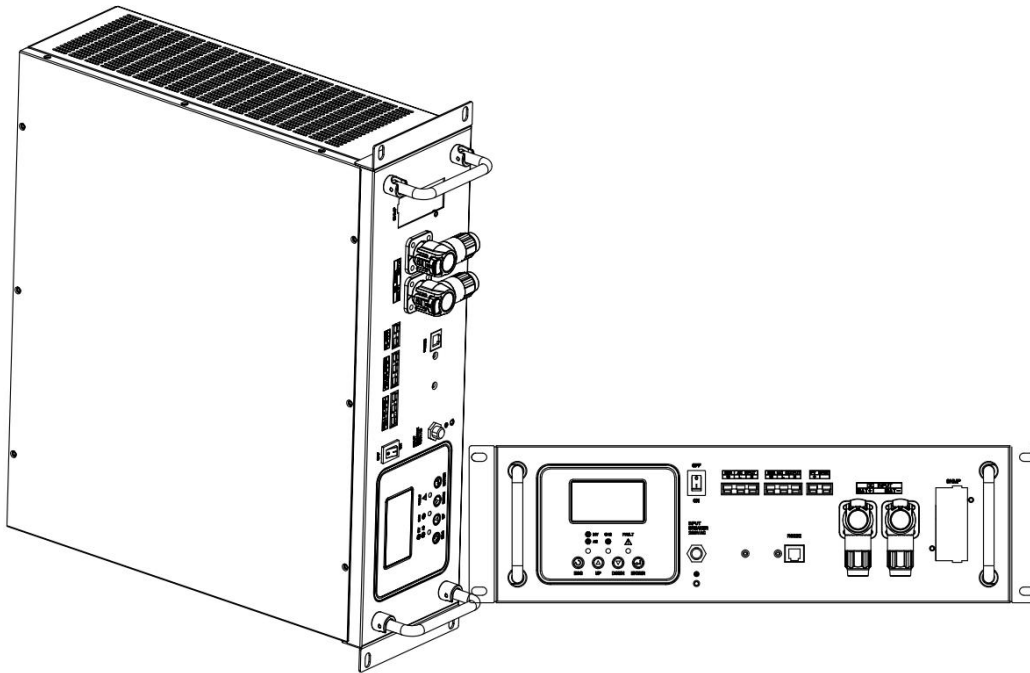


User Manual

Rack-mounted Inverter Control Machine



CNR110 5500-48 5.5KW 48VDC

CNR110 3500-24 3.5KW 24VDC

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1、 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.

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 this unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual.
2. 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 or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning.
5. CAUTION: Only qualified personnel can install this device with battery.
6. Never charge a frozen battery.
7. For optimum operation of the product, please follow required spec to select appropriate cable size.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect mains and batteries.
10. The fuse is provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS: The product should be connected to a permanent grounded wiring system.
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 trouble shooting table, please send this product back to local dealer or service center for

maintenance.

Warning!: Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO GROUNDING.

14. Caution: It's requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

3、 INTRODUCTION

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

3.1 Features

- ⌘ Pure sine wave inverter.
- ⌘ Configurable mains input voltage range for home appliances and personal computers via load requirements.
- ⌘ Configurable battery charging current based on load requirements.
- ⌘ Configurable Mains/Solar Charger priority via LCD setting.
- ⌘ Compatible to mains input and generator input.
- ⌘ Auto restart while mains is recovering.
- ⌘ Overload/Over temperature/ short circuit protection.
- ⌘ Smart battery charger design for optimized battery performance.
- ⌘ Cold start function.
- ⌘ Remote monitor function via SNMP Card(optional).

3.2 Basic System Architecture

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

- ⌘ Generator or Mains.
- ⌘ PV modules.

Consult with your system integrator for other possible system architectures depending on your requirements.

