USER MANUAL
HYBRID SOLAR INVERTER/CHARGER

3.5kVA / 6.5kVA 230Vac

Table Of Contents

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. 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. Fuse is 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.

3. INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter,
 MPPT 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
- Inverter running without battery
- Built-in MPPT solar controller
- 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 (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
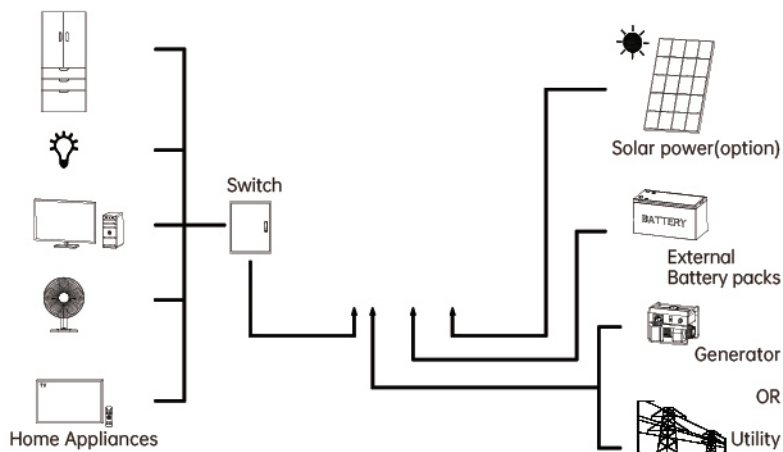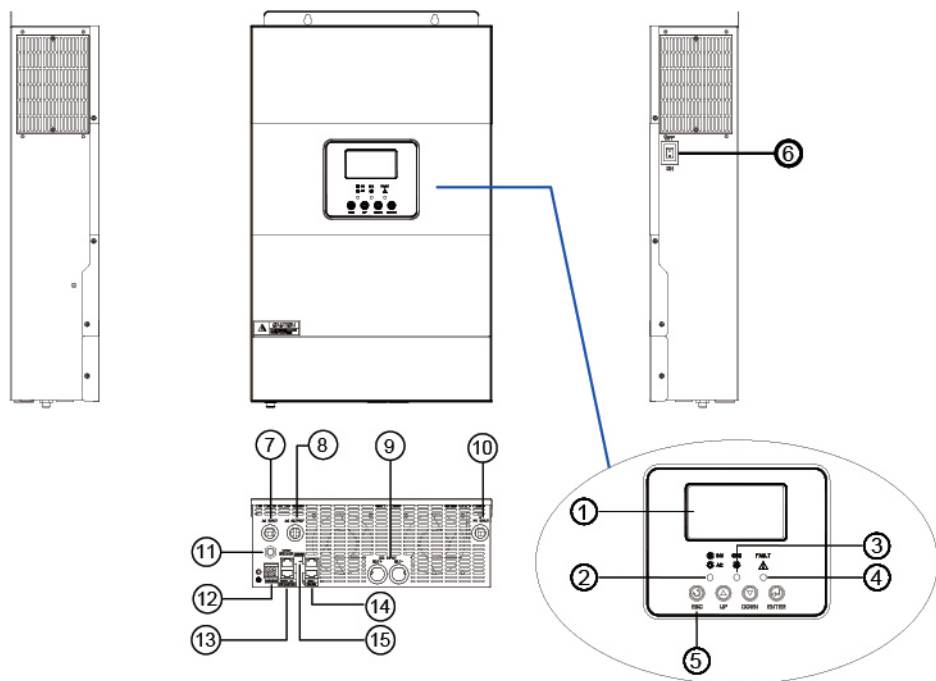appliances such as tube light, fan, refrigerator and air conditioner.

Solar power(option)

Switch

BATTERY

External
Battery packs

Generator

OR

Utility

Home Appliances

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.Battery input

10.PV input

11. Circuit breaker

12.Dry contact (Optional)

13.Parallel communication port (only parallel)

14.BMS communication port (only parallel)

15.RS232 communication port

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

4. INSTALLATION

4.1 Unpacking and Inspection

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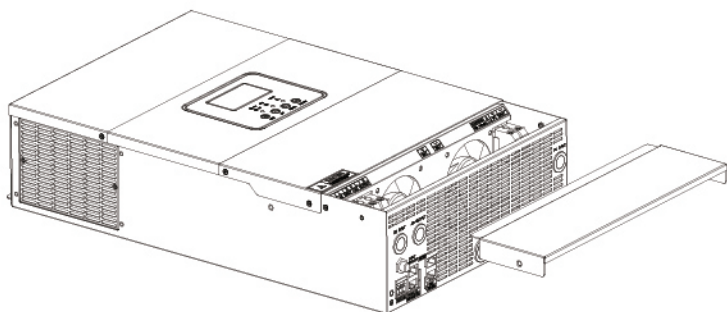Be sure that nothing inside the package is damaged.
You should have received the following items inside of package:

▸ The unit x 1
▸ User manual x 1
▸ Parallel wire (only parallel) x 1
▸ Current equalization wire (parallel only) 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.
▸ 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 right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.
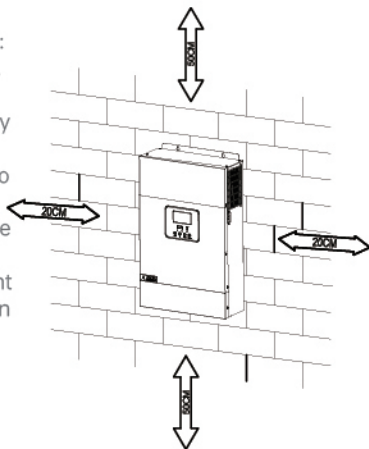
⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

Install the unit by screwing three screws.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 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 、 stripping length(L2) and tinning length(L1) as below.

