

User Manual

2.5KW Modular Inverter/Charger

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ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

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

SAFETY INSTRUCTIONS



WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. 2 piece of 63A, 65VDC Fuses are provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

This is a multi-function modular inverter/charger which can be used as inverter, AC charger or solar charger in 19-inch shelf. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as various operation mode and settings.

Features

- Compact module design
- Parallel operation and module redundancy design
- Hot swappable
- Multi-function design

Basic System Architecture

The following illustrations show several basic applications for the 8 inverter/charger modules.

- All 8 units are configured as inverter modules. Simply plug all modules to the shelf, connect to battery or DC source at DC terminal and connect to appliances at AC output.

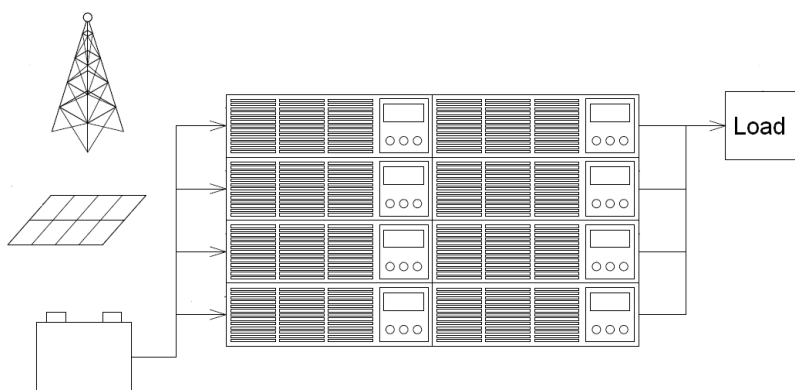


Figure 1 Inverter system

- All 8 power modules are configured as AC chargers. Simply plug all modules to the shelf, connect to utility power at AC input and connect to battery at DC terminal.

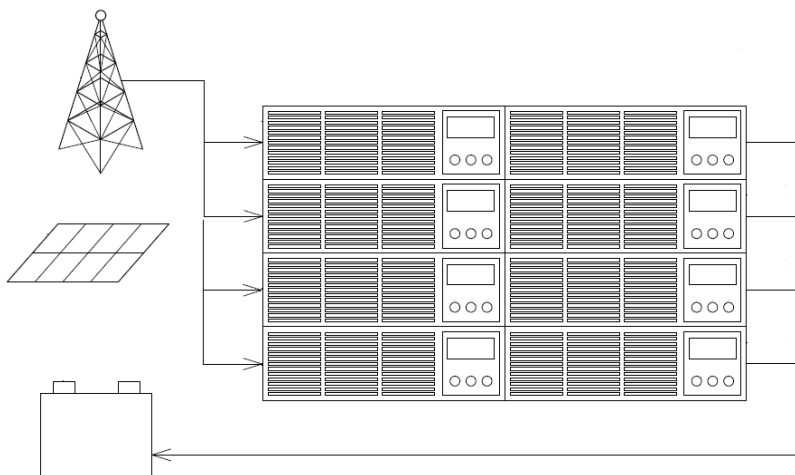


Figure 2 Utility power charger system

- All 8 power modules are configured as DC power modules. Simply plug all modules to the shelf. Connect utility power at AC input and connect DC load at DC output.

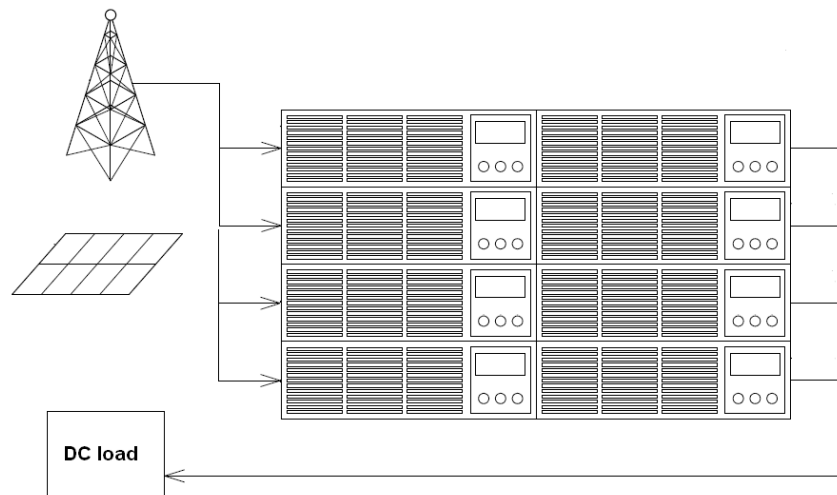


Figure 3 DC power system

- All 8 power modules are configured as solar chargers. Simply plug all modules to the shelf. Connect to solar panel at PV input on each 2U shelf and connect battery at DC terminal.

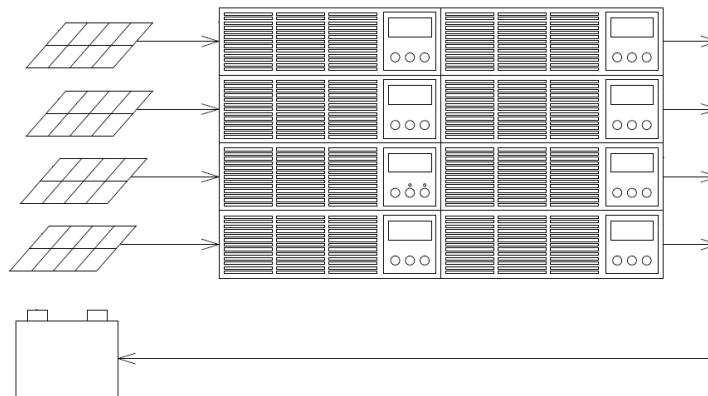


Figure 4 Solar charger system

- 4 modules are configured as AC chargers and 4 modules are configured as solar chargers. Simply plug 8 modules to the shelf. Connect to utility power at AC input for the utility power chargers and to solar panel at PV input for the solar chargers. At last, connect to battery at the DC terminal of each module.

