MUST®

100% PURE SINE WAVE HOME INVERTER

USER'S MANUAL

Portable photovoltaic energy storage power station

HBP1800 1-3KW

Please download the software "SolarPowerMonitor2.2.81".
Download link:https://en.must-ee.com

Appliances

4200-100001-00A1

Contents

About the Manual

Scope: This manual describes the assembly, installation, operation and troubleshooting of this equipment. Please read this manual carefully before installation and operation. Retain this manual for future reference.
This manual provides safety and installation guidelines and information on tools and wiring .

The following situations are not covered by the warranty :
(1) Overdue the warranty period .
(2) The serial number has been changed or lost.
(3) The battery capacity is the lowest or the appearance of the device is damaged.
(4) External factors such as transportation,negligence,etc.
(5) This equipment has been damaged by an irresistible natural disaster .
(6) Damage caused by not following the power supply conditions or operating environment .

This manual provides safety and installation guidelines and information on tools and wiring.

Safety Notice

WARNING: This chapter contains important safety and operating instructions. Read and save this manual for future reference.

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1. Before using this unit , please read all instructions and precautions on this unit , understand the battery type and all relevant chapters in this manual to Prevent explosion which may lead to personal injury and battery damage .

2. Do not disassemble the unit . When service or repair is required , send it to a professional service center . Incorrect assembly may result in electric shock or fire .

3. To reduce the risk of electric shock , disconnect all wiring before attempting any maintenance or cleaning . Turning off the device does not reduce this risk .

4. Caution - Only professionals should install this device and battery .

5. Grounding Instructions - This equipment should be connected to a permanently grounded wiring system. Be sure to comply with local requirements and regulations to use this device .

6. Never make AC output and AC input .

7. Do not move this equipment during operation, please turn off the inverter when moving.

Product Description

This is a multi-functional photovoltaic energy storage power station, integrated with battery, MPPT solar charge controller, high frequency pure sine wave inverter and UPS function module into one , which is suitable for outdoor backup electric compartment and spontaneous self-use system .

MPPT solar charge controller adopts advanced MPPT method and intelligent battery management design, which ensures the acquisition of maximum energy ;High frequency pure sine wave inverter adopts high frequency design , achievement high rate density , small size , simple operation and other advantages; The whole machine has high efficiency and is empty The load loss is small . Use large-capacity basket and high-density hammer pool , Improve system portability .

Features

- Pure sine Wave AC Output Inverter with 1KW - 3KW rated power and power factor 1
- High power density with universal wheels and high portability.
- Setting input voltage and voltage range on the LCD Screen.
- 5V USB and 12V DC output supported.
- AC/PV input and battery priority level configurable on LCD
- Protection functions such as overload, over temperature and short circuit.

