



# **HYBRID INVERTER**

## **TECO4.2KW/TECO 6.2KW**

VERSION: 1.0

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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.

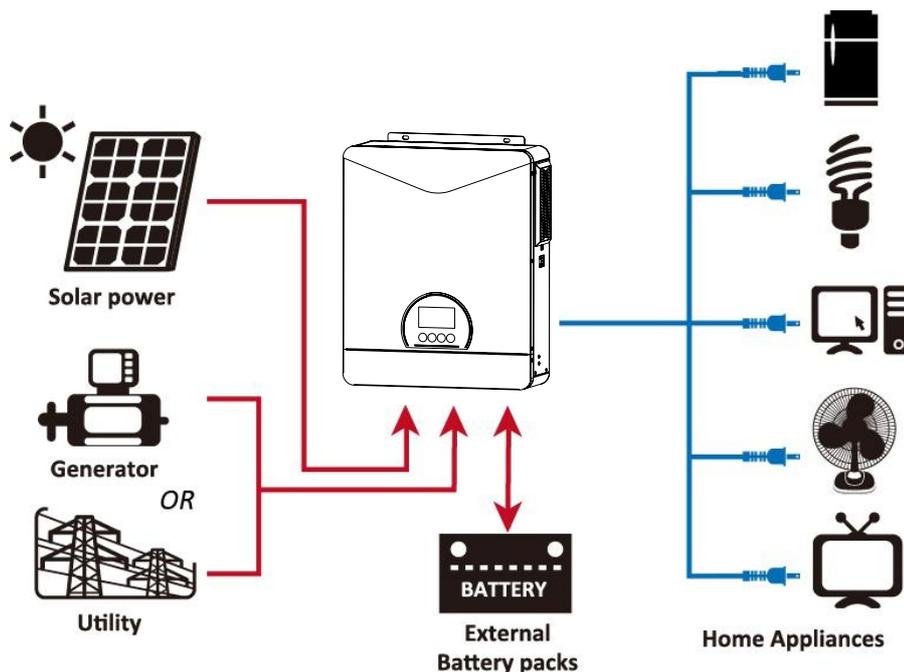
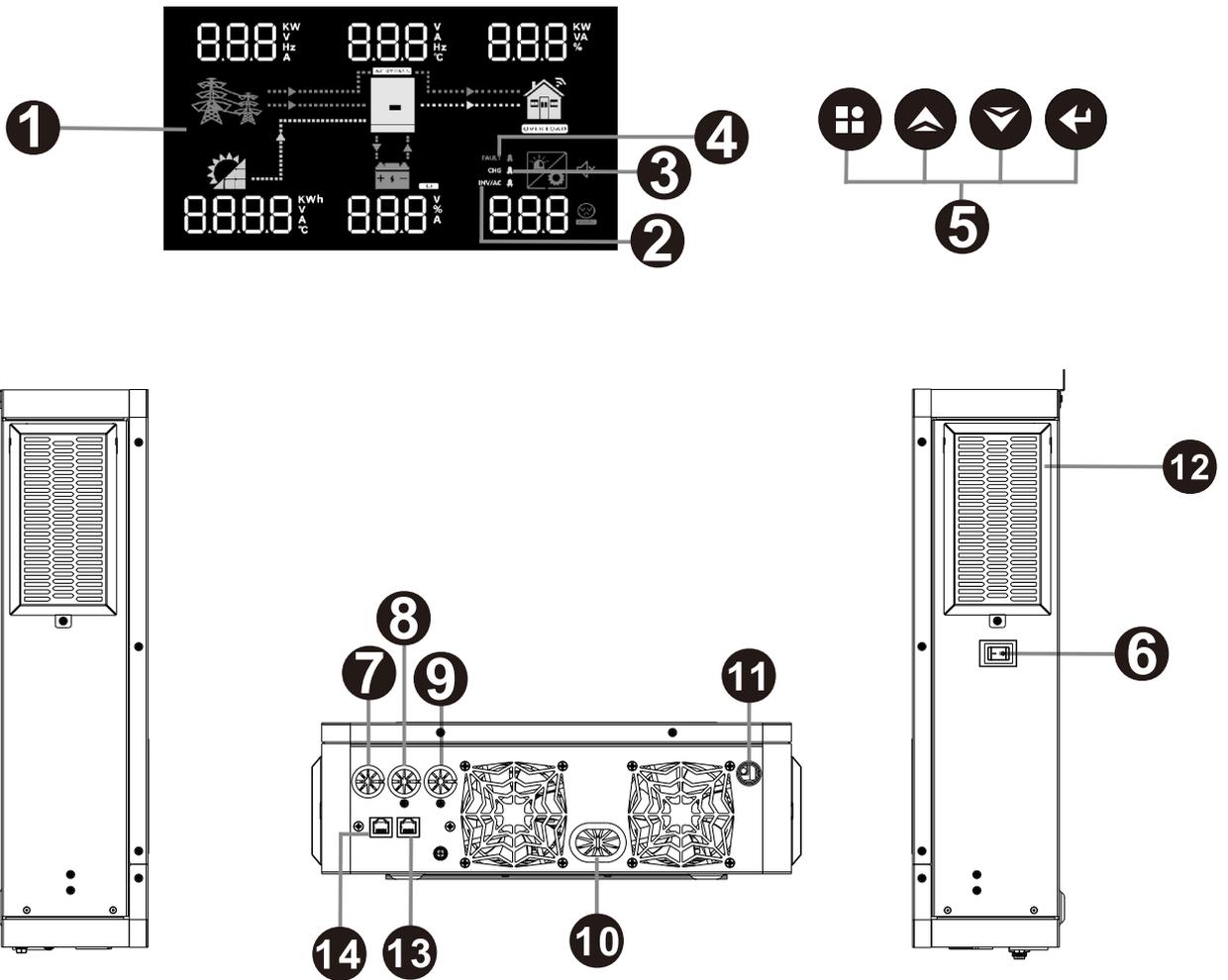


