

USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

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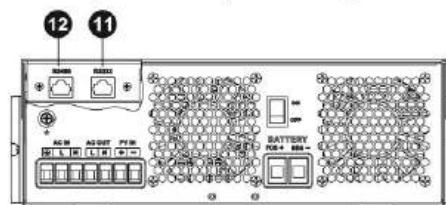
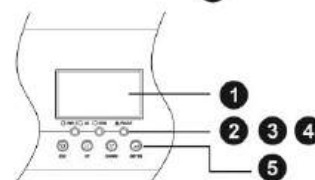
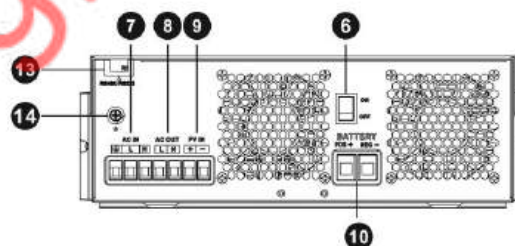
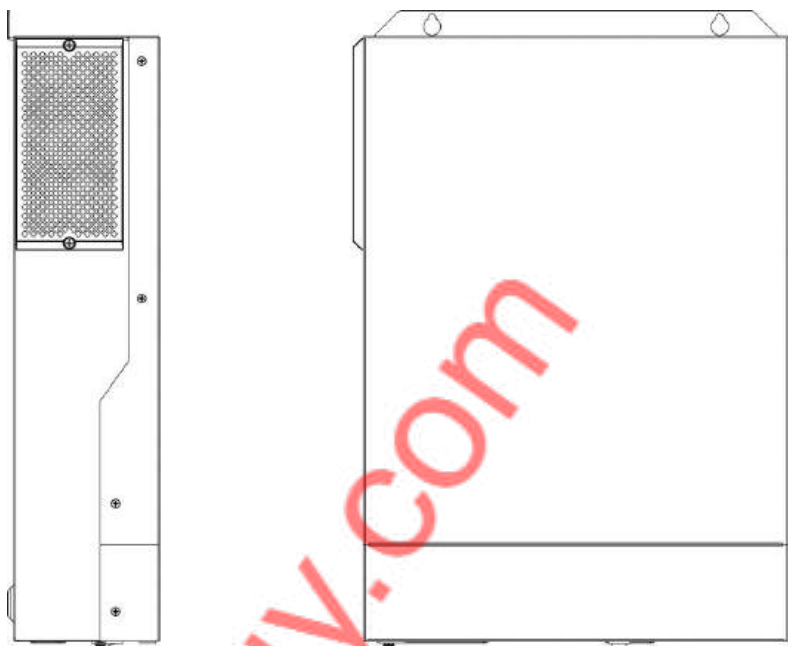
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PRODUCT OVERVIEW



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232 communication port
12. RS485 communication port
13. Wire outlet hole
14. Grounding

INSTALLATION

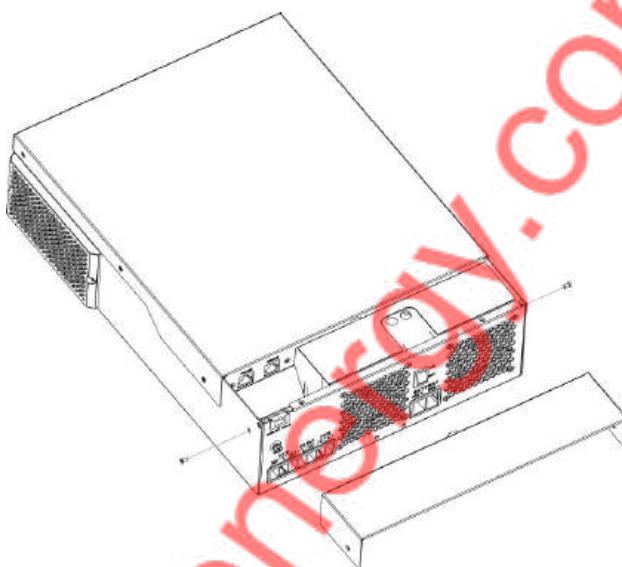
Unpacking and Inspection

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

1. The unit x 1
2. User manual x 1

Preparation

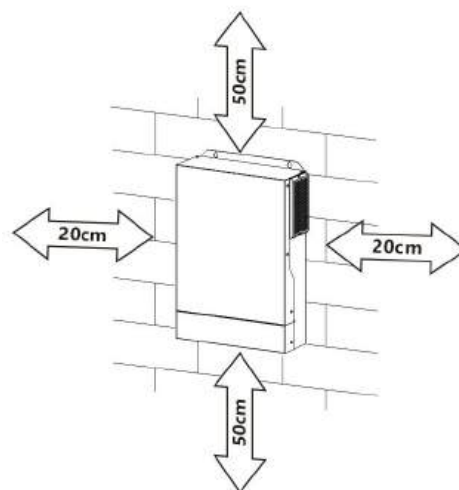
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

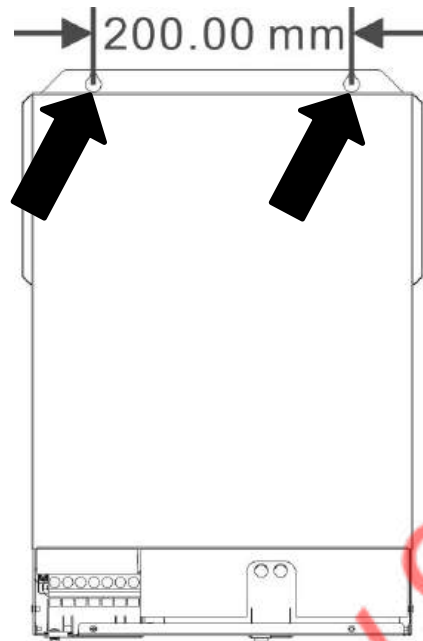
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



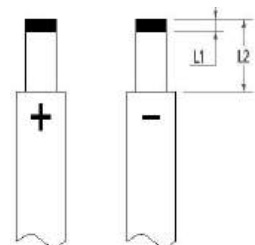
Battery Connection

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 a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable, stripping length(L2) and tinning length(L1) as below.

Stripping Length:

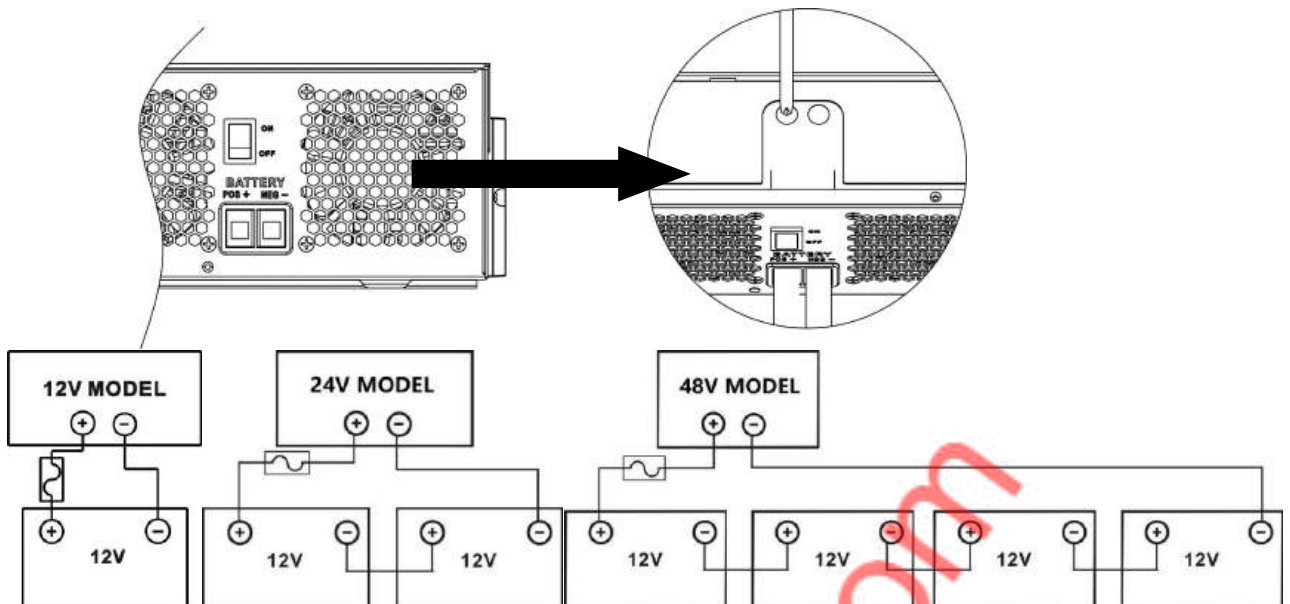


Recommended battery cable, stripping length (L2) and tinning length(L1):

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm ²	L1 (mm)	L 2 (mm)	Torque value
All Models	137A	100AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

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

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

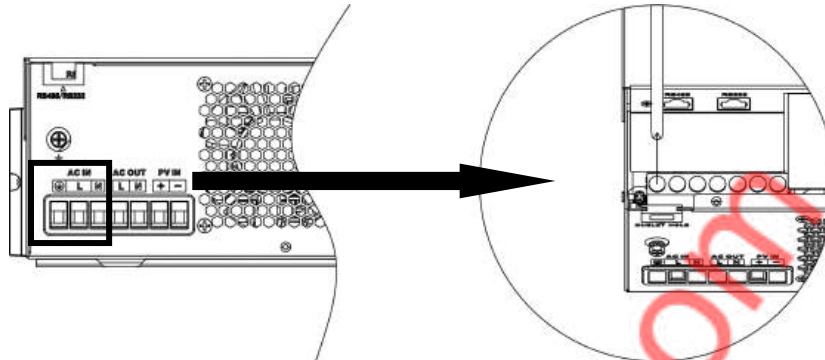
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
1.5KVA	12AWG	1.4~ 1.6Nm
4KVA	10AWG	1.4~ 1.6Nm
5.5KVA/6.2KVA	8 AWG	1.4~ 1.6Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

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



WARNING:

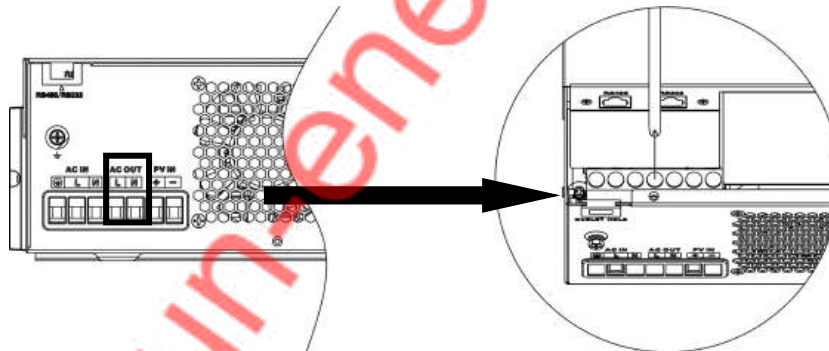
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
1.5KVA (PVmax=160V)	30A	10 AWG	1.4~1.6 Nm
4KVA (PVmax=160V)	40A	8 AWG	1.4~1.6 Nm
4KVA	15A	12 AWG	1.4~1.6 Nm
5.5KVA	18A	12 AWG	1.4~1.6 Nm
6.2KVA	27A	12 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode					
INVERTER MODEL	4KVA	5.5KVA	6.2KVA	1.5K~4KVA (PVmax=160V)	
Max. PV Array Open Circuit Voltage	500DC			160VDC	
PV Array MPPT Voltage Range	60VDC~500VDC			30-160V	
Max. PV INPUT CURRENT	15A	18A	27A	30A(1.5K)	50A(3.5K)

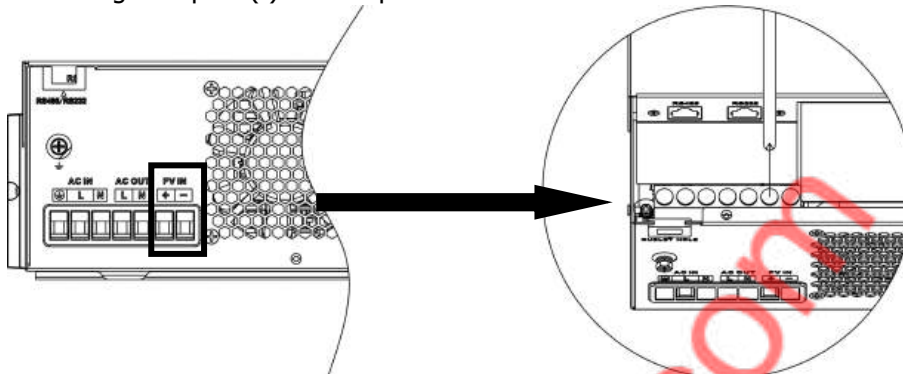
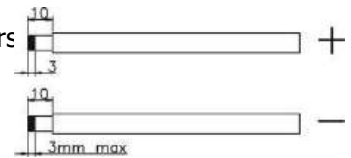
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,350 W	4KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	1,800 W	
	5 pcs in serial	5 pcs	2,250 W	
	6 pcs in serial	6 pcs	2,700 W	
	7 pcs in serial	7 pcs	3,150 W	
	8 pcs in serial	8 pcs	3,600 W	
	9 pcs in serial	9 pcs	4,050 W	
	10 pcs in serial	10 pcs	4,500 W	5.5KVA/6.2KVA
	11 pcs in serial	11 pcs	4,950 W	
	12 pcs in serial	12 pcs	5,400 W	6.2KVA
	6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W	
	8 pieces in serial and 2 sets in parallel	14 pcs	6,300 W	
	1 pcs in serial	1 pcs	450W	4KVA(PVmax=160V)
2 pcs in serial	2 pcs	900W		
3 pcs in serial	3 pcs	1,350 W		
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,650 W	4KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	2,200 W	
	5 pcs in serial	5 pcs	2,750 W	
	6 pcs in serial	6 pcs	3,300 W	
	7 pcs in serial	7 pcs	3,850 W	
	8 pcs in serial	8 pcs	4,400 W	
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	5.5KVA/6.2KVA
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W	
	6 pieces in serial and 2 sets in parallel	12 pcs	6,600 W	6.2KVA
	1 pcs in serial	1 pcs	550W	
	2 pcs in serial	2 pcs	1000W	1.5K/4KVA(PVmax=160V)
	3 pcs in serial	3 pcs	1,500 W	4KVA(PVmax=160V)

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

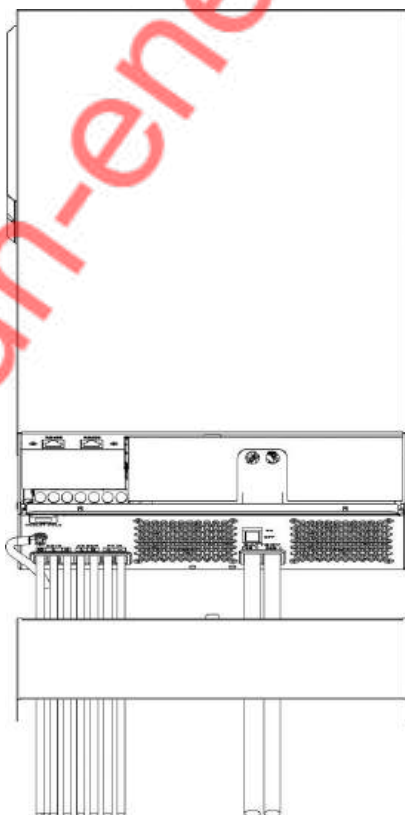
1. Remove insulation sleeve 10 mm for positive and negative conductors
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



3. Make sure the wires are securely connected.

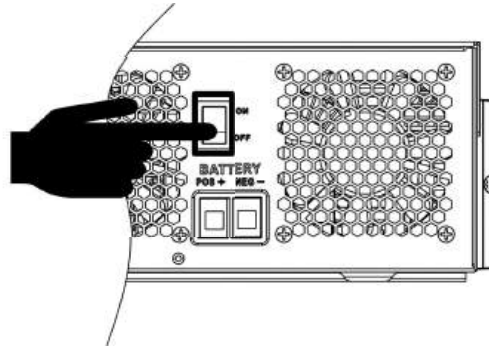
Final Assembly

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



OPERATION

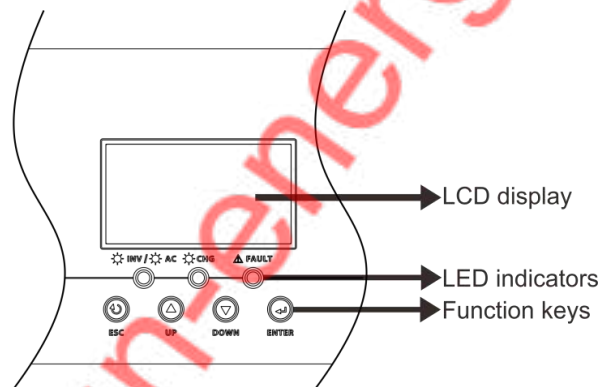
Power ON/OFF



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

Operation and Display Panel

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



LED Indicator

LED Indicator		Messages	
	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Setting

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





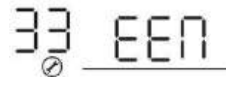
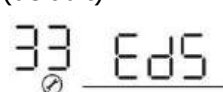
Setting Programs:

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Solar first 01 SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first (default) 01 UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 01 SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 01 SUB	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time. Note: SUB priority is just for PVmax=500Vdc model.





02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 60 ^A	If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 03 Gnt	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		05 LI2	Support PYLON US2000 Protocol 3.5 Version
		05 LI4	Standard communication Protocol form inverter supplier
06	Auto restart when overload occurs	Restart disable 06 Lfd	Restart enable (default) 06 LfE
07	Auto restart when over temperature occurs	Restart disable 07 tfd	Restart enable (default) 07 tFE
08	Output voltage	220V 08 220 ^v	230V (default) 08 230 ^v
		240V 08 240 ^v	

09	Output frequency	50Hz (default) 09 50 Hz	60Hz 09 60 Hz
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 10 nPL	auto 10 ALO
11	Maximum utility charging current	30A (default) 11 30A If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC.	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.	
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.	
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.	
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Battery fully charged (default) 13 BATT FUL	48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 24V models: Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 12V models: Setting range is from 12V to full (the value of program13-0.4V), but the max setting value must be more than the value of program12.

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 16 C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 O50	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Buzzer mode	Mode1 BU2 18 nd1	Buzzer mute
		Mode2 BU2 18 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 BU2 18 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) BU2 18 nd4	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 BEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 23 byd	Bypass enable(default) 23 byE

25	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 	
26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.	
27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26	
29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V	
32	Bulk charging time (C.V stage)	Automatically (Default): 	If selected, inverter will judge this charging time automatically.
		5 min 	The setting range is from 5 min to 900 min. Increment of each click is 5 min.
		900 min 	
If "USE" is selected in program 05, this program can be set up.			
33	Battery equalization	Battery equalization 	Battery equalization disable (default)
		 If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

34	Battery equalization voltage	12V models default setting is 14.6V. Setting range is from floating voltage ~ 15.5V. Increment of each click is 0.1V. 24V models default setting is 29.2V. Setting range is from floating voltage ~ 31V. Increment of each click is 0.1V. 48V models default setting is 58.4V. Setting range is from floating voltage ~ 64V. Increment of each click is 0.1V.	
35	Battery equalized time	60min (default) 35 60	Setting range is from 0 min to 900min.
36	Battery equalized timeout	120min (default) 36 120	Setting range is from 0min to 900 min.
37	Equalization interval	30days (default) 37 30d	Setting range is from 1 to 90 days.
39	Equalization activated immediately	Enable 39 AEN	Disable (default) 39 AdS
		If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page..	
41	Automatic activation for lithium battery	AAt 41 nNL	Disable automatic activation (default)
		AAt 41 Ato	When Program05 is selected "Lix" as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit.
42	Manual activation for lithium battery	nAt 42 NOP	Default: disable activation
		nAt 42 Act	When Program05 is selected "Lix" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.
43	Setting SOC point back to utility source when selecting "SBU priority" or "Solar first" in program 01	43 050% ^{BAT}	Default 50%, 5%~50% Settable, but the minimum setting value must be more than the value of program 45.

44	Setting SOC point back to battery mode when selecting "SBU priority" or "Solar first" in program 01		Default 95%, 60%~100% Settable
45	Low DC cut-off SOC		Default 20%, 3%~30% Settable, but the max setting value must be less than the value of program 43.
46	Maximum discharge current protection when selecting "single" in program 28		Default OFF Disable current discharge current protection function
			Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value.

BATTERY EQUALIZATION

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.

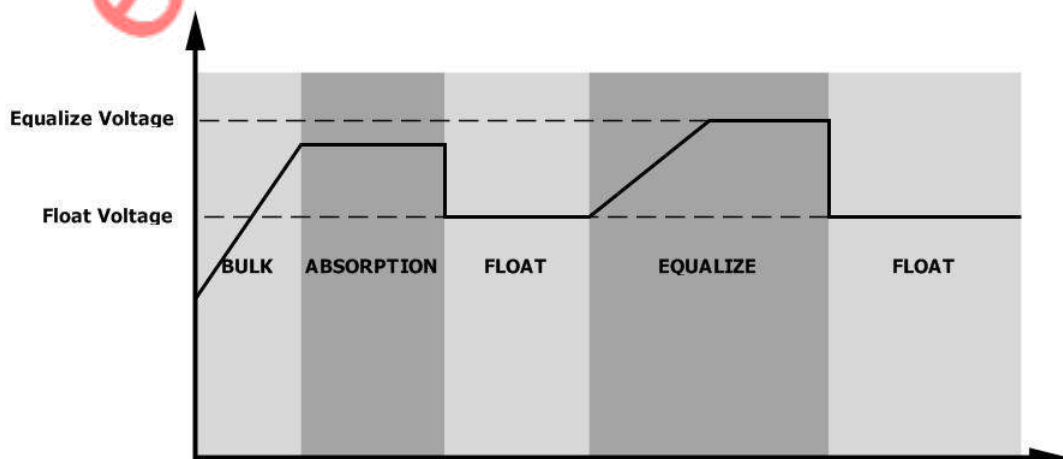
● How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

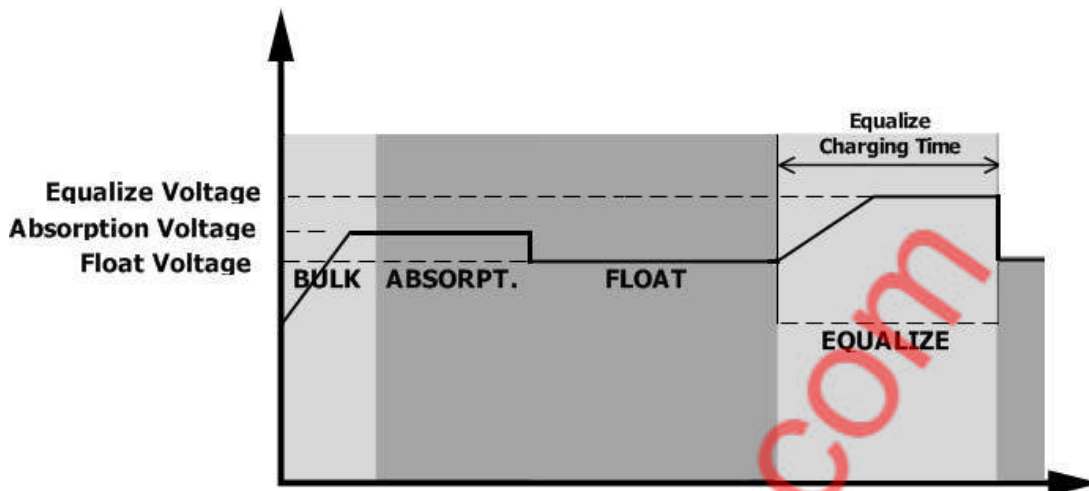
● When to Equalize

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

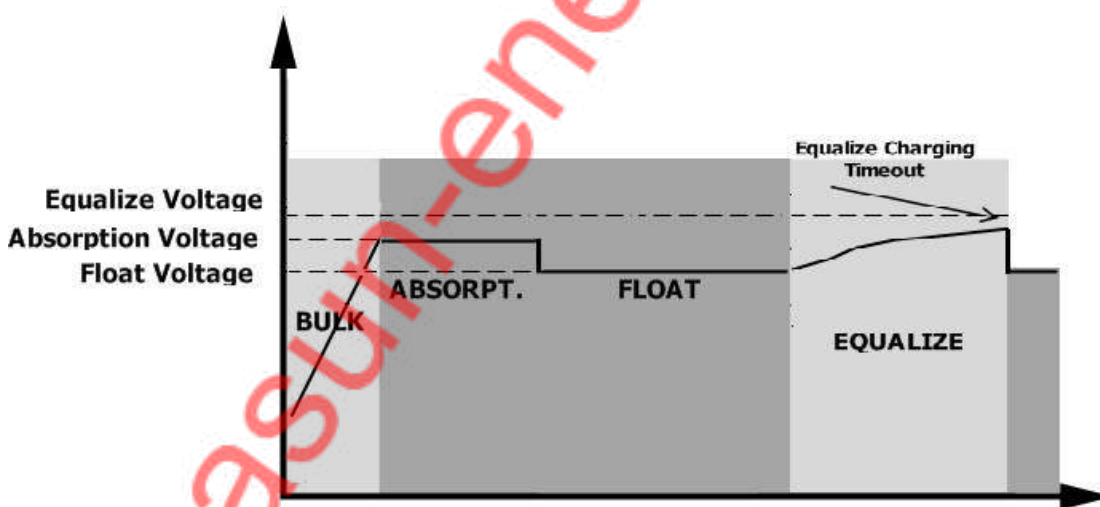


- **Equalize charging time and timeout**

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.



SETTING FOR LITHIUM BATTERY

Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

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

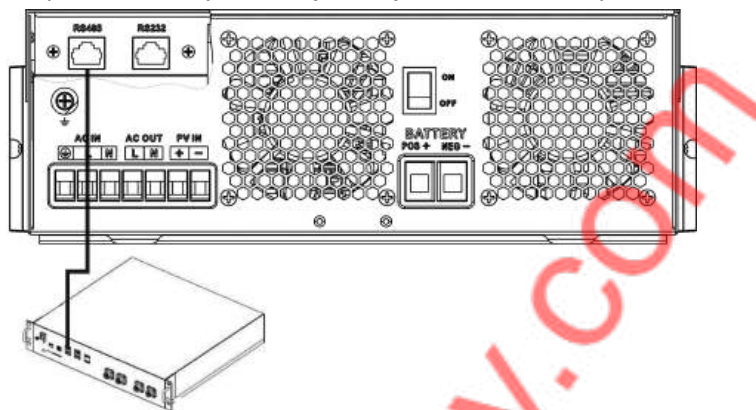


Fig 1

Lithium battery communication and setting

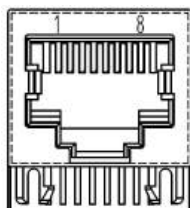
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

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

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

Pin number	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B



LCD setting

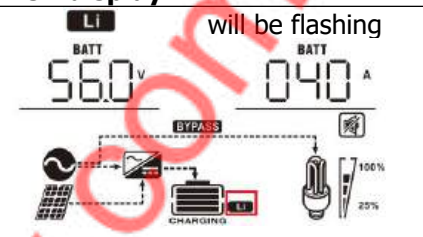
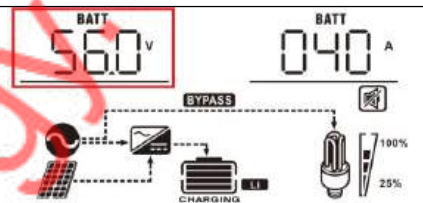
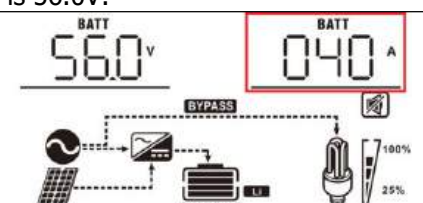


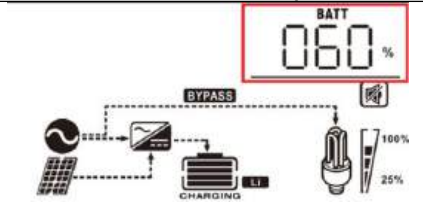
After connecting, you need to finish and confirm some settings as follow:

- 1) Select program 05 as lithium battery type.
- 2) Confirm program 41/42/43/44/45 setting value.

Note: Program 43/44/45 are only available with successful communication, they will replace the Program 12/13/29 function, at the same time, program 12/13/29 become unavailable.

LCD Display

If communication between the inverter and battery is successful, there is some information showing on the LCD as follow:

Item	Description	LCD display
1	Communication successful icon	 <p>will be flashing</p>
2	Max lithium battery charging voltage	 <p>Max lithium battery charging voltage is 56.0V.</p>
3	Max lithium battery charging current	 <p>Max lithium battery charging current is 40A.</p>
4	Lithium battery discharging is forbidden	
5	Lithium battery charging is forbidden	
6	Lithium battery SOC(%)	 <p>Lithium battery SOC is 63AH and 60%</p>

Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

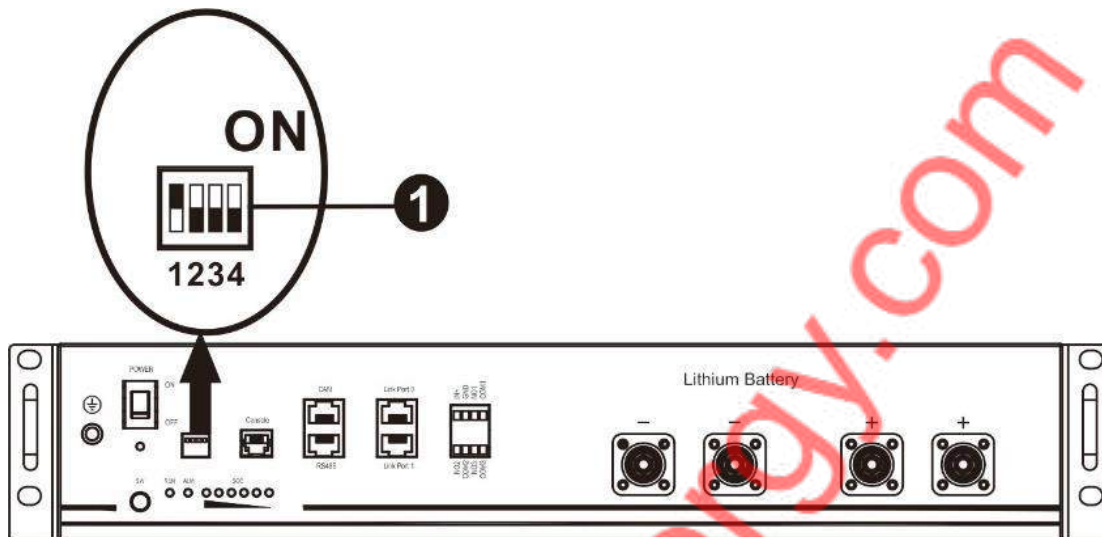
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

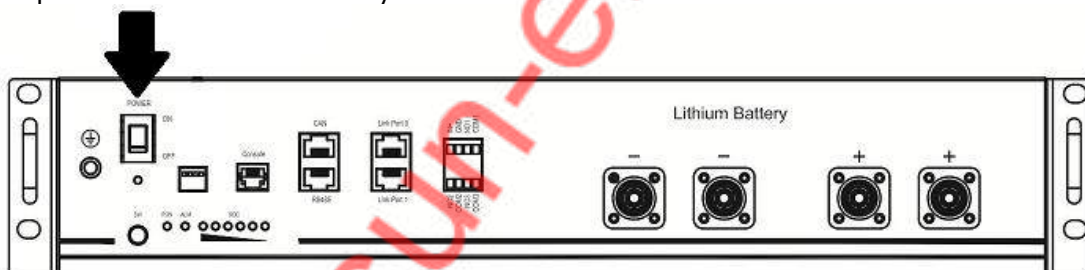
NOTE: "1" is upper position and "0" is bottom position.



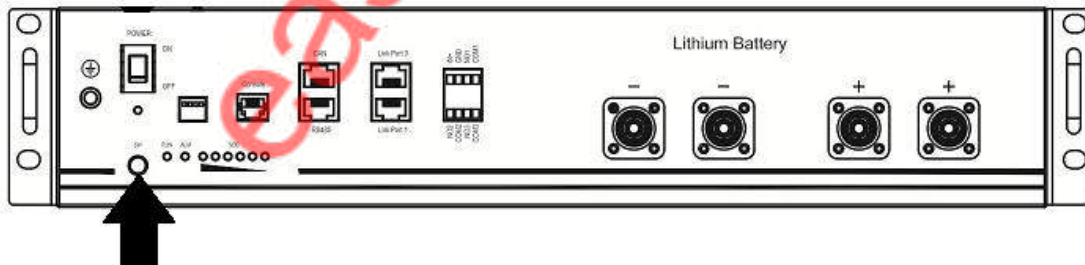
2). Process of install

Step 1. Use the RS485 cable to connect inverter and Lithium battery as Fig 1.

Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "Li2" in LCD program 5.

If communication between the inverter and battery is successful, the battery icon **Li** on LCD display will light

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

1. Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage

2. Set battery type as "USE" (user-defined)

05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program 27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.
----	-------------------------------------	---

4. Set floating charging voltage as C.V voltage.

27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26
----	---------------------------	--

5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program 12. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V
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6. Set Max charging current which must be less than the Max charging current of BMS.

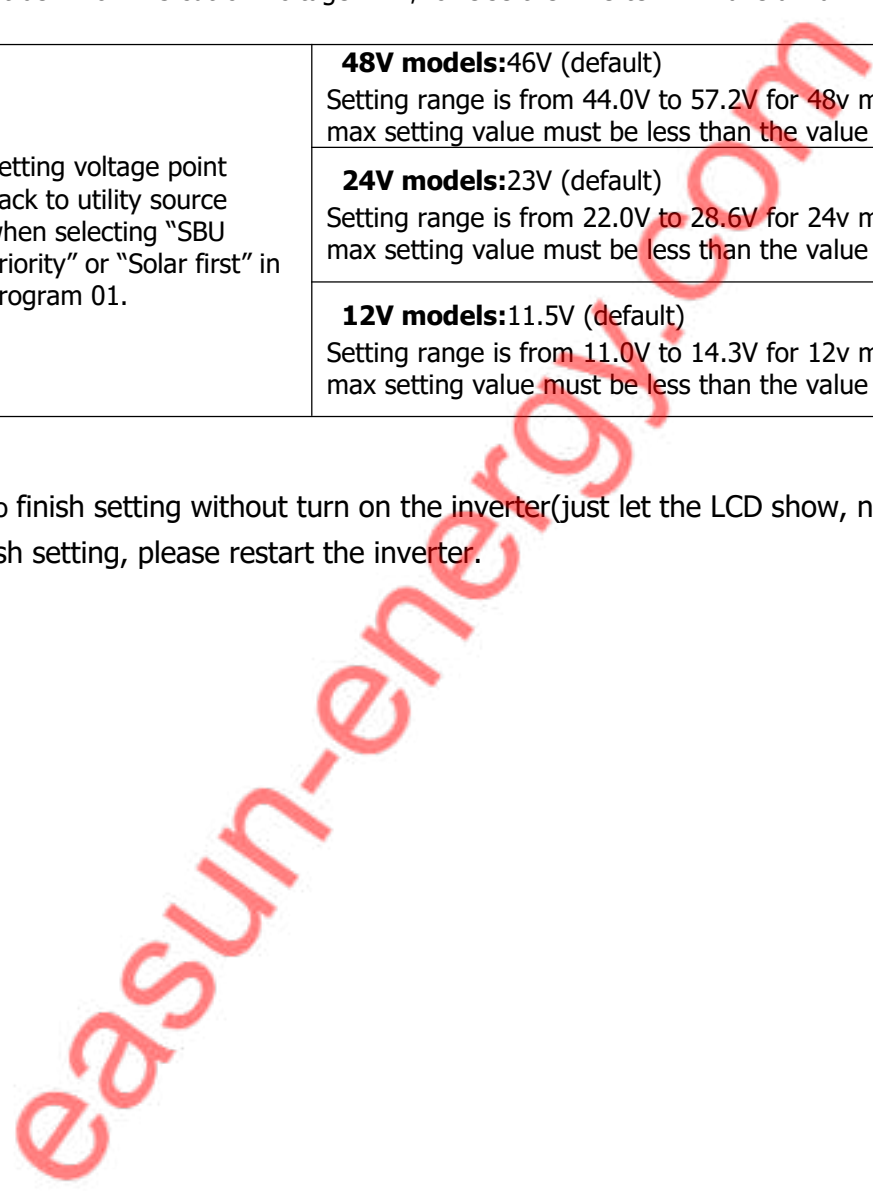
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 60 A	If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
----	---	--------------------------	--

7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01. The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.






