Basic System Structure

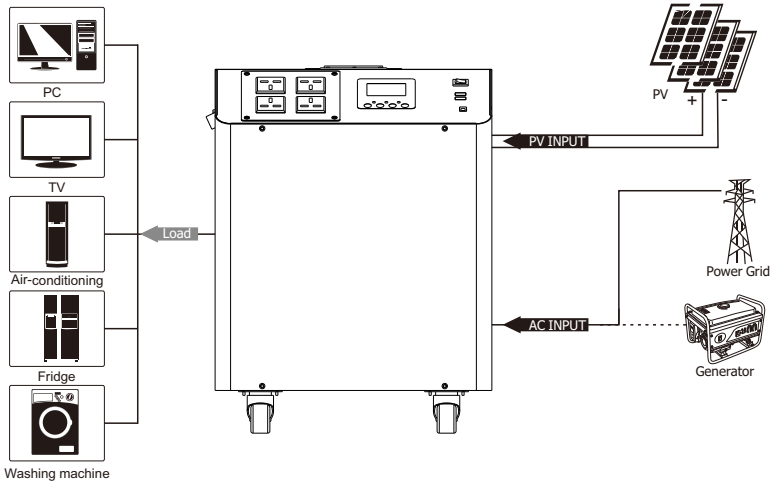
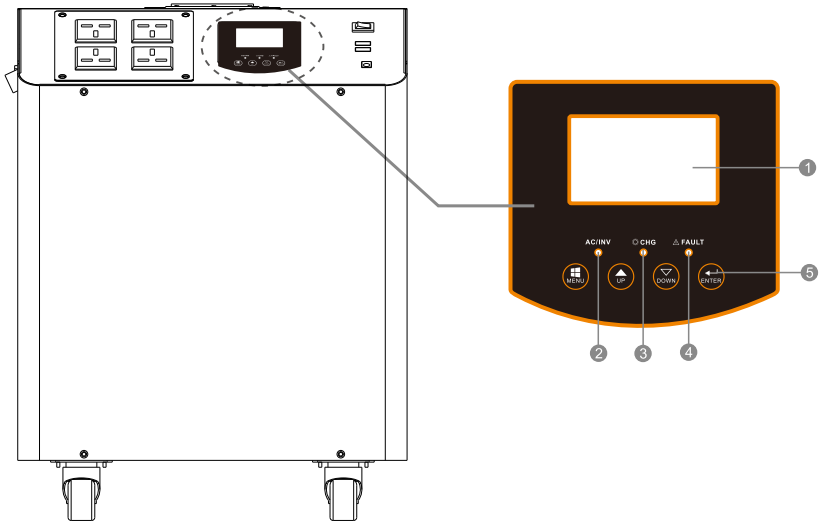
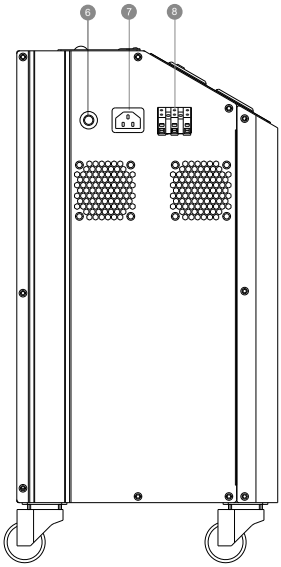
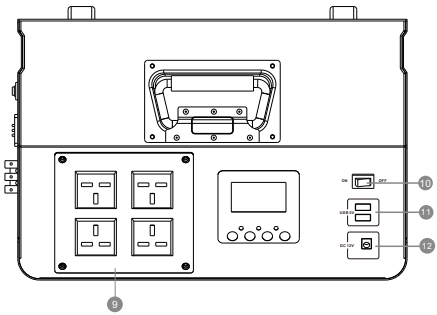


Figure I Hybrid power generation system

Product Description







1. LCD display
2. Status Indicator
3. Charge/discharge Indicator
4. Indicator light
5. Function Button
6. AC input over-current protection
7. AC input
8. PV input
9. AC output
10. Switch
11. DC5V USB output
12. DC12V output

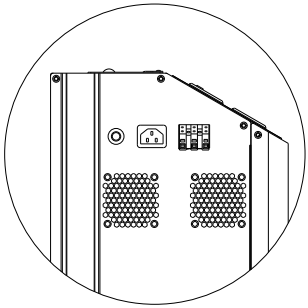
Installation

Unpacking and Inspection

Check the equipment before installation. Make sure nothing in the package damages the product . The following contains included: Machine X 1
User Manual X 1
Mains input line X 1

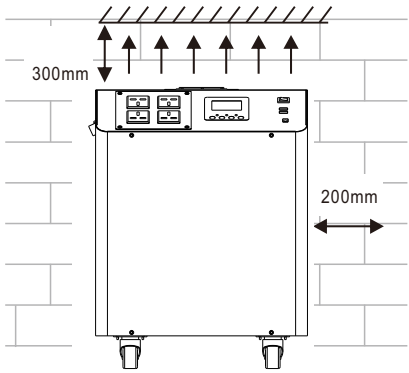
Preparation

Before turning on the device, please reserve a distance of more than 30CM above the device and to the left and right to ensure for heat dissipation.Input and Output Connection
1.After power on, you can directly take power from the AC output.
2.DC output powered without turned on.
3.Connect the grid and the AC input terminal with the matching wires to load the mains and charge the battery.
4.Please make sure the cable is firmly connected and do not move the machine while it is running .



