maximo

USER'S MANUAL
SOLAR INVERTER

PV2024 HM &
PV3024 HM

Version 10/08/2018

Table Of Contents

ABOUT THIS MANUAL

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.

Scope

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

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. Fuses (4 pieces of 40A, 32VDC for 2KVA and 6 pieces of 40A, 32VDC for 3KVA) are provided as over-current protection for the battery supply.
11. 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.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **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.

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.

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
- IP20 rating, avoid direct sunlight

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
- PV modules (option)

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.
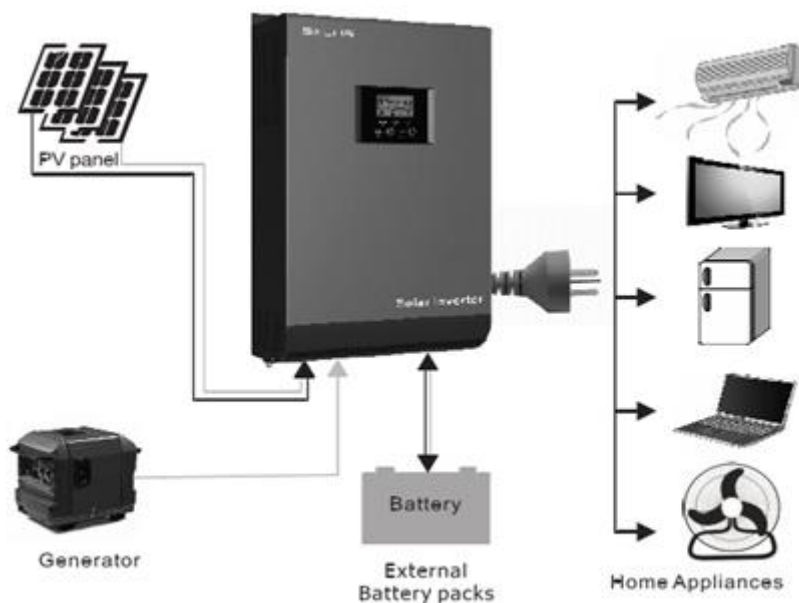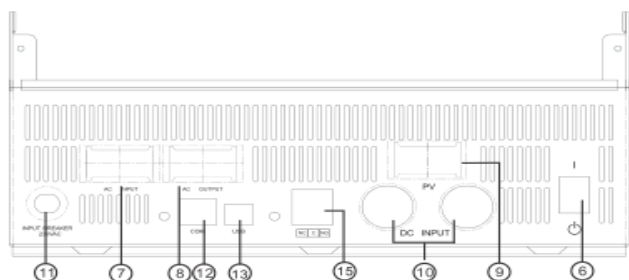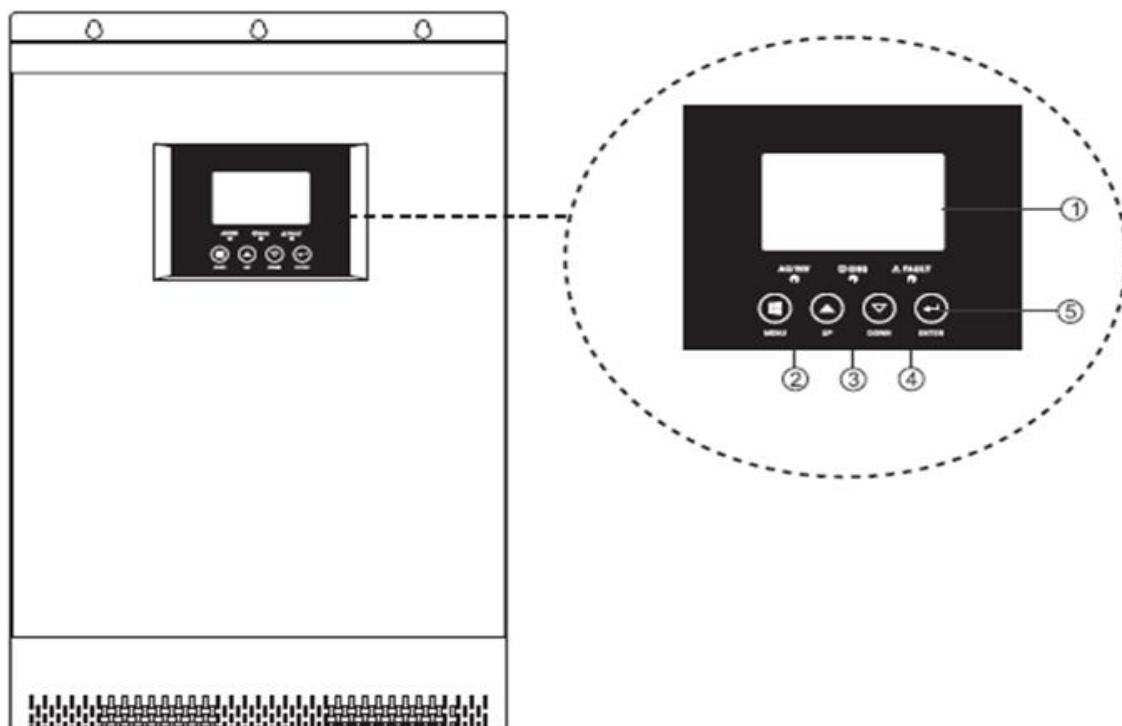

