Product Model

POW-HVM13.2M



PowMr

HYBRID SOLAR INVERTER

User Manual

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1 ABOUT THIS MANUAL

1.1 Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

1.2 Scope

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

2 SAFETY INSTRUCTIONS

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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
3. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
4. CAUTION-Only qualified personnel can install this device with battery.
5. NEVER charge a frozen battery.
6. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
7. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
8. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
9. One piece of 150A fuse is provided as over-current protection for the battery supply.
10. GROUNDING INSTRUCTIONS-This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
11. NEVER cause AC output and DC input short circuited, Do NOT connect to the mains when DC input short circuits.
12. Warning!! Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

3 INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

3.1 Features

- Pure sine wave inverter
- Configurable Input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

3.2 Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility
- PV modules

Consult with your system integrator for other possible system architectures depending on your requirements. This Inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

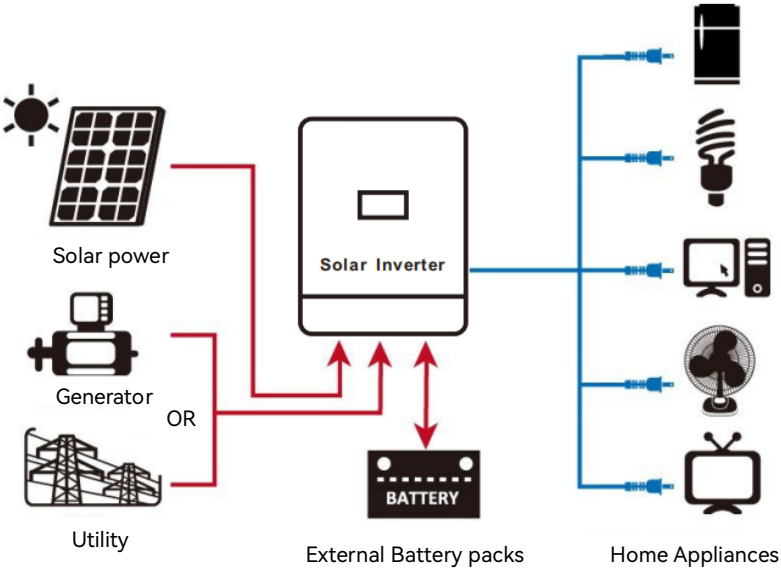
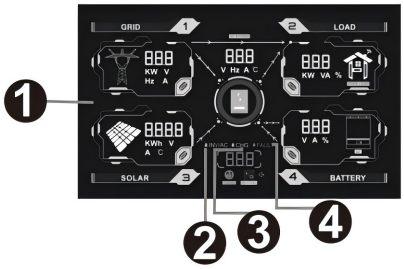
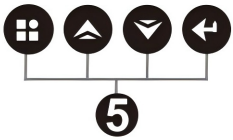
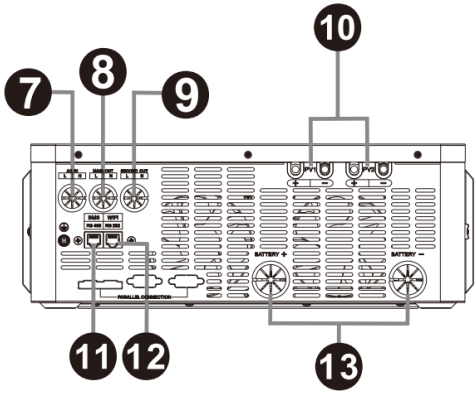


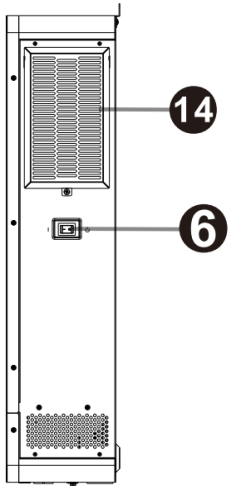
Figure 1 Hybrid Power System

3.3 Product Overview









1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Touch Function buttons
6. Power on/off switch
7. AC input
8. Main output
9. Second output
10. PV1 and PV2 input
11. Battery communication/RS-485 port
12. WIFI communication/RS-232 port
13. Battery input
14. Anti dust kit

4 INSTALLATION

4.1 Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

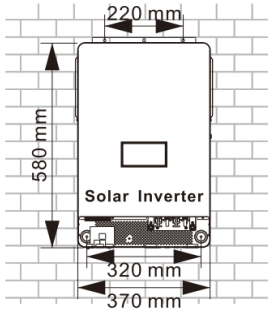
- The unit × 1
- User manual × 1
- Ring terminal × 1
- MC4 terminal head × 2

4.2 Preparation

Before connecting all lines, remove the screws under the machine and remove the bottom cover plate.

4.3 Mounting the Unit

Consider the following points before selecting where to install:



- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Make sure that other objects and surfaces are left with enough space from the machine to ensure adequate heat dissipation and that there is enough room to remove the wires.

SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

Install the unit by screwing two screws. It's recommended to use M4 or M5 screws.

4.4 Battery Connection

Recommended battery cable size:

Model	Wire Size	Cable (mm^2)	Torque value (Max)
13.2KW	1×2AWG	25	2 Nm

CAUTION

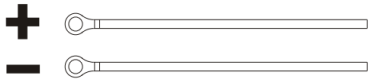
- For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in the above table as required fuse or breaker size.