Stripping Length:
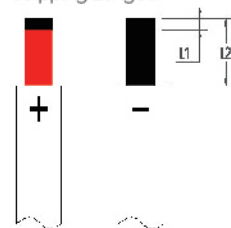
Recommended battery cable 、 stripping length(L2)and tinning length(L1):

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm²	L1 (mm)	L 2 (mm)	Torque value
3.5KVA	137A	100AH	2AWG	38	3	18	2~ 3 Nm
6.5KVA	137A	200AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1.Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2.Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3.Insert 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 battery cables are tightly screwed to the battery connector.

Inverter 3.5K ⊕ ⊝

12V   12V

Inverter 5.5K ⊕ ⊝

12V   12V   12V   12V
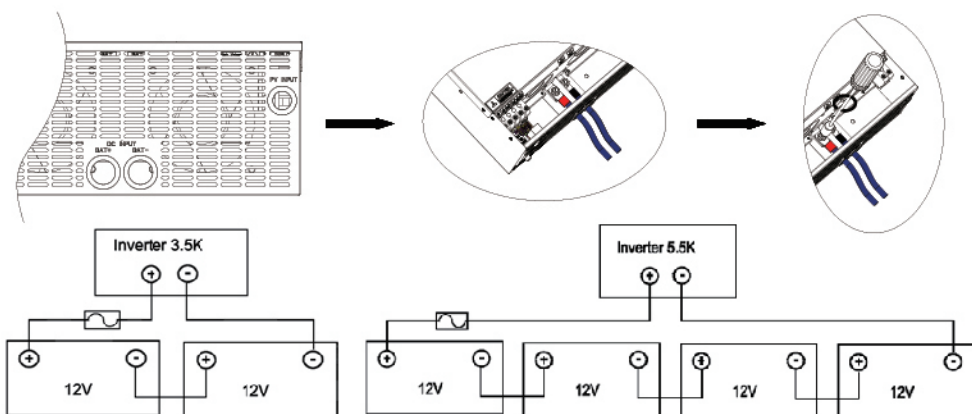
> ⚠️ **WARNING: Shock Hazard**
> Installation must be performed with care due to high battery voltage in series.

⚠️	**CAUTION!!**	Do not place anything between the flat part of the inverter terminal 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 positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

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 50A
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
3.5KVA	10AWG	1.4~ 1.6Nm
6.5KVA	8AWG	1.4~ 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 3mm.
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)
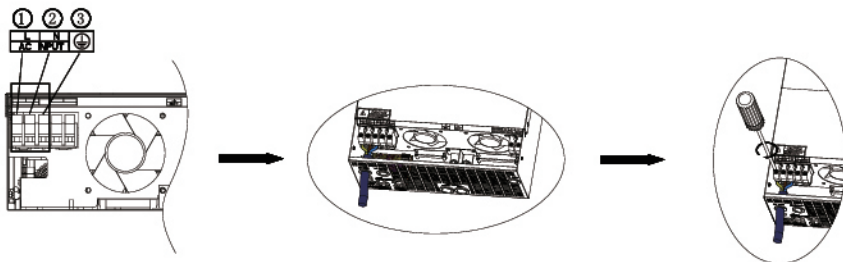
⚠ **WARNING:**
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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)
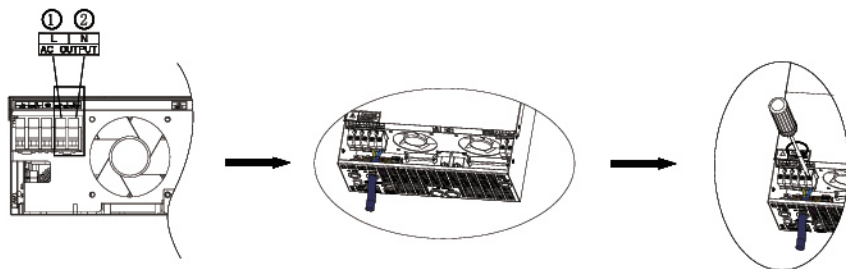
⚠ **WARNING:**
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

Note:Important ▸When the inverter is working in battery mode or standby mode, neutral of output is connected to grounding of AC output.
▸When the inverter is working in AC mode, neutral of output is disconnected to grounding of AC output and connected to neural of AC input.
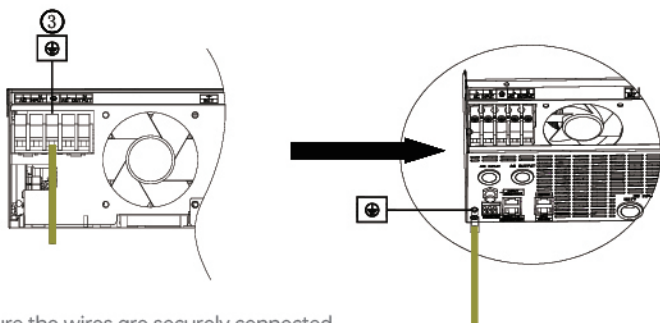
5.Make sure the wires are securely connected.