Figure 1 Hybrid Power System

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

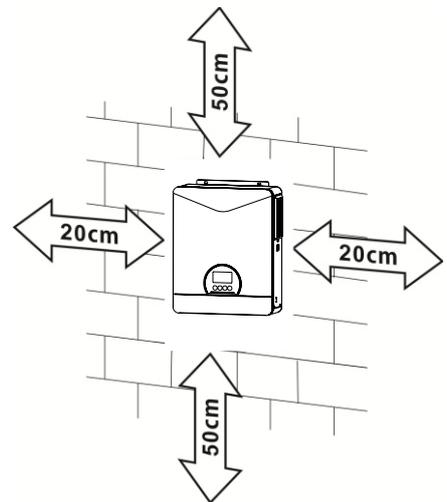
### 4.2 Preparation

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

### 4.3 Mounting the Unit

Consider the following points before selecting where to install:

- ⌘ Do not mount the inverter on flammable construction materials.
- ⌘ Mount on a solid surface
- ⌘ Install this inverter at eye level in order to allow the LCD display to be read at all times.
- ⌘ For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- ⌘ The ambient temperature should be between 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 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 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.

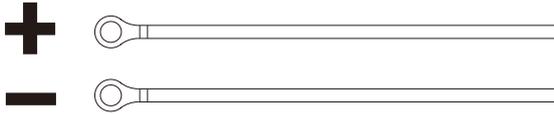
**WARNING!** It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

