USER MANUAL

HYBRID SOLAR INVERTER/CHARGER

3.6KVA/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

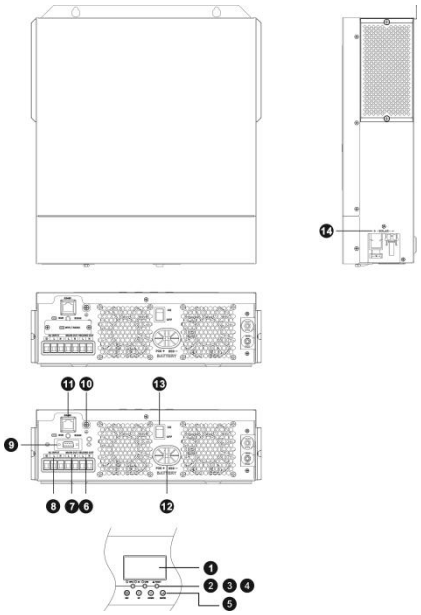
This manual provides safety and installation guidelines as well as information on tools and wiring.

SAFETY INSTRUCTIONS

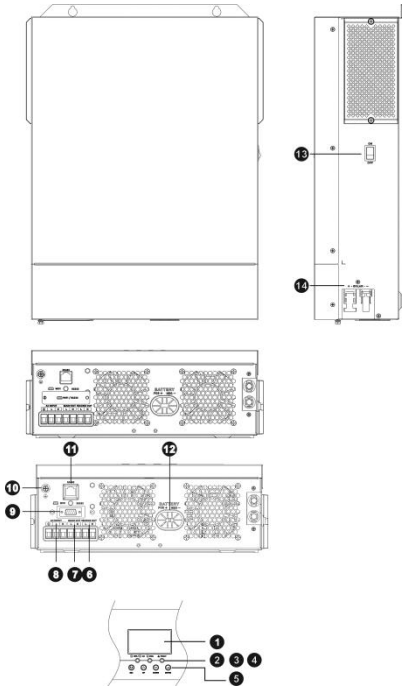
WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

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
3. injury and damage.
4. 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.
5. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
6. **CAUTION** – Only qualified personnel can install this device with battery.
7. **NEVER** charge a frozen battery.
8. 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.
9. 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.
10. 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.
11. Fuse is provided as over-current protection for the battery supply.
12. 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.
13. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
14. **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.

PRODUCT OVERVIEW



3.6KVA Model



6.2KVA Model

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

INSTALLATION

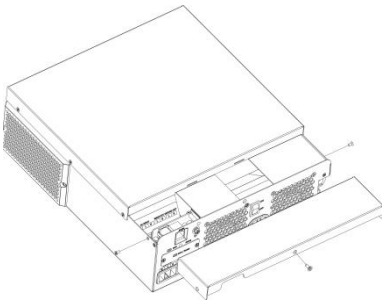
Unpacking and Inspection

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:

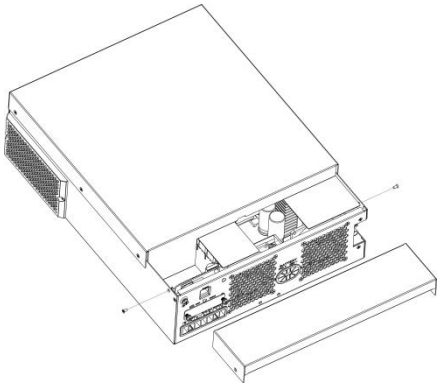
1. The unit x 1
2. User manual x 1
3. PV connector x 2

Preparation

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



3.6KVA Model

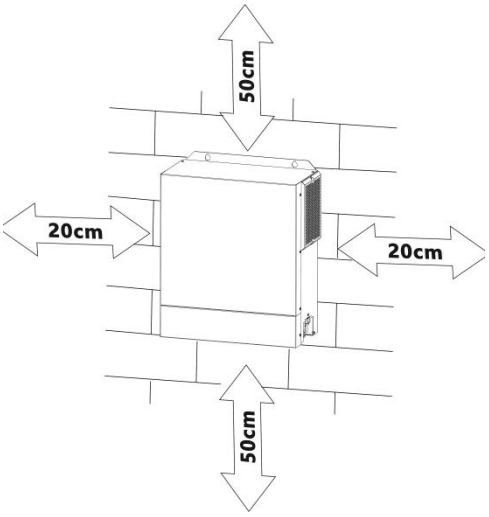


6.2KVA Model

Mounting the Unit

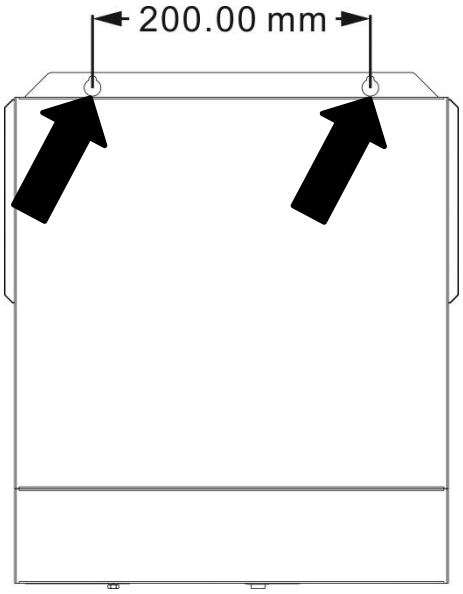
Consider the following points before selecting where to install:

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.