This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

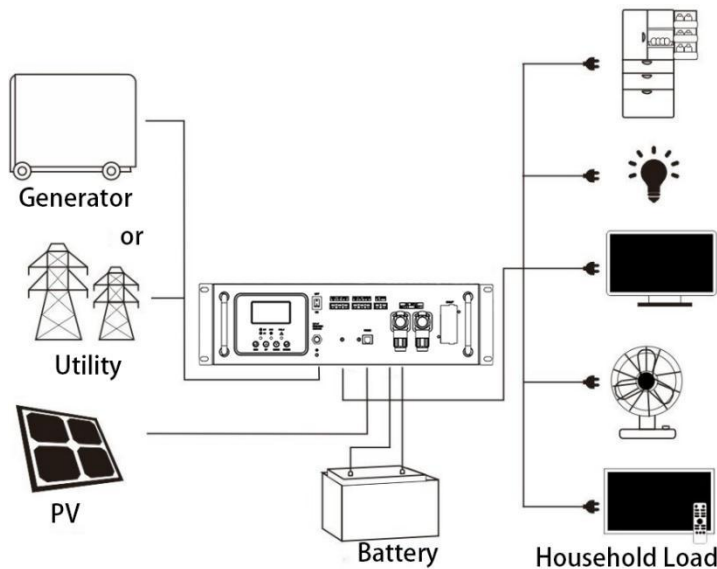
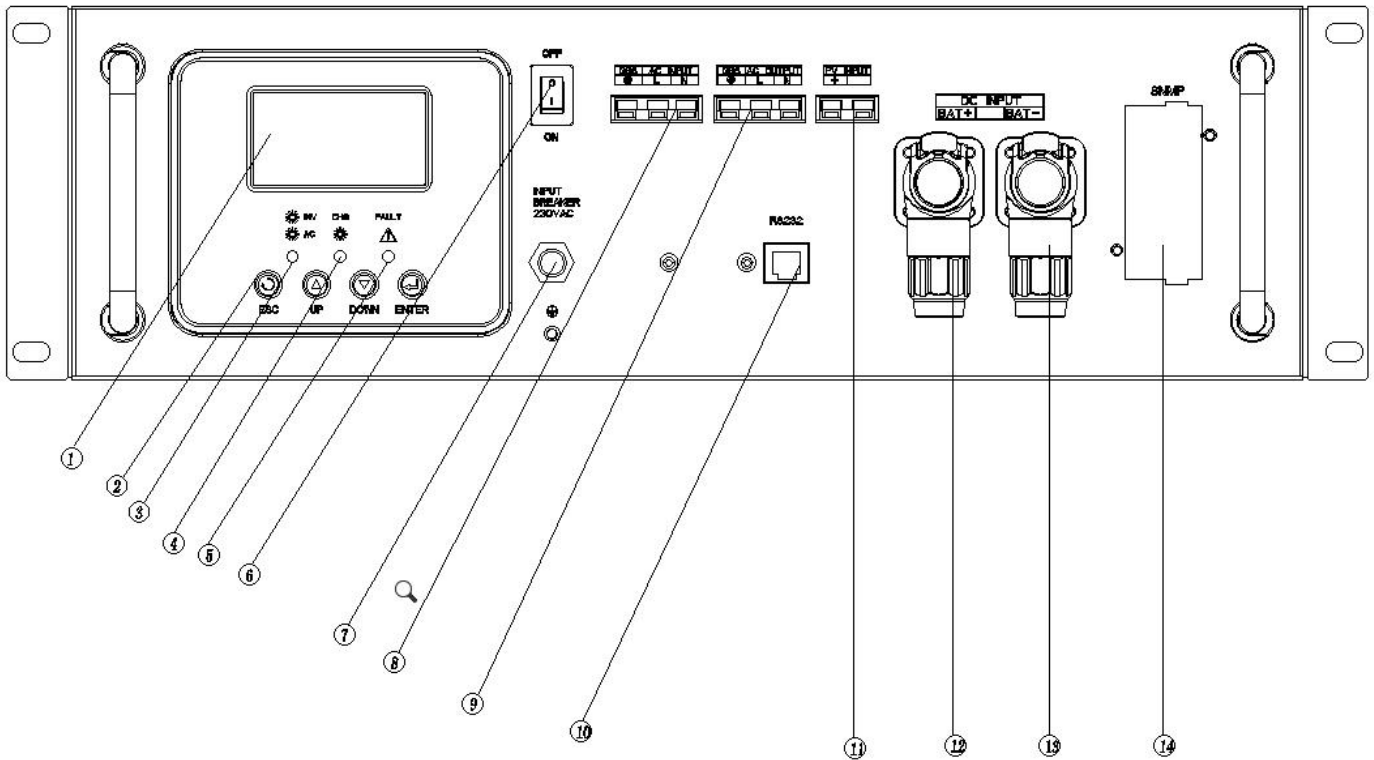


Figure 1 Hybrid Power System

3.3 Product Overview



1. LCD display
2. Function Keys
3. Status indicator
4. Charging indicator
5. Fault indicator
6. Power ON/OFF switch
7. Breaker
8. Mains input
9. Mains output
10. RS-232 communication port
11. PV input
12. Battery Positive Industrial Connector
13. Battery Negative Industrial Connector
14. SNMP smart card slot

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
- Anderson sockets and terminals
- Industry connects x2

4.2 Preparation



Before installing the wiring, please crimp the distribution wire of the Anderson socket as shown in the figure.

4.3 Mounting the Unit

Read this manual carefully and familiarize yourself with the installation procedures before installing.

- Be very careful when installing the battery, and wear protective goggles when installing lead-acid liquid battery. Once in contact with the battery acid, rinse the contact part with water in time.
- Avoid placing metal objects near the battery to prevent a short circuit.
- Acidic gases may be generated when the battery is charged, so make sure the environment is well ventilated.
- When installing the cabinet, be sure to leave enough space around the machine for heat dissipation; do not install the machine and lead-acid liquid battery in the same cabinet, so as

- to avoid the acid gas generated when the battery works that may corrode the machine.
- Only charge the battery that meets the requirements of this all-in-one machine.
- The false connection points and corroded wires may generate great heat that may melt the wire insulation, burn the surrounding material, or even cause fire, so make sure that the connectors are tightened, and the wires should be fixed with ties to avoid shaking when moving the machine, causing the connectors to be loose.
- The system connection wires should be selected according to the current density of not more than 5A/mm².
- When installing outdoors, avoid direct sunlight and rainwater infiltration.
- When the power is turned off, there is still a high voltage inside the machine, so do not open or touch the internal components and wait for the capacitor runs out of power.
- Do not install the all-in-one machine in harsh environments such as wet, greasy, flammable, explosive or dusty.
- Do not reverse the polarity of the battery input end of this product, otherwise the equipment may easily damaged or unpredictable danger may occur.
- The mains input and AC output are high voltage, so do not touch the wire connections.
- When the fan is working, do not touch to prevent injury.

It is necessary to confirm that it is the only input device for loads as needed and it is prohibited to use it in parallel with other input AC power to avoid damage.

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 appliances, however, it's still requested to have over-current protection installed. Please refer to normal current(A) in below table as required fuse or switch size.

Warning: All wiring must be performed by a qualified personnel.

