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1 About This Manual

1.1 Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations, Keep 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. One piece of 150A fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/ charger should be connected to a permanent grounder 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, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

3.1 Features

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

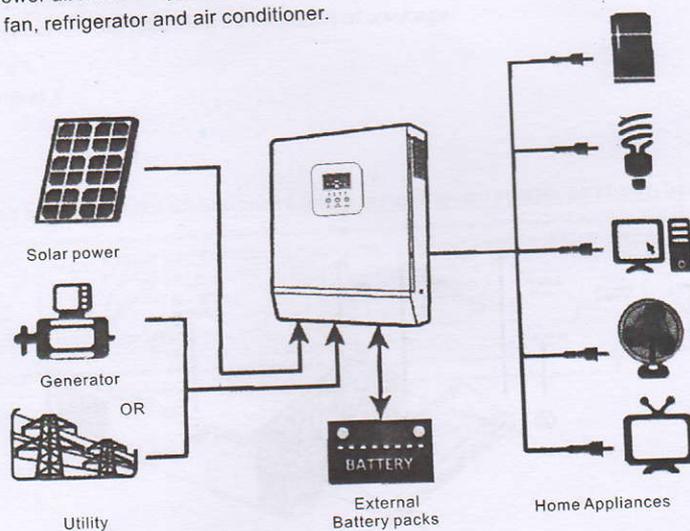
3.2 Basic System Architecture

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

- ◆ Generator or Utility
- ◆ PV modules

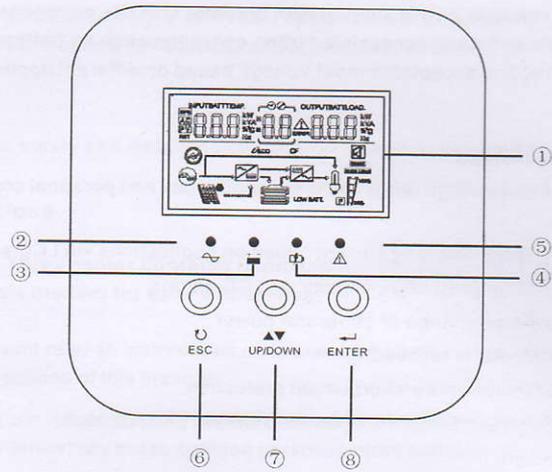
Consult with your system integrator for other possible system architectures depending on your requirements.

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



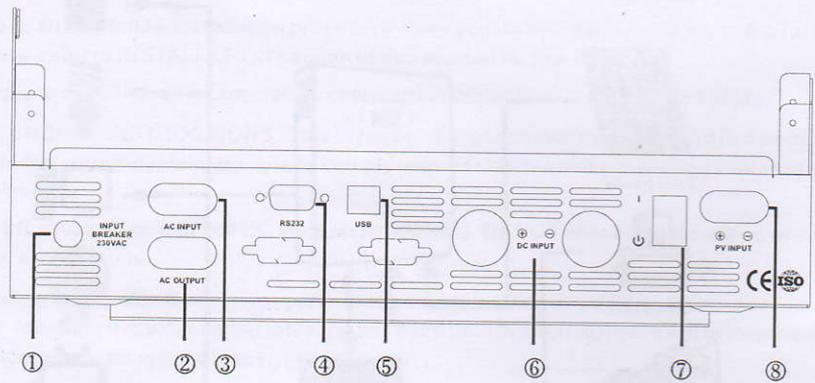
3.3 Product Overview

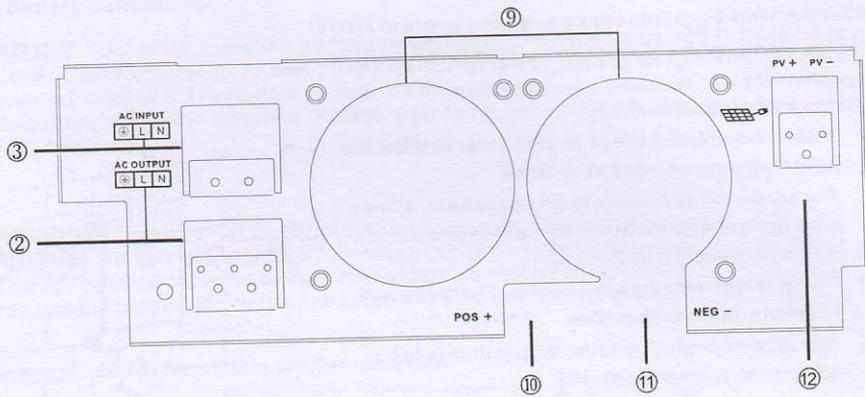
3.3.1 LCD Screen



- | | |
|-------------------------------|--------------------------|
| ①.....LCD Display | ⑤.....Alarming Indicator |
| ②.....AC Mode Indicator | ⑥.....ESC |
| ③.....Inverter Mode Indicator | ⑦.....UP/DOWN |
| ④.....Charging Indicator | ⑧.....ENTER |

3.3.2 Back Panel





- | | |
|--------------------------------|--------------------------------|
| 1.....Input Breaker | 7.....Power ON/OFF Switch |
| 2.....AC Output | 8.....PV Input |
| 3.....AC Input | 9.....Fan |
| 4.....RS232 Communication Port | 10...Battery Terminal Positive |
| 5.....USB Communication Port | 11...Battery Terminal Negative |
| 6.....Battery Input | 12...Solar Panel Input |

4 INSTALLATION

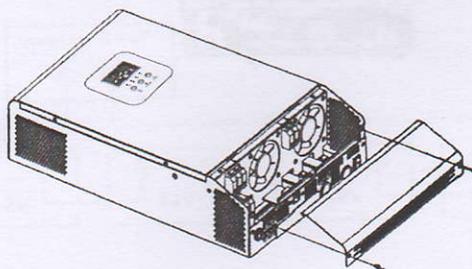
4.1 Unpacking and Inspection

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 1

4.2 Preparation

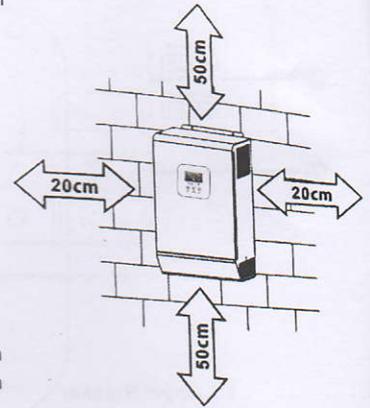
Before connecting all please take off bottom cover by removing two screws as shown below.



4.3 Mounting the Unit

Consider the following points before selecting where to install:

- ※ Do not mount the inverter on flammable construction materials.
- ※ Mount on a solid surface
- ※ Install this inverter at eye level in order to allow the LCD display to be read at all times.
- ※ For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- ※ The ambient temperature should be between and to ensure optimal operation.
- ※ The recommended installation position is to be adhered to the wall vertically.
- ※ Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing two screws.

- 1,2 Use the M6*80mm expansion bolts.
- 3 Use M4 or M5.