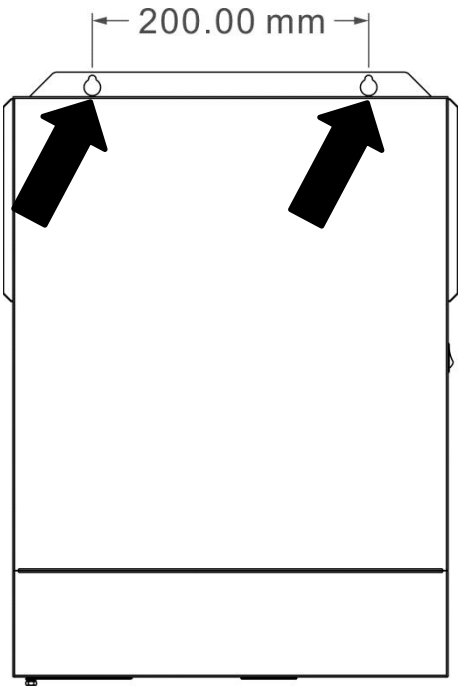


⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

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



3.6KVA Model

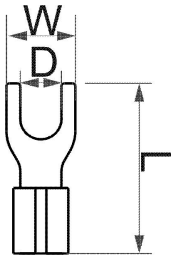


6.2KVA Model

Battery Connection

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

WARNING! All wiring must be performed by qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminals as below

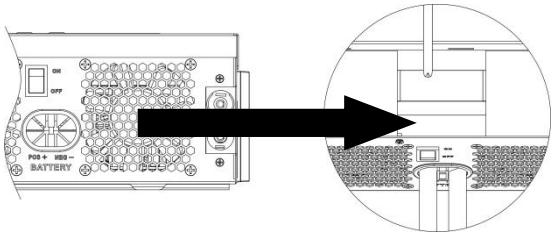


Recommended battery cable 、Terminal size:

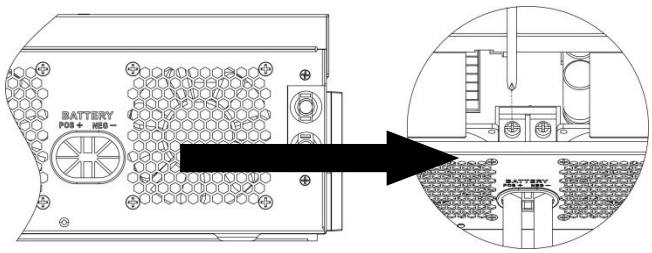
Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm2	Terminal size(mm)			Torque value
					L	W	D	
3.6KVA 6.2KVA	140A	200AH	2AWG	33	37	22	8.4	2~3 Nm

Please follow below steps to implement battery connection:

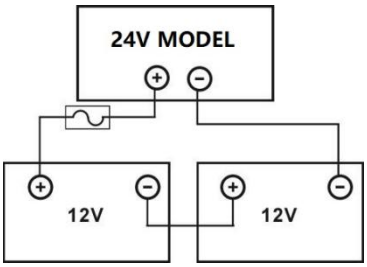
1. Make positive and negative cables based on recommended terminal size.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2~3Nm. Make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

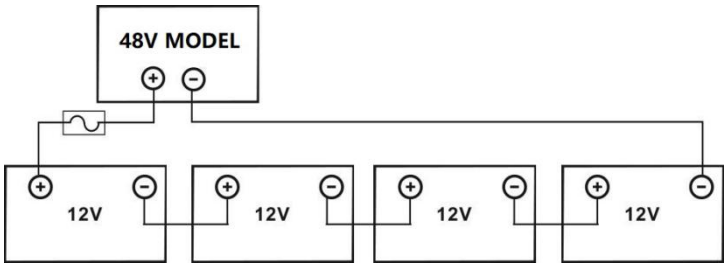


3.6KVA Model



6.2KVA Model





⚠	**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.

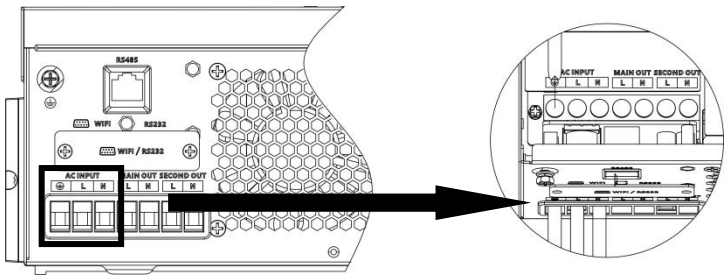
WARNING! All wiring must be performed by qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
3.6KVA	10AWG	1.4~ 1.6Nm
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.
5. This inverter is equipped with dual output. There are four terminals (main out-L/N, second out-L/N) available on output port. It's set up through LCD program or monitoring software to turn on and off the second output in program 43. Refer to "LCD setting" section for the details in program 29 and 31.

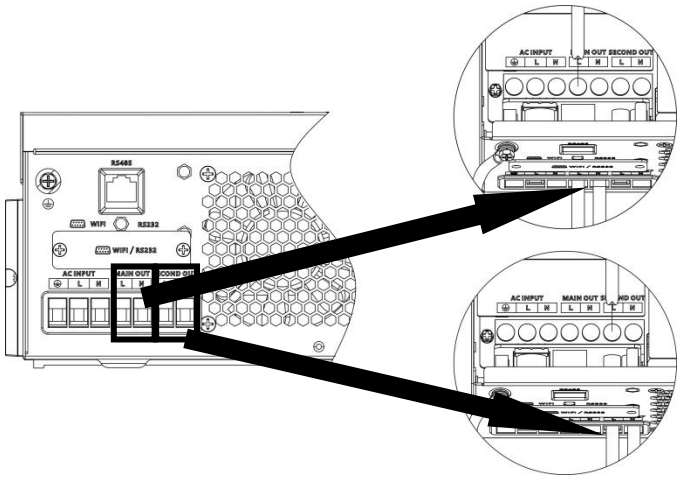
Remark:

1). The main output usually carries heavy loads which make the battery discharge time faster, the heavy loads are such as air-conditioners, heaters, motors and so on.

