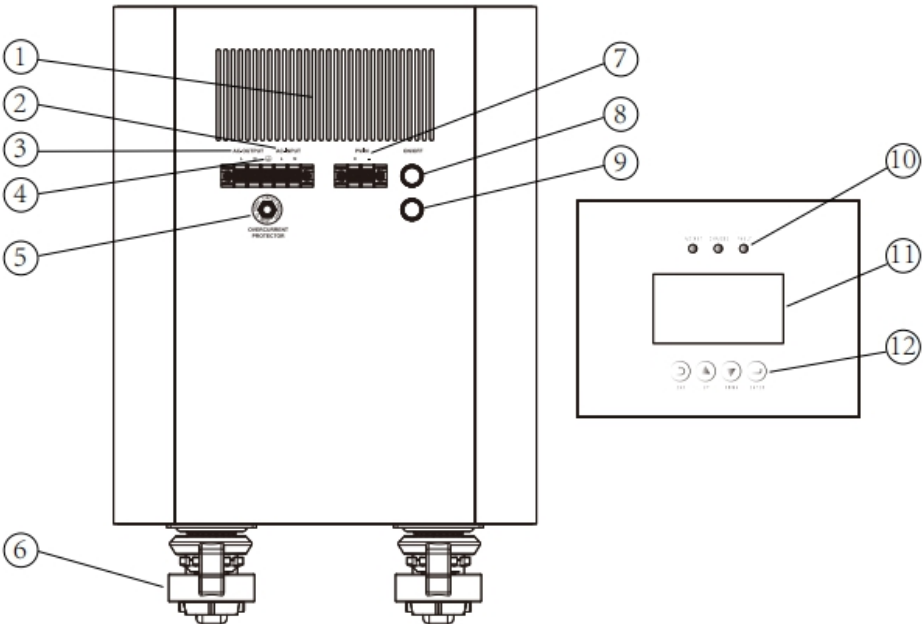


Welcome to use this solar energy storage with inverter all-in-one machine. This product can meet the demand of photovoltaic and energy storage systems at the same time. It can realize off-grid function and two-way control of electric energy. Intelligent control can achieve highly autonomous energy scheduling. It is easy to install and debug, simple to operate and maintain, is an ideal choice for family residential application scenarios. This product supports off-grid switching (typical switching time is 10ms), support input and output overload and short circuit protection, DC/AC side is equipped with surge protection can continuously provide safety electricity for the family.

1.5 Product Features

- 1. It has segmented charging and discharging function.
- 2. It has built-in lithium battery dual activation function, which can be triggered by connecting to either AC power or photovoltaic power.
- 3. It has energy-saving mode function to reduce no-load loss.
- 4. There are 4 charging modes available: Photovoltaic only, Utility priority, Photovoltaic priority and Hybrid charging.
- 5. There are 2 output modes: AC bypass and inverter output, and it has the uninterrupted power supply function.
- 6. It has complete short circuit protection, over-voltage protection, low-voltage protection, over-load protection, reverse feeding protection etc., 360° all-round protection.
- 7. Adopt full digital voltage and current double closed loop control, advanced SPWM technology, and output pure sine wave.
- 8. Advanced MPPT technology, efficiency up to 99.9%.
- 9. Adopt intelligent adjustable speed fan to dissipate heat efficiently and extend system life.

2. Product Overview



①	Cooling fan	⑦	PV input
②	AC input port	⑧	Inverter switch
③	AC output port	⑨	Battery switch
④	Ground terminal	⑩	Indicator Lights
⑤	AC input overload protector	⑪	LCD screen
⑥	Universal wheel	⑫	Operation buttons

3. Installation

3.1. Unpacking and Inspection

Please check the unit before unpacking to ensure that there is no damage in the package. You should receive the following items in the package:

All-in-one machine x1

User manual x1

Terminal block x8

3.2. Preparation

Before making any wiring connections, remove the terminal protection covers.

3.3. Installation Precautions

Before selecting an installation location, please consider the following points:

1. Do not install the all-in-one machine in a humid, flammable, explosive, or dusty environment.
2. During installation, leave more than 300MM space on the left and right sides of the all-in-one machine for heat dissipation.
3. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
4. When installing in outdoor, please avoid direct sunlight and rain infiltration.
5. Mains input and AC output are high voltage, please do not touch them.

3.4 AC Input/Output Connection

Warning! ! Before connecting the AC input, please install a separate AC circuit breaker between this machine and the AC input. This will ensure that this machine can be safely disconnected during maintenance and fully protect the AC input from over current. The recommended specification of the AC circuit breaker is 30A.


Warning!! There are two terminal docks marked with 'IN' and 'OUT' , please do not mistakenly connect the input and output connection docks.

Warning!! All wiring must be done by qualified personnel.

Warning!! Using the appropriate cables for AC input and output connections. It is very important for safe and efficient operation of the system. To reduce the risk, please use the correct recommended cable size as shown in the figure below:

Recommended AC Wiring Diameter	Maximum Bypass Input Current	Recommended Circuit Breaker	Torque Value
10mm ² / 7AWG	40A	2P—40A	1.2-1.6Nm

*Insert the AC input or output wire according to the polarity indicated on the terminal docks and tighten the screws.

 → Ground wire (yellow-green)
L → LINE (brown)
N → Neutral (blue)

WARNING !! Make sure the power cord is disconnected before attempting to connect the AC input to this machine.

WARNING!! Make sure the power cord is connected securely.

3.5 PV connection

Warning!! When connecting PV modules, please install a DC circuit breaker between this machine and the PV modules.