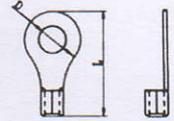


4.4 Battery Connection

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 over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.

Ring terminal:

WARNING! All wiring must be performed by be 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 and terminal size as below.

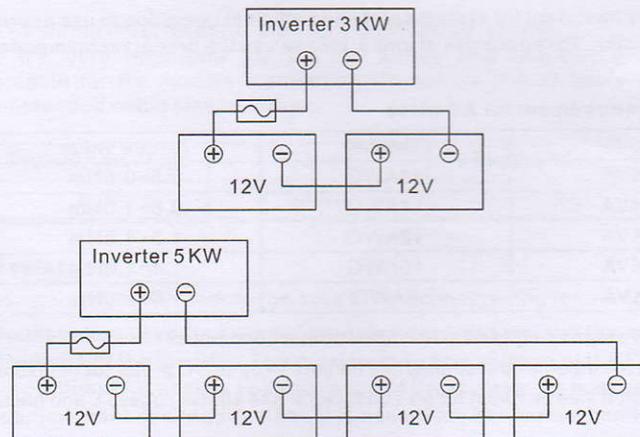


Recommended battery cable and terminal size:

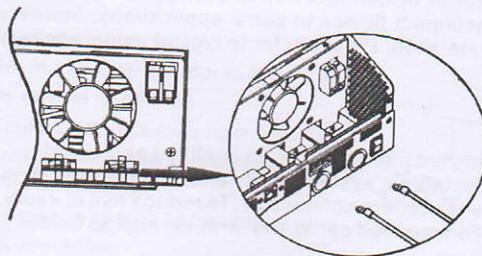
Model	Typical Amperage	Battery capacity	Wire Size	Ring Terminal			Torque value
				Cable(mm ²)	Dimensions		
					D(mm)	L(mm)	
1KVA/2KVA	66A	100AH	1*6AWG	14	6.4	39.2	2~3 Nm
			2*10AWG	8	6.4	23.8	
3KVA	100A	100AH	1*4AWG	22	6.4	33.2	2~3 Nm
		200AH	2*8AWG	14	6.4	29.2	
4KVA	110A	200AH	1*2AWG	38	6.4	39.2	2~3 Nm
			2*6AWG	28	6.4	33.2	
5KVA	110A	200AH	1*2AWG	38	6.4	39.2	2~3 Nm
			2*6AWG	28	6.4	33.2	

please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.



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



WARNING: Shock Hazard

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



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

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 disconnected during maintenance and fully protected from over current of AC input. The recommended spec of breaker is 32A for 3KW and 50A for 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 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.

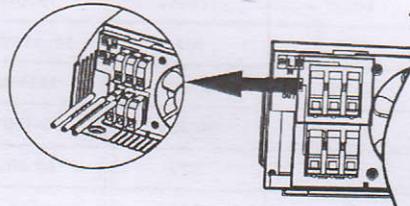
Suggested cable requirement for AC wires

Model	Gauge	Torque value
1KVA	16AWG	0.5~0.6Nm
2KVA	14AWG	0.8~1.0Nm
3KVA	12AWG	1.2~1.6Nm
4KVA	10AWG	1.4~1.6Nm
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 N3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

 → Ground (yellow-green)
 L → LINE (brown or black)
 N → Neutral (blue)



WARNING:

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

4. Make sure the wires are securely connected

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

4.6 PV Connection

PV Connection(Only apply for the model with solar charger)

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

Typical Amperage	Gauge	Torque Value
60A	3AWG	1.4~1.6Nm

PV module selection:

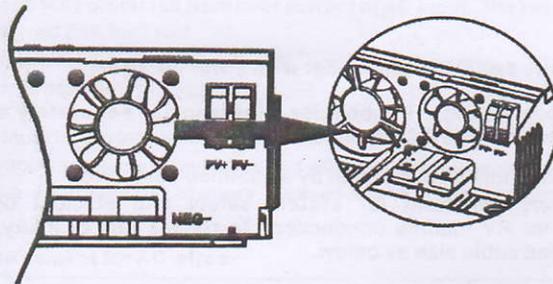
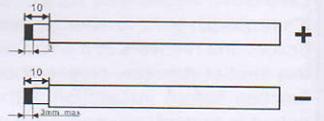
When choosing the right PV module, be sure to first consider the following requirements:
 The open circuit voltage (Voc) of the PV modules does not exceed the maximum PV array open circuit voltage of the inverter. The maximum supply voltage of the PV modules should be close to the optimal PV access voltage range of the inverter for best performance. If one PV module cannot meet this requirement, it is necessary to connect multiple PV modules in series.

Model	GA1012P	GA2024P	GA3024M	GA5048M
PV Charging Mode	PWM	PWM	MPPT	MPPT
MAX. PV Input Power	600W	1200W	1500W	5500W
MPPT Tracking Range	N/A	N/A	30~115Vdc	120~430Vdc
MAX. PV Input Voltage	55Vdc	80Vdc	145Vdc	450Vdc
Best open circuit voltage range	15-30V	30-32V	70-110V	370-430V
Best voltage	15V	30V	60-90V	300-340V
MAX. PV Charging Current	50A	50A	60A	80A
MAX. AC Charging Current	50A	50A	60A	80A
MAX. Charging Current	100A	100A	120A	80A

PV Module Wire Connection

Please follow below steps to implement PV module connection:

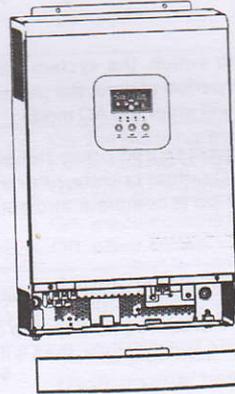
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool
3. Fix wire cover to the inverter with supplied screws as shown in below chart.



4. Check correct polarity of wire from PV modules and PV input connectors. Then, connect positive pole(+) of connection wire to positive pole(+) of PV input connector. Connect negative pole(-) of connection wire to negative pole(-) of PV input connector. Screw two wires tightly in clockwise direction. Recommended tool: 4mm blade screwdriver.

4.7 Final Assembly

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



4.8 Communication Connection

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

2. Wi-Fi cloud communication(option):

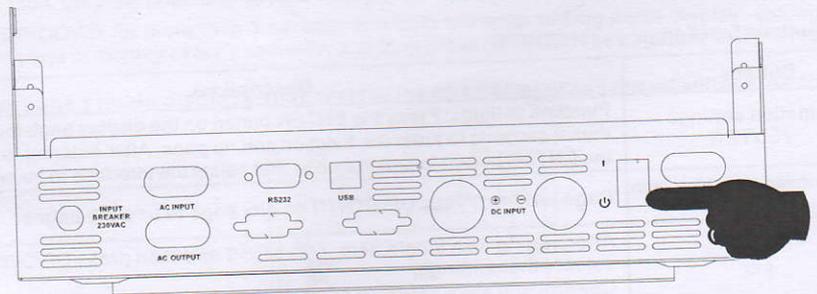
please use supplied communication cable to connect to inverter and Wi-Fi module. Download APP and installed from APP store, and Refer to "Wi-Fi Plug Quick Installation Guideline" to set up network and registering. The inverter status would be shown by mobile phone APP or webpage of computer.