2). The second output usually carries light loads which make the battery discharge time longer, the light loads are such as lights, computers, fans and so on.

3). Normally, the cutoff point of second out is lower than main-out, so that the light loads will not be cut off power.

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



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

Model	Typical Amperage	Cable Size	Torque
3.6KVA	15A	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.

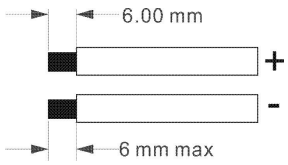
Solar Charging Mode		
INVERTER MODEL	3.6KVA	6.2KVA
Max. PV Array Open Circuit Voltage	500DC	
PV Array MPPT Voltage Range	30VDC~500VDC	60VDC~500VD
Max. PV INPUT CURRENT	15A	27A

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.

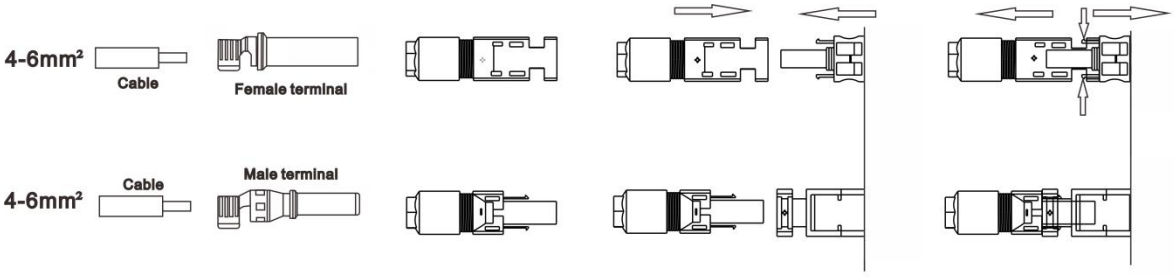
	SOLAR INPUT	**Q'ty of panels**	**Total input power**	**Inverter Model**
Solar Panel Spec. (reference) - 450Wp -Vmp: 34.67Vdc -Imp: 13.82A -Voc: 41.25Vdc -Isc: 12.98A	2 pcs in serial	2 pcs	900 W	3.6KVA-6.2KVA
	3 pcs in serial	3 pcs	1,350 W	
	4 pcs in serial	4 pcs	1,800 W	
	5 pcs in serial	5 pcs	2,250 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	6.2KVA
	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	6.2KVA
	7 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	Inverter Model
	2 pcs in serial	2 pcs	900 W	3.6KVA-6.2KVA
	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	6.2KVA
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	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	

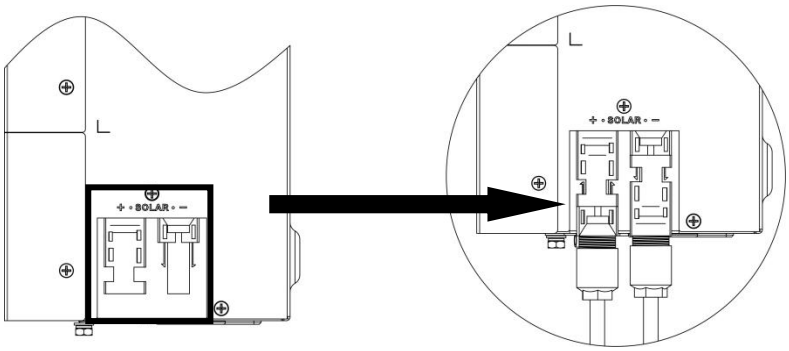
PV Module Wire Connection:

Please follow below steps to implement PV module connection:



1. Remove insulation sleeve 6 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.

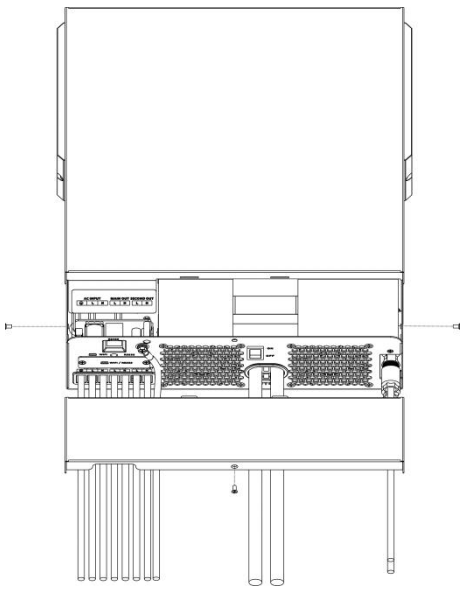




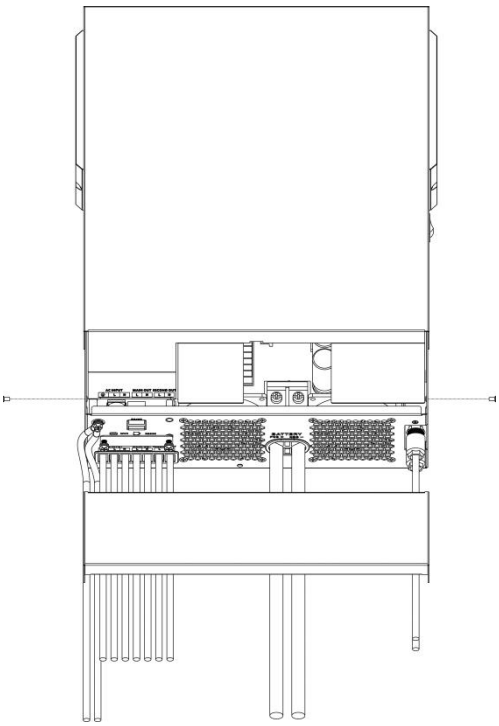
3. Make sure the wires are securely connected.

Final Assembly

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



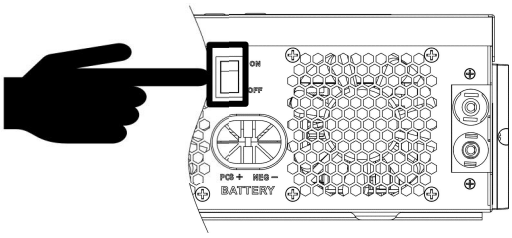
3.6KVA Model



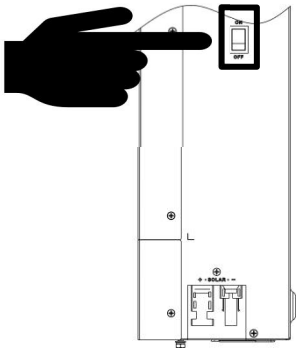
6.2KVA Model

OPERATION

Power ON/OFF



3.6KVA Model

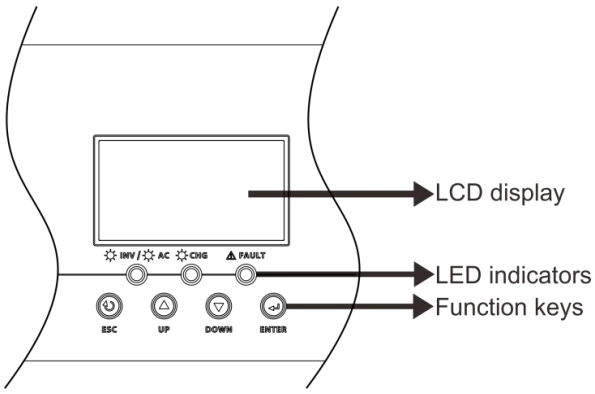


6.2KVA Model

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 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:

Remark: Max[A,B] takes the larger value of both A and B and Min[A,B] takes the smaller value of both A and B

Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Utility first (default)	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	Solar energy provides power to the loads as 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	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	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.
		SUF priority	If solar energy is sufficient to all connected loads and charge battery, the solar energy could feedback to the grid 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)	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) 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 GEN	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) AGM	Lead acid battery
		Flooded FLD	Flooded battery
		User-Defined 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.
		LI2 Li2	Support PYLON US2000 Protocol 3.5 Version
		LI4 Li4	Standard communication Protocol form inverter supplier
		LIB Lithium battery without communication 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 LRD	Restart enable (default) LRE

07	Auto restart when over temperature occurs	Restart disable trd	Restart enable (default) trE
08	Output voltage	230V(default) The available voltage settings are 220V, 230V, 240V	
09	Output frequency	50Hz (default) The available frequency settings are 50Hz and 60Hz	
10	Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off.	Manual(default) nML	Auto Ato
11	Maximum utility charging current	30A (default) If selected, acceptable charging current range will be within 5- Max. AC charging current of SPEC.	
12	Setting voltage or SOC percentage back to utility source when selecting "SBU priority" or "Solar first" in program 01.	**24V models:** 1)If program 5 is not LIB, the default setting is 23.0V and setting range is as follow: Max[22V, program31+0.1V]~Min[program13-0.1V,28.6V] 2)If program 5 is LIB, the default setting: 26.0V setting range is as follow: Max[22V, program31+0.1V]~Min[program13-0.1V,28.6V] 3).If program 5 is Lix, communication between the inverter and battery is successful, default value is 20% and setting range is as follow: Max[5%, program31+1%]~Min[program13-1%,96%] **48V models:** 1).If program 5 is not LIB, the default setting is 46.0V and setting range is as follow: Max[44V, program31+0.1V]~Min[program13-0.1V,57.2V] 2).If program 5 is LIB, the default setting: 52.0V setting range is follow: Max[44V, program31+0.1V]~Min[program13-0.1V,57.2V] 3).If program 5 is Lix, communication between the inverter and battery is successful, default value is 20% and setting range is as follow: Max[5%, program31+1%]~Min[program13-1%,96%]	

13	Setting voltage or SOC percentage back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	**24V models**: 1).If program 5 is not LIB, the default setting is battery fully charged and setting range is as follow: Max[24V, program12+0.1V]~Min [program26-0.5V or Full] 2).If program 5 is LIB, the default setting is battery fully charged and setting range is as follow: Max[24V, program12+0.1V]~Min [program26-0.5V or Full] 3). If program 5 is Lix, communication between the inverter and battery is successful, default value is 30% and setting range is as follow: Max[10%, program12+1%]~100% **48V models**: 1).If program 5 is not LIB, the default setting is battery fully charged and setting range is as follow: Max[48V, program12+0.1V]~Min [program26-0.5V or Full] 2).If program 5 is LIB, the default setting is battery fully charged and setting range is as follow: Max[48V, program12+0.1V]~Min [program26-0.5V or Full] 3).If program 5 is Lix, communication between the inverter and battery is successful, default value is 30% and setting range is as follow: Max[10%, program12+1%]~100%
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.
		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, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.