12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.

Remark:





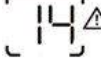
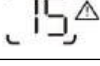
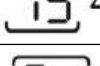
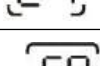
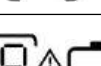

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.



Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
14	Fan blocked	None	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
21	Lithium Battery over current	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	1.5KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Input Voltage Waveform	Sinusoidal (utility or generator)				
Nominal Input Voltage	230Vac				
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)				
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)				
High Loss Voltage	280Vac±7V				
High Loss Return Voltage	270Vac±7V				
Max AC Input Voltage	300Vac				
Nominal Input Frequency	50Hz / 60Hz (Auto detection)				
Low Loss Frequency	40±1Hz				
Low Loss Return Frequency	42±1Hz				
High Loss Frequency	65±1Hz				
High Loss Return Frequency	63±1Hz				
Output Short Circuit Protection	Battery mode: Electronic Circuits				
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)				
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)				
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>	<p>Output Power</p> <p>Rated Power</p> <p>50% Power</p> <p>90V 170V 230V Input Voltage</p>				

Table 2 Inverter Mode Specifications

INVERTER MODEL	1.5KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Output Power	1.5KVA/1.5KW	4KVA/4KW		5.5KVA/5.5KW	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave				
Output Voltage Regulation	230Vac±5%				
Output Frequency	50Hz or 60Hz				
Peak Efficiency	94%				
Surge Capacity	2* rated power for 5 seconds				
Nominal DC Input Voltage	12Vdc	24Vdc		48Vdc	
Cold Start Voltage	11.0Vdc	23.0Vdc		46.0Vdc	
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.0Vdc 10.7Vdc 10.1Vdc	22.0Vdc 21.4Vdc 20.2Vdc		44.0Vdc 42.8Vdc 40.4Vdc	
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.5Vdc 11.2Vdc 10.6Vdc	23.0Vdc 22.4Vdc 21.2Vdc		46.0Vdc 44.8Vdc 42.4Vdc	
Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	10.5Vdc 10.2Vdc 9.6Vdc	21.0Vdc 20.4Vdc 19.2Vdc		42.0Vdc 40.8Vdc 38.4Vdc	

Table 3 Charge Mode Specifications

Utility Charging Mode					
INVERTER MODEL	1.5KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Max Charging Current (PV+AC) (@ VI/P=230Vac)	120Amp		100Amp	100Amp	120Amp
Max Charging Current (AC) (@ VI/P=230Vac)	80Amp				
Bulk Charging Voltage	Flooded Battery	14.6Vdc	29.2Vdc	58.4Vdc	
	AGM / Gel Battery	14.1Vdc	28.2Vdc	56.4Vdc	
Floating Charging Voltage	13.5Vdc	27Vdc	54Vdc		
Overcharge Protection	15.5 Vdc	33Vdc	63Vdc		
Charging Algorithm	3-Step				
Charging Curve	<p>The graph plots Battery Voltage (per cell) on the left y-axis and Charging Current (%) on the right y-axis against Time on the x-axis. The voltage curve (black) rises linearly in the Bulk stage, plateaus in the Absorption stage, and remains constant in the Maintenance stage. The current curve (red) is constant in the Bulk stage, then decays exponentially in the Absorption stage, and remains at a low level in the Maintenance stage. Key voltage points are 2.25Vdc and 2.43Vdc (2.35Vdc). Time intervals T0 and T1 are marked, with T1 = 10 * T0, minimum 10mins, maximum 8hrs.</p>				
Solar Input					
INVERTER MODEL	1.5KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Power	900W	1500W	4000W	5500W	6500W
Max. PV Array Open Circuit Voltage	160Vdc		500Vdc		
PV Array MPPT Voltage Range	30Vdc~160Vdc		60Vdc~500Vdc		
Max. Input Current	30A	50A	15A	18A	27A
Max. Charging Current(PV)	60A		100A	100A	120A

Table 4 General Specifications

INVERTER MODEL	1.5KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Operating Temperature Range	-10°C to 55°C				
Storage temperature	-15°C~ 60°C				
Humidity	5% to 95% Relative Humidity (Non-condensing)				
Dimension(D*W*H), mm	358x295x105			438x295x105	
Net Weight, kg	5.8	6.2	8.2	8.7	

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. Re-charge battery. 2. Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	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 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/15	Internal components failed.	Return to repair center.
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 14	Bus voltage is too low.	
Another fault code		If the wires is connected well, please return to repair center.	

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USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

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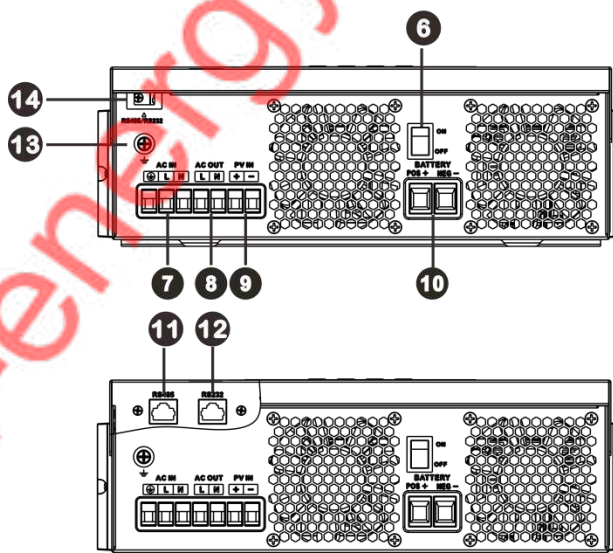
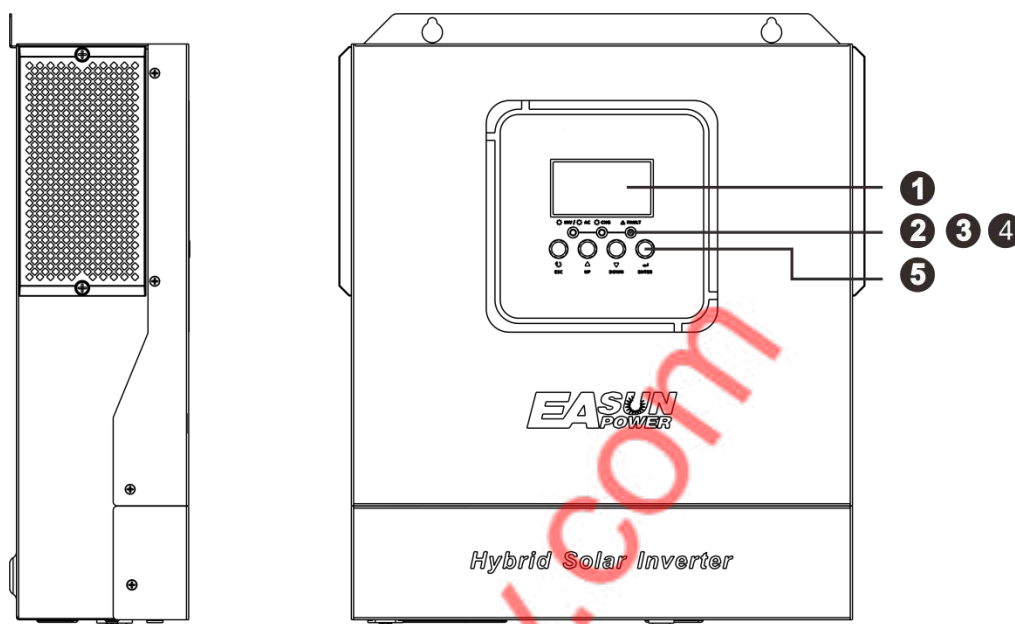
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PRODUCT OVERVIEW



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232 communication port
12. RS485 communication port
13. Wire outlet hole
14. Grounding

INSTALLATION

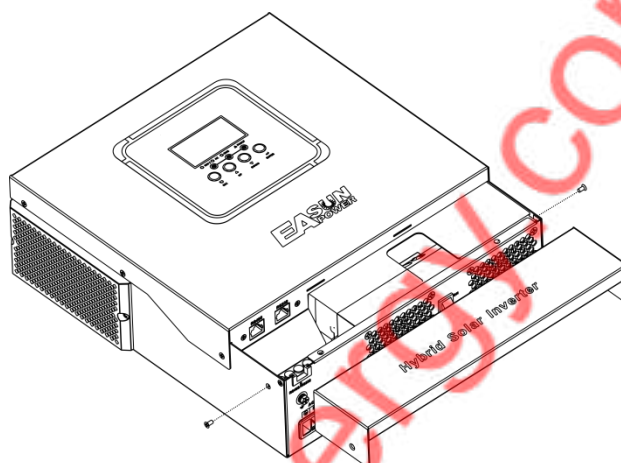
Unpacking and Inspection

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

1. The unit x 1
2. User manual x 1

Preparation

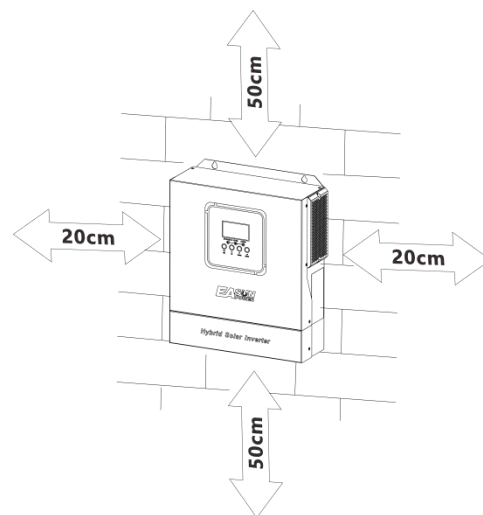
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

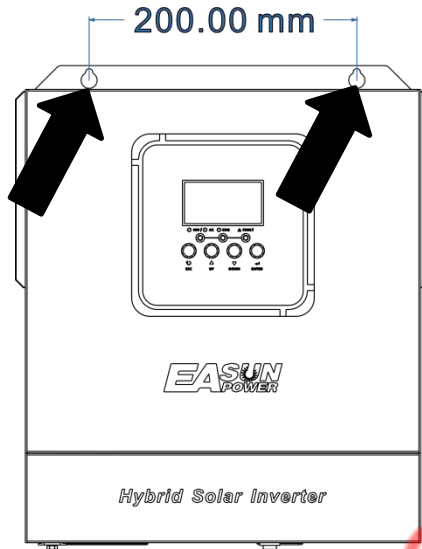
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



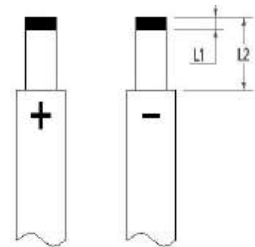
Battery Connection

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 a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable 、stripping length(L2) and tinning length(L1) as below.

Stripping Length:

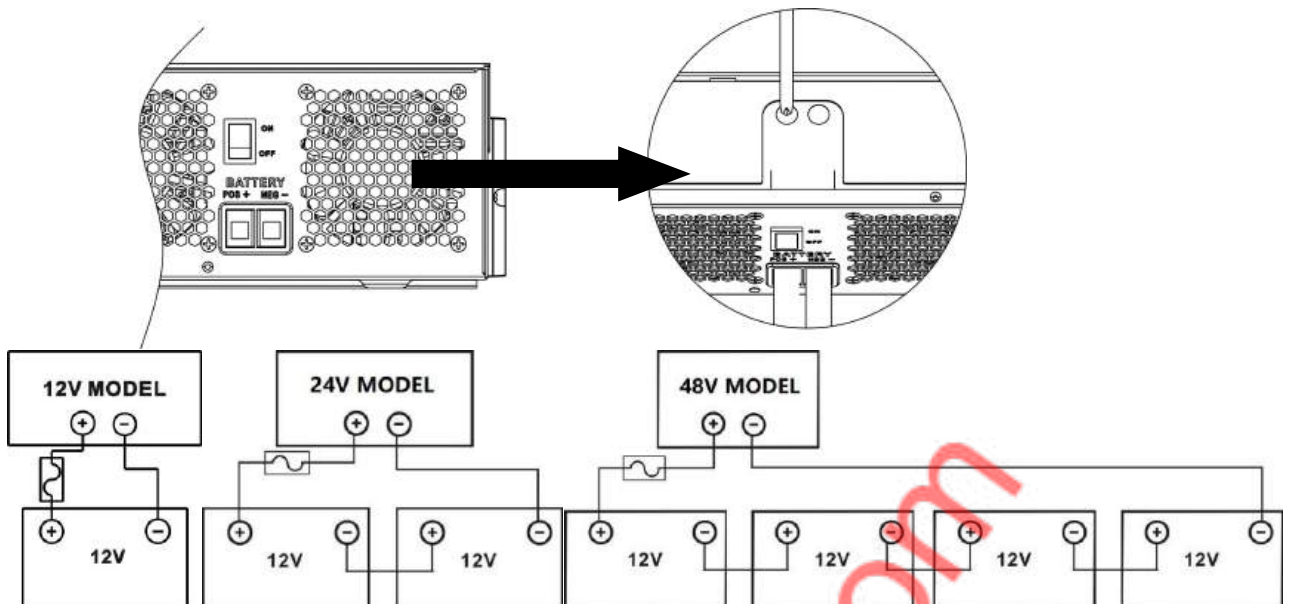


Recommended battery cable 、stripping length (L2) and tinning length(L1):

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm ²	L1 (mm)	L 2 (mm)	Torque value
All Models	137A	100AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

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

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

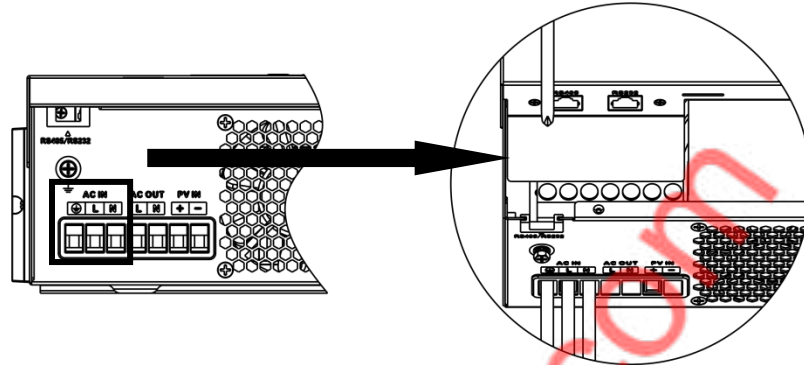
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
2KVA	12AWG	1.4~ 1.6Nm
4KVA	10AWG	1.4~ 1.6Nm
5.5KVA/6.2KVA	8 AWG	1.4~ 1.6Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

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



WARNING:

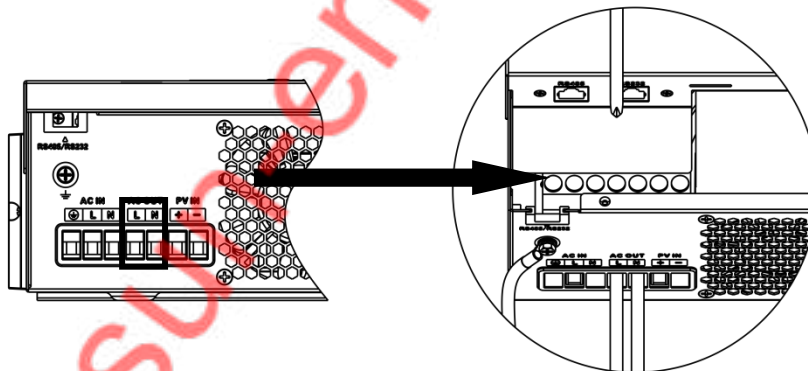
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→Ground (yellow-green)

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
2KVA (PVmax=160V)	30A	10 AWG	1.4~1.6 Nm
4KVA (PVmax=160V)	40A	8 AWG	1.4~1.6 Nm
4KVA	15A	12 AWG	1.4~1.6 Nm
5.5KVA	18A	12 AWG	1.4~1.6 Nm
6.2KVA	27A	12 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode					
INVERTER MODEL	4KVA	5.5KVA	6.2KVA	2K~4KVA (PVmax=160V)	
Max. PV Array Open Circuit Voltage	500DC			160VDC	
PV Array MPPT Voltage Range	60VDC~500VDC			30-160V	
Max. PV INPUT CURRENT	15A	18A	27A	30A(2K)	50A(4K)

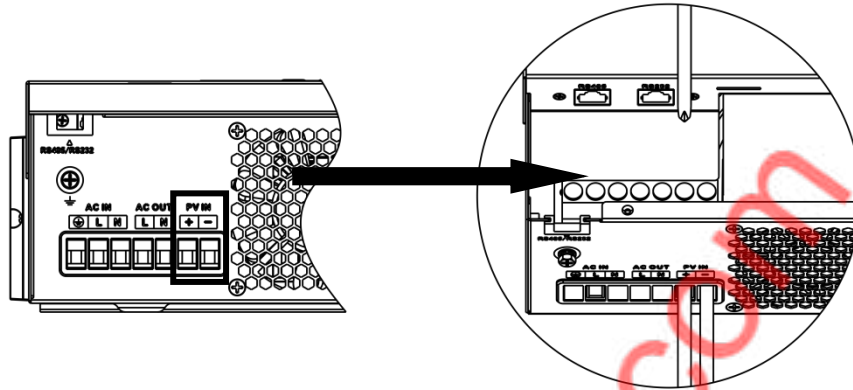
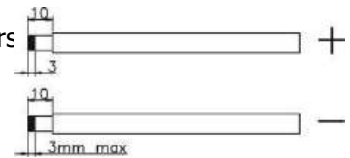
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,350 W	4KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	1,800 W	
	5 pcs in serial	5 pcs	2,250 W	
	6 pcs in serial	6 pcs	2,700 W	
	7 pcs in serial	7 pcs	3,150 W	
	8 pcs in serial	8 pcs	3,600 W	
	9 pcs in serial	9 pcs	4,050 W	
	10 pcs in serial	10 pcs	4,500 W	5.5KVA/6.2KVA
	11 pcs in serial	11 pcs	4,950 W	
	12 pcs in serial	12 pcs	5,400 W	6.2KVA
	6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W	
	8 pieces in serial and 2 sets in parallel	14 pcs	6,300 W	
	1 pcs in serial	1 pcs	450W	4KVA(PVmax=160V)
2 pcs in serial	2 pcs	900W		
3 pcs in serial	3 pcs	1,350 W		
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,650 W	4KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	2,200 W	
	5 pcs in serial	5 pcs	2,750 W	
	6 pcs in serial	6 pcs	3,300 W	
	7 pcs in serial	7 pcs	3,850 W	
	8 pcs in serial	8 pcs	4,400 W	
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	5.5KVA/6.2KVA
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W	
	6 pieces in serial and 2 sets in parallel	12 pcs	6,600 W	6.2KVA
	1 pcs in serial	1 pcs	550W	
	2 pcs in serial	2 pcs	1000W	2K/4KVA(PVmax=160V)
	3 pcs in serial	3 pcs	1,500 W	4KVA(PVmax=160V)

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

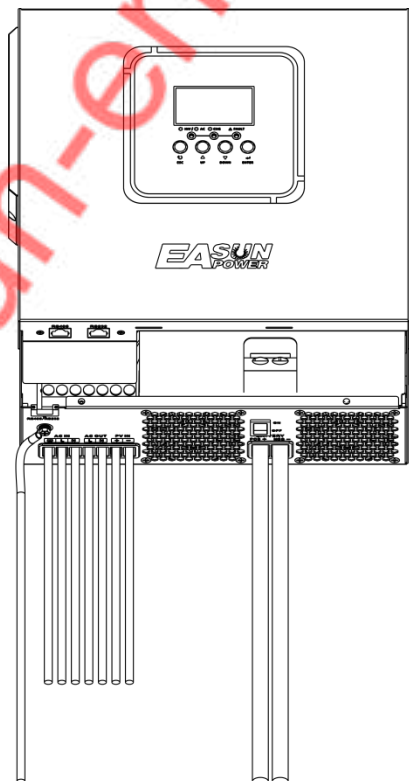
1. Remove insulation sleeve 10 mm for positive and negative conductors
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



3. Make sure the wires are securely connected.

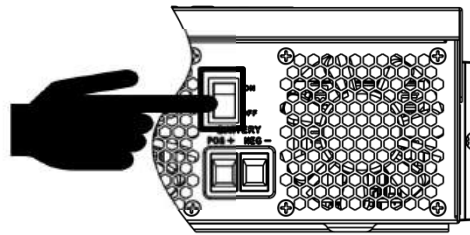
Final Assembly

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



OPERATION

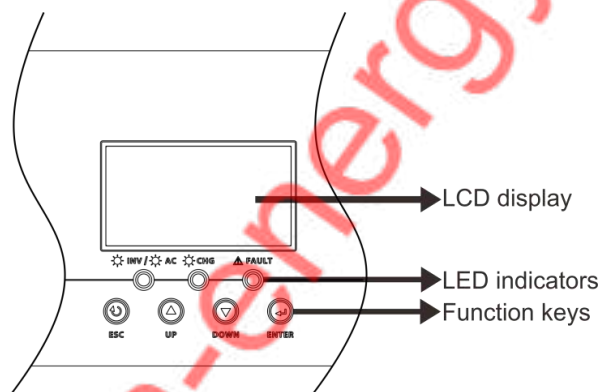
Power ON/OFF



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

Operation and Display Panel

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



LED Indicator

LED Indicator		Messages	
	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Setting

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







Setting Programs:

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Solar first 01 SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first (default) 01 UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 01 SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 01 SUB	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time. Note: SUB priority is just for PVmax=500Vdc model.





02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 60 ^A	If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 03 Gnt	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		05 LI2	Support PYLON US2000 Protocol 3.5 Version
		05 LI4	Standard communication Protocol form inverter supplier
06	Auto restart when overload occurs	Restart disable 06 Lfd	Restart enable (default) 06 LFE
07	Auto restart when over temperature occurs	Restart disable 07 tfd	Restart enable (default) 07 tFE
08	Output voltage	220V 08 220 ^v	230V (default) 08 230 ^v
		240V 08 240 ^v	

09	Output frequency	50Hz (default) 09 50 Hz	60Hz 09 60 Hz
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 10 nPL	auto 10 ALO
11	Maximum utility charging current	30A (default) 11 30A If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC.	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.	
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.	
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.	
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Battery fully charged (default) 13 BATT FUL	48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 24V models: Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 12V models: Setting range is from 12V to full (the value of program13-0.4V), but the max setting value must be more than the value of program12.

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 16 C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 O50	Solar energy will be the only charger source no matter utility is available or not.
If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.			
18	Buzzer mode	Mode1 BU2 18 nd1	Buzzer mute
		Mode2 BU2 18 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 BU2 18 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) BU2 18 nd4	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 BEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 23 byd	Bypass enable(default) 23 byE

25	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 	
26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.	
27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26	
29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V	
32	Bulk charging time (C.V stage)	Automatically (Default): 	If selected, inverter will judge this charging time automatically.
		5 min 	The setting range is from 5 min to 900 min. Increment of each click is 5 min.
		900 min 	
If "USE" is selected in program 05, this program can be set up.			
33	Battery equalization	Battery equalization 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

34	Battery equalization voltage	12V models default setting is 14.6V. Setting range is from floating voltage ~ 15.5V. Increment of each click is 0.1V. 24V models default setting is 29.2V. Setting range is from floating voltage ~ 31V. Increment of each click is 0.1V. 48V models default setting is 58.4V. Setting range is from floating voltage ~ 64V. Increment of each click is 0.1V.	
35	Battery equalized time	60min (default) 35 60	Setting range is from 0 min to 900min.
36	Battery equalized timeout	120min (default) 36 120	Setting range is from 0min to 900 min.
37	Equalization interval	30days (default) 37 30d	Setting range is from 1 to 90 days.
39	Equalization activated immediately	Enable 39 AEN	Disable (default) 39 AdS
		If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page..	
41	Automatic activation for lithium battery	AAt 41 nNL	Disable automatic activation (default)
		AAt 41 Ato	When Program05 is selected "Lix" as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit.
42	Manual activation for lithium battery	nAt 42 NOP	Default: disable activation
		nAt 42 Act	When Program05 is selected "Lix" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.
43	Setting SOC point back to utility source when selecting "SBU priority" or "Solar first" in program 01	43 050% ^{BAT}	Default 50%, 5%~50% Settable, but the minimum setting value must be more than the value of program 45.

44	Setting SOC point back to battery mode when selecting "SBU priority" or "Solar first" in program 01		Default 95%, 60%~100% Settable
45	Low DC cut-off SOC		Default 20%, 3%~30% Settable, but the max setting value must be less than the value of program 43.
46	Maximum discharge current protection when selecting "single" in program 28		Default OFF Disable current discharge current protection function
			Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value.

BATTERY EQUALIZATION

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.

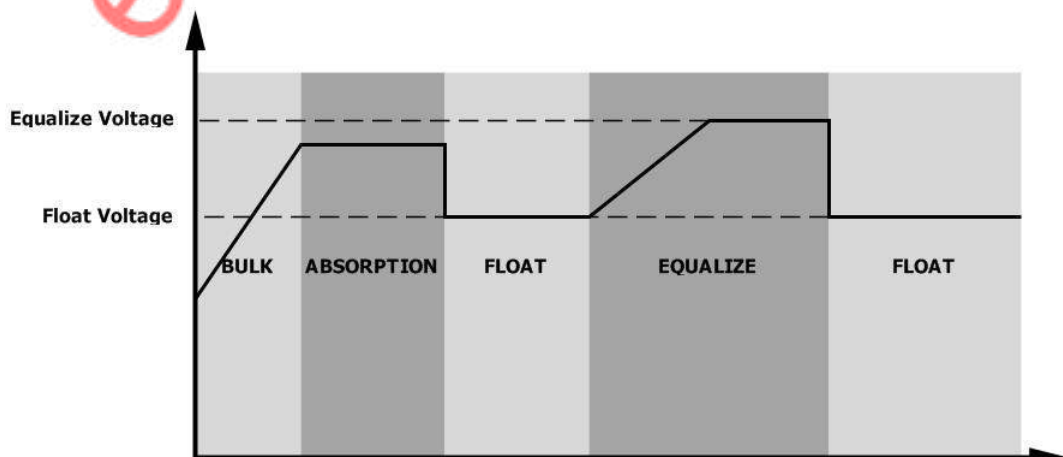
● How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

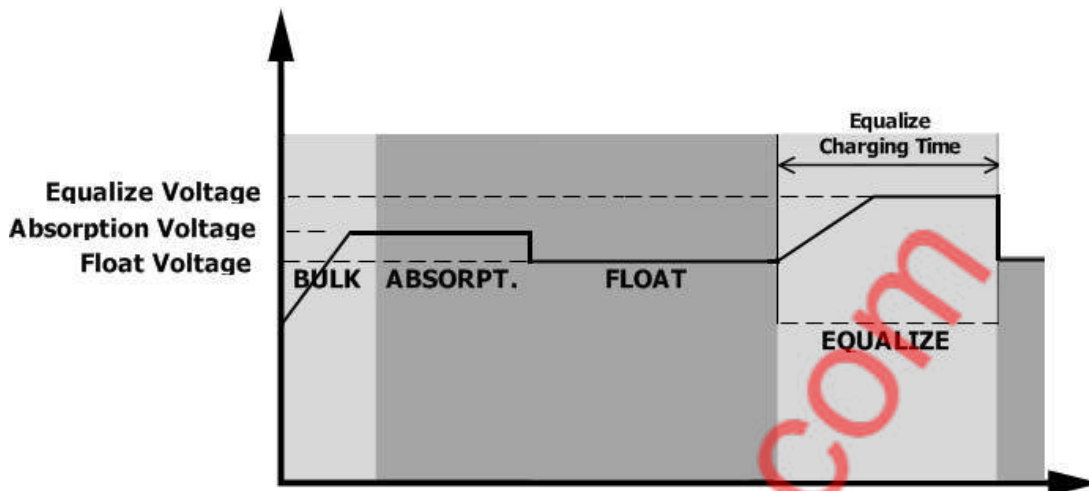
● When to Equalize

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

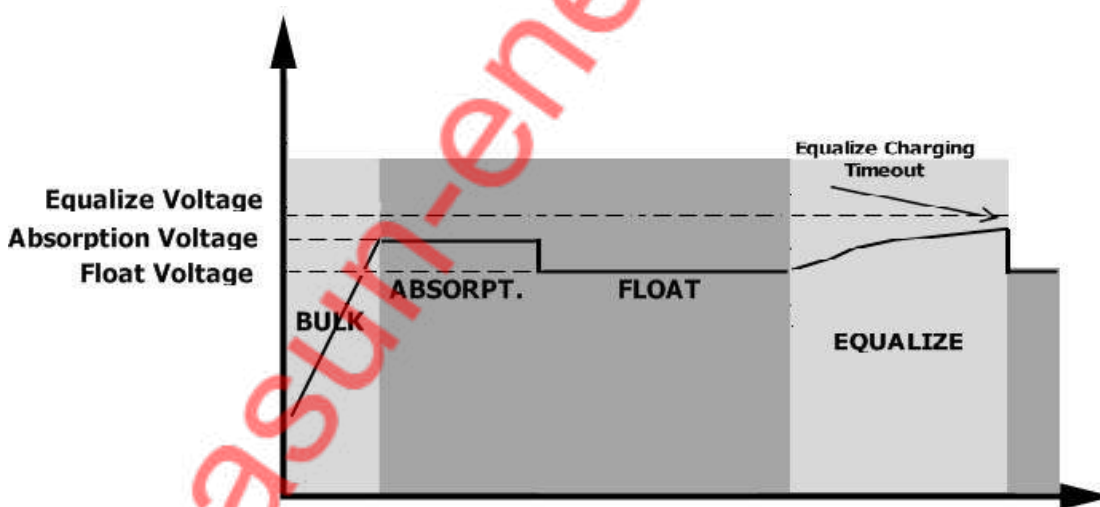


- **Equalize charging time and timeout**

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.



SETTING FOR LITHIUM BATTERY

Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

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

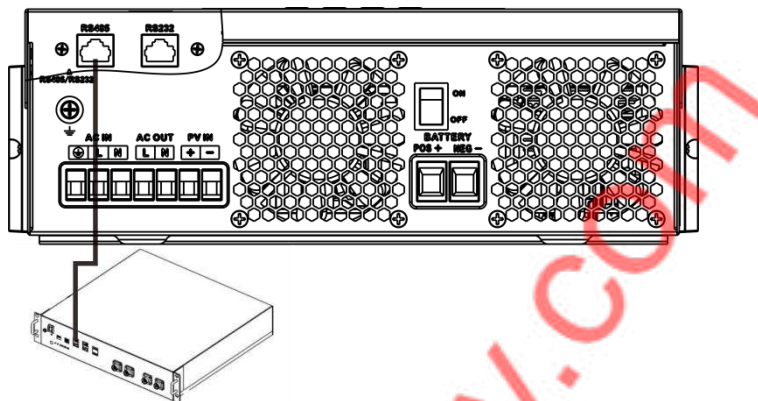


Fig 1

Lithium battery communication and setting

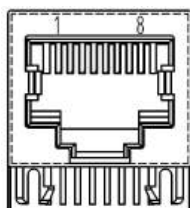
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

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

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

Pin number	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B



LCD setting

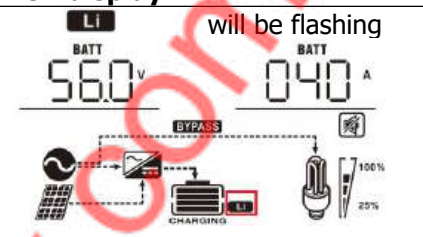
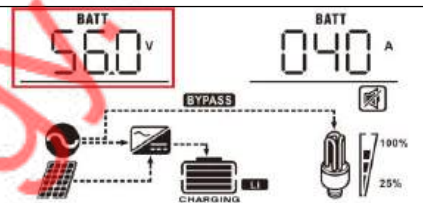
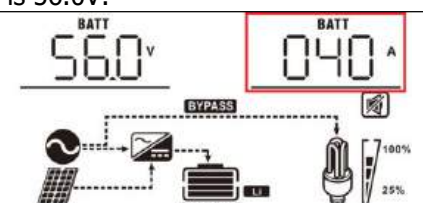


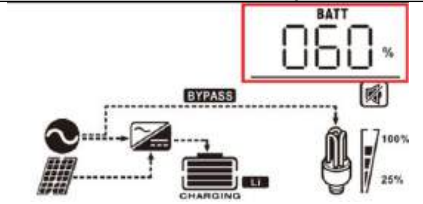
After connecting, you need to finish and confirm some settings as follow:

- 1) Select program 05 as lithium battery type.
- 2) Confirm program 41/42/43/44/45 setting value.

Note: Program 43/44/45 are only available with successful communication, they will replace the Program 12/13/29 function, at the same time, program 12/13/29 become unavailable.

LCD Display

If communication between the inverter and battery is successful, there is some information showing on the LCD as follow:

Item	Description	LCD display
1	Communication successful icon	 <p>will be flashing</p>
2	Max lithium battery charging voltage	 <p>Max lithium battery charging voltage is 56.0V.</p>
3	Max lithium battery charging current	 <p>Max lithium battery charging current is 40A.</p>
4	Lithium battery discharging is forbidden	
5	Lithium battery charging is forbidden	
6	Lithium battery SOC(%)	 <p>Lithium battery SOC is 63AH and 60%</p>

Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

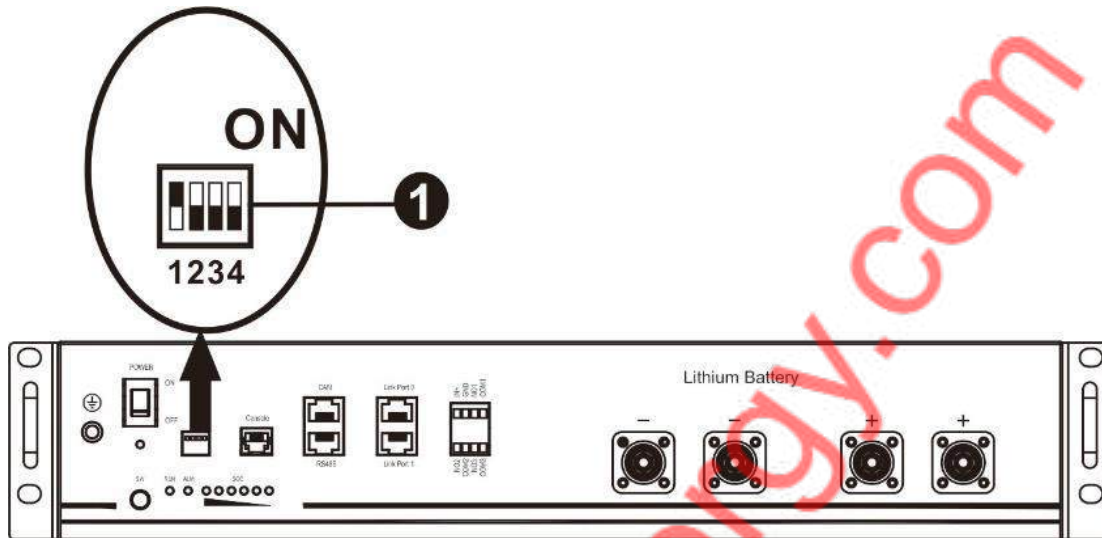
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

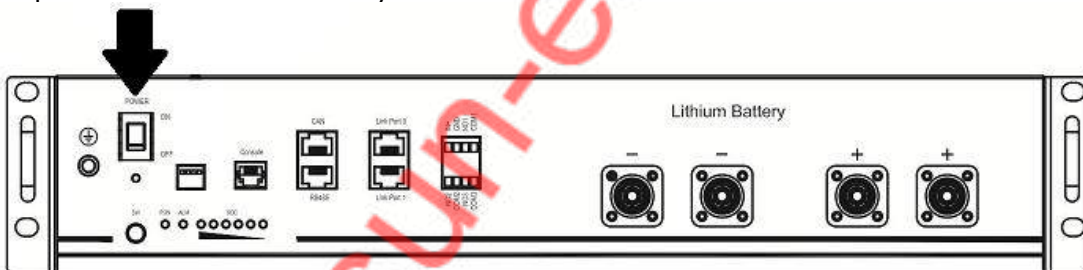
NOTE: "1" is upper position and "0" is bottom position.