CAUTION: Important
Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely,
it may cause utility short-circuited 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.

4.6 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 personnel.

WARNING! It'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
3.5KVA	15A	12 AWG	1.4~1.6 Nm
6.5KVA	18A	12 AWG	1.4~1.6 Nm

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	3.5KVA /6.5KVA
Max. PV Array Open Circuit Voltage	500DC
PV Array MPPT Voltage Range	120VDC~450VDC

Take the 330Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

| Solar Panel Spec. (reference) - 330Wp -Vmp: 33.25Vdc - Imp: 9.925A -Voc: 40.35Vdc - Isc: 10.79A Cells: 60	SOLAR INPUT Min in serial: 6 pcs, max. in serial: 12 pcs	Q'ty of panels	Total input power	Inverter Model
	6 pcs in serial	6 pcs	1980W	3.5KVA/6.5KVA
	10 pcs in serial	10 pcs	3300W	3.5KVA/6.5KVA
	12 pcs in serial	12 pcs	3960W	3.5KVA/6.5KVA
	6 pieces in serial and 2 sets in parallel	12 pcs	3960W	3.5KVA/6.5KVA
	8 pieces in serial and 2 sets in parallel	16 pcs	5280W	6.5KVA

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

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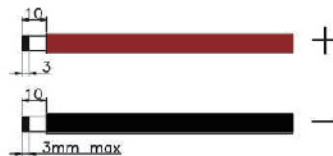

2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.
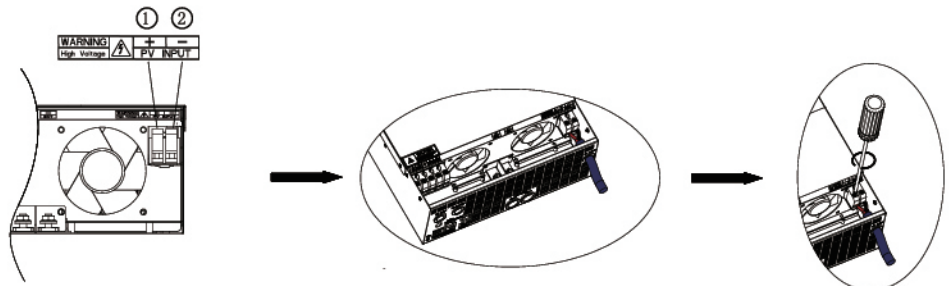
3. Make sure the wires are securely connected.

4.7 Final Assembly

After connecting all wirings,
please put bottom cover back by screwing two screws as shown below.
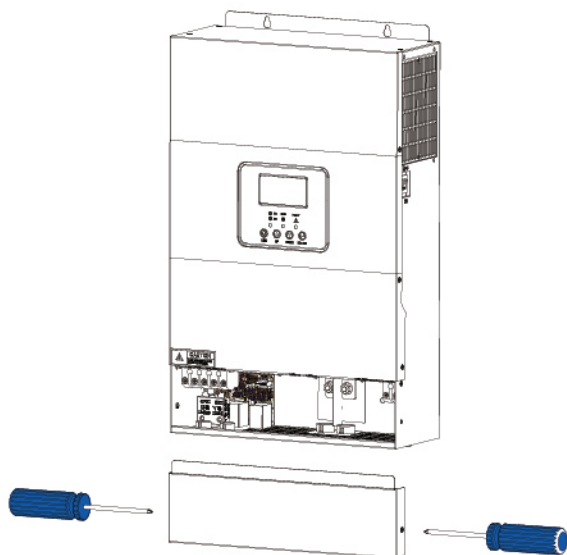
4.8 Dry Contact Signal

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 Utility.			Close	Open
	Output is powered from Battery or Solar.	Program 01 set as Utility	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU or SUB or Solar first	Battery voltage < Setting value in Program 12	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open

5. Equipment operation

5.1 Operation Power ON/OFF

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.
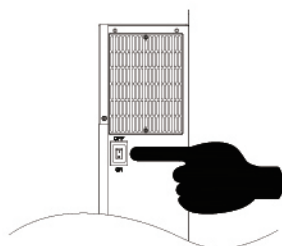
5.2 Operation and Display Panel

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.
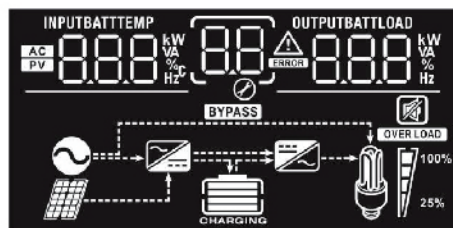
① LED screen