WARNING

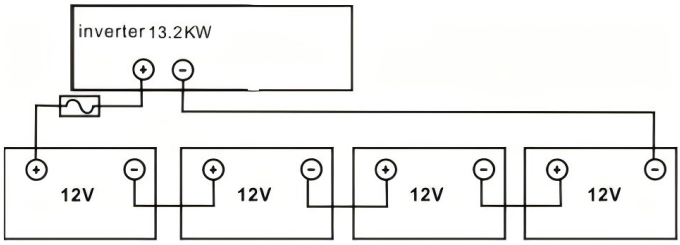
- All wiring must be performed by a qualified personnel.
- It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable.

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.

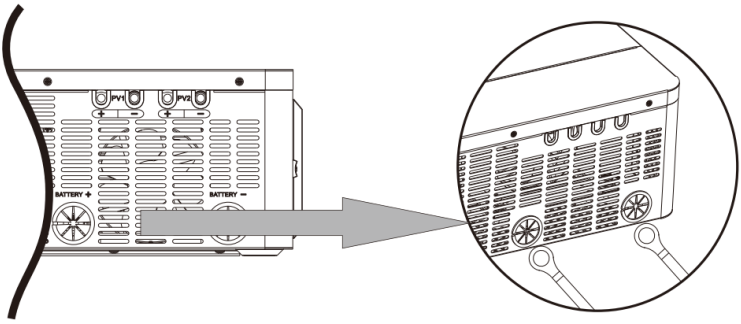


3. Connect all battery packs as below chart.



4. Insert the battery wires flatly into battery connectors of inverter and make sure the bolts are tightened with torque of 2 Nm in clockwise direction. Make sure polarity at both the battery and the inverter/charge is correctly connected and conductors are tightly screwed into the battery terminals.

   Recommended tool: #2 Pozi Screwdriver



WARNING: Shock Hazard!

- Installation must be performed with care due to high battery voltage in series.

CAUTION

- Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

4.5 AC Input/Output Connection

Suggested cable requirement for AC wires:

Model	Gauge	Cable(mm^2)	Torque Value
13.2KW	10 AWG	6	1.2 Nm

CAUTION

- Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 63A for 13.2KW.
- There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

WARNING

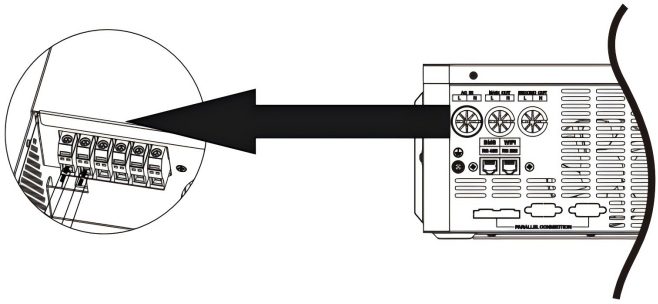
- All wiring must be performed by a qualified personnel.
- It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size.

Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws.

L→LINE (brown or black);

N→Neutral (blue)

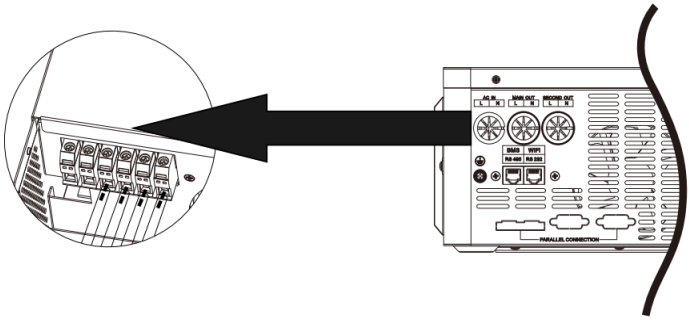


WARNING

- Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.

L→LINE (brown or black); N-Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION

- Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this Inverter/ charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

4.6 PV Connection

Model	Gauge	Cable(mm^2)	Torque Value
13.2KW	1×10 AWG	6	1.2 Nm

CAUTION

- Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.

WARNING

- It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size.

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

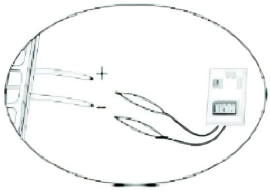
Inverter model	13.2KW
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	90Vdc~450Vdc

Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference) -250Wp -Vmp: 30.1Vdc -Imp: 8.3A -Voc: 37.7Vdc -Isc: 8.4A -Cells: 60	SOLAR INPUT (Min in serial: 6 pcs, max. in serial: 13 pcs)	Q'ty of panels	Total Input power
	6 pcs in serial	6 pcs	1500W
	8 pcs in serial	8 pcs	2000W
	12 pcs in serial	12 pcs	3000W
	13 pcs in serial	13 pcs	3250W
	12 pieces in serial and 3 sets in parallel	36 pcs	8200W
	10 pieces in serial and 4 sets in parallel	40 pcs	10200W

PV Module Wire Connection

Step 1. Check the input voltage of PV array modules. The acceptable input voltage of the inverter is 90VDC-500VDC.Please make sure that the maximum current load of each PV input connector is 18A



CAUTION

- Exceeding the maximum input voltage can destroy the unit!! Check the system before wire connection.