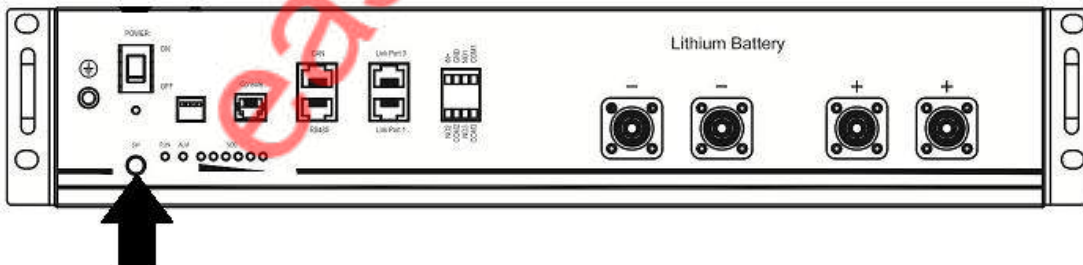
2). Process of install

Step 1. Use the RS485 cable to connect inverter and Lithium battery as Fig 1.

Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "Li2" in LCD program 5.

If communication between the inverter and battery is successful, the battery icon **Li** on LCD display will light

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

1. Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage

2. Set battery type as "USE" (user-defined)

05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program 27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.
----	-------------------------------------	---

4. Set floating charging voltage as C.V voltage.

27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26
----	---------------------------	--

5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program 12. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V
----	------------------------	--

6. Set Max charging current which must be less than the Max charging current of BMS.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 <u>60</u> A	If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
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


















7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01. The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.





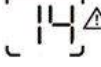
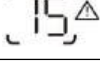
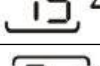
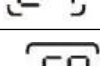
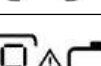

Remark:

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
14	Fan blocked	None	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
21	Lithium Battery over current	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	2KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Input Voltage Waveform	Sinusoidal (utility or generator)				
Nominal Input Voltage	230Vac				
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)				
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)				
High Loss Voltage	280Vac±7V				
High Loss Return Voltage	270Vac±7V				
Max AC Input Voltage	300Vac				
Nominal Input Frequency	50Hz / 60Hz (Auto detection)				
Low Loss Frequency	40±1Hz				
Low Loss Return Frequency	42±1Hz				
High Loss Frequency	65±1Hz				
High Loss Return Frequency	63±1Hz				
Output Short Circuit Protection	Battery mode: Electronic Circuits				
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)				
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)				
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>	<p>Output Power</p> <p>Rated Power</p> <p>50% Power</p> <p>90V 170V 280V Input Voltage</p>				

Table 2 Inverter Mode Specifications

INVERTER MODEL	2KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Output Power	2KVA/2KW	4KVA/4KW		5.5KVA/5.5KW	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave				
Output Voltage Regulation	230Vac±5%				
Output Frequency	50Hz or 60Hz				
Peak Efficiency	94%				
Surge Capacity	2* rated power for 5 seconds				
Nominal DC Input Voltage	12Vdc	24Vdc		48Vdc	
Cold Start Voltage	11.0Vdc	23.0Vdc		46.0Vdc	
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.0Vdc 10.7Vdc 10.1Vdc	22.0Vdc 21.4Vdc 20.2Vdc		44.0Vdc 42.8Vdc 40.4Vdc	
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.5Vdc 11.2Vdc 10.6Vdc	23.0Vdc 22.4Vdc 21.2Vdc		46.0Vdc 44.8Vdc 42.4Vdc	
Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	10.5Vdc 10.2Vdc 9.6Vdc	21.0Vdc 20.4Vdc 19.2Vdc		42.0Vdc 40.8Vdc 38.4Vdc	

Table 3 Charge Mode Specifications

Utility Charging Mode					
INVERTER MODEL	2KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Max Charging Current (PV+AC) (@ VI/P=230Vac)	120Amp		100Amp	100Amp	120Amp
Max Charging Current (AC) (@ VI/P=230Vac)	80Amp				
Bulk Charging Voltage	Flooded Battery	14.6Vdc	29.2Vdc		58.4Vdc
	AGM / Gel Battery	14.1Vdc	28.2Vdc		56.4Vdc
Floating Charging Voltage	13.5Vdc	27Vdc		54Vdc	
Overcharge Protection	15.5 Vdc	33Vdc		63Vdc	
Charging Algorithm	3-Step				
Charging Curve	<p>The graph plots Battery Voltage (per cell) on the left y-axis and Charging Current (%) on the right y-axis against Time on the x-axis. The voltage curve (black) rises linearly in the Bulk stage, plateaus in the Absorption stage, and then slightly drops in the Maintenance stage. The current curve (red) is constant in the Bulk stage, then decays exponentially in the Absorption stage, and remains low in the Maintenance stage. Key voltage points are 2.43Vdc (2.35Vdc) and 2.25Vdc. Time intervals T0 and T1 are marked, with T1 = 10 * T0, minimum 10mins, maximum 8hrs.</p>				
Solar Input					
INVERTER MODEL	2KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Power	900W	1500W	4000W	5500W	6500W
Max. PV Array Open Circuit Voltage	160Vdc		500Vdc		
PV Array MPPT Voltage Range	30Vdc~160Vdc		60Vdc~500Vdc		
Max. Input Current	30A	50A	15A	18A	27A
Max. Charging Current(PV)	60A		100A	100A	120A

Table 4 General Specifications

INVERTER MODEL	2KVA	4KVA	4KVA	5.5KVA	6.2KVA
	PVmax=160V				
Operating Temperature Range	-10°C to 55°C				
Storage temperature	-15°C~ 60°C				
Humidity	5% to 95% Relative Humidity (Non-condensing)				
Dimension(D*W*H), mm	358x295x105			438x295x105	
Net Weight, kg	5.8	6.2	8.2	8.7	

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. Re-charge battery. 2. Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	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 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/15	Internal components failed.	Return to repair center.
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 14	Bus voltage is too low.	
Another fault code		If the wires is connected well, please return to repair center.	

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USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

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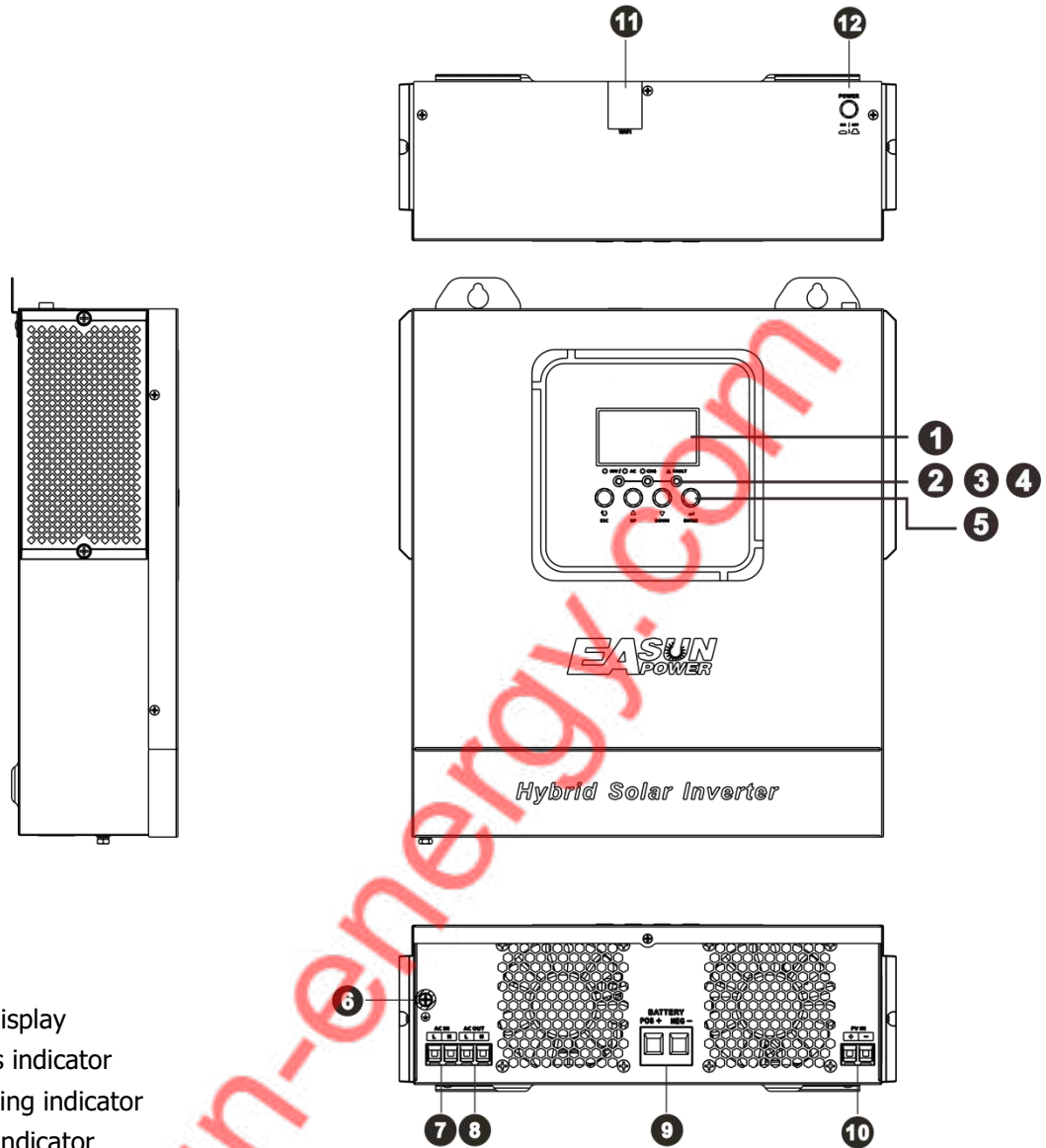
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PRODUCT OVERVIEW



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Grounding
7. AC input
8. AC output
9. Battery input
10. PV input
11. WIFI communication port
12. Power on/off switch

INSTALLATION

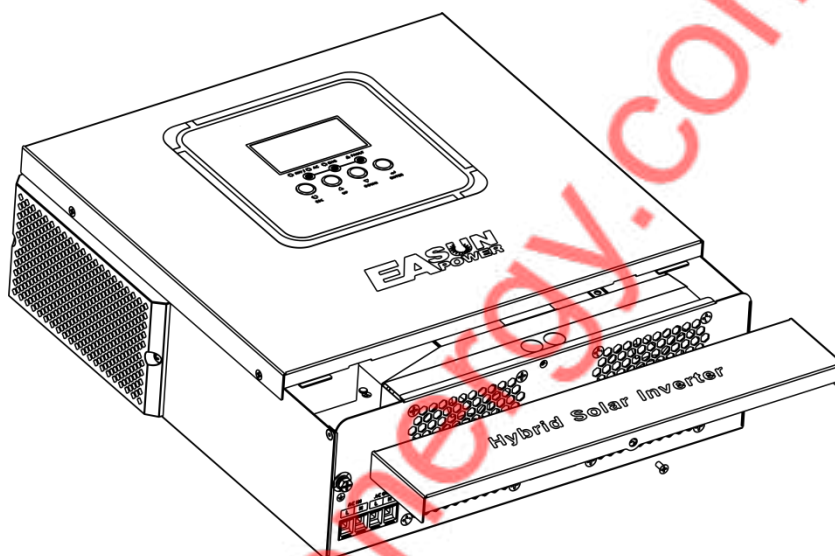
Unpacking and Inspection

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

1. The unit x 1
2. User manual x 1

Preparation

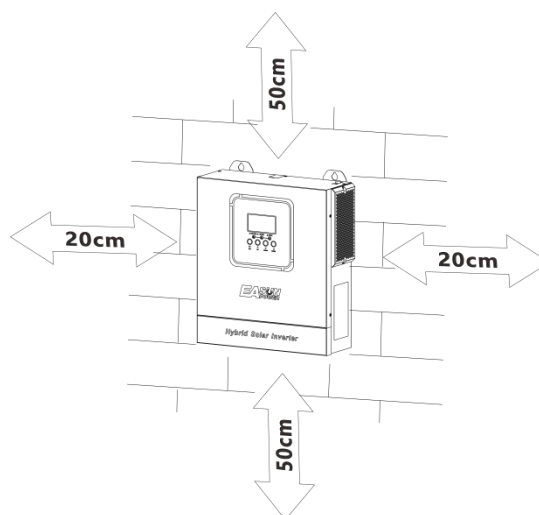
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

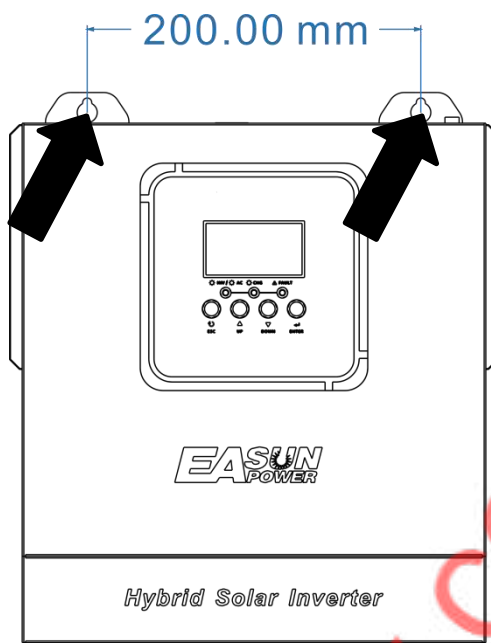
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.

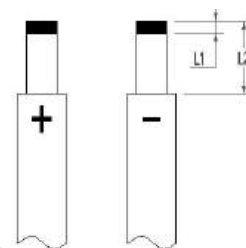


Battery Connection

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 a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable 、stripping length(L2) and tinning length(L1) as below.

Stripping Length:

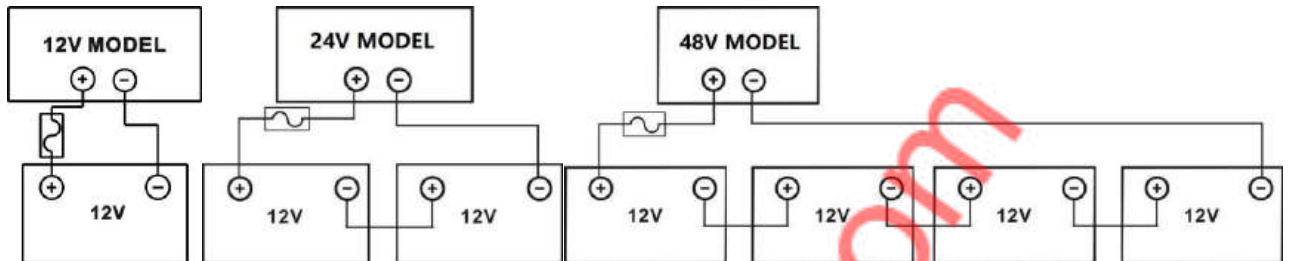
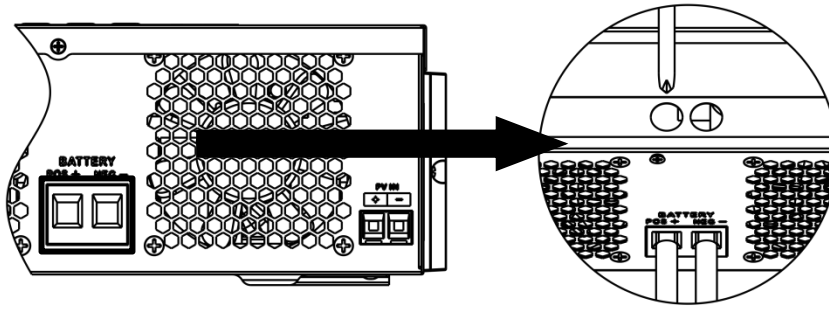


Recommended battery cable 、stripping length (L2) and tinning length(L1):

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm ²	L1 (mm)	L 2 (mm)	Torque value
1500W-24	70A	100AH	6AWG	13.3	3	18	2~ 3 Nm
2500W-24	100A	100AH	4AWG	21.15	3	18	2~ 3 Nm
Other Models	140A	100AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

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

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

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
1.5KW	12AWG	1.4~ 1.6Nm
2.5KW/3.2W	10AWG	1.4~ 1.6Nm
5.5KW	8 AWG	1.4~ 1.6Nm

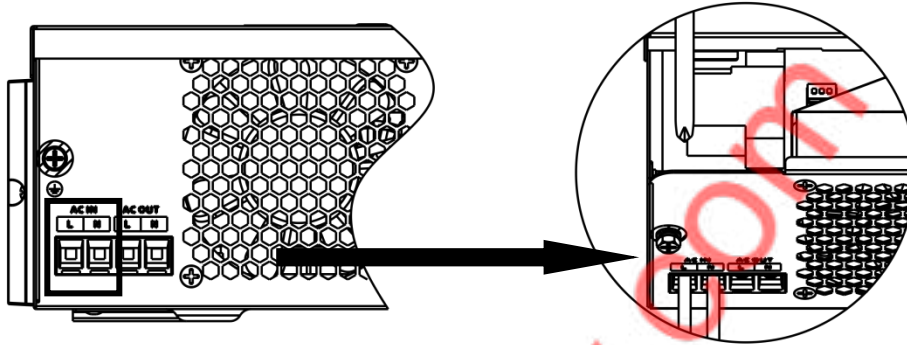
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

⊕ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



WARNING:

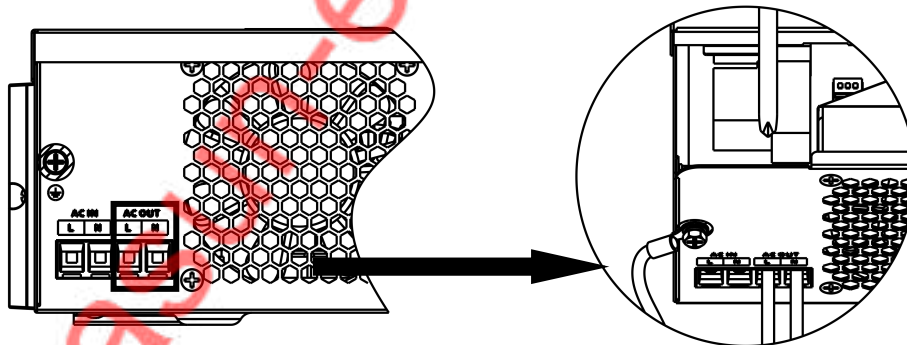
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
1.5KW-3.2KW	15A	12 AWG	1.4~1.6 Nm
5.5KW	18A	12 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode		
INVERTER MODEL	1.5KW-3.2KW	5.5KW
Max. PV Array Open Circuit Voltage	500VDC	
PV Array MPPT Voltage Range	30VDC~500VDC	60VDC~500VDC
Max. PV INPUT CURRENT	15A	18A

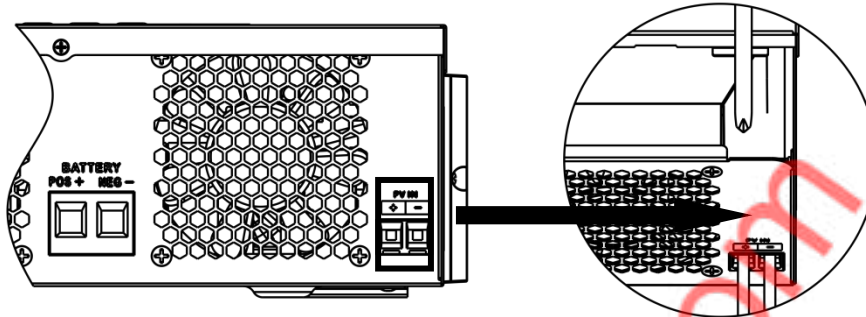
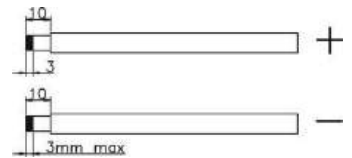
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	1 pcs in serial	1 pcs	450 W	1.5KW-5.5KW
	2 pcs in serial	2 pcs	900 W	1.5KW-5.5KW
	3 pcs in serial	3 pcs	1,350 W	1.5KW-5.5KW
	4 pcs in serial	4 pcs	1,800 W	1.5KW-5.5KW
	5 pcs in serial	5 pcs	2,250 W	2.5KW-5.5KW
	6 pcs in serial	6 pcs	2,700 W	2.5KW-5.5KW
	7 pcs in serial	7 pcs	3,150 W	2.5KW-5.5KW
	8 pcs in serial	8 pcs	3,600 W	3.5KW-5.5KW
	9 pcs in serial	9 pcs	4,050 W	3.5KW-5.5KW
	10 pcs in serial	10 pcs	4,500 W	5.5KW
	11 pcs in serial	11 pcs	4,950 W	
	12 pcs in serial	12 pcs	5,400 W	
6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W		
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	1 pcs in serial	1 pcs	550 W	1.5KW-5.5KW
	2 pcs in serial	2 pcs	1,100 W	1.5KW-5.5KW
	3 pcs in serial	3 pcs	1,650 W	1.5KW-5.5KW
	4 pcs in serial	4 pcs	2,200 W	2.5KW-5.5KW
	5 pcs in serial	5 pcs	2,750 W	2.5KW-5.5KW
	6 pcs in serial	6 pcs	3,300 W	3.5KW-5.5KW
	7 pcs in serial	7 pcs	3,850 W	3.5KW-5.5KW
	8 pcs in serial	8 pcs	4,400 W	5.5KW
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W	

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

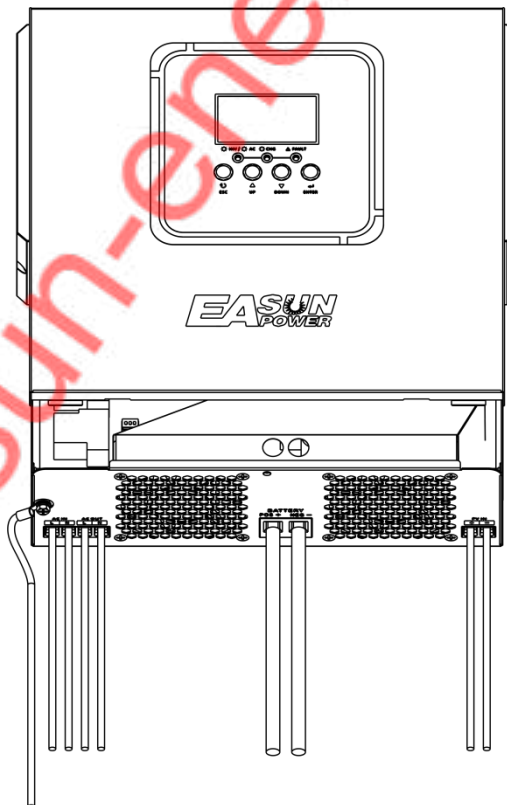
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



3. Make sure the wires are securely connected.

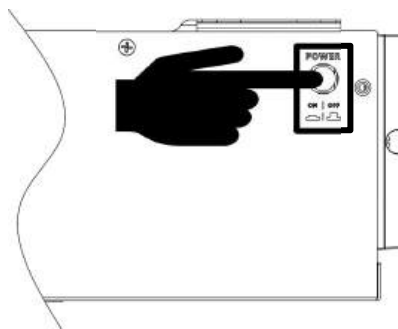
Final Assembly

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



OPERATION

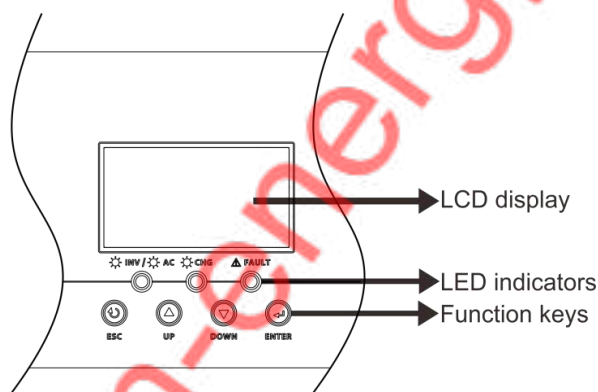
Power ON/OFF



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

Operation and Display Panel

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



LED Indicator

LED Indicator		Messages	
	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Setting

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






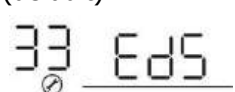
Setting Programs:

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Utility first (default) 01 UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 01 SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SBU priority 01 SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 01 SUB	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 60 ^A	If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 03 Gnt	If selected, acceptable AC input voltage range will be within 90-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		Lithium battery without communication 05 LIB	If "LIB" is selected, the battery default value is fit for lithium battery without communication battery charge voltage and low DC cut-off voltage can be set up in program 26,27 and 29.
06	Auto restart when overload occurs	Restart disable 06 Lfd	Restart enable (default) 06 LFE
07	Auto restart when over temperature occurs	Restart disable 07 tfd	Restart enable (default) 07 tFE

08	Output voltage	220V 08 220 ^v	230V (default) 08 230 ^v
		240V 08 240 ^v	
09	Output frequency	50Hz (default) 09 50 ^{Hz}	60Hz 09 60 ^{Hz}
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 10 nNL	auto 10 AFD
11	Maximum utility charging current	30A (default) 11 30A If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC.	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29.	
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29.	
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29.	
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Battery fully charged (default) 13 BATT FUL	48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 24V models: Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 12V models: Setting range is from 12V to full (the value of program13-0.4V), but the max setting value must be more than the value of program12.

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 16 C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 050	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Buzzer mode	Mode1 BU2 18 nd1	Buzzer mute
		Mode2 BU2 18 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 BU2 18 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) BU2 18 nd4	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 BEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 23 byd	Bypass enable(default) 23 bye

25	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 	
26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.	
27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26	
29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V	
32	Bulk charging time (C.V stage)	Automatically (Default): 	If selected, inverter will judge this charging time automatically.
		5 min 	The setting range is from 5 min to 900 min. Increment of each click is 5 min.
		900 min 	
If "USE" is selected in program 05, this program can be set up.			
33	Battery equalization	Battery equalization 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

34	Battery equalization voltage	<p>12V models default setting is 14.6V. Setting range is from floating voltage ~ 15.5V. Increment of each click is 0.1V.</p> <p>24V models default setting is 29.2V. Setting range is from floating voltage ~ 30V. Increment of each click is 0.1V.</p> <p>48V models default setting is 58.4V. Setting range is from floating voltage ~ 62V. Increment of each click is 0.1V.</p>	
35	Battery equalized time	<p>60min (default)</p> <p>35 60</p>	Setting range is from 0 min to 900min.
36	Battery equalized timeout	<p>120min (default)</p> <p>36 120</p>	Setting range is from 0min to 900 min.
37	Equalization interval	<p>30days (default)</p> <p>37 30d</p>	Setting range is from 1 to 90 days.
39	Equalization activated immediately	<p>Enable</p> <p>39 AEN</p>	<p>Disable (default)</p> <p>39 AdS</p>
		<p>If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page..</p>	
41	Automatic activation for lithium battery. Note: This function is just available for supporting lithium battery activation models, other models are reserve setting item	<p>AAE 41 nNL</p>	Disable automatic activation (default)
		<p>AAE 41 AEO</p>	<p>When Program05 is selected "Lix" or "User-Defined" as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit.</p>
42	Manual activation for lithium battery. Note: This function is just available for supporting lithium battery activation models, other models are reserve setting item	<p>nAt 42 NOP</p>	Default: disable activation
		<p>nAt 42 ACT</p>	<p>When Program05 is selected "Lix" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.</p>

46	Maximum discharge current protection when selecting "single" in program 28	ndC 46 OFF	Default OFF Disable current discharge current protection function
		ndC 46 100 ^A	Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value.

BATTERY EQUALIZATION

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.

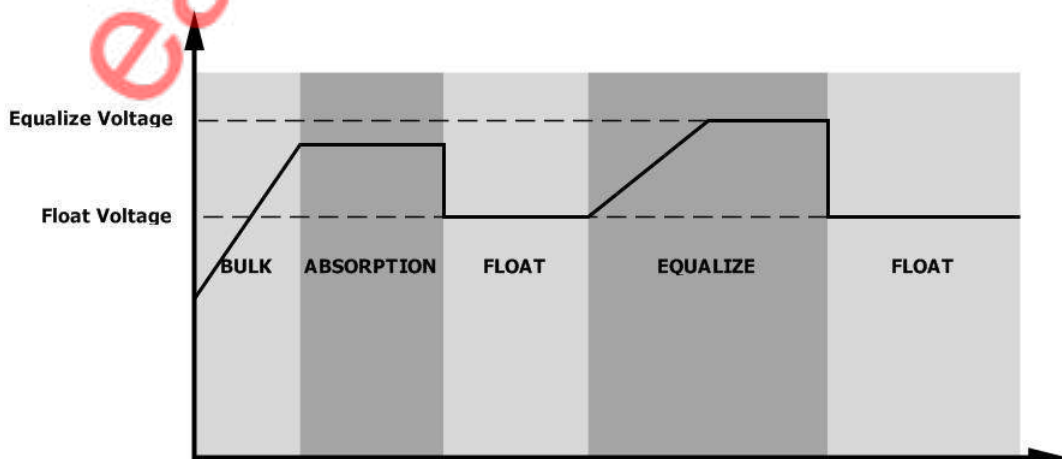
● How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

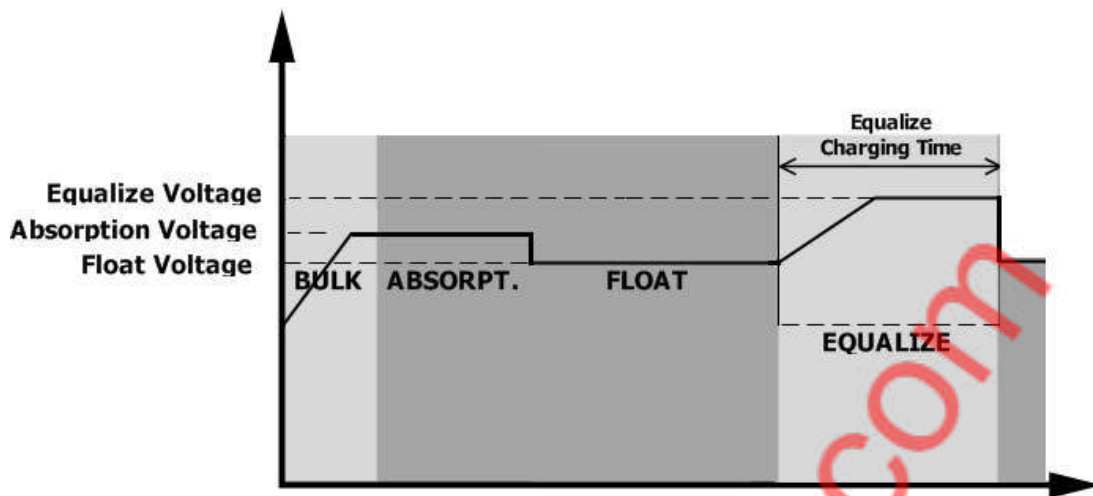
● When to Equalize

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

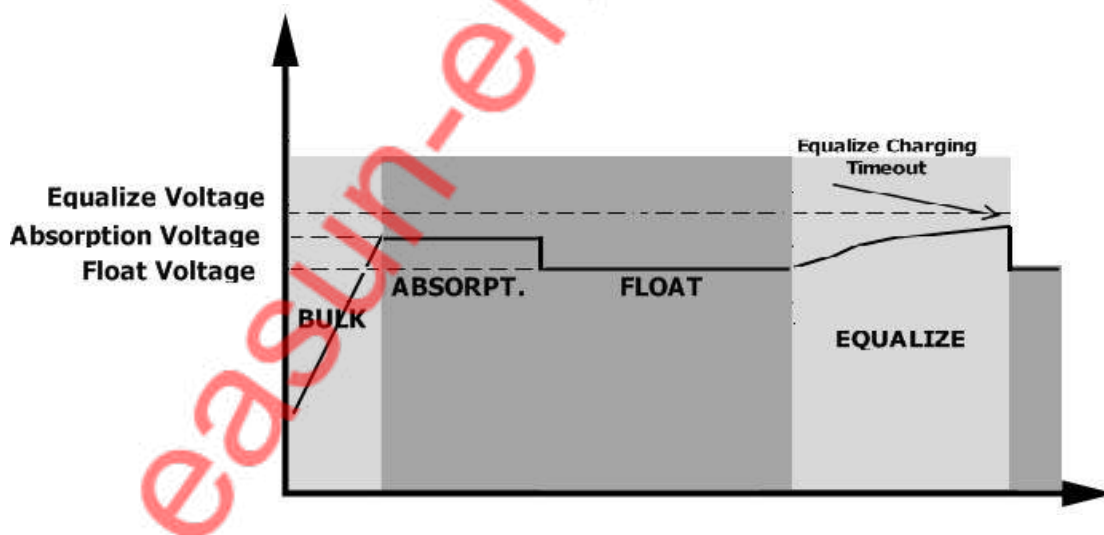


- **Equalize charging time and timeout**

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.



SETTING FOR LITHIUM BATTERY

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

1. Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage

2. Set battery type as "LIB"

05	Battery type	AGM (default) 05 AGn	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		Lithium battery without communication 05 LIB	If "LIB" is selected, the battery default value is fit for lithium battery without communication battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program 27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.
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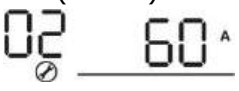
4. Set floating charging voltage as C.V voltage.

27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26
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5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	<p>If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.</p> <p>12V models default setting: 10.5v Setting range is from 10.0V to 13.5V</p> <p>24V models default setting: 21.0v Setting range is from 20.0V to 27.0V</p> <p>48V models default setting: 42.0V Setting range is from 40.0V to 54.0V</p>
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6. Set Max charging current which must be less than the Max charging current of BMS.