Figure 1 Hybrid Power System

Product Overview

2-3KVA single model

NOTE: For parallel model installation and Operation, please check separate parallel installation guide for the details.

1. LCD display
2. Status indicator
3. Discharging/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. Circuit breaker
12. RS-485 communication port
13. USB
15. Dry Contact

INSTALLATION

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
- Communication cable x 1
- USB cable x 1
- Software CD x 1

Preparation

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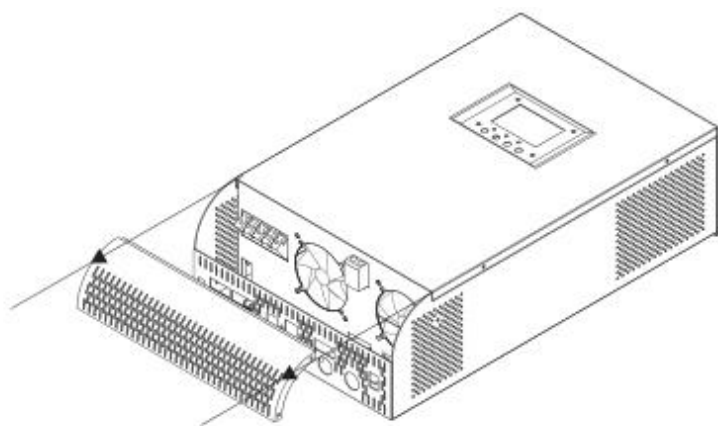
Mounting the Unit

Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface, indoor IP20, avoid direct sunlight
- 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. 200 mm to the side and approx. 300 mm 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 below diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.
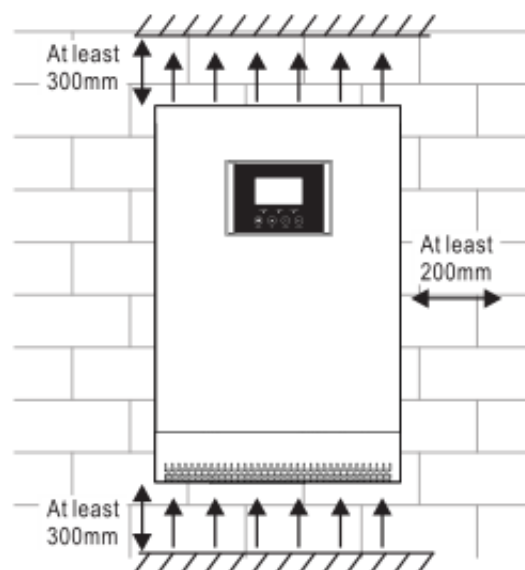
⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

Install the unit by screwing three screws.
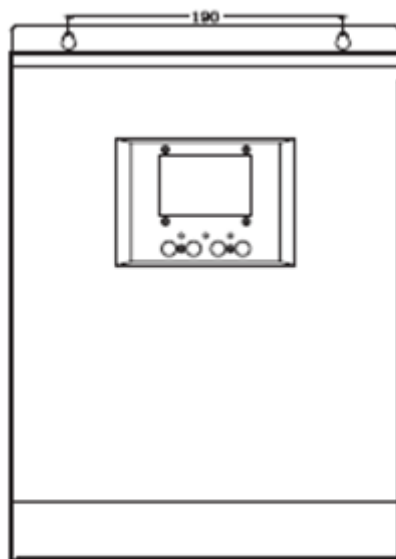
2-3KVA

Battery Connection

CAUTION: To 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 beaker size.