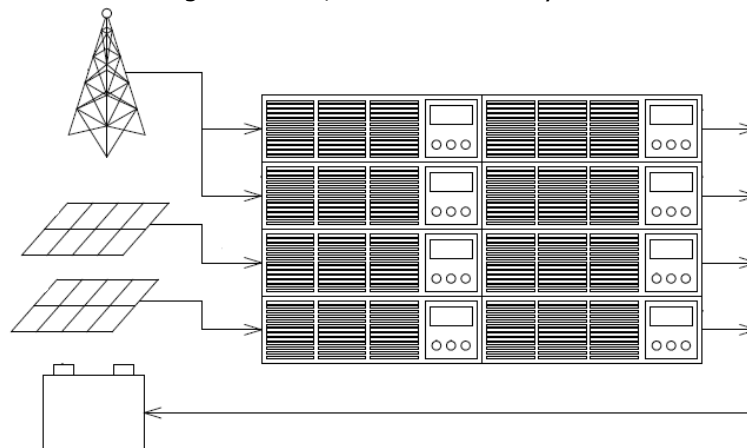


Figure 5 Hybrid charger system

- Two power modules are configured as utility power charger, two are configured as solar chargers and two are configured as inverters. Simply plug all modules to the shelf. Connect to utility power at AC input

for the utility power chargers, connects to solar panel at PV input for solar chargers and connect to AC appliances at AC output for inverters. Then, connect to battery at DC terminal for the utility power chargers, solar chargers and inverters.

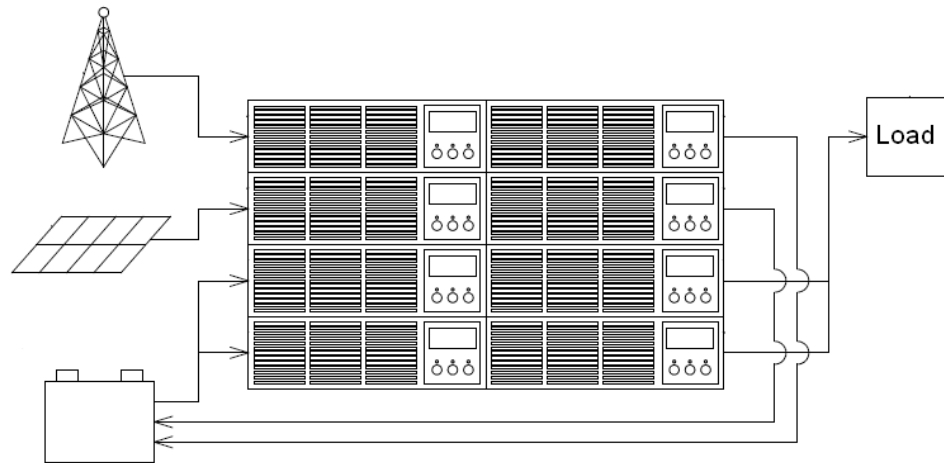
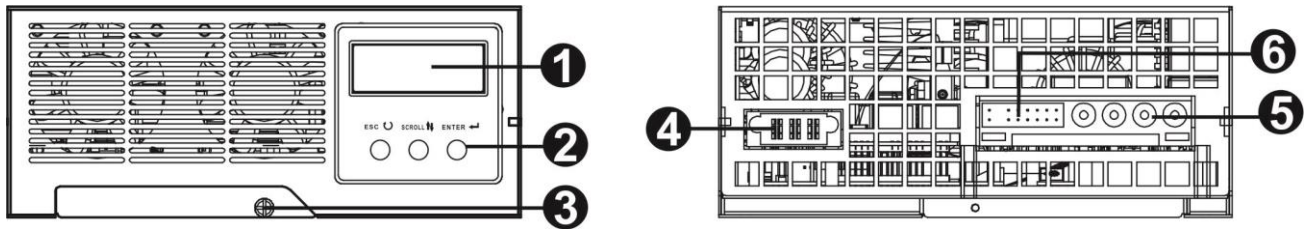


Figure 5 Inverter with hybrid charger system

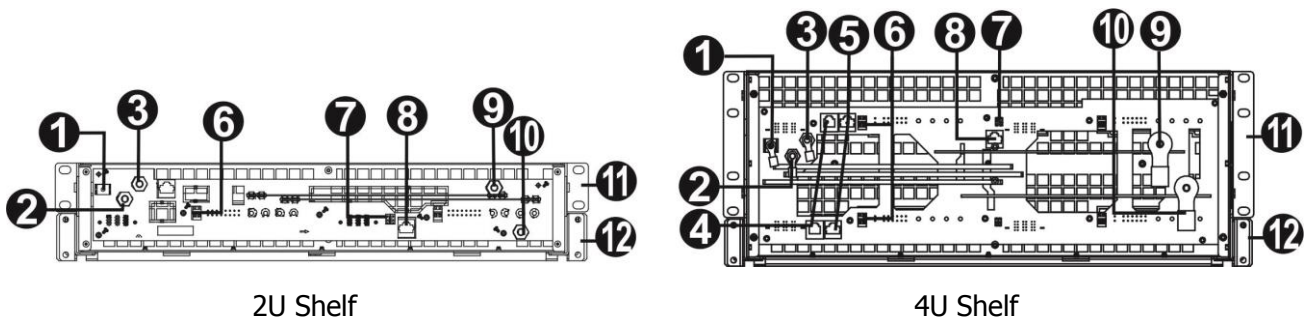
Product Overview

Power Module



1. LCD display
2. Function keys
3. Panel locker screw
4. AC input or PV input or AC output
5. DC terminal
6. Parallel port