Install Equipment
Taking the following notes into consideration before choosing an installation location:

1. Do not install the inverter on flammable building materials .
2. Pls install it on a sturdy surface .
3. Install this inverter at eye level so that the LCD display can be read at any time .
4. In order to properly dissipate the air circulation, please leave a space of about 200mm from the side and about 300mm above the device .
5. To ensure the best operation, the ambient temperature should be between 0-50 ° C
6. It is recommended to install vertically on the wall
7. Leave a little free space around the inverter, as shown in the picture to the right, to ensure adequate heat dissipation and enough space to move the cables



8. heat dissipation and enough space to move the cables

Only suitable for installation on concrete or other fire resistant surfaces

PV Panel Connection

Please choose the appropriate wire according to the matching photovoltaic panel.

PV module selection :

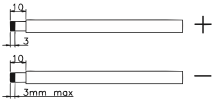
When choosing the right PV module, be sure to consider the following parameters:

1. The open-circuit voltage (VOC) of the PV module does not exceed the maximum open-circuit voltage of the PV array of the inverter.
2. The open circuit voltage (VOC) of the PV module should be higher than the minimum value of the cell voltage.
3. The maximum power point voltage of the photovoltaic array should be close to the MPPT optimal working voltage of the inverter or within the MPPT working voltage range. If a photovoltaic module cannot meet this requirement, it is necessary to connect the photovoltaic modules in series to meet the requirements. See the table below.

power	1KW	2KW	3KW
Maximum charging current	60A		
PV open circuit voltage	75VDC	100VDC	145VDC
Photovoltaic MPPT voltage range cut	15-75VDC	30-80VDC	30-120VDC
System battery voltage	12.8VDC	25.6VDC	25.6VDC

Follow the steps below to connect the PV module:

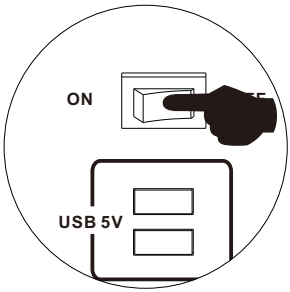
I.Remove the 10mm positive and negative conductor insulating sleeves on the PV inverter.



II.Check that the cable connection between the PV module and the PV input connector is correct. Then, connect the positive (+) side of the cable to the positive (+) side of the PV input connector. Connect the negative (-) of the cable to the negative (-) of the PV input con

Operation

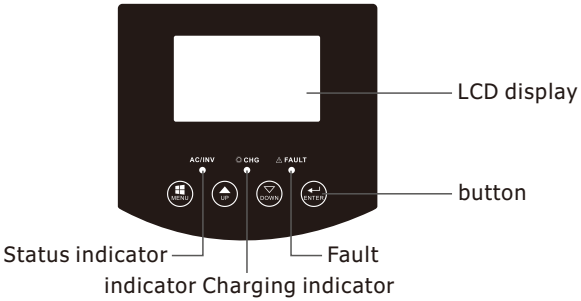
On/Off



Once the unit is installed correctly,**batter**ies **is connected**.T**he unit** could be **turned on by simply pressing the on/off button (the button on the chassis).**

Operating and Display Panels

The operation and display panel shown in the following figure is located on the front panel of the inverter. It includes three indicator lights , four function keys and an LCD The display screen indicates the running status and input and output information .



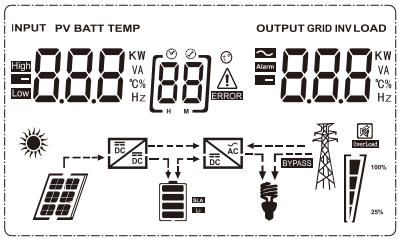
LED Indicator

LED Indicator			**Messages**
AC/ INV	Green	Solid On	Output is powered by grid in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
CHG	Yellow	Flashing	Battery is charging or discharging.
⚠ FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Keys	**Description**
MENU	Enter reset mode or setting mode go to previous selection.
UP	Increase the setting data.
DOWN	Decrease the setting data.
ENTER	Enter setting mode and Confirm the selection in setting mode go to next selection or exit the reset mode.