3. GPRS cloud communication(option):

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

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 (located on the button of the case) to turn on the unit.

5.1.1 Steps to start up

Connect the battery that meets the requirements (battery voltage needs to be beyond 23V) or AC (AC needs to confirm the suitable input range depends on the output mode), then you can start up the inverter.

➤ Mains power on

Connect to normal AC power, press the switch, the system will automatically turn on. If you set AC output power priority, after waiting for a period of time, the panel will display AC mode that represents turn on the machine successfully, then will enter the AC mode.

When the normal mains power is connected and press the power-on button then the system will automatically power on. If it is set as AC output priority, after a period of time, the panel will display the AC mode to indicate that the power-on is complete and enter the AC mode.

➤ Battery boot

Connect to battery, press the power-on button to establish a working power source.

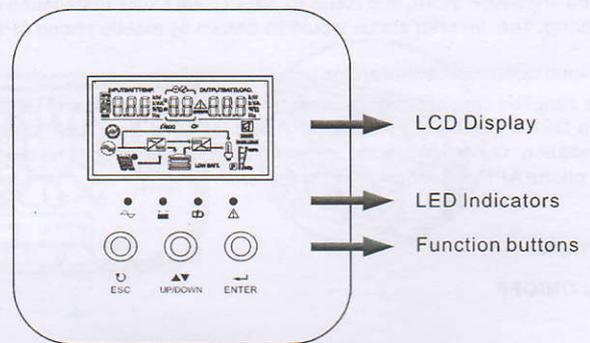
The system will automatically turn on, after waiting for a period of time, the panel will display battery mode that represents turn on the machine successfully, then will enter the battery mode.

5.1.2 Shutdown steps

When the system is in battery mode or AC mode output, press the switch again, then the system will be turned off.

5.2 Operation and Display Panel

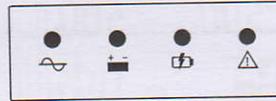
The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four indicators, three function buttons and a LCD display, indicating the operating status and input/output power information.



5.2.1 Buttons function

Buttons	Descriptions
Function settings /ENTER	Function settings: Press the ENTER button on the display page for more than 2 seconds to enter the function setting page. After entering, press the ENTER button to turn the page and select the interface to be set.
Page turning / inquiry button UP/DOWN	Page turning: Press UP/DOWN on any page to turn the pages.
ESC	After setting up a single item, press ESC and then press UP/DOWN to select other settings. Confirm and save settings: On the function settings page, press ESC for 2 seconds, and then go back to the main interface and set to save.

5.2.2 LED indicator functions



Indicator lights	Name	Descriptions
LED-G	Input light (Green)	On: the AC is normal and enters the AC to work. Flash: the AC is normal, but does not enter the AC to work Off: the AC is abnormal
LED-Y	Invert (Yellow)	On: machine working in battery mode output Off: other states
LED-Y	Battery (Yellow)	On: the battery is float charging Flash: battery charging off at constant voltage Off: other states
LED-R	Warning (Red)	On: inverter fault Flash: inverter has alarm Off: The inverter is normal

5.2.3 Inverter working state table corresponding to indicator lamp

Warning buzzer	Descriptions
Long beeping, continuous for 10 seconds then stop.	Failure Mode
Stop after beeping for 3 seconds	Loss or recovery of PV/input voltage
	The main switch is on or off
Beep per second, continuous for 1 min then stop	All other alarms (battery low voltage alarm will only beep in battery mode.)

5.2.4 Checking Parameter Operation

Under normal circumstances, there are ten pages in the display. Press the query button UP/DOWN to draw a page for the display, and display information such as input-output voltage input-output rate, battery, PV electricity and electricity, negative and component versions, etc. If there is an alarm, a page of alarm information will be displayed, and if the inverter fails, a page of trouble code will be displayed. By default, the main panel displays the fault information. When the transformer has no fault or fault, the main page displays the voltage and rate information by default.

Press UP/DOWN for more than 1 second, and LCD will enter polling mode display: automatically turn the page of display every 2 seconds, and long press UP/DOWN key again to exit polling mode.

Display page 1 (main display page): display the inverter input and output voltage, as shown in Figure 1-1.

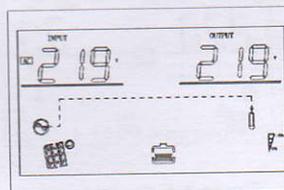


Figure 1-1 display page 1

Display Page 2: Display the input and output frequency of the inverter, as shown in Figure 1-2.

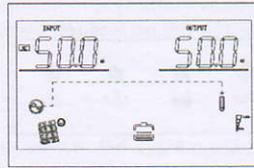


Figure 1-2 display page 2

Display page 3: battery information, showing battery voltage and battery capacity and charging current, as shown in Figure 1-3.

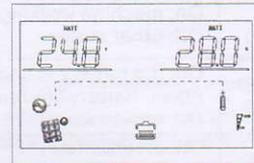


Figure 1-3 display page 3

Display page 4: PV info, display PV voltage and PV charging amps, as shown in Figure 1-4.

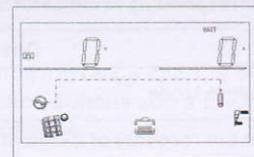


Figure 1-4 display page 4

Display page 5: PV info, display PV voltage and PV charging wattage, show as 1-5.

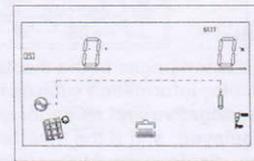


Figure 1-5 display page 5

Display page 6: Output Information shows the output voltage and output power, as shown in Figure 1-6.

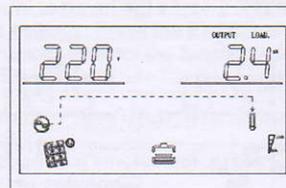


Figure 1-6 display page 6

Display page 7: Output Information shows the output voltage and output power, as shown in Figure 1-7

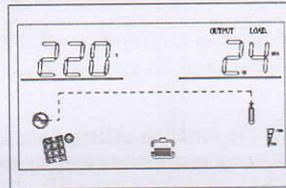


Figure 1-7 display page 7

Display page 8: Output Information displays output voltage and load percentage, as shown in Figure 1-8.

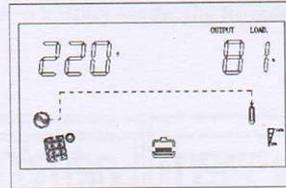


Figure 1-8 display page 8

Display page 9: Software version displays the inverter system software version, as shown in Figure 1-9(Software Version VER 01)

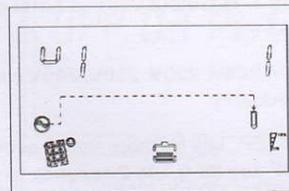


Figure 1-9 display page 9

Display page 10: Software version displays the MPPT system software version, as shown in Figure 1-10(Software Version VER 34)

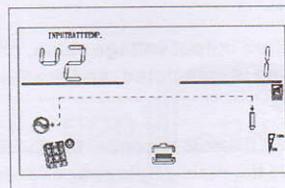


Figure 1-10 display page 10

5.3 Function setting operation

➤ Function setting operation:

The page for setting the exit function and setting as bellow:

- Long press "ENTER" button for more than 2 seconds, enter into function setting mode. Press "Enter" button to choose function, turn the page to you need to set, the corresponding indicator will flash.
- Press "Enter" button again, enter the function setting, you will see the word of function you choose lighting, on the left of word will occur numerical flashing, then you can press "UP/DOWN" button to use.
- After finish setting, press the enter button again, the data will be on instead of flashing.