Ring terminal:

WARNING! All wiring must be performed by a qualified person.
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 and terminal size as below.
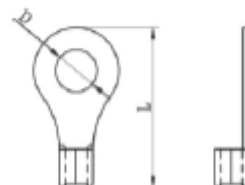
Recommended battery cable and terminal size:

Model	Typical Amperage	Battery capacity	Wire Size	Ring Terminal			Torque value
				Cable mm²	Dimensions		
					D(mm)	L(mm)	
2024	66A	100AH	1*6AWG	14	6.4	29.2	2~ 3 Nm
		200AH	2*10AWG	8	6.4	23.8	2~ 3 Nm
3024	100A	100AH	1*4AWG	22	6.4	33.2	2~ 3 Nm
		200AH	2*8AWG	14	6.4	29.2	2~ 3 Nm

Please follow below steps to implement battery connection:
1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as below chart, It's suggested to connect at least 100Ah capacity battery for 2KVA/3KVA model.
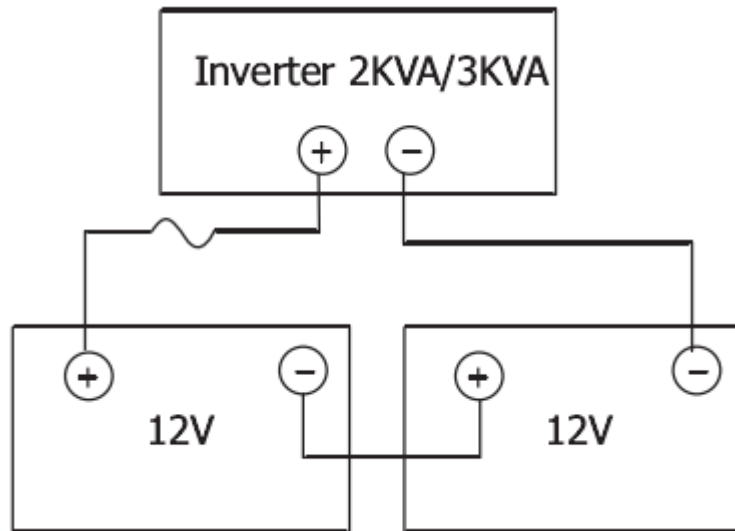
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.
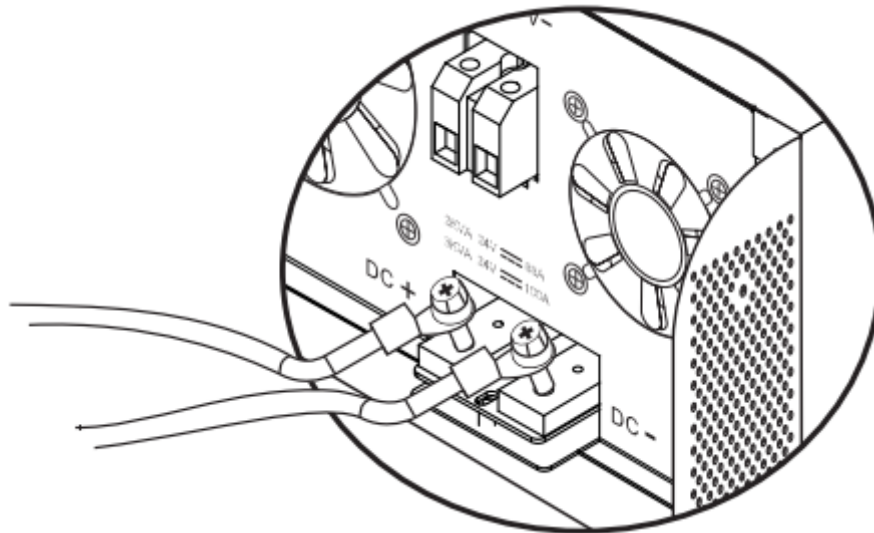
⚠	**WARNING: Shock Hazard** Installation must be performed with care due to high battery voltage in series.

⚠	**CAUTION!!** Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur. **CAUTION!!** Do not apply anti-oxidant substance on the terminals before terminals are connected tightly. **CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure DC (+) must be connected to DC (+) and DC (-) must be connected to DC (-).

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 2KVA, 32A for 3KVA.

CAUTION!! There are two terminal blocks with "IN" and "OUT" markings. Please do NOT-misconnect input and output connectors.

WARNING! All wiring must be performed by 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
2024	14 AWG	0.8~ 1.0Nm
3024	12 AWG	1.2~ 1.6Nm

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. Be sure to connect PE protective conductor (⏚) first.

