



USER MANUAL

2.0KVA/3.0KVA

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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 Target Group

This manual is designed for professionals and end users. Operations that do not require any specific skills can also be handled by the end users themselves. Professionals must have the following skills:

- Understand how the inverter works and operates.
- After training, someone knows that how to deal with crises and risks in the installation and use of electrical equipment and devices.
- After training, someone knows that how to install and commission electrical equipment and fixtures.
- Understand the applicable standards and directives.
- Understand and abide by this manual and all safety knowledge.

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. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. 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.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. 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.
8. 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.
9. 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.
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 multifunctional off grid solar inverter, which integrates MPPT solar charging controller, high-frequency pure sine wave inverter and Ups function module, and is very suitable for off-grid backup power supply and spontaneous self-use system. The design of high-frequency transformer enables the machine to provide reliable power conversion in a small size. This inverter can also work in battery-free mode.

The whole system also needs other equipment to achieve complete operation, such as photovoltaic modules, generator or utility grid. According to your requirements, please consult your system integrator to obtain other possible system components, WiFi module is a plug-and-play monitoring device installed on the inverter. With this device, users can monitor the running status of solar system anytime and anywhere through mobile phones or websites.

3.1 Features

- Pure sine wave output inverter
- According to the requirements of load (household appliances/personal computers), the input voltage range of utility grid can be selected
- According to the battery requirements, the charging current can be set through LCD
- Solar energy and utility grid can power loads at the same time
- AC input is compatible with mains and generator
- Automatic restart function when mains power is restored
- Overload/ Over temperature/ short circuit protection
- The intelligent charging design of battery makes the battery more fully utilized
- RS485 port Used for communication with BMS
- Cold start function
- Intelligent fan speed adjustment, which adjusts the fan speed according to temperature, load and charging current
- Built-in MPPT, operating voltage range 55V~430V, open circuit voltage 450Vdc
- WIFI remote monitoring (optional)

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 mains electricity
- Solar module (optional)

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.

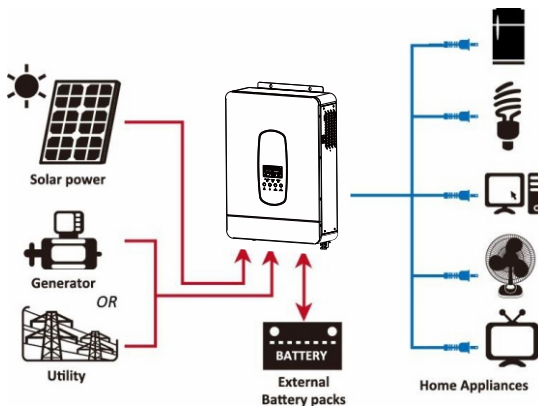
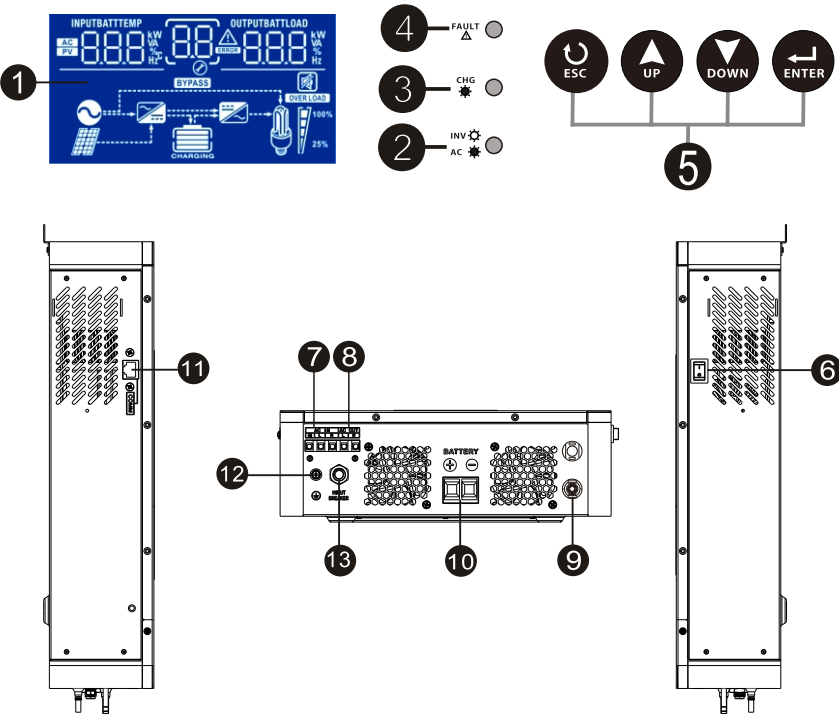