② Indicator light
③ Touch button
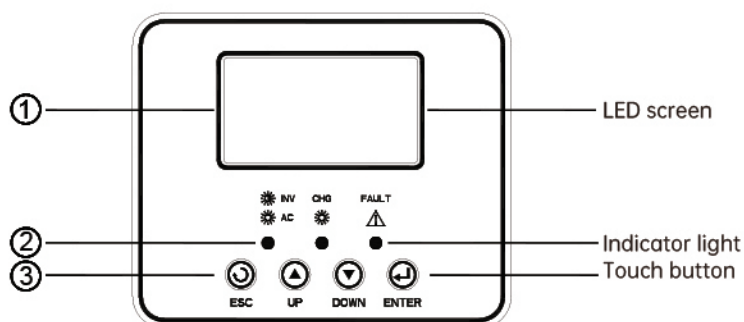
LED Indicator

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	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 888 kW VA %°F Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
88 ⊘	Indicates the setting programs.
88 ⚠ ERROR	Indicates the warning and fault codes. Warning: 88 ⚠ flashing with warning code. Fault: 88 ERROR lighting with fault code
Output Information	
OUTPUTBATTLOAD 888 kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.
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%
100% 25%				

Icon	Function description
Mode Operation Information	
∿	Indicates unit connects to the mains.
▦	Indicates unit connects to the PV panel.
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.

5.4 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 **00 ESC**	
01	Output source priority: To configure load power source priority	Utility first (default) **0.1 Uti**	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 **0.1 SOL**	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, solar energy and utility will supply power the loads at the same time. Battery provides power to the loads only when any one condition happens: -Solar energy and utility not available -Solar energy is weak and utility is not available.
		SBU priority **0.1 SbU**	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 **02 10ᴬ**	20A **02 20ᴬ**
		30A **02 30ᴬ**	40A **02 40ᴬ**
		50A **02 50ᴬ**	60A (default) **02 60ᴬ**

13

		70A `02  70 A`	**80A** `02  80 A`
		90A `02  90 A`	**100A** `02  100 A`
03	AC input voltage range	**Appliances (default)** `03 APL`	If selected, acceptable AC input voltage range will be 90-280VAC.
		UPS `03 UPS`	If selected, acceptable AC input voltage range will be 170-280VAC.
05	Battery type	**AGM (default)** `05 AGn`	**Flooded** `05 FLd`
		User-Defined `05 LIb`	`05 USE`
		If "User-Defined" 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 Ltd`	**Restart enable** `06 LtE`
07	Auto restart when over temperature occurs	**Restart disable (default)** `07 ttd`	**Restart enable** `07 ttE`
09	Output frequency	**50Hz (default)** `09  50 Hz`	**60Hz** `09  60 Hz`
10	Output voltage	**220V** `10  220 V`	**230V (default)** `10  230 V`
		240V `10  240 V`	
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 program 02 for utility charger.	**2A** `11  2A`	**10A** `11  10A`
		20A `11  20A`	**30A (default)** `11  30A`
		40A `11  40A`	**50A** `11  50A`
		60A `11  60A`	

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	**Available options in 3.5KW model:**

Available options in 3.5KW model:

22.0V	22.5V
12 BATT 22.0ᵥ	12 BATT 22.5ᵥ
23.0V (default)	**23.5V**
12 BATT 23.0ᵥ	12 BATT 23.5ᵥ
24.0V	**24.5V**
12 BATT 24.0ᵥ	12 BATT 24.5ᵥ
25.0V	**25.5V**
12 BATT 25.0ᵥ	12 BATT 25.5ᵥ

Available options in 5.5KW model:

44V	45V
12 BATT 44ᵥ	12 BATT 45ᵥ
46V (default)	**47V**
12 BATT 46ᵥ	12 BATT 47ᵥ
48V	**49V**
12 BATT 48ᵥ	12 BATT 49ᵥ
50V	**51V**
12 BATT 50ᵥ	12 BATT 51ᵥ

13 — Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	**Available options in 3.5KW model:**

Available options in 3.5KW model:

Battery fully charged	24V
13 BATT FUL	13 BATT 24.0ᵥ
24.5V	**25V**
13 BATT 24.5ᵥ	13 BATT 25.0ᵥ
25.5V	**26V**
13 BATT 25.5ᵥ	13 BATT 26.0ᵥ
26.5V	**27V (default)**
13 BATT 26.5ᵥ	13 BATT 27.0ᵥ
27.5V	**28V**
13 BATT 27.5ᵥ	13 BATT 28.0ᵥ

		28.5V `13 285 v BATT`	29V `13 29.0 v BATT`
		Available options in 5.5KW model:	
		Battery fully charged `13 FUL BATT`	48V `13 48.0 v BATT`
		49V `13 49.0 v BATT`	50V `13 50.0 v BATT`
		51V `13 51.0 v BATT`	52V `13 52.0 v BATT`
		53V `13 53.0 v BATT`	54V (default) `13 54.0 v BATT`
		55V `13 55.0 v BATT`	56V `13 56.0 v BATT`
		57V `13 57.0 v BATT`	58V `13 58.0 v BATT`
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Faul mode,charger source can be programmed as below:	
		Utility first `16 CUt`	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.
		Solar first `16 CSO`	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 OSO`	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery 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 bON`	Alarm off `18 bOF`