18	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
19	Auto return to default display screen	Return to default display screen (default) EXP	If selected, no matter how users switch display screen, it will automatically return to default display screen after no button is pressed for 1 minute.
		Stay at latest screen bEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on LoN	Backlight off (default) LoF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable byd	Bypass enable(default) byE
25	Modbus ID Setting	Modbus ID Setting Range ： 001(default)~247	
26	Bulk charging voltage (C.V voltage)	If self-defined or "LIB" is selected in program 5, this program can be setup. **24V models：** If program 5 is not LIB, the default is 28.2V and setting range is from value of program27 to 31V; If program 5 is LIB, the default is 28.2V and setting range is from value of program27 to 29V; **48V models：** If program 5 is not LIB, the default is 56.4V and setting range is from value of program 27 to 62V; If program 5 is LIB, the default is 56.4V and setting range is from value of program 27 to 58V;	

27	Floating charging voltage	If self-defined or "LIB" is selected in program 5, this program can be set up. **24V models**: If program 5 is not LIB, the default setting is 27.0V and setting range is from 24.0V to the value of program 26; If program 5 is LIB, the default setting: 28.2V and setting range is from 24.0V to the value of program 26; **48V models**: If program 5 is not LIB, the default setting is 54.0V and setting range is from 48.0V to the value of program 26; If program 5 is LIB, the default setting is 56.4V and setting range is from 48.0V to the value of program 26;
29	Setting cut off voltage point or SOC percentage percentage on the second output (OP2)	If self-defined or "LIB" is selected in program 5, this program can be set up. **24V models**: 1).If program 5 is not LIB, the default is 21.0V, setting range is as follow: 20v~Min[program 31,27V], the value is less than program 31 2). If program 5 is LIB, the default is 25.0V, setting range is as follow: 20v~Min[program 31,27V], the value is less than program 31 3). If program 5 is Lix, communication between the inverter and battery is successful, default value is 10% and setting range is from 0% to the SOC of program 31. **48V models**: 1).If program 5 is not LIB, the default is 42.0V, setting range is as follow: 40v~Min[program 31,54V], the value is less than program 31 2). If program 5 is LIB, the default is 50.0V, setting range is as follow: 40v~Min[program 31,54V], the value is less than program 31 3). If program 5 is Lix, communication between the inverter and battery is successful, default value is 10% and setting range is from 0% to the SOC of program 31.
31	Setting cut off voltage point or SOC percentage percentage on the Main output (OP1)	If self-defined or "LIB" is selected in program 5, this program can be set up, low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. **24V models**: 1). If program 5 is not LIB, the default is 22.0V, setting range is from the value of program29 to Min [program12 - 0.1V, 27V]; 2). If program 5 is LIB, the default is 25.9V, setting range is from the value of program29 to Min [program12 - 0.1V, 27V]; 3). If program 5 is Lix, communication between the inverter

		and battery is successful, default value is 15% and setting range is from the SOC of program29 to Min[95%, program12 - 1%]. **48V models**: 1). If program 5 is not LIB, the default is 44.0V, setting range is from the value of program29 to Min [program12 - 0.1V, 54V]; 2). If program 5 is LIB, the default is 51.9V, setting range is from the value of program29 to Min [program12 - 0.1V, 54V]; 3). If program 5 is Lix, communication between the inverter and battery is successful, default value is 15% and setting range is from the SOC of program29 to Min[95%, program12 - 1%].	
32	Bulk charging time (C.V stage)	If self-defined or "LIB" is selected in program 05, this program can be set up.	
		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	
33	Battery equalization	If "Flooded" or "User-Defined" or "LIB" is selected in program 05, this program can be set up.	
		Battery equalization EEN	Battery equalization disable (default) Ed5
34	Battery equalization voltage	**24V models**: The default is 29.2V, setting range is from floating voltage ~ 31V; **48V models**: If program 5 is not LIB, the default is 58.4V, setting range is from floating voltage ~ 62V;	
35	Battery equalized time	60min (default)	Setting range is from 0 min to 900min.
36	Battery equalized timeout	120min (default)	Setting range is from 0min to 900 min.
37	Equalization interval	30days (default)	Setting range is from 1 to 90 days.
39	Equalization activated immediately	Enable AEN	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.
		Disable (default) Ad5	

41	Automatic activation for lithium battery	Disable nAL	Disable automatic activation (default)
		Auto Ato	When Program05 is selected as "User-Defined" or "LIB" or "LIx", 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	Disable noP	Default: disable activation
		Activation ACt	When Program05 is selected "User-Defined" or "LIB" or "LIx" as lithium battery, when the battery is not detected, if you want to activate the lithium battery at a time, you could select it.
43	OP2 Output Enabel	Enable (default) on	OP2 output is allowed
		Disable oFF	OP2 output is forbidden
46	Maximum discharge current protection	Default OFF oFF Disable current discharge current protection function	
		Only available in Single model. The setting range is from 20A to 500A. 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.	
47	Setting the OP2 overload warning point	Set the OP2 overload warning point. If the set value is exceeded, 22 warning will be displayed. Setting range is from 10% to 100% and the default setting is 50%;	
50	lithium battery activation time	When lithium battery activation function is available, the activation time could be set, the setting range is 6s~300s,the default time is 6s;	

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.