Figure 1 Hybrid Power System

3.3 Product Overview



- 1. LCD display
- 2. Status indicator
- 3. Charging indicator
- 4. Fault indicator
- 5. Function buttons
- 6. Power on/off switch
- 7. AC input
- 8. AC output
- 9. PV input
- 10. Battery input
- 11. RS232/RS485 communication port
- 12. Safety(Earth)ground
- 13. Circuit breaker

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 x 1
- ☒ User manual x 1

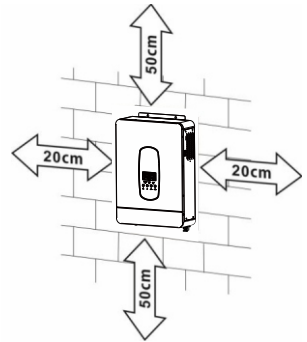
4.2 Preparation

Before connecting all wirings, please take off bottom cover by removing two screws as shown below.

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.
- Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and to have enough space for removing 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

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 below table as required fuse or breaker size.

WARNING! All wiring must be performed by a qualified personnel.

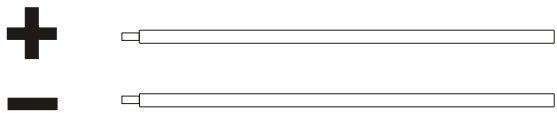
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

Recommended battery cable size:

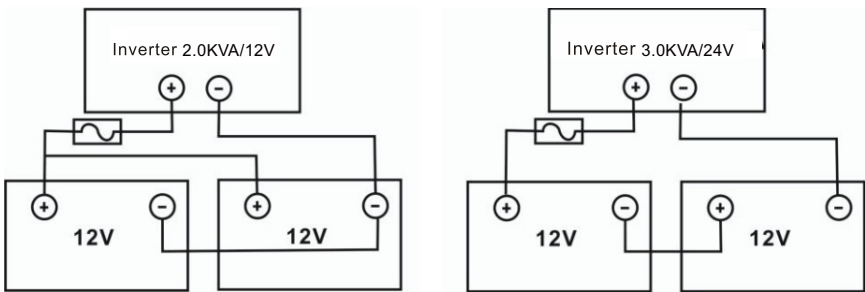
Model	Wire Size	Cable (mm ²)	Torque value (max)
2.0KVA 12V	1 x 4AWG	22	2-3Nm
3.0KVA 24V	1 x 6AWG	13	2-3Nm

Please follow below steps to implement battery connection:

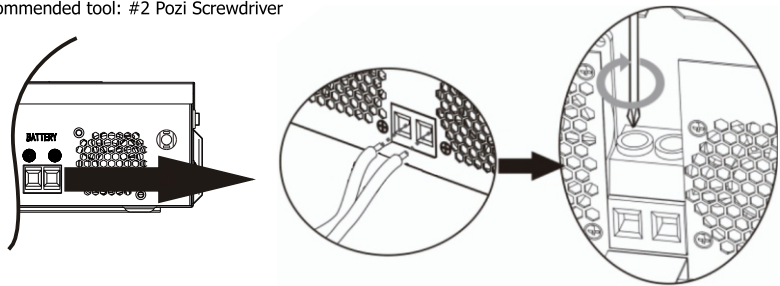
- 1. Remove insulation sleeve 18 mm for positive and negative conductors.
- 2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.



- 4. Connect all battery packs as below chart.



- 5. 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 Pozzi 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 (-).

Lithium Battery Connection

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

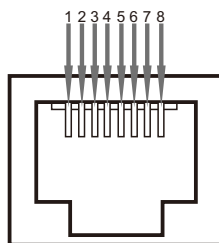
1. Connect the battery according to the recommended battery cable specifications.
2. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and that the ring terminal is tightened with the battery terminal.
3. Connect one side of RJ45 cable to the BMS communication port of inverter.
4. 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" mode.