Long press "ESC" button for more than 2 seconds, the function will complete setting. Return to function setting, then back to main page. (If you don't exit manually, after 30 seconds, it will be back to main page automatically).

5.3.1 Output Voltage (OPU)

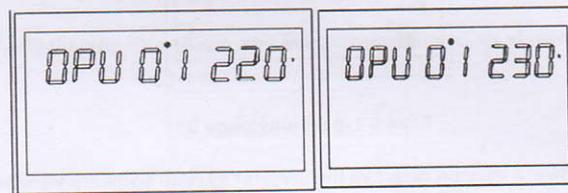


Figure 1-11 Output Voltage Setting

- The default output voltage is 230V, 208V, 220V, 230V, 240V can be set, all working conditions can be set, and it will take effect immediately.
- Press the function setting key "ENTER" key for more than 2 seconds to enter the function setting page, press the query key "UP/DOWN" key for 0.1 to 2 seconds to select the function, after turning the page to the output voltage PU setting page, the word OPU flashes.
- Press the "ENTER" key for 0.1 to 2 seconds to enter the setting page of the output voltage OPU. At this time, the word OPU is long on, and the value flashes to the right of the word OPU. Press the query key "UP/DOWN" key for 0.1 to 2 seconds to select different output voltage values, the available voltage values are 208V, 220V, 230V, 240V. By default, the output voltage is 230V, and the settings are saved in real time.
- After turning the page to the desired output voltage value, press the "ENTER" key for 0.1~2 seconds, the output voltage PU setting is completed, and the value on the right side of the OPU will be long on and no longer flashing.
- Press the "ESC" key for more than 0.1 to 2 seconds, the function will be set successfully, exit the function setting page, and return to the main display page (or do not operate, and automatically jump back to the main display page after waiting for up to 30S).

Note:

When the output voltage is set to 208V, the output needs to be derated to 90%.

5.3.2 Output frequency

Output frequency setting, the default value is 50Hz.

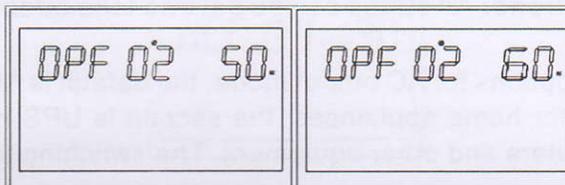


Figure 1-12 Output Frequency Setting Page

Function description: 50Hz or 60Hz can be adjusted, default value is 50Hz.

Setting conditions: All states can be set. In battery mode, the setting will take effect when the inverter is restarted next time; in mains mode, it will take effect immediately. After the setting is completed, after switching back to battery mode, the frequency will change at a slower rate.

5.3.3 Output priority settings

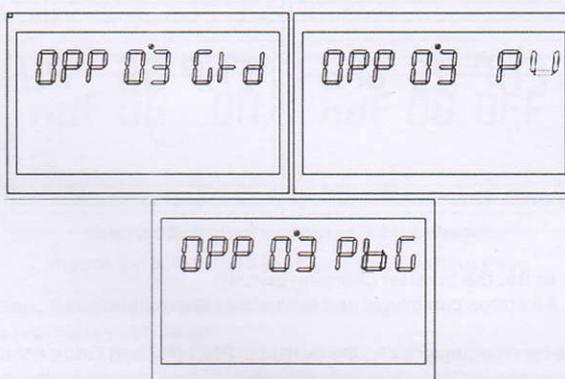


Figure 1-13 Output priority settings page

Function description: Set the inverter output priority.

Setting conditions: All states can be set, and they will take effect immediately after setting.

Note:

There are three options for output priority, the default is GRD: mains output priority; the second is PU(PV): photovoltaic output priority; the third is PBG: PV first, battery second, mains third output;

5.3.4 Output Mode Settings (MOD)

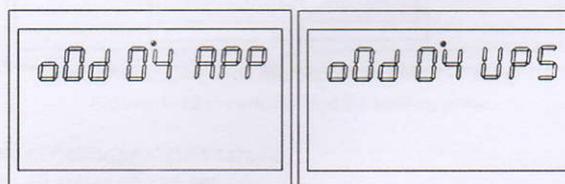


Figure 1-14 Output mode setting page

Function description: Set the inverter output mode.

Setting conditions: All states can be set and take effect immediately.

illustrate:

There are two options for AC output mode, the default is APP: Appliance, which is used for home appliances; the second is UPS mode, which is used for computers and other equipment. The switching time is typically 10ms.

5.3.5 Charging priority settings (CHP)

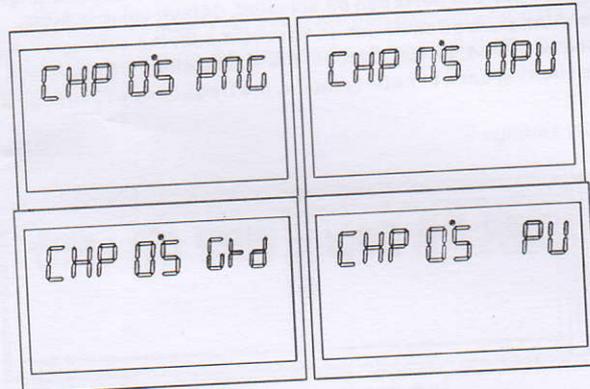


Figure 1-15 Charging priority setting page

Function description: Set the inverter charging priority.

Setting conditions: All states can be set and take effect immediately.

illustrate:

There are four options for charging priority, the default is PNG (PV and Grid); PV and Grid are charged at the same time; the second is OPV (Only PV); only photovoltaic charging; the third is GRD (Grid); mains charging priority The fourth is PV: PV priority charging.

5.3.6 Mains charging current (RCC)

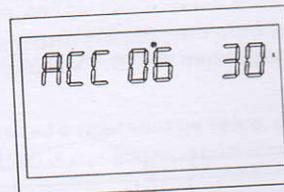


Figure 1-16 Mains maximum charging setting page

5.3.7 Maximum charging current (MCC)

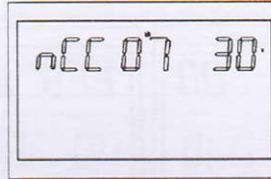


Figure 1-17 Maximum charging current setting page

Function description: Set the maximum charging current value of the inverter.

Setting conditions: All states can be set.

illustrate:

MCC: Maximum Charge Current, the maximum charging current refers to the maximum value of the PV and mains charging current.