Shelf



1. Neutral terminal of AC connection (AC-N) or negative terminal of PV connection (PV-)
2. Grounding terminal
3. Line terminal of AC connection (AC-L) or positive terminal of PV connection (PV+)
4. Current sharing port
5. Parallel communication port
6. Dry contact
7. RS232 Selection jumper (for firmware upgrade only)
8. RS232 Port (for firmware upgrade only)
9. Positive terminal of DC connection (DC+)
10. Negative terminal of DC connection (DC-)
11. Mounting bracket
12. Mounting slider

INSTALLATION

Unpacking and Inspection

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

Module package	Shelf package
<ul style="list-style-type: none">● Power module unit● User manual	<ul style="list-style-type: none">● Mounting bracket x 2● Mounting slider x 2● Slider manual● M6 clip x 2● M6 screws x 5● M4 screws x 4● Mounting screws x 2● Current sharing cable x 1 (only for 4U shelf)● Parallel communication cable x 1 (only for 4U shelf)

Placement

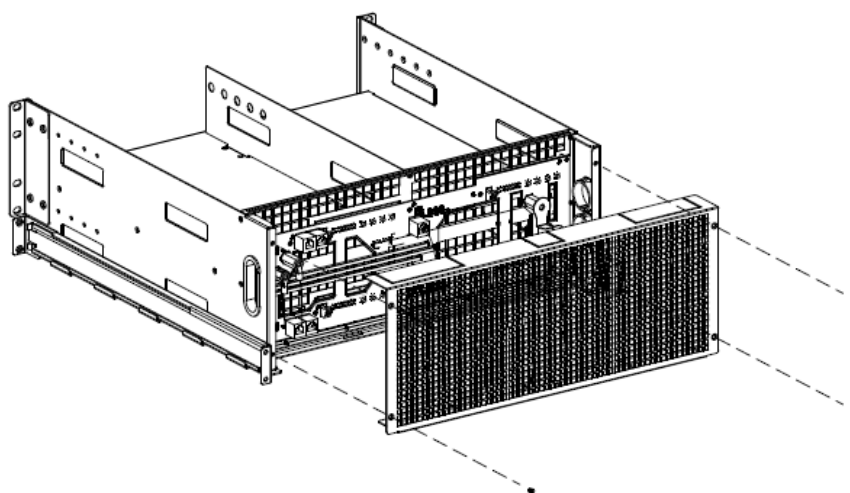
Consider the following points before installation:

- Do not mount the shelf on flammable construction materials.
- Mount on a stable rack or cabinet
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between -20°C and 55°C to ensure optimal operation.

Preparation

Before connecting all wirings, please follow below steps to prepare module installation:

1. Install two sliders on the two sides of a rack chassis or cabinet (refer to slider manual).
2. Fix the brackets to the shelf with supplied screws.
3. Take off rear cover from the shelf by removing 4 screws as shown below (4U for example).

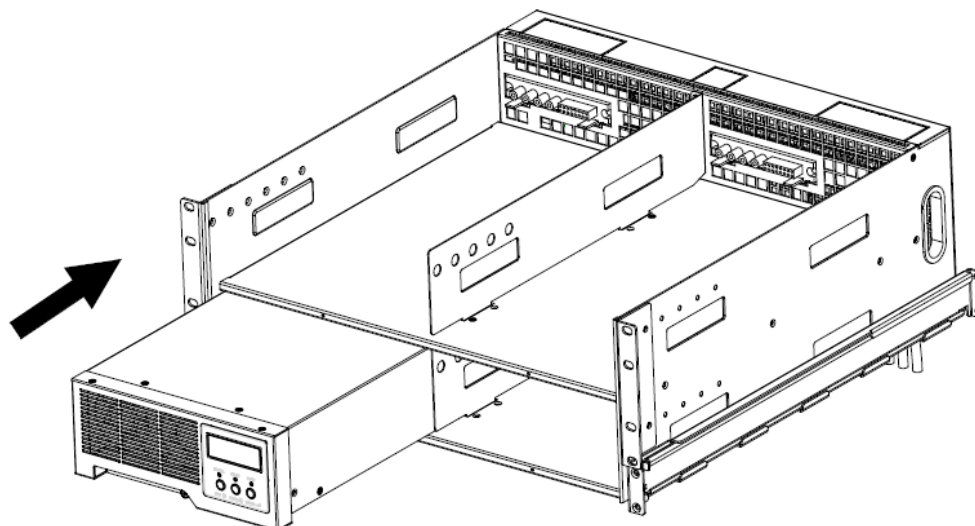


Unit Assembly

Please follow below steps to install modules into the shelf.

1. Place a module in the slot of shelf.
2. Push the module towards rear side of shelf.
3. Fix the unit with panel locker screw.

Module installation in 4U shelf for reference



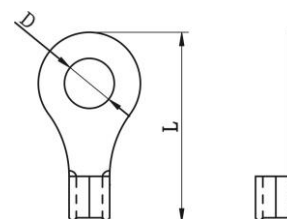
Battery Connection

CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.