   ⏚→**Ground (yellow-green)**
   L→**LINE (brown or black)**
   N→**Neutral (blue)**
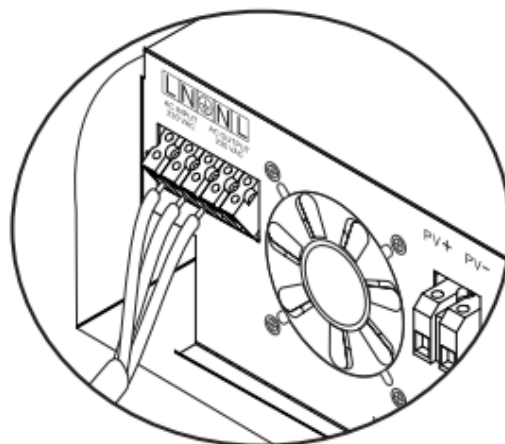
⚠	**WARNING:**
	Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.

   ⏚→**Ground (yellow-green)**
   L→**LINE (brown or black)**
   N→**Neutral (blue)**
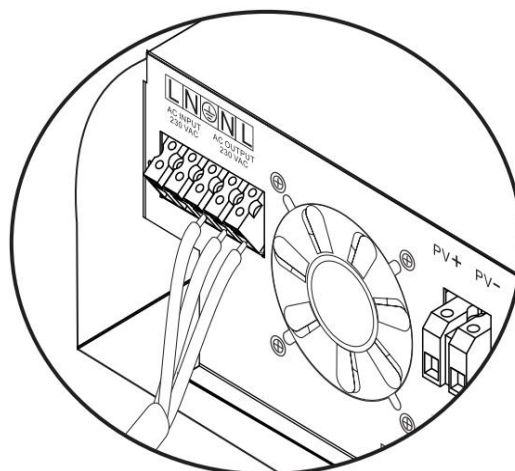
5. Make sure the wires are securely connected.

CAUTION: Important

Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause AC short-circuit when these inverters are worked in parallel operation.

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.

PV Connection

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

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

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	Typical Amperage	Cable Size	Torque
2024/40A **3024/40A**	40A	8 AWG	1.4~1.6Nm
2024/60A **3024/60A**	60A	8 AWG	1.4~1.6Nm

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.

2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Solar Charging Mode		
INVERTER MODEL	**2024/40A** **3024/40A**	**2024/60A** **3024/60A**
Max. PV Array Open Circuit Voltage	145Vdc	
PV Array MPPT Voltage Range	30~130Vdc	
Min. battery voltage for PV charge	17Vdc	

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10 mm for positive and negative conductors

2. 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.

(2-3KVA)
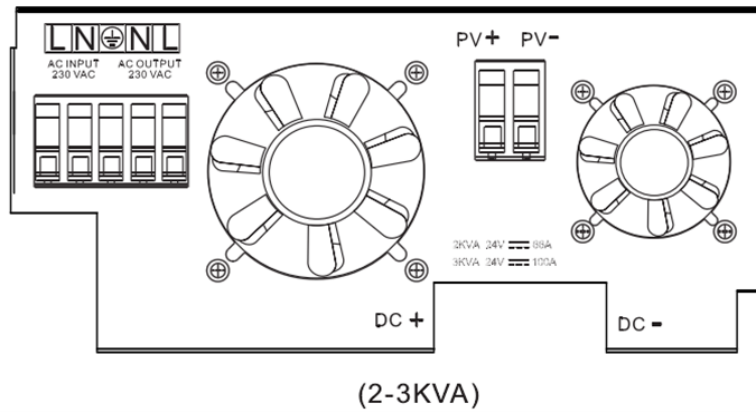
Final Assembly

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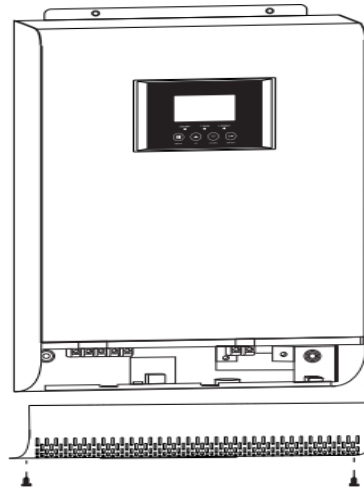
Communication Connection

Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

Below chart is showned RJ45 Pins define

Pin	Define
1	RS-485-B
2	RS-485-A
3	GND
4	
5	CANL
6	CANH
7	
8	
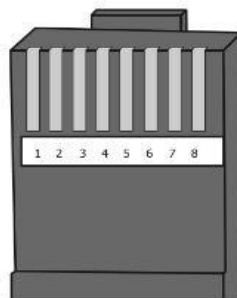
Dry Contact Signal