3KV 150V-MPPT Version is 2/10/20/30/40/50/60/70/80/90/100/110/120A optional;

5KV-48V 450V MPPT Voltage version is 2/10/20/30/ 40/50/60/70/80A optional;

5.3.8 Menu Front (MDF)

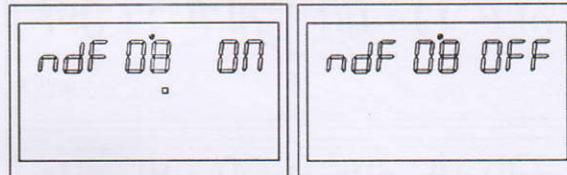


Figure 1-18 Return to the home page setting page

Function description: Return to the main interface settings.

Setting conditions: All states can be set.

illustrate:

The default setting is ON. In the function setting operation, when it is set to ON, if the page is not in the first interface (P1) at this time, it will return to the first interface after 1 minute; if it is set to OFF, if the page is not in the first interface (P1) at this time, the LCD will Always stay on this interface.

5.3.9 Overload restart setting (LrS)

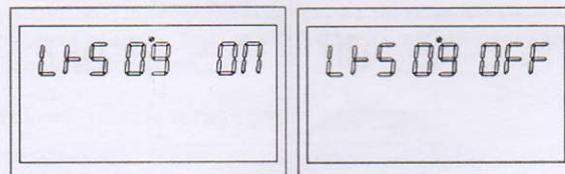


Figure 1-19 Overload restart setting page

Function description: Overload restart setting.

Setting conditions: All states can be set.

illustrate:

Overload restart is set to ON by default.

5.3.10 Over temperature restart setting (TrS)

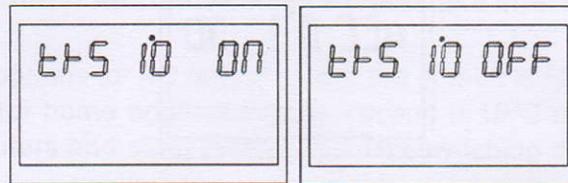


Figure 1-20 Over temperature restart setting page

Function description: Over-temperature restart settings.

Setting conditions: All states can be set.

illustrate:

The default setting for over-temperature restart is 0N.

5.3.11 Main input power failure alarm setting (MIP)

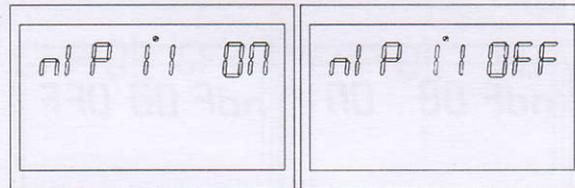


Figure 1-21 Main input power failure alarm setting page

Function description: Mains or PV loss alarm long beep setting

Setting conditions: All states can be set, the default is ON, and the mains or PV loss alarm will beep for a while. Can be set to OFF. (All modes can be set)

illustrate:

MIP: Main input cut warning

The default setting is ON, after the main input detection is lost, the buzzer will sound for 3s; when it is set to OFF, after the main input is lost, the buzzer will not sound constantly.

5.3.12 Power Saving Mode (PWS)

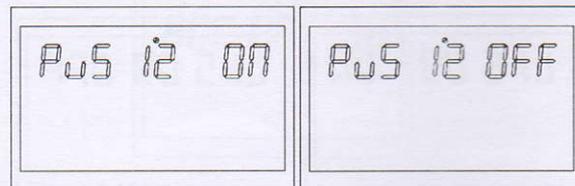


Figure 1-22 Power Saving Mode Setting Page

Function description: Set whether the inverter enables low power consumption mode (energy saving mode).

Setting conditions: All states can be set.

illustrate:

PWS: Power Saving

The default setting is OFF, the function is not turned on; when it is set to ON, in battery mode, if the load is lower than 25W, the system will temporarily stop the output, and then continue to output. If the load is higher than 35W, the system will resume continuous normal output.

5.3.13 Overload convert to bypass setting (OLG)

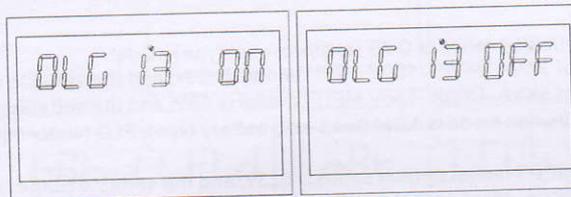


Figure 1-23 Overload convert to bypass setting page

Function description: When overload in the battery mode, set whether to switch to the mains mode (bypass mode) immediately.

Setting conditions: All states can be set.

illustrate:

OLG:Over load to Bypass

The default setting is OFF, the function is not enabled; when it is set to ON, under the condition of PV priority output with load, if overloaded, the system will immediately transfer to bypass (mains output, namely bypass mode).

5.3.14 Silent mode setting

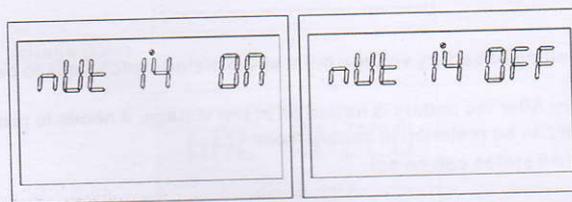


Figure 1-24 Silent mode setting page

Function description: Set whether the buzzer beeps or not.

Setting conditions: All states can be set.

illustrate:

MUE Mute

The default setting is OFF, and the function is not turned on; when it is set to ON, the buzzer does not sound under any circumstances, such as alarms, faults, etc. All modes can be set and function normally, pictures cannot be displayed.

5.3.15 Battery mode to mains mode voltage point

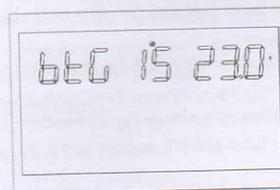


Figure 1-25 Battery mode to mains mode voltage point setting page

Function description: When the battery and mains exists at the same time, the battery will be transferred to the mains when it is discharged to a certain voltage to ensure that the battery will not be empty.

Setting conditions: All states can be set, and the output priority should be set in PV or PBG modes.
illustrate:

BTG: Back To Grid

When the battery definition mode is CUS (customer set type) mode:

The default setting of 3KVA-24Vdc-150V-MPPT model is 23v, and the settable range is [22, 26].

The default setting of 5KVA-48Vdc-450V MPPT model is 46V, and the settable range is [44, 52].

When the battery definition mode is AGM (lead-acid battery type), FLD (water injection battery type) mode:

3KVA-24Vdc-150V MPPT model default setting is 23v, and the settable range is [22, 26].

The default setting 5KVA-48Vdc-450V-MPPT model is 46V, and the settable range is [44, 52].

When the battery definition mode is LIB (lithium battery type) mode:

The default setting of 3KVA-24Vdc-150V MPPT model is 23.8v, and the settable range is [20, 25].

The default setting of 5KVA-48Vdc-450V MPPT model is 47.6V, and the settable range is [40, 50].

