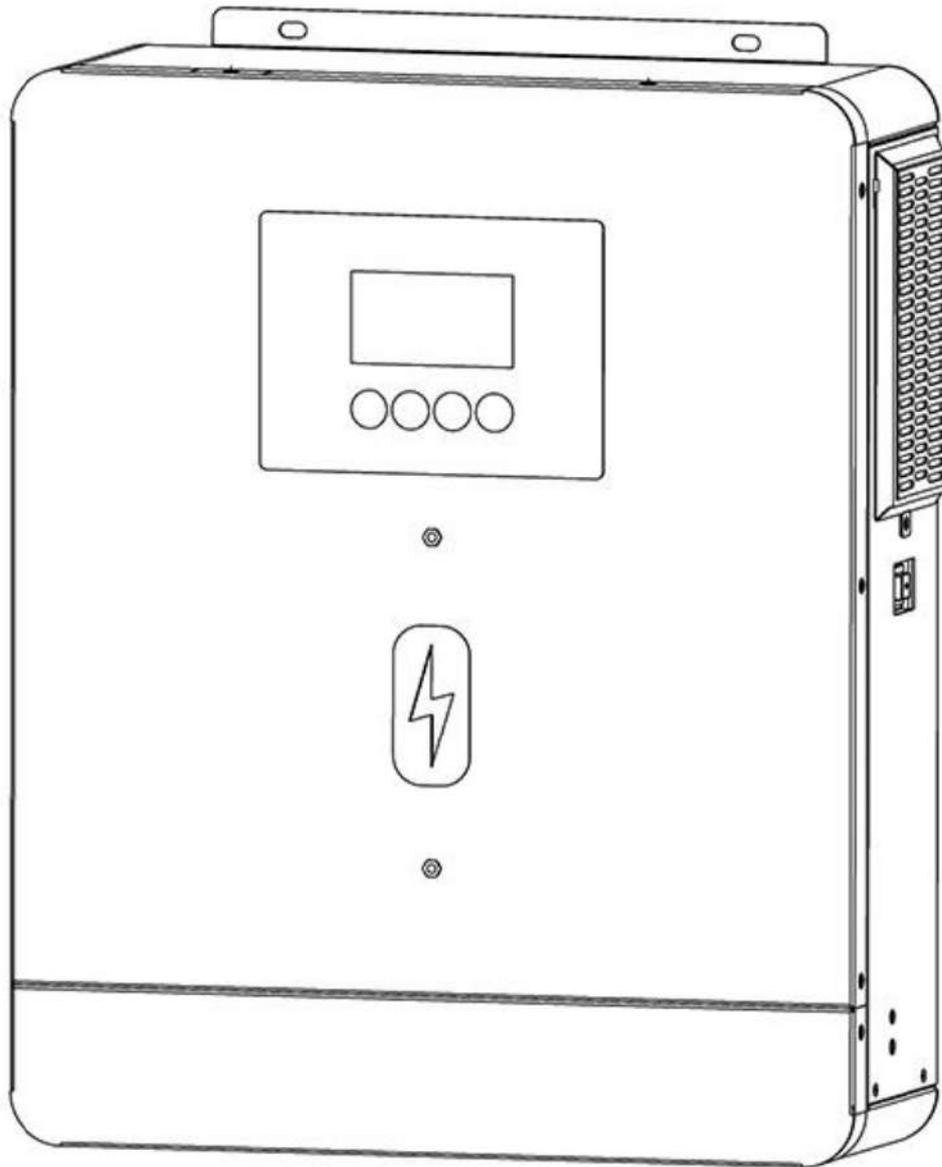


Product Type

POW-HVM6.2M-48V-N

POW-HVM4.2M-24V-N

POW-HVM3.6M-24V-N



POWMr

HYBRID INVERTER

User Manual

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1 ABOUT THIS MANUAL

1.1 Purpose

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

1.2 Scope

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

2 SAFETY INSTRUCTIONS



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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. One piece of 150A fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/charger should be connected to a permanent 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.