02	<p>Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)</p>	<p>60A (default)</p> 	<p>If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)</p>
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


















7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	<p>48V models:46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.</p>
		<p>24V models:23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.</p>
		<p>12V models:11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.</p>





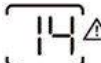


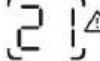
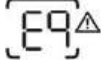

Remark:

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
14	Fan blocked	None	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
21	Lithium Battery over current	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	1.5KW	1.5KW	2.5KW	3.2KW	5.5KW
Input Voltage Waveform	Sinusoidal (Utility or Generator)				
Nominal Input Voltage	230Vac				
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)				
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)				
High Loss Voltage	280Vac±7V				
High Loss Return Voltage	270Vac±7V				
Max AC Input Voltage	300Vac				
Nominal Input Frequency	50Hz / 60Hz (Auto detection)				
Low Loss Frequency	40±1Hz				
Low Loss Return Frequency	42±1Hz				
High Loss Frequency	65±1Hz				
High Loss Return Frequency	63±1Hz				
Output Short Circuit Protection	Battery mode: Electronic Circuits				
Efficiency (Line Mode)	>95% (Rated R load, Battery full charged)				
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)				
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>					

Table 2 Inverter Mode Specifications

INVERTER MODEL	1.5KW	1.5KW	2.5KW	3.2KW	5.5KW
Rated Output Power	1.5KVA/1.5KW		2.5KVA/2.5KW	3.2KVA/3.2KW	5.5KVA/5.5KW
Output Voltage Waveform	Pure Sine Wave				
Output Voltage Regulation	230Vac±5%				
Output Frequency	50Hz or 60Hz				
Peak Efficiency	94%				
Surge Capacity	2* rated power for 5 seconds				
Nominal DC Input Voltage	12Vdc	24Vdc			48Vdc
Cold Start Voltage	11.0Vdc	23.0Vdc			46.0Vdc
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.0Vdc 10.7Vdc 10.1Vdc	22.0Vdc 21.4Vdc 20.2Vdc			40.4Vdc 42.8Vdc 44.0Vdc
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.5Vdc 11.2Vdc 10.6Vdc	23.0Vdc 22.4Vdc 21.2Vdc			46.0Vdc 44.8Vdc 42.4Vdc
Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	10.5Vdc 10.2Vdc 9.6Vdc	21.0Vdc 20.4Vdc 19.2Vdc			42.0Vdc 40.8Vdc 38.4Vdc

Table 3 Charge Mode Specifications

Utility Charging Mode					
INVERTER MODEL	1.5KW	1.5KW	2.5KW	3.2KW	5.5KW
Max Charging Current (PV+AC) (@ VI/P=230Vac)	100Amp	60Amp	80Amp	100Amp	100Amp
Max Charging Current (AC)(@ VI/P=230Vac)	60Amp				
Bulk Charging Voltage	Flooded Battery	14.6Vdc	29.2Vdc		58.4Vdc
	AGM / Gel Battery	14.1Vdc	28.2Vdc		56.4Vdc
Floating Charging Voltage	13.5Vdc	27Vdc		54Vdc	
Overcharge Protection	15.5 Vdc	33Vdc		63Vdc	
Charging Algorithm	3-Step				
Charging Curve					
Solar Input					
INVERTER MODEL	1.5KW	1.5KW	2.5KW	3.2KW	5.5KW
Rated Power	2000W	2000W	3000W	4000W	5500W
Max. PV Array Open Circuit Voltage	500Vdc				
PV Array MPPT Voltage Range	30Vdc~500Vdc				60Vdc~500Vdc
Max. Input Current	15A	15A	15A	15A	18A
Max. Charging Current(PV)	100A	60A	100A	100A	100A

Table 4 General Specifications

INVERTER MODEL	1.5KW	1.5KW	2.5KW	3.2KW	5.5KW
Operating Temperature Range	-10°C to 55°C				
Storage temperature	-15°C~ 60°C				
Humidity	5% to 95% Relative Humidity (Non-condensing)				
Dimension(D*W*H), mm	330x278x98				438x295x105
Net Weight, kg	3.8		3.95		8.2

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. Re-charge battery. 2. Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	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 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/15	Internal components failed.	Return to repair center.
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
Fault code 14	Bus voltage is too low.		
Another fault code		If the wires is connected well, please return to repair center.	

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USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

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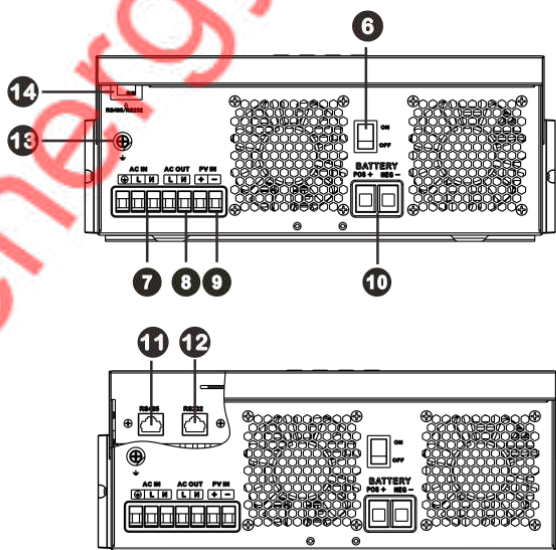
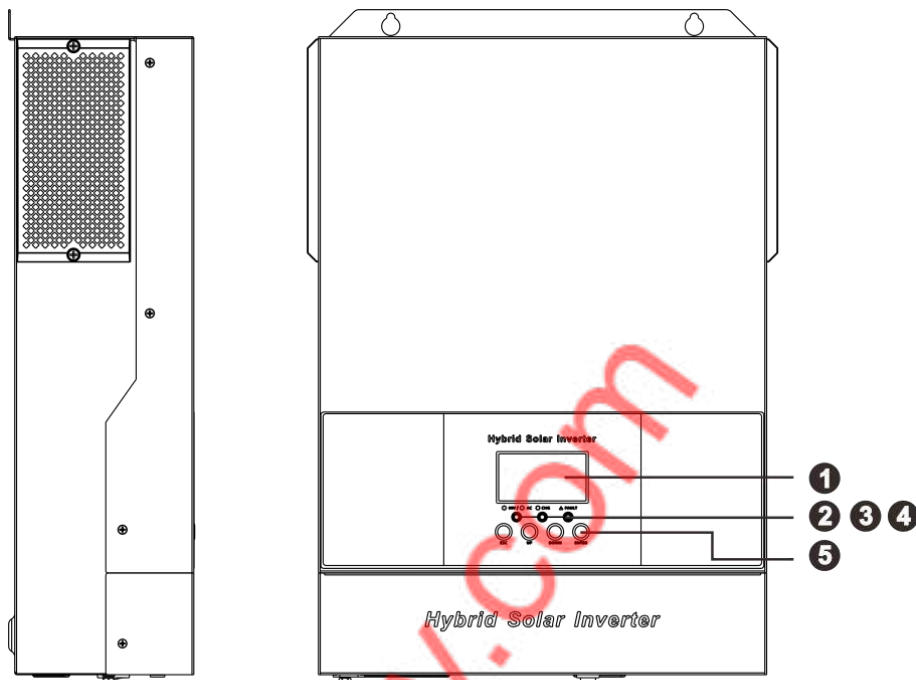
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PRODUCT OVERVIEW



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232 communication port
12. RS485 communication port
13. Wire outlet hole
14. Grounding

INSTALLATION

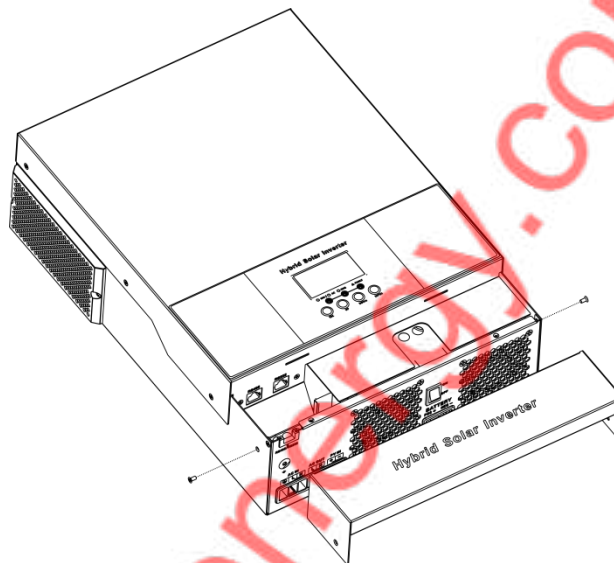
Unpacking and Inspection

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

1. The unit x 1
2. User manual x 1

Preparation

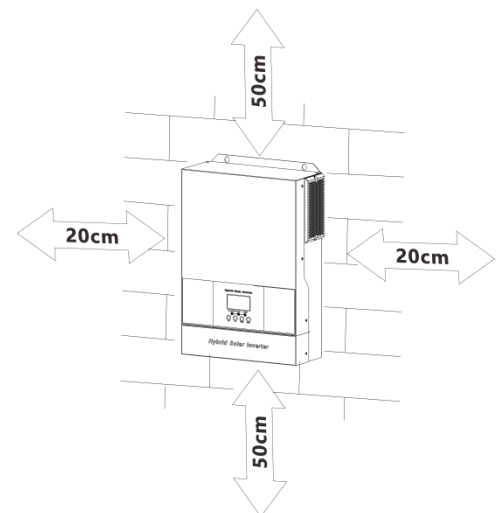
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

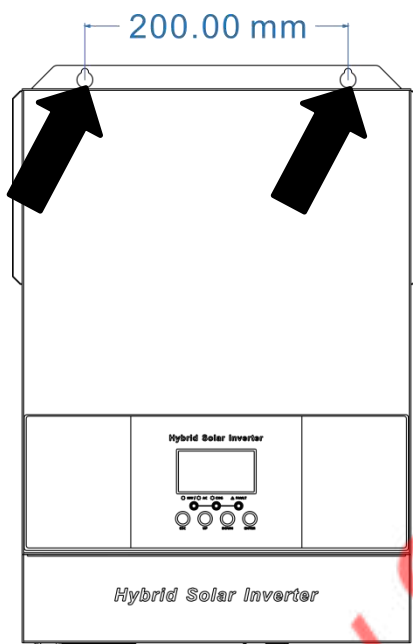
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



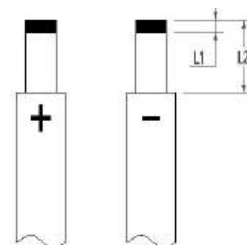
Battery Connection

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 a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable 、stripping length(L2) and tinning length(L1) as below.

Stripping Length:

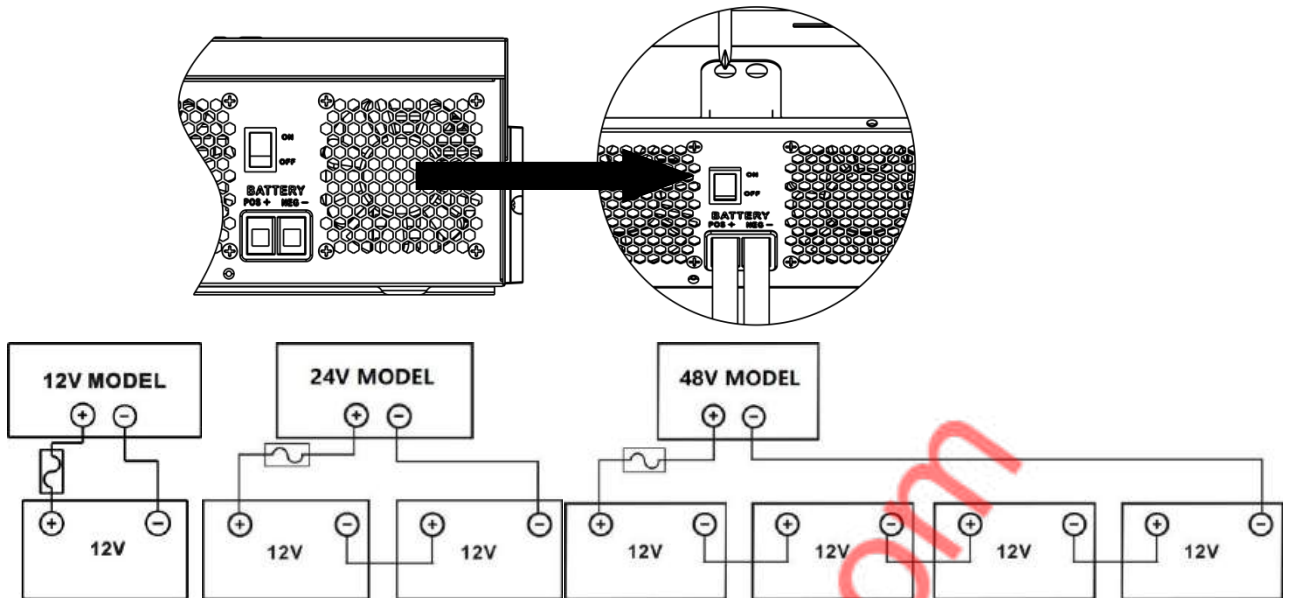


Recommended battery cable 、stripping length (L2) and tinning length(L1):

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm ²	L1 (mm)	L 2 (mm)	Torque value
All Models	137A	100AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

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

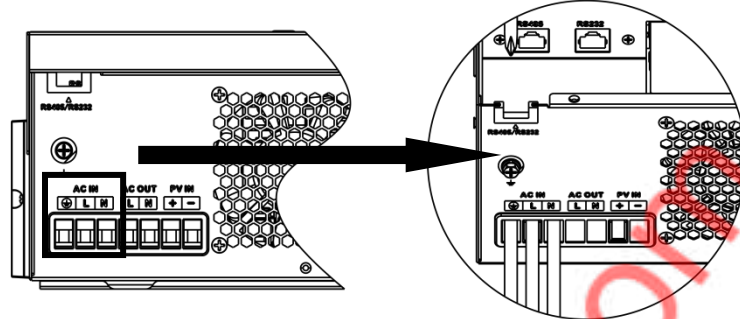
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
1.5KVA	12AWG	1.4~ 1.6Nm
3.5KVA	10AWG	1.4~ 1.6Nm
5.5KVA/6.2KVA	8 AWG	1.4~ 1.6Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.
⊕→Ground (yellow-green) L→LINE (brown or black) N→Neutral (blue)



WARNING:

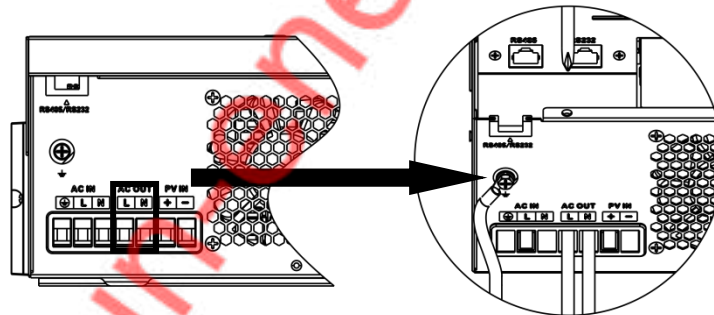
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
1.5KVA (PVmax=160V)	30A	10 AWG	1.4~1.6 Nm
3.5KVA (PVmax=160V)	40A	8 AWG	1.4~1.6 Nm
3.5KVA	15A	12 AWG	1.4~1.6 Nm
5.5KVA	18A	12 AWG	1.4~1.6 Nm
6.2KVA	27A	12 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode					
INVERTER MODEL	3.5KVA	5.5KVA	6.2KVA	1.5K~3.5KVA (PVmax=160V)	
Max. PV Array Open Circuit Voltage	500DC			160VDC	
PV Array MPPT Voltage Range	60VDC~500VDC			30-160V	
Max. PV INPUT CURRENT	15A	18A	27A	30A(1.5K)	50A(3.5K)

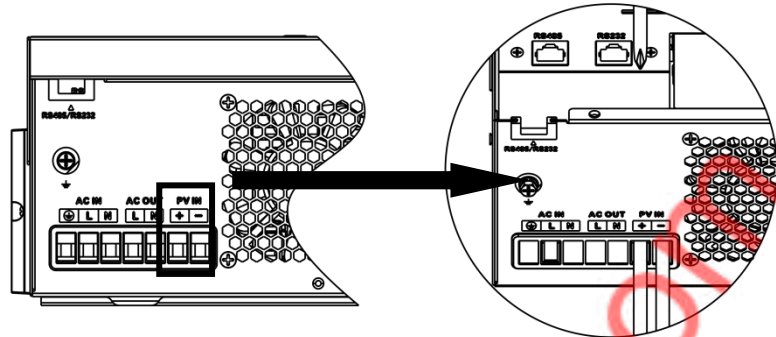
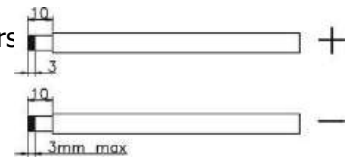
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,350 W	3.5KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	1,800 W	
	5 pcs in serial	5 pcs	2,250 W	
	6 pcs in serial	6 pcs	2,700 W	
	7 pcs in serial	7 pcs	3,150 W	
	8 pcs in serial	8 pcs	3,600 W	
	9 pcs in serial	9 pcs	4,050 W	
	10 pcs in serial	10 pcs	4,500 W	5.5KVA/6.2KVA
	11 pcs in serial	11 pcs	4,950 W	
	12 pcs in serial	12 pcs	5,400 W	6.2KVA
	6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W	
	8 pieces in serial and 2 sets in parallel	14 pcs	6,300 W	
	1 pcs in serial	1 pcs	450W	3.5KVA(PVmax=160V)
2 pcs in serial	2 pcs	900W		
3 pcs in serial	3 pcs	1,350 W		
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,650 W	3.5KVA/5.5KVA/6.2KVA
	4 pcs in serial	4 pcs	2,200 W	
	5 pcs in serial	5 pcs	2,750 W	
	6 pcs in serial	6 pcs	3,300 W	
	7 pcs in serial	7 pcs	3,850 W	
	8 pcs in serial	8 pcs	4,400 W	
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	5.5KVA/6.2KVA
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W	
	6 pieces in serial and 2 sets in parallel	12 pcs	6,600 W	6.2KVA
	1 pcs in serial	1 pcs	550W	
	2 pcs in serial	2 pcs	1000W	1.5K/3.5KVA(PVmax=160V)
	3 pcs in serial	3 pcs	1,500 W	3.5KVA(PVmax=160V)

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

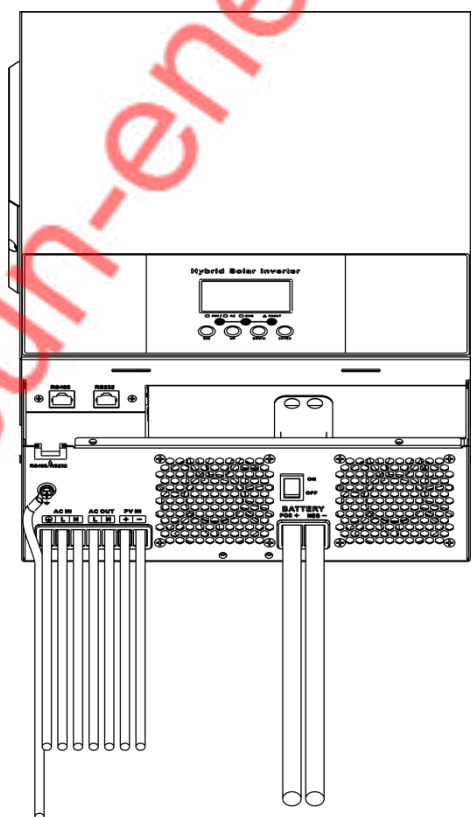
1. Remove insulation sleeve 10 mm for positive and negative conductors
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



3. Make sure the wires are securely connected.

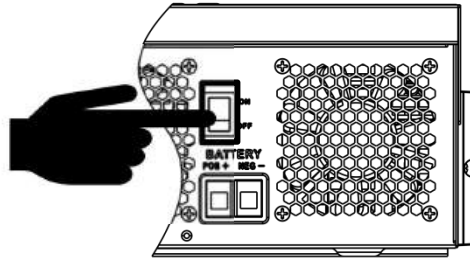
Final Assembly

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



OPERATION

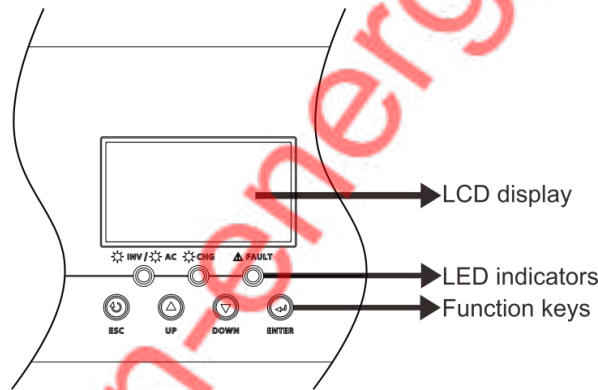
Power ON/OFF



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

Operation and Display Panel

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



LED Indicator

LED Indicator		Messages	
	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Setting

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







Setting Programs:

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Solar first 01 SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first (default) 01 UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 01 SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 01 SUB	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time. Note: SUB priority is just for PVmax=500Vdc model.





02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 02 60 ^A	If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 03 Gnt	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLD
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		05 LI2	Support PYLON US2000 Protocol 3.5 Version
		05 LI4	Standard communication Protocol form inverter supplier
06	Auto restart when overload occurs	Restart disable 06 Lfd	Restart enable (default) 06 LFE
07	Auto restart when over temperature occurs	Restart disable 07 tfd	Restart enable (default) 07 tFE
08	Output voltage	220V 08 220 ^v	230V (default) 08 230 ^v
		240V 08 240 ^v	

09	Output frequency	50Hz (default) 09 50 Hz	60Hz 09 60 Hz
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 10 nPL	auto 10 ALO
11	Maximum utility charging current	30A (default) 11 30A If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC.	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.	
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.	
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.	
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Battery fully charged (default) 13 BATT FUL	48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 24V models: Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 12V models: Setting range is from 12V to full (the value of program13-0.4V), but the max setting value must be more than the value of program12.

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 16 C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 050	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Buzzer mode	Mode1 BU2 18 nd1	Buzzer mute
		Mode2 BU2 18 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 BU2 18 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) BU2 18 nd4	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 BEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 23 byd	Bypass enable(default) 23 byE

25	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 	
26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.	
27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26	
29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V	
32	Bulk charging time (C.V stage)	Automatically (Default): 	If selected, inverter will judge this charging time automatically.
		5 min 	The setting range is from 5 min to 900 min. Increment of each click is 5 min.
		900 min 	
If "USE" is selected in program 05, this program can be set up.			
33	Battery equalization	Battery equalization 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

34	Battery equalization voltage	12V models default setting is 14.6V. Setting range is from floating voltage ~ 15.5V. Increment of each click is 0.1V. 24V models default setting is 29.2V. Setting range is from floating voltage ~ 31V. Increment of each click is 0.1V. 48V models default setting is 58.4V. Setting range is from floating voltage ~ 64V. Increment of each click is 0.1V.	
35	Battery equalized time	60min (default) 35 60	Setting range is from 0 min to 900min.
36	Battery equalized timeout	120min (default) 36 120	Setting range is from 0min to 900 min.
37	Equalization interval	30days (default) 37 30d	Setting range is from 1 to 90 days.
39	Equalization activated immediately	Enable 39 AEN	Disable (default) 39 AdS
		If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page..	
41	Automatic activation for lithium battery	AAt 41 nNL	Disable automatic activation (default)
		AAt 41 Ato	When Program05 is selected "Lix" as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit.
42	Manual activation for lithium battery	nAt 42 NOP	Default: disable activation
		nAt 42 Act	When Program05 is selected "Lix" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.
43	Setting SOC point back to utility source when selecting "SBU priority" or "Solar first" in program 01	43 050% ^{BAT}	Default 50%, 5%~50% Settable, but the minimum setting value must be more than the value of program 45.

44	Setting SOC point back to battery mode when selecting "SBU priority" or "Solar first" in program 01		Default 95%, 60%~100% Settable
45	Low DC cut-off SOC		Default 20%, 3%~30% Settable, but the max setting value must be less than the value of program 43.
46	Maximum discharge current protection when selecting "single" in program 28		Default OFF Disable current discharge current protection function
			Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value.

BATTERY EQUALIZATION

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.

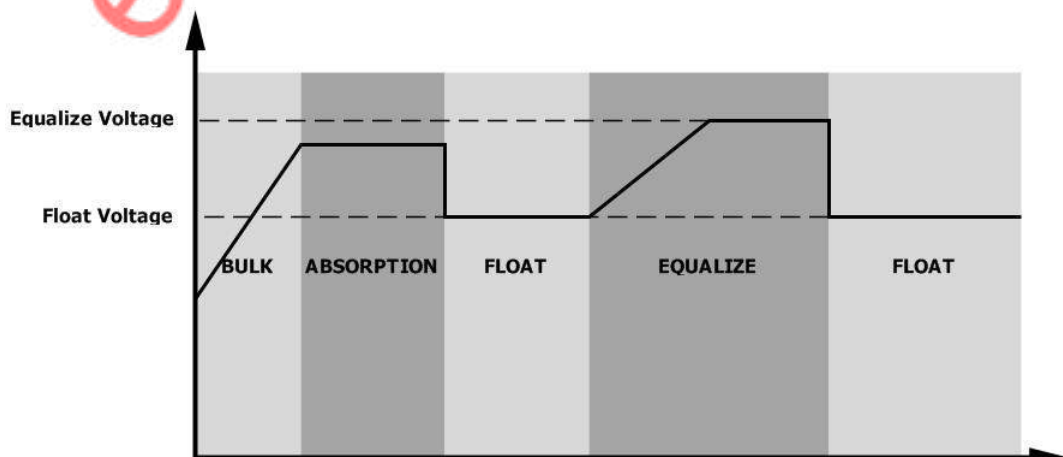
● How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

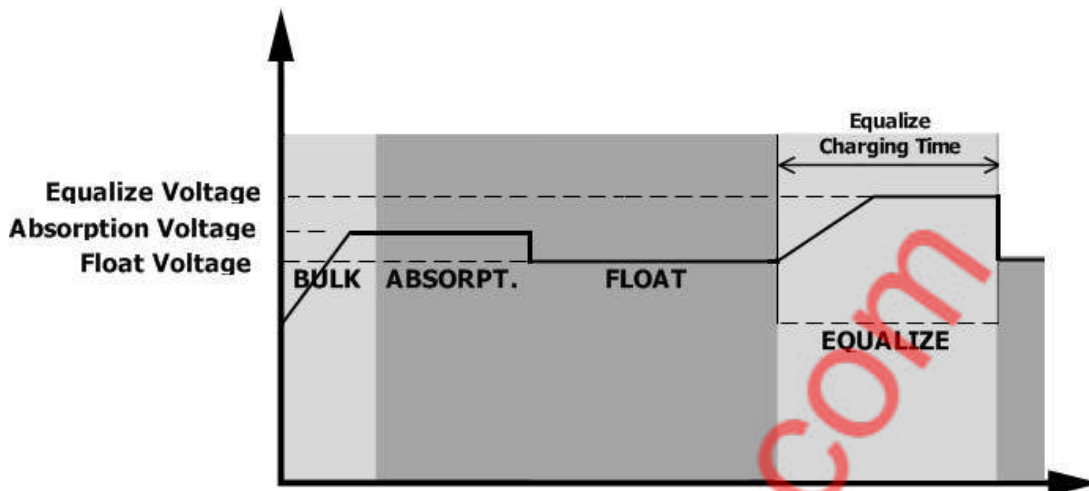
● When to Equalize

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

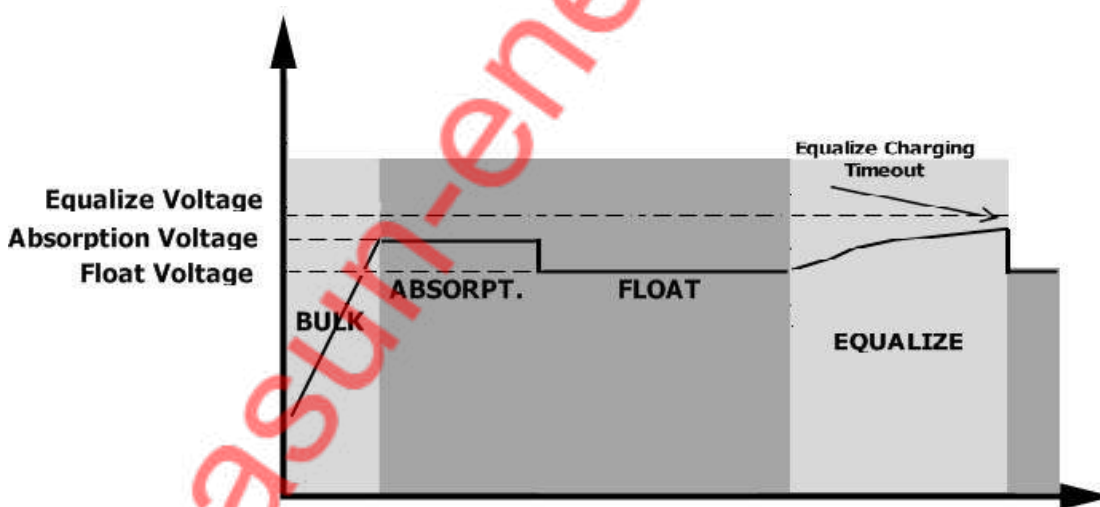


- **Equalize charging time and timeout**

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.



SETTING FOR LITHIUM BATTERY

Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

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

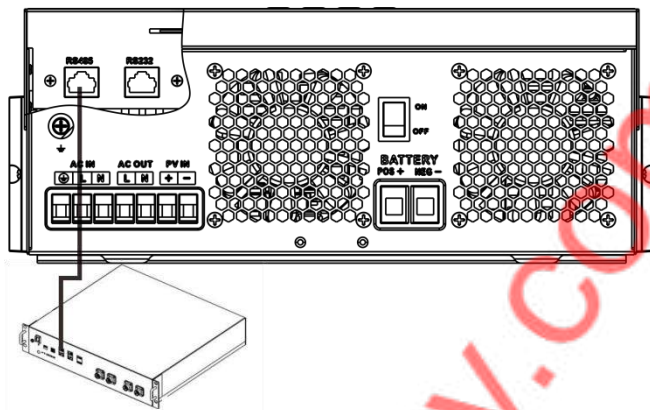


Fig 1

Lithium battery communication and setting

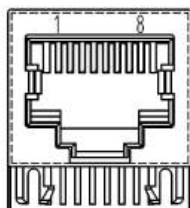
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

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

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

Pin number	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B



LCD setting

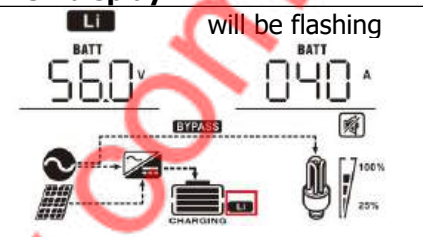
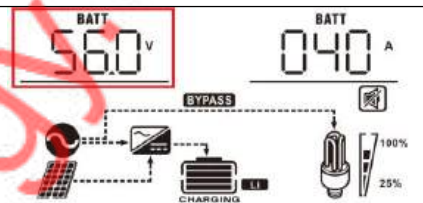
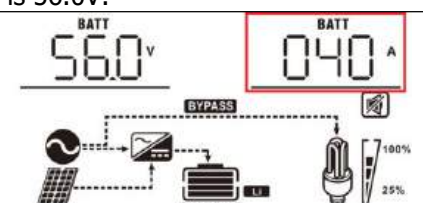


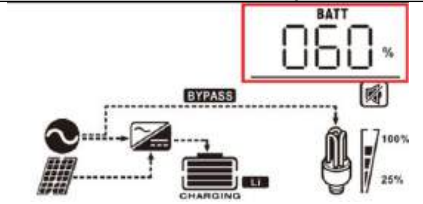
After connecting, you need to finish and confirm some settings as follow:

- 1) Select program 05 as lithium battery type.
- 2) Confirm program 41/42/43/44/45 setting value.

Note: Program 43/44/45 are only available with successful communication, they will replace the Program 12/13/29 function, at the same time, program 12/13/29 become unavailable.

LCD Display

If communication between the inverter and battery is successful, there is some information showing on the LCD as follow:

Item	Description	LCD display
1	Communication successful icon	 <p>will be flashing</p>
2	Max lithium battery charging voltage	 <p>Max lithium battery charging voltage is 56.0V.</p>
3	Max lithium battery charging current	 <p>Max lithium battery charging current is 40A.</p>
4	Lithium battery discharging is forbidden	 will flash once every 1 second
5	Lithium battery charging is forbidden	 will flash once every 2 second
6	Lithium battery SOC(%)	 <p>Lithium battery SOC is 63AH and 60%</p>

Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

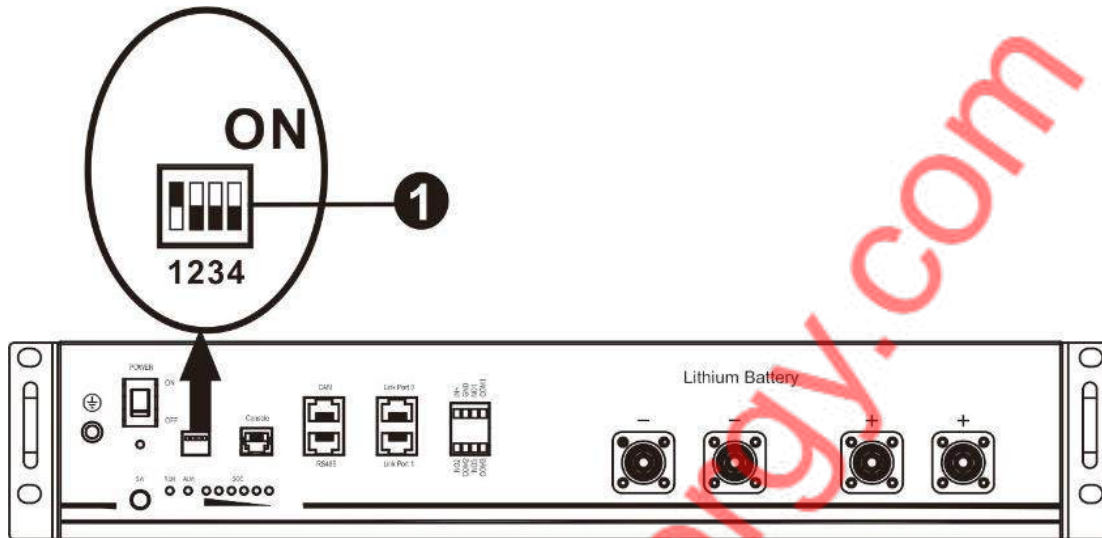
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

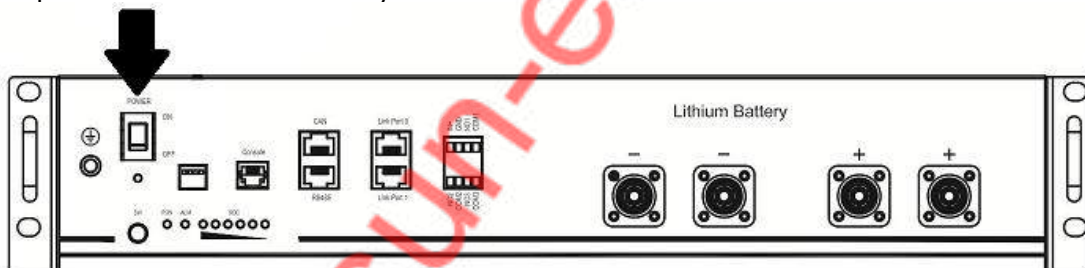
NOTE: "1" is upper position and "0" is bottom position.



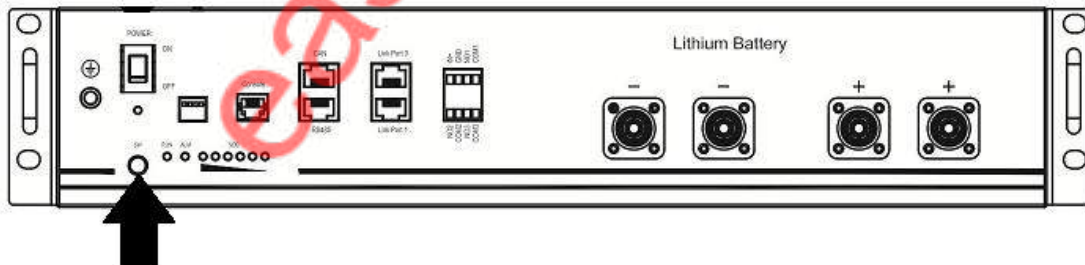
2). Process of install

Step 1. Use the RS485 cable to connect inverter and Lithium battery as Fig 1.

Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "Li2" in LCD program 5.

If communication between the inverter and battery is successful, the battery icon **Li** on LCD display will light

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

1. Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage

2. Set battery type as "USE" (user-defined)

05	Battery type	AGM (default) 05 AGM	Flooded 05 FLd
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program 27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.
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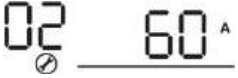
4. Set floating charging voltage as C.V voltage.

27	Floating charging voltage	If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26
----	---------------------------	--

5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program 12. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V
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6. Set Max charging current which must be less than the Max charging current of BMS.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
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7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01. The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.






















12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.
		24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.
		12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.