**Recommended battery cable size:**

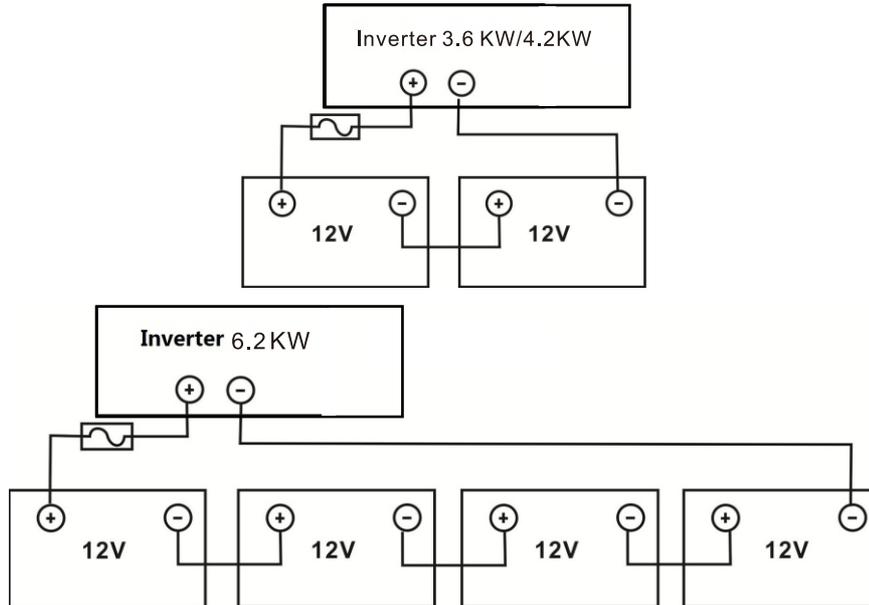
Model	Wire Size	Cable (mm <sup>2</sup> )	Torque value (max)
3.6KW/4.2KW/6.2KW	1 x 2AWG	25	2 Nm

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.

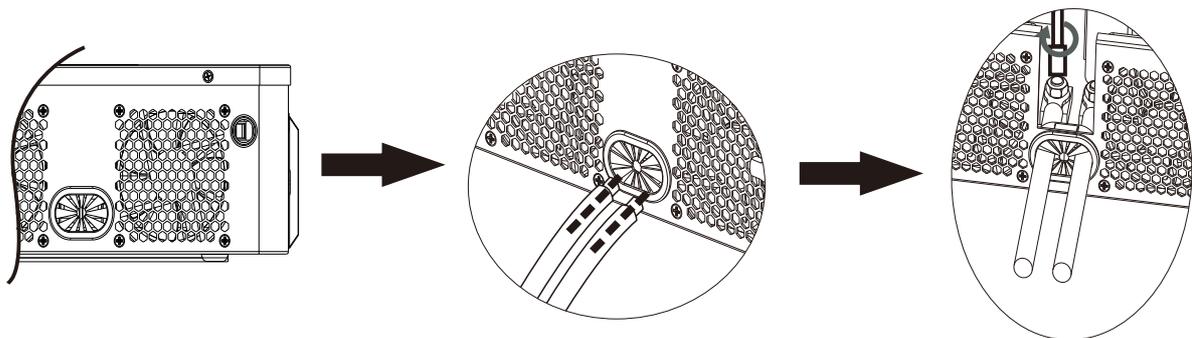


3. Connect all battery packs as below chart.



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



	<b>WARNING: Shock Hazard</b> Installation must be performed with care due to high battery voltage in series.
	<b>CAUTION!!</b> 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

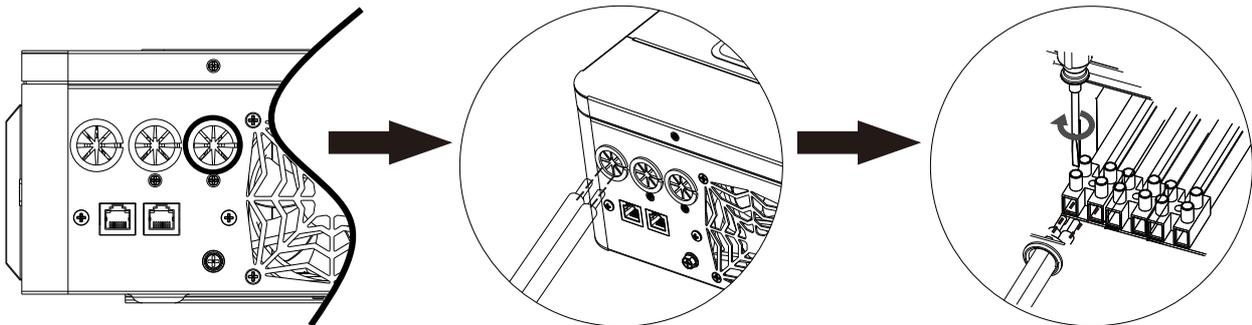
Model	Gauge	Cable (mm <sup>2</sup> )	Torque Value
3.6KW/4.2KW	12 AWG	4	1.2 Nm
6.2KW	10 AWG	6	1.2 Nm