WARNING! All wiring must be performed by 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 when the unit works as inverter, utility charger or solar charger.

Ring terminal:

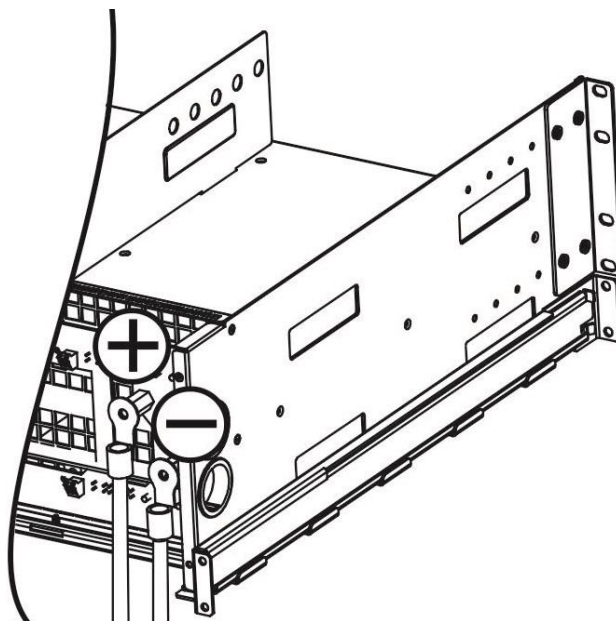


Recommended battery cable and terminal size:

Model	Typical Amperage	Battery Capacity	Wire Size	Ring Terminal			Torque Value
				Cable mm²	Dimensions		
					D (mm)	L (mm)	
2U Shelf	112 A	100 AH	1 * 4AWG	22	6.4	33.2	3~4 Nm
		200 AH	2 * 8AWG	14	6.4	29.2	
4U Shelf	224 A	200 AH	1 * 0AWG	60	6.4	49.5	3~4 Nm
			2 * 4AWG	38	6.4	39	

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as units requires. It's suggested to connect at least 200Ah capacity battery for 2U-shelf system and 4U-shelf system
3. The battery cable wiring direction can be horizontal or vertical depending on the space of rack chassis or cabinet. Make sure the screws are tightened with torque of 3-4 Nm. Make sure polarity at both the battery and the inverter/charge are correctly connected and ring terminals are tightly screwed to the battery terminals.



WARNING: Shock Hazard

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



CAUTION!! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.

CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

AC Connection Or PV Connection

These three connectors can be applied for AC connectors or PV connectors. If choosing AC connector function, please follow below steps to install AC wires. If choosing PV connector function, please skip this section to next section for the detailed PV wiring.

AC Connection

WARNING! All wiring must be performed by qualified personnel.

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

Suggested cable requirement for AC wires

Model	Gauge	Cable (mm ²)	Torque Value
2U Shelf	12 AWG	4	2~3 Nm
4U Shelf	8 AWG	10	2~3 Nm

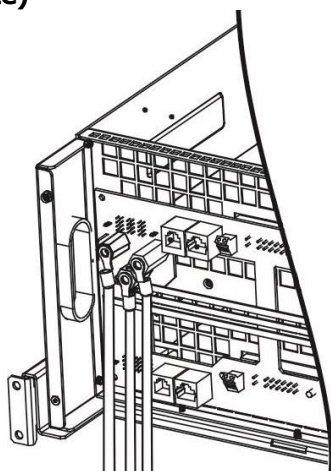
This AC connectors can do either AC input or AC output. Please follow below steps to implement AC connection:

1. Before making AC connection, be sure to open DC protector or disconnecter firstly.
2. Assemble AC wires based on recommended AC cable and terminal size.
3. Fix AC wires according to polarities indicated on terminal and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

⊕ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue or white)**



WARNING:

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

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between unit and AC input power source. This will ensure the unit can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 32A for 2U Shelf and 50A for 4U Shelf.

4. Make sure the wires are securely connected.

CAUTION: Important

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

PV Connection

CAUTION: When power module works as solar charger module, before connecting to PV modules, please install **separately** a DC circuit breaker between inverter and PV modules.

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 PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Typical Amperage	Gauge	Cable (mm ²)	Torque
2U Shelf	24A	12 AWG	4	2~3 Nm
4U Shelf	48A	8 AWG	10	2~3 Nm

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Max. PV Array Open Circuit Voltage	320Vdc max
PV Array MPPT Voltage Range	160~320Vdc
Min. battery voltage for PV charge	36Vdc

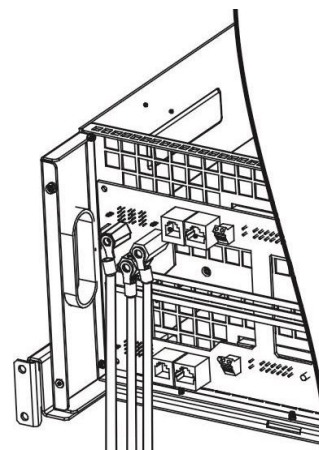
Please follow below steps to implement PV module connection:

1. Before making PV connection, be sure to open DC protector or disconnector first.
2. Assemble PV wires based on recommended cable and terminal size.
3. Fix PV wires according to polarities indicated on terminal and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