Warning!! All connections must be made by qualified personnel.

Warning!! Using appropriate cables to connect PV modules. It is very important for the safe and efficient operation of the system. To reduce risks, please use the correct recommended cable sizes as shown below:

Recommended PV Input Wiring Diameter	Maximum PV Input Current	Recommended Circuit Breaker	Torque Value
5.2mm ² /10AWG	22A	2P—32A	1.2-1.6Nm

PV Module Selection:

When choosing a suitable PV module, please be sure to consider the following parameters:

- 1. The open circuit voltage (Voc) of PV module do not exceed the maximum value.
- 2. The open circuit voltage (Voc) of PV module should higher the minimum value.

Max.PV Array Open Circuit	500Vdc
Starting Voltage	100Vdc
PV Array MPPT Voltage Range	120Vdc~450Vdc

Check the connection of the cable between PV module and PV input connector is correct or not. Then connect the positive (+) of the cable to the positive (+) of the PV input connection terminal, and the negative (-) of the cable to the negative (-) of the PV input connection terminal.

WARNING!! Make sure the wire connections are secured.

4. Operation

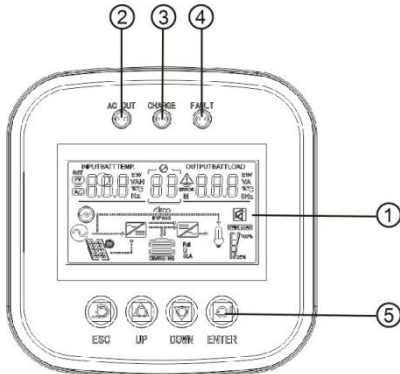
4.1. Start the All-in-one Machine

- Step 1: Press the battery switch on the all-in-one machine.
- Step 2: Press the inverter switch on the all-in-one machine, then the screen and indicator light will light up, indicating that the inverter has been activated.
- Step 3: Close the PV, AC input and AC output circuit breakers in sequence.
- Step 4: Start the loads one by one according to the power.

4.2. Operation and LCD Display Introduction

The LCD display as shown in the figure below, on the front panel of the all-in-one machine, it includes 3 indicator lights, 4 function buttons and 1 LCD display show the operating status and input/output information.

- 1. LCD Display
- 2. Status Indicator
- 3. Charging Instructions
- 4. Fault Indication
- 5. Function Buttons



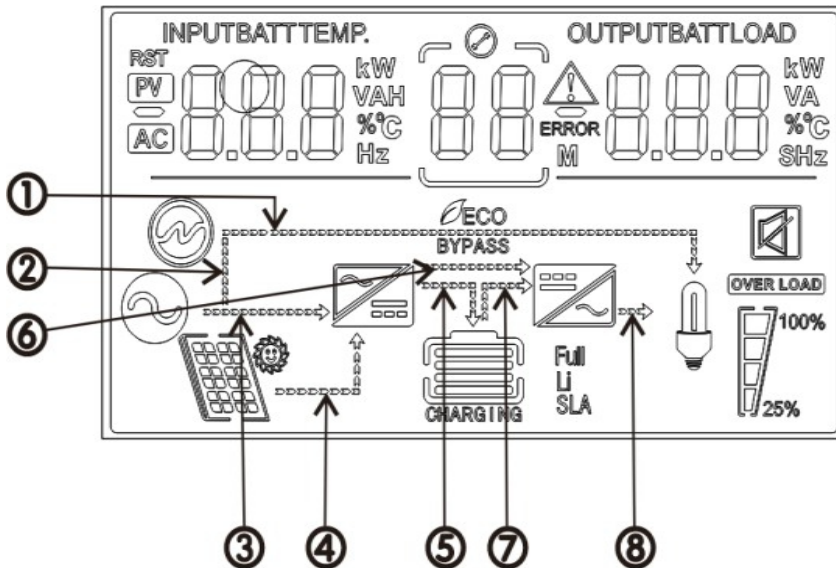
Indicator Light Introduction












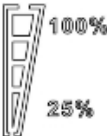






Indicator Lights	Color	Description
AC OUT	Yellow	Steady on: AC power output
		Flashing: Inverter output
CHARGE	Green	Flashing: Fast charging
		Steady on: Float charging
FAULT	Red	Flashing: Fault status




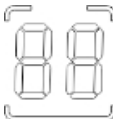
Operation Button Introduction

Function keys	Description
ESC	Enter/Exit the settings menu
UP	Previous selection
DOWN	Next selection
ENTER	Under the settings menu, confirm/enter options

LCD Display Introduction:







Icon	Function	Icon	Function
	Indicate the AC input is connected to AC input source		Indicates the inverter discharge circuit is working
	Indicate the wide voltage AC input mode (APL mode)		Indicates the machine is in the mains bypass working mode
	Indicate the PV input is connected to the solar energy panels		Indicate the AC output is in the overload state
	<p>Indicate the machine is connected to the battery.</p> <p> Indicate the remaining battery power 0%~24%,</p> <p> Indicate the remaining battery power 25%~49%,</p> <p> Indicate the remaining battery power 50%~74%,</p> <p> Indicate the remaining battery power 75%~100%</p>		<p>Indicate the AC output load percentage, indicating the load percentage 0%~24%,</p> <p>Indicates the load percentage 25%~49%,</p> <p>Indicates the load percentage 50%~74%,</p> <p>Indicates load percentage ≥ 75%</p>
	Indicate the current battery type of the machine is lithium battery		Indicate the buzzer is not enabled
	Indicate the current battery type of the machine is lead Acid battery		Indicate the machine has an alarm
	Indicate the battery is being charged		Indicate the machine is in the fault state


	Indicate the AC/PV charging circuit is working		Indicate the machine is in the setup mode
	Indicate there is AC voltage output at the AC output terminal		The parameters displayed in the middle of the screen 1. In non-setting mode, shows the alarm or fault code 2. In setting mode, shows the parameter item code in setting currently

M When used in parallel, it indicate the machine is the master machine, which is only valid in parallel mode.