There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition			Dry contact port	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from "AC in"			Close	Open
	Output is powered from Battery or Solar.	Program 01 set as AC	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 21 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU，Solar first	Battery voltage < Setting value in Program 20	Open	Close
			Battery voltage>Setting value in Program 21 or battery charging reaches floating stage	Close	Open

OPERATION

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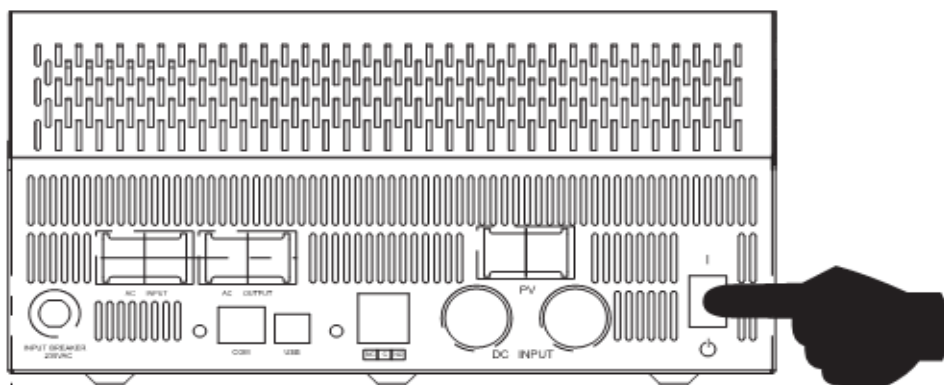
Once the unit has been properly installed and the batteries are connected, simply press On/Off switch (located on the button of the case) to turn on the unit.

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
LED indicators
Function keys
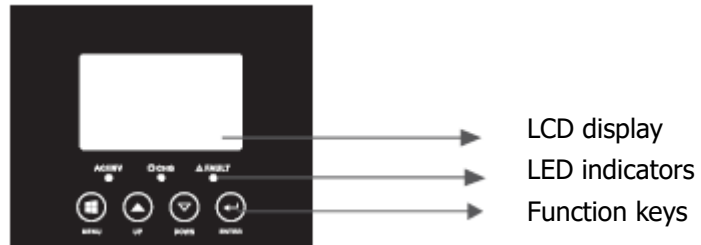
LED Indicator

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

Function Keys

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

LCD Display Icons
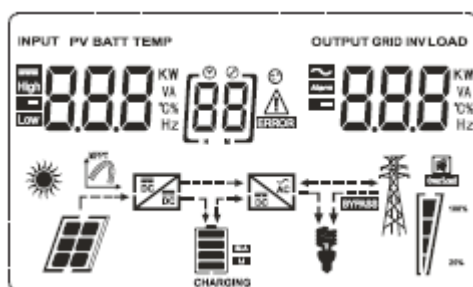
Icon	Function description
Input Source Information and Output Information	
∿	Indicates the AC information.
▬	Indicates the DC information.
888 KW VA ℃% Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. Indicate output voltage, output frequency, load in VA, load in Watt and discharging current.
Configuration Program and Fault Information	
[88]	Indicates the setting programs.
88 ⚠ ERROR	Indicates the warning and fault codes. Warning: flashing 88 ⚠ with warning code. Fault: lighting 88 ▬ with fault code.
Battery Information	
🔋 SLA LI CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

In AC mode, it will present battery charging status.

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

In battery mode, it will present battery capacity.

Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.717V/cell	🔋
	1.717V/cell ~ 1.8V/cell	🔋
	1.8 ~ 1.883V/cell	🔋

	> 1.883 V/cell		
50%> Load > 20%	< 1.817V/cell		
	1.817V/cell ~ 1.9V/cell		
	1.9 ~ 1.983V/cell		
	> 1.983V/cell		
Load < 20%	< 1.867V/cell		
	1.867V/cell ~ 1.95V/cell		
	1.95 ~ 2.033V/cell		
	> 2.033V/cell		

Load Information

OVER LOAD	Indicates overload.

	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
	0%~24%	25%~49%	50%~74%	75%~100%

Mode Operation Information

	Indicates unit connects to the generator.
	Indicates unit connects to the PV panel.
BYPASS	Indicates load is supplied by generator power.
	Indicates the solar charger is working.
	Indicates the DC/AC inverter circuit is working.

Mute Operation

	Indicates unit alarm is disabled.