⊕ → **Ground (yellow-green)**

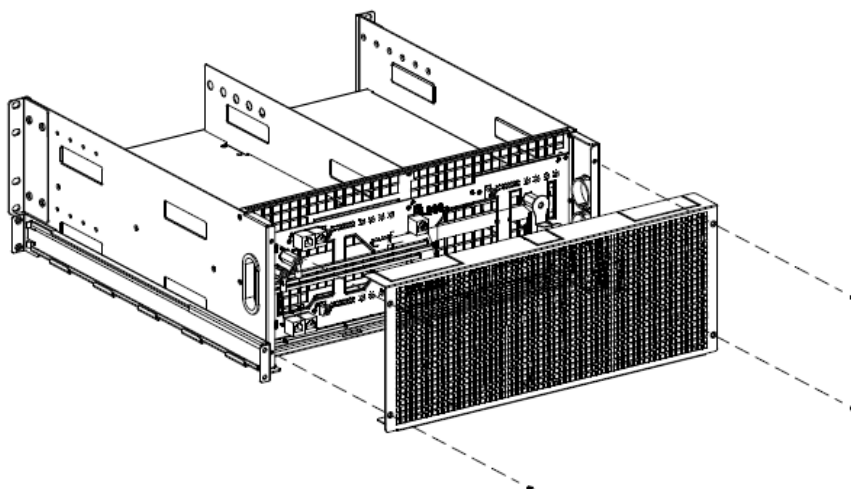
L → **PV+ (brown or red)**

N → **PV- (blue or black)**



Final Assembly

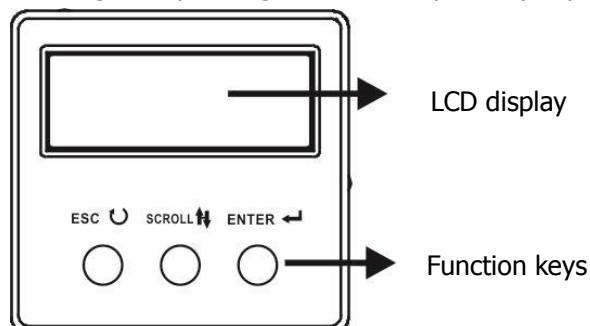
After connecting all wirings, please put rear cover back by screwing four screws as shown below.



OPERATION

Operation and Display Panel

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



Function Keys

Function Key	Description
ESC	To exit setting mode
SCROLL	To go to next selection or change value
ENTER	To confirm the selection in setting mode or enter setting mode

Operation Mode Setting

After power module and shelf are assembled well, please connect shelf to battery to set up power module function. It's requested to set up operation mode first before operation. The default operation mode is inverter mode. Refer to below steps to change operation mode.

1. After pressing and holding ENTER button for 3 seconds, the unit will enter setting menu. Please select program 86 by keep pressing "SCROLL" button. There are 4 options available: AC charger mode, inverter mode, solar charge mode and DC power mode. Please choose one option by pressing "ENTER" button for confirmation. Then, disconnect DC input from the module. After that, connect unit wiring according to the setting. (For other program setting, please check **LCD Setting**.)
2. Plug power module to the whole system and the power module will operate according to operation mode setting.

Turn On/Off Output

Once the power module has been properly installed and all wires are connected correctly, the module will be turned on/off output automatically according to operation mode setting.

Inverter mode

When the power module works as an inverter, it will automatically startup when the battery voltage is higher than cold-start voltage and will turn off output when battery voltage is lower than under voltage point.

AC charger or DC power

When the power module works as an AC charge or DC power, it will automatically startup when line voltage or battery voltage is within acceptable range. The unit will turn off output when line voltage or battery voltage is beyond acceptable range.

Solar charger

When the power module works as a solar charger, it can will automatically startup when PV voltage is within acceptable range. The unit will turn off output when PV voltage is beyond acceptable range.

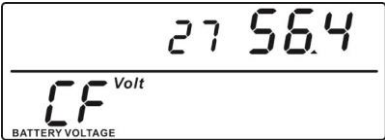

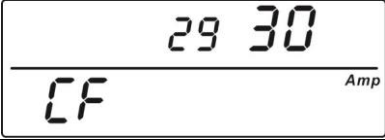
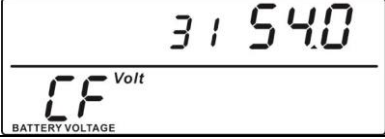
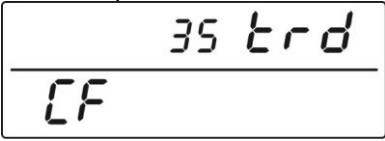
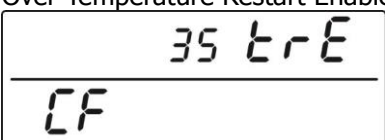
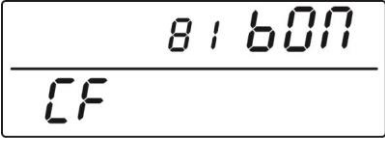
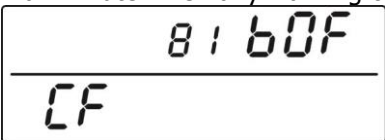
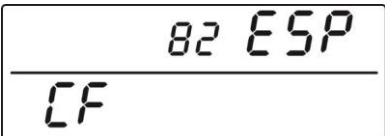
LCD Setting