Parameters displayed on the left side of the screen: Input parameters

	Indicate the AC input
	Indicate the PV input
	The icon is not displayed
	Indicates battery voltage, total battery charging current, AC charging power, AC input voltage, AC input frequency, PV input voltage, internal heat sink temperature, software version

Parameters displayed on the right side of the screen: Output parameters

	Indicates output voltage, output current, output active power, output apparent power, battery discharge current and software version; In setting mode, displays the setting parameters under the currently set parameter item code
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Arrow Display

①	Not display	⑤	Charging the battery
②	Grid supply the loads	⑥	Not display
③	Grid input charging	⑦	Battery supply to inverter
④	PV input charging	⑧	Inverter supply the loads

How to view real-time data:

On the LCD main screen, press the 'UP' and 'DOWN' buttons to turn the pages and view the real-time data of the machine.

Page No	Parameters on the left side of the screen	On the middle	Parameters on the right side of the screen
1	Battery Voltage	Fault Code	Output Voltage
2	Battery voltage collected by BMS (It will be display after connected well the BMS communication only)		Battery capacity rate collected by BMS (It will be display after connected well the BMS communication only)
3	Battery Current		Battery Power
4	AC Output Current		AC Output Active Power
5	AC Output Frequency		AC Output Apparent Power
6	AC Input Current		AC Input Voltage
7	AC Input Frequency		AC Input Apparent Power
8	PV Input Voltage		PV Input Power
9	PV Heat Sink Temperature		PV Input Current
10	Inverter Heat Sink Temperature		Bus Voltage
11	Program Version 1		Program Version 2
12	Battery Rated Voltage		Output Rated Power
13	PV Rated Voltage		PV Rated Charging Current
14	Machine ID		Inverter Parallel Mode

4.3. Setting parameter description

Button operation instructions: To enter and exit the setup menu, press the "SET" button. After entering the setup menu, the parameter number [00] will flash. At this time, you can press the "UP" and "DOWN" buttons to select the parameter item code to be set. Then press the "ENT" button to enter the parameter editing state. At this time, the parameter value is flashing. Use the "UP" and "DOWN" buttons to adjust the parameter value. Finally, press the "ENT" button to complete the parameter editing and return to the parameter selection status.

No	Parameter Name	Setting Options	Description
00	Quit	[00] ESC	Exit the settings menu
01	Work-first mode	[01] GID Default	In the utility priority mode, the utility will give priority to supplying power to the loads. When not have the utility input, it will switch to photovoltaic and battery to supply power to the loads.
		[01] BAT	In PV battery priority mode, photovoltaic power will give priority to the loads. When photovoltaic energy is insufficient, the battery will also supply power to the loads. Only the battery voltage is under or lower than the setting value of parameter [16], it will switch to AC power supply. Only the battery is fully charged or higher than the setting value of parameter [17], it will switch to battery discharge.
		[01] PV	In PV priority mode, photovoltaic power will give priority to the loads. When photovoltaic energy is insufficient, the battery will also supply power to the loads. Only there is no PV input or the battery power is lower than the setting value of parameter [16], it will switch to the mains electricity.

		[01] HBD	Hybrid mode, you can set the hybrid mode through [33] setting item
02	AC Output Voltage Range Setting	[02] 120V	120V model: 100/105/110/120Vac can be set, default 120Vac. AC output power = rated power * (setting voltage/120)
		[02] 230V	230V model : 200/208/220/230/240Vac can be set, default 230Vac. AC output power = rated power * (setting voltage/230)
03	Output Frequency	[03] 50.0HZ	Bypass adaptive, when there is AC power, it automatically adapts to the frequency when the AC power is first supplied; when there is no AC power, the output frequency can be set through this menu. The default setting for 230V machines is 50HZ, and the default setting for 120V machines is 60HZ.
		[03] 60.0HZ	
04	AC Input Voltage Range	[04] APL	230V model wide range input mains voltage range 90~280V 120V model AC input range: 90~140V Frequency range: 47~ 55Hz (50Hz); 57Hz ~ 65Hz (60Hz);
		[04] UPS Default	230V model narrow range input mains voltage range 170~280V 120V model AC input range: 90~140V Frequency range: 47~ 55Hz (50Hz);57Hz ~ 65Hz (60Hz);
		[04] GEN	When the diesel engine is input, it needs to be set to this mode. At this time: 230V model input AC voltage range 90~280V 120V model input AC voltage range: 90~140V Frequency range: 40~70Hz

05	Energy Saving Mode	[05] DIS Default	Disable Energy Saving Mode
		[05] ENA	In the energy-saving mode, if the load is empty or less than 25W, the inverter output will be turned off after a delay; When the power is larger than 50W, the inverter starts automatically.
06	Charging Mode	[06] SNU Default	PV and utility hybrid charging, photovoltaic charging priority. When photovoltaic energy is insufficient, utility charging is used to supplement. When photovoltaic energy is sufficient, utility charging stop. Note: Photovoltaic and utility can only be charged at the same time when the mains bypass output is loaded. When the inverter is working, only photovoltaic can be started charge
		[06] OUO	Utility charging priority, and the photovoltaic charging is started only when the mains power is invalid
		[06] OSO	PV charging priority, and utility charging is started only when photovoltaic charging is ineffective
		[06] NUC	Only PV charging is enabled, not utility charging
07	Maximum Total Charging Current	[07] 80A Default	Maximum total charging current setting Setting range 0~100A
08	PV Maximum Charging Current	[08] 80A Default	Maximum PV charging current to the battery: 0-100A.
09	AC Maximum Charging Current	[09] Default	M series models, setting range 0~40A, default 40A; V Series models, setting range 0~60A, default 60A.