Communication And Setting Of Lithium Battery

1. 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's PIN definition as below:

Pin number	Port definitions
1	RS485B
2	RS485A
3	VCC
4	NC
5	NC
6	GND
7	RS485A
8	RS485B



Communication port pin definition

2. 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" in program 05. Then select the matching battery protocol in Program 10 .

05	Battery type	Battery type 05 <u>AGn</u>
		Flooded 05 <u>FLd</u>
		User Defined 05 <u>USE</u>
		Lithium battery mode 05 <u>LIB</u>
		Lithium battery communication mode LIB 05 <u>485</u>

10	Lithium battery protocol	PYLON 10 PYL
		PACE 10 PAC

3. In "LIB" 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.

Battery voltage	The remaining battery capacity
Battery charging current	Battery discharge current
The rated capacity of the battery	Cycle charge and discharge times
BMS board temperature	MOS temperature
The maximum voltage of single battery cell	The minimum voltage of single battery cell
The maximum temperature of single battery	The minimum temperature of single battery

Battery Alarm Code

Alarm code	Alarm event	Icom flashing
21	Battery cell over voltage	[21] ①
22	Battery cell under voltage	[22] ①
23	Battery pack over voltage	[23] ①
24	Battery pack under voltage	[24] ①
25	Charging over current	[25] ①
26	Discharging over current	[26] ①
27	Charging cell over temperature	[27] ①
28	Discharging cell over temperature	[28] ①
29	Charging cell under temperature	[29] ①
30	Discharging cell under temperature	[30] ①
34	Battery capacity is too low	[34] ①
44	Battery cell voltage imbalance	[44] ①
45	Battery cell temperature imbalance	[45] ①
46	Internal communication alarm	[46] ①

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 over voltage	
37	System failure	
39	Charging MOS fault	
40	Discharging MOS fault	
41	Temperature sensor fault	
42	Battery cell fault	
43	Sampling communication failure	
61	Communication failure	

4.5 AC Input/Output Connection

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 20A for 2.0kva and 32A for 3.0kva.

CAUTION!! 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.

WARNING! 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 as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
2.0KVA 12V	1*12AWG	1.2~1.6Nm
3.0KVA 24V	1*10AWG	1.2~1.6Nm

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

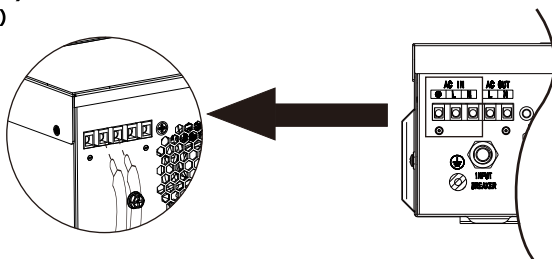
- Before making AC input/output connection, be sure to open DC protector or disconnecter first.
- Remove insulation sleeve 10mm for five conductors. And shorten phase L and neutral conductor N 3 mm.
- Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.



→ **Ground (yellow-green)**

L→ LINE (brown or black)

N→ Neutral (blue)



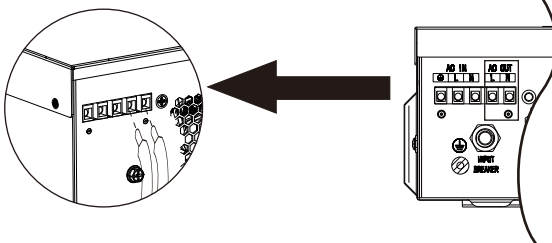
WARNING:

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

- 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 trigger 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

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 as below.

Model	Wire Size	Torque value (max)
2.0KVA 12V 3.0KVA 24V	1x16AWG	1.2~1.6Nm

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.