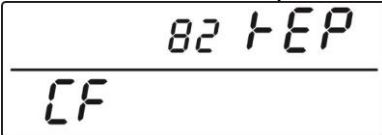
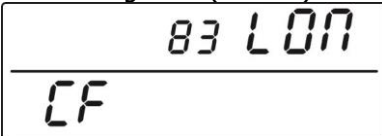
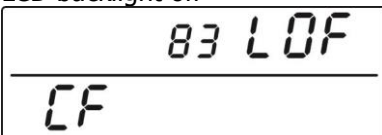
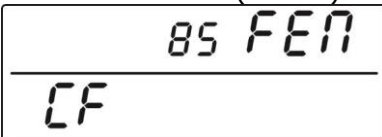
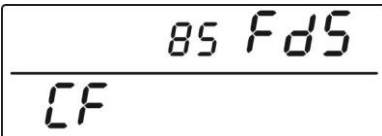
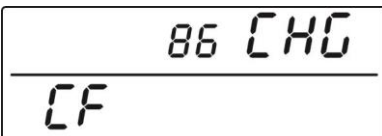
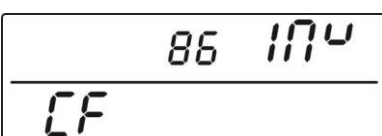
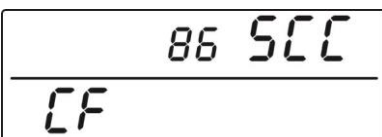
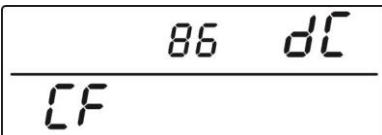
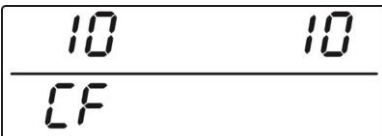
After pressing and holding ENTER button for 3 seconds, the unit will enter setting menu.

Press "SCROLL" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

Item	Description	LCD display	Applied Operation Mode
00	Exit setting menu	<div>00 ESC</div> <div>CF</div>	All
01	Output voltage configuration	Output voltage 220VAC <div>01 220</div> <div>CF</div>	Inverter Mode
		Output voltage 230VAC (Default) <div>01 230</div> <div>CF</div>	
		Output voltage 240VAC <div>01 240</div> <div>CF</div>	
02	Output frequency configuration	Output frequency 50Hz (Default). <div>02 50</div> <div>CF Hz</div>	Inverter Mode
		Output frequency 60Hz <div>02 60</div> <div>CF Hz</div>	
03	Battery under restart: Auto restart after battery shutdown occurs	Battery under restart enable (Default) <div>03 U-r-E</div> <div>CF</div>	Inverter Mode
		Battery under restart disable <div>03 U-r-d</div> <div>CF</div>	


04	Overload restart: Auto restart after overload shutdown occurs	Overload restart disable (Default) <div>04 Lrd CF</div>	Inverter Model
		Overload restart enable <div>04 LrE CF</div>	
05	Over temperature restart: Auto restart after over temperature shutdown occurs for inverter mode only	Over temperature restart disable (Default) <div>05 trd CF</div>	Inverter Mode
		Over temperature restart enable <div>05 trE CF</div>	
10	Cold start voltage	Setting range is from 45.0V to 55.0V. Increment of each click is 0.1V. Default value is 45.0V. <div>CS4 10 45.0 CF^{Volt} BATTERY VOLTAGE</div>	Inverter Mode
11	Low battery voltage	Setting range is from 45.0V to 55.0V. Increment of each click is 0.1V. Default value is 45.0V. <div>LO4 11 45.0 CF^{Volt} BATTERY VOLTAGE</div>	Inverter Mode
12	Battery shutdown voltage	Setting range is from 40.0V to 50.0V. Increment of each click is 0.1V. Default value is 40.0V <div>UD4 12 40.0 CF^{Volt} BATTERY VOLTAGE</div>	Inverter Mode
21	Battery Type	AGM <div>21 AGn CF BATTERY TYPE</div>	AC charger Mode/ Solar charger Mode
		Flooded <div>21 FLd CF BATTERY TYPE</div>	
		User-defined <div>21 USE CF BATTERY TYPE</div>	

27	Constant charging voltage Setting	<p>Setting range is from 48.0V to 58.4V. Increment of each click is 0.1V. Default value is 56.4V</p> 	AC charger Mode/ Solar charger Mode
28	Floating Charging Voltage Setting	<p>Setting range is from 48.0V to 58.4V. Increment of each click is 0.1V. Default value is 54.0V</p> 	AC charger Mode/ Solar charger Mode
29	Charging Current Setting	<p>Setting range is from 2A or 10A to 60A. Increment of each click is 10A. Default value is 30A.</p> 	AC charger Mode/ Solar charger Mode
31	DC output voltage setting	<p>Setting range is from 48.0V to 58.4V. Increment of each click is 0.1V. Default value is 54.0V</p> 	DC power mode
35	Over Temperature Restart: Auto restart after over temperature shutdown occurs for AC charger, solar charger and DC power modes	<p>Over Temperature Restart Disable</p> 	AC charger mode/ Solar charger mode/ DC power mode
		<p>Over Temperature Restart Enable</p> 	
81	Alarm control	<p>Alarm on when any warning occurs (Default)</p> 	All
		<p>Alarm mute when any warning occurs.</p> 	All
82	Auto return to default main page	<p>Enable (Default): If selected, no matter how users switch display screen, it will automatically return to default main page after no button is pressed for 1 minute.</p> 	All




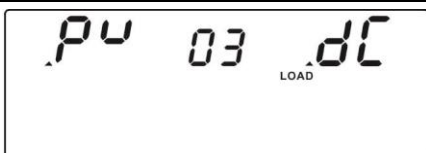

		Disable: If selected, the display screen will stay at latest screen user finally switches. 	All
83	Backlight control	LCD backlight on (Default) 	All
		LCD backlight off 	All
85	Record fault code	Fault record enable (Default) 	All
		Fault record disable 	All
86	Operation Mode Setting: Please refer to "Operation Mode Setting" section for the setup procedure	AC Charge Mode 	All
		Inverter Mode (Default) 	
		Solar Charge Mode 	
		DC Power Mode 	
	Firmware version display		All