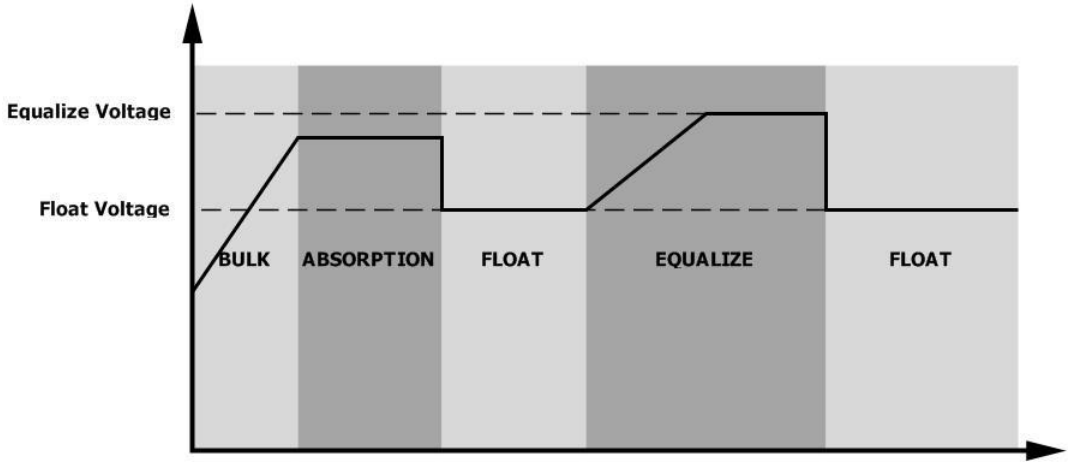
- **.How to Apply Equalization Function**

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.

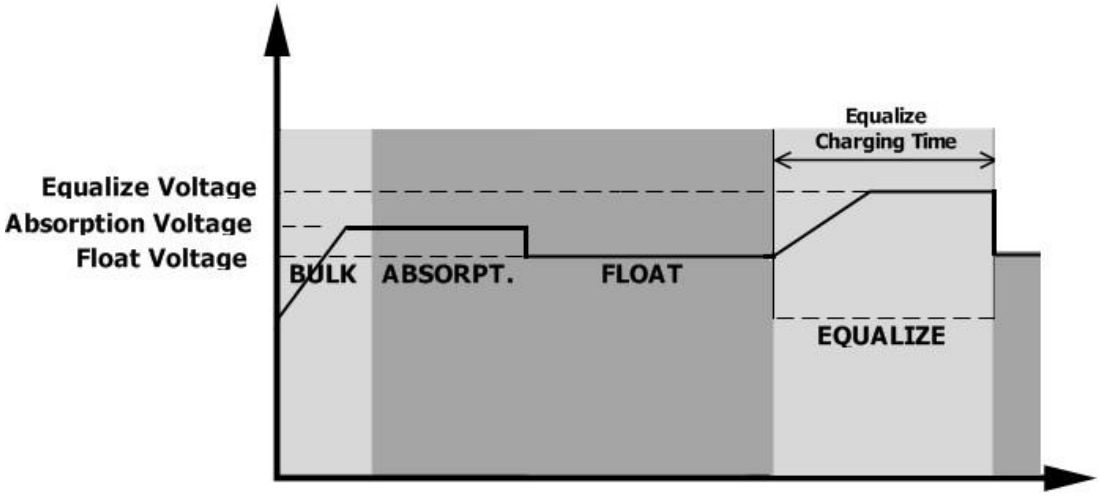
- **When to Equalize**

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.