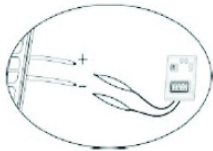
INVERTER MODEL	2.0KVA/3.0KVA
Max. PV Array Open Circuit Voltage	450Vdc
PV Array MPPT Voltage Range	50Vdc~430Vdc

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

Solar panel parameters -250Wp -Vmp: 30.1Vdc -Imp: 8.3A -Voc: 37.7Vdc -Isc: 8.4A -Cells: 60	Solar Input	Q'ty of panels	Total Input
	Range(Min in serial: 6pcs, max in serial: 11pcs)		
	3 pcs in serial	3	750W
	4 pcs in serial	4	1000W
	5 pcs in serial	5	1250W
	6 pcs in serial	6	1500W
	8 pcs in serial	8	2000W
	11 pcs in serial	11	2750W

PV Module Wire Connection

Step1: Check the input voltage of PV array module. The acceptable input voltage of the inverter is 50VDC-430VDC. 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.

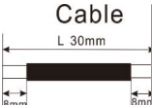
Step 3: Assemble provided PV connectors with PV modules by the following steps.

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.



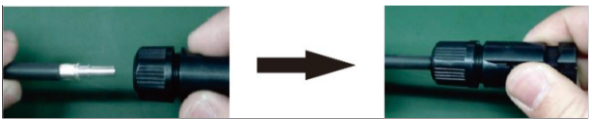
Insert assembled cable into female connector housing as shown below charts.



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

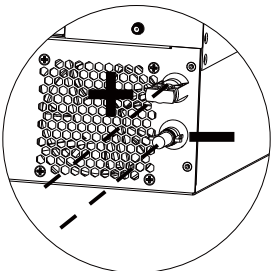


Insert assembled cable into male connector housing as shown below charts.



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

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.



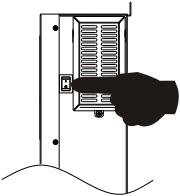
4.7 Final Assembly

After connecting all wirings, please put bottom cover back by screwing four screws as shown below.

5 OPERATION

5.1 Power ON/OFF

Side view of unit



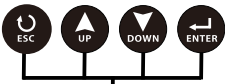
Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

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 a LCD display, indicating the operating status and input/output power information.



LCD display



Function keys



LED indicators

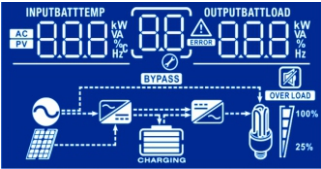
LED Indicator

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.

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

5.3 LCD Display Icons



Icon	Function description	
Input Source Information		
	Indicates the AC input.	
	Indicates the PV input	
	Indicate input voltage, input frequency, PV voltage, charger current charger power, battery voltage.	
Configuration Program and Fault Information		
	Indicates the setting programs.	
	Warning:  flashing with warning code.	
	Fault:  lighting with fault code	
Output Information		
	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.	
Battery Information		
	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.
Floating mode. Batteries are fully charged.		4 bars will be on.

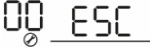
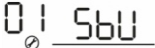
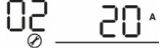
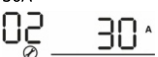
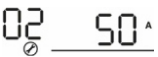
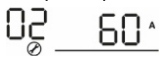
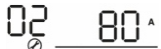
In battery mode, it will present battery capacity.		
Load > 50%	< 1.717V/cell	
	1.717V/cell~1.8V/cell	
	1.8~1.883V/cell	
	> 1.883V/cell	
50% > Load > 20%	< 1.817V/cell	
	1.817V/cell~1.9V/cell	
	1.9~1.983V/cell	
	> 1.983V/cell	
Load < 20%	< 1.867V/cell	
	1.867V/cell~1.95V/cell	
	1.95~2.033V/cell	
	> 2.033V/cell	

Load Information				
		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 connects to the mains.		
		Indicates unit connects to the PV panel.		
		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.		