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)**

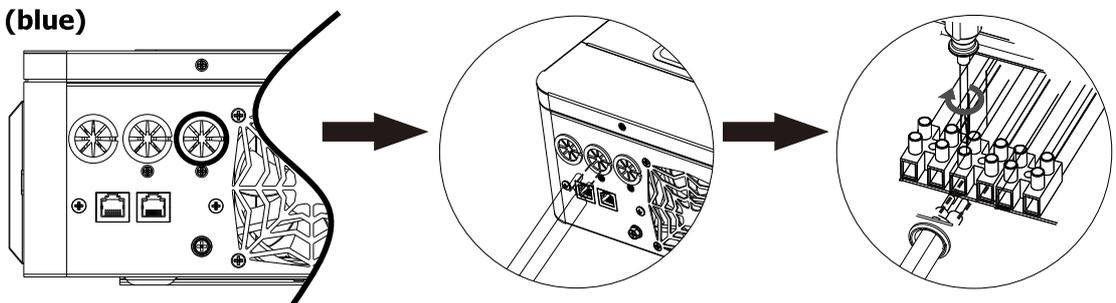


	<p><b>WARNING:</b> Be sure that AC power source is disconnected before attempting to hardwire it to the unit.</p>
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4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.

**L→LINE (brown or black)**

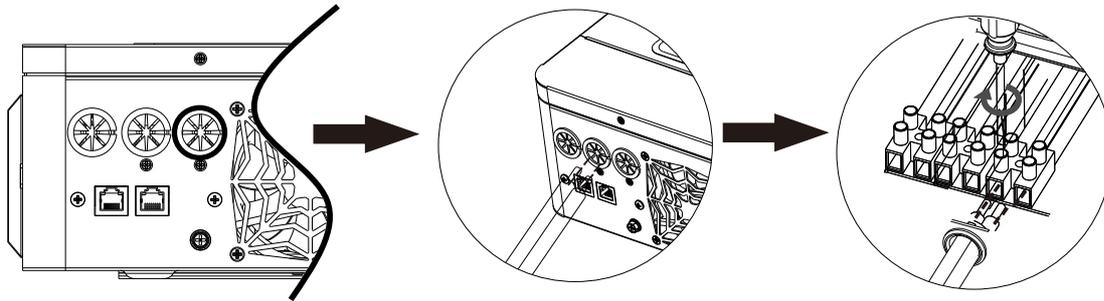
**N→Neutral (blue)**



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 <sup>2</sup> )	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.

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

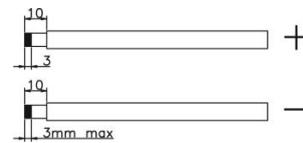
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference)	SOLAR INPUT	Q'ty of panels	Total input power
	(Min in serial: 6 pcs, max. in serial: 13 pcs)		
- 250Wp - Vmp: 30.1Vdc - Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A - Cells: 60	6 pcs in serial	6 pcs	1500W
	8 pcs in serial	8 pcs	2000W
	12 pcs in serial	12 pcs	3000W
	13 pcs in serial	13 pcs	3250W
	8 pieces in serial and 2 sets in parallel	16 pcs	4000W
	10 pieces in serial and 2 sets in parallel	20 pcs	5000W
	10 pieces in serial and 2 sets in parallel	20 pcs	6200W
	12 pieces in serial and 2 sets in parallel	24 pcs	6500W
	10 pieces in serial and 3 sets in parallel	30 pcs	7500W

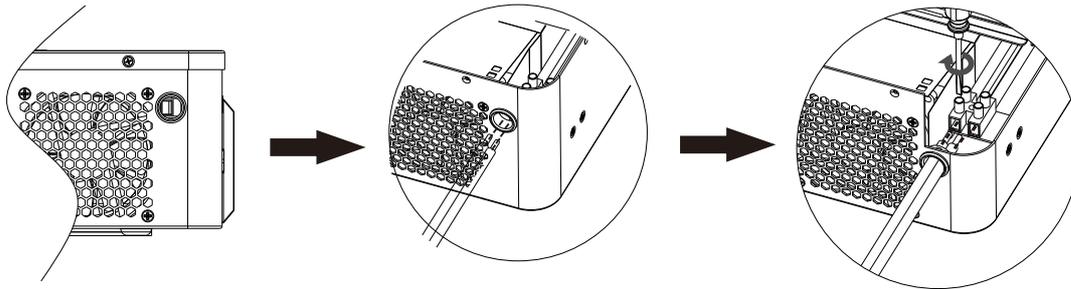
### PV Module Wire Connection

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):