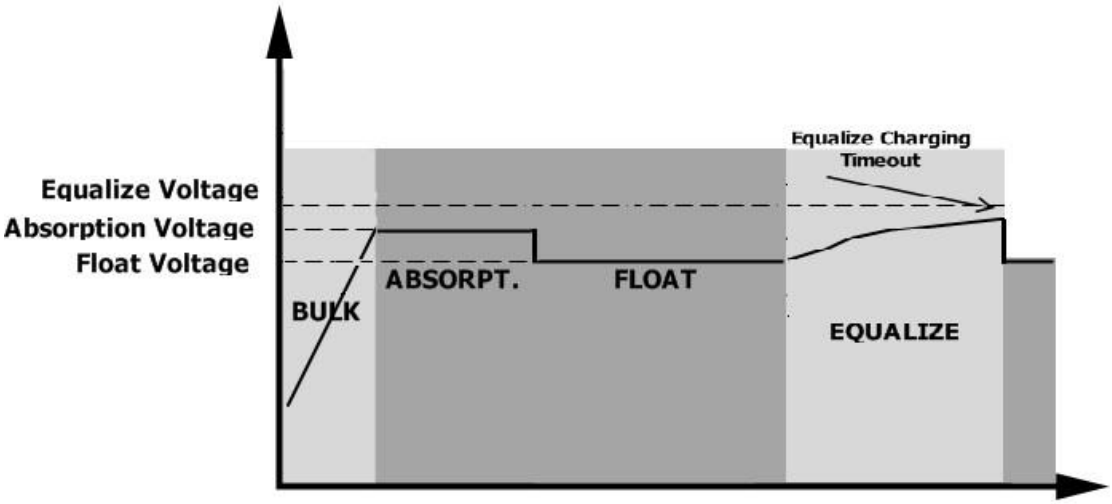


- **Equalize charging time and timeout**

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

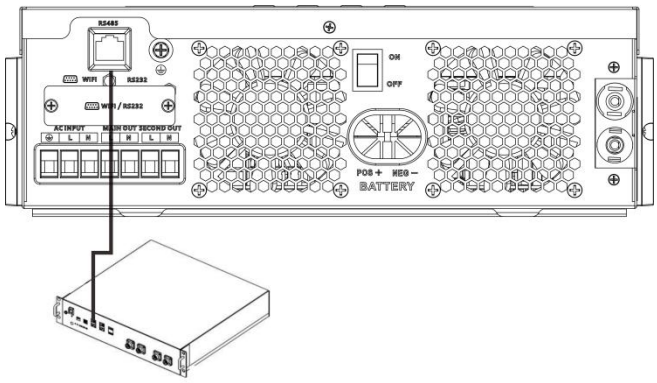
Lithium Battery Connection

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.

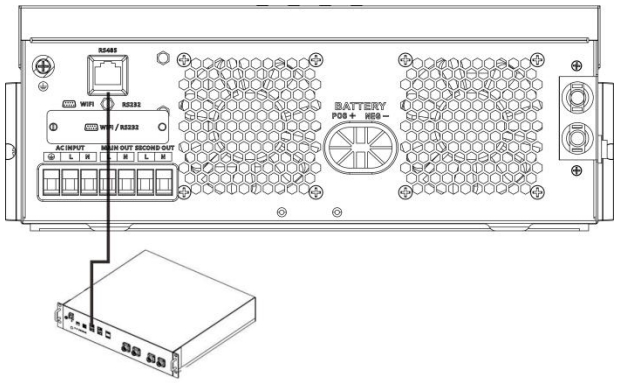
Please follow below steps to implement lithium battery connection:

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.



3.6KVA Model



6.2KVA Model

Fig 1

Lithium battery communication and setting

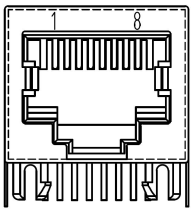
if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

- 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 umber	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 program12/13/29/31/41/42 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**	Remark
1	Communication successful icon	Li
2	Max lithium battery charging voltage	
3	Max lithium battery charging current	
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(%)	

Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

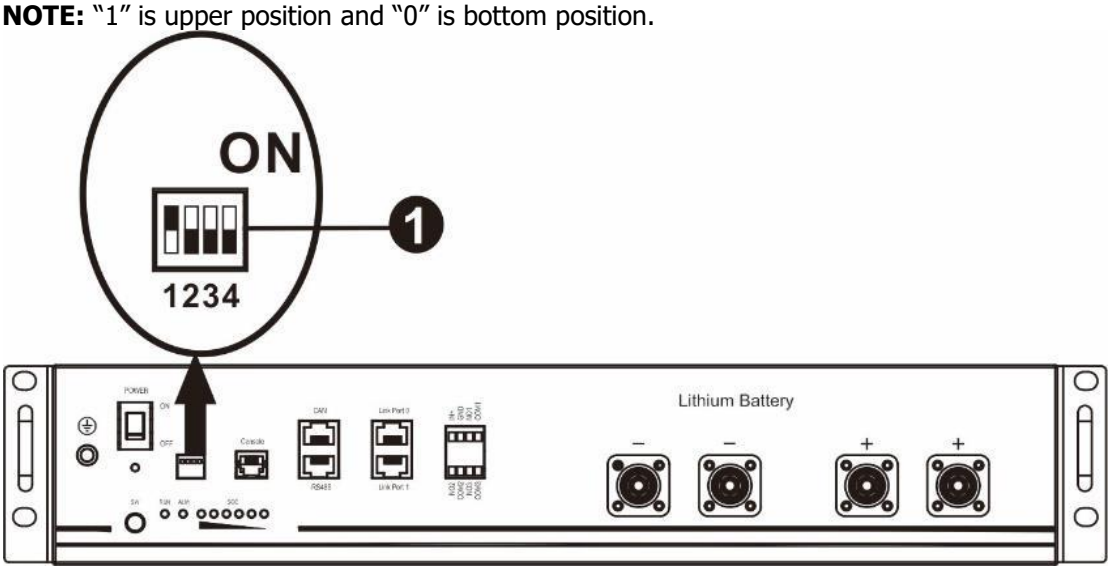
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

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.

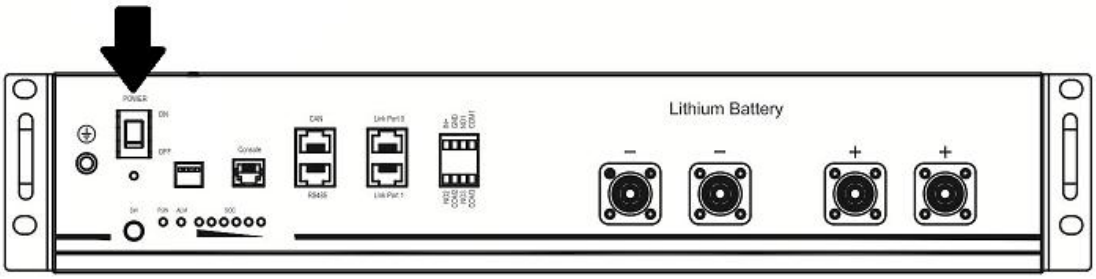
NOTE: "1" is upper position and "0" is bottom position.