LCD Setting

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

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape [00]ESC	
01	Output source priority selection	[01]Sbu	Solar energy provides power to the loads as first priority. If battery voltage has been higher than the setting in point 21 for 5 minutes, the inverter will turn to battery mode, solar and battery will provide power to the load at the same time. When the battery voltage drops to the setting in point 20, the inverter will turn to bypass mode, "AC in" provides power to the load only, and solar power will charge the battery at the same time.
		[01]SOL	Solar energy provides power to the loads as first priority. If battery voltage has been higher than the setting in point 21 for 5 minutes, and the solar energy has been available for 5 minutes, the inverter will turn to battery mode, solar and battery will provide power to the load at the same time. When the battery voltage drops to the setting point in program 20, the inverter will turn to bypass mode, and "AC in" provides power to the load only, and the solar will charge the battery at the same time.
		(default) [01]ut,	"AC in" will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when AC power is not available.
02	AC input voltage range	Appliances (default) [02]APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS [02]UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		VDE [02]ude	If selected, acceptable AC input voltage range will conform to VDE4105(184VAC-253VAC)

		GEN	When the user uses the device to connect the generator，select the generator mode.
		[02] GEN	
03	Output voltage	[03] 230ᵥ	Set the output voltage (220VAC-240VAC)
04	Output frequency	50HZ(default) [04] 50.0	60HZ [04] 60.0
05	Solar supply priority	[05] bLU	Solar energy provides power to charge battery as first priority
		(default) [05] LbU	Solar energy provides power to the loads as first priority
06	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disabled [06] bYd	Bypass enabled (default) [06] bYE
07	Auto restart when overload occurs	Restart disabled (default) [07] Ltd	Restart enabled [07] LtE
08	Auto restart when over temperature occurs	Restart disabled (default) [08] ttd	Restart enabled [08] ttE
10	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first [10] CSO	Solar energy will charge battery as first priority. AC will charge battery only when solar energy is not available.
		Solar and AC (default) [10] SNU	Solar energy and AC will charge battery at the same time.
		Only Solar [10] OSO	Solar energy will be the only charger source.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
11	Maximum charging current: To configure total charging current	40A (default) [11] 40 ᴬ	Setting range is from 1 A to 70A. Increment of each click is 1A.

	for solar and generator.(Max. charging current=AC current +solar charging current)	60A (default) [¹] 60ᴬ	Setting range is from 1 A to 80A. Increment of each click is 1A.
13	Maximum AC charging current	20A (default) [¹³] 20ᴬ	30A(Maximum current) [¹³] 30ᴬ

14	Battery type	AGM (default) [¹⁴]AGn	Flooded [¹⁴]FLd
		GEL [¹⁴]GEL	LEAD [¹⁴]LEA
		Lithium Ion [¹⁴]Li	User-Defined [¹⁴]USE
		If "User-Defined" LI is selected, battery charge voltage and low DC cut-off voltage can be set up in program 17, 18 and 19.	
17	Bulk charging voltage (C.V voltage)	24V model default setting: 28.2V [¹⁷] 28.2	
		If self-defined is selected in program 14, this program can be set up. Setting range is from 24.0V to 29.2V for 24Vdc model. Increment of each click is 0.1V	
18	Floating charging voltage	24V model default setting: 27.0V [¹⁸] 27.0ᵛ	
		If self-defined is selected in program 14, this program can be set up. Setting range is from 24.0V to 29.2V for 24Vdc model. Increment of each click is 0.1V	
19	Low DC cut off battery voltage setting	24V model default setting: 20.4V [¹⁹] 20.4ᵛ	
		If self-defined is selected in program 14, this program can be set up. Setting range is from 20.0V to 24.0V for 24Vdc 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	
20	Battery stop discharging voltage when AC is available	Available options for 24V models:	
		23V (default) [²⁰] 23.0ᵛ	Setting range is from 22.0V to 29.0V Increment of each click is 0.1V
21	Battery stop charging	Available options for 24V models:	

		voltage when AC is available	27.0V (default) $[2]$ 27.0$_V$	Setting range is from 22.0V to 29.0V. Increment of each click is 0. 1V

22	Auto turn page	(default) $[22]$ PtE	If selected, the display screen will auto turn the display page.
		$[22]$ Ptd	If selected, the display screen will stay at latest screen user finally switches.
23	Backlight control	Backlight on $[23]$ LON	Backlight off (default) $[23]$ LOF
24	Alarm control	Alarm on (default) $[24]$ bON	Alarm off $[24]$ bOF
25	Beeps while primary source is interrupted	Alarm on $[25]$ AON	Alarm off (default) $[25]$ AOF
27	Record Fault code	Record enable (default) $[27]$ FON	Record disabled $[27]$ FOF