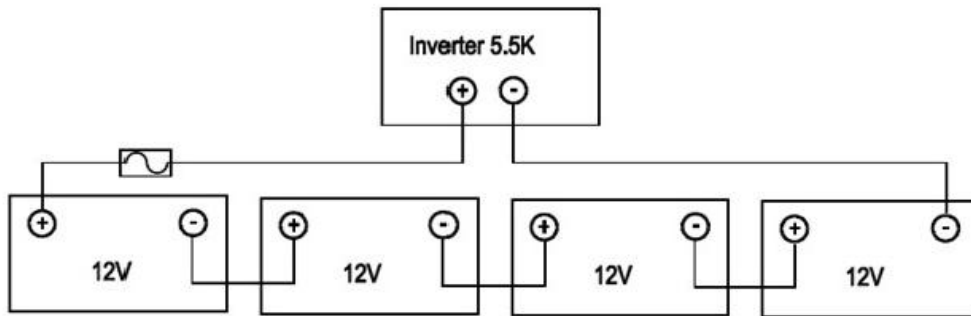
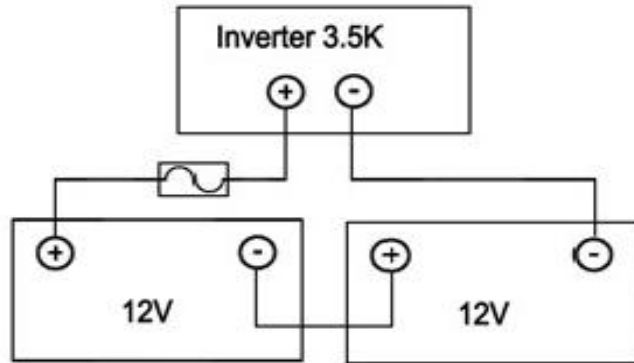
Warning: It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

Recommended battery cable size:

Model	Wire Size	Cable(mm ²)	Torque Value (max)
3.5KW/5.5KW	1 x 2AWG	35	2 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.
3. Connect all battery packs as below chart.



Insert the battery wires smoothly into the industrial connectors of the battery terminals. Use a hydraulic tool to compress the terminal, screw on the cover, hold down the switch on the top of the connector, and insert the corresponding industrial connector into the corresponding terminal.



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



Warning: Shock Hazard. Installation must be performed with care due to high battery voltage in series.

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 32A for 3.5KW and 50A for 5.5KW.

Caution! There are two terminal blocks with “IN” and “OUT” markings. Please do NOT mis-connect input and output connectors.

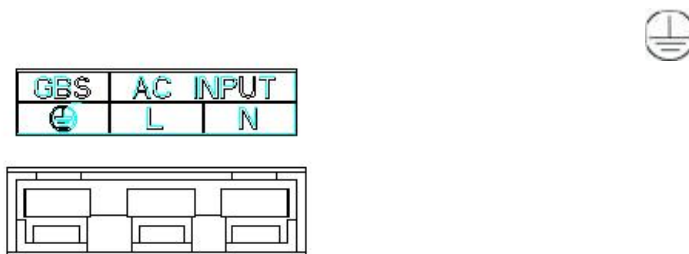
Warning! All wiring must be performed by a qualified personnel.

Warning! To reduce risk of injury, please use the proper recommended cable size as below:

Model	Gauge	Cable (MM2)	Torque Value
3.5KW	12 AWG	4	1.2 Nm
5.5KW	10 AWG	6	1.2 Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnecter first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert the pre-made 3p Anderson socket input city wire pair into the terminal shown in the figure below. Caution: The L . N PE wires of the mains input correspond to the terminals shown in the figure below, and the L N wires are not allowed to be inserted in reverse.



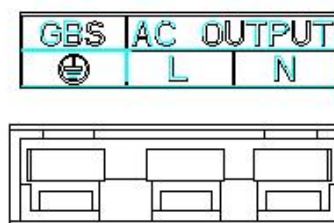
Warning: Be sure that mains is disconnected before attempting to hardwire it to the unit.



4. Then, connect the mains output wire according to the polarity marking of the terminal, and insert the pair of 3P Anderson socket output power wires made in advance into the terminals shown in the figure below.

→ E → Ground (yellow or green)

L → Line (red or brown)

N → Neutral (blue)



	Caution: Make sure the wires are securely connected. If the live wire and neutral wire are connected incorrectly, when the inverter in the parallel state, it will cause a short circuit.
	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 separate switch between inverter and PV modules. Otherwise, it will cause a short circuit when the inverter in the parallel state.

Caution: All wiring must be performed by a qualified personnel.

Caution: To reduce risk of injury, please use the proper recommended cable size as below:

Model	Gauge	Cable (MM ²)	Torque value
3.5KW/5.5KW	1 x 12AWG	4	1.2 Nm

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.

Model	3.5KW	5.5KW
Max. PV Open Circuit Voltage	500Vdc	
MPPT Voltage Range	120Vdc~450Vdc	

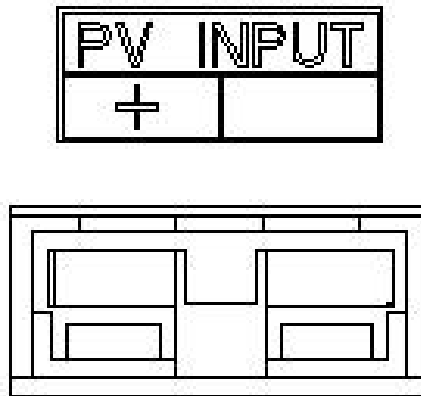
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec.	SOLAR INPUT	Quantity of solar panels	Input Power
- 250Wp	(Min in serial: 6 pcs, max. In serial: 13 pcs)		
- Vmp: 30.1Vdc	6 pcs in serial	6	1500W

- Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A - Cells: 60	8 pcs in serial	8	2000w
	12 pcs in serial	12	3000w
	13 pcs in serial	13	3250w
	8 pieces in serial and 2 sets in parallel	16	4000w

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.
3. Check correct polarity of wire connection from PV modules and PV input connectors. Then, insert the pre-made 2p Anderson socket PV input power cable pair into the terminals shown in the figure below.



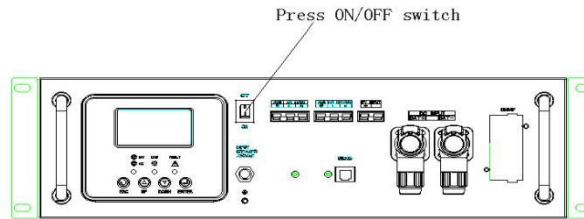
4.7 Communication Connection

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.