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 ispressed for 1 minute.
		Stay at latest screen 19 HEP	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 (default) 25 FEN	Record disable 25 FdS
26	Bulk charging voltage (C.V voltage)	3.5KW default setting: 28.2V CV 26 28.2v BATT 5.5KW default setting: 56.4V CV 26 56.4v BATT If self-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V for 3.5KW model and 48.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V.	
27	Floating charging voltage	3.5KW default setting: 27.0V FLV 27 27.0v BATT 5.5KW default setting: 54.0V FLV 27 54.0v BATT If self-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V for 3.5KW model and 48.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V. If "USE" is selected in program 05, this program can be set up	
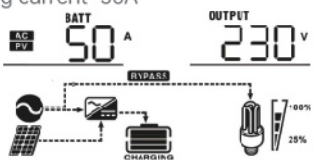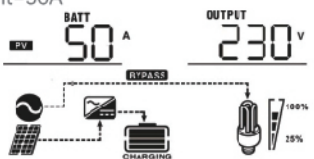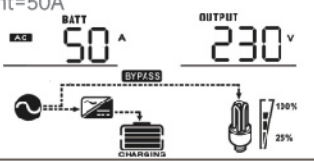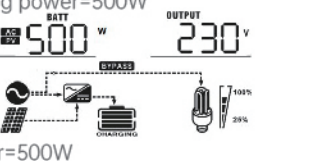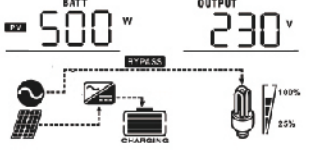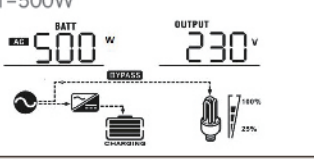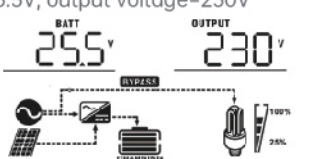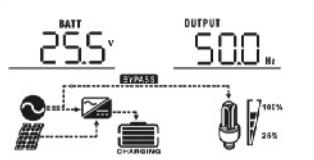
28	AC output mode	Single: This inverter is used in single phase application. **28 SI G**	Parallel: This inverter is operated in parallel system. (Need hardware support) **28 PAL**
		L1 phase **28 3P1**	The inverter is operated in L1 phase in 3-phase application.
		L2 phase **28 3P2**	The inverter is operated in L2 phase in 3-phase application.
		L3 phase **28 3P3**	The inverter is operated in L3 phase.in 3-phase application.
29	Low DC cut-off voltage	3.5KW default setting: 21.0V **COU 29 21.0v BATT**	
		5.5KW default setting: 42.0V **COU 29 42.0v BATT**	
		If self-defined or lithium battery is selected in program 5, this program can be set up. Setting range is from 21.0V to 24.0V for 3.5KW model and 42.0V to 48.0V for 5.5KW 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.	
30	Battery equalization	Battery equalization **30 EEN**	Battery equalization disable (default) **30 EdS**
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
31	Battery equalization voltage	3.5KW default setting: 29.2V **EU 31 29.2v BATT**	
		5.5KW default setting: 58.4V **EU 31 58.4v BATT**	
		Setting range is from 25.0V to 31.5V for 3.5KW model and 48.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V.	
33	Battery equalized time	60 mins (default) **33 60**	Setting range is from 5 mins to 900 mins. Increment of each click is 5 mins.
34	Battery equalized timeout	120 mins (default) **34 120**	Setting range is from 5 mins to 900 mins. Increment of each click is 5 mins.
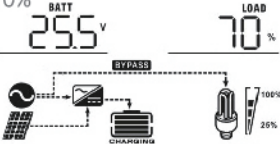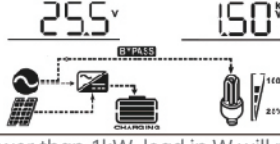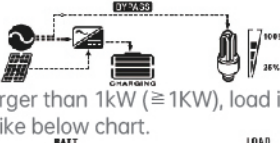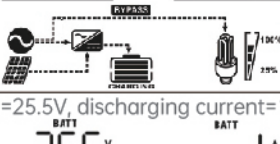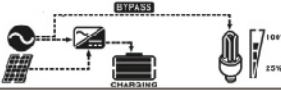
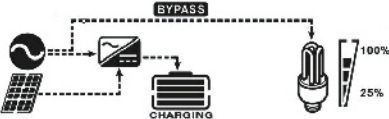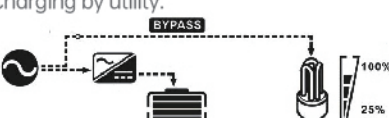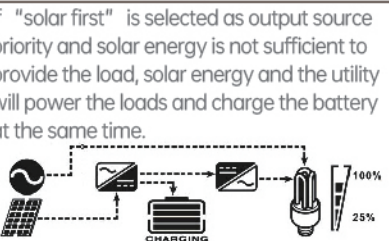| 35	Equalization interval	30 days (default) 35 30d	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 36 AEN	Disable (default) 36 AdS
		If equalization function is enabled in program 30, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows"E9" If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "E9" will not be shown in LCD main page.	
37	Communication protocol	37 PLY 37 HI t 37 Jdb	
		If Lithium battery is selected in program 5, the corrected protocol should be selected to establish the communication between the inverter and the BMS (battery management system). Default setting "PLY" is Pylon protocol,including RS485 and Can.	
38	Bms alarm enable	Bms alarm diable(default) 38 bAd	Bms alarm enable 38 bAE
39	Discharge cut off Soc	6%(default) 39 6	When Lithum battery is selected in Program 5, end of discharge Soc should be setted.Setting range is 1%-99%,and should not more than charge stop Soc.
40	Charge stop Soc	97%(default) 40 97	When Lithum battery is selected in Program 5, full charge Soc should be setted.Setting range is 30%-100%,and should not less than end of discharge Soc.
41	Restart Soc	Disable（default) 41 20	When Lithum battery is selected in Program 5, inverter will shut down when battery fully discharged, and inverter will recovery output until battery Soc is above the restart Soc if only PV source recovery. And if Utility is available, inverter will output immediately. Setting range is from 10%-99%, not less than the end of discharge Soc, and not more than the charge stop Soc.
42	Grid-parallel operation	42 FGN	42 FGS