LCD Display Icons



Icon	Function description
Input Source Information and Output Information	
	Indicates the AC information.
	Indicates the DC information.
KW VA ℃% Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. Indicate output voltage, output frequency, load in VA, load in Watt and discharging current.
Configuration Program and Fault Information	
	Indicates the setting programs.
ERROR	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting ERROR with fault code.
Battery Information	
SLA LI	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

In AC mode, it will present battery charging status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Batteries are fully charged.		4 bars will be on.

In battery mode, it will present battery capacity.		
Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.717V/cell	
	1.717V/cell ~ 1.8V/cell	
	1.8 ~ 1.883V/cell	
	> 1.883 V/cell	
50%> Load > 20%	< 1.817V/cell	
	1.817V/cell ~ 1.9V/cell	
	1.9 ~ 1.983V/cell	
	> 1.983V/cell	
Load < 20%	< 1.867V/cell	
	1.867V/cell ~ 1.95V/cell	
	1.95 ~ 2.033V/cell	
	> 2.033V/cell	

Load Information				
OVER LOAD	Indicates overload.			
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
	0%~24%	25%~49%	50%~74%	75%~100%
				

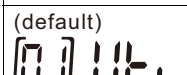
Mode Operation Information	
	Indicates unit connected to the mains.
	Indicates unit connected to the PV panel.
BYPASS	Indicates load is supplied by utility power.
	Indicates the solar charger is working.
	Indicates the DC/AC inverter circuit is working.

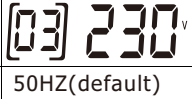
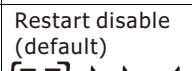
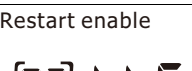
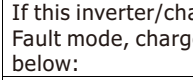
Mute Operation	
	Indicates unit alarm is disabled.

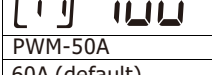
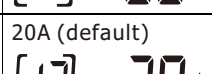
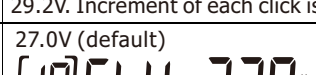
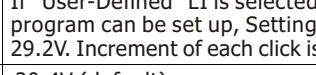
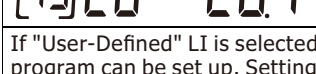
LCD Setting

After pressing and holding "ENTER" button for 2 seconds, the unit will enter setting mode. Press "UP"or "DOWN" button to select setting programs. And then, press "ENTER" or "MENU" button to confirm the selection and exit.

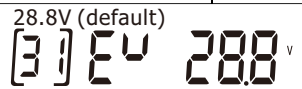
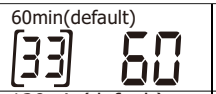
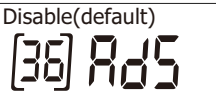
Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority selection		Solar energy provides power to the loads as first priority. If battery voltage has been higher than the setting point in program 21 for 5 minutes, the inverter will turn to battery mode, solar and battery will provide power to the load at the same time. When the battery voltage drops to the setting point in program 20, the inverter will turn to bypass mode, utility provides power to the load only, and the solar will charge the battery at the same time.
			Solar energy provides power to the loads as first priority. If battery voltage has been higher than the setting point in program 21 for 5 minutes, and the solar energy has been available for 5 minutes too, the inverter will turn to battery mode, solar and battery will provide power to the load at the same time. When the battery voltage drops to the setting point in program 20, the inverter will turn to bypass mode, utility provides power to the load only, and the solar will charge the battery at the same time.
		(default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.

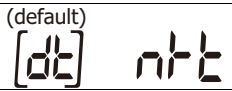
02	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC.
		VDE 	If selected, acceptable AC input voltage range will conform to VDE4105(184VAC-253VAC)
		GEN 	When the user uses the device to connect the generator, select the generator mode.
03	Output voltage		Set the output voltage amplitude, (220VAC-240VAC)
04	Output frequency	50HZ(default) 	60HZ 
05	Solar supply priority		Solar energy provides power to charge battery as first priority
		(default) 	Solar energy provides power to the loads as first priority
06	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 	Bypass enable (default) 
07	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
08	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 
10	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.