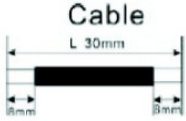
Step 2. Disconnect the DC circuit breaker.

Step 3. Assemble provided PV connectors with PV modules by the following below steps.

Components for PV connectors and Tools:

Female connector housing		Male terminal	
Female terminal		Crimping tool and spanner	
Male connector housing			

Cable preparation and connector assembly process:

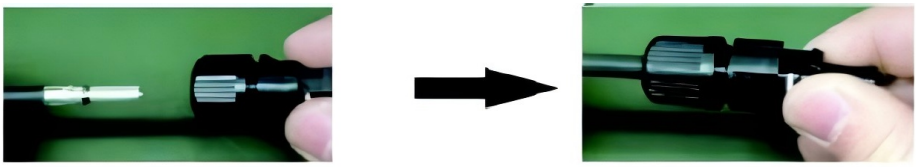


Strip one cable 8 mm on both end sides and be careful NOT to nick conductors.

Insert striped cable into female terminal and crimp female terminal as shown below charts.



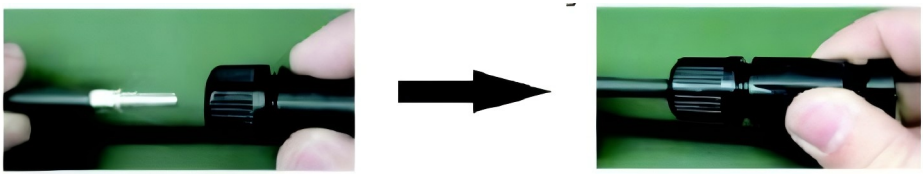
Insert assembled cable into female connector housing as shown below charts.



Insert striped cable into male terminal and crimp male terminal as shown below charts.

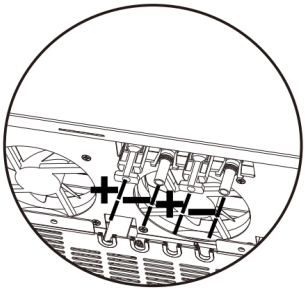


Insert assembled cable into male connector housing as shown below charts.



Then, use spanner to screw pressure dome tightly to female connector and male connector.

Step 4. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV Input connector.



4.7 Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws.

4.8 Communication Connection

1. Wi-Fi cloud communication (option):

Please use supplied communication cable to connect to inverter and Wi-Fi module. Download APP and installed from APP store, and Refer to "Wi-Fi Plug Quick Installation Guideline" to set up network and registering. The inverter status would be shown by mobile phone APP or webpage of computer.

2. GPRS cloud communication (option):

Please use supplied communication cable to connect to inverter and GPRS module, and then applied external power to GPRS module. Download APP and installed from APP store, and Refer to "GPRS RTU Quick Installation Guideline" to set up network and registering. The inverter status would be shown by mobile phone APP or webpage of computer.

3. Battery Communication

The communication between the battery and the inverter can be realized through the battery communication interface, so that the inverter and the lithium battery can exchange information (Baud rate:9600).

4. Lithium battery and inverter connection:

If choosing lithium battery for the inverter, only lithium batteries that have been matched with BMS communication protocol are allowed.

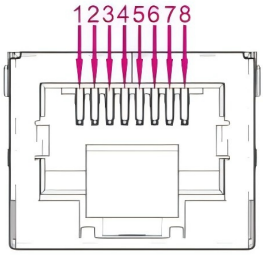
a. Connect the battery according to the recommended battery cable specifications.
b. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and that the ring terminal is tightened with the battery terminal.
c. Connect one side of RJ45 cable to the BMS communication port of inverter.
d. Insert the other side of RJ45 cable into RS485 communication port on lithium battery.

NOTE: If you choose a lithium battery. please make sure to connect the battery and inverter with BMS communication cable, and select the battery type as "LIB-485" mode.

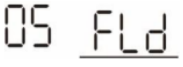
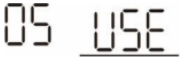
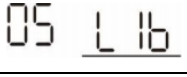
Communication and Setting of Lithium Battery

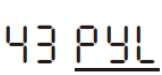
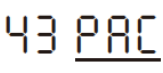
Connect the RJ45 communication cable between inverter and battery. Please confirm that the lithium battery BMS port's PIN is correspond with the inverter BMS communication port. The inverter BMS port PIN definition as below:

Pin number	Port definitions
1	RS485B
2	RS485A
3	NG
4	NG
5	NG
6	NG
7	RS485A
8	RS485B



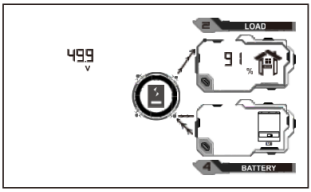
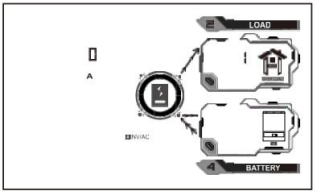
In order to communicate with the lithium battery BMS, you should press the "ENTER" button for a long time, and set the battery type as "LIB-485" in program 05. Then select the matching battery protocol in Program 43.