5.5 Display Setting
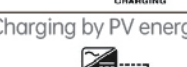
The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.
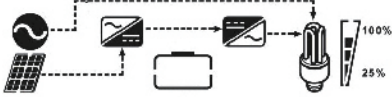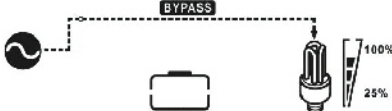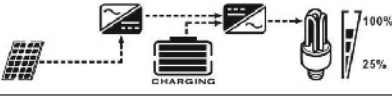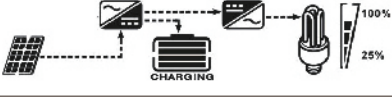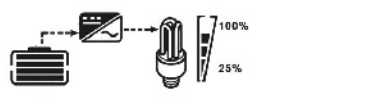
Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V
Input frequency	Input frequency=50Hz
PV voltage	PV voltage=260V
PV current	PV current = 2.5A
PV power	PV power = 500W

Charging current	AC and PV charging current=50A 50 A BATT 230 V OUTPUT PV charging current=50A 50 A BATT 230 V OUTPUT AC charging current=50A 50 A BATT 230 V OUTPUT
Charging power	AC and PV charging power=500W 500 W BATT 230 V OUTPUT PV charging power=500W 500 W BATT 230 V OUTPUT AC charging power=500W 500 W BATT 230 V OUTPUT
Battery voltage and output voltage	Battery voltage=25.5V, output voltage=230V 25.5 V BATT 230 V OUTPUT
Output frequency	Output frequency=50Hz 25.5 V BATT 50.0 Hz OUTPUT

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 (≥1KVA), 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 (≧1KW), load in W will present x.xkW like below chart.
0Battery voltage/DC discharging current	Battery voltage=25.5V, discharging current=1A
Lithium battery Soc	Battery voltage is 53.0v, battery soc is 56%
Main CPU version checking	Main CPU version 00014.04

5.6 Operating Mode Description

Operation mode	Description	LCD display
Standby mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	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.
Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	PV energy and utility 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 in line mode.	Charging by utility and PV energy. Charging by utility. If "solar first" is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will power the loads and charge the battery at the same time.

Line Mode	The unit will provide output power from the mains. It will also charge the battery in line mode.	If "solar first" is selected as output source priority and battery is not connected, solar energy and the utility will power the loads. Power from utility.
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV energy. PV energy will supply power to the loads and charge battery at the same time. Power from battery only.
Battery Mode	The unit will provide output power from battery and PV power.	Power from PV energy only.

5.7 Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	01
02	Over temperature or NTC is not connected well.	02
03	Battery voltage is too high	03
04	Battery voltage is too low	04
05	Output short circuit or over temperature is detected by internal converter components.	05
06	Output voltage is too high.	06
07	Overload time out	07
08	Bus voltage is too high	08

09	Bus soft start failed	09
51	Over current or surge	51
52	Bus voltage is too low	52
53	Inverter soft start fails	53
55	Over DC voltage in AC output	55
57	Current sensor fails	57
58	Output voltage is too low	58
59	PV voltage is over limitation	59
71	Firmware version inconsistent	71
72	Current sharing fault	72
73	Output voltage different	73
80	CAN fault	80
81	Host lost	81
82	Synchronization lost	82
83	Battery voltage detected different	83
84	AC input voltage and frequency detected different	84
86	AC output mode setting different	85

5.8 Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashin
01	Fan is locked when inverter is on.	Beeps three times every second	01
02	Over temperature	None	02
03	Battery is over-charged	Beeps once every second	03
04	Low battery	Beeps once every second	04
07	Overload	Beeps once every 0.5 second	07 OVER LOAD
10	Output power derating	Beeps twice every 3 seconds	10
13	Bms alarm or comm lost	Beeps twice every seconds	13
15	PV energy is low.	Beeps twice every 3 seconds	15
16	High AC input (>280VAC) during BUS soft start	None	16
E9	Battery equalization	None	6P
6P	Battery is not connected	None	E9

25

6. Clearance and maintenance for anti-dust kit

6.1 Overview

Every inverter is already installed with anti-dusk kit in 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