3 INTRODUCTION

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

3.1 Features

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

3.2 Basic System Architecture

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

- ☒ Generator or Utility.
- ☒ PV modules

Consult with your system integrator for other possible system architectures depending on your requirements. This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

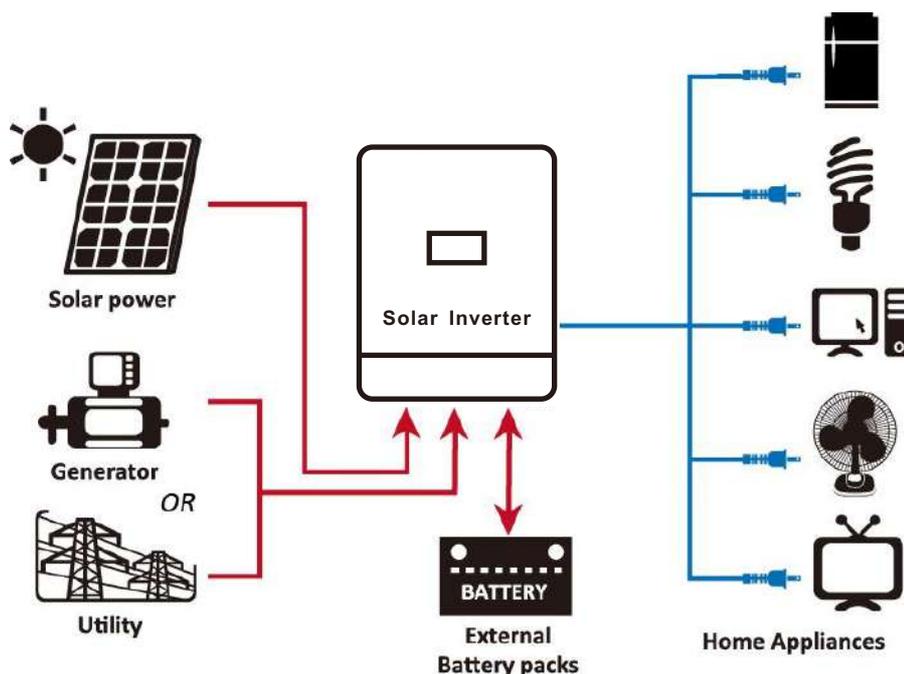
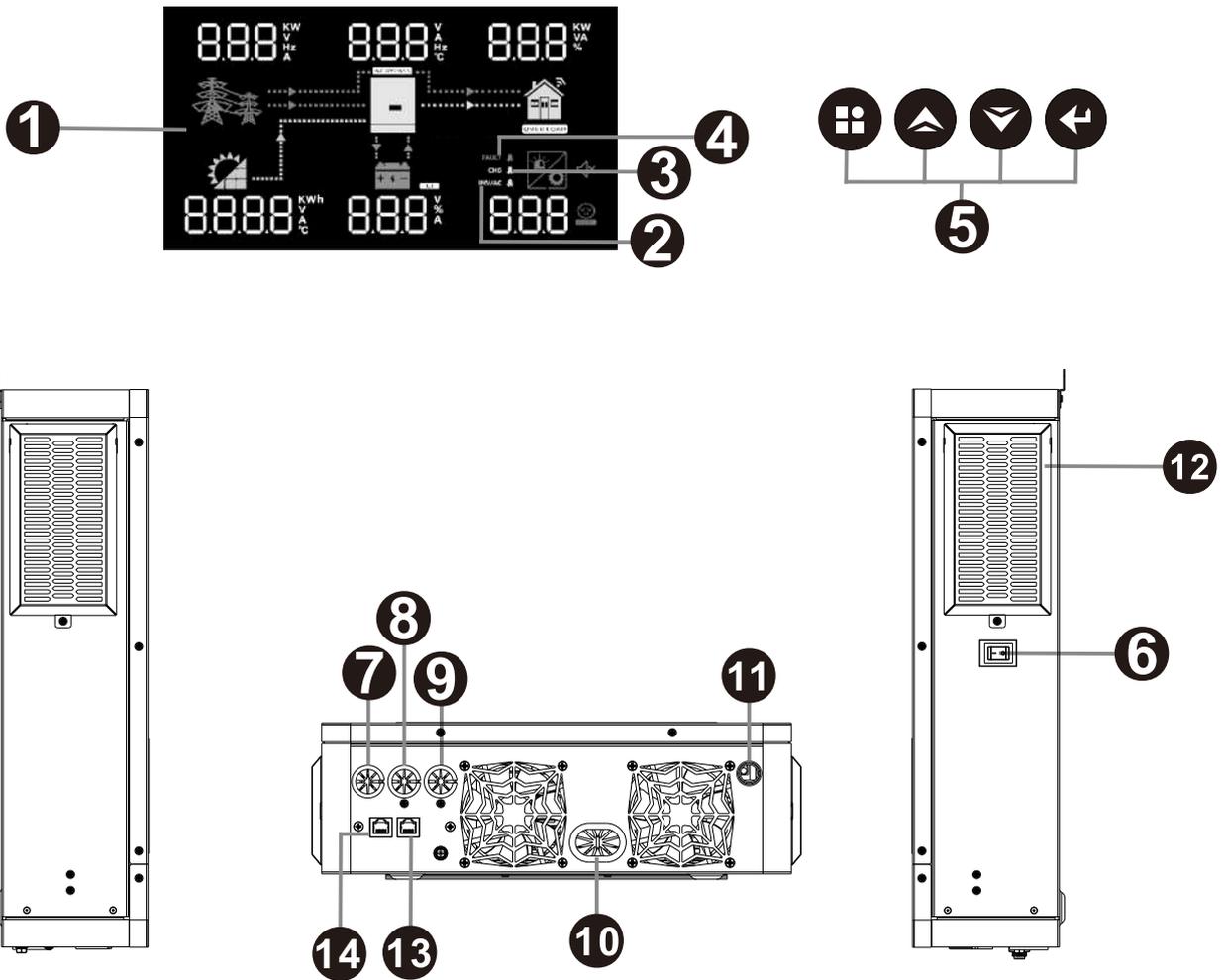