10	Battery Full Charge Judgment Current	[10] 3A Default	When the battery voltage is larger than or equal to the constant voltage charging value and the charging current is less than this set value, the battery is judged to be fully charged and charging is turned off;
11	Battery Type	<p>[11] USE</p> <p>[11] SLd</p> <p>[11] FLd</p> <p>[11] GEL Default</p> <p>[11] LF14/LF15/LF16</p> <p>[11] N13/N14</p>	<p>User-defined, all battery parameters can be set</p> <p>Sealed lead-acid battery, constant voltage charging voltage 57.6V, floating charge voltage 55.2V.</p> <p>Open lead-acid battery, constant voltage charging voltage 58.4V, floating charge voltage 55.2V</p> <p>Colloidal lead-acid battery, constant voltage charging voltage 56.8V, floating charge voltage 55.2V</p> <p>Lithium iron phosphate battery LF16/LF15/LF14, corresponding to lithium iron phosphate battery 16 series, 15 series and 14 series, 16 series default constant voltage charging voltage 56.8V, 15 series default constant voltage charging voltage 53.2V, 14 series default constant voltage charging voltage is 49.2V, can be adjustable.</p> <p>Ternary lithium battery, adjustable. N13 default constant voltage charging voltage 53.2V, the default constant voltage charging voltage of N14 string is 57.6V</p>
12	Constant Charging Voltage	[12] 57.6V Default	Constant charging voltage setting, setting range 48V~58.8V, It is valid when the input voltage is 0.4V and the battery type is custom or lithium battery

13	Float Charge Voltage	[13] 55.2V Default	Float charge voltage, setting range 48V~58.4V, step 0.4V
14	Maximum Constant Voltage Charging Time	[14] 120 Default	The maximum time setting of constant voltage charging. The constant charging voltage reaches the parameter 【12】 When setting voltage, maximum charging time and setting range 5min~900min, step by 5 minutes
15	Battery Recharge Recovery Point	[15] 52V Default	After the battery is fully charged, the inverter stops charging. When the voltage reaches this value, charging is resumed.
16	Battery To Mains Power	[16] 46V Default	When parameter [01] = BAT, the battery voltage is lower than the set value, and the output switches from inverter to AC power. The setting range is 44V~52V. It cannot exceed.
17	Mains To Battery	[17] 57.6V Default	When parameter [01] = BAT, the battery voltage is higher than the set value. The output is switched from AC to inverter, with a setting range of 48V~60V.
18	Battery Under Voltage Alarm	[18] 44V Default	Battery under voltage alarm point. When the battery voltage is lower than this judgment point, an under voltage alarm (01 fault) is issued , and the output does not shut down. The setting range is 40V~52V, step 0.4V.
19	Over Discharge Delay Protection Voltage	[19] 42V Default	Over discharge voltage, battery voltage is lower than this judgment point, delay parameter 【22】 Turn off the inverter output after the set time. Setting range 40V~48V, step 0.4V
20	Over Discharge Immediate Protection Voltage (Battery EOD)	[20] 42V Default	Battery discharge limit voltage, if the battery voltage is lower than this judgment point, the output will be immediately shut down (report 02 fault). Setting range 40V~52V, Step 0.4V, valid when battery type is custom and lithium battery

21	Battery Voltage Recovery After Over-discharge Protection (02 Fault Clearing)	[21] 52V Default	When the battery over-discharge protection disconnects the inverter output, the battery voltage needs to be greater than this set value to restore the battery inverter AC output.
22	Over Discharge Delay Protection Time	[22] 5S Default	Over discharge delay protection time, when the battery voltage is lower than parameter [19], the inverter output will be turned off after the delay time set by this parameter.5S~50S, step 5S
23	RS485-2 /CAN Communication Function	[23] DIS Default	RS485-2 turns off the BMS communication function. Our PC and remote monitoring protocols can continue to be used.
		[23] RS485	RS485-2 BMS communication function
24	BMS Protocol Settings	When [23] setting item = BMS, you need to select the corresponding lithium battery manufacturer brand for communication	
		PLN=Paineng, PCE=Peicheng, GXU=Guoxuan, DAQ=Daqin, AOG=Aoguan, OLT=Ouyang LiTe, XWD=Xinwanda, CFE=Changfeng, MIT=Maitian	
25	Discharge Alarm SOC (Can be set when BMS is enabled)		【23】 The setting item BMS is enabled and becomes effective. If the battery capacity rate is lower than this value, the machine will alarm 07. If the battery capacity rate is higher than this value, the machine will alarm 07. The alarm can be cleared after 5%.
26	Switch to AC SOC (Can be set when BMS is enabled)		【23】 The setting item BMS is enabled and becomes effective. The battery capacity rate is low. When the value exceeds this value and AC power is available, the machine switches to AC power operation.