5.4 LCD Setting

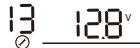
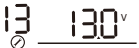
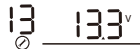
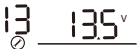
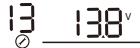
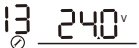
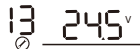
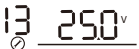
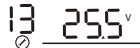
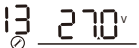
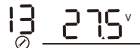
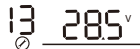
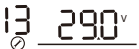
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

Setting Programs:

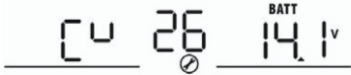
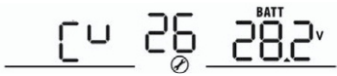
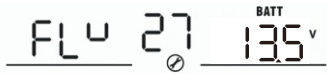
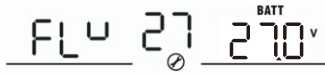
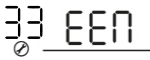
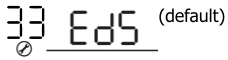
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	SUB priority (default) 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, utility will supply 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.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	10A 	20A 
		30A 	40A 
		50A 	60A (default) 
		70A 	80A 

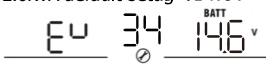
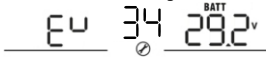
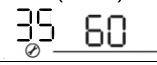
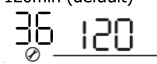
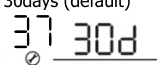
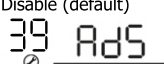
03	AC input voltage range	Appliances (default) 03 <u>APL</u>	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 <u>UPS</u>	If selected, acceptable AC input voltage range will be within 170-280VAC.
04	Power saving mode enable/disable	Saving mode disable (default) 04 <u>SdS</u>	If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.
		Saving mode enable 04 <u>SEn</u>	If enabled, the output of inverter will be off when connected load is pretty low or not detected.
05	Battery type	AGM (default) 05 <u>AGm</u>	Flooded 05 <u>FLd</u>
		User-Defined 05 <u>USE</u>	LiB 05 <u>LiB</u>
		If USE or LiB is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.	
06	Auto restart when overload occurs	Restart disable (default) 06 <u>LtD</u>	Restart enable 06 <u>LtE</u>
07	Auto restart when over temperature occurs	Restart disable (default) 07 <u>tD</u>	Restart enable 07 <u>tE</u>
08	Output voltage	220V 08 <u>220</u> ^v	230V (default) 08 <u>230</u> ^v
		240V 08 <u>240</u> ^v	
09	Output frequency	50Hz (default) 09 <u>50</u> ^{Hz}	60Hz 09 <u>60</u> ^{Hz}
10	Lothium battery protocol	PYLON (default) 10 <u>PYL</u>	PACE 10 <u>PAC</u>
11	Maximum utility charging current	10A 11 <u>10</u> ^A	20A 11 <u>20</u> ^A
		30A (default) 11 <u>30</u> ^A	40A 11 <u>40</u> ^A
		50A 11 <u>50</u> ^A	60A 11 <u>60</u> ^A

12	Setting voltage point back to utility source when selecting "SBU priority"	Available options in 12V models:	
		11.0V 12 110 ^v	11.3V 12 113 ^v
		11.5V(default) 12 115 ^v	11.8V 12 118 ^v
		12.0V 12 120 ^v	12.3V 12 123 ^v
		12.5V 12 125 ^v	12.8V 12 128 ^v
		Available options in 24V models:	
		22V 12 220 ^v	22.5V 12 225 ^v
		23V(default) 12 230 ^v	23.5V 12 235 ^v
		24V 12 240 ^v	24.5V 12 245 ^v
		25V 12 250 ^v	25.5V 12 255 ^v

13	Setting voltage point back to battery mode when selecting "SBU priority" in program 01	Available options in 12V models:	
		Battery full charged	12.0V
			
		12.3V	12.5V
			
		12.8V	13.0V
			
		13.3V	13.5V(default)
			
		13.8V	14.0V
			
		14.3V	14.5V
			
		Available options in 24V models:	
		Battery full charged	24V
			
		24.5V	25V
			
		25.5V	26V
			
		26.5V	27V(default)
			
		27.5V	28V
			
		28.5	29V
			

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 16 C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 050	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) 18 60N	Alarm off 18 60F
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	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 19 FEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
22	Beeps while primary source is interrupted	Alarm on (default) 22 AON	Alarm off 22 AOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 23 byd	Bypass enable 23 byE
25	Record Fault code	Record enable 25 FEN	Record disable (default) 25 FdS