Remark:





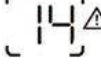
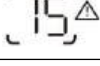
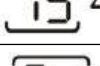
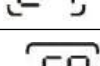
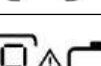

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.

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Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
14	Fan blocked	None	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
21	Lithium Battery over current	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	1.5KVA	3.5KVA	3.5KVA	5.5KVA	6.2KVA
	PVmax=160V				
Input Voltage Waveform	Sinusoidal (utility or generator)				
Nominal Input Voltage	230Vac				
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)				
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)				
High Loss Voltage	280Vac±7V				
High Loss Return Voltage	270Vac±7V				
Max AC Input Voltage	300Vac				
Nominal Input Frequency	50Hz / 60Hz (Auto detection)				
Low Loss Frequency	40±1Hz				
Low Loss Return Frequency	42±1Hz				
High Loss Frequency	65±1Hz				
High Loss Return Frequency	63±1Hz				
Output Short Circuit Protection	Battery mode: Electronic Circuits				
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)				
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)				
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>	<p>The graph illustrates the output power derating characteristics. The vertical axis represents Output Power, with a horizontal line for Rated Power and a lower horizontal line for 50% Power. The horizontal axis represents Input Voltage, with markers at 90V, 170V, and 280V. The power remains constant at the Rated Power level from 170V up to 280V. Between 170V and 90V, the output power decreases linearly to 50% of the Rated Power. Below 90V, the output power is zero.</p>				

Table 2 Inverter Mode Specifications

INVERTER MODEL	1.5KVA	3.5KVA	3.5KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Output Power	1.5KVA/1.5KW	3.5KVA/3.5KW		5.5KVA/5.5KW	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave				
Output Voltage Regulation	230Vac±5%				
Output Frequency	50Hz or 60Hz				
Peak Efficiency	94%				
Surge Capacity	2* rated power for 5 seconds				
Nominal DC Input Voltage	12Vdc	24Vdc		48Vdc	
Cold Start Voltage	11.0Vdc	23.0Vdc		46.0Vdc	
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.0Vdc 10.7Vdc 10.1Vdc	22.0Vdc 21.4Vdc 20.2Vdc		44.0Vdc 42.8Vdc 40.4Vdc	
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	11.5Vdc 11.2Vdc 10.6Vdc	23.0Vdc 22.4Vdc 21.2Vdc		46.0Vdc 44.8Vdc 42.4Vdc	
Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	10.5Vdc 10.2Vdc 9.6Vdc	21.0Vdc 20.4Vdc 19.2Vdc		42.0Vdc 40.8Vdc 38.4Vdc	

Table 3 Charge Mode Specifications

Utility Charging Mode					
INVERTER MODEL	1.5KVA	3.5KVA	3.5KVA	5.5KVA	6.2KVA
	PVmax=160V				
Max Charging Current (PV+AC) (@ VI/P=230Vac)	120Amp		100Amp	100Amp	120Amp
Max Charging Current (AC) (@ VI/P=230Vac)	80Amp				
Bulk Charging Voltage	Flooded Battery	14.6Vdc	29.2Vdc		58.4Vdc
	AGM / Gel Battery	14.1Vdc	28.2Vdc		56.4Vdc
Floating Charging Voltage	13.5Vdc	27Vdc		54Vdc	
Overcharge Protection	15.5 Vdc	33Vdc		63Vdc	
Charging Algorithm	3-Step				
Charging Curve	<p>The graph plots Battery Voltage (per cell) on the left y-axis and Charging Current (%) on the right y-axis against Time on the x-axis. The voltage curve (black) rises linearly in the Bulk stage, plateaus in the Absorption stage, and remains constant in the Maintenance stage. The current curve (red) is constant in the Bulk stage, then decays exponentially in the Absorption stage, and remains low in the Maintenance stage. Key voltage points are 2.25Vdc and 2.43Vdc (2.35Vdc). Time intervals T0 and T1 are marked, with T1 = 10 * T0, minimum 10mins, maximum 8hrs.</p>				
Solar Input					
INVERTER MODEL	1.5KVA	3.5KVA	3.5KVA	5.5KVA	6.2KVA
	PVmax=160V				
Rated Power	900W	1500W	4000W	5500W	6500W
Max. PV Array Open Circuit Voltage	160Vdc		500Vdc		
PV Array MPPT Voltage Range	30Vdc~160Vdc		60Vdc~500Vdc		
Max. Input Current	30A	50A	15A	18A	27A
Max. Charging Current(PV)	60A		100A	100A	120A

Table 4 General Specifications

INVERTER MODEL	1.5KVA	3.5KVA	3.5KVA	5.5KVA	6.2KVA
	PVmax=160V				
Operating Temperature Range	-10°C to 55°C				
Storage temperature	-15°C~ 60°C				
Humidity	5% to 95% Relative Humidity (Non-condensing)				
Dimension(D*W*H), mm	358x295x105			438x295x105	
Net Weight, kg	5.8	6.2	8.2	8.7	

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. Re-charge battery. 2. Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	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 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/15	Internal components failed.	Return to repair center.
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
Fault code 14	Bus voltage is too low.		
Another fault code		If the wires is connected well, please return to repair center.	

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USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

8.5KVA/11.0KVA 230Vac

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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. Fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. **NEVER** cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

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

Features

1. Pure sine wave inverter
2. Inverter running without battery
3. Built-in MPPT solar controller
4. Configurable input voltage range for home appliances and personal computers via LCD setting
5. Configurable battery charging current based on applications via LCD setting
6. Configurable AC/Solar Charger priority via LCD setting
7. Compatible to mains voltage or generator power
8. Auto restart while AC is recovering
9. Overload/ Over temperature/ short circuit protection
10. Smart battery charger design for optimized battery performance
11. Cold start function

Basic System Architecture

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

1. Generator or Utility.
2. PV modules (option)

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

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

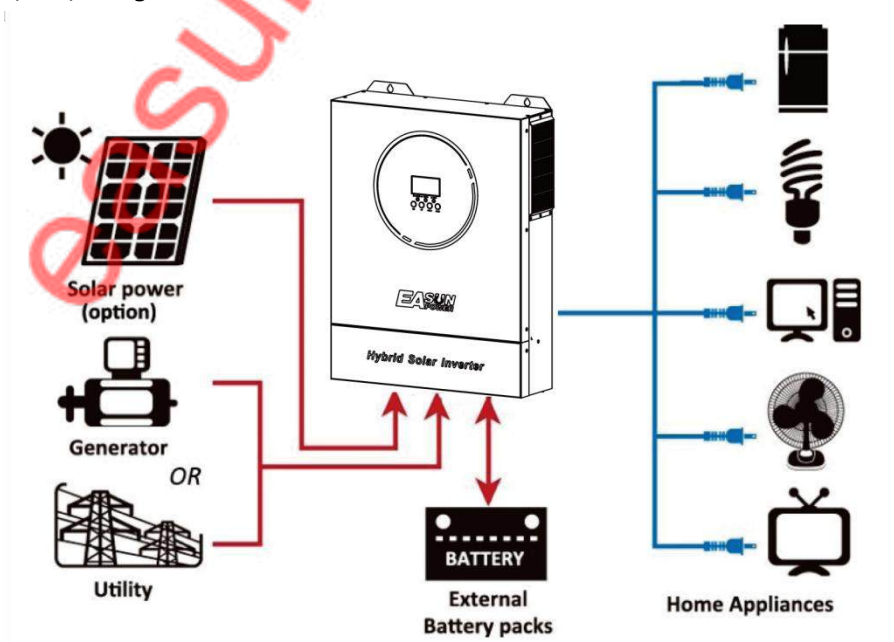
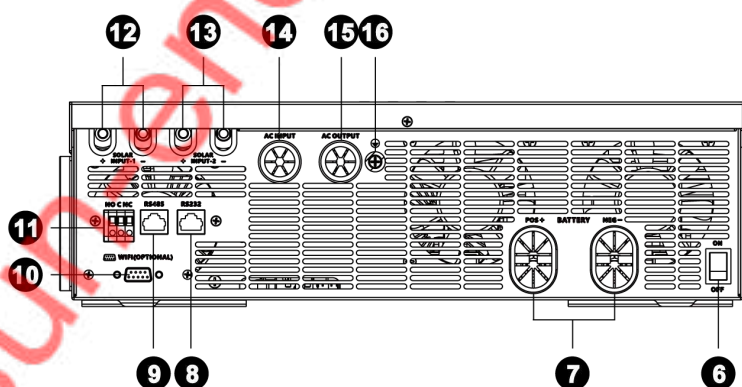
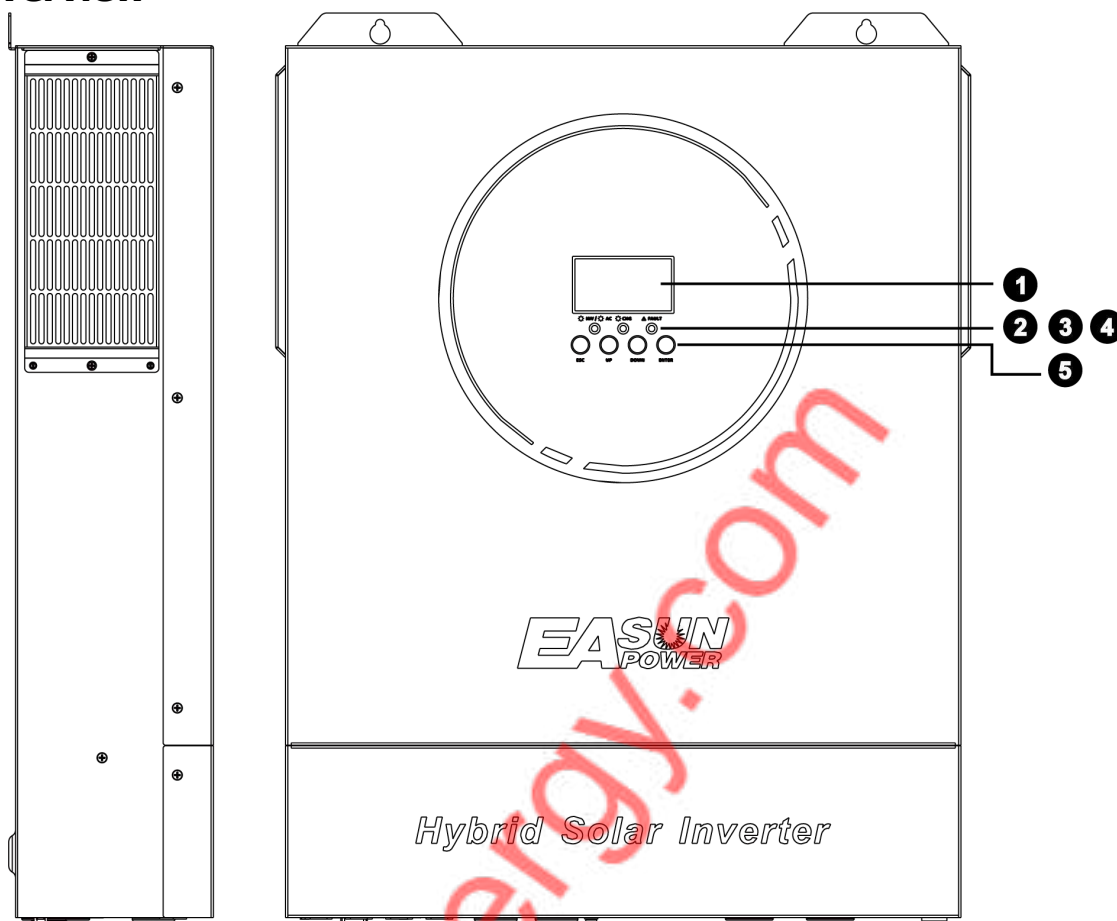


Figure 1 Hybrid Power System

Product Overview



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. Battery negative/ positive outlet hole
8. RS232 communication port (RJ45)
9. RS485 communication port (RJ45)
10. RS232 communication port (DB9)
11. Dry contact port
12. PV1 input
13. PV2 input
14. AC input
15. AC output
16. Grounding point

Note: RS232 communication port (DB9) and RS232 communication port (RJ45) can't be used simultaneously, only one can be used at the same time

INSTALLATION

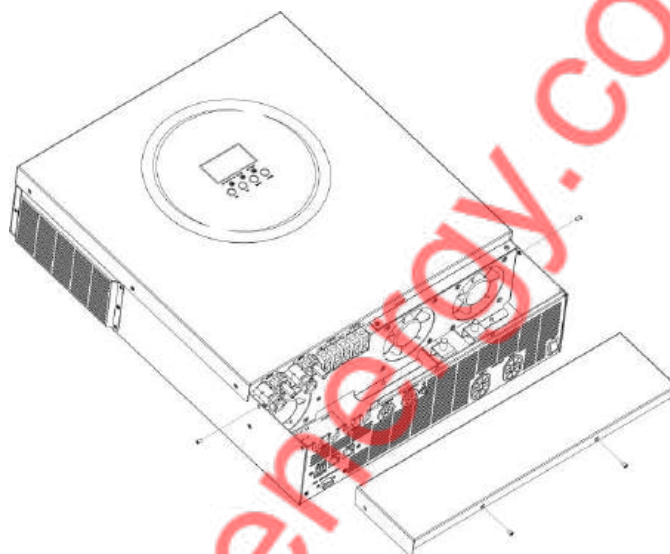
Unpacking and Inspection

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

1. The unit x 1
2. User manual x 1
3. PV connector x 4
4. Battery fuse x 1

Preparation

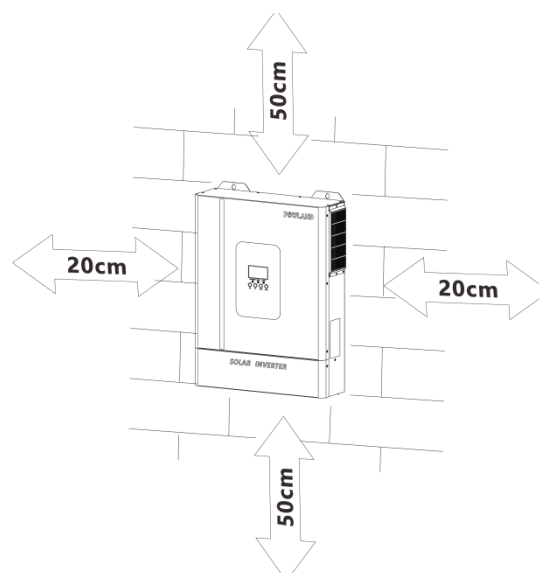
Before connecting all wirings, please take off bottom cover by removing four screws as shown below.



Mounting the Unit

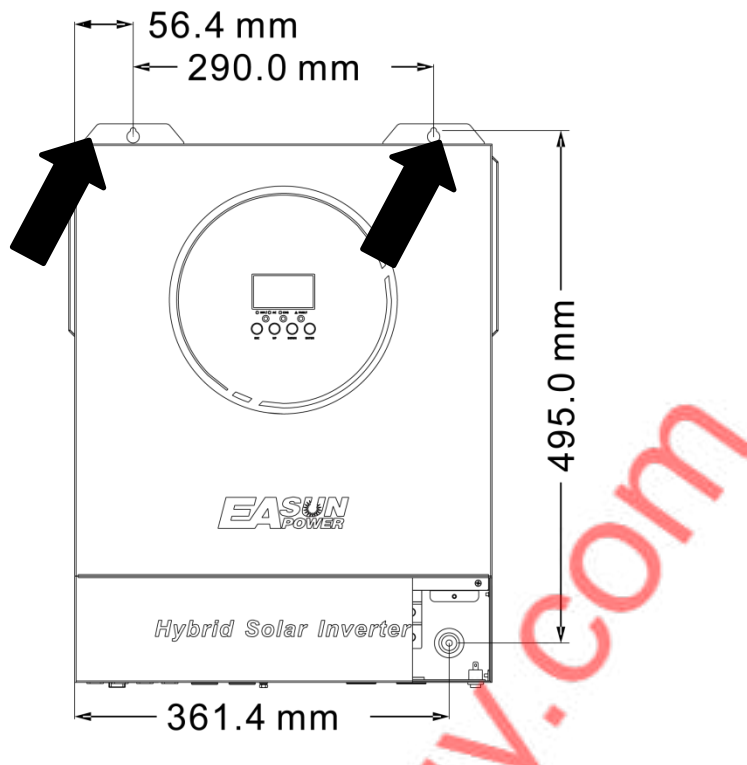
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



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 a qualified personnel.

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

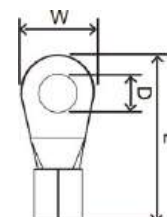
Recommended battery cable 、 Terminal size:

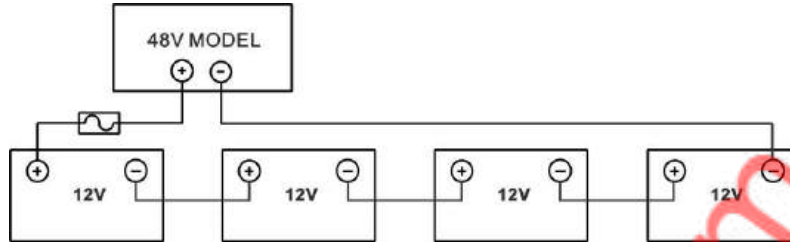
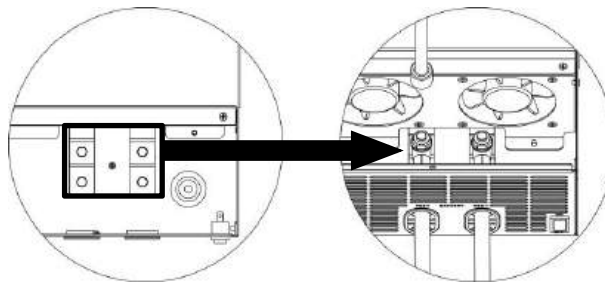
Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm2	Terminal size(mm)			Torque value
					L	W	D	
8.5KW	180A	400AH	4AWG*2	25	37	22	8.4	10~12 Nm
11.0KW	220A	600AH	2AWG*2	38	37	22	8.4	10~12 Nm


Terminal size:


Please follow below steps to implement battery connection:

1. Make positive and negative cables based on recommended terminal size.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 10-12Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.





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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 63A.

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

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

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

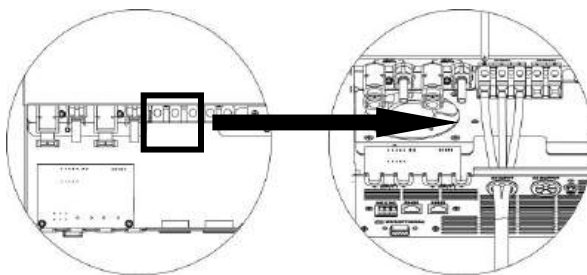
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
All Model	6 AWG	1.2~ 1.4Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnecter first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

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



WARNING:

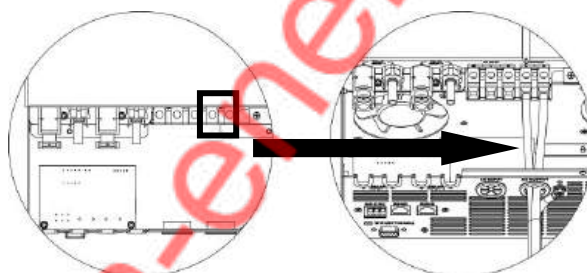
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
All Model	18A*2	10 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode		
INVERTER MODEL	8.5KW	11.0KW
Max. PV Array Open Circuit Voltage	500VDC	
PV Array MPPT Voltage Range	60VDC~500VDC	
Max. PV INPUT CURRENT	18A*2	

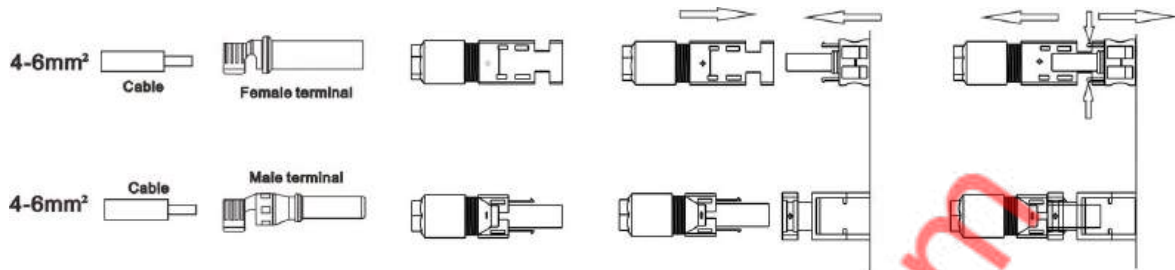
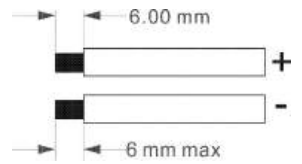
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below. The recommended module configurations are fit for PV1 or PV2, for example: PV1 is 8 pcs in serial and PV2 could be 8 pcs in serial too, total quantity of panels is 16pcs.

Solar Panel Spec. (reference)	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model	
	- 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	3 pcs in serial	3 pcs	1,350 W	All Model
	4 pcs in serial	4 pcs	1,800 W		
	5 pcs in serial	5 pcs	2,250 W		
	6 pcs in serial	6 pcs	2,700 W		
	7 pcs in serial	7 pcs	3,150 W		
	8 pcs in serial	8 pcs	3,600 W		
	9 pcs in serial	9 pcs	4,050 W		
	10 pcs in serial	10 pcs	4,500 W		
	11 pcs in serial	11 pcs	4,950 W		
	12 pcs in serial	12 pcs	5,400 W		
	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model	
Solar Panel Spec. (reference)	3 pcs in serial	3 pcs	1,650 W	All Model	
- 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	4 pcs in serial	4 pcs	2,200 W		
	5 pcs in serial	5 pcs	2,750 W		
	6 pcs in serial	6 pcs	3,300 W		
	7 pcs in serial	7 pcs	3,850 W		
	8 pcs in serial	8 pcs	4,400 W		
	9 pcs in serial	9 pcs	4,950 W		

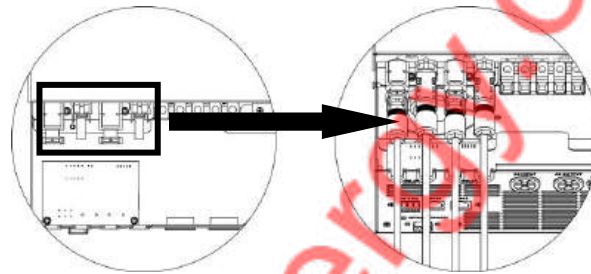
PV Module Wire Connection:

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.

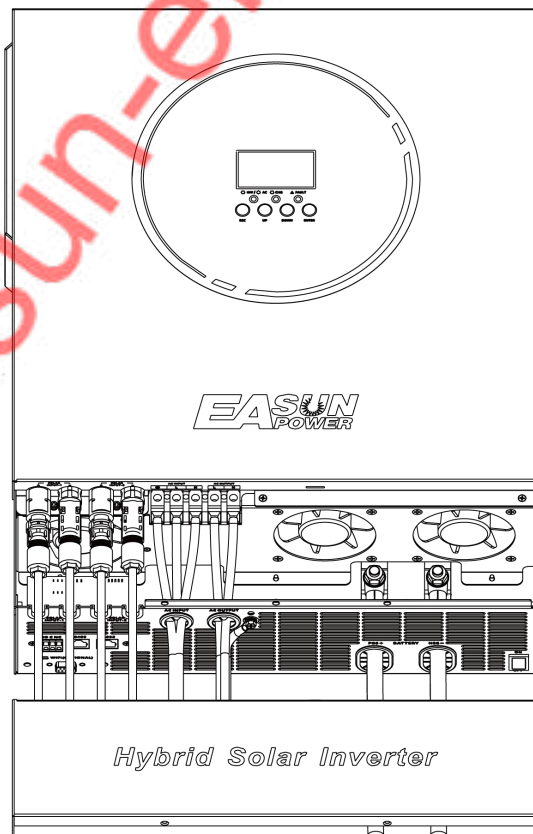


3. Make sure the wires are securely connected.



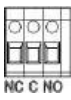
Final Assembly

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




Dry Contact Signal

There is one dry contact (3A/250VAC) available on the rear panel. When program 16 of F0 group is set as "Model1", it could be used to deliver signal to external device when battery voltage reaches warning level. When program 16 of F0 is set as "Model2" and the unit is working in battery mode, it could be used to trigger the grounding box to connect neutral and grounding of AC output together.

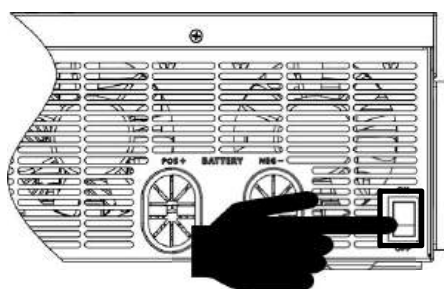
Unit Status	Condition		Dry contact port: 		
			NC & C	NO & C	
Power Off	Unit is off and no output is powered.		Close	Open	
Power On	Output is powered from Utility.		Close	Open	
	Output is powered from Battery or Solar.	Program 1 of F1 set as SUB	Battery voltage or Soc < Low DC warning voltage or Soc	Open	Close
			Battery voltage or Soc > setting value program 5 of F2 or battery charging reaches floating stage	Close	Open
	Output is powered from Battery or Solar.	Program 1 of F1 is set as SBU	Battery voltage < Setting value program 5 of F2	Open	Close
Battery voltage > setting value program 6 of F2 or battery charging reaches floating stage			Close	Open	

When program 16 of F0 is set as "Model2":

Unit Status	Condition		Dry contact port: 	
			NC & C	NO & C
Power Off	Unit is off and no output is powered.		Close	Open
Power On	Unit works in standby mode, line mode or fault mode		Close	Open
	Unit works in battery mode or power saving mode		Open	Close

OPERATION

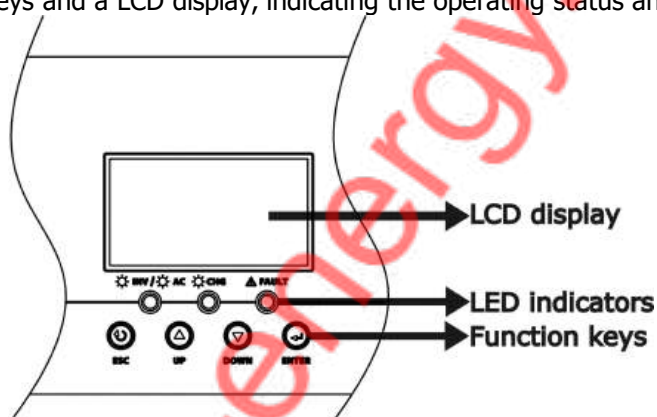
Power ON/OFF



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

Operation and Display Panel

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



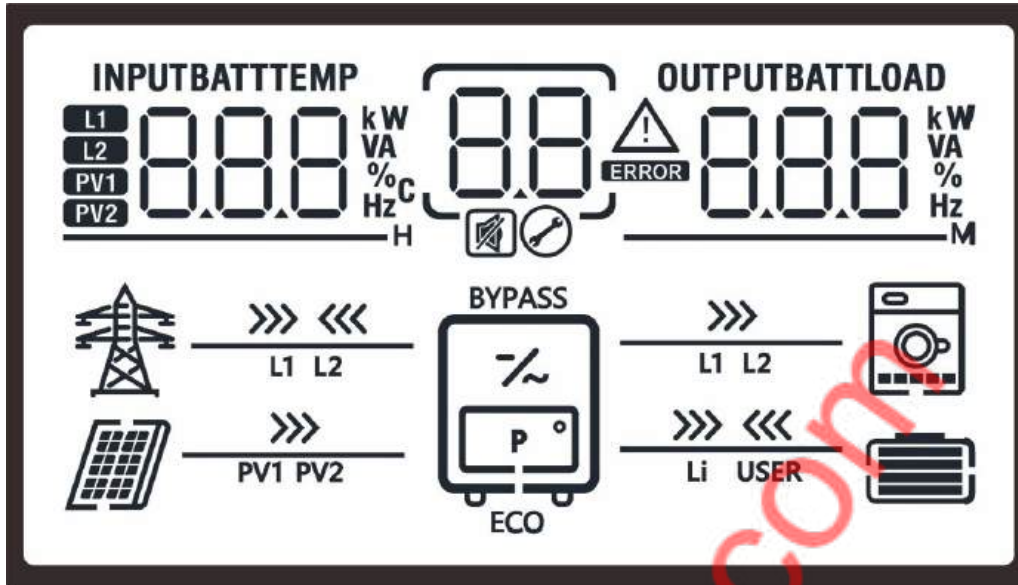
LED Indicator

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

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display



LCD Setting

1. Pressing and holding ENTER button for 3 seconds, the unit will enter setting groups mode.
2. Press "UP" or "DOWN" button to select setting groups. There are 5 groups setting menu include F0/F1/F2/F3/F4, press "ENTER" button to confirm the selection or ESC button to exit.

F0: Setting general parameters

F1: Setting AC output parameters

F2: Setting battery parameters

F3: Setting time parameters

F4: Setting systems parameters

3. Press "ENTER" button to confirm the selection groups or ESC button to return selection groups or exit.

Setting F0 Programs:

Program	Description	Selectable option	
01	AC input voltage range	Appliances (default) APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator GNT	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.

02	Power saving mode enable/disable	Saving mode disable (default) 5d5	If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.
		Saving mode enable 5E7	If enabled, the output of inverter will be off when connected load is pretty low or not detected.
03	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable bYd	Bypass enable (default) bYE
04	Auto restart when overload occurs	Restart disable Lfd	Restart enable (default) LFE
05	Auto restart when over temperature occurs	Restart disable Efd	Restart enable (default) EFE
06	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) nNL	auto AtO
07	Auto return to default display screen	Return to default display screen (default) E9P	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen HEP	If selected, the display screen will stay at latest screen user finally switches.
08	Backlight control	Backlight on (default) LoN	Backlight off LoF
09	Buzzer mode	Mode1 nd1	Buzzer mute
		Mode2 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) nd4	The buzzer sounds when there is a fault
10	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 001; 002; 003.....	

16	Dry contact mode Please check the function in chapter about "Dry Contact Signal"	Model1:(default) it could be used to deliver signal to external device when battery voltage reaches warning level. Model2: Allow neutral and grounding of AC output is connected together. This function is only available when the inverter is working with external grounding box.Only when the inverter is working in battery mode, it will trigger grounding box to connect neutral and grounding of AC output. Neutral and grounding of AC output is connected.
----	---	--

Setting F1 Programs:

Program	Description	Selectable option	
		SUB priority (default) SUB	<p>Solar->Utility->Battery Solar energy is charged first and then power to the loads.</p> <p>If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.</p>
01	Output source priority	SBU priority SBU	<p>Solar-> Battery ->Utility Solar energy provides power to the loads as first priority.</p> <p>If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.</p> <p>Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 05 of F2 group.</p>
		SUF priority SUF	<p>Solar->Utility->Battery If solar energy is sufficient to all connected loads and charge battery, the solar energy could feedback to the grid (sell power to grid)</p> <p>If solar energy is not sufficient to power all connected loads, utility energy will supply power to the loads at the same time.</p>

03	Output voltage	220V 220 ^v	230V (default) 230 ^v
		240V 240 ^v	
04	Output frequency	50Hz (default) 050 _{Hz}	60Hz 060 _{Hz}
06	Salve output source priority	OFF(default) oFF	Turn off salve output source priority
	The priority is available after setting application period, the units will turn to salve priority in the setting period from main priority	SUB priority SUB	The function is the same as in program 01 of F1.
		SBU priority SUBU	
07	Start timer setting for salve output source priority - Hours setting	00	The setting range is from 00 to 23 of every day
08	Start timer setting for salve output source priority - Minutes setting	00	The setting range is from 00 to 59 of every hour
09	End timer setting for salve output source priority - Hours setting	00	The setting range is from 00 to 23 of every day
10	End timer setting for salve output source priority - Minutes setting	00	The setting range is from 00 to 59 of every hour

Setting F2 Programs:

Program	Description	Selectable option
01	Battery type	AGM AGM (default)
		FLD Flooded
		USE User-Defined If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program03/04/08 of F2.
		L12 Support PYLON US2000 Protocol (3.5 Version)
		L14 Standard communication Protocol 2 from inverter supplier
		L16 If "LIB" is selected, the battery default value is fit for lithium battery without communication battery charge voltage and low DC cut-off voltage can be set up in program03/04/08 of F2.
02	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:
		Solar first 50F Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 500 Solar energy and utility will charge battery at the same time.
		Only Solar 050 Solar energy will be the only charger source no matter utility is available or not.
		Solar residual 50r Solar energy will support all connected loads as first priority, the residual energy will charge battery
03	Bulk charging voltage (C.V voltage)	56.4V(default) 56.4 ^v
		If self-defined or LIB is selected in program 01 of F2, this program can be set up. Setting range is the value of program 04 of F2 to 62.0V.
04	Floating charging voltage	54.0V(default) 54.0 ^v
		If self-defined or LIB is selected in program 01 of F2, this program can be set up. Setting range is from 48.0V to the value of program 03 of F2.

05	Setting voltage or Soc point back to utility source when selecting "SBU priority".	Lithium battery without communication: Default :46V	Setting range is from 44.0V to 57.2V, but the max setting value must be less than the value of program 06 of F2, and the minimum setting value must be more than the value of program 08 of F2
		Lithium battery with communication: Default :50%	Setting range is from 5%~50%, but the minimum setting value must be more than the value of program 08 of F2 plus 2%.
06	Setting voltage point back to battery mode when selecting "SBU priority" in program 01(F1).	Battery fully charged (default) FUL	If selected, acceptable voltage range will be from 48v to the value in program 03 of F2. but the minimum setting value must be more than the value of program 05 of F2.
		Default 95% 06 095% ⊗	Setting range is from 60% to 100%
08	Low DC cut-off voltage or Soc	1. If self-defined or LIB is selected in program 01 of F2, default value is 42.0V, setting range is from 40.0V to 54.0V, the max setting value must be less than the value of program 05 of F2. 2.If LIX is selected in program 01 of F2 and communication between the inverter and battery is successful, default value is 20%, the setting range value is 3%~30%, but the value must less than the value of program 05 of F2.	
09	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	80A (default)	8.5KW Model : If selected, acceptable charging current range will be within 10-140A, but it shouldn't be less than the AC charging current (program 10 of F2) 11.0KW Model : If selected, acceptable charging current range will be within 10-160A, but it shouldn't be less than the AC charging current ((program 10 of F2)
10	Maximum utility charging current	60A (default)	If selected, acceptable charging current range will be within 2-120A, but the max setting value must be less than the value of program 09 of F2
11	Slave charger source priority The priority is available after setting application period, the units will turn to slave priority in the setting period form main priority	OFF(default) off	Turn off slave charger source priority
		Solar first Sof	The function is the same as in program 02 of F2 group.
		Solar and Utility (default) SNU	
		Only Solar oS0	
		Solar residual Sof	

12	Start timer setting for salve charger source priority - Hours setting	00	The setting range is from 00 to 23 of every day
13	Start timer setting for salve charger source priority - Minutes setting	00	The setting range is from 00 to 59 of every hour
14	End timer setting for salve output charger priority - Hours setting	00	The setting range is from 00 to 23 of every day
15	End timer setting for salve charger source priority - Minutes setting	00	The setting range is from 00 to 59 of every hour
16	Bulk charging time (C.V stage)	Automatically (Default): AUT	If selected, inverter will judge this charging time automatically.
		5 min 005	The setting range is from 5 min to 900 min. Increment of each click is 5 min.
		900 min 900	
If "USE" is selected in program 01 of F2 group, this program can be set up.			
17	Battery equalization	Battery equalization EEN	Battery equalization disable (default) Ed5
		If "Flooded" or "User-Defined" is selected in program 01 of F2, this program can be set up.	
18	Battery equalization voltage	Default setting is 58.4V. 58.4 ^v	Setting range is from 48v~ 62V. Increment of each click is 0.1V(The minimum value should be greater than the floating recharge value).
19	Battery equalized time	60min (default) 60	Setting range is from 0min to 900min. Increment of each click is 5min.
20	Battery equalized timeout	120min (default) 120	Setting range is from 0min to 900 min. Increment of each click is 5 min.
21	Equalization interval	30days (default) 30d	Setting range is from 1 to 90 days. Increment of each click is 1 day

22	Equalization activated immediately	Enable REN	Disable (default) AD5
		<p>If equalization function is enabled in program 17 of F2, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 21 of F2 setting.</p> <p>At this time, "E9" will not be shown in LCD main page.</p>	
23	Manual activate the lithium battery setting	Disable(default) NoP	Default: disable activation
		Active ACT	When program 01 of F2 is selected "Lix" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.
24	Automatic activation for lithium battery	nNL	Default: disable activation
		Auto AtO	When program 01 of F2 is selected "Lix" as lithium battery, when the battery is not detected, the unit or PV will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit.
25	Max battery discharge current setting	OFF(default) oFF	When the battery discharge current more than the setting value, the unit will stop discharging and go to bypass mode or standby mode. The setting range is from 50 to 500
		500 ^A	

Setting F3 Programs:

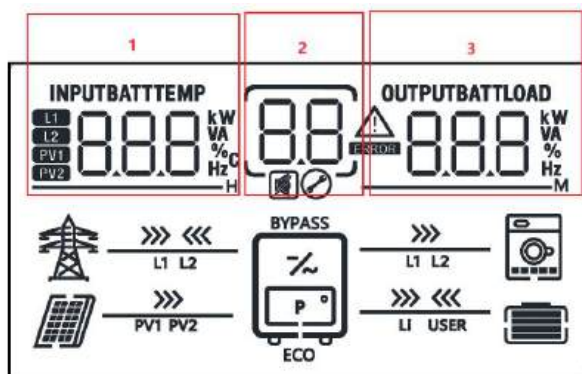
Program	Description	Selectable option	
01	Time setting –Year	000;00 1..099	For year setting, the range is from 00 to 99.
02	Time setting–Month	00 1;002...0 12	For month setting, the range is from 1 to 12.
03	Time setting–Day	00 1;002...03 1	For day setting, the range is from 1 to 31.
04	Time setting –Hour	000;00 1..023	For hour setting, the range is from 0 to 23.
05	Time setting –Minute	000;00 1..059	For minute setting, the range is from 0 to 59.
06	Time setting –Second	000;00 1..059	For second setting, the range is from 0 to 59.