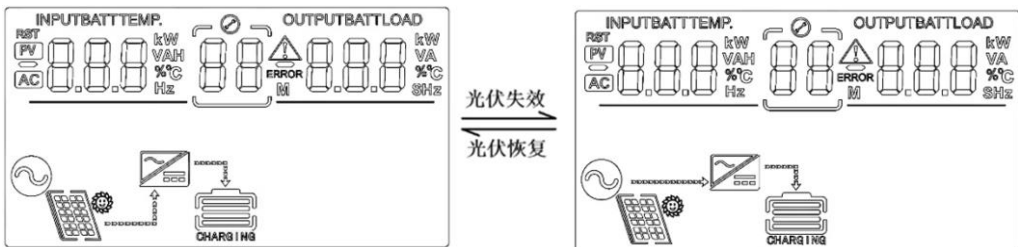
27	Switching Inverter SOC (Can be set when BMS is enabled)		【23】 The setting item BMS is enabled and becomes effective. In battery priority mode, if the battery capacity rate is higher than this value, the machine will switch back to inverter mode from AC power mode.
28	Discharge Cut-off SOC (Can be set when BMS is enabled)		【23】 The setting item BMS is enabled and becomes effective. If the battery capacity rate is lower than this value, the machine will report 08 fault and cut off the mains power or disconnect the power supply output.
29	Charging Cut-off SOC (Can be set when BMS is enabled)		【23】 The setting item is effective after BMS is enabled. When the battery capacity rate is higher than this value, the inverter considers that the battery is fully charged. In battery priority mode, the machine will switch from AC power to battery power.
30	Buzzer Alarm	[30] DIS Default	Disable Alarm
		[30] ENA	Enable Alarm
32	RS485 ID Setting	[32] 1 Default	Parallel mode, setting range 1-6, ID cannot be repeated, parallel start The machine will automatically assign addresses; the single machine mode setting range is 1-254;
33	-	-	-
34	N-PE Connection Switching Function Enabled	[34] DIS Default	It is forbidden to automatically connect the N line and the PE line under any working conditions.
		[34] ENA	When off-grid and without mains input, the N line is automatically connected to the PE; bypass When AC power input, the N line is automatically disconnected from the PE

35	Automatic Battery Activation	[34] DIS	When the battery is in sleep mode or not connected, PV or AC IN will not automatically. Battery activation turns on the battery output.
		[34] ENA Default	When the battery is in sleep mode or not connected, PV or AC IN will automatically power on. Battery activation turns on the battery output.

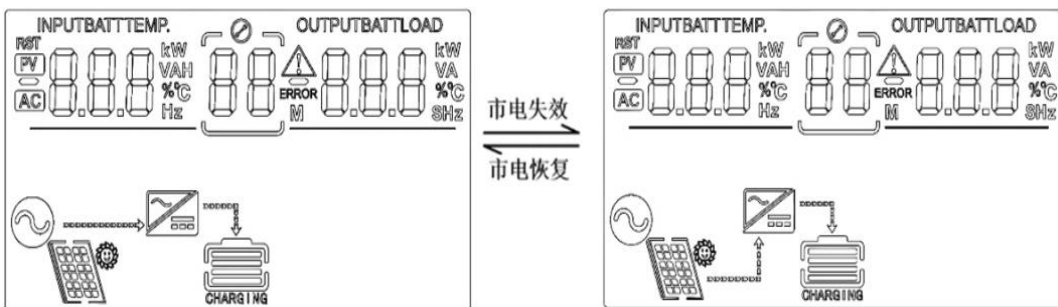
5. Working mode

5.1 Charging Mode

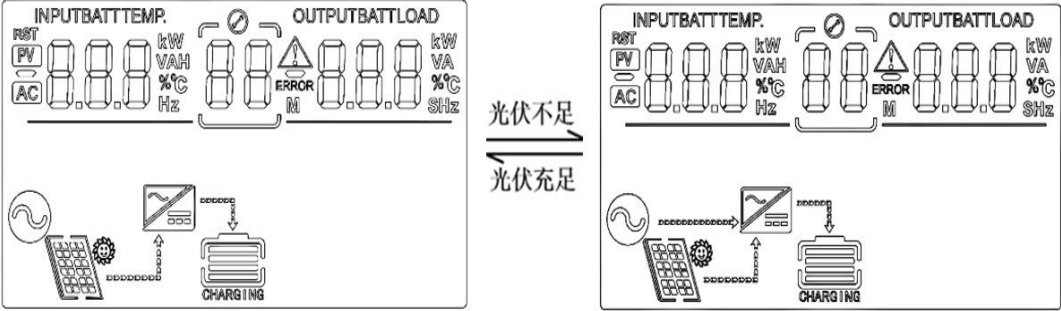
1) Photovoltaic priority: Photovoltaic priority charging, only when the photovoltaic power fails will the mains charging be started. Make full use of solar power generation during the day and switch to mains charging at night to maintain the battery power. It is used in areas with relatively stable power grids and relatively expensive electricity prices.



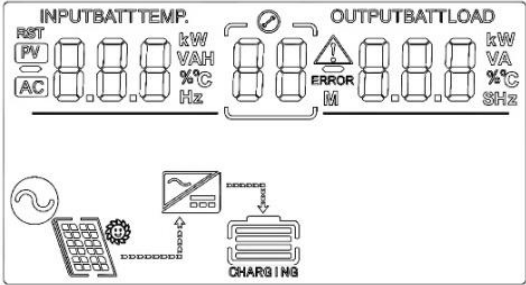
2) Utility priority: Mains power gives priority to charging the battery, and photovoltaic charging is only started when the mains power is invalid .