5、 OPERATION

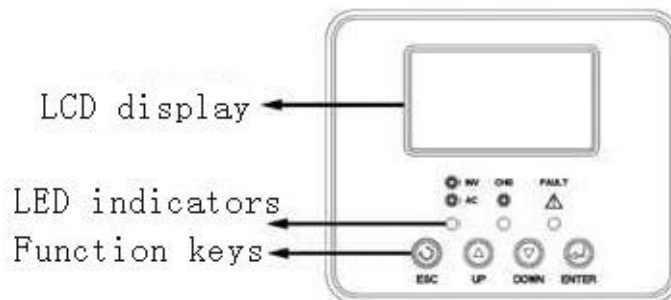
5.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press ON/OFF switch 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.



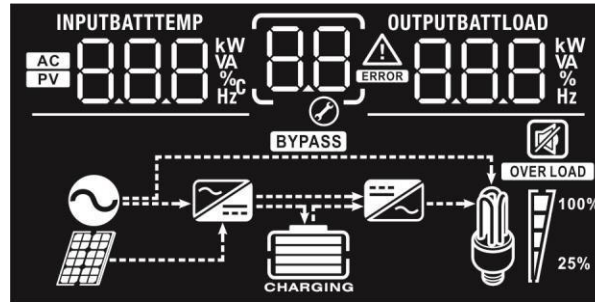
LED indicator

LED Indicator		Messages	
	Green	Solid On	Output is powered by mains in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
	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










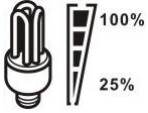










5.3 LCD Display Icons



Icon	Function description												
Input Source Information													
	Indicates the AC input												
	Indicates the PV input												
	Indicate input voltage, input frequency, PV voltage, charger current (if PV in charging for 3.5K models), charger power, battery voltage.												
Configuration Program and Fault Information													
	Indicate input voltage, input frequency, PV voltage, charger current(if PV in charging for 3.5K models), charger power, battery voltage, fault details.												
	Indicates the warning and fault codes. Warning : flashing with warning code. Warning : flashing with warning code.												
Output Information													
	Indicate output voltage, output frequency, load percent, load voltage and discharging current.												
Battery Information													
	Indicates battery level by 0-24%, 25-49%, 50-74% , 75-100% in battery mode and charging status in line mode.												
In AC mode, it will present battery charging status.													
	<table border="1"> <thead> <tr> <th>Status</th> <th>Battery voltage</th> <th>LCD Display</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Constant Current mode/Constant Voltage mode</td> <td><2V/cell</td> <td>4 bars will flash in turns.</td> </tr> <tr> <td>2 ~ 2.083V/节</td> <td>Bottom bar will be on and the other three bars will flash in turns.</td> </tr> <tr> <td>2.083 ~ 2.167V/节</td> <td>Bottom two</td> </tr> <tr> <td>> 2.167 V/节</td> <td>Bottom three bars will be on and the bottom bar will flash.</td> </tr> </tbody> </table>	Status	Battery voltage	LCD Display	Constant Current mode/Constant Voltage mode	<2V/cell	4 bars will flash in turns.	2 ~ 2.083V/节	Bottom bar will be on and the other three bars will flash in turns.	2.083 ~ 2.167V/节	Bottom two	> 2.167 V/节	Bottom three bars will be on and the bottom bar will flash.
Status	Battery voltage	LCD Display											
Constant Current mode/Constant Voltage mode	<2V/cell	4 bars will flash in turns.											
	2 ~ 2.083V/节	Bottom bar will be on and the other three bars will flash in turns.											
	2.083 ~ 2.167V/节	Bottom two											
	> 2.167 V/节	Bottom three bars will be on and the bottom bar will flash.											

Floating mode. 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%	< 1.85V/cell			
	1.85V/cell ~ 1.933V/cell			
	1.933V/cell ~ 2.017V/cell			
	> 2.017V/cell			
Load < 50%	< 1.892V/cell			
	1.892V/cell ~ 1.975V/cell			
	1.975V/cell ~ 2.058V/cell			
	> 2.058V/cell			
Load Information				
	Indicates overload.			
	Indicates the load level by: 0~24% , 25~50% , 50%~75%,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







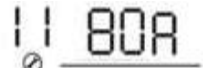

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. And then, press “ENTER” button to confirm the selection or ESC button to exit.

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape 00 ESC	
01	Output source priority: To configure load power source priority	Utility first (default) 01 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 priority 01 SOL	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 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 low energy and utility no
		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-




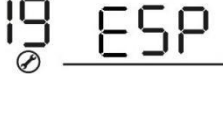
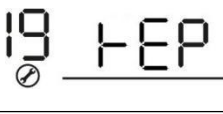
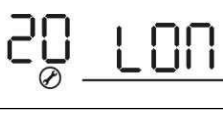



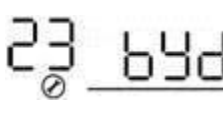



			level warning voltage or the setting point in program 12.
02	<p>Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)</p>	<p>10A </p>	<p>20A </p>
		<p>30A </p>	<p>40A </p>
		<p>50A </p>	<p>60A </p>







		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 within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-defined 05 USE	If "User-defined" is selected, battery charge voltage and low DC cut-off charge can be set up in program 26,27 and 29.
06	Auto restart when overload occurs	Restart disable (default) 06 Lfd	Restart enable 06 LfE
07	Auto restart when over temperature occurs	Restart disable (default) 07 tfd	Restart enable 07 tFE
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	<p>Maximum utility charging current</p> <p>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.</p>	<p>2A</p> 	<p>10A</p> 
		<p>20A</p> 	<p>30A (default)</p> 
		<p>40A</p> 	<p>50A</p> 
		<p>60A</p>	<p>80A</p> 
	<p>Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.</p>	<p>Available options in 3.5KW model:</p>	
		<p>22.0V</p> 	<p>22.5V</p>