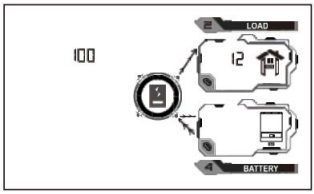
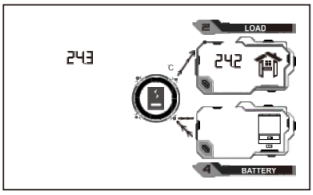
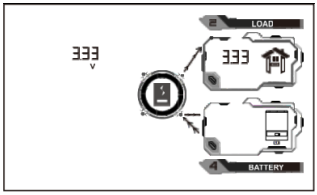
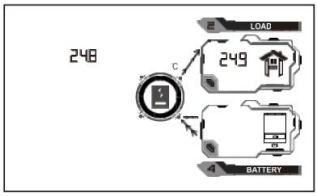
05	Battery type	AGM (default) 
		Flooded 
		User Defined 
		Lithium battery mode 
		Lithium battery communication mode

		
43	Lithium battery protocol	PYLON 
		PACE 

CAUTION: When the battery type is set to “LIB-485”,the setting items 12,13 and 29 are displayed in percentage.

In"LIB-485" mode, press and hold the "ESC" button to view the information of the lithium battery, and the inverter display screen will enter the following screen
(the initial interface shows the total battery voltage and remaining battery capacity).
Press the "DOWN" button to display the following data in turn.

Selectable information		LCD display
The data is displayed in the upper left corner of the LCD	The data is displayed in the upper right corner of the LCD	LCD display interface
Total battery voltage = 49.9V	Remaining battery capacity= 91%	
Battery charging current = 0A	Battery discharge current=1A	

Rated battery capacity= 100AH	Battery charge cycles =12	
Minimum MOS temperature of battery =24.3℃	Maximum MOS temperature of battery =24.2℃	
The maximum voltage of a single battery cell =3.33V	Minimum voltage of a single battery cell =3.33V	
Maximum temperature of battery cell =24.8℃	Minimum temperature of battery cell =24.9℃	

Battery Alarm Code

Alarm code	Alarm event	Icon flashing
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	
24	Battery Pack Under Voltage	
25	Charging Over Current	
26	Discharging Over Current	
27	Charging Cell Over Temperature	
28	Discharging Cell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
34	Battery capacity is too low	
44	Battery Cell Voltage Imbalance	
45	Battery Cell Temperature Imbalance	
46	Internal Communication Alarm	

Battery fault code

Fault code	Fault event	The icon is long and bright
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	
24	Battery Pack Under Voltage	
25	Charging Over Current	
26	Discharging Over Current	
27	Charging Cell Over Temperature	
28	Discharging Cell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
31	Ambient Over Temperature	
32	Ambient Under Temperature	
33	MOS Over Temperature	
35	Battery Short Circuit	

36	Charge Overvoltage	
37	System Failure	
39	Charging MOS Fault	
40	Discharge MOS Fault	
41	Temperature Sensor Fault	
42	Battery Cell Fault	
43	Sampling Communication Failure	
61	Communication Failure	

5 OPERATION

5.1 Power ON/OFF

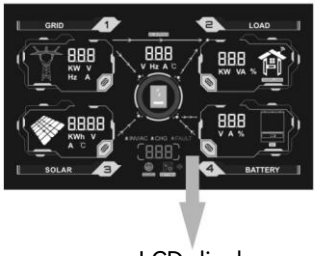
Side view of unit



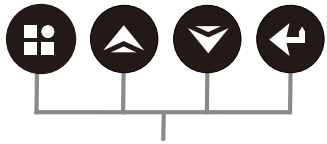
Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

5.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and an LCD display, indicating the operating status and input/output power information.



LCD display



Function keys

➢ **Function Keys**

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

➢ **LED Indicator**

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

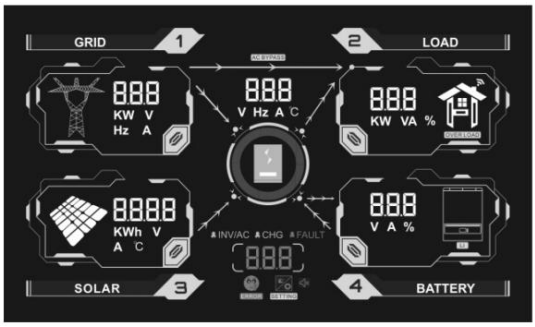
5.3 RGB Light (option)

① Inverter state: green light

② Utility state: blue light

③ Failure state: red light

5.4 LCD Display Icons



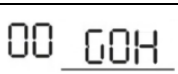
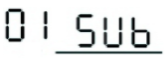
Icon	Function description
Input Source Information	
	Indicates the AC input.
	Indicates the PV input
KW V Hz A	Indicate input voltage, input frequency, PV voltage, charger current (if PV in charging for 13.2KW models), charger power, battery voltage.
Configuration Program and Fault Information	
	Indicates the setting programs.
ERROR	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code.
Output Information	
KW VA %	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.