Figure 1 Hybrid Power System

3.3 Product Overview



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. Main output
9. Second output
10. Battery input
11. PV input
12. Anti dust kit
13. WIFI communication/RS-232 port
14. Battery communication/RS-485 port

4 INSTALLATION

4.1 Unpacking and Inspection

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

- The unit x 1
- User manual x 1

4.2 Preparation

Before connecting all lines, remove the screws under the machine and remove the bottom cover plate.

4.3 Mounting the Unit

Consider the following points before selecting where to install:

- ⌘ Do not mount the inverter on flammable construction materials.
- ⌘ Mount on a solid surface
- ⌘ Install this inverter at eye level in order to allow the LCD display to be read at all times.
- ⌘ For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- ⌘ The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- ⌘ The recommended installation position is to be adhered to the wall vertically.
- ⌘ Make sure that other objects and surfaces are left with enough space from the machine to ensure adequate heat dissipation and that there is enough room to remove the wires.



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

Install the unit by screwing two screws. It's recommended to use M6 screws.

4.4 Battery Connection

CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to 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.

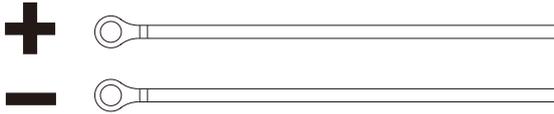
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

Recommended battery cable size:

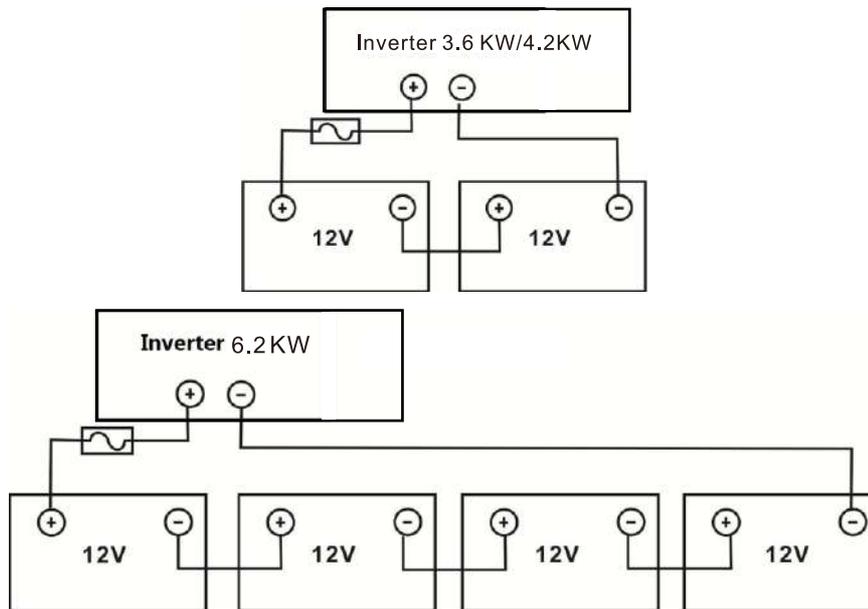
Model	Wire Size	Cable (mm ²)	Torque value (max)
3.6KW/4.2KW/6.2KW	1 x 2AWG	25	2 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.