Step 1: Please loosen the screw in counterclockwise direction on the top of the inverter.
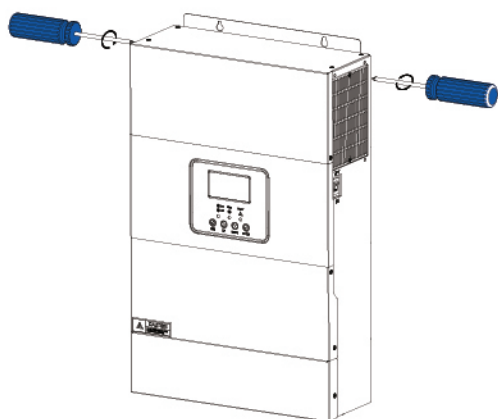
Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.
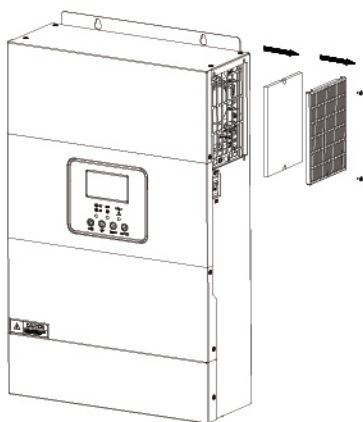
Step 3: Clean air filter foam and dustproof case. After clearance,
re-assemble the dust-kit back to the inverter.

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

7. 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.

7.1 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.

7.2 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.
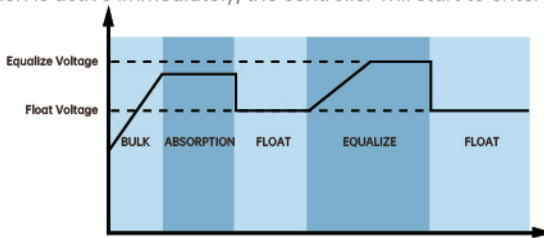
7.3 Equalize charging time and timeout

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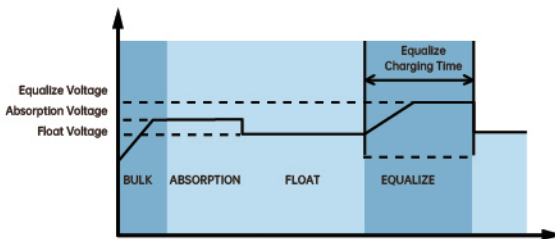
However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't
rise to battery equalization voltage point, the charge controller will extend the battery equalized
time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than
battery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

8. Setting for lithium battery
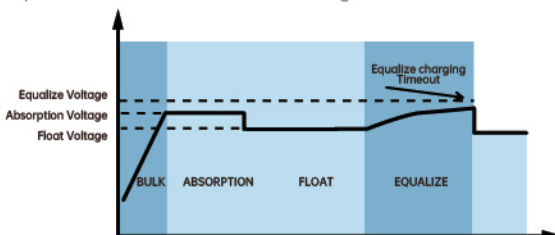
8.1 Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RJ45 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:
1).Assemble battery terminal based on recommended battery cable and terminal size (same as Lead acid, see section Lead-acid Battery connection for details).
2).Connect the end of RJ45 port of battery to BMS(RS485) communication port of inverter.
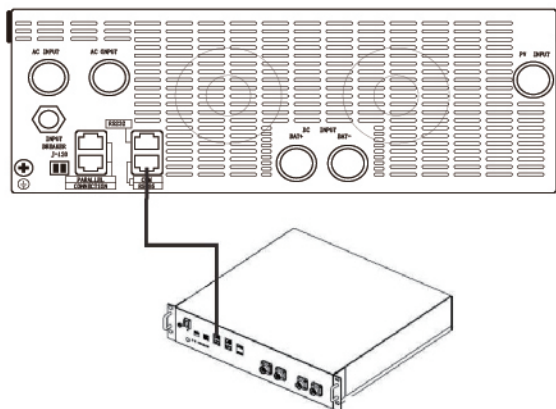

● If choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:
Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.

● Have the inverter start or stop charging according to the status of lithium battery.

8.2 Battery communication cable port definition

Connect the end of RS485 of battery to RS485 communication port of inverter

Make sure the lithium battery port connects to the inverter is Pin to Pin, the communication cable is insideof package and the inverter port pin assignment shown as below:

Pin number	Port function
PIN1、PIN8	RS485-B
PIN2、PIN7	RS485-A
PIN3	GND
PIN4	CAN-H
PIN5	CAN-L
PIN6	GND
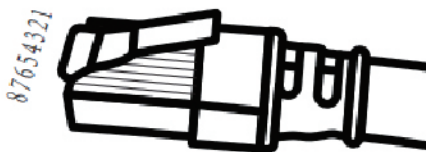
9. Specifications

9.1 Table 1 Line Mode Specifications

INVERTER MODEL	3.5KVA	6.5KVA
Rated Output Power	3.5KVA/3.5KW	6.5KVA/5.5KW
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	Line mode: Circuit Breaker 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 95V or 170V depending on models, the output power will be derated	