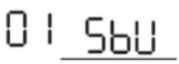
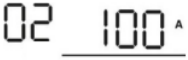
Battery Information	
	
Load Information	
OVER LOAD 	Indicates overload.
Mode Operation Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
AC BYPASS	Indicates load is supplied by utility power.
	Indicates the utility charger circuit is working.
	Indicates the DC/AC inverter circuit is working.
Mute Operation	
	Indicates unit alarm is disabled.

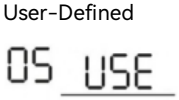
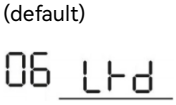
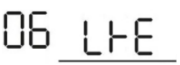
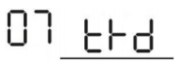
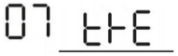
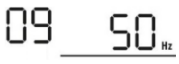
5.5 LCD Setting

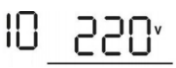
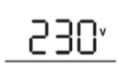
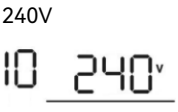
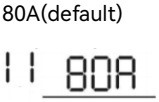
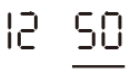
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

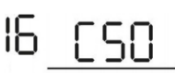
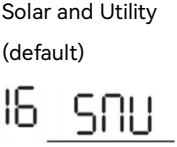
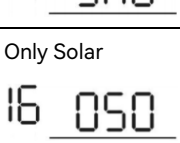
Setting Programs:

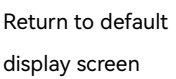
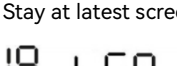
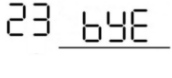
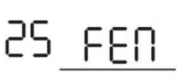
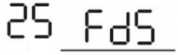
No.	Description	Selectable option	
00	Exit setting mode	Escape (default) 	One-button restore setting options
			
01	Output source priority: To configure load power source priority	Utility first 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first (default) 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, utility will supply power to the loads at the same time. Battery provides power to the loads only when any one condition happens: - Solar energy and utility is not available.

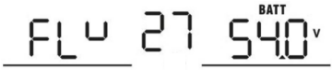
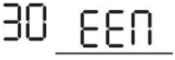
			- Solar energy is not sufficient and utility is not available.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		MKS priority 	Solar energy provides power to the loads as first priority if solar energy is not sufficient to power all connected loads utility energy will supply power to the loads at the same time. The battery only supplies energy to the load as a backup power.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	100A (default) 	Setting range is 10~160A. Increment of each click is 10A.

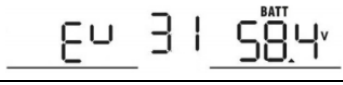
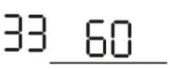
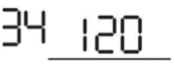
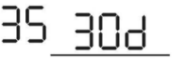
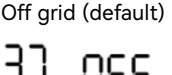
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90~280VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170~280VAC.
05	Battery type	AGM(default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		LIB 	When using lithium battery and not connected to BMS communication
		LIB-485 	
06	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 
09	Output frequency	50Hz (default) 	60Hz 
10	Output voltage	220V	230V (default)

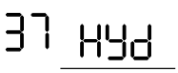
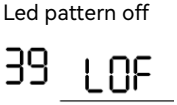
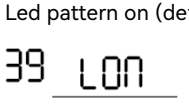
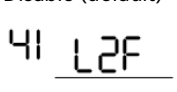
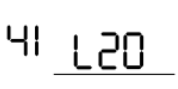
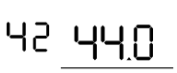
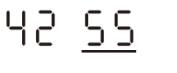
			
		240V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from 02 for utility charger.	80A(default) 	Setting range is 2A and 10~140A. Increment of each click is 10A.
12	Setting voltage point or SOC back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 13.2KW model:	
		46V(default) 	Setting range: 42~51V. Increment of each click is 1V.
	When “SBU” is selected in program 01 and “LIB-485” is selected in program 05, the power point is set back to the common power supply	50% (default) 	Setting range: 10%~50%. Increment of each click is 5%. When the power is lower than the set value, it will automatically switch back to the public power output (if the public power access has a delay, it will be switched to the public power after the delay time after the power is lower than the set value.)
13		Available options in 13.2KW model:	

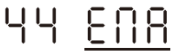
	Setting voltage point or SOC back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	54V(default)  Battery fully charged  	Setting range: 48~58V. Increment of each click is 1V.
	When “SBU” is selected in program 01 and “LIB-485” is selected in program 05, the power point is set back to the battery mode.	95% (default)  	Setting range: 30%~100% Increment of each click is 5%. When the battery power is higher than the set value, it will automatically switch back to battery mode output (when the set value is 100, it will automatically switch when the power is 100%).
16	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.	
18	Alarm control	Alarm on (default) 	Alarm off 
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable (default) 	Record disable 
26	Bulk charging voltage	13.2KW default setting: 56.4V	

	(C.V voltage)		
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V for 13.2KW model. Increment of each click is 0.1V.	
27	Floating charging voltage	13.2KW default setting: 54.0V 	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V for 13.2KW model. Increment of each click is 0.1V.	
29	Low DC cut-off voltage	13.2KW default setting: 40.0V 	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 40.0V to 48.0V for 13.2KW model. 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.	
		If “LIB-485” is selected in item 05. You can set the battery low SOC shutdown point.	 The default value is 5%, and 5%~30% can be set.
30	Battery equalization	Battery equalization 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
31		13.2KW default setting: 58.4V	