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

	(default) $[dt]$ nrt	Reset setting disable
SEt	$[dt]$ rSt	Reset setting enable

Fault Reference Code

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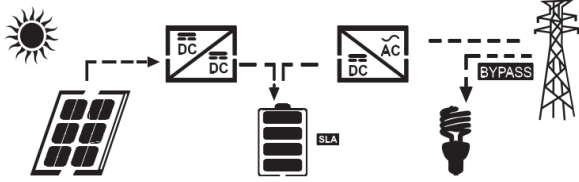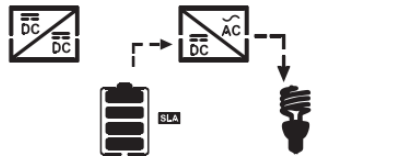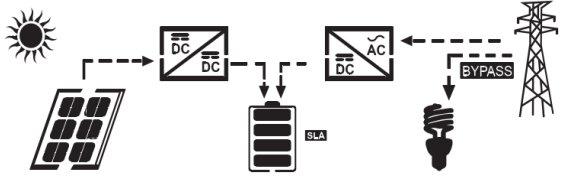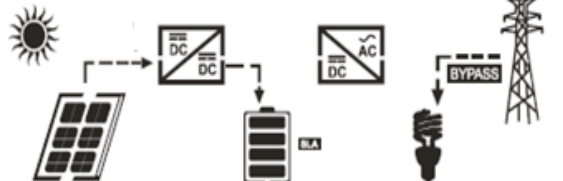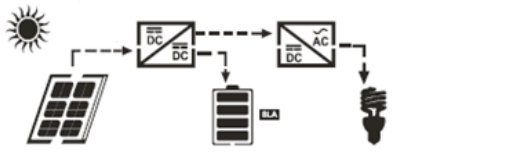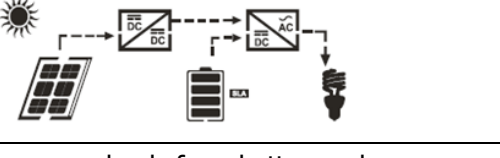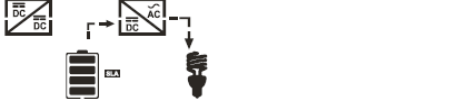
01	Fan is locked when inverter is off	[01] ⚠ ERROR
02	Inverter transformer over temperature	[02] ⚠ ERROR
03	battery voltage is too high	[03] ⚠ ERROR
04	Battery voltage is too low	[04] ⚠ ERROR
05	Output short circuited	[05] ⚠ ERROR
06	Inverter output voltage is high	[06] ⚠ ERROR
07	Overload time out	[07]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

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

Warning Indicator

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

Operating State Description

Operation state	Description	LCD display
Inverter state	PV energy is charging the battery and generator is providing power to the AC load.	PV is on PV is off
Charge state	PV energy and generator are charging the battery.	
Bypass state	Error are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	
Off-Grid state	The inverter will provide output power from battery and PV power.	Inverter power loads from PV energy Inverter power loads from battery and PV energy Inverter power loads from battery only

Stop state	The inverter stopped working. Turn off the inverter by the soft key and restart it.	

Display Setting

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

Selectable information	LCD display
Battery voltage/DC discharging current	**BATT** 26.0 V 48.0 A
Inverter output voltage/Inverter output current	229 V **INV** 6.70 A
"AC in" voltage/ "AC in" current	229 V - 3.0 A
Load in Watt/VA	1.50 KW **LOAD** 1.68 K VA
"AC in" frequency/Inverter frequency	**INPUT** 50.0 Hz **INV** 50.0 Hz
PV voltage and power	**PV** 61.0 V 1.00 KW
PV charger output voltage and MPPT charging current	**PV** 25.0 V **OUTPUT** 40.0 A