3) Hybrid charging: PV and mains are mixed and charged, with PV MPPT charging being the priority. When PV energy is insufficient, mains will be used to supplement. When PV energy is sufficient, mains will stop charging. This method is the fastest and is suitable for areas with unstable power grids, which can provide sufficient backup power supply at any time.



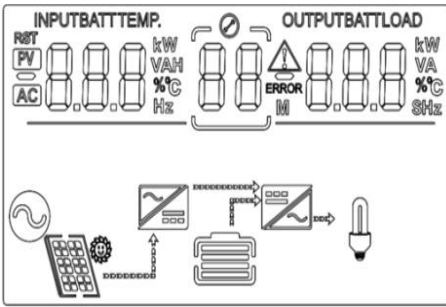
4) Photovoltaic charging only: Only photovoltaic charging, not AC charging. This method is the most energy-saving method. The battery power comes from solar energy and is usually used in areas with good lighting conditions.



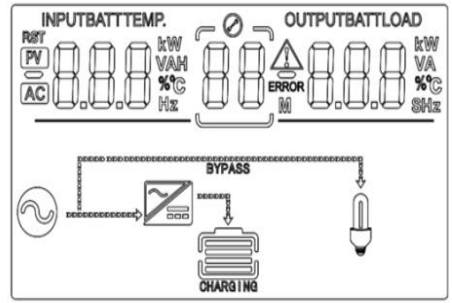
5.2 Discharging Mode

1) Photovoltaic priority mode: When photovoltaic power is ineffective, it switches to AC power supply and charging. This mode maximizes the use of solar energy while maintaining battery power. It is suitable for areas with relatively stable power grids.

The power supply sequence achieved is: photovoltaic-mains-battery

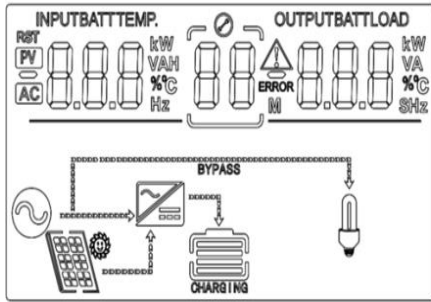


光伏失效
 光伏恢复

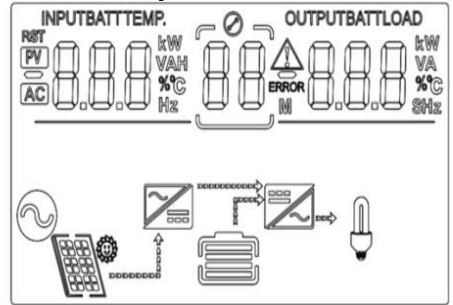


2) Mains priority mode: Switch to battery power only when there is no mains power. Switch to mains power and charging when there is mains power. The device is equivalent to UPS and is used in areas with unstable power grids. Switching does not affect photovoltaic charging.

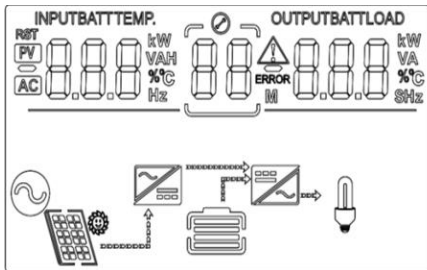
The power supply sequence is: mains-photovoltaic-battery



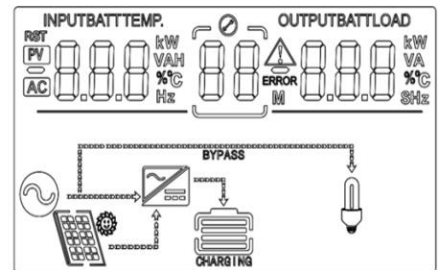
市电失效
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3) Inverter priority mode: Switch to mains power supply only when the battery voltage is lower than the set point (04 setting item), and switch to battery power supply mode when the mains charging battery voltage is higher than the set point (05 setting item)



电池欠压
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6. Fault codes and countermeasures

6.1 Fault Code

Error code	Fault Name	Does it affect the output?	Description
【01】	Battery Voltage Low Voltage Reminder	No	The battery voltage is lower than the setting item [18] . Reminds that the battery is in low voltage state.
【02】	Battery Voltage Low Voltage Protection	Yes	The battery voltage is low, the output is turned off and the Stop battery discharge protection.
【03】	Battery Discharge Average Current Over-current Protection	Yes	If the average battery discharge current is larger than the maximum input battery current for 1 minute, the input stop battery discharge protection.
【04】	Battery Discharge Instantaneous Value Over-current Protection	Yes	When the instantaneous value of the battery discharge current is greater than the maximum instantaneous value of the device, the output is turned off to stop the battery discharge protection.
【05】	Battery Not Connected	Yes	Battery disconnected warning
【06】	Battery Over-voltage	Yes	If the selected battery type or the set battery voltage is exceeded, the output is turned off to stop battery charging electric protection.
【07】	BMS Battery Capacity Rate Alarm	No	Lithium battery BMS battery capacity rate low wake up. (Set BMS enable to be effective)