Setting F4 Programs:

Program	Description	Selectable option	
01	Reset all stored data of PV generated power and output load energy	Reserve data(default) No	Reset generated energy data YEs

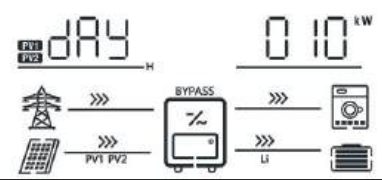
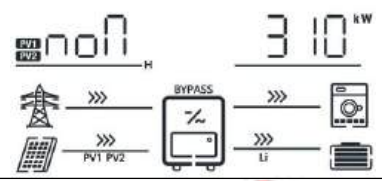
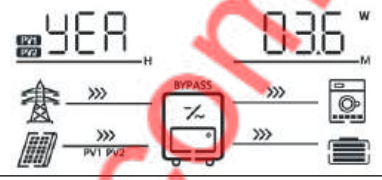
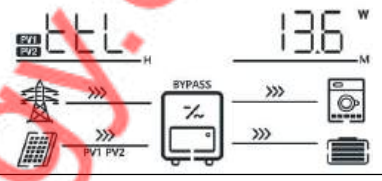


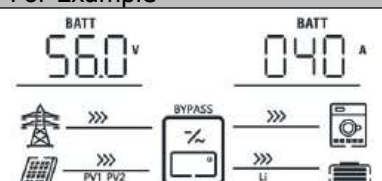
LCD display description

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. all of information could be show in 1/2/3 area of LCD



LCD display information			
Item	1 area data	3 area data	For Example
1	Input voltage	Output voltage	<p>Input Voltage=220V, output voltage=220V (Default Display Screen)</p>
2	Input frequency	Output frequency	<p>Input frequency=50Hz Output frequency=50Hz</p>
3	Output active power	Output apparent power	<p>Active power=3.02KW Apparent power=4.0KVA</p>
4	Input active power	PV feedback power	<p>active power=800w feedback power=0w</p>

5	Battery voltage	Load percentage	<p>Battery voltage=50V Load percentage=80%</p>
6	Charging power	Charging current	<p>Total charging power=1.8KW Charging current=36A Icon AC and PV is light show that AC grid and PV charging battery at the same time</p>
7	Total PV power	Discharge current	<p>PV power=8.6KW Battery discharge current is 0 A</p>
8	PV1 power	PV2 power	<p>PV1 power =4.5kw PV2 power =4.3kw</p>
9	PV1 voltage	PV1 current	<p>PV voltage=360V PV current=12A</p>
10	PV2 voltage	PV2 current	<p>PV voltage=320V PV current=13A</p>






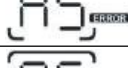
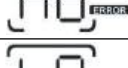

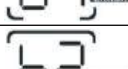










9	DAY	Generation power/day		Generation power/day=10KWh 
10	MON	Generation power /month		Generation power /month=310KWh 
11	YEA	Generation power /year		Generation power /year=3.6MWh 
12	TTL	Total generation power		Total generation power=13.6MWh 
13	Year	month	day	2024/03/25 
14	Hour	second	minute	16:25 03s 
Only communication between the inverter and battery is successful, communication successful icon LI will be flashing, there is some information showing on the LCD				
Item	1 Area data	3 Area data		For Example
15	Max lithium battery charging voltage	Max lithium battery charging current		



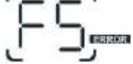
16		<p>xx1: Indicating that lithium battery charging is prohibited;</p> <p>x1x: Indicating that the lithium battery is prohibited;</p> <p>1xx: Indicating that the lithium battery requires forced charging</p>		
17		Lithium battery SOC(%)		
<p>Other LCD display information Please press and hold the button "Down" for a long time on main menu page, you could see the follow information.</p>				
Item	1 Area data	2 Area data	2 Area data	For Example
18	Software Version part1	Software Version Part2	Software Version Part3	
19	Model code Version part1	Model code Version Part2	Model code Version Part3	
20	CPU type	HD	Hardware Version	

Fault Reference Code

There are seven groups about fault code, a fault code consist of group code and number, group code is first and number is last, such as C0.

- A: Inverter group fault code
- B: battery group fault code
- C: PV group fault code
- D: Output group fault code
- E: Parallel group fault code
- F: Other group fault code
- G: Grid group fault code

Fault Code	Fault Event	Icon on
A0	Output short circuited.	
A1	Output voltage is too high.	
A2	Over current or surge	
A3	Over DC voltage in AC output	
A4	Inverter current offset is too high	
A5	Output voltage is too low	
A6	Inverter negative power	
B0	Battery voltage is too high	
B1	DCDC over current	
B2	DC/DC current offset is too high	
C0	PV over current	
C1	PV over voltage	
C2	PV1 current offset is too high	
C3	PV2 current offset is too high	
D0	Overload time out	
D1	Op current offset is too high	
F0	Over temperature of inverter module	
F1	Over temperature of PV module	
F2	Over temperature of DCDC module	

F3	Bus voltage is too high	
F4	Bus soft start failed	
F5	Bus voltage is too low	

Warning Indicator

There are seven groups about warning code, a warning code consist of group code and number, number is first and group code is last, such as 0C.

A: Inverter group fault code

B: battery group fault code





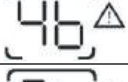
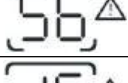
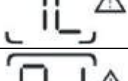


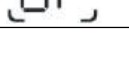
C: PV group fault code

D: Output group fault code

E: Parallel group fault code

F: Other group fault code

G: Grid group fault code

Warning Code	Warning Event	Audible Alarm	Icon flashing
0B	Battery low	Beep once every second	
1B	Battery is not connected	None	
2B	Battery equalization	None	
3B	Battery low and it isn't up to the setting value of program 06 of F2 group	Beep twice every 3 seconds	
4B	Lithium battery communication is abnormal	Beep once every 0.5 second	
5B	Battery discharge overcurrent	None	
1C	PV energy is too weak	Beep twice every 3 seconds	
0D	Overload	Beep once every 0.5 second	
1D	Output power derating	Beep twice every 3 seconds	
0F	Temperature is too High	Beep three times every second	

BATTERY EQUALIZATION

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.

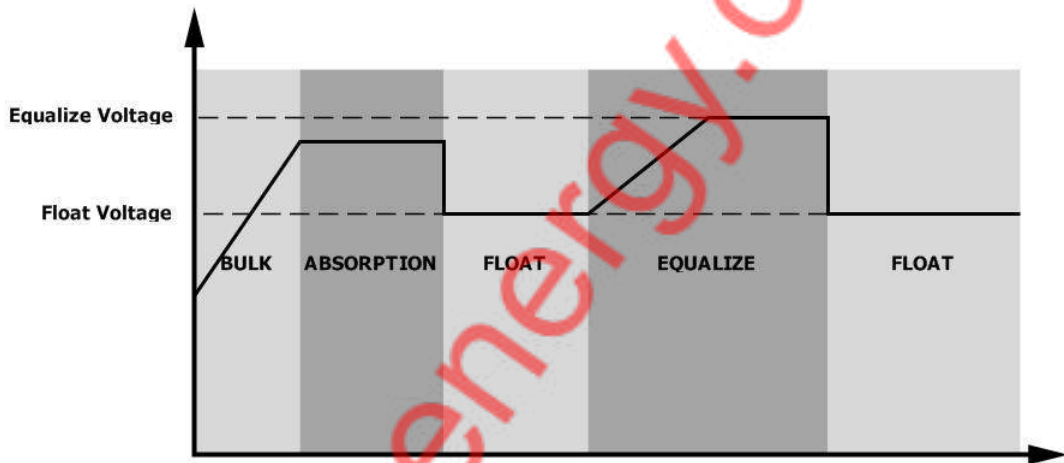
1. How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

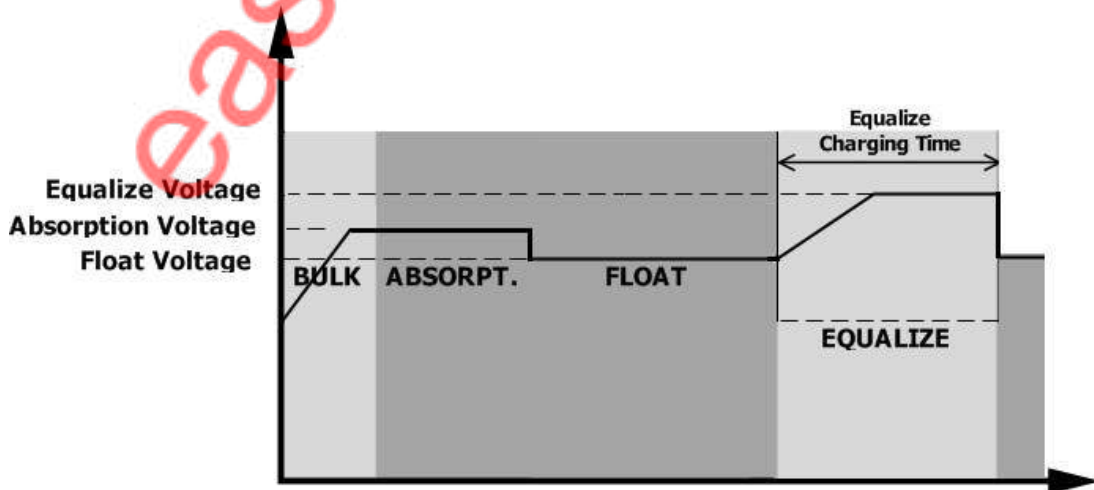
2. When to Equalize

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

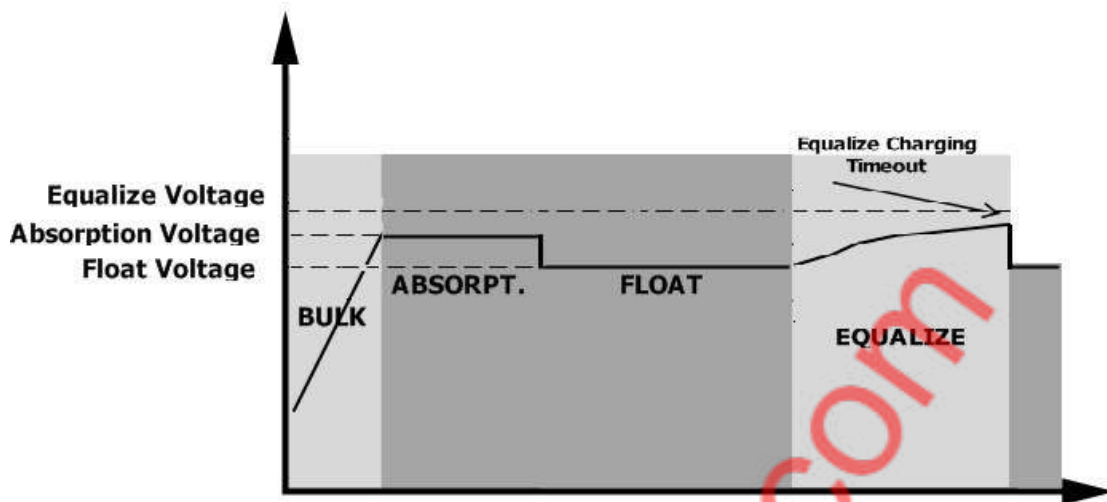


3. Equalize charging time and timeout

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



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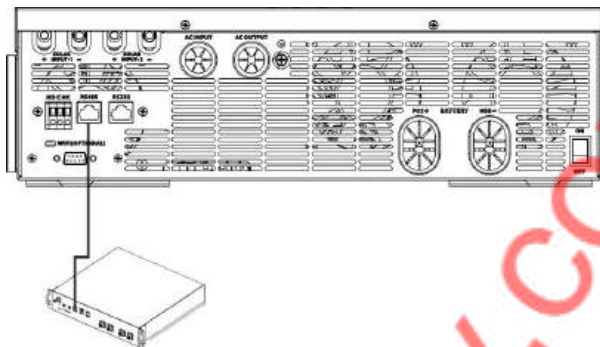
SETTING FOR LITHIUM BATTERY

Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

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



Lithium battery communication and setting

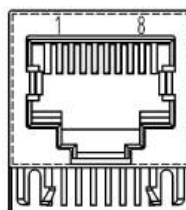
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

1. Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
2. Have the inverter start or stop charging according to the status of lithium battery.

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

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

Pin number	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B



Setting for PYLON US2000 lithium battery

1. PYLONTECH US2000 lithium battery setting:

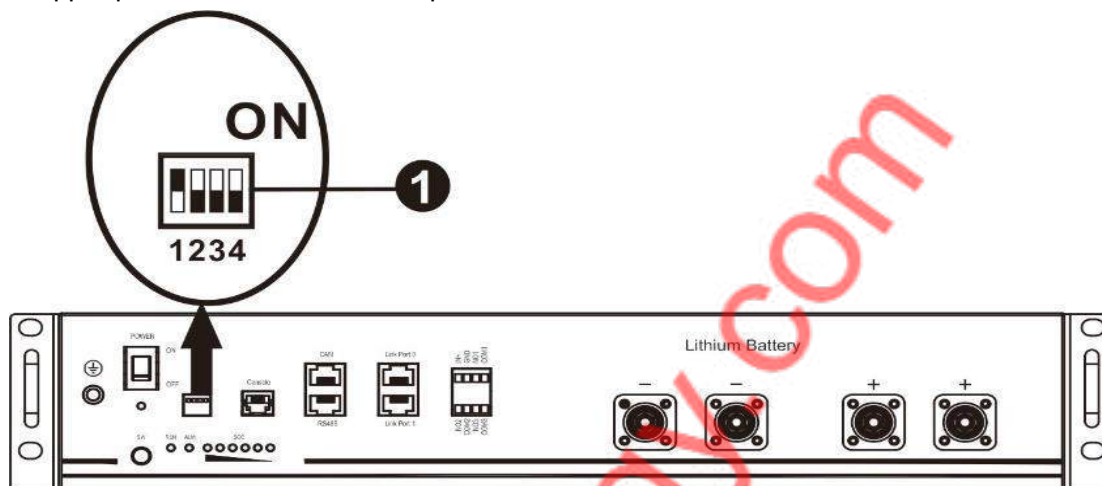
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

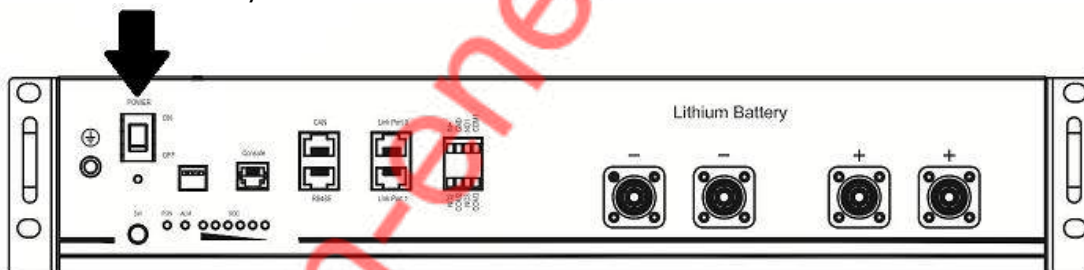
NOTE: "1" is upper position and "0" is bottom position.



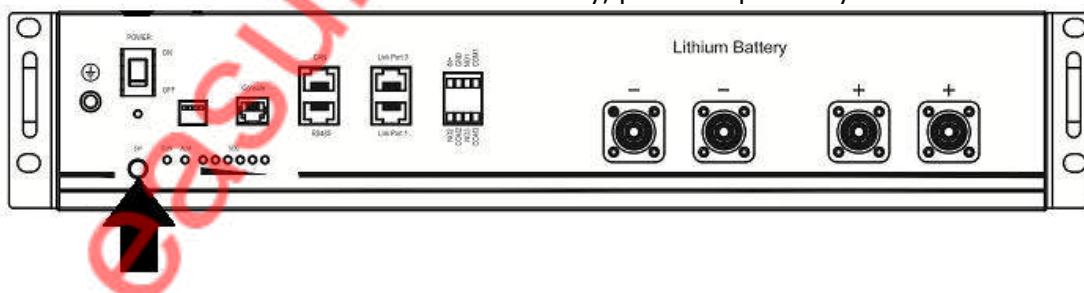
2. Process of install

Step 1. Use the RS485 cable to connect inverter and Lithium battery.

Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "Li2" in LCD program 5.

If communication between the inverter and battery is successful, the battery icon **LI** on LCD display will light

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

A.Recommended method 1: Set battery type as "LIB " in program 01 of F2;

B.Recommended method 2: Setting as follow:

1. Before starting setting, you must get the battery BMS specification:

A. Max charging voltage

B. Max charging current

C. Discharging protection voltage

2. Set battery type as "LIB " in program 01 of F2;

3. Set C.V voltage as Max charging voltage of BMS-0.5V in program 03 of F2;

4. Set floating charging voltage as C.V voltage in program 03 of F2;

5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+3V;

6. Set Max charging current in program 09 of F2 which must be less than the Max charging current of BMS.

7. Setting voltage point back to utility source when selecting "SBU priority" in program 05 of F2.

The setting value must be \geq Low DC cut-off voltage+2V, or else the inverter will have a warning as battery voltage low.

Remark:

1. you'd better to finish setting without turn on the inverter(just let the LCD show, no output);

2. when you finish setting, please restart the inverter.

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	8.5KW	11.0KW
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40±1Hz	
Low Loss Return Frequency	42±1Hz	
High Loss Frequency	65±1Hz	
High Loss Return Frequency	63±1Hz	
Output Short Circuit Protection	Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)	
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>		
<p>Output power derating: When battery voltage drops to 50.5V(8.5K)/ 55.0V(11K), the output power will be derated.</p>	<p>8.5KW Output power derating</p> <p>11.0 KW Output power derating</p>	

Table 2 Inverter Mode Specifications

INVERTER MODEL	8.5KW	11.0KW
Rated Output Power	8.5KVA/8.5KW	11.0KVA/11.0KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	60Hz or 50Hz	
Peak Efficiency	94%	
Overload Protection	5.5s@≥140% load; 10.5s@100%~140% load	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	48Vdc	
Cold Start Voltage	46.0Vdc	
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	44.0Vdc 42.8Vdc 40.4Vdc	
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	46.0Vdc 44.8Vdc 42.4Vdc	
Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	42.0Vdc 40.8Vdc 38.4Vdc	

Table 3 Charge Mode Specifications

Utility Charging Mode		
INVERTER MODEL	8.5KW	11.0KW
Charging Current (Max) (AC+PV)	140Amp	160Amp
AC Charging Current (Max)	120Amp (@ $V_{IP}=230V_{ac}$)	
Bulk Charging Voltage	Flooded Battery	58.4Vdc
	AGM / Gel Battery	56.4Vdc
Floating Charging Voltage	54Vdc	
Overcharge Protection	63Vdc	
Charging Algorithm	3-Step	
Charging Curve	<p>The graph plots Battery Voltage (per cell) on the left y-axis and Charging Current (%) on the right y-axis against Time on the x-axis. The voltage curve (black line) rises linearly in the Bulk stage, plateaus in the Absorption stage, and then slightly drops and levels off in the Maintenance stage. The current curve (red line) is constant in the Bulk stage, then decreases exponentially in the Absorption stage, and remains low in the Maintenance stage. Key voltage points are 2.25Vdc and 2.43Vdc (2.35Vdc). Time markers T0 and T1 are shown, with T1 = 10 * T0, minimum 20mins, maximum 8hrs.</p>	
Solar Input		
INVERTER MODEL	8.5KW	11.0KW
Rated Power	5000W*2	5500W*2
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	60Vdc~500Vdc	
Max. MPPT Charge Current	140A	160A
Max. Input Current	18A*2	18A*2

Table 4 General Specifications

INVERTER MODEL	8.5KW	11.0KW
Safety Certification	CE	
Operating Temperature Range	-10°C to 55°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension(D*W*H), mm	540x403x122	
Net Weight, kg	14.4	14.8

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low	1.Re-charge battery. 2.Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1.Check if AC wires are too thin and/or too long. 2.Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS Appliance)
	Green LED is flashing.	Set "SBU" or "SUB" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code D0	Overload error. The inverter is overload 100% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code A2	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code F2	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code B0	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 A1/A5	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1.Reduce the connected load. 2.Return to repair center
	Fault code F3/F4	Internal components failed.	Return to repair center.
	Fault code A2	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code F5	Bus voltage is too low.	
	Fault code A3	Output voltage is unbalanced.	
Another fault code		If the wires is connected well, please return to repair center.	

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USER MANUAL

HYBRID SOLAR INVERTER/CHARGER
6.2KVA 230Vac

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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. Fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. **NEVER** cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Inverter running without battery
- Built-in MPPT solar controller
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

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

- Generator or Utility.
- PV modules (option)

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

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

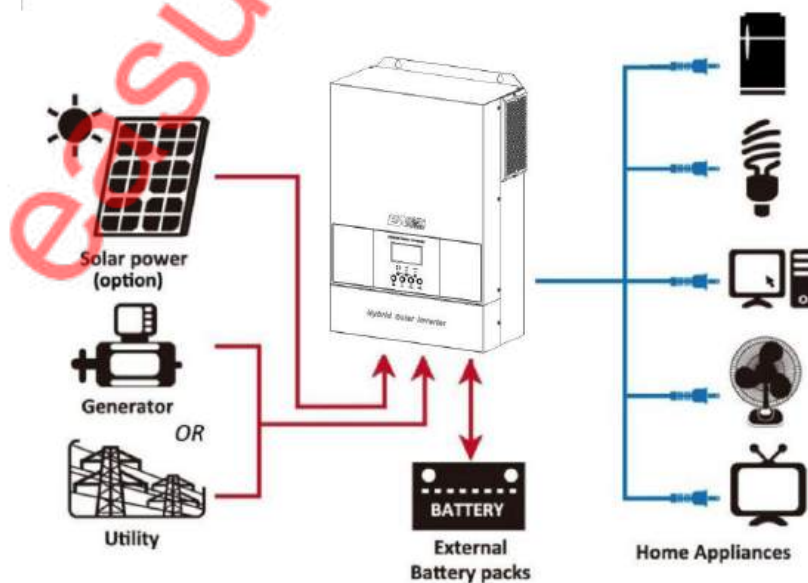
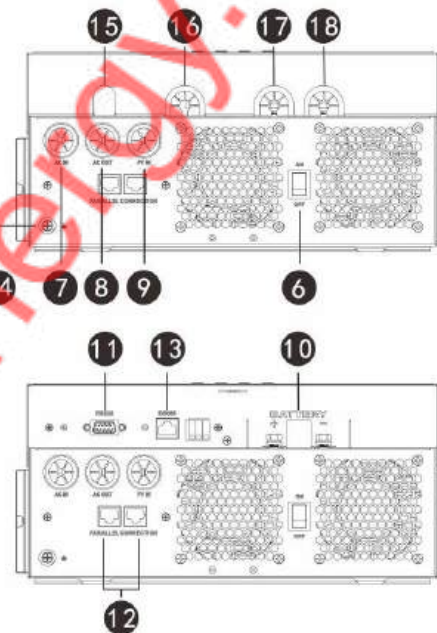
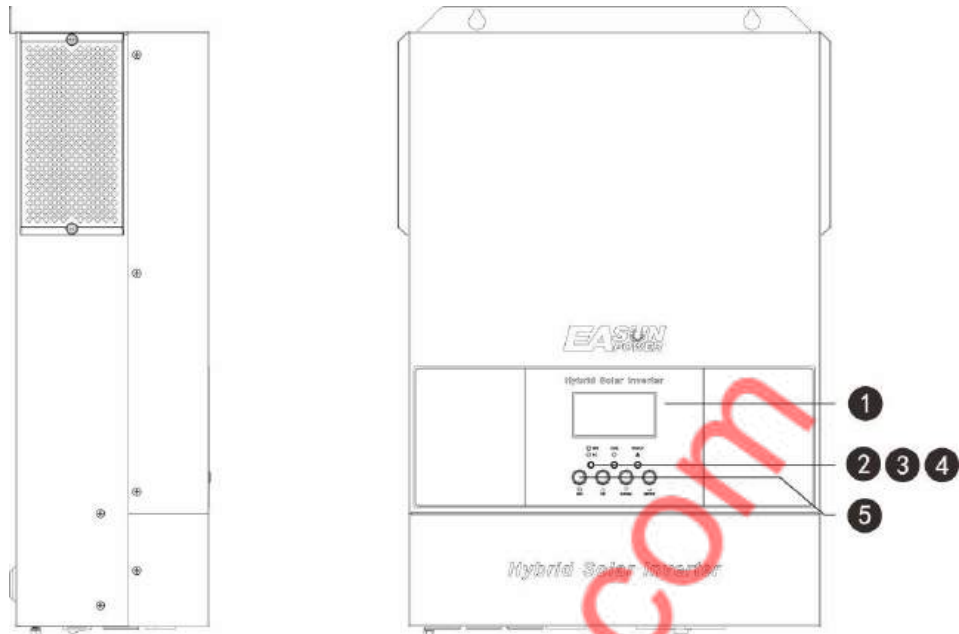


Figure 1 Hybrid Power System

Product Overview



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232 communication port
12. Parallel communication port (only for parallel model)
13. RS485 communication port
14. Grounding
15. WiFi module avoidance hole (Only use WiFi module models to remove)
16. RS485 communication line outlet
17. Battery positive outlet hole
18. Battery negative outlet hole

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

INSTALLATION

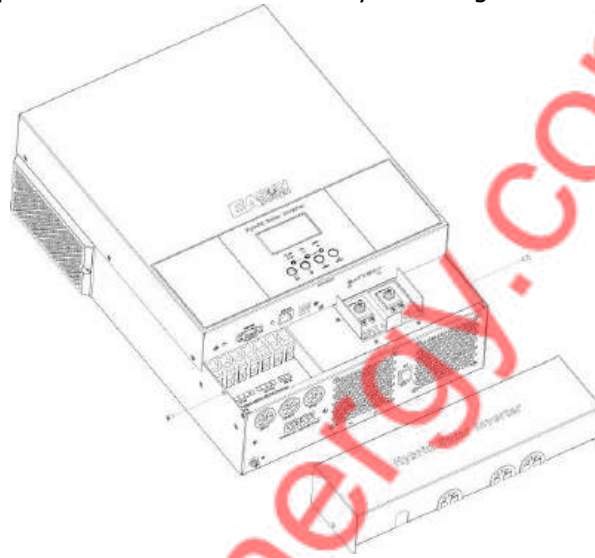
Unpacking and Inspection

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

- The unit x 1
- User manual x 1

Preparation

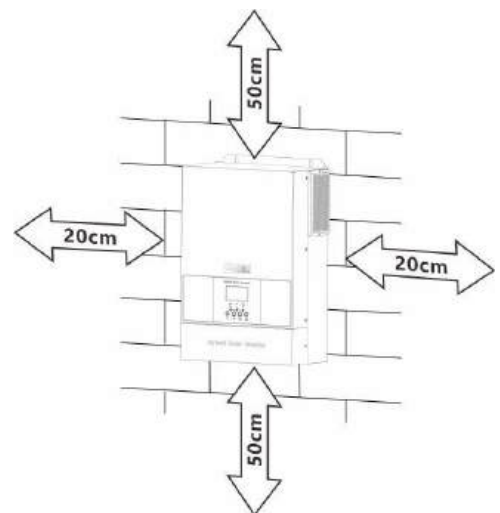
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

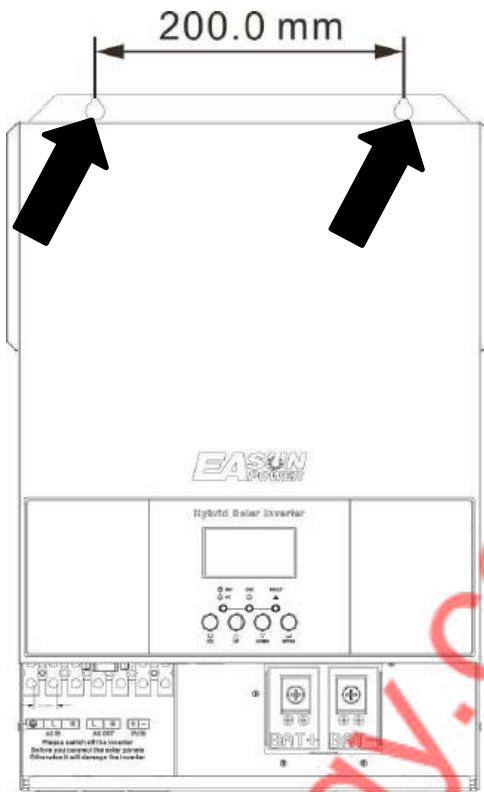
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



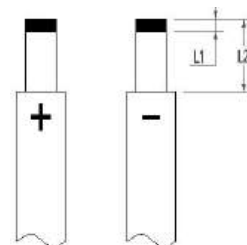
Battery Connection

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 a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable, stripping length(L2) and tinning length(L1) as below.

Stripping Length:



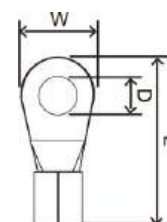
Recommended battery cable, stripping length (L2) and tinning length(L1), terminal size:

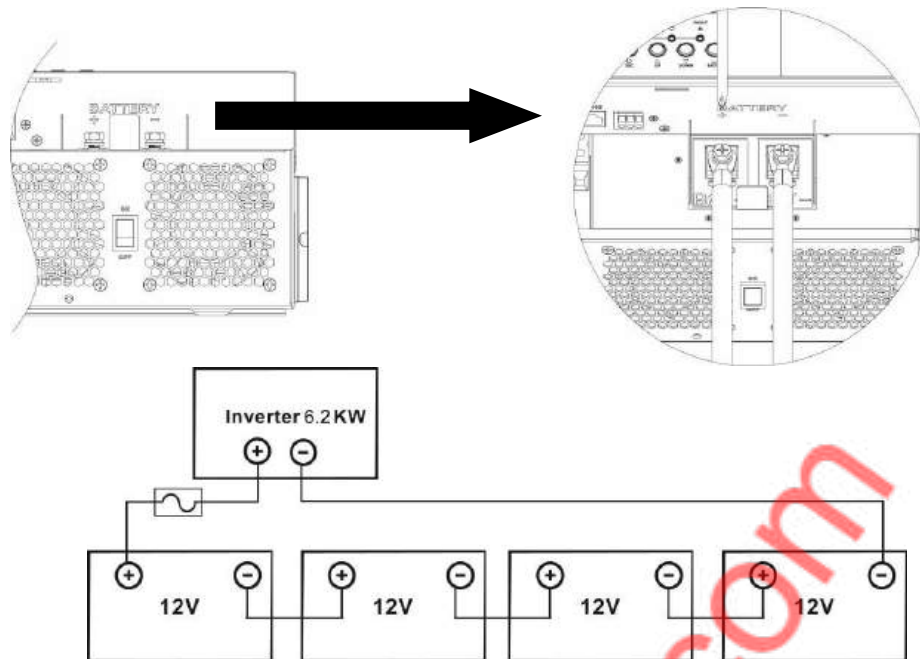
Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm ²	Terminal size(mm)			Torque value
					L	W	D	
6.2KVA	137A	200AH	2AWG	38	37	18	6.4	2~ 3 Nm

Terminal size:

Please follow below steps to implement battery connection:

1. 6.2KVA: Make positive and negative cables based on recommended terminal size.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.





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

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

AC Input/Output Connection

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

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

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

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

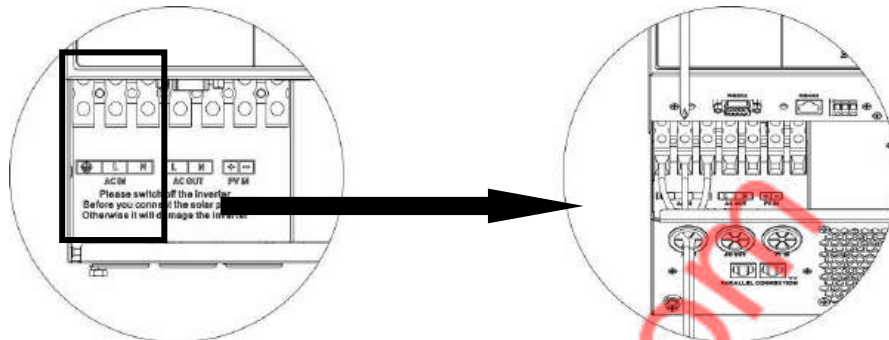
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
6.2KVA	8 AWG	1.4~ 1.6Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

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



WARNING:

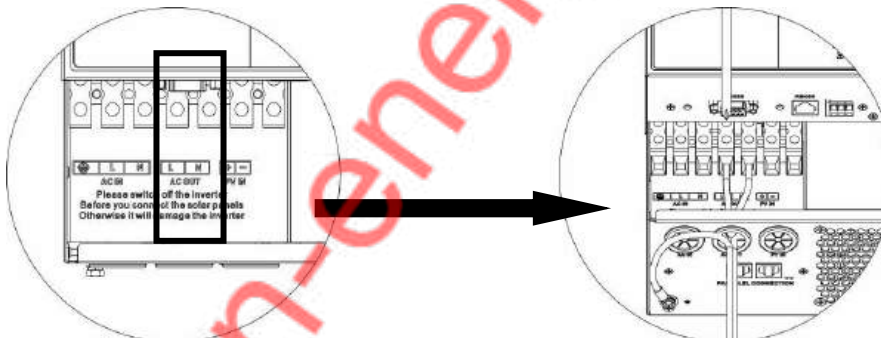
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→Ground (yellow-green)

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
6.2KVA	27A	10 AWG	1.4~1.6 Nm

PV Module Selection:

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

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

Solar Charging Mode	
INVERTER MODEL	6.2KVA
Max. PV Array Open Circuit Voltage	500DC
PV Array MPPT Voltage Range	60VDC~500VDC

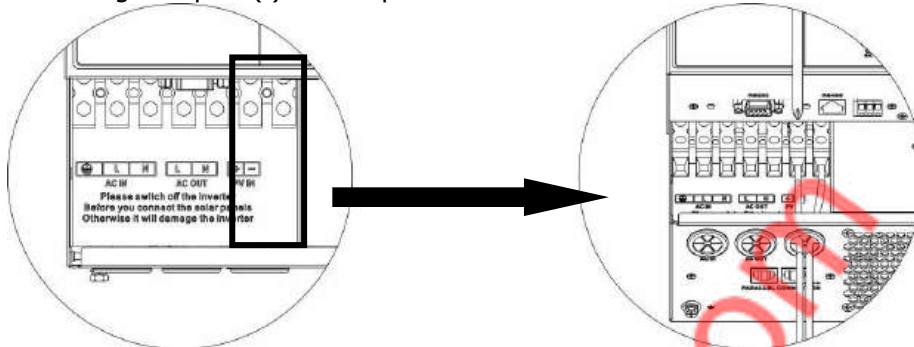
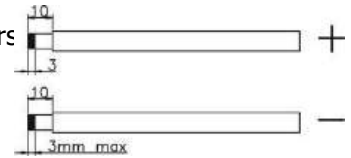
Take the 330Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	SOLAR INPUT	Q'ty of panels	Total input power
	3 pcs in serial	3 pcs	1,350 W
	4 pcs in serial	4 pcs	1,800 W
	5 pcs in serial	5 pcs	2,250 W
	6 pcs in serial	6 pcs	2,700 W
	7 pcs in serial	7 pcs	3,150 W
	8 pcs in serial	8 pcs	3,600 W
	9 pcs in serial	9 pcs	4,050 W
	10 pcs in serial	10 pcs	4,500 W
	11 pcs in serial	11 pcs	4,950 W
	12 pcs in serial	12 pcs	5,400 W
	6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W
	8 pieces in serial and 2 sets in parallel	14 pcs	6,300 W
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power
	3 pcs in serial	3 pcs	1,650 W
	4 pcs in serial	4 pcs	2,200 W
	5 pcs in serial	5 pcs	2,750 W
	6 pcs in serial	6 pcs	3,300 W
	7 pcs in serial	7 pcs	3,850 W
	8 pcs in serial	8 pcs	4,400 W
	9 pcs in serial	9 pcs	4,950 W
	10 pcs in serial	10 pcs	5,500 W
	11 pcs in serial	11 pcs	6,050 W
	12 pcs in serial	12 pcs	6,600 W
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W
6 pieces in serial and 2 sets in parallel	12 pcs	6,600 W	

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10 mm for positive and negative conductors
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.