12		23.0V (default)	23.5V
		24.0V	24.5V
		25.0V	25.5V
		Available options in 5.5KW model:	
		44V	45V
		46V (default)	47V
48V	49V		
50V	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:	
		Battery fully charged	24V
		24.5V	25V
		25.5V	26V
26.5V	27V (default)		

		27.5V 13 ^{BATT} 27.5 v ⊗	28V 13 ^{BATT} 28.0 v ⊗
		28.5V 13 ^{BATT} 28.5 v ⊗	29V 13 ^{BATT} 29.0 v ⊗
		Available options in 5.5KW model:	
		Battery fully charged 13 ^{BATT} FUL ⊗	48V 13 ^{BATT} 48.0 v ⊗
		49V 13 ^{BATT} 49.0 v ⊗	50V 13 ^{BATT} 50.0 v ⊗
		51V 13 ^{BATT} 51.0 v ⊗	52V 13 ^{BATT} 52.0 v ⊗
		53V 13 ^{BATT} 53.0 v ⊗	54V (default) 13 ^{BATT} 54.0 v ⊗
		55V 13 ^{BATT} 55.0 v ⊗	56V 13 ^{BATT} 56.0 v ⊗
		57V 13 ^{BATT} 57.0 v ⊗	58V 13 ^{BATT} 58.0 v ⊗
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:	
		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 	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) 	Alarm off 
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable (default) 	Record disable 

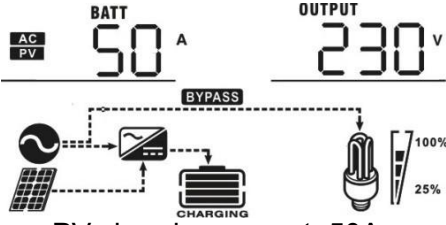
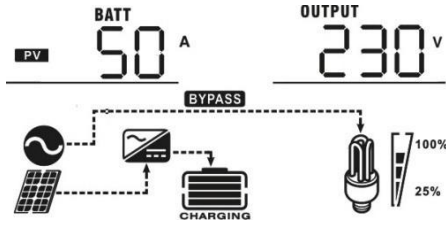
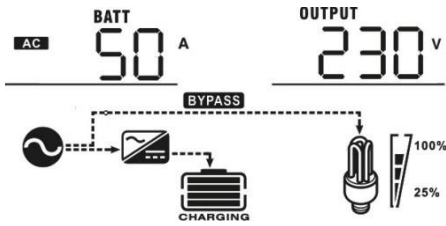
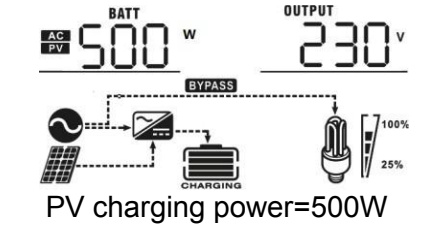
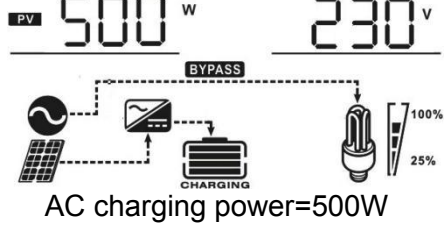
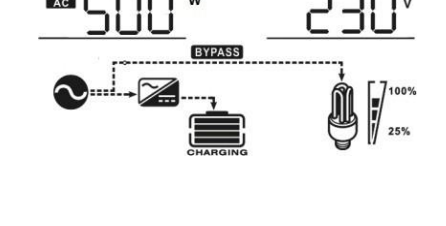
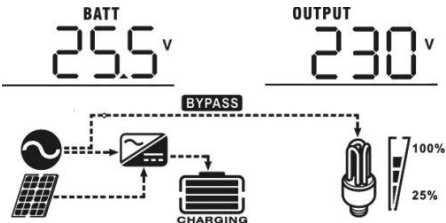
26	Bulk charging voltage (C.V voltage)	3.5KW default setting: 28.2V 
		5.5KW default setting: 56.4V 
		If self-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V for 3.5KW model and 41.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V.
27	Floating charging voltage	3.5KW default setting: 27.0V 
		5.5KW default setting: 54.0V 
		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 41.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V.
29	Low DC cut-off voltage	3.5KW default setting: 21.0V 
		5.5KW default setting: 42.0V 
		If self-defined 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.