		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
11	Maximum charging current: To configure total charging current for solar and utility chargers.(Max. charging current=utility charging current +solar charging current)	2-3KW	
		MPPT-50A	
		MPPT-60A	
		60A (default) 	Setting range is from 1 A to 80A. Increment of each click is 1A.
		MPPT-80A	
		80A (default) 	Setting range is from 1 A to 80A. Increment of each click is 1A.
		MPPT-100A	
		100A (default) 	Setting range is from 1 A to 100A. Increment of each click is 1A.
		PWM-50A	
		60A (default) 	Setting range is from 1 A to 80A. Increment of each click is 1A.
13	Maximum utility charging current	20A (default) 	30A (Maximum current) 
17	Bulk charging voltage (C.V voltage)	28.2V (default) 	
		If "User-Defined" LI is selected in program 14, this program can be set up. Setting range is from 24.0V to 29.2V. Increment of each click is 0.1V	
18	Floating charging voltage	27.0V (default) 	
		If "User-Defined" LI is selected in program 14, this program can be set up, Setting range is from 24.0V to 29.2V. Increment of each click is 0.1V.	
19	Low DC cut off battery voltage setting	20.4V (default) 	
		If "User-Defined" LI is selected in program 14, this program can be set up. Setting range is from 20.0V to 24.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.	

20	Battery stop discharging voltage when grid is available	23V (default) 	Setting range is from 22.0V to 29.0V Increment of each click is 0.1V
21	Battery stop charging voltage when grid is available	Available options for 24V models: 27.0V (default) 	Setting range is from 22.0V to 29.0V. Increment of each click is 0.1V
22	Auto turn page	(default) 	If selected, the display screen will auto turn the display page.
			If selected, the display screen will stay at latest screen user finally switches.
23	Backlight control	Backlight on 	Backlight off(default) 
24	Alarm control	Alarm on (default) 	Alarm off 
25	Beeps while primary source is interrupted	Alarm on 	Alarm off (default) 
27	Record Fault code	Record enable (default) 	Record disable 
28	Solar power balance: When enabled, solar input power will be automatically adjusted according to connected load power.	Solar power balance enable 	If selected, the solar input power will be automatically adjusted according to the following formula: Max. Input solar power = Max. battery charging power + Connected load power when the machine in OffGrid workstate.
		Solar power balance disable (default) 	If selected, the solar input power will be the same to max. Battery charging power no matter how much loads are connected. The max.battery charging power will be based on the setting current in program 11 (Max. solar power = Max.battery charging power)
29	Power saving mode enable/ disable	Saving mode disable (default) 	If disable, no matter connected load is low or high, the on/off status of inverter output will not be effected.
		Saving mode enable 	If enable, the output of inverter will be off when connected load is pretty low or not detected.

30	Battery equalization	Battery equalization 	Battery equalization disable(default) 
31	Battery equalization voltage	28.8V (default)  Setting range is from 24.0V to 29.2V. Increment of each click is 0.1V.	
33	Battery equalization time	60min(default) 	Setting range is from 5 min to 900min. Increment of each clink is 5min.
34	Battery equalization timeout	120min(default) 	Setting range is from 5 min to 900min. Increment of each clink is 5min.
35	Equalization interval	30days(default) 	Setting range is from 0 to 90days. Increment of each clink is 1 day.
36	Equalization activated immediately	Enable 	Disable(default) 
		If equalization function is enabled in program 30, this program can be set up. If "Enable"is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "  ". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "  " will be shown in LCD main page too.	

After pressing and holding "MENU" button for 6 seconds, the unit will enter reset model. Press "Up"and "DOWN" button to select programs. And then ,press "ENTER" button to exit.

	(default) 	Reset setting disable.
		Reset setting enable.