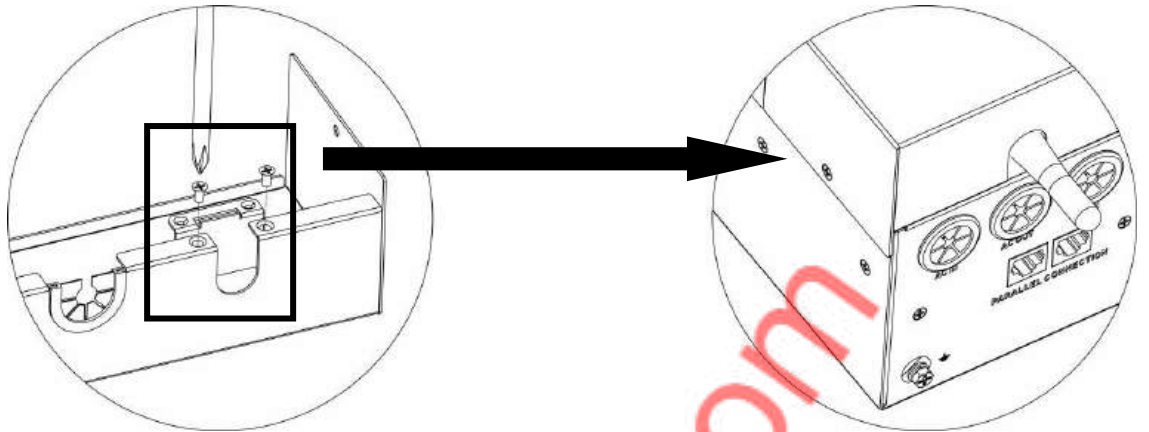


3. Make sure the wires are securely connected.

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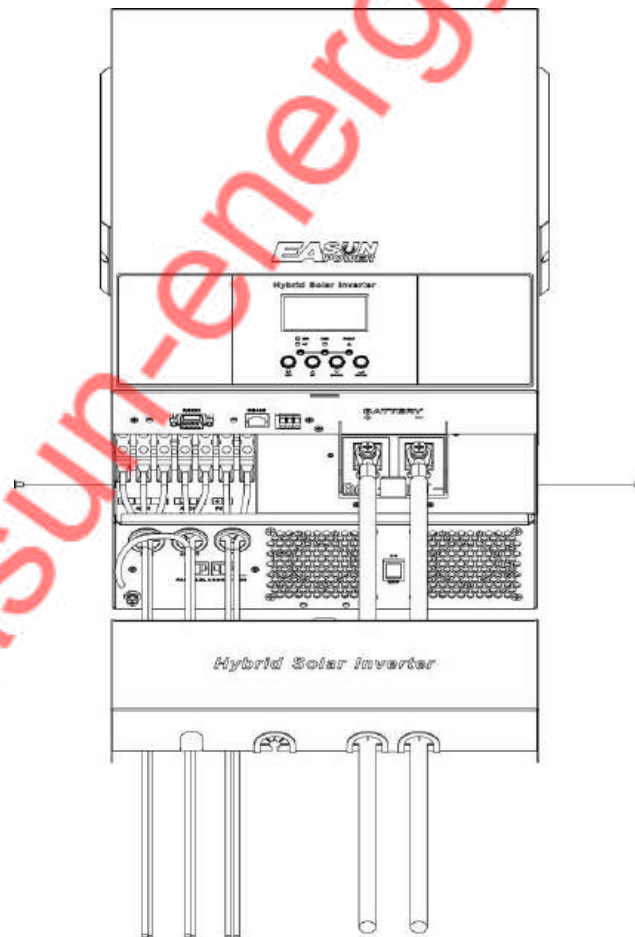
Schematic diagram of wiring cover disassembly hole

1. Use a Phillips screwdriver to remove two screws
2. Remove the baffle



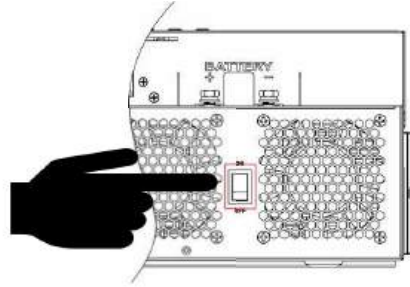
Final Assembly

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



OPERATION

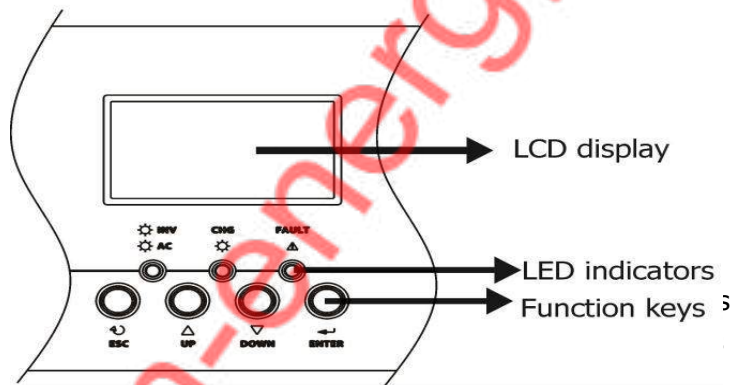
Power ON/OFF



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

Operation and Display Panel

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



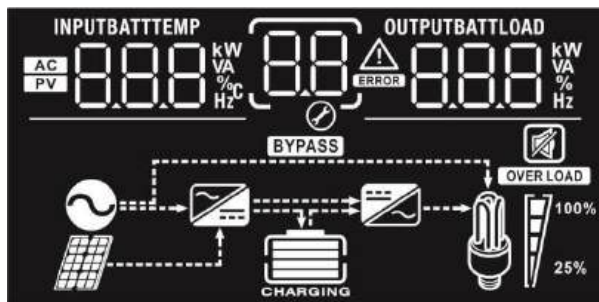
LED Indicator

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


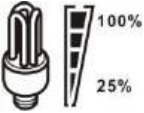










Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display Icons



Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
	Indicates the setting programs.
	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code
Output Information	
OUTPUTBATTLOAD 	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

Load Information				
	Indicates overload.			
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
	0%~24%	25%~49%	50%~74%	75%~100%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
	Indicates load is supplied by utility power.			
	Indicates the utility charger circuit is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

LCD Setting

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




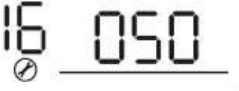
Setting Programs:

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Solar first 01 SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first (default) 01 UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 01 SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 01 SUB	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	10A 02 10 ^A	20A 02 20 ^A
		30A 02 30 ^A	40A 02 40 ^A
		50A 02 50 ^A	60A (default) 02 60 ^A
		70A 02 70 ^A	80A 02 80 ^A
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 03 GNL	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
04	Power saving mode enable/disable	Saving mode disable (default) 04 SDS	If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.
		Saving mode enable 04 SEN	If enabled, the output of inverter will be off when connected load is pretty low or not detected.
05	Battery type	AGM (default) 05 AGM	Flooded 05 FLD
		User-Defined 05 USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
06	Auto restart when overload occurs	Restart disable 06 LTD	Restart enable (default) 06 LFE
07	Auto restart when over temperature occurs	Restart disable 07 LTD	Restart enable (default) 07 LFE

08	Output voltage	220V 08 220 ^v	230V (default) 08 230 ^v
		240V 08 240 ^v	
09	Output frequency	50Hz (default) 09 50 ^{Hz}	60Hz 09 60 ^{Hz}
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 10 nNL	auto 10 AFD
11	Maximum utility charging current	2A 11 2A	10A 11 10A
		20A 11 20A	30A (default) 11 30A
		40A 11 40A	50A 11 50A
		60A 11 60A	70A 11 70A
		80A 11 80A	
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 48V models: Setting range is from 44.0V to 57.2V for 48v model, but The max setting value must be less than the value of program13.	
		44V 12 44.0 ^v	45V 12 45.0 ^v
		46V (default) 12 46.0 ^v	47V 12 47.0 ^v
		48V 12 48.0 ^v	49V 12 49.0 ^v
		50V 12 50.0 ^v	51V 12 51.0 ^v
		52V 12 52.0 ^v	53V 12 53.0 ^v
		54V 12 54.0 ^v	55V 12 55.0 ^v

13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Available options in 48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12.	
		Battery fully charged (default) 13 ^{BATT} FUL	48V 13 ^{BATT} 48.0 ^v
		49V 13 ^{BATT} 49.0 ^v	50V 13 ^{BATT} 50.0 ^v
		51V 13 ^{BATT} 51.0 ^v	52V 13 ^{BATT} 52.0 ^v
		53V 13 ^{BATT} 53.0 ^v	54V 13 ^{BATT} 54.0 ^v
		55V 13 ^{BATT} 55.0 ^v	56V 13 ^{BATT} 56.0 ^v
		57V 13 ^{BATT} 57.0 ^v	58V 13 ^{BATT} 58.0 ^v
		59V 13 ^{BATT} 59.0 ^v	60V 13 ^{BATT} 60.0 ^v
		61V 13 ^{BATT} 61.0 ^v	62V 13 ^{BATT} 62.0 ^v

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Utility first 	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	

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18	Buzzer mode	Mode1 BU2 18 nd1	Buzzer mute
		Mode2 BU2 18 nd2	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 BU2 18 nd3	The buzzer sounds when there is a specific warning or fault
		Mode4(default) BU2 18 nd4	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 FEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 LON	Backlight off 20 LOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 23 byd	Bypass enable(default) 23 byE
25	Modbus ID Setting	Modbus ID Setting Range : 001(default)~247 nd 25 001	
26	Bulk charging voltage (C.V voltage)	48V models default setting: 56.4V CV 26 56.4 ^{BATT} v	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 62.0V for 48v model. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V.	
27	Floating charging voltage	48V models default setting: 54.0V FLV 27 54.0 ^{BATT} v	
28	AC output mode	Single: This inverter is used in single phase application. 28 S10	Parallel: This inverter is operated in parallel system. (Need hardware support)

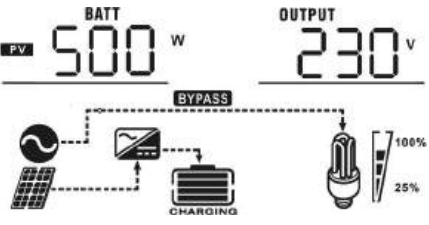
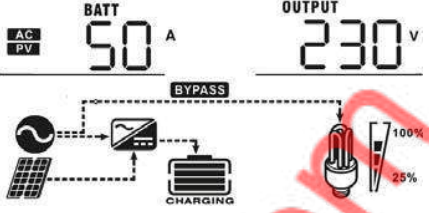
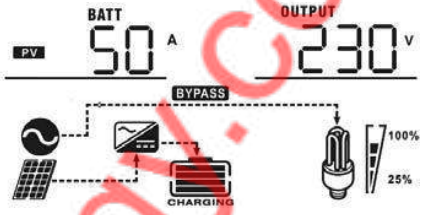
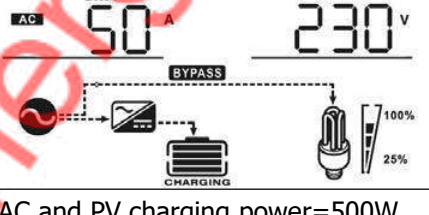
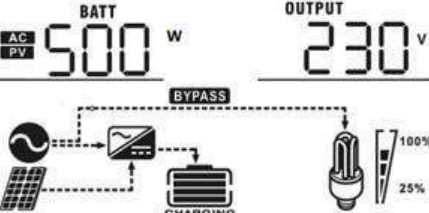
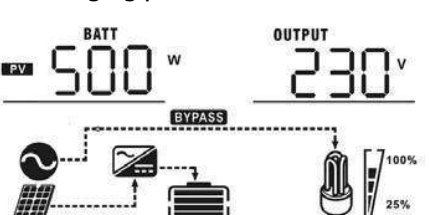
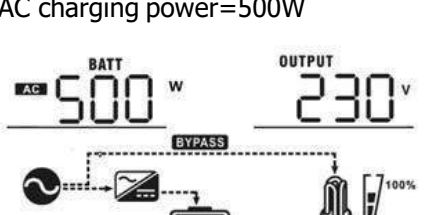
			28 <u>PAR</u>
		L1 phase 28 <u>3P1</u>	The inverter is operated in L1 phase in 3-phase application
		L2 phase 28 <u>3P2</u>	The inverter is operated in L2 phase in 3-phase application
		L3 phase 28 <u>3P3</u>	The inverter is operated in L3 phase in 3-phase application
29	Low DC cut-off voltage	48V models default setting: 42.0V 04 29 <u>42.0</u> ^{BATT} v	If self-defined is selected in program 5, this program can be set up. Setting range is from 40.0V to 54.0V for 48v model. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
32	Bulk charging time (C.V stage)	Automatically (Default): 32 <u>AUT</u>	If selected, inverter will judge this charging time automatically.
		5 min 32 <u>5</u>	The setting range is from 0 min to 900 min. Increment of each click is 5 min.
		900 min 32 <u>900</u>	
If "USE" is selected in program 05, this program can be set up.			
33	Battery equalization	Battery equalization 33 <u>EEN</u>	Battery equalization disable (default) 33 <u>EdS</u>
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
34	Battery equalization voltage	48V models default setting is 58.4V. Setting range is from 48V ~ 64V. Increment of each click is 0.1V. E4 34 <u>64.0</u> ^{BATT} v	
35	Battery equalized time	60min (default) 35 <u>60</u>	Setting range is from 0min to 900min. Increment of each click is 5min.

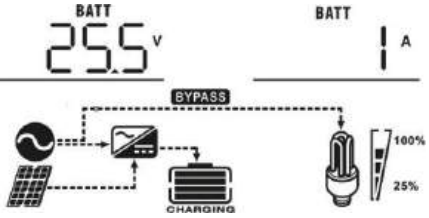
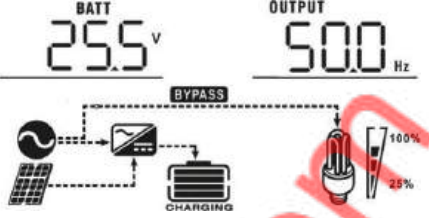

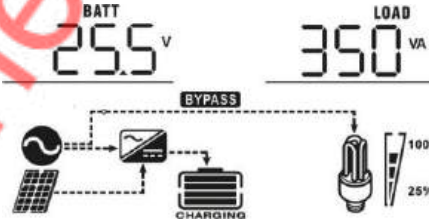
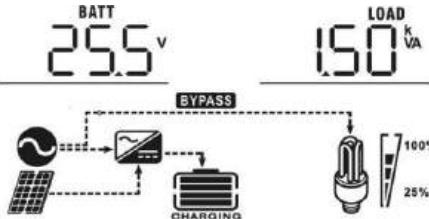
36	Battery equalized timeout	120min (default) 36 120	Setting range is from 0min to 900 min. Increment of each click is 5 min.
37	Equalization interval	30days (default) 37 30d	Setting range is from 1 to 90 days. Increment of each click is 1 day
39	Equalization activated immediately	Enable 39 AEN	Disable (default) 39 AdS
		If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page.	
46	Maximum discharge current protection	ndC 46 OFF	Default OFF Disable current discharge current protection function
		ndC 46 100 ^A	When the mains exists, the battery stops discharging when the discharge current reaches the set value, and the mains supplies power to the load. When the mains does not exist, an alarm will be raised, but the battery will still discharge. The setting range is from 20A to 500A

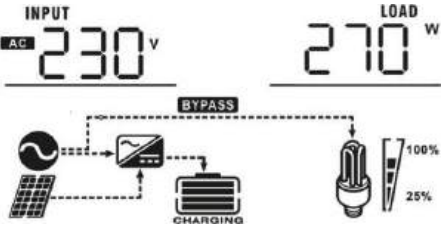

Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, MPPT charging current, MPPT charging power, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in VA, load in Watt, DC discharging current, main CPU Version and second CPU Version.

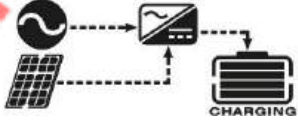



Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	<p>Input Voltage=230V, output voltage=230V</p>
Input frequency	<p>Input frequency=50Hz</p>
PV voltage	<p>PV voltage=200V</p>
MPPT Charging current	<p>Current $\geq 10A$</p> <p>Current < 10A</p>

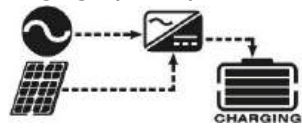



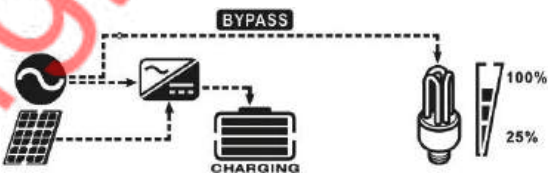
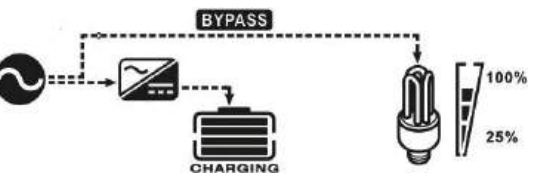
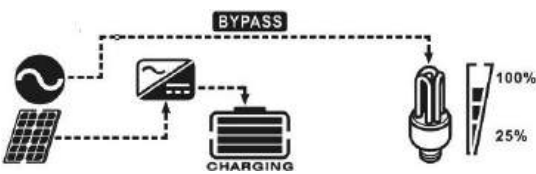
<p>MPPT Charging power</p>	<p>MPPT charging power=500W</p>  <p>The diagram shows a digital display with 'BATT' and 'PV' indicators. The 'BATT' display shows '500 W' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p>
<p>Charging current</p>	<p>AC and PV charging current=50A</p>  <p>The diagram shows a digital display with 'BATT' and 'AC' indicators. The 'BATT' display shows '50 A' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p> <p>PV charging current=50A</p>  <p>The diagram shows a digital display with 'BATT' and 'PV' indicators. The 'BATT' display shows '50 A' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p> <p>AC charging current=50A</p>  <p>The diagram shows a digital display with 'BATT' and 'AC' indicators. The 'BATT' display shows '50 A' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p>
<p>Charging power</p>	<p>AC and PV charging power=500W</p>  <p>The diagram shows a digital display with 'BATT' and 'AC' indicators. The 'BATT' display shows '500 W' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p> <p>PV charging power=500W</p>  <p>The diagram shows a digital display with 'BATT' and 'PV' indicators. The 'BATT' display shows '500 W' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p> <p>AC charging power=500W</p>  <p>The diagram shows a digital display with 'BATT' and 'AC' indicators. The 'BATT' display shows '500 W' and the 'OUTPUT' display shows '230 V'. Below the display is a schematic diagram with a 'BYPASS' button. The schematic includes a solar panel, a battery, and a load (light bulb). The battery is labeled 'CHARGING'. The load is shown with a 100% and 25% indicator.</p>

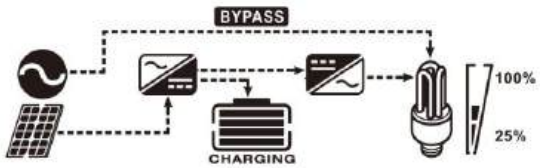
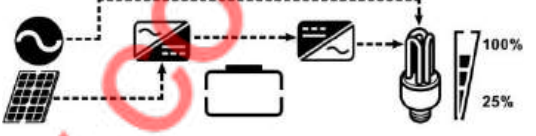
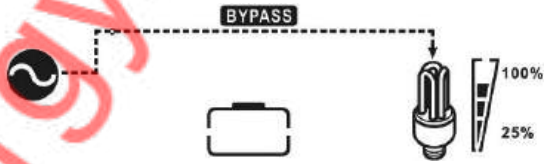
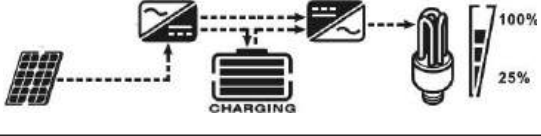
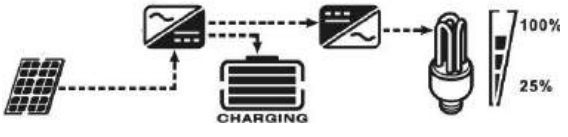

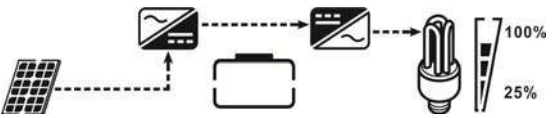
<p>Battery voltage/ DC discharging current</p>	<p>Battery voltage=25.5V, discharging current=1A</p> 
<p>Output frequency</p>	<p>Output frequency=50Hz</p> 
<p>Load percentage</p>	<p>Load percent=70%</p> 
<p>Load in VA</p>	<p>When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.</p>  <p>When load is larger than 1kVA ($\geq 1\text{kVA}$), load in VA will present x.xkVA like below chart.</p> 

<p>Load in Watt</p>	<p>When load is lower than 1kW, load in W will present xxxW like below chart.</p>  <p>When load is larger than 1kW ($\geq 1\text{KW}$), load in W will present x.xkW like below chart.</p> 
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



















Operating Mode Description

Operation mode	Description	LCD display
<p>Standby mode / Power saving mode</p> <p>Note:</p> <p>*Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.</p> <p>*Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.</p>	<p>No output is supplied by the unit but it still can charge batteries.</p>	<p>Charging by utility and PV energy.</p> 
		<p>Charging by utility.</p> 
		<p>Charging by PV energy.</p> 
		<p>No charging.</p> 








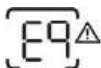

<p>Fault mode</p> <p>Note:</p> <p>*Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.</p>	<p>PV energy and utility can charge batteries.</p>	<p>Charging by utility and PV energy.</p>  <p>Charging by utility.</p>  <p>Charging by PV energy.</p>  <p>No charging.</p> 
<p>Line Mode</p>	<p>The unit will provide output power from the mains. It will also charge the battery at line mode.</p>	<p>Charging by utility and PV energy.</p> 
<p>The unit will provide output power from the mains. It will also charge the battery at line mode.</p>	<p>The unit will provide output power from the mains. It will also charge the battery at line mode.</p>	<p>Charging by utility.</p> 
<p>The unit will provide output power from the mains. It will also charge the battery at line mode.</p>	<p>The unit will provide output power from the mains. It will also charge the battery at line mode.</p>	<p>If "solar first" is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will provide the loads and charge the battery at the same time.</p> 

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

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
16	Over DC voltage in AC output	
17	Reserved	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
20	Battery low and it isn't up to the setting value of program 13	Beep twice every 3 seconds	
E9	Battery equalization	None	
bP	Battery is not connected	None	

BATTERY EQUALIZATION

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.

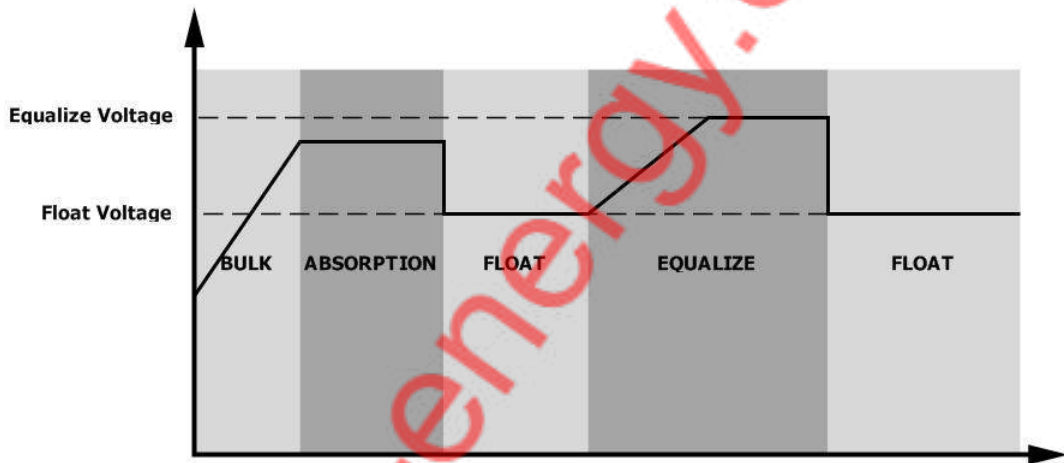
- **How to Apply Equalization Function**

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

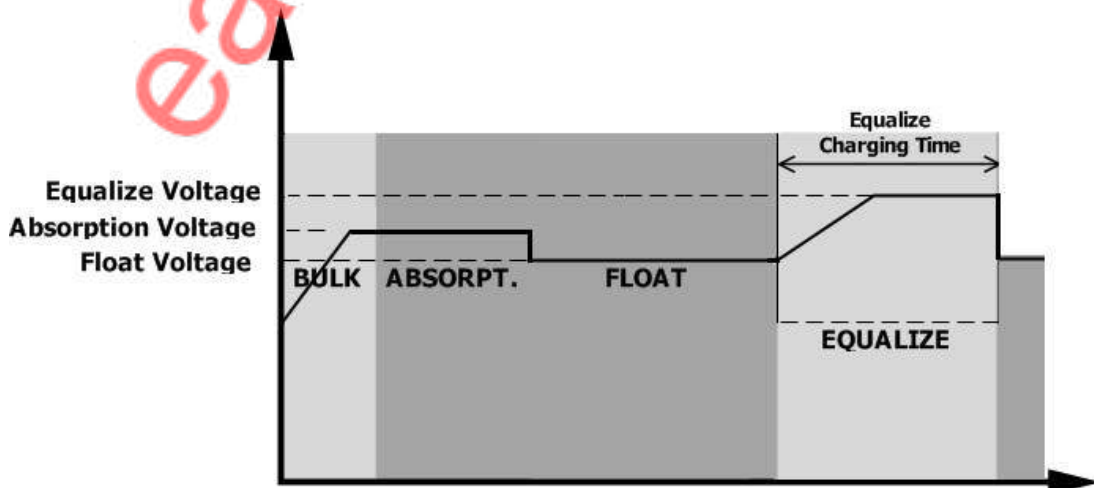
- **When to Equalize**

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

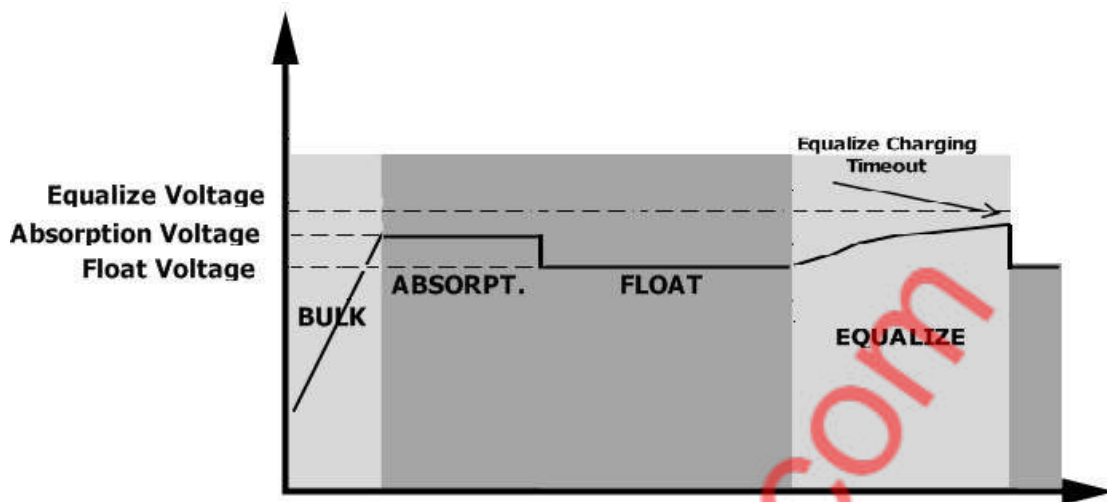


- **Equalize charging time and timeout**

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.



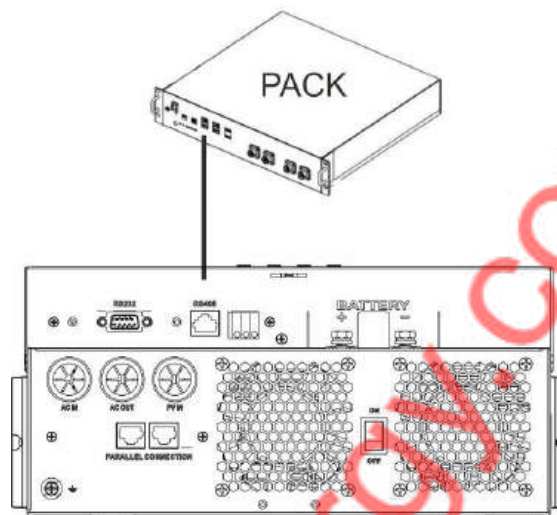
SETTING FOR LITHIUM BATTERY

Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

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



Lithium battery communication and setting

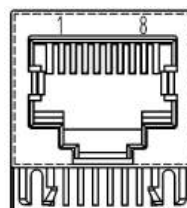
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

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

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

Pin number	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B



LCD setting

After connecting, you need to finish and confirm some settings as follow:

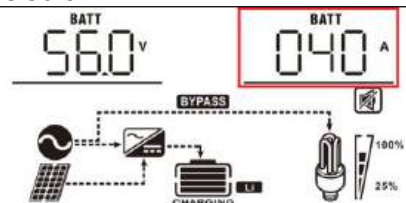


Program	Description	Selectable option	
05	Battery type	05 AGM	AGM (default)
		05 FLd	Flooded
		05 USE	User-Defined
		05 LI 1	Standard communication Protocol form inverter supplier
		05 LI 2	Support PYLON US2000 Protocol
		05 LI 3	Customized Protocol or Support FOX ESS Lithium Battery Protocol
		05 LI 4	Customized Protocol
43	Setting SOC point back to utility source when selecting "SBU priority" or "Solar first" in program 01	43 BAT 050%	Default 50%, 5%~50% Settable
		44 BAT 095%	Default 95%, 60%~100% Settable

Note: Program 43/44/45 are only available with successful communication, they will replace the Program 12/13/29 function, at the same time, program 12/13/29 become unavailable.

LCD Display

If communication between the inverter and battery is successful, there is some information showing on the LCD as follow:

Item	Description	LCD display
1	Communication successful icon	<p>The LCD display shows "BATT 56.0V" and "BATT 040A". Above the voltage reading, the "LI" icon is flashing. Below the readings is a system diagram showing solar panels, an inverter, and a battery bank. The battery bank is labeled "CHARGING" and has a "BYPASS" button. A light bulb icon indicates 100% and 25% charge levels.</p>
2	Max lithium battery charging voltage	<p>The LCD display shows "BATT 56.0V" and "BATT 040A". The "56.0V" reading is enclosed in a red box. The system diagram below is similar to the one in item 1, but the battery bank is labeled "CHARGING" and the light bulb icon indicates 100% and 25% charge levels.</p>

		Max lithium battery charging voltage is 56.0V.
3	Max lithium battery charging current	 <p>Max lithium battery charging current is 40A.</p>
4	Lithium battery discharging is forbidden	Li will flash once every 1 second
5	Lithium battery charging is forbidden	Li will flash once every 2 second
6	Lithium battery SOC(AH)	
7	Lithium battery SOC(%)	 <p>Lithium battery SOC is 63AH and 60%</p>

Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

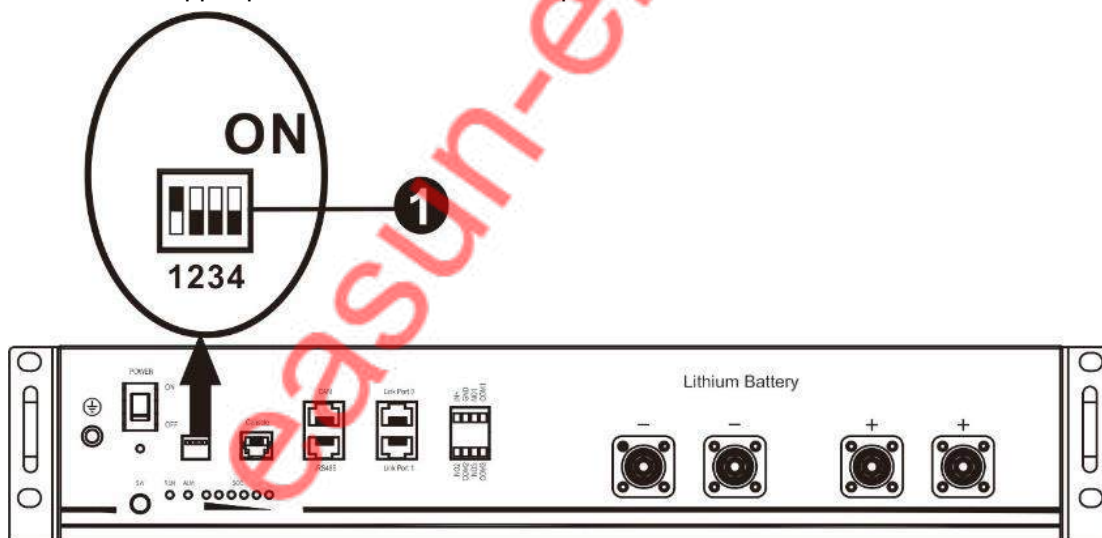
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

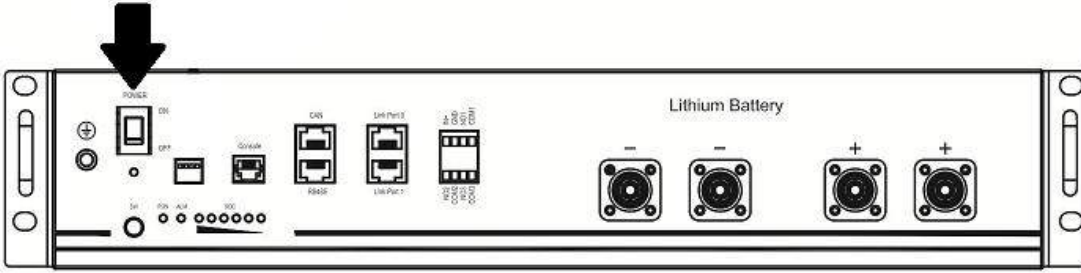
NOTE: "1" is upper position and "0" is bottom position.