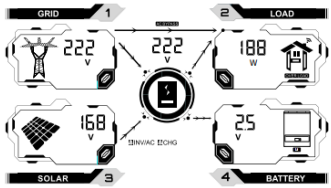
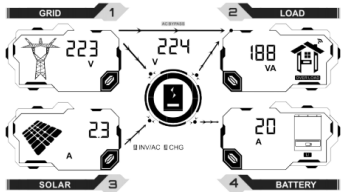
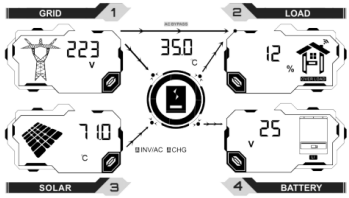
	Battery equalization voltage		
		Setting range is from 48.0V to 61.0V for 13.2KW model. Increment of each click is 0.1V.	
33	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click 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 not be shown in LCD main page.	
37	GRID-tie operation	Off grid (default) 	Inverter operates only in off-grid mode. Solar energy provides power to the loads as first priority and charging second.

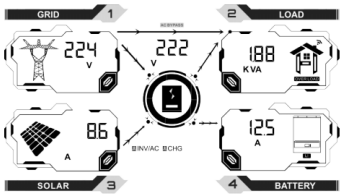
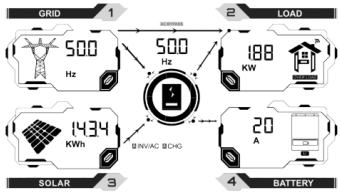
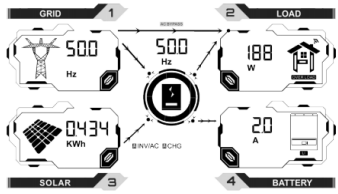
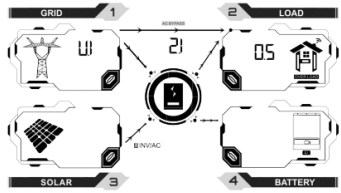
		Hybrid 	Inverter operates hybrid mode. Solar energy provides power to the loads as first priority and charging second Excess energy feed to grid.
38	GRID-tie current	10A 	Increment of each click is 2A.
39	Led pattern light	Led pattern off 	Led pattern on (default) 
41	Dual output	Disable (default) 	Use 
42	Enter the dual output functional voltage point	13.2KW default setting: 44.0V 	
		Setting range is from 40.0V to 52.0 V for 48VDC model. Increment of each click is 0.1V.	
	Enter the power point of dual output function	13.2KW default setting: 55% 	
		Setting range is from 5% to 85% for 48VDC model. Increment of each click is 5%. When the power is lower than the set value or battery low voltage alarm, the main output of the inverter is disconnected, and the main output no longer supplies power to the external.	
43	Lithium battery protocol	PYLON (default) 	PACE 

44	Delayed grid access	Disable 	Enable(default) 
45	Maximum Second Load	20%~70%	If the inverter enter the dual output function, the output power of the second channel, can be change to 20%~70% of the rated power.

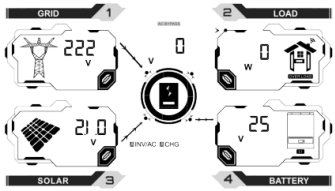
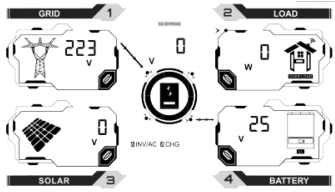
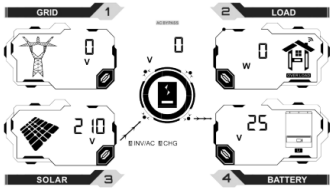
5.6 Display Setting

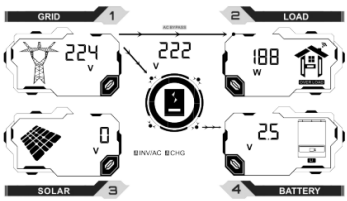
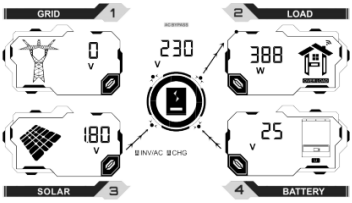
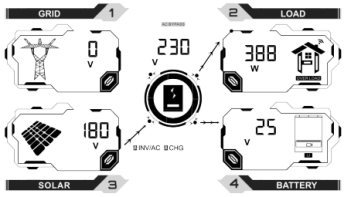
The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.