Operation Mode and LCD Display

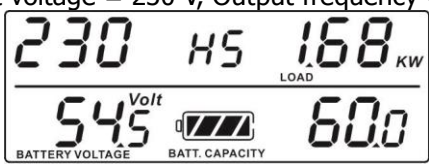
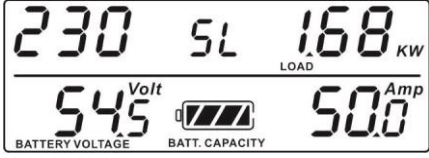
When the power module is powered on, the LCD will initialize for few seconds. Refer to below screen.

Initializing while power on	
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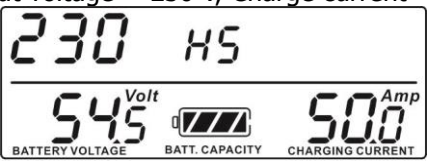
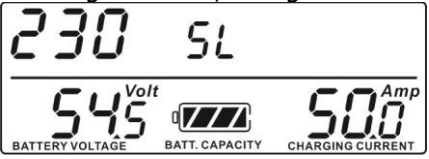
Then, the LCD will show operation mode screen based on different operation mode setting. Refer to below table for different operation mode screen. After 5 seconds, LCD screen will switch to main page to show all parameters of the power module.

Operation Mode	LCD Screen
Operation mode can't be recognized. LCD screen will blink for 5 seconds and then backlight is off.	
Inverter mode LCD screen will light on for 5 seconds and it' blue backlight.	
AC charger mode LCD screen will light on for 5 seconds and it' green backlight.	
Solar Charger mode LCD screen will light on for 5 seconds and it' white backlight.	
DC Power mode LCD screen will light on for 5 seconds and it' green backlight.	

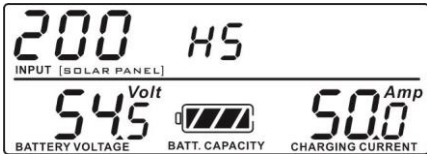
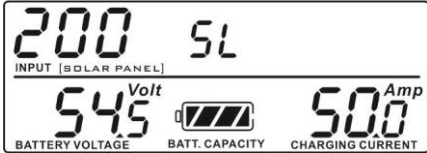

When the power module works as an inverter, LCD screen will show as the followings.

<p>Default main page: display all parameters of power module including output voltage, output frequency, connected load in kw, input battery voltage, battery capacity, Host or slave module* and fault code.</p>	<p>Host Inverter Output voltage = 230 V, Output frequency = 60Hz</p> 
<p>Second page: display setting operation mode</p>	<p>Slave Inverter Output voltage = 230 V, Output frequency = 50Hz</p> 

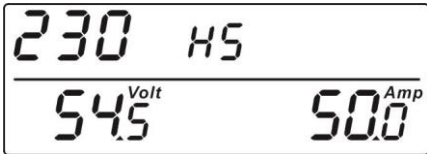
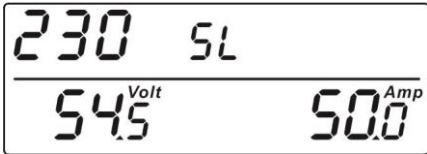

When the power module work as an AC charger, LCD screen will show as the followings.

<p>Default main page: display all parameters of power module including input voltage, output battery voltage, battery capacity, Host or slave module, charging current and fault code.</p>	<p>Host AC Charger AC Input voltage = 230 V, Charge current = 50.0A</p> 
<p>Second page: display setting operation mode</p>	<p>Slave AC Charger AC Input voltage = 230 V, Charge current = 50.0A</p> 























When the power module work as a solar charger, LCD screen will show as the followings.

<p>Default main page: display all parameters of power module including input voltage, output battery voltage, battery capacity, Host or slave module, charging current and fault code.</p>	<p>Host Solar Charger PV Input voltage = 200 V, Charge current = 50.0A</p>  <p>Slave Solar Charger PV Input voltage = 200 V, Charge current = 50.0A</p> 
<p>Second page: display setting operation mode</p>	<p>PV Charge Mode</p> 

When the power module work as a DC power module, LCD screen will show as the followings.



<p>Default main page: display all parameters of power module including input voltage, output voltage, Host or slave module, output current and fault code.</p>	<p>Host DC Power Module AC Input voltage = 230 V, Output voltage=54.5V</p>  <p>Slave DC Power Module AC Input voltage = 230 V, Output voltage=54.5V</p> 
<p>Second page: display setting operation mode</p>	<p>DC Power Mode</p> 

Fault Reference Code

Fault Code	Fault Event	Icon on
001	Fan locked	
002	Over temperature	
003	Battery voltage is high	
005	Output short circuited	
006	Output voltage is high	
007	Overload time out	
008	Bus voltage is high	
009	Bus soft start fails	
051	Over current or surge	
052	Bus voltage is too low	
053	Inverter soft start fails	
056	Battery Open	
057	Current sensor fails	
058	Output voltage is too low	
060	Negative power fault	
070	Operation mode setting is not corresponding to wire connection.	
071	CAN protocol versions are different between power modules	
072	Current sharing fault	
080	CAN communication fault	
081	Host signal loss	
082	Synchronize signal loss	
083	Battery voltage detection error	

NOTE: Fault codes **005, 006, 007, 053, 058, 060** and **072** are only available in in Inverter mode.