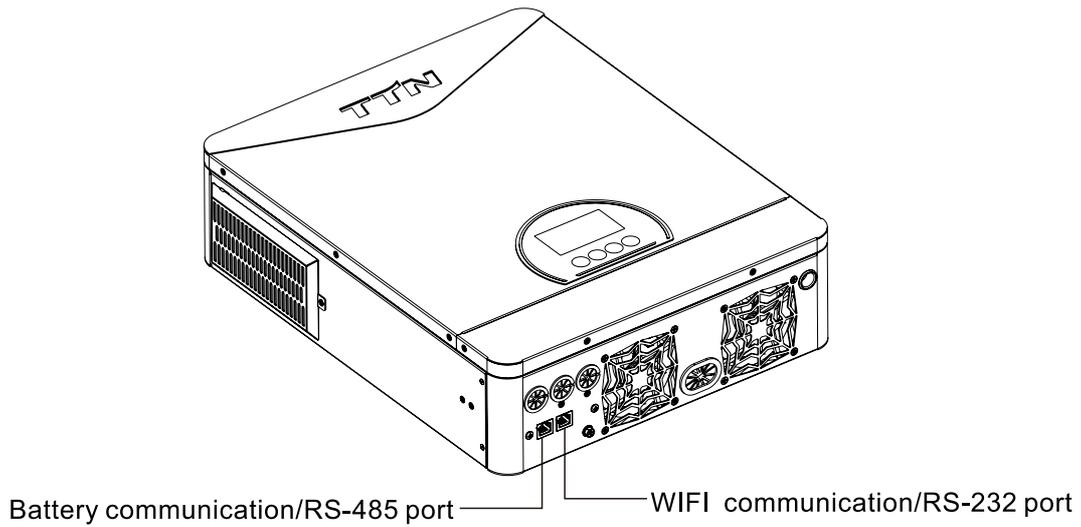
Please use supplied communication cable to connect to inverter and Wi-Fi module. Download APP and installed from APP store, and Refer to "Wi-Fi Plug Quick Installation Guideline" to set up network and registering. The inverter status would be shown by mobile phone APP or webpage of computer.

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

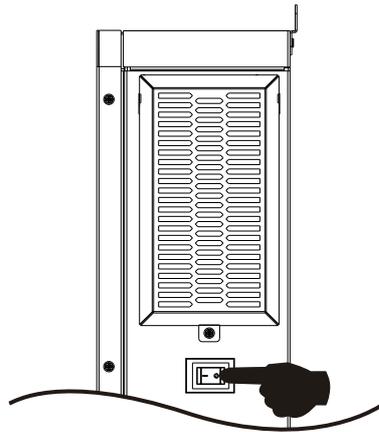
The communication between the battery and the inverter can be realized through the battery communication interface, so that the inverter and the lithium battery can exchange information.



## 5 OPERATION

### 5.1 Power ON/OFF

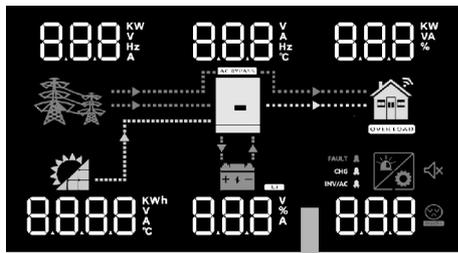
#### Side view of unit



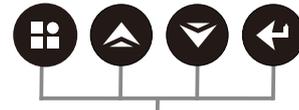
Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

### 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.



LCD display



Function keys

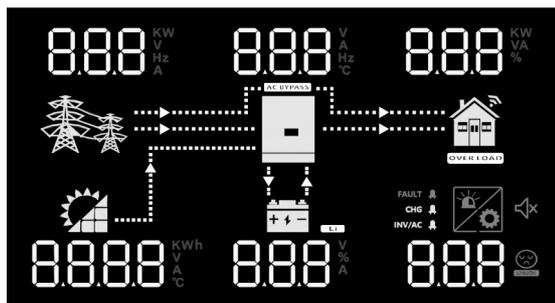
### LED Indicator

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

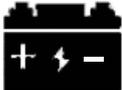
### Function Keys

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
<b>Input Source Information</b>	
	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.