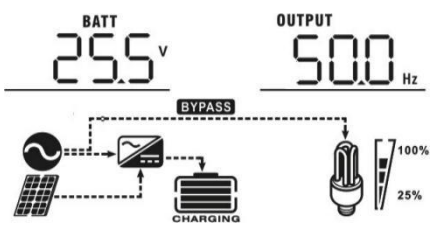
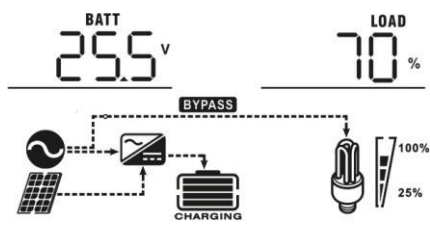
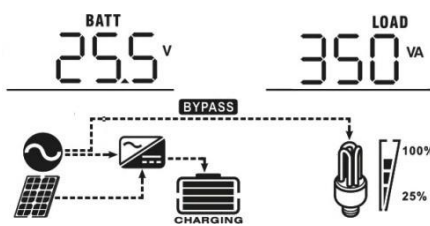
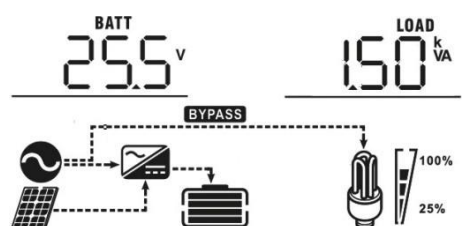
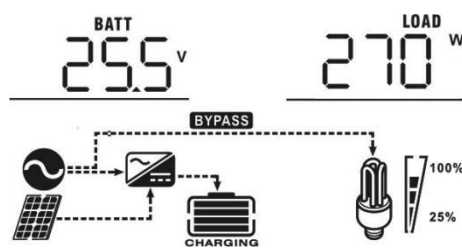
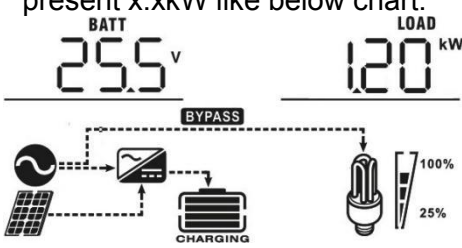
30	Battery equalization	Battery equalization	Battery equalization disable (default)
		<p>If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.</p>	
31	Battery equalization voltage	3.5KW default setting: 29.2V	
		5.5KW default setting: 58.4V	
Setting range is from 25.0V to 31.5V for 3.5KW model and 41.0V to 61.0V for 5.5KW model. Increment of each click is 0.1V.			
33	Battery equalized time	60min (default)	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default)	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default)	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable	Disable (default)
		<p>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 "EQ". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "EQ" will not be shown in LCD main page.</p>	

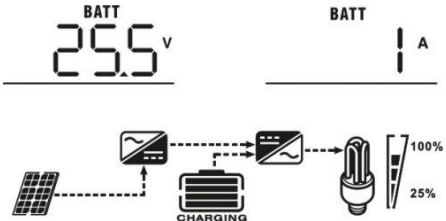
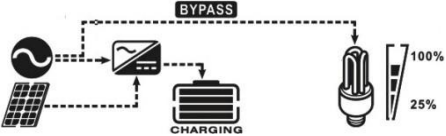
5.5 Display Setting

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.





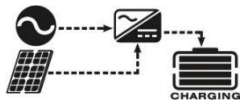



Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	<p>Input Voltage=230V, output voltage=230V</p>
Input frequency	<p>Input frequency=50Hz</p>
PV voltage	<p>PV voltage=260V</p>
PV current	<p>PV current = 2.5A</p>
PV power	<p>PV power = 500W</p>

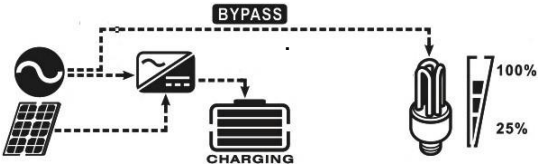
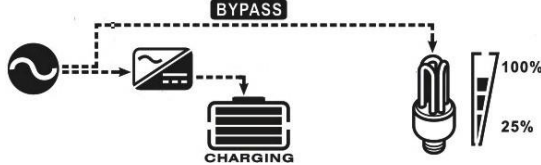
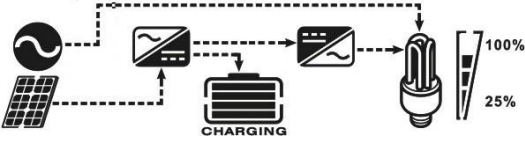
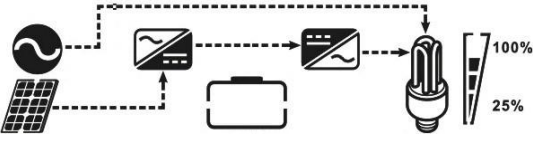
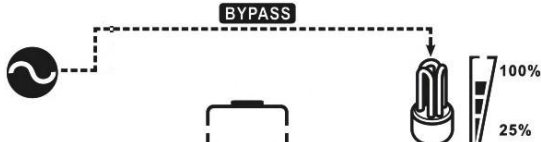
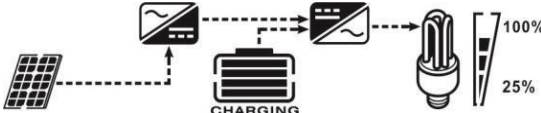
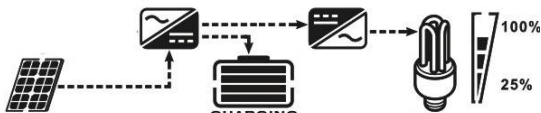

<p>Charging current</p>	<p>AC and PV charging current=50A</p>  <p>PV charging current=50A</p>  <p>AC charging current=50A</p> 
<p>Charging power</p>	<p>AC and PV charging power=500W</p>  <p>PV charging power=500W</p>  <p>AC charging power=500W</p> 
<p>AC charging power=500W</p>	<p>Battery voltage=25.5V, output voltage=230V</p> 

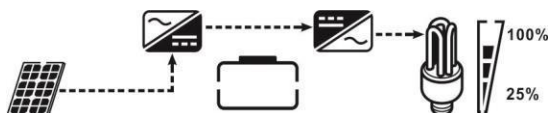
<p>Output frequency</p>	<p>Output frequency=50Hz</p> 
<p>Load percentage</p>	<p>Load percent=70%</p> 
<p>Load in VA</p>	<p>When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.</p>  <p>When load is larger than 1kVA ($\geq 1\text{kVA}$), load in VA will present x.xkVA like below chart.</p> 
<p>Load in Watt</p>	<p>When load is lower than 1kW, load in W will present xxxW like below chart.</p>  <p>When load is larger than 1kW ($\geq 1\text{kW}$), load in W will present x.xkW like below chart.</p> 