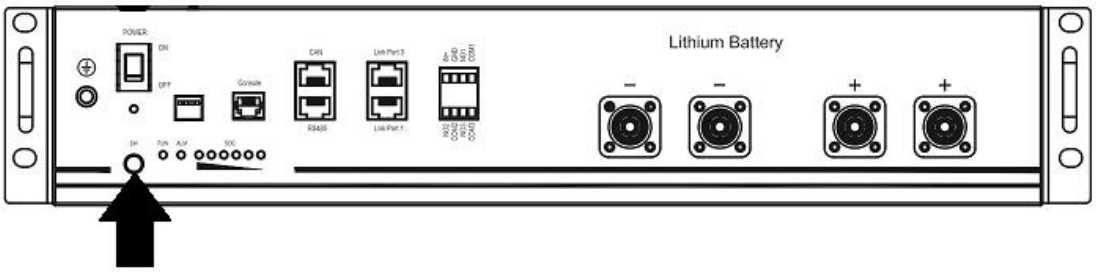
2). Process of install

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:

A. Recommended method 1：Set battery type as "LIB" in program 05;

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 05;
3. Set C.V voltage as Max charging voltage of BMS-0.5V in program 26;
4. Set floating charging voltage as C.V voltage in program 27;
5. Set Low DC cut-off voltage ≥discharging protection voltage in program 29;
6. Set Max charging current in program 02 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 12.

The setting value must be ≥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.

Fault Reference Code

Fault Code	Fault Event
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
24	Op2 current offset is too high

Warning Indicator

Warning Code	Warning Event	Audible Alarm
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
22	The load exceeds the set value of program program47	None
E9	Battery equalization	None
bP	Battery is not connected	None

SPECIFICATIONS

Table 1 Line Mode Specifications

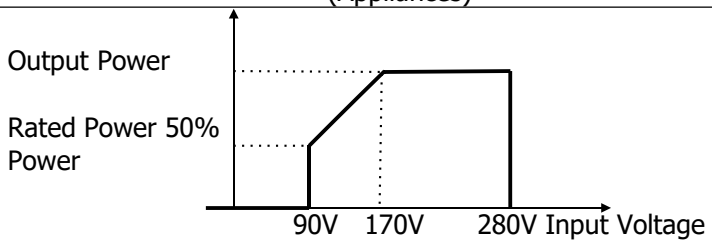
INVERTER MODEL	3.6KVA	6.2KVA
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
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	Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)	
Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.		

Table 2 Inverter Mode Specifications

INVERTER MODEL	3.6KVA	6.2KVA
Rated Output Power	3.6KVA 3.6KW	6.2KVA 6.2KW
Dual output function	Yes	Yes
Max.main output power Max.second output power	3.6KVA 3.6KW	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	24Vdc	48Vdc
Cold Start Voltage	23.0Vdc	46.0Vdc
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	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%	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%	21.0Vdc 20.4Vdc 19.2Vdc	42.0Vdc 40.8Vdc 38.4Vdc

Table 3 Charge Mode Specifications

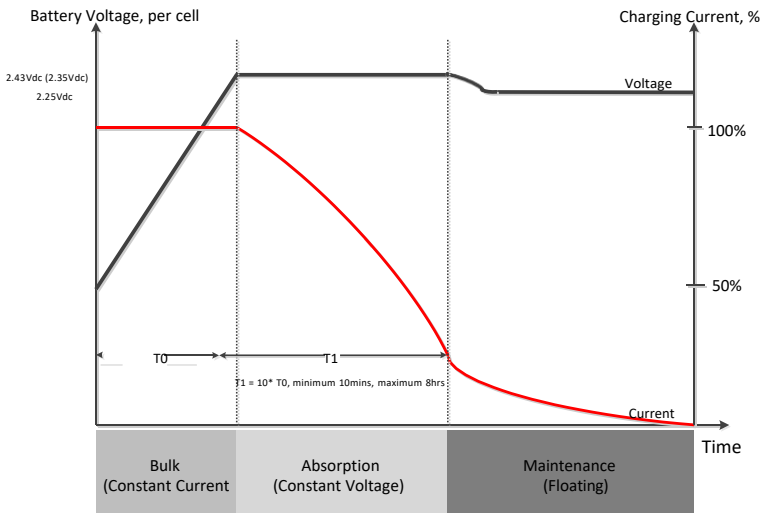
Utility Charging Mode			
INVERTER MODEL		**3.6KVA**	**6.2KVA**
Max Charging Current (PV+AC) (@ VI/P=230Vac)		100Amp	120Amp
Max Charging Current (AC)(@ VI/P=230Vac)		80Amp	80Amp
Bulk Charging Voltage	**Flooded Battery**	29.2Vdc	58.4Vdc
	AGM / Gel Battery	28.2Vdc	56.4Vdc
Floating Charging Voltage		27Vdc	54Vdc
Overcharge Protection		32Vdc	63Vdc
Charging Algorithm		3-Step	
Charging Curve			
Solar Input			
INVERTER MODEL		**3.6KVA**	**6.2KVA**
Rated Power		4000W	6500W
Max. PV Array Open Circuit Voltage		500Vdc	
PV Array MPPT Voltage Range		30Vdc~500Vdc	60Vdc~500Vdc
Max. Input Current		15A	27A
Max. Charging Current(PV)		100A	120A

Table 4 General Specifications

INVERTER MODEL	**3.6KVA**	**6.2KVA**
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	368x312x105	438x315x122
Net Weight, kg	6.5	9.0

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)	Check if AC wires are too thin and/or too long. 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.