9.2 Table 2 Inverter Mode Specifications

INVERTER MODEL	3.5KVA	6.5KVA
Rated Output Power	3.5KVA/3.5KW	6.5KVA/5.5KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	50Hz or 60Hz	
Peak Efficiency	>93.5%	
Overload Protection	5s@≥140% load; 10s@100%~140% load	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	24.0Vdc	48.0Vdc
Cold Start Voltage	23.0Vdc	46.0Vdc
Low DC Warning Voltage		
@ load < 20%	22.0Vdc	44.0Vdc
@ 20% < load < 50%	21.4Vdc	42.8Vdc
@ load > 50%	20.2Vdc	40.4Vdc
Low DC Warning Return Voltage		
@ load < 20%	23.0Vdc	46.0Vdc
@ 20% < load < 50%	22.4Vdc	44.8Vdc
@ load > 50%	21.2Vdc	42.4 Vdc
Low DC Cut-off Voltage		
@ load < 20%	21.0Vdc	42.0Vdc
@ 20% < load < 50%	20.4Vdc	40.8Vdc
@ load > 50%	19.2Vdc	38.4Vdc

9.3 Table 3 Charge Mode Specifications

INVERTER MODEL		3.5KVA	6.5KVA
Max Charging Current (PV+AC)		100Amp (@VI/P=230Vac)	
AC Charging Current (Max)		60Amp (@VI/P=230Vac)	
Bulk Charging Voltage	Flooded Battery	29.2 Vdc	58.4Vdc
	AGM / Gel Battery	28.2Vdc	56.4Vdc
Floating Charging Voltage		27.0Vdc	54.0Vdc
Overcharge Protection		33.0Vdc	63.0Vdc
Charging Algorithm		3-Step	
Charging Curve			
Solar Input			

INVERTER MODEL	3.5KVA	6.5KVA
Max. PV Array Power	5000W	6000W
Nominal PV Voltage	240Vdc	
Start-up Voltage	160Vdc +/- 10Vdc	
PV Array MPPT Voltage Range	120~450Vdc	
Max. PV Array Open Circuit Voltage	500Vdc	
Max. Input Current	15	18
Max Charging Current (AC charger plus solar charger)	100Amp	

9.4 Table 4 General Specifications

INVERTER MODEL	3.5KVA	6.5KVA
Safety Certification	CE	
Operating Temperature Range	-10°C to 55°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension(D*W*H), mm	448x295x105(122)	
Net Weight, kg	8.2(8.5)	9.9(10.2)

10. TROUBLE SHOOTING

Problem	Display/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process	Buzzer will be active for 3 seconds and then complete off	The battery voltage is too low	1.Re-charge battery 2.Replace battery
No resafter power on	No indication	1.The battery voltage is far too low 2.Battery polarity is connected reversed	1.Check if batteries and the wiring are connected well 2.Re-charge battery 3.Replace battery
When the unit is turned on,internal relay is switched on and off repeatedly	Battery icon turns red	Battery is disconnected	Check if battery wires are connected well
Buzzer beeps continuously and fault/warning icon turns red and flashes.	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
	Fault code 02	Internal temperature of inverter component is over 100°C	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high
	Fault code 03	The battery voltage is too high	Check if spec and quantity of batteries are meet requirements
	Fault code 01	Fan fault	Check whether the fan is lock, or replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	Reduce the connected load.
	Fault code 08	Bus voltage is too high	Restart the device, if the fault repeat frequently, please contact after service.
	Fault code 09/53/57	Internal components failed.	Please contact after service or return to repair center.
	Fault code 51	Over current or surge.	Restart the devise, if fault repeat frequently, please contact the after service.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Inverter voltage Dc component is over	
	Fault code 80	Communication abnormal	Please check the connection of parallel comm cable, and then restart the device, if the fault happens again, please contact after service.

12. Technical Parameters

GGH-3.5kw　　GGH- 6.5kw

Model	GGH-3.5kw	GGH-6.5kw
Rated Power	3500VA/3500W	6500VA/5500W
INPUT(AC)		
Voltage	230V AC	
Optional Voltage Range	170-280V AC(For Personal Computers);90-280V AC(For Home Appliances)	
Frequeney Range	50Hz/60Hz(Auto Sensing)	
OUTPUT(AC)		
AC stabilized voltage	230V AC±5%	
Surge Power	7000VA	12000VA
Peak efficiency	93.5%	
Switching time	10ms(ForPersonal Computers);20ms(For Home Appliances)	
Wave form	Pure Sine Wave	
BATTERY		
Battery type	Lead acid + Lithium battery	
Battery voltage range	21-30V	42-60V
Charging curve	Three-Stage	
Lithium battery charging strategy	Adaptive to lithium battery	
Solar Charge & AC Charge		
Maximum photovoltaic power	3500W	5500W
Maximum PV open circuit voltage	500V DC	
MPPT Range & Working Voltage	120~450V DC	
Maximum Solar Charging Current	100A	
Maximum AC charging current	60A	
Solar Charger Type	MPPT	
General DaTa		
Product size(mm)	302*490*110	
Package size(mm)	346*536*178	
Net Weight(kgs)	8.44	9.7
Communication Interface	RS232/RS485CAN /Drycontact	
Relative Humidity	5% to 95%	
Operating Temperature	-10°C to 50°C	
Storage Temperature	-15°C to 60°C	

Note:Product specifications are subject to change without further notice.　33