【08】	BMS Battery Capacity Rate Low Protection	Yes	Lithium battery BMS battery capacity rate is low, turn off the output to stop battery discharge protection. (Set Set BMS enable to be valid)
【09】	Bypass Overload Protection	Yes	The AC power is overloaded and the AC output is turned off.And stop mains charging.
【10】	Battery Inverter Overload Protection	Yes	Battery discharge inverter overload, shut down current output and stop battery discharge protection.
【11】	Battery Inverter AC Output Short Circuit	Yes	Battery discharge inverter AC output short circuit, turn off AC output and stop battery discharge protection Protection.
【12】	Battery Inverter AC Output Over-current	Yes	The battery discharge inverter AC output over-current will shut down the AC output and stop the battery discharge protection.
【13】	DC Component of Battery Inverter Voltage is Abnormal	Yes	The DC component of the battery inverter voltage is abnormally regulated , shutting down the AC output and stopping battery discharge electric protection.
【14】	Bus Over-voltage Software Sampling Protection	Yes	Internal battery boost, boost bus voltage overvoltage software protection, shut down AC output and charging electricity.
【15】	Bus Overvoltage Hardware Sampling Protection	Yes	Internal battery boost, boost bus voltage overvoltage hardware protection, shut down AC output and charging

【16】	Bus Under-voltage Protection	Yes	Internal battery boost, boost bus voltage undervoltage protection, shut down AC output and charging electricity.
【17】	Bus Bar Short Circuit Protection	Yes	Internal battery boost, boost bus voltage short circuit protection, shut down AC output and charging electricity.
【18】	PV Input Voltage Over-voltage	Yes	The solar input voltage exceeds the maximum allowable input voltage protection.
【19】	-	-	-
【20】	PV Over-current Protection	No	Solar charging over-current hardware protection, shut down solar charging.
【21】	-	-	-
【22】	PV Heat Sink Over Temperature	No	The temperature of the solar charging radiator is too high. Close solar charging.
【23】	AC Radiator Over Temperature	Yes	The AC charging or battery inverter discharge radiator temperature is too high. Turn off the AC charging or battery inverter discharge. Battery inverter discharge.
【24】	Main Transformer Over temperature	Yes	The internal main transformer of AC charging or battery inverter discharge is too high. Turn off the AC charging. Power or battery inverter discharge.
【25】	AC Input Relay Short Circuit	Yes	AC input relay short circuit protection to prevent inverter AC output from back flowing to bypass AC enter

【26】	-	-	-
【27】	Fan Failure	Yes	The fan is blocked or fails, shut down the inverter output and various charging function
【28】	-	-	-
【29】	-	-	-
【30】	Model Detection Error	Yes	The model was not set at the factory, and the model was identified incorrectly error
【31】	-	-	-
【32】	-	-	-
【33】	-	-	-
【34】	-	-	-
【49】	BMS Communication Error	No	Check whether the communication line is connected correctly and 【11】 Is it set to the corresponding lithium battery? Pool Communication Protocol
【50】	BMS Other Fault Alarms	No	After checking the lithium battery BMS fault type, Clearing Lithium Battery faults
【51】	BMS Battery Over Temperature Alarm	No	Lithium battery BMS over temperature alarm
【52】	BMS Battery Over-current Alarm	No	Lithium battery BMS battery over-current alarm
【53】	BMS Battery Over-voltage Alarm	No	Lithium battery BMS battery over-voltage alarm
【54】	BMS Battery Under-voltage Alarm	No	Lithium battery BMS battery undervoltage alarm
【55】	BMS Battery Low Temperature Alarm	No	Lithium battery BMS low temperature alarm

6.2 Fault Clearing

Fault Code	Fault	Solution
/	No Display On The Screen	Check whether the battery circuit breaker or PV circuit breaker is closed; whether the switch is in the "ON" state; press any button on the screen Exit screen sleep mode.
【06】	Rechargeable Battery Over-voltage Protection	Check whether the battery voltage exceeds the protection value. If it exceeds, the battery needs to be discharged until the voltage is lower than the battery overvoltage recovery point.
【01】 【02】	Battery Under-voltage Protection	Wait until the battery charge is restored to above the low voltage disconnect recovery voltage.
【27】	Fan Failure	Check if the fan is not turning or is blocked by something. .
【22】 【23】	Radiator Over Temperature Protection	When the device temperature cools down to below the over-temperature recovery temperature, the normal charge and discharge control.
【09】 【10】	Bypass Overload Protection, Inverter Overload Protection	① Reduce the use of electrical equipment; ① Restart the machine and the load will resume output.
【11】	Inverter Short Circuit Protection	① Carefully check the load connection and remove the short circuit fault point; ② Re-energize the load and the load will resume output.
【18】	PV Over-voltage	Use a multimeter to check if the PV input voltage exceeds the maximum allowable voltage. Allowable input voltage.
【05】	Battery Disconnection Warning	Check if the battery is disconnected or if the circuit breaker on the battery side is disconnected. There is a closure.
【40】 【42】	Parallel Wiring Fault	Check if the parallel cable is not properly connected, for example, it is loose or connection error

【49】	BMS Communication error	Check whether the BMS communication line and inverter communication port are connected correct
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Note: If you encounter a product failure that cannot be solved by the methods in the table above, please contact our after-sales service department for technical support and do not disassemble the device yourself.

7. Protection Function

No	Protective Function	Description
1	PV Current Limiting/Power Limiting Protection	When the configured PV array charging current exceeds the PV rated current, rated current for charging.
2	PV Night Time Anti-reverse Charging Protection	At night, the battery voltage is larger than the PV panel voltage, preventing the battery from discharge through PV panels.
3	Mains Input Over-voltage Protection	When the mains voltage exceeds 280V (230V model) or 140V (120V model)When the AC power is turned on, the charging will stop and the inverter output will be switched.
4	Mains Input Under-voltage Protection	When the mains voltage is lower than 170V (230V model/UPS mode) or 90V (120V model or APL mode), the AC power charging will stop and the reverse charge output
5	Battery Over-voltage Protection	When the battery voltage reaches the over-voltage disconnect voltage point, the PV and AC power will be automatically stopped.Charge the battery to prevent damage from overcharging.
6	Battery Under-voltage Protection	When the battery voltage reaches the low voltage disconnection voltage point, the battery discharge will stop automatically.Prevent the battery from being damaged by excessive discharge.