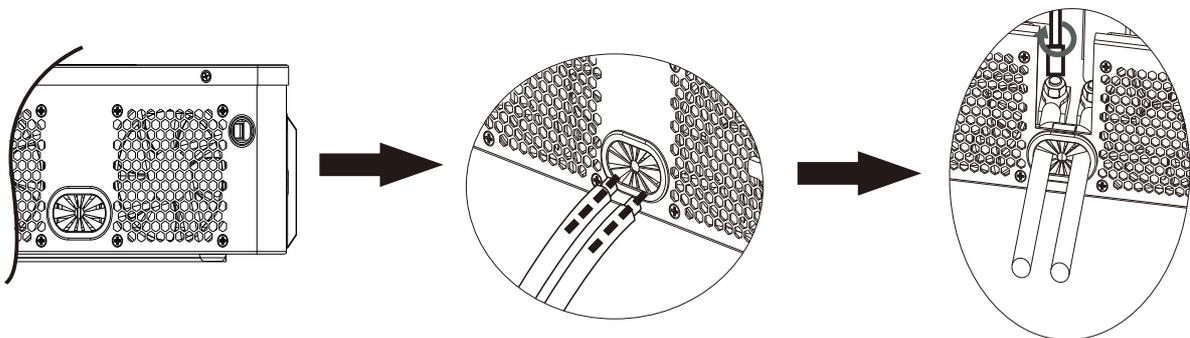


3. Connect all battery packs as below chart.



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

Recommended tool: #2 Pozi Screwdriver



	WARNING: Shock Hazard Installation must be performed with care due to high battery voltage in series.
	CAUTION!! Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

4.5 AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 32A for 3.6KW/4.2KW and 50A for 6.2KW.

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

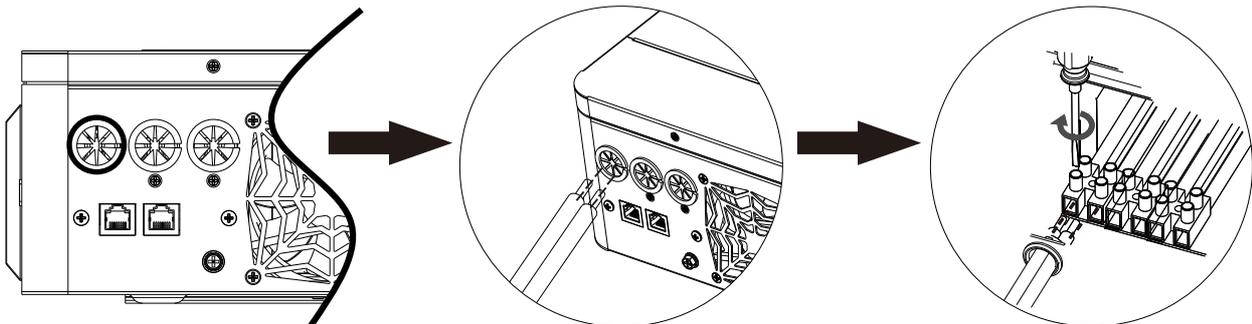
Model	Gauge	Cable (mm ²)	Torque Value
3.6KW/4.2KW	12 AWG	4	1.2 Nm
6.2KW	10 AWG	6	1.2 Nm

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.