5.3.16 Switch back to battery mode voltage point (BTB)

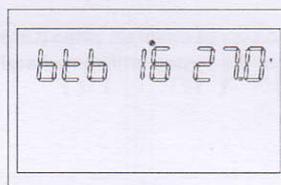


Figure 1-26 Setting of battery voltage point when mains switch back to battery mode

Function description: After the battery is turned off at low voltage, it needs to reach a certain battery voltage value before it can be restarted in battery mode.

Setting conditions: All states can be set.

illustrate:

BTB: Back To Battery

When the battery definition mode is CUS (customer set type) mode:

The default setting of 3KVA-24Vdc-150V-MPPT model is 26V, and the settable range is [24, 29] (when the setting value $V_{btb} > 26V$, the voltage point of switching back to battery mode remains at 26V), and the output priority is set to photovoltaic (PV priority output Or photovoltaic battery mains (PBG output, if it is not in battery mode at this time, if the battery voltage is higher than 26V, the system will switch back to battery mode.

The default setting of 5KVA-48Vdc-450V-MPPT model is 54V, and the settable range is [48, 58] (the logic is the same as above).

When the battery definition mode is AGM (lead-acid battery type), FLD (water injection battery type) mode:

3KVA-24Vdc-150V-MPPT model default Set to 26V, the settable range is [24, 29] (the logic is the same as above).

5KVA-48Vdc-450V-MPPT model default setting is 52v, the settable range is [48, 58] (the logic is the same as above).

The battery definition mode is LIB (lithium battery type) mode:

The default setting of 3KVA-24Vdc-150V-MPPT model is 27.2v, and the settable range is [23, 29] (the logic is the same as above).

The default setting of 5KVA-48Vdc-450V-MPPT model is 54.4V, and the settable range is [46, 58] (the logic is the same as above).

5.3.17 Battery mode setting

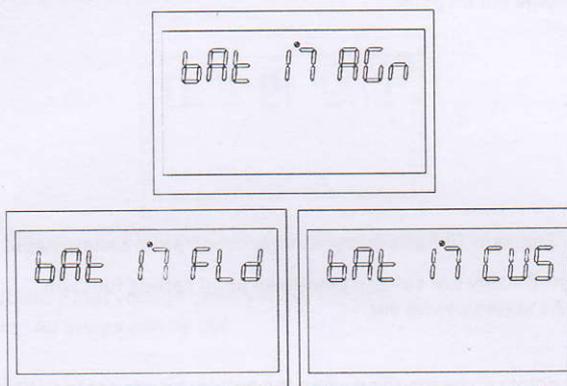


Figure 1-27 Battery mode setting page

Function description: battery type setting function

Setting conditions: All states can be set.

illustrate:

BAT:Battery Type

Four battery type settings: the default setting is AGM (lead-acid battery); the second is FLd (water injection battery); the third is LIB (lithium battery); the fourth is CUS (customer setting type).

5.3.18 Battery low voltage point

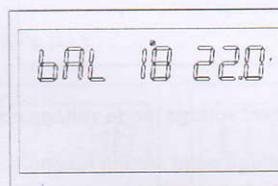


Figure 1-28 Battery low voltage point setting

Function description: Low voltage alarm point setting.

Setting conditions: All states can be set.

illustrate:

bAL: battery Low

The battery low voltage point can be modified when the battery type is set to CUS (customer set type).

3KVA-24Vdc-150V-MPPT model is set to 22v by default, and the settable range is [21, 27]

5KVA-48Vdc-450V-MPPT model is set to 44V by default, and the settable range is [42, 54]

When the battery type is set to LIB (lithium battery type), the battery low voltage point can be modified.

The default setting of 3KVA-24Vdc-150V-MPPT model is 23.8v, the settable range is [20.6, 25.0]

The default setting of 5KVA-48Vdc-450V-MPPT model is 47.6V, and the settable range is [41.2, 50.0]

5.3.19 Battery low voltage cut off point

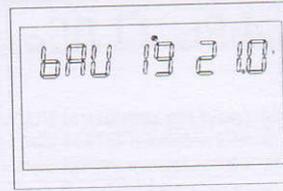


Figure 1-29 Battery low voltage cut off point setting page

Function description: Battery low voltage shutdown point setting function.

Setting conditions: All states can be set.

illustrate:

bAU: battery Under

The battery shutdown point can be modified when the battery type is set to CUS (customer set type).

The default setting of 3KVA-24Vdc-150V-MPPT model is 21V, and the setting range is [20,24]

The default setting of 5KVA-48Vdc-450V-MPPT is 42V, and the settable range is [40,48]

The battery shutdown point can be modified when the battery type is set to LIB (lithium battery type).

3KVA-24Vdc-150V-MPPT model is set to 23V by default, and the settable range is [20,24]

The default setting of 5KVA-48Vdc-450V-MPPT model is 46V, and the setting range is [40, 48]

5.3.20 Constant voltage mode voltage point setting (bCV)

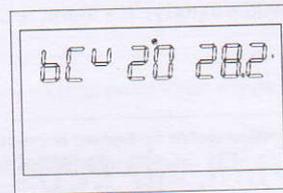


Figure 1-30 Constant voltage mode voltage point setting page

Function description: Constant voltage point setting function

Setting conditions: All states can be set

illustrate:

bCV : battery Constant Voltage

The constant voltage charging point can be modified when the battery type is set to CUS (customer set type).

The default setting of 3KVA-24Vdc-150V-MPPT model is 28.2, and the setting range is [24,29]. The constant voltage point voltage needs to be higher than the floating point voltage.

The default setting of 5KVA-48Vdc-450V-MPPT model is 56.4, and the settable range is [48,60]. The constant voltage point voltage needs to be higher than the floating point voltage.

The constant voltage charging point can be modified when the battery type is set to LIB (lithium battery type).

The default setting of 3KVA-24Vdc-150V-MPPT model is 28.2, and the setting range is [25,29]. The constant voltage point voltage needs to be higher than the floating point voltage.

The default setting of 5KVA-48Vdc-450V-MPPT model is 56.4, and the setting range is [48,56]. The constant voltage point voltage needs to be higher than the floating point voltage.

5.3.21 Floating charge mode voltage point setting (bFL)

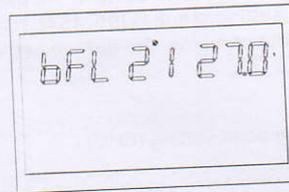


Figure 1-31 Floating charge mode voltage point setting page

Function description: Float voltage point setting function.

Setting conditions: All states can be set.

illustrate:

bFL : battery Float

Set the battery type to cUS (customer set type) to modify the battery floating point.
The default setting of 3KVA-24Vdc-150V-MPPT model is 27.6V, and the setting range is [26.6, 27.8].
The constant voltage point voltage needs to be higher than the floating point voltage.
The default setting of 5KVA-48Vdc-450V-MPPT model is 54V, and the setting range is [48, 60]. The constant voltage point voltage needs to be higher than the floating point voltage.
The constant voltage charging point can be modified when the battery type is set to LIB (lithium battery type).
The default setting of 3KVA-24Vdc-150V-MPPT model is 27.6V, and the setting range is [24, 28].
The constant voltage point voltage needs to be higher than the floating point voltage.
The default setting of 5KVA-48Vdc-450V-MPPT model is 55.2V, and the settable range is [50, 58].
The constant voltage point voltage needs to be higher than the floating point voltage.