## 5.4 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	
00	Exit setting mode	Escape (default) 00 <u>GOE</u>	One-button restore setting options
		00 <u>GOH</u>	
01	Output source priority: To configure load power source priority	Utility first 01 <u>USb</u>	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 (default) 01 <u>SUb</u>	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, utility will supply power to the loads at the same time. Battery provides power to the loads only when any one condition happens: - Solar energy and utility is not available. - Solar energy is not sufficient and utility is not available.
		SBU priority 01 <u>SbU</u>	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.
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 <u>10<sup>A</sup></u>	20A 02 <u>20<sup>A</sup></u>
		30A 02 <u>30<sup>A</sup></u>	40A 02 <u>40<sup>A</sup></u>
		50A 02 <u>50<sup>A</sup></u>	60A (default) 02 <u>60<sup>A</sup></u>

02		70A 02 70 <sup>A</sup>	80A 02 80 <sup>A</sup>	90A 02 90 <sup>A</sup>
		100A 02 100 <sup>A</sup>	110A 02 110 <sup>A</sup>	120A 02 120 <sup>A</sup>
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.	
		AGM (default) 05 AGM	Flooded 05 FLD	
05	Battery type	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.	
		User-Defined 05 LIB	When the solar energy exists, Set this item to LIB, and the lithium battery will be activated for 3 second.	
		User-Defined 05 LIC	If selected, Lithium battery communication connection for PACE 232 BMS. The lithium battery activation function is automatically enabled. <input type="checkbox"/> LIB function has built in)	
		User-Defined 05 LIP	If selected, Lithium battery communication connection for PACE 485 BMS. The lithium battery activation function is automatically enabled. <input type="checkbox"/> LIB function has built in)	
		User-Defined 05 LIL	If selected, Lithium battery communication connection for PYLON 485 BMS. The lithium battery activation function is automatically enabled. <input type="checkbox"/> LIB function has built in)	
06	Auto restart when overload occurs	Restart disable (default) 06 LFD	Restart enable 06 LFE	
07	Auto restart when over temperature occurs	Restart disable (default) 07 tFd	Restart enable 07 tFE	
09	Output frequency	50Hz (default) 09 50 <sup>Hz</sup>	60Hz 09 60 <sup>Hz</sup>	
10	Output voltage	220V 10 220 <sup>v</sup>	230V (default) 10 230 <sup>v</sup>	
		240V 10 240 <sup>v</sup>		
11	Maximum utility charging current  Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging	2A 11 2A	10A 11 10A	
		20A 11 20A	30A (default) 11 30A	

	current from program 02 for utility charger.	40A 11 40A	50A 11 50A			
		60A 11 60A	70A 11 70A ⊗	80A 11 80A ⊗		
		90A 11 90A	100A 11 100A			
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 3.6KW/4.2KW model:				
		21.0V 12 <sup>BATT</sup> 21.0v	21.5V 12 <sup>BATT</sup> 21.5v	22.0V 12 <sup>BATT</sup> 22.0v		
		22.5V 12 <sup>BATT</sup> 22.5v	23.0V (default) 12 <sup>BATT</sup> 23.0v	23.5V 12 <sup>BATT</sup> 23.5v		
		24.0V 12 <sup>BATT</sup> 24.0v	24.5V 12 <sup>BATT</sup> 24.5v			
		25.0V 12 <sup>BATT</sup> 25.0v	25.5V 12 <sup>BATT</sup> 25.5v			
		Available options in 6.2KW model:				
		42V 12 <sup>BATT</sup> 42v	43V 12 <sup>BATT</sup> 43v	44V 12 <sup>BATT</sup> 44v ⊗		
		45V 12 <sup>BATT</sup> 45v	46V (default) 12 <sup>BATT</sup> 46v	47V 12 <sup>BATT</sup> 47v		
		48V 12 <sup>BATT</sup> 48