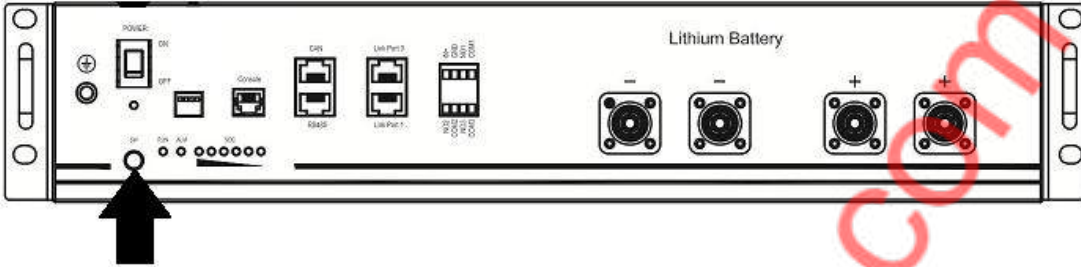
2). Process of install

Step 1. Use the RS485 cable to connect inverter and Lithium battery as Fig 1.

Step 2. Switch on Lithium battery.




Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "Li2" in LCD program 5.




If communication between the inverter and battery is successful, the battery icon  on LCD display will light **Setting for lithium battery without communication**

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:


1. Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage


2. Set battery type as "USE" (user-defined)

05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.


3. Set C.V voltage as Max charging voltage of BMS-**0.5V**.

26	Bulk charging voltage (C.V voltage)	default setting: 56.4V 
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 62.0V for 48v model. But the setting value must be more than or equal the value of program 27. Increment of each click is 0.1V.





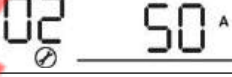
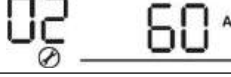


4. Set floating charging voltage as C.V voltage.

27	Floating charging voltage	default setting: 54.0V
		 <p>If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to the value of program 26 for 48v model. Increment of each click is 0.1V.</p>


5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	default setting: 42.0V
		 <p>If self-defined is selected in program 5, this program can be set up. Setting range is from 40.0V to 54.0V for 48v model. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.</p>

6. Set Max charging current which must be less than the Max charging current of BMS.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	10A	20A
			
		30A	40A
			
		50A	60A (default)
			
		70A	80A
			

7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 48V models: 46V (default)
		

Remark:

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	6.2KVA
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)
High Loss Voltage	280Vac±7V
High Loss Return Voltage	270Vac±7V
Max AC Input Voltage	300Vac
Nominal Input Frequency	50Hz / 60Hz (Auto detection)
Low Loss Frequency	40±1Hz
Low Loss Return Frequency	42±1Hz
High Loss Frequency	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Line mode: Circuit Breaker Battery mode: Electronic Circuits
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
<p>Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.</p>	<p>The graph illustrates the output power derating characteristics. The vertical axis represents Output Power, with a horizontal dotted line for Rated Power and a lower horizontal dotted line for 50% Power. The horizontal axis represents Input Voltage, with markers at 90V, 170V, and 280V. The power starts at 50% at 90V, rises linearly to reach the Rated Power level at 170V, and remains constant at the Rated Power level up to 280V.</p>

Table 2 Inverter Mode Specifications

INVERTER MODEL	6.2KVA
Rated Output Power	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	230Vac±5%
Output Frequency	60Hz or 50Hz
Peak Efficiency	94%
Surge Capacity	2* rated power for 5 seconds
Nominal DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	44.0Vdc 42.8Vdc 40.4Vdc
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	46.0Vdc 44.8Vdc 42.4Vdc
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	42.0Vdc 40.8Vdc 38.4Vdc

Table 3 Charge Mode Specifications

Utility Charging Mode		
INVERTER MODEL	6.2KVA	
Max Charging Current (PV+AC)	120Amp (@ $V_{I/P}=230V_{ac}$)	
MaxCharging Current (AC)	80Amp (@ $V_{I/P}=230V_{ac}$)	
Bulk Charging Voltage	Flooded Battery	58.4Vdc
	AGM / Gel Battery	56.4Vdc
Floating Charging Voltage	54Vdc	
Overcharge Protection	63Vdc	
Charging Algorithm	3-Step	
Charging Curve		
Solar Input		
INVERTER MODEL	6.2KVA	
Rated Power	6500W	
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	60Vdc~500Vdc	
Max. Input Current	27A	
MaxCharging Current(PV)	120A	

INVERTER MODEL	6.2KVA
Safety Certification	CE
Operating Temperature Range	-10°C to 55°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Net Weight, kg	10
Ingress Protection rating	IP21

Table 4 General Specifications

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. Re-charge battery. 2. Replace battery.
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.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	Battery is over-charged.	Please contact the seller and provide a video or pictures of the malfunction
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Please contact the seller and provide a video or pictures of the malfunction
	Fault code 08/09/15	Internal components failed.	Please contact the seller and provide a video or pictures of the malfunction
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, Please contact the seller and provide a video or pictures of the malfunction
	Fault code 14	Bus voltage is too low.	
Fault code 16	Output voltage is unbalanced.		
Another fault code		If the wires is connected well, Please contact the seller and provide a video or pictures of the malfunction	

Parallel Installation Guide

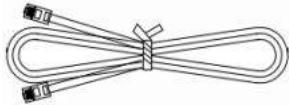
1. Instruction

This inverter can be used in parallel with two different operation modes.

1. Parallel operation in single phase with up to 12 units.
2. Maximum 12 units work together to support three-phase equipment. 10 units support one phase maximum.

2. Package Contents

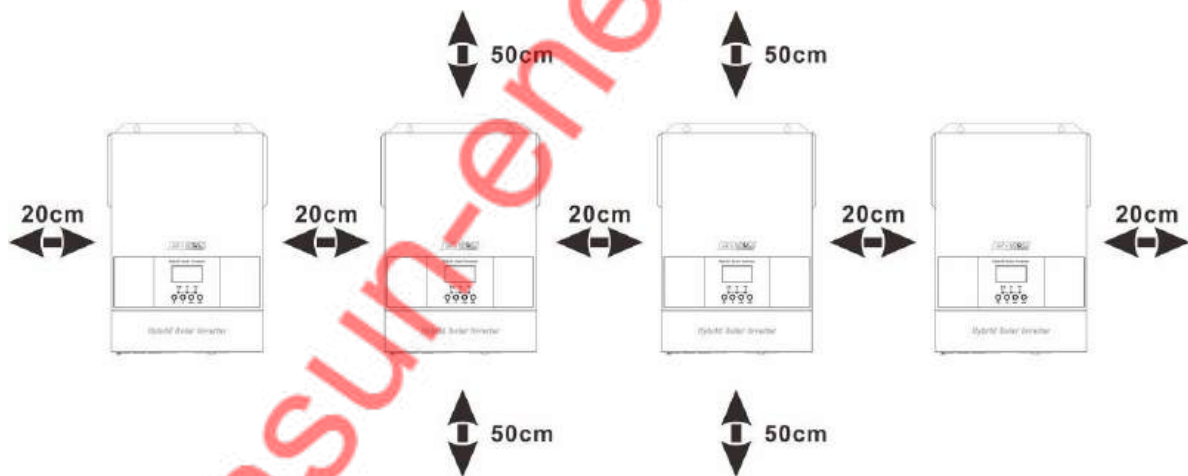
In parallel kit, you will find the following items in the package:



Parallel communication cable

3. Mounting the Unit

When installing multiple units, please follow below chart.



NOTE: 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. Be sure to install each unit in the same level.

4. Wiring Connection

NOTICE: It's requested to connect to battery for parallel operation.

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

Model	Wire Size	Cable mm ²	Terminal size(mm)			Torque value
			L	W	D	
6.2KVA	2AWG	38	37	18	6.4	2~ 3 Nm

Terminal size:



WARNING: Be sure the length of all battery cables is the same. Otherwise, there will be voltage difference between inverter and battery to cause parallel inverters not working.

Recommended AC input and output cable size for each inverter:

Model	AWG no.	Torque
6.2KVA	8 AWG	1.4~1.6Nm

You need to connect the cables of each inverter together. Take the battery cables for example: You need to use a connector or bus-bar as a joint to connect the battery cables together, and then connect to the battery terminal. The cable size used from joint to battery should be X times cable size in the tables above. "X" indicates the number of inverters connected in parallel.

Regarding AC input and output, please also follow the same principle.

CAUTION!! Please install the breaker at the battery and AC input side. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of battery or AC input. The recommended mounted location of the breakers is shown in the figures in Point 5.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
6.2KVA	100A/60VDC

*If you want to use only one breaker at the battery side for the whole system, the rating of the breaker should be X times current of 1 unit. "X" indicates the number of inverters connected in parallel.

Recommended breaker specification of AC input with single phase:

Model	2 units	3 units	4 units	5 units	6 units	7 units	8 units	9 units	10 units	11 units	12 units
6.2KVA	100A	150A	200A	250A	300A	350A	400A	450A	500A	550A	600A

Note1: Also, you can use 40A breaker (50A for 6.2KVA) for only 1 unit, and each inverter has a breaker at its AC input.

Recommended battery capacity

Inverter parallel numbers	2	3	4	5	6	7	8	9	10	11	12
Battery Capacity	400AH	600AH	800AH	1000AH	1200AH	1400AH	1600AH	1800AH	2000AH	2200AH	2400AH

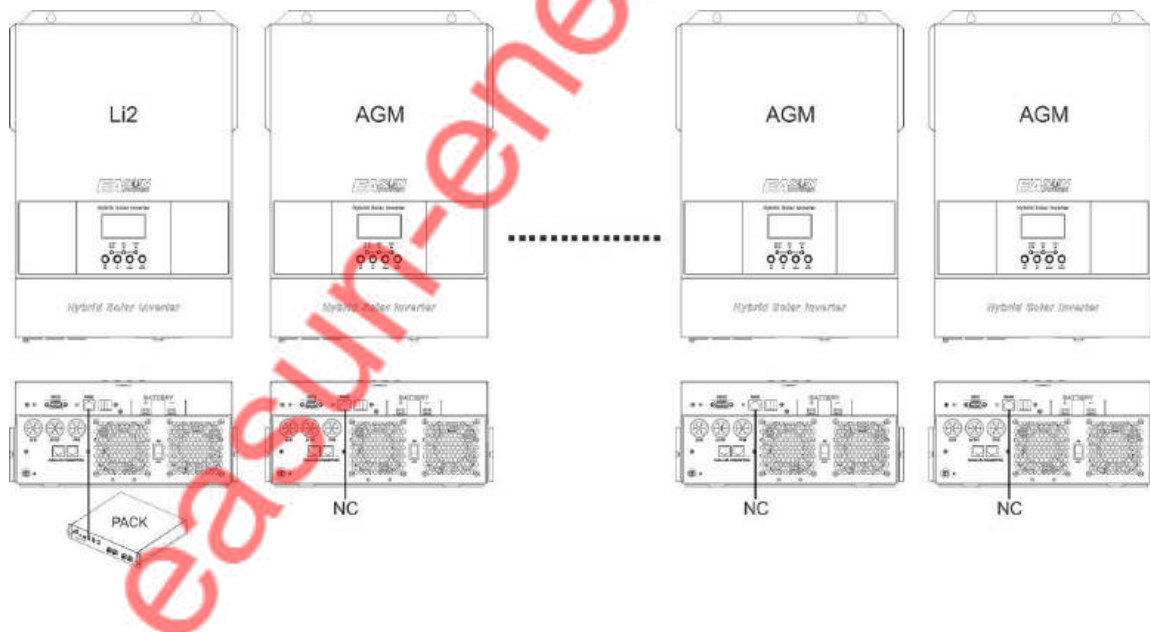
WARNING! Be sure that all inverters will share the same battery bank. Otherwise, the inverters will transfer to fault mode.

Communicating with battery BMS in parallel system

- 1) Only support common battery installation
- 2) Use RJ45 cable to connect any one of inverters (no need to connect to a specific inverter) and Lithium battery.

Simply set this inverter battery type to "Li 2" in LCD program 5. Others should be default value "AGM".

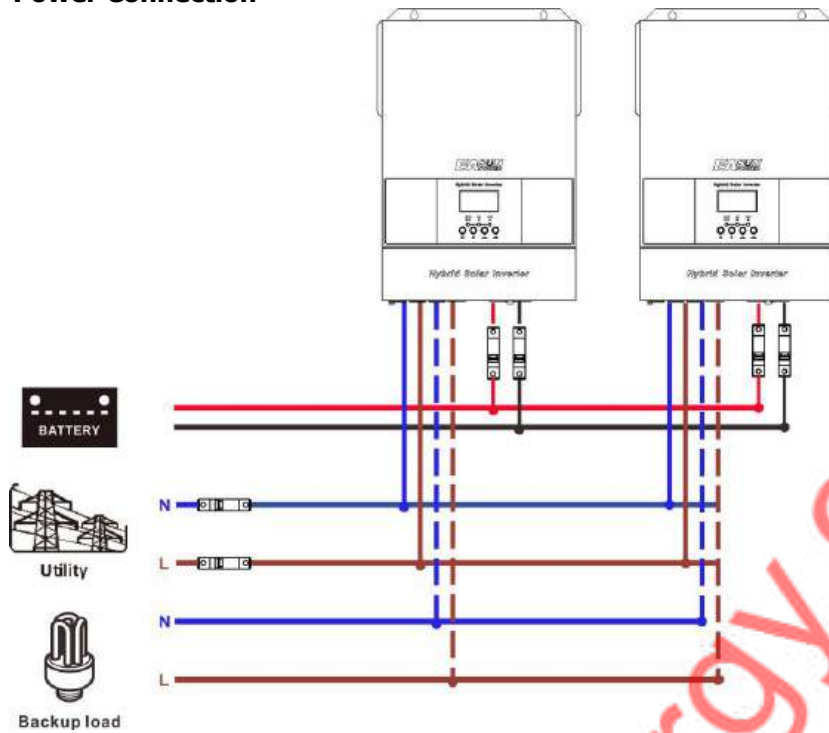
Note: Make sure only one inverter is connected RJ45 cable and only the one is set as Lithium in LCD program 5.



5. Parallel Operation in Single phase

Two inverters in parallel:

Power Connection

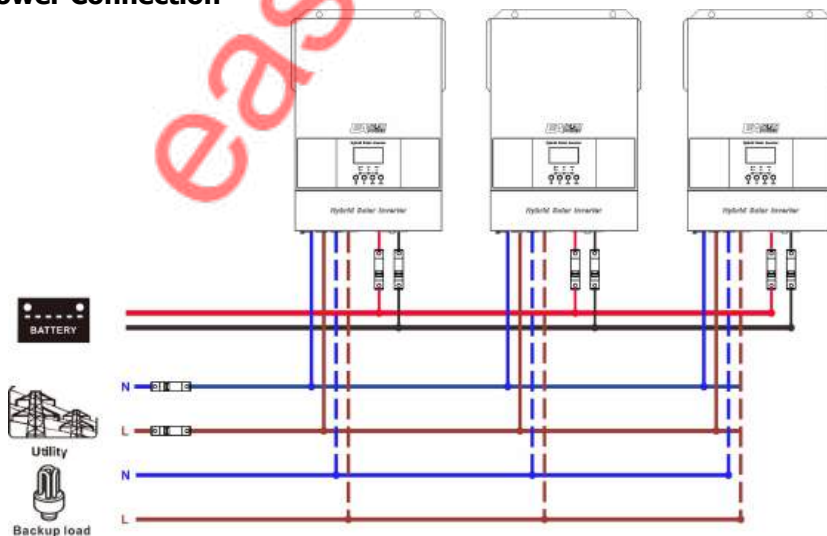


Communication Connection

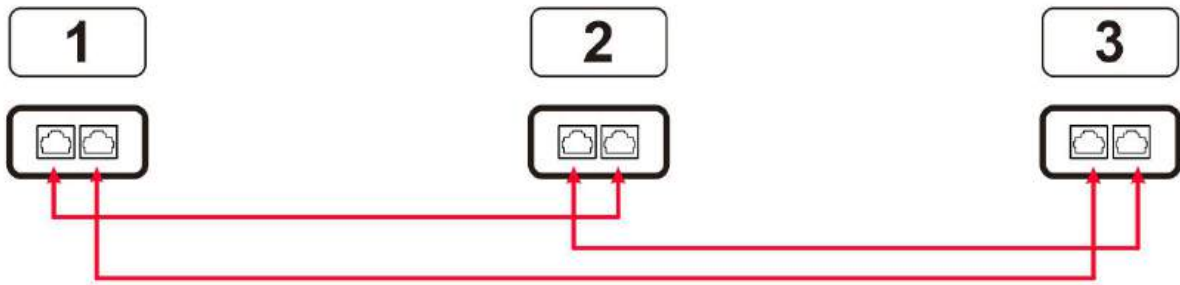


Three inverters in parallel:

Power Connection

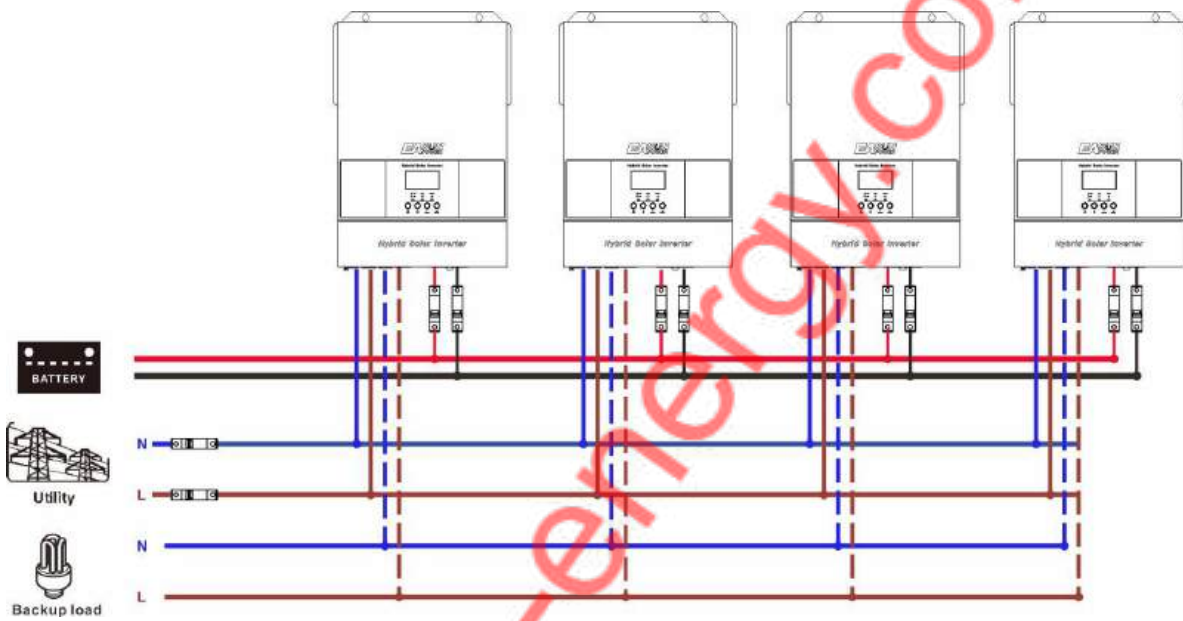


Communication Connection



Four inverters in parallel:

Power Connection

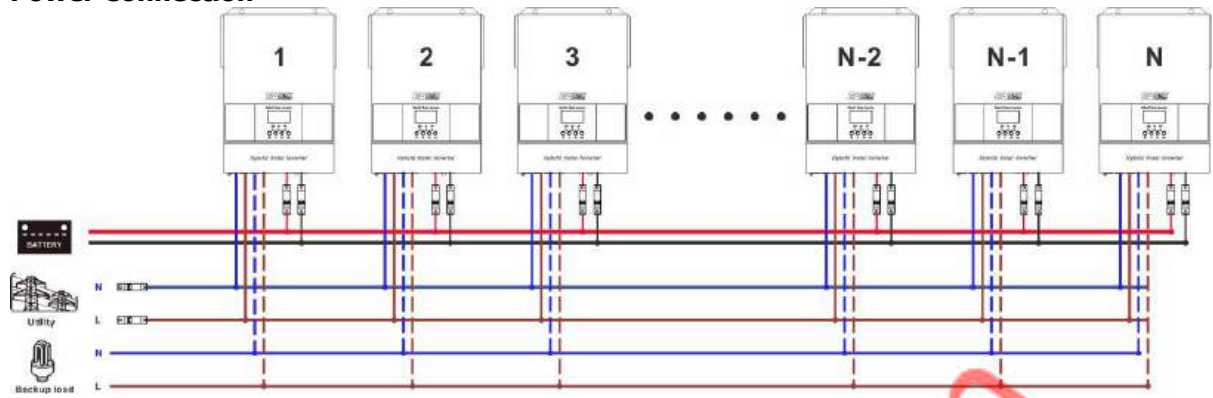


Communication Connection



Six inverters in parallel:

Power Connection



Communication Connection



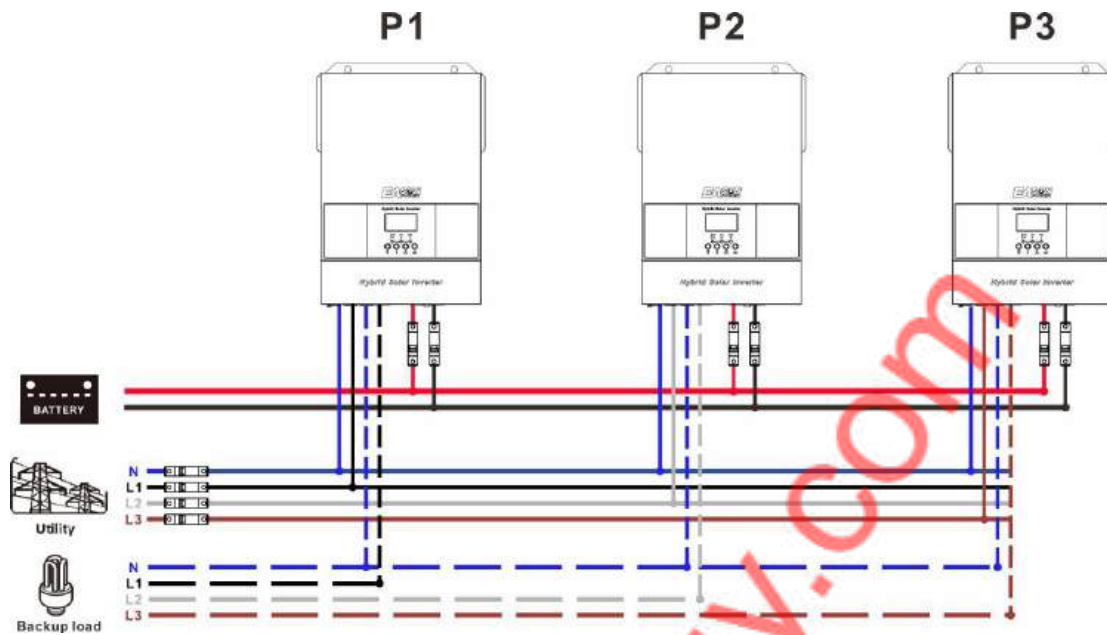
Note: $N_{max}=12$ units.

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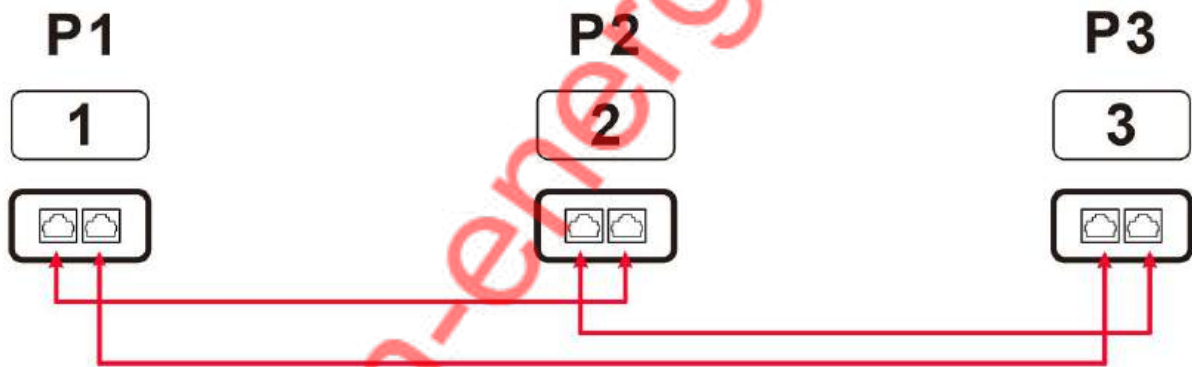
6. Support 3-phase equipment

One inverter in each phase:

Power Connection

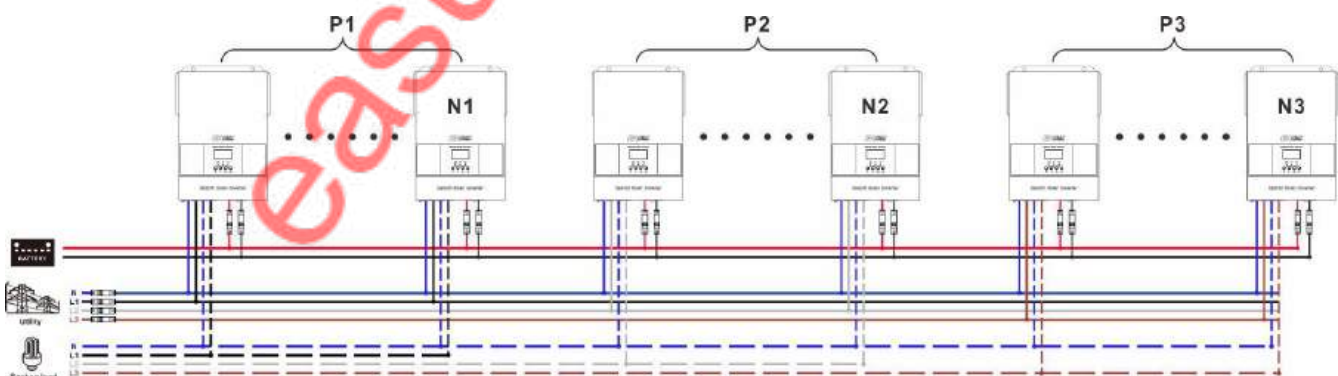


Communication Connection



Three inverters in each phase:

Power Connection



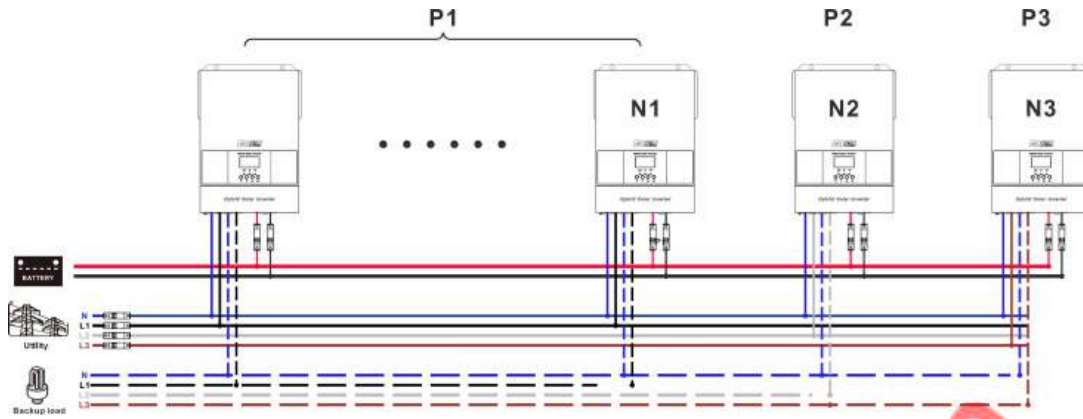
Note: It's up to customer's demand to pick **10** inverters on any phase.

P1: L1-phase, P2: L2-phase, P3: L3-phase.

$N = N1 + N2 + N3, N_{max} = 12 \text{ units}$

$N1_{max} = 10 \text{ units}$ is in one phase and one inverter for the other two phases ($N2 = N3 = 1$) :

Power Connection



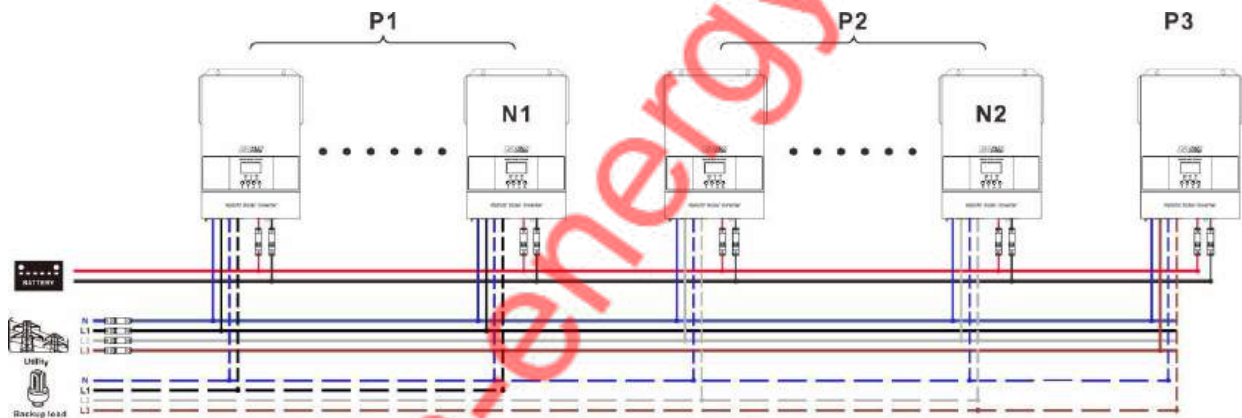
Note: It's up to customer's demand to pick 7 inverters on any phase.

P1: L1-phase, P2: L2-phase, P3: L3-phase.

$$N = N1 + N2 + N3, N_{max} = 12 \text{ units}$$

$N1_{max} = N2_{max} = 9 \text{ units}$ is in two phases and one inverter for the one phase ($N3=1$) :

Power Connection



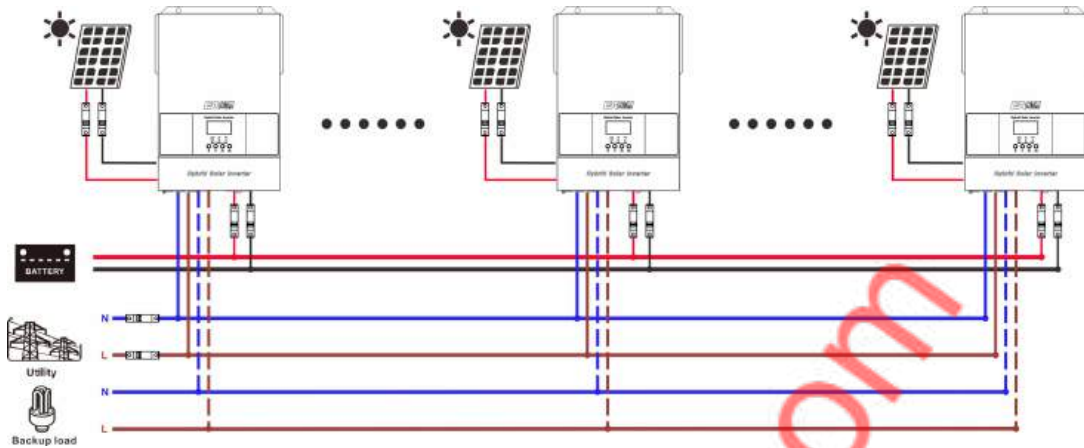
Communication Connection



7. PV Connection

Please refer to user manual of single unit for PV Connection.

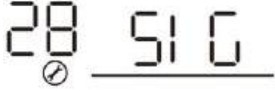
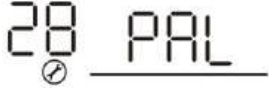
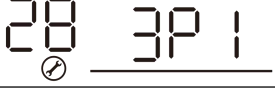



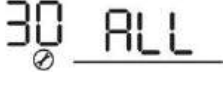
CAUTION: Each inverter should connect to PV modules separately.



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8. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
28	AC output mode	Single: This inverter is used in single phase application. 	Parallel: This inverter is operated in parallel system. (Need hardware support) 
		L1 phase 	The inverter is operated in L1 phase in 3-phase application
		L2 phase 	The inverter is operated in L2 phase in 3-phase application
		L3 phase 	The inverter is operated in L3 phase in 3-phase application
30	PV judge condition (Only apply for setting "Solar first" in program 1: Output source priority)	One Inverter (Default): 	When "ONE" is selected, as long as one of inverters has been connected to PV modules and PV input is normal, parallel or 3-phase system will continue working according to rule of "solar first" setting. For example, two units are connected in parallel and set "SOL" in output source priority. If one of two units has connected to PV modules and PV input is normal, the parallel system will provide power to loads from solar or battery power. If both of them are not sufficient, the system will provide power to loads from utility.
		All of Inverters: 	When "ALL" is selected, parallel or 3-phase system will continue working according to rule of "solar first" setting only when all of inverters are connected to PV modules. For example, two units are connected in parallel and set "SOL" in output source priority. When selecting "ALL" in program 30, it's necessary to have all inverters connected to PV modules and PV input is normal to allow the system to provide power to loads from solar and battery power. Otherwise, the system will provide power to loads from utility.

Fault code display:

Fault Code	Fault Event	Icon on
24	Host loss	
25	Synchronization loss	
26	Incompatible battery type	
27	Firmware version inconsistent	

Warning code display:

Warning Code	Warning Event	Icon on
16	CAN communication loss	
17	AC output mode setting is different	
18	Battery voltage detected different	

9. Commissioning

Parallel in single phase

Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

Step 2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units. **NOET:** It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.

Step 3: Turn on each unit.

LCD display in Master unit	LCD display in Slave unit

NOTE: Master and slave units are randomly defined. If it is master the icon blinks, if it is slave the icon normally on.

Step 4: Switch on all AC breakers of Line wires in AC input. It's better to have all inverters connect to utility at the same time. If detecting AC connection, they will work normally.

LCD display in Master unit	LCD display in Slave unit

Step 5: If there is no more fault alarm, the parallel system is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

10. Trouble shooting

Situation		Solution
Fault Code	Fault Event Description	
24	Host data loss	<ol style="list-style-type: none"> 1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
25	Synchronization data loss	<ol style="list-style-type: none"> 3. Check if communication cables are connected well and restart the inverter. 1. If the problem remains, please contact your installer.
26	Incompatible battery type	<ol style="list-style-type: none"> 1. Check the battery type setting to ensure that only the device connected to the BMS in the system is one of Li1 or Li2 or Li3 2. If the problem remains, please contact your installer.
27	Firmware version inconsistent	<ol style="list-style-type: none"> 1. Update all inverter firmware to the same version. 2. Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your instraller to provide the firmware to update. 3. After updating, if the problem still remains, please contact your installer.

Situation		Solution
Warning Code	Warning Event Description	
16	CAN communication loss	<ol style="list-style-type: none"> 1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
17	AC output mode setting is different.	<ol style="list-style-type: none"> 1. Switch off the inverter and check LCD setting #28. 2. For parallel system in single phase, make sure "PAL" is set on #28. 3. If the problem remains, please contact your installer.
18	The battery voltage of each inverter is not the same.	<ol style="list-style-type: none"> 1. Make sure all inverters share same groups of batteries together. 2. Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are close, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter. 3. If the problem still remains, please contact your installer.

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