Warning Indicator

Warning Event	Audible Alarm	Icon flashing
Fan is locked when inverter is on.	Beep three times every second	ERROR
Overload	Beep once every 0.5 second	888 ^W LOAD OVERLOAD ^{KW}
PV voltage is high or low	Beep once every 1 second	888 ^W INPUT [SOLAR PANEL] ^{KW}
Battery open	Beep once every 0.5 second	888 ^{Volt} BATTERY VOLTAGE
Battery voltage is too high	Beep once every 1 second	888 ^{Volt}  BATTERY VOLTAGE BATT. CAPACITY
Battery voltage is too low	Beep once every 1 second	888 ^{Volt}  BATTERY VOLTAGE BATT. CAPACITY
Grid voltage is abnormal	Beep once every 1 second	888

SPECIFICATIONS

Table 1 Electrical Specification, Inverter

Inverter Mode	
Nominal DC Voltage	48Vdc
DC Operation Range	40VDC ~ 60VDC (...S.P.S. start at 44Vdc, shutdown at 41Vdc)
Cold Start Voltage	45Vdc
Low/High DC Warning Voltage	45VDC/58VDC
Low/High DC Cut-off Voltage	40VDC/60VDC
Isolation AC-DC	Reinforced isolation 4242Vdc/1min
Inrush Current	< 1.5 * rated current @ nominal voltage
DC Input Protection	Reverse polarity protection
Reflected Psophometric Noise Current	< 1%
Reflected Wide Band Noise Current	< 10%
Peak to peak noise	150mV up to 100MHz
Rated Output Power	2.5KVA/2.5KW
Output Voltage Waveform	Pure Sine Wave
Output Voltage	220/230/240Vac selectable
Voltage Regulation	±2%
Output Frequency	50/60 Hz selectable
Peak Efficiency	93%
Overload Protection	5s@>150% load; 10s@110%~150% load (NTC protected at 110 degree)
Surge Capacity	2 * rated power for 5sec
THDV	<3% for linear load; <5% for non-linear load @Vdc > warning level
Crest Factor	3:1
DC Offset	≤100mV
Parallel Operation Capability	Max 8pcs parallel
Load sharing	5% (@Load >50%)

Table 2 Electrical Specifications, AC Charger/DC Power module

AC Charger Mode	
Max. Charger Power	2500W
Max. Charging Current	60Amp
Charger Feature	3 Step
Output regulation	$\pm 0.5\%$
Power factor	$> 99\%$
Peak Efficiency	92%
Input Voltage Waveform	Sinusoidal (utility or generator)
Low Loss Voltage	175Vac $\pm 7V$
Low Loss Return Voltage	185 Vac $\pm 7V$
High Loss Voltage	275Vac $\pm 7V$
High Loss Return Voltage	265Vac $\pm 7V$
Low Loss Frequency	40 ± 1 Hz
Low Loss Return Frequency	42 ± 1 Hz
High Loss Frequency	65 ± 1 Hz
High Loss Return Frequency	63 ± 1 Hz
Max AC Input Voltage	300Vac
Parallel Operation Capability	Max 8pcs parallel

Table 3 Electrical Specifications, Solar Charger

Solar Charger Mode	
Rated Charger Power	2500W
Max. Charging Current	60Amp
Charger Feature	3 step
Output regulation	$\pm 0.5\%$
Solar Charger Type	MPPT
Max. PV Array Open Circuit Voltage	320Vdc
PV Array Voltage High Loss	325Vdc
PV Array Voltage High Comeback	320Vdc
PV Array Voltage Low Loss	155Vdc
PV Array Voltage Low Back	160Vdc
PV Array MPPT Voltage Range	160Vdc ~ 320Vdc
Parallel Operation Capability	2pcs module as sub-system
Output power de-rating: When PV input voltage drops to 230V, the output power will be de-rated.	<p>The graph illustrates the output power de-rating characteristic of the solar charger. The x-axis represents the input voltage in Volts (V), with key points at 160V, 230V, and 320V. The y-axis represents the output power. The power remains constant at a low level until 160V. Between 160V and 230V, the power increases linearly, reaching the 'Rated Power' at 230V. From 230V to 320V, the output power remains constant at the 'Rated Power' level. A horizontal dotted line at 70% of the Rated Power intersects the linear ramp at 160V, indicating the de-rating point.</p>

Table 4 General Specifications

Operation Temperature Range	-20 °C to 55 °C
Storage Temperature Range	-30°C ~ 70°C
Altitude	0 ~ 1500 Meters
Relative humidity	5% ~ 95% non-condensing
Audible Noise	<50dB
Cooling	Forced Air
Safety Certification	CE
Housing Dimension (L*W*H), mm	408.5 *215 * 88
Packing Dimension (L*W*H), mm	500 * 300 * 200
Housing Color	Silver/Black
Net Weight, kg	5.8

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
No response after power on.	No indication.	1. The battery voltage is far too low. 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Buzzer beeps continuously and red backlight is on.	Fault code 07	Overload error. The unit is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 110°C.	Check whether the air flow of the unit is blocked or 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	Power module works as an inverter and output voltage is abnormal*. Note: Output voltage is lower 30Vac than rated output voltage or higher 20Vac than rated output voltage.	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit. If the error happens again, please return it to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well and problem remains, please return it to repair center.
	Fault code 70	The input source is not matching for the current operation mode.	Check whether the input source is right connected. Or change the operation mode setting.