7	Load Output Short Circuit Protection	When a short circuit occurs at the load output for more than 200MS, the output will be shut down immediately.
8	Radiator Over temperature Protection	When the internal temperature of the all-in-one machine is too high, the all-in-one machine will stop charging and discharging. When it returns to normal, the all-in-one machine will resume charging and discharging.
9	Overload Protection	The output will resume 3 minutes after overload protection. If the overload occurs 5 times in a row, the output will be shut off until the machine is powered on again. For specific overload levels and duration, please refer to the technical documentation at the end of the manual. parameters table
10	PV Anti-reverse Protection	The machine will not be damaged when the PV polarity is reversed.
11	AC Reverse Feeding Protection	Prevent battery inverter AC power from back flowing to bypass AC input.
12	Bypass Over-current Protection	Built-in AC input overcurrent protection circuit breaker.
13	Battery Input Over-current Protection	When the battery discharge output current is larger than the maximum value and lasts for 1 minute, it switches to AC output.
14	Battery Input Protection	When the battery is reversed or the inverter is short-circuited, the inverter internal battery input fuse will blow, preventing battery damage or fire.
15	Charging Short Circuit Protection	When the external battery port is short-circuited during PV or AC charging, the inverter will protect and stop output current.

8. Specifications

Model	PH15000	
Battery parameters		
Battery Type	LiFePO4	
Rated Capacity	280AH	
Rated Voltage	51.2V	
Rated Energy	14336Wh	
Utility mode		
Rated Input Voltage	220/230Vac	110/120Vac
Input Voltage Range	(170Vac~280Vac) \pm 2% (90Vac-280Vac) \pm 2%	(90Vac-140Vac) \pm 2%
Frequency	50Hz/ 60Hz (auto detection)	
Frequency Range	47 \pm 0.3Hz~55 \pm 0.3Hz (50Hz); 57 \pm 0.3Hz~65 \pm 0.3Hz (60Hz);	
Overload/Short circuit protection	Breaker	
Maximum Efficiency	>95%	
Conversion Time	10ms (typical)	
(Bypass and Inversion)		
AC Reverse Feeding Protection	YES	
Maximum Bypass Overload Flow	40A	
Inverter mode		
Output Voltage Waveform	Pure Sine Wave	
Rated Output Power (VA)	5600	
Rated Output Power(W)	5600	

Power Factor	1	
Rated Output Voltage (Vac)	230Vac	120Vac
Output Voltage Error	±5%	
Output Frequency Range (Hz)	50Hz±0.3Hz/60Hz±0.3Hz	
Maximum Efficiency	>92%	
Overload Protection	<p>230V Model (102% < load < 125%)±10%: Report an error and shut down the output after 5 minutes; (125% < load < 150%)±10%: error is reported and the output is turned off after 10 seconds; Load > 150%±10%: error is reported and the output is turned off after 5 seconds;</p> <p>120V Model (102% < load < 110%)±10%: Report an error and shut down the output after 5 minutes; (110% < load < 125%)±10%: error is reported and the output is turned off after 10 seconds; Load > 125%±10%: error is reported and the output is turned off after 5 seconds;</p>	
Peak Power	11000 VA	
Motor Load Capacity	3HP	
Output Short Circuit Protection	Breaker	
Bypass Circuit Breaker Specifications	40A	
Rated Battery Input Pressure	48V (minimum starting voltage 44V)	

Battery Voltage Range	40.0Vdc~60Vdc \pm 0.6Vdc (undervoltage alarm/ shutdown voltage/ overvoltage alarm/ overvoltage Restore... LCD screen can be set)
Power Saving Mode	Load \leq 25W Enter power saving mode
Mains Charging	
Battery Type	Lithium battery
Maximum Charging Current (can set up)	60A
Charging Current Error	\pm 5A _{dc}
Charging Voltage Range	40–60V _{dc}
Short Circuit Protection	Circuit Breakers and Fuses
Circuit Breaker Specifications	40A
Overcharge Protection	Alarm and shut down charging after 1 minute
Solar Charging	
Maximum PV Open Circuit Voltage	500V _{dc}
PV Operating Voltage Range	100-500V _{dc}
MPPT Voltage Range	120-450V _{dc}
Battery Voltage Range	40-60V _{dc}
Maximum PV Input power	6000W
Maximum PV Input Current	22A
Maximum PV Charging Power	5500W
Solar Charging Current Range (Configurable)	0-100A

Charging Short Circuit Protection	Blown fuse
Wiring Protection	Reverse polarity protection
Maximum hybrid charging current (PV+AC)	
Maximum Hybrid Charging Flow (Configurable)	0-100A
Certification Specifications	
Specification Certification	CE(IEC62109-1,2)
EMC Certification Level	EN61000, C2
Working Temperature Range	-15°C to 55°C
Storage Temperature Range	-25°C ~ 60°C
Humidity Range	5% to 95% (three-conformal coating protection)
Noise	≤60dB
Heat Dissipation	Forced air cooling, adjustable wind speed
Dimensions (L*W*D)	620*345*760MM
Net Weight (kg)	137KG
Gross Weight (kg)	147KG