L→LINE (brown or black)

N→Neutral (blue)



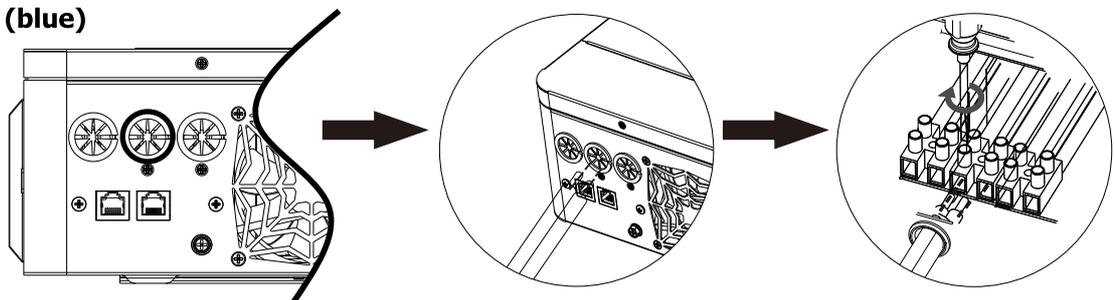
WARNING:

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.

L→LINE (brown or black)

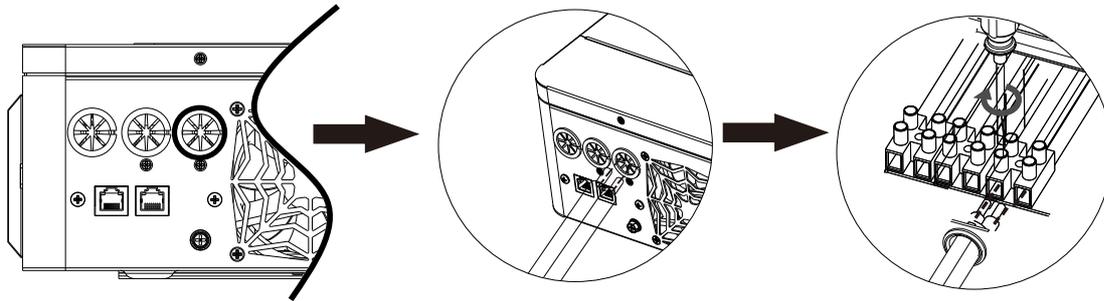
N→Neutral (blue)



5. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.

L→**LINE (brown or black)**

N→**Neutral (blue)**



6. Make sure the wires are securely connected.

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

4.6 PV Connection

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

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	Wire Size	Cable (mm ²)	Torque value (max)
3.6KW/4.2KW/6.2KW	1 x 12AWG	4	1.2 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.

INVERTER MODEL	3.6KW/4.2KW	6.2KW
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	60Vdc~450Vdc	

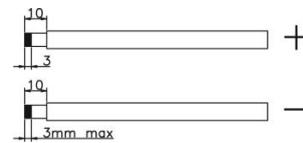
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference)	SOLAR INPUT	Q'ty of panels	Total input power
	(Min in serial: 6 pcs, max. in serial: 13 pcs)		
- 250Wp	6 pcs in serial	6 pcs	1500W
- Vmp: 30.1Vdc	8 pcs in serial	8 pcs	2000W
- Imp: 8.3A	12 pcs in serial	12 pcs	3000W
- Voc: 37.7Vdc	13 pcs in serial	13 pcs	3250W
- Isc: 8.4A	8 pieces in serial and 2 sets in parallel	16 pcs	4000W
- Cells: 60	10 pieces in serial and 2 sets in parallel	20 pcs	5000W
	12 pieces in serial and 2 sets in parallel	24 pcs	6500W
	10 pieces in serial and 3 sets in parallel	30 pcs	7500W

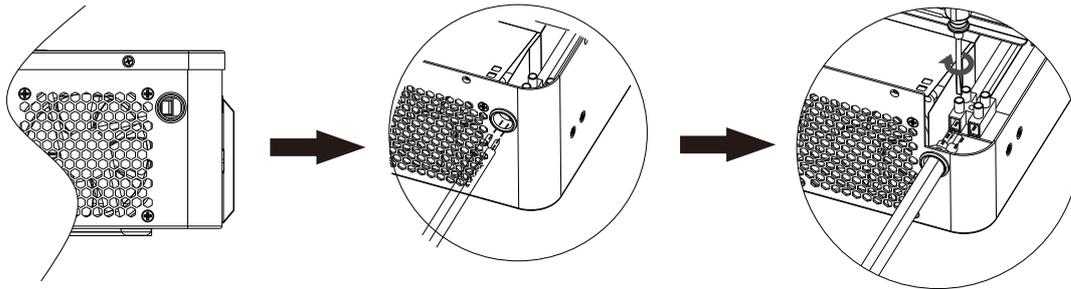
PV Module Wire Connection

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.