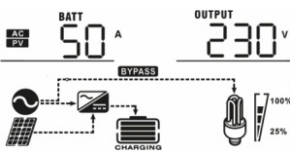
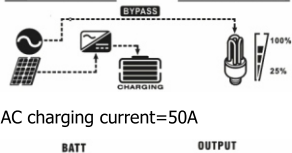
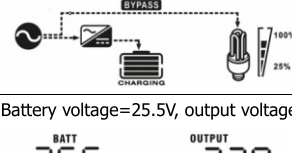
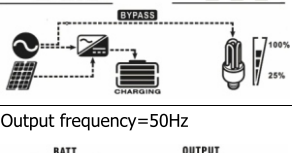
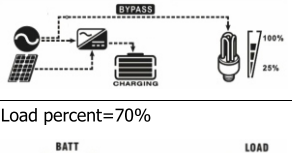
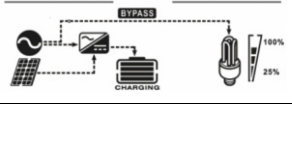
26	Bulk charging voltage (C.V voltage)	2.0KVA 12V default setting: 14.1V 
		3.0KVA 24V default setting: 28.2V 
		If self-defined is selected in program 5, this program can be set up. Setting range is from 12.0V to 14.6 V for 2.0KVA 12V model and 24.0V to 29.2 V for 3.0KVA 24Vmodel. Increment of each click is 0.1V.
27	Floating charging voltage	2.0KVA 12V default setting: 13.5V 
		3.0KVA 24V default setting: 27.0V 
		If self-defined is selected in program 5, this program can be set up. Setting range is from 12.0V to 14.6V for 2.0KVA 12V model and 24.0V to 29.2 V for 3.0KVA 24Vmodel. Increment of each click is 0.1V.
29	Low DC cut-off voltage	2.0KVA 12V default setting: 10.5 V 
		3.0KVA 24V default setting: 21.0 V 
		If self-defined is selected in program 5, this program can be set up. Setting range is from 10.0V to 12.0V for 2.0KVA 12V model and 20.0V to 24.0V for 3.0KVA 24Vmodel. 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.
33	Battery equalization	 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.

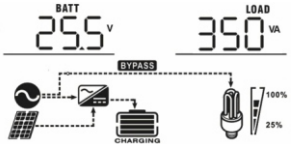
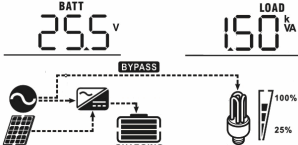
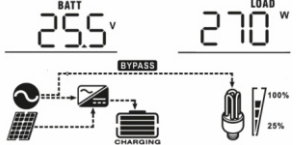
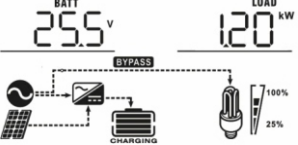
34	Battery equalization voltage	2.0KVA default settig :14.6V 	
		Setting range is from 12.5V to 14.7V. Increment of each click is 0.1V.	
		3.0KVA default setting: 29.2V 	
		Setting range is from 25.0V to 29.5V. Increment of each click is 0.1V.	
35	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
36	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
37	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
39	Equalization activated immediately	Enable 	Disable (default) 
		If equalization function is enabled in program 33, 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 "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page.	

5.5 DisplaySetting

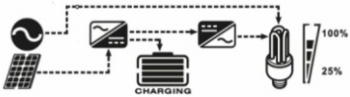
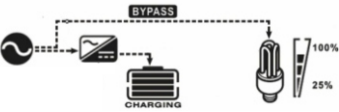
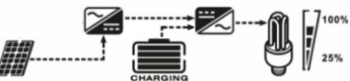
The LCD display information will be switched in turns by pressing “UP” or “DOWN” key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, PV power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in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

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V
Input frequency	Input frequency=50Hz
PV voltage	PV voltage=260V
MPPT Charging current	MPPT Charging current=500W

Charging current	AC and PV charging current=50A  PV charging current=50A  AC charging current=50A 
Battery voltage and output voltage	Battery voltage=25.5V, output voltage=230V 
Output frequency	Output frequency=50Hz 
Load percentage	Load percent=70% 