Selectable information	LCD display
Input voltage=222V, PV1 voltage=168V, Battery voltage=25V, Output voltage=222V, Load in Watt=188W, Chg(Flashing), Inv/ac(bright)	
Input voltage=223V, PV1 current=2.3A, Battery current=20A, Output voltage=224V, Load in VA=188VA, Chg(Flashing), Inv/ac(bright)	
Input voltage=223V, PV1 ntc temperature=71.0℃, Battery voltage= 25V, Inv ntc temperature=35.0℃, Load percentage=12%, Chg(Flashing), Inv/ac(bright)	
Input voltage=222V, PV2 voltage=168V, Battery voltage= 25V, Output voltage=222V, Load in Watt=1.18KW, Chg(Flashing), Inv/ac(bright)	

Input voltage=224V, PV2 current=8.6A, Battery current=12.5A, Output voltage=222V, Load in VA=1.88KVA, Chg(Flashing), Inv/ac(bright)	
Input frequency=50.0Hz, PV2 power=1.434KWh, Battery current=20A, Output frequency=50.0Hz, Load in watt=1.88KW, Chg(Flashing), Inv/ac(bright)	
Input frequency=50.0Hz, PV power=0.434KWh, Battery current=20A, Output frequency=50.0Hz, Load in watt=188W, Chg(Flashing), Inv/ac(bright)	
Main CPU version checking	Main CPU version 21 05 

5.7 Operating Mode Description

Operation mode	Selectable information	LCD display
Standby mode/ Power saving mode **Note:** *standby mode: The inverter is not turned on yet but at this time the inverter can charge battery without AC output. *Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.	No output is supplied by the unit but it still can charge batteries.	 PV and mains charging
		 Mains charging
		 PV charging
Line mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	 Grid-connected mode

		 Mains charging
Grid-Tie Operation	When working in Grid-Tie mode, the icon will be flash 3s/times 	 Grid-connected mode
Battery mode	The unit will provide output power from battery and power	 Battery and Solar supply power to loads at the same time
		 Solar supply power to loads

5.8 Battery Equalization Description

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.

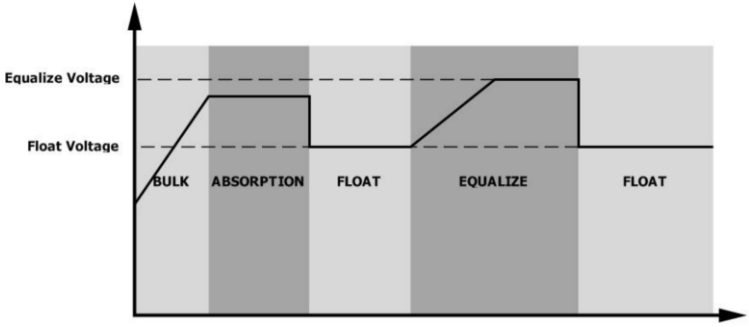
➢ **How to Apply Equalization Function**

You must enable battery equalization function in monitoring LCD setting program 30 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 35.
2. Active equalization immediately in program 36.

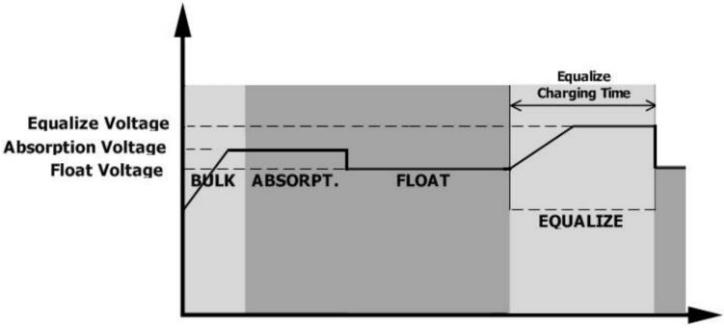
➢ **When to Equalize**

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

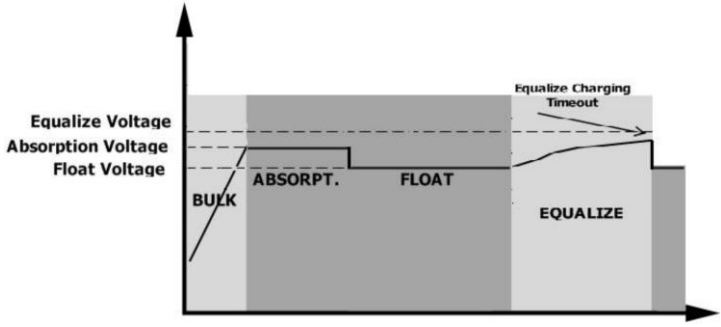


➢ **Equalize charging time and timeout**

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



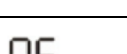
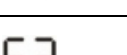
However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



5.9 Mains and Lithium Battery Activation Function

1. After 90s of mains power connection to the inverter, the machine is connected to the mains and starts to work.
2. The inverter is in lithium battery mode (item 05 is LIB or LIB-485). After the mains is connected, the battery is not connected, and the mains activation function is automatically enabled.

5.10 Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	
02	Over temperature	
03	Battery voltage is too high	
04	Battery voltage is too low	
05	Output short circuited or over temperature is detected by internal converter components.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
51	Over current or surge	
52	Bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	

57	Current sensor failed	
58	Output voltage is too low	
59	PV voltage is over limitation	

5.11 Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
03	Battery is over-charged	Beep once every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
15	PV energy is low.	Beep twice every 3 seconds	
E9	Battery equalization	None	
bP	Battery is not connected	None	

6 CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

6.1 Overview

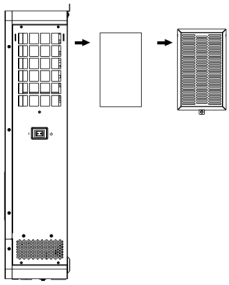
Every inverter is already installed with anti-dust kit from factory. Inverter will automatically detect this kit and activate internal thermal sensor to adjust internal temperature. This kit also keeps dust from your inverter and increases product reliability in harsh environment.