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



4.7 Final Assembly

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

4.8 Communication Connection

1. Wi-Fi cloud communication (option):

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

2. GPRS cloud communication (option):

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

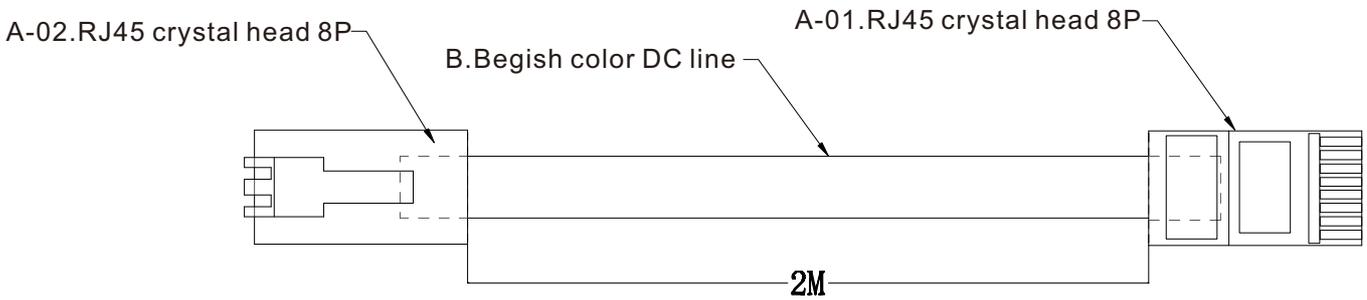
3. Battery communication

The communication between the battery and the inverter can be realized through the battery communication interface, so that the inverter and the lithium battery can exchange information Baud rate 9600 .

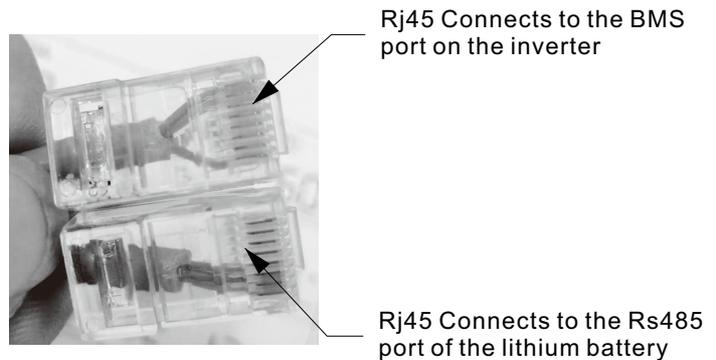
4. Lithium battery and inverter connection:

Use power cables, communication cables for lithium batteries, and inverters to connect.

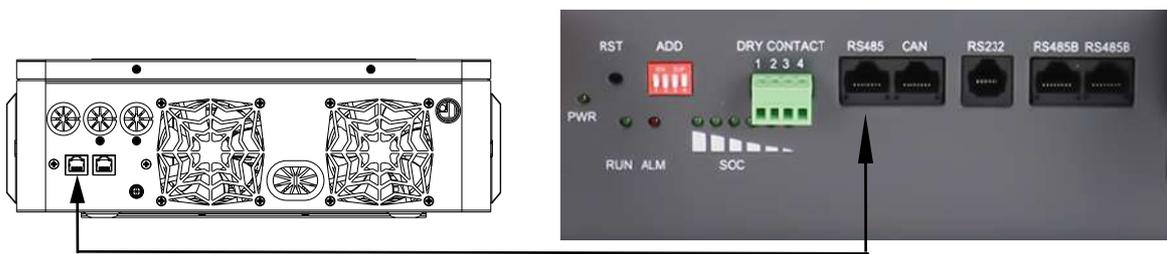
Note: Lithium battery and inverter positive and negative positions, check the correct installation; The RJ45 connector of the communication cable connects to the BMS port of the inverter, and the other RJ45 connector connects to the RS485 port of the lithium battery; Before connecting, make sure that the lithium battery and inverter are turned off. (It is recommended to install a circuit breaker for the power cables of the lithium battery and the inverter battery interface. Otherwise, a spark may occur.)