Load in VA	When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.  When load is larger than 1kVA ($\geq 1\text{kVA}$), load in VA will present x.xkVA like below chart. 
Load in Watt	When load is lower than 1kW, load in W will present xxxW like below chart.  When load is larger than 1kW ($\geq 1\text{kW}$), load in W will present x.xkW like below chart. 
Battery voltage/DC discharging current	Battery voltage=25.5V, discharging current=1A 
CPU version checking	CPU version 20 03 

5.6 Operating Mode Description

Operation mode	Description	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.	Charging by utility and PV energy. 
		Charging by utility. 
		Charging by PV energy. 
		No charging. 
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	Solar and mains supply power to loads at the same time 
		Mains charging 
Battery Mode	The unit will provide output power from battery and PV power.	PV energy will supply power to the loads and charge battery at the same time. 
		Power from battery only. 

5.7 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.

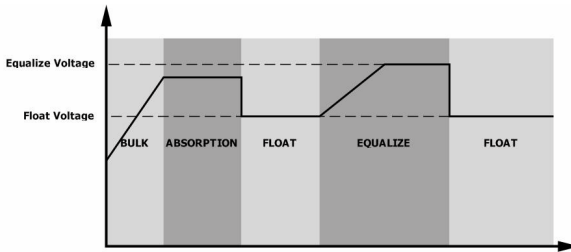
• How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Check the program 5 is user-defined or flooded mode .
2. Check program 33 is enabled.
3. Setting equalization in the program 34 to program 37 , that is depend on your battery requirements . (detailed information in LCD Setting part) .
4. Active equalization immediately in program 39.

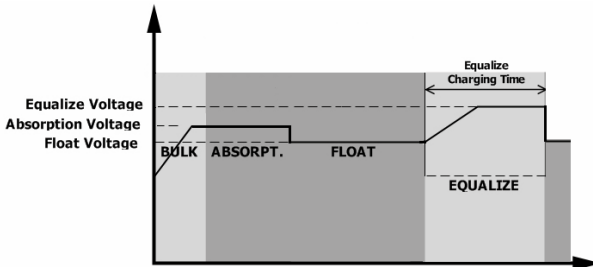
• When to Equalize

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.

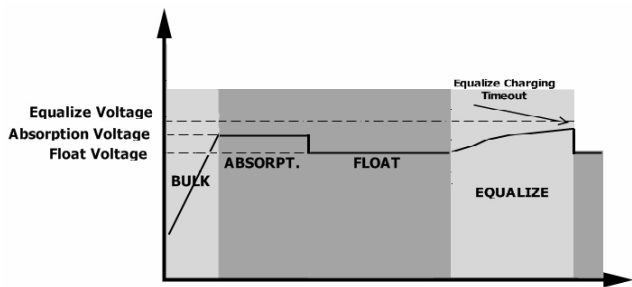


• Equalize charging time and timeout

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.



5.8 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	
13	Solar charger stops due to high PV voltage	
51	Over current or surge	
52	Bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	
56	Battery is disconnected	
57	Current sensor failed	
58	Output voltage is too low	

5.9 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 weak	No Beep	
EQ	Battery equalization	No Beep	
bP	Battery is not connected	No Beep	

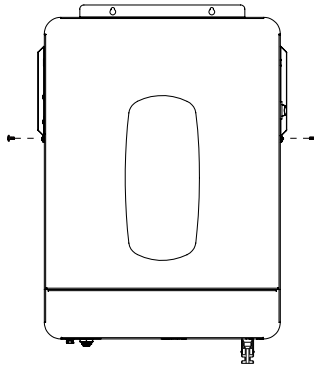
6 CLEARANCE AND MAINTENANCE FOR ANTI -DUST KIT (Optional)

6.1 Overview

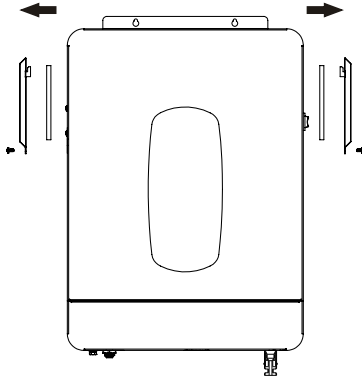
Every inverter is already installed with anti-dusk kit from factory. Inverter will automatically detect this kit and activate internal thermal sensor to adjust internal temperature. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

6.2 Clearance and Maintenance(option)

Step 1: Please remove screws as below.