SPECIFICATIONS

Table 1 Line Mode Specifications
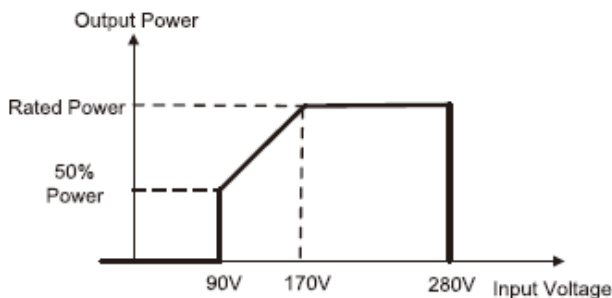
INVERTER MODEL	2024	3024
Input Voltage Waveform	Sinusoidal	
Nominal Input Voltage	230Vac	
Low Loss Voltage	90Vac±7V(APL, GEN); 170Vac±7V(UPS) 186Vac±7V(VDE)	
Low Loss Return Voltage	100Vac±7V(APL, GEN);180Vac±7V(UPS) 196Vac±7V(VDE)	
High Loss Voltage	280Vac±7V(APL, UPS,GEN) 253Vac±7V(VDE)	
High Loss Return Voltage	270Vac±7V(APL, UPS,GEN) 250Vac±7V(VDE)	
Max AC Input Voltage	300Vac	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40HZ±1HZ(APL, UPS,GEN) 47.5HZ±0.05HZ(VDE)	
Low Loss Return Frequency	42HZ±1HZ(APL, UPS,GEN) 47.5HZ±0.05HZ(VDE)	
High Loss Frequency	65HZ±1HZ(APL, UPS,GEN) 51.5HZ±0.05HZ(VDE)	
High Loss Return Frequency	63HZ±1HZ(APL, UPS,GEN) 50.05HZ±0.05HZ(VDE)	
Output Short Circuit Protection	Line mode: Circuit Breaker Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS, VDE) 20ms typical (APL)	
Output power derating: When AC input voltage drops to 170V depending on models, the output power will be de-rated	230Vac model: 	

Table 2 Inverter Mode Specifications

INVERTER MODEL	2024	3024
Rated Output Power	2KVA/1.6KW	3KVA/2.4KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	60Hz or 50Hz	
Peak Efficiency	90%	
Overload Protection	5s@≥150% load; 10s@110%~150% load	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	24Vdc	
Cold Start Voltage	23.0Vdc	
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	22.0Vdc 21.4Vdc 20.2Vdc	
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	23.0Vdc 22.4Vdc 21.2Vdc	
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	21.0Vdc 20.4Vdc 19.2Vdc	
High DC Recovery Voltage	29Vdc	
High DC Cut-off Voltage	30Vdc	
No Load Power Consumption	<20W	

Table 3 Charge Mode Specifications

AC Charging Mode			
INVERTER MODEL		**2024**	**3024**
Charging Current @Nominal Input Voltage		20/30A	
Absorption Voltage	**AGM / Gel/LEAD Battery**	25Vdc	
	Flooded Battery	25Vdc	
Refloat Voltage	**AGM / Gel/LEAD Battery**	27.4Vdc	
	Flooded Battery	27.4Vdc	
Float Voltage	**AGM / Gel/LEAD Battery**	28.8Vdc	
	Flooded Battery	28.4Vdc	
Charging Algorithm		3-Step(Flooded Battery, AGM/Gel Battery), 4-Step(LI)	

Solar Charging Mode		
INVERTER MODEL	**2024/3024**	
Charging Current (MPPT)	40Amp	60Amp
System DC Voltage	24Vdc	
Operating Voltage Range	30-130Vdc	
Max. PV Array Open Circuit Voltage	145Vdc	
Max PV Isc	40Amp	60Amp
Standby Power Consumption	2W	
Battery Voltage Accuracy	+/-0.3%	
PV Voltage Accuracy	+/-2V	
Charging Algorithm	3-Step(Flooded Battery, AGM/Gel Battery),4-Step(LI)	
Charging algorithm for lead acid battery		

Charging algorithm for Lithium battery	

Joint AC and Solar Charging		
INVERTER MODEL	**2024/3024**	
Max Charging Current	70Amp	80Amp
Default Charging Current	40Amp	60Amp

Table 4 General Specifications

INVERTER MODEL	**2024**	**3024**
Safety Certification	CE	
Back-feed current to array	0 Amp	0 Amp
Inrush current	30 Amp	30 Amp
Max output fault current	10.4 Amp	15.7 Amp
Max output overcurrent protection	7.7 Amp	11.5 Amp
Operating Temperature Range	0°C to 55°C	
Storage temperature	-15°C~ 60°C	
Dimension (D*W*H), mm	272x 355 x 125	
Net Weight, kg	10.5	11.5

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. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 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 check if input voltage range setting is correct (Appliance→Wide)
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.
		Internal temperature of inverter component is over 90 °C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02		
	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 202Vac or is higher than 253Vac)	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.	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.

Appendix: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 24Vdc 100Ah (min)	Backup Time @ 24Vdc 200Ah (min)
2KVA	200	766	1610
	400	335	766
	600	198	503
	800	139	339
	1000	112	269
	1200	95	227
	1400	81	176
	1600	62	140
	1800	55	125
	2000	50	112
3KVA	300	449	1100
	600	222	525
	900	124	303
	1200	95	227
	1500	68	164
	1800	56	126
	2100	48	108
	2400	35	94
	2700	31	74
	3000	28	67

Note: 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.

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