CONNECTION METHOD	
A-01	A-02
1	7
2	8
8	6
EMPTY PIN IS NOT CONNECTED	



The lithium battery communication cable interface is shown in the figure



Inverter connection port

Lithium battery connection diagram

In order to communicate with the lithium battery BMS, you should press the “ENTER” button for a long time, and set the battery type as “LIB-485” in program 05. Then select the matching battery protocol in Program 43.

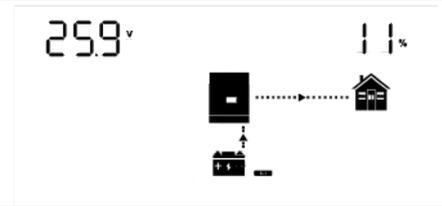
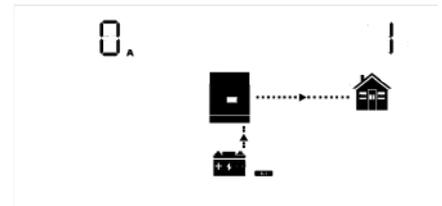
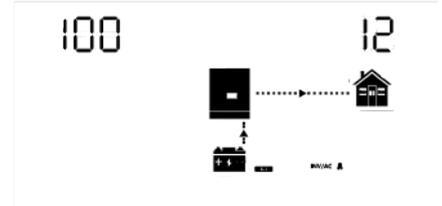
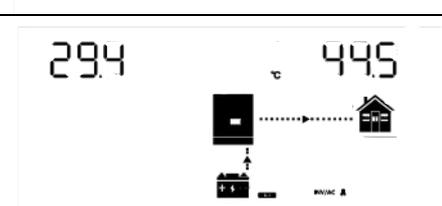
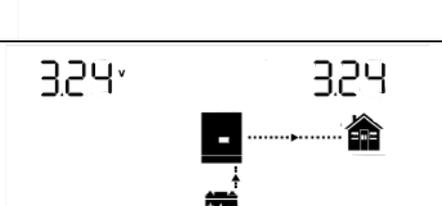
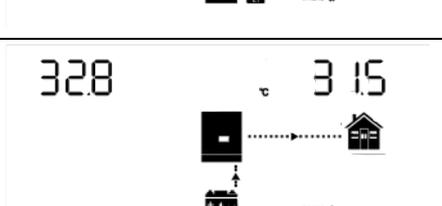
05	Battery type	AGM (default) 05 <u>AGM</u>
		Flooded 05 <u>FLD</u>
		User Defined 05 <u>USE</u>
		Lithium battery mode 05 <u>LIB</u>
		Lithium battery communication mode LIB 05 <u>485</u>
43	Lithium battery protocol	PYLON 43 <u>PYL</u>
		PACE 43 <u>PAC</u>

CAUTION: When the battery type is set to “LIB-485”, the setting items 12, 13 and 29 are displayed in percentage.

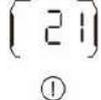
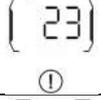
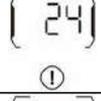
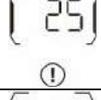
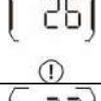
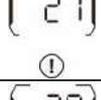
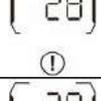
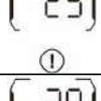
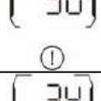
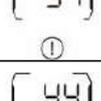
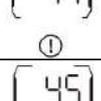
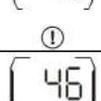
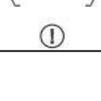
CAUTION: When the battery type is set to “LIB-485”, the user cannot modify the maximum charging current. When communication fails, the inverter will cut off the output.

12	When the SBU mode is selected in program 01, the battery SOC point for switching to the utility source input can be set.	12 <u>50</u> % The default value is 50%, and 10% ~ 50% can be set.
13	When the SBU mode is selected in program 01, the SOC point for switching to the battery mode can be set.	13 <u>95</u> % The default value is 95%, and 30% ~ 100% can be set.
29	If "LIB-485" is selected in item 05. you can set the battery low SOC shutdown point.	29 <u>20</u> % The default value is 20%, and 5% ~ 30% can be set.