5.3.22 Mains low voltage point setting (LLV)

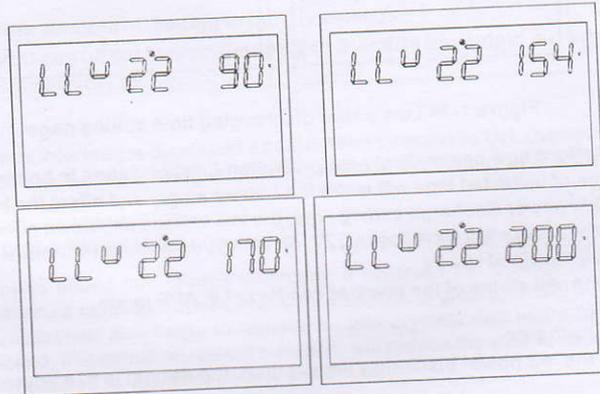


Figure 1-32 Mains low voltage point setting page in APP mode

Function description: Set the mains low voltage protection point.

Setting conditions: The inverter is in APP and UPS mode, all states can be set

illustrate:

LLV:Line Low Voltage

In inverter mode (output mode: MOD needs to be set to APP), the low-voltage point of mains is set, the default setting is 154V, and the setting range is [90, 154]. (Output mode: MOD needs to be set to UPS), the low-voltage point setting of mains, the default setting is 185V, and the setting range is [170, 200].

5.3.23 Mains high voltage protecting point setting (LHV)

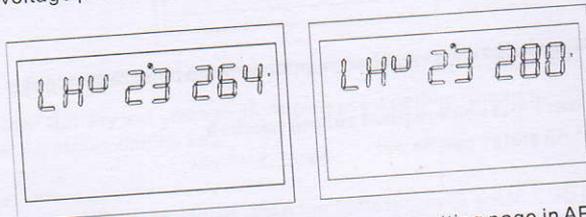


Figure 1-33 Mains high voltage protecting point setting page in APP mode

Function description: Set the mains high voltage protection point.

Setting conditions: The inverter is in APP mode, and all states can be set.

illustrate:

LHV: Line High Voltage

In inverter mode (output mode: MOD needs to be set to APP), the mains high voltage point setting, the default setting is 264V, and the setting range is [264, 280].

5.3.24 Low power discharging time setting (LWD)

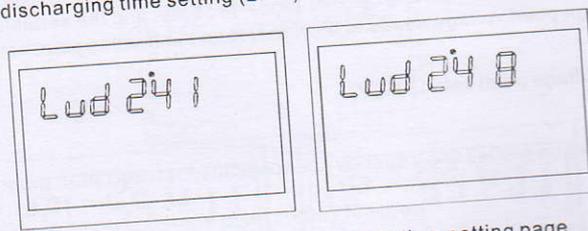


Figure 1-34 Low power discharging time setting page

Function description: Low power discharge protection function, when in battery mode, under a low load, the discharge of unlimited time will make the battery empty and affect the battery life. When the inverter is in the low power discharge setting time, the low voltage shutdown point of the 3KVA-24Vdc-150V-MPPT model battery will increase to 22V. 5KVA-48Vdc-450V-MPPT model battery low voltage shutdown point will be raised to 44V.

Setting conditions: All states of the inverter can be set in APP mode.

illustrate:

LWD : Low Watt Discharge

In inverter mode, the low power discharge time setting, the default is 8 (8 hours), the setting range is [1, 8]

In battery mode, after the continuous discharge time exceeds 8 hours and the battery shutdown point has not been reached, the battery voltage shutdown point will be modified to $11V \times \text{number of battery cells}$, and the system will alarm for 1 minute when the battery continues to discharge to $11V \times \text{number of battery cells}$. Then shut down again.

When the battery voltage exceeds $13.2V \times \text{the number of battery cells}$ exceeds 30s, the battery discharge time will be reset.

5.3.25 Inverter soft start setting (SRE)

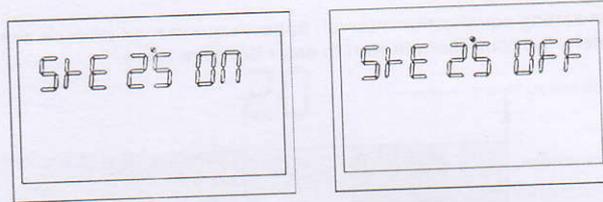


Figure 1-35 Inverter soft start setting page

Function description: When the setting is ON, the inverter output gradually increases from 0 to the target voltage point. This function is very suitable for the motor and the loads with motor. When the setting is OFF, the inverter output is directly increased from 0 to the target voltage point.

Setting conditions: at all states can be set.

illustrate:

SRE: Soft Relay Enable

The default setting is OFF, and the output switch will not be closed until the inverter voltage rises to the rated output. If set to On, the output switch will be closed before the inverter starts boosting.

5.3.26 Reset factory settings(SED)



Figure 1-36 Default value settings page

Function description: Restore all setting to factory settings.

Setting conditions: It can be set in mains mode and StandBy (no output but screen on state). It cannot be set when the battery mode.

illustrate:

SED: Set Default

Before the setting, this interface is displayed as OFF. When it is set to ON, the system will restore to factory settings. After the setting is completed, this interface will display OFF again.

5.4 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.

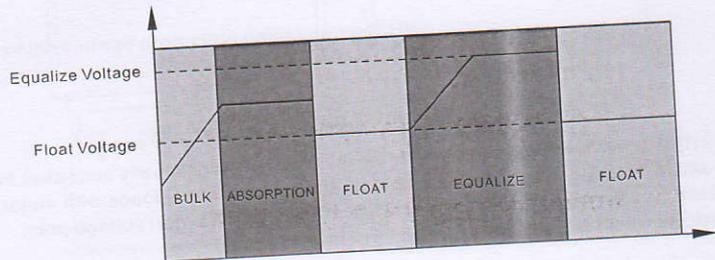
※ How to Apply Equalization Function

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.