Battery voltage/DC discharging current	<p>Battery voltage=25.5V, discharging current=1A</p> 
Main CPU version checking	<p>Main CPU version 00014.04</p> 

5.6 Operating Mode Description

Operation mode	Description	LCD display
<p>Standby mode/Power saving mode</p> <p>Note:</p> <p>*Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.</p> <p>*V/Power Save Mode: If enabled, the inverter output will shut down when the connected load is low or not detected.</p>	<p>No output is supplied by the unit but it still can charge batteries.</p>	<p>Charging by utility and PV energy.</p>  <p>Charging by utility.</p>  <p>Charging by PV energy.</p>  <p>No charging.</p> 
<p>Fault mode</p> <p>Note:</p> <p>*Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.</p>	<p>PV energy and utility can charge batteries.</p>	<p>Charging by utility and PV energy.</p>  <p>Charging by utility.</p>  <p>Charging by PV energy.</p>  <p>No charging.</p> 

Operation mode	Description	LCD display
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode. .	<p>Charging by utility and PV energy.</p> 
		<p>Charging by utility.</p> 
	The unit will provide output power from the mains. It will also charge the battery at line mode.	<p>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 provide the loads and charge the battery at the same time.</p> 
		<p>If "solar first" is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads.</p> 
		<p>Power from utility.</p> 
Battery Mode	The unit will provide output power from battery and PV power.	<p>Power from battery and PV energy.</p> 
		<p>Power from battery and PV energy.</p> 
		<p>Power from battery only.</p> 

<p>PV mode</p>	<p>The unit will provide output power from battery and PV power.</p>	<p>Power from PV energy only.</p> 
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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.

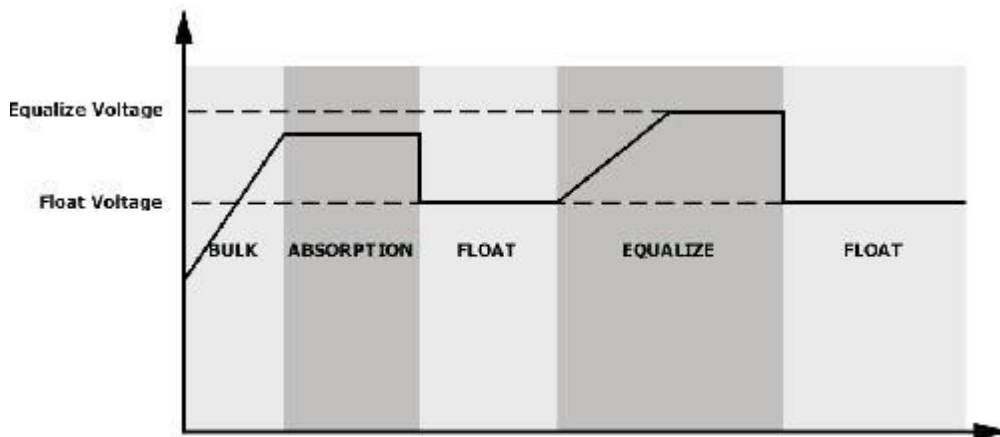
- **How to apply equalization function**