In "LIB-485" mode, press and hold the "ESC" button to view the information of the lithium battery, and the inverter display screen will enter the following screen (the initial interface shows the total battery voltage and remaining battery capacity). Press the "DOWN" button to display the following data in turn.

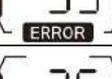
Selectable information		LCD display
The data is displayed in the upper left corner of the LCD	The data is displayed in the upper right corner of the LCD	LCD display interface
Total battery voltage = 25.9V	Remaining battery capacity = 11%	
Battery charging current = 0A	Battery discharge current = 1A	
Rated battery capacity = 100AH	Battery charge cycles = 12	
Minimum MOS temperature of battery = 29.4	Maximum MOS temperature of battery = 44.5	
The maximum voltage of a single battery cell = 3.24V	Minimum voltage of a single battery cell = 3.24V	
Maximum temperature of battery cell = 32.8	Minimum temperature of battery cell = 31.5	

Battery Alarm Code

Alarm code	Alarm event	Icon flashing
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	
24	Battery Pack Under Voltage	
25	Charging Over Current	
26	Discharging Over Current	
27	Charging Cell Over Temperature	
28	Discharging Cell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
34	Battery capacity is too low	
44	Battery Cell Voltage Imbalance	
45	Battery Cell Temperature Imbalance	
46	Internal Communication Alarm	

Battery fault code

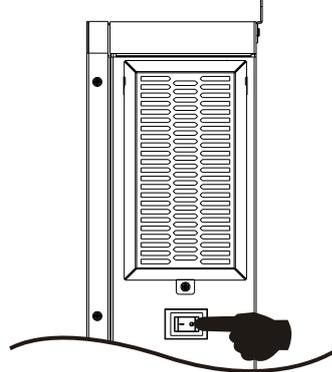
Fault code	Fault event	The icon is long and bright
21	Battery Cell Over Voltage	
22	Battery Cell Under Voltage	
23	Battery Pack Over Voltage	

24	Battery Pack Under Voltage	
25	Charging Over Current	
26	Discharging Over Current	
27	Charging Cell Over Temperature	
28	Discharging Cell Over Temperature	
29	Charging Cell Under Temperature	
30	Discharging Cell Under Temperature	
31	Ambient Over Temperature	
32	Ambient Under Temperature	
33	MOS Over Temperature	
35	Battery Short Circuit	
36	Charge Overvoltage	
37	System Failure	
39	Charging MOS Fault	
40	Discharge MOS Fault	
41	Temperature Sensor Fault	
42	Battery Cell Fault	
43	Sampling Communication Failure	
61	Communication Failure	

5 OPERATION

5.1 Power ON/OFF

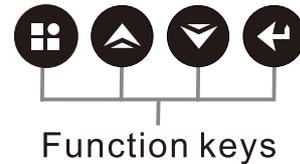
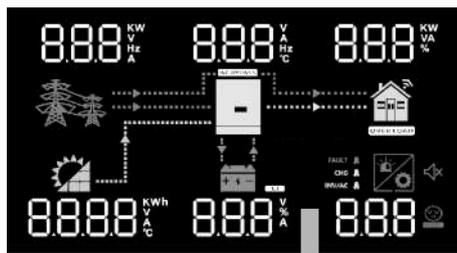
Side view of unit



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

5.2 Operation and Display Panel

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



Function keys

LCD display

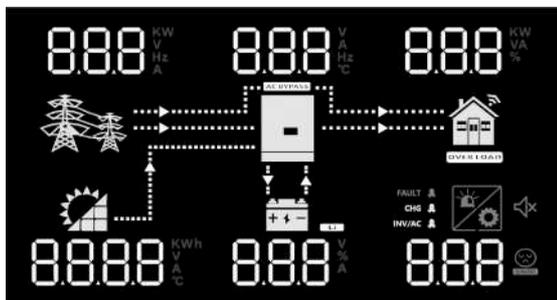
LED Indicator

LED Indicator		Messages	
INV/AC 	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

5.3 LCD Display Icons



Icon	Function description
Input Source Information	
	Indicates the AC input.
	Indicates the PV input
	Indicate input voltage, input frequency, PV voltage, charger current (if PV in charging for 3.6KW models), charger power, battery voltage.
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	
	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
Load Information	
	Indicates overload.

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.