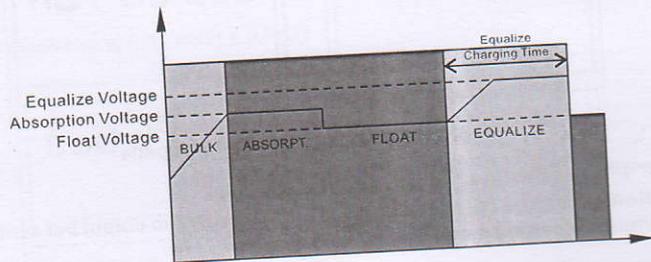
※ **When to Equalize**

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

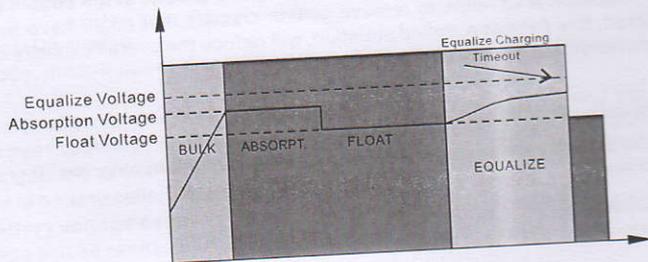


※ **Equalize charging time and timeout**

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



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



5.5 Fault and alarm description

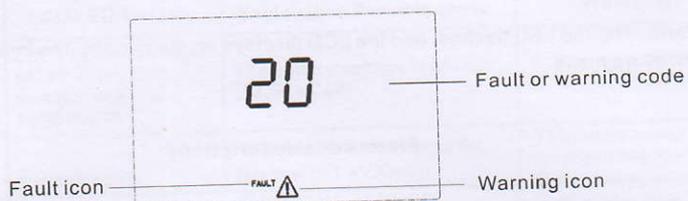


Figure 1-37 Fault and warning icons

Function description: The alarm code ALA flashes and the buzzer beeps once for 1s and stops after 1 minute. The fault indicator code is always on, the buzzer beeps for 10 seconds and then stops. After the fault is stopped and the fault is eliminated, Then try to restart the inverter. If the restart fails for three times, it will continue to be in the fault state.

The fault and alarm LCD display is as shown in the figure above, the fault icon in the fault mode is always on, and the alarm icon in the alarm state flashes. Kindly contact the manufacturer to eliminate the abnormal condition according to the fault information.

5.5.1 Faults Descriptions

➤ **Fault:** The inverter enters the fault mode, the red LED light is always on and the LCD displays the fault code.

Fault code descriptions

Fault code	English meaning	Recovering conditions	Alarm warning
1	Bus soft start fail	Unrecoverable	Fault
2	Bus high	Unrecoverable	Fault
3	Bus low	Unrecoverable	Fault
5	Over temperature	Unrecoverable	Fault
6	Battery high	Recoverable Not charging: 29V (high voltage point -2V); Charging: high voltage point -2V	Fault
7	Bus soft Fault	Unrecoverable	Fault
8	Bus short Fault	Unrecoverable	Fault
9	INV soft Fault	Unrecoverable	Fault
10	INV over voltage	Unrecoverable	Fault
11	INV under voltage	Unrecoverable	Fault
12	INV short circuit	Unrecoverable	Fault
13	Negative power	Unrecoverable	Fault
14	Overload fault	Unrecoverable	Fault
15	ModelFault	Unrecoverable	Fault
16	No boot loader	Unrecoverable	Fault

5.5.2 Warning Descriptions

➤ **Alarm:** The red LED flashes, and the LCD displays an alarm code, the inverter does not enter the failure mode

Alarm code descriptions

Alarm Code	English meaning	Inverter action	Recovering conditions	Alarm Warning
50	Battery not connected	Alarm, no charging	Battery voltage $\geq 10V \cdot n$	Alarm
51	Low battery shutdown	Alarm, battery low voltage shutdown or unable to boot	Auto-restart when battery voltage more then $(10V+0.2V) \cdot N$, N for numbers of battery serial group.	Alarm
52	Battery low	Alarm	Recoverable (action point + 0.2v/piece)	Alarm
53	Battery charge short	Alarm, no charging	Unrecoverable	Alarm
55	Over charge	Alarm, no charging	Recoverable MPPT non charging: 29V (high voltage point - 2V); MPPT charging: high voltage point - 2V	Alarm
57	Over temperature	Alarm, no charging	The temperature sensor of PFC or INV is lower than 90°C	Alarm
58	Fan lock	Alarm, If one fan fails, the other fan rotates at full speed	Recoverable	Alarm
59	EEPROM fail	Alarm	Unrecoverable	Alarm
60	Overload warning	Alarm, no charging	Reduce the load lower than 97%	Alarm
62	Weak energy from PV (For 5KVA high PV voltage type)	Turn off the PV output and charging	recover after 10 mins	Alarm

6 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. Recharge 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. Recharge battery 3. Replace battery
Mains exist but the unit works in battery mode.	Input voltage is displayed as on the LCD and green LED is flashing	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS & Appliance)
	Green LED is flashing	Set "SBU" 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.

7. Technical datasheet

Model		GA1012P	GA2024P	GA3024M	GA5048M	GA5548M
Input	Input Sources	L+N+PE				
	Rated Input Voltage	208/220/230/240VAC				
	Voltage Range	154-264VAC±3V(APP Mode)185-264VAC±3V(UPS Mode)				
	Frequency	50Hz/60Hz(Auto Adaptive)				
Output	Rated Capacity	1000W	2000W	3000W	5000W	5500W
	Output Voltage	208/220/230/240VAC±5%				
	Output Frequency	50/60Hz±0.1%				
	Waveform	Pure Sine Wave				
	Transfer Time (adjustable)	Computers(UPS Mode)10ms, Appliance(APP Mode)20ms				
	Peak Power	2000VA	4000VA	6000VA	10000VA	11000VA
	Over Load Ability	Battery Mode: 1min@102%~110% Load 10s@110%~130% Load 3s@130%~150% Load 200ms@>150% Load				
Peak Efficiency (battery Mode)	>93%	>93%	>94%	>94%	>94%	
Battery	Battery Voltage	12Vdc	24Vdc	24Vdc	48Vdc	48Vdc
	Constant Charging Voltage(Adjustable)	14. 1Vdc	28. 2Vdc	28. 2Vdc	56. 4Vdc	56. 4Vdc
	Floate Charging Voltage(Adjustable)	13. 5Vdc	27Vdc	27Vdc	54Vdc	54Vdc
Chargers	PV Charging Mode	PWM	PWM	MPPT	MPPT	MPPT
	MAX.PV Input Power	600W	1200W	1500W	5500W	5500W
	MPPT Tracking Range	N/A	N/A	30~115Vdc	120~430Vdc	120~430Vdc
	MAX.PV Input Voltage	55Vdc	80Vdc	145Vdc	450Vdc	450Vdc
	Best open circuit voltage range	15-30V	30-32V	70-110V	370-430V	370-430V
	Best voltage	15V	30V	60-90V	300-340V	300-340V
	MAX.PV Charging Current	50A	50A	60A	80A	80A
	MAX.AC Charging Current	50A	50A	60A	80A	80A
Display	LCD Display	Display Running Mode/Loads/Input/Output etc.				
	RS232	5PIN/Pitch2.0mm. Baud Rate2400				
Interface	Communication Port	2×5PIN/Pitch2.54mm,Lithium Lattery BMS Communication Card, WifiCard,DryContact				
	Parallel Connect Interface	Without Parallel Connect			With Parallel	
Environments	Operating Temperature	0~40℃				
	Humidity	20%~95%(Non-condensing)				
	Storage Temperature	-15~60℃				
	Altitude	Altitude Not Over 1000m,Derating over 1000m,Max 4000m. Refer to IEC62040				
	Noise	<50db				