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

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

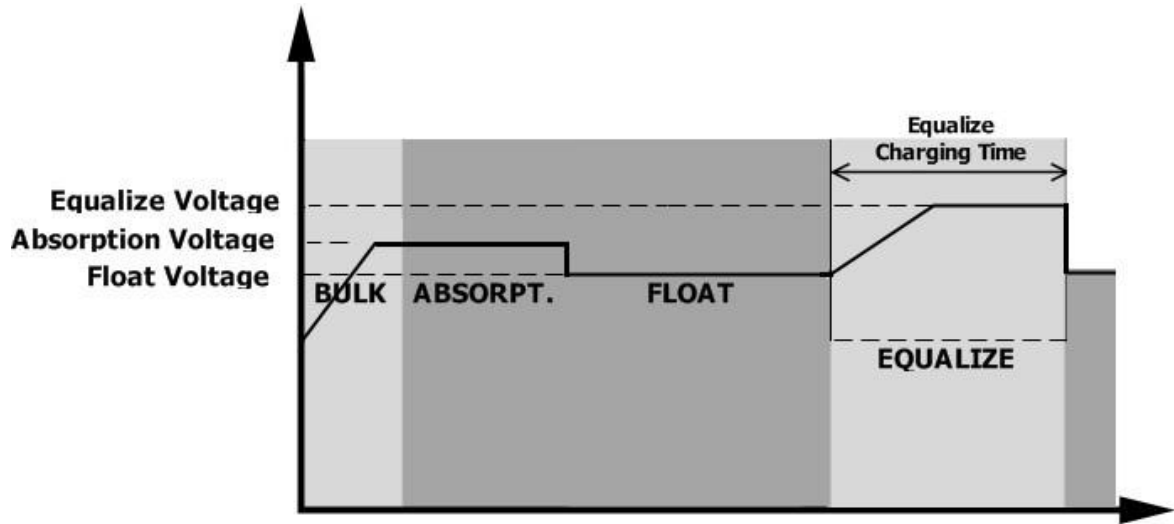
- **When to equalize**

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

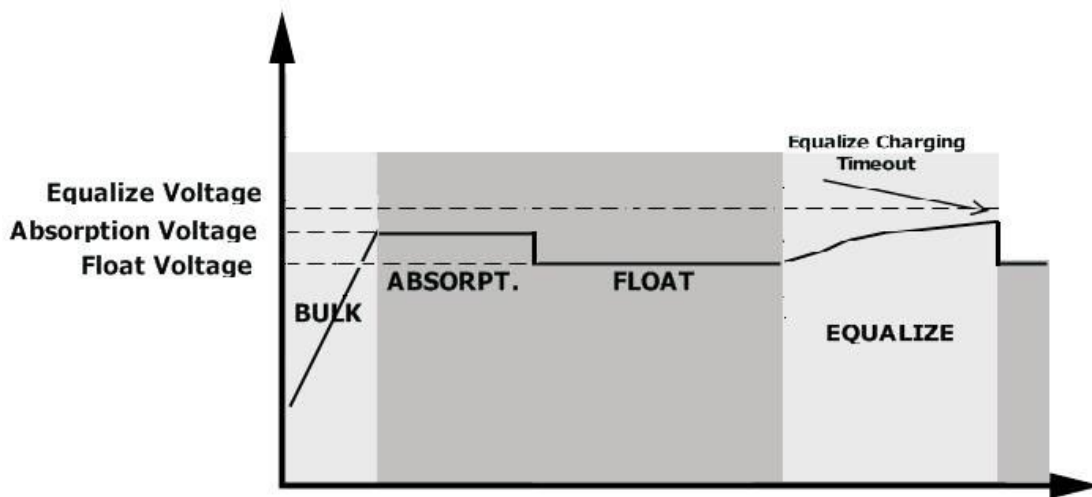


- **Equalize charging time and time out**

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raise 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 to high.	
09	Bus soft start failed.	
51	Over current or surge.	
52	Bus voltage is too low.	
53	Inverter soft start failed.	
55	Over DC voltage in AC output.	
57	Current sensor failed.	
58	Output voltage is too low.	
59	PV voltage is over limitation.	

5.9 Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second.	
02	Battery is over-charged	Beep once every second.	
03	Low battery	Beep once every second.	
04	Overload	Beep once every 0.5 second.	
07	Output power derating.	Beep twice every 3 second.	
10	PV energy is low.	Beep twice every 3 second.	
15	High AC input during BUS soft start. (>280VAC)	None	
16	Fan is locked when inverter is on.	Beep three times every second.	
E9	Battery equalization	None	
bP	Battery is not connected.	None	

6.SPECIFICATIOIS

Table 1 Mains Mode Specifications

Model	3.5KW	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	Circuit Breaker	
Efficiency (Mains Mode)	> 95% (Rated load, battery full charged)	
Transfer Time	10ms typical (UPS) ; 20ms (Appliances)	
Output power derating: When AC input voltage drops to 170V, the output power will be derated.	<p>The graph illustrates the output power derating characteristics. The vertical axis represents Output Power, with two specific levels marked: 50% Power and Rated Power. The horizontal axis represents Input Voltage, with three key points marked: 90V, 170V, and 280V. The power output is zero for input voltages below 90V. At 90V, the output power jumps to 50% of the rated power. Between 90V and 170V, the output power increases linearly until it reaches the Rated Power level. From 170V to 280V, the output power remains constant at the Rated Power level. Beyond 280V, the output power drops to zero.</p>	

Table 2 Inverter Mode Specifications

Model	3.5KW	5.5KW
Rated Output Power	3.5KW	5.5KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	50Hz	
Peak Efficiency	93%	
Overload Protection	5s@±150%load; 10s @ 110%~150%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<50% load≥50%	23.0Vdc	46.0Vdc
	22.0Vdc	44.0Vdc
Low DC Warning Return Voltage load<50% load≥50%	23.5Vdc	47.0Vdc
	23.0Vdc	46.0Vdc
Low DC Cut-off Voltage load<50% load≥50%	21.5Vdc	43.0Vdc
	21.0Vdc	42.0Vdc
High DC Recovery Voltage	32.0Vdc	62.0Vdc
High DC Cut-off Voltage	33.0Vdc	63.0Vdc
No Load Power Consumption	<35W	

Table 3 Charge Mode Specifications

Utility Charging Mode			
Model	3.5KW	5.5KW	
Charging Mode	3-Step		
AC Charging Current (Max)	80Amp (@VI/P=230Vac)		
Bulk Charging Voltage	Flooded Battery	29.2Vdc	58.4Vdc
	AGM/Gel Battery	28.2Vdc	56.4Vdc
Floating Charging Voltage	27.0Vdc	54.0Vdc	
Charging Curve			
MPPT Solar Charging Mode			
Model	3.5KW	5.5KW	
Max. PV Array Power	5000W	6000W	
Nominal PV Voltage	240Vdc		
PV Array MPPT Voltage Range	120~450Vdc		
Max. PV Array Open Circuit Voltage	500Vdc		
Solar Charging	100Amp		
Max. AC Charging Current	80amp		

Table 4 General Specifications

Model	3.5K W	5.5K W
Safety Certification	CE	
Operating Temperature Range	-10°C to 50°C	
Storage temperature	-15°C ~ 60°C	
Humidity	5%~95% Relative Humidity (Non-condensing)	
Dimension (D*W*H), mm	300 x 110 x 475	
Gross weight, kg	10.5	11.5

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 Utility Switch is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power.	1. Check if AC wires are too thin or too long. 2. Check if generator(if applied) is working well or if input voltage range setting is correct.(UPS Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing.	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120°C. (For 1-3K only)	Check the air flow of the unit.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the ambient temperature is too high.
	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	

	Fault code 52	Bus voltage is too low.	happens again, please return to repair center.
	Fault code 55	Output voltage is unbalanced.	

9、 APPENDIX: APPROXIMATE BACK-UP TIME TABLE

Model	Load (VA))	Backup Time@ 24VDC 100AH (min)	Backup Time@24VDC200AH (min)
3.5KW	300	359	880
	600	176	420
	900	99.2	242
	1200	76	182
	1500	54	131
	1800	45	101
	2100	38	86
	2400	28	75
	2700	25	59
	3000	22	54

Model	Load (VA))	Backup Time@48VDC100AH (min)	Backup Time@ 48VDC 200AH (min)
5.5KW	500	490	1030
	1000	214	490
	1500	126	322
	2000	89	217
	2500	72	172
	3000	61	146
	3500	52	113
	4000	40	90
	4500	35	80
	5000	32	72

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.