6.2 Clearance and Maintenance

Step 1: Please loosen the screw in counterclockwise direction on the top of the inverter.



Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.



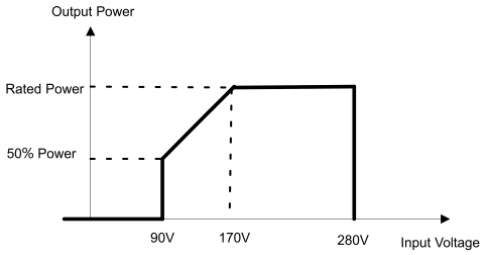
Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

NOTICE

- The anti-dust kit should be cleaned from dust every one month.

7 SPECIFICATIONS

7.1 Table 1 Line Mode Specification

INVERTER MODEL	POW-HVM13.2M
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	170Vac+7V (UPS); 90Vac±7V (Appliances)
Low Loss Return Voltage	180Vac±7V(UPS); 100Vac±7V(Appliances)
High Loss Voltage	280Vac±7V
High Loss Return Voltage	270Vac±7V
Max AC Input Voltage	300Vac
Nominal Input Frequency	50Hz/60Hz (Auto detection)
Low Loss Frequency	40±1Hz
Low Loss Return Frequency	42±1Hz
High Loss Frequency	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Circuit Breaker
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
Output power derating: When AC Input voltage drops to 170V, the output power will be derated.	

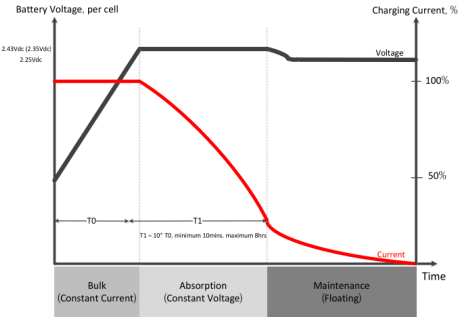
7.2 Table 2 Inverter Mode Specification

INVERTER MODEL	POW-HVM13.2M
Rated Output Power	13.2KW
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	230Vac±5%
Output Frequency	50Hz
Peak Efficiency	94%
Overload Protection	5s@≥150% load; 10s@101%~150% load
Surge Capacity	2* rated power for 5 seconds
Nominal DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage	
@ load<50%	44.0Vdc
@ load≥50%	42.0Vdc
Low DC Warning Return Voltage	
@ load<50%	45.0Vdc
@ load≥50%	44.0Vdc
Low DC Cut-off Voltage	
@ load<50%	41.0Vdc
@ load≥50%	40.0Vdc
High DC Recovery Voltage	62Vdc
High DC Cut-off Voltage	61Vdc
No Load Power Consumption	< 80W
Saving Mode Power Consumption	< 15W

7.3 Table 3 Two Load Output Power

INVERTER MODEL	POW-HVM13.2M
Full Load	13200W
Maximum Main Load	13200W
Second Load Range	2640W~6600W
Main Load Cut Off Voltage	44VDC
Main Load Return Voltage	52VDC

7.4 Table 4 Charge Mode Specifications

Utility Charging Mode		
INVERTER MODEL		**POW-HVM13.2M**
Charging Algorithm		3-Step
AC Charging Current (Max)		140Amp
Bulk Charging Voltage	Flooded Battery	58.4
	AGM/ Gel Battery	56.4
Floating Charging Voltage		54Vdc
Charging Curve		

MPPT Solar Charging Mode	
INVERTER MODEL	**POW-HVM13.2M**
Max. PV Array Power	8000W*2
Nominal PV Voltage	300V

PV Array MPPT Voltage Range	90Vdc~450Vdc
I Max. PV	22A/22A
Max. PV Array Open Circuit Voltage	500Vdc
Max Charging current (AC charger plus solar charger)	160Amp

7.5 Table 5 General Specifications

INVERTER MODEL	POW-HVM13.2M
Safety Certification	CE
Operating Temperature Range	-10℃ ~ 50℃
Storage temperature	-15℃ ~ 60℃
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension	580×370×136mm
Net Weight	14kg

8 TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Internal fuse tripped.	1. Contact repair center for replacing the fuse. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set “Solar first” as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.

	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120℃.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02	Internal temperature of inverter component is over 100℃.	
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	

9 Appendix: Approximate Back-up Time Table

Model	Load (W)	Backup Time @ 48Vdc 100Ah (min)	Backup Time @ 48Vdc 200Ah (min)
13.2KW	500	613	1288
	1000	268	613
	1500	158	402
	2000	111	271
	2500	90	215
	3200	76	182
	3500	65	141
	4000	50	112
	4500	44	100
	5000	40	90
	6200	36	80
	7200	32	70
	8200	28	60
	9200	24	50
	10200	20	40

Note:

1. Backup time depends on the quality of the battery, age of battery and type of battery. Specifications of batteries may vary depending on different manufacturers.
2. The final interpretation right of this product belongs to the company.

PowMr

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