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

Table 1 Line Mode Specifications

INVERTER MODEL	2.0KVA-12V	3.0KVA-24V
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac $\pm$ 7V (UPS); 90Vac $\pm$ 7V (Appliances)	
Low Loss Return Voltage	180Vac $\pm$ 7V (UPS); 100Vac $\pm$ 7V (Appliances)	
High Loss Voltage	280Vac $\pm$ 7V	
High Loss Return Voltage	270Vac $\pm$ 7V	
Max AC Input Voltage	300Vac	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40 $\pm$ 1Hz	
Low Loss Return Frequency	42 $\pm$ 1Hz	
High Loss Frequency	65 $\pm$ 1Hz	
High Loss Return Frequency	63 $\pm$ 1Hz	
Output Short Circuit Protection	Battery mode: Electronic Circuits	
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.	The graph illustrates the output power derating characteristics. The vertical axis represents Output Power, with specific levels for 50% Power and Rated Power marked. The horizontal axis represents Input Voltage, with key points at 90V, 170V, and 280V. The power remains constant at a low level until 90V, then rises linearly to reach the Rated Power at 170V. It remains at Rated Power until 280V, after which it drops to zero.	

Table 2 Inverter Mode Specifications

INVERTER MODEL	2.0KVA-12V	3.0KVA-24V
Rated Output Power	2000VA/1800W	3000VA/3000W
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac $\pm$ 5%	
Output Frequency	60Hz or 50Hz	
Peak Efficiency	94 %	
Overload Protection	5s@ $\geq$ 150% lo ad; 10s@ 110% ~ 150% lo ad	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	12Vdc	24Vdc
Cold Start Voltage	11.5Vdc	23.0Vdc
Low DC Warning Voltage @ lo ad < 50%	11.0Vdc	22.0Vdc
@ load $\geq$ 50%	10.5Vdc	21.0Vdc
Low DC Warning Return Voltage @ load < 50%	11.5Vdc	23.0Vdc
@ load $\geq$ 50%	11.0Vdc	22.0Vdc
Low DC Cut- off Voltage @ load < 50%	10.5Vdc	21.0Vdc
@ load $\geq$ 50%	10.0Vdc	20.0Vdc
High DC Cut- off Voltage	16Vdc	31Vdc
No Load Power Consumption	<35W	<35W
Saving Mode Power Consumption	<10W	<15W

Table 3 Charge Mode Specifications

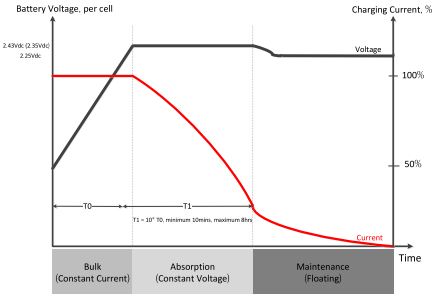
Utility Charging Mode			
INVERTER MODEL		2.0KVA-12V	3.0KVA-24V
Charging Algorithm		3-Step	
AC Charging Current (Max)		60Amp (@V _{I/P} = 230Vac)	60Amp (@V _{I/P} = 230Vac)
Bulk Charging Voltage	Flooded Battery	14.6	29.2
	AGM / Gel Battery	14.1	28.2
Floating Charging Voltage		13.5Vdc	27Vdc
Charging Curve			
MPPT Solar Charging Mode			
INVERTER MODEL		2.0KVA-12V	3.0KVA-24V
Max. PV Array Power		2000W	3000W
Nominal PV Voltage		300 Vdc	
PV Array MPPT Voltage Range		50~430Vdc	
Max. PV Array Open Circuit Voltage		450Vdc	
Max Charging Current (AC charger plus solar charger)		80Amp	

Table 4 General Specifications

INVERTER MODEL	2.0KVA-12V	3.0KVA-24V
Safety Certification	CE	
Operating Temperature Range	0 °C to 55 °C	
Storage temperature	-15 °C~ 60 °C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension (D* W* H) , mm	405*284*106	
Net Weight, kg	5.0	5.5

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)
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°C.	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°C.	
	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.	