Fault Reference Code

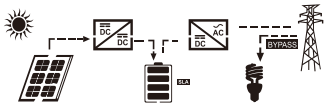
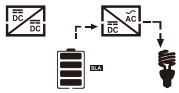
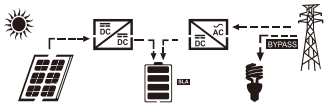
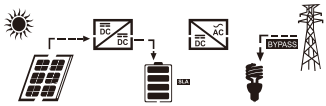
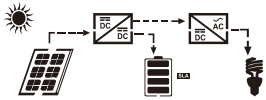
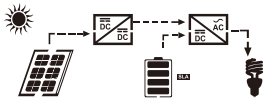
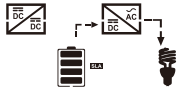
Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off	
02	Inverter transformer over temperature	
03	battery voltage is too high	
04	battery voltage is too low	
05	Output short circuited	
06	Inverter output voltage is high	
07	Overload time out	
08	Inverter bus voltage is too high	
09	Bus soft start failed	
11	Main relay failed	
21	Inverter output voltage sensor error	
22	Inverter grid voltage sensor error	
23	Inverter output current sensor error	
24	Inverter grid current sensor error	
25	Inverter load current sensor error	
26	Inverter grid over current error	
27	Inverter radiator over temperature	
31	Solar charger battery voltage class error	
32	Solar charger current sensor error	
33	Solar charger current is uncontrollable	
41	Inverter grid voltage is low	
42	Inverter grid voltage is high	

43	Inverter grid under frequency	
44	Inverter grid over frequency	
51	Inverter over current protection error	
52	Inverter bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	
56	Battery connection is open	
57	Inverter control current sensor error	
58	Inverter output voltage is too low	

Warning Indicator

Fault Code	Fault Event	Icon on
61	Fan is locked when inverter is on.	
62	Fan 2 is locked when inverter is on.	
63	Battery is over-charged.	
64	Low battery.	
67	Overload.	
70	Output power derating.	
72	Solar charger stops due to low battery.	
73	Solar charger stops due to high PV voltage.	
74	Solar charger stops due to over load.	
75	Solar charger over temperature.	
76	PV charger communication error.	
77	Parameter error.	

Operating State Description

Operation state	Description	LCD display
Utility-Tie state	PV energy is charger into the battery and utility provide power to the AC load.	PV is on 
		PV is off 
Charge state	PV energy and grid can charge batteries.	
Bypass state	Error are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	
Off-Grid state	The inverter will provide output power from battery and PV power.	Inverter power loads from PV energy 
		Inverter power loads from battery and PV energy 
		Inverter power loads from battery only 
Stop mode	The inverter stop working if you turn off the inverter by the soft key or error has occurred in the condition of no grid.	

Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: battery voltage, battery current ,inverter voltage, inverter current, grid voltage, grid current, load in Watt, load in VA, grid frequency, inverter frequency, PV voltage, PV charging power, PV charging output voltage, PV charging current.

Selectable information	**LCD display**
Battery voltage/DC discharging current	
Inverter output voltage/Inverter output current	
Grid voltage/Grid current	
Load in Watt/VA	
Grid frequency/Inverter frequency	
PV voltage and power	
PV charger output voltage and MPPT charging current	

SPECIFICATIONS

Table 1 Line Mode Specifications

MODEL		HBP18-1012	HBP18-2024	HBP18-3024
INVERTER	Rated Power	1KW	2KW	3KW
	Waveform	Pure Sine Wave		
	AC Voltage Output	230Vac		
	Rated Batterry Input Voltage	12VDC	24VDC	
	Efficiency	90%		
PV Input	Max PV Current	60A		
	MPPT Tracking Efficiency	98%max		
	Max PV Array Open Circuit Voltage	75VDC	100VDC	145VDC
	PV Array MPPT Voltage Range	15~75VDC	30~80VDC	30~120VDC
AC Input	Rated Input Voltage	230Vac ±5%		
	Input Voltage Range	90-280VAC		
	Frequency Range	50Hz / 60Hz		
	Transfer Time	10ms (UPS, VDE); 20ms (APL)		
	AC Charge Current	10/20A (±4A)	20A/30A (±4A)	
DC Output	USB 5V	2PCS		
	12V	1PCS		
Lifepo4 Battery	Battery Type	Lifepo4 Battery		
	Capacity	100Ah/1280Wh	92Ah/2355Wh	150Ah/3840Wh
	Rated Voltage	12.8VDC	25.6VDC	
	Rated Output Current	100A		

GUARANTEECERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		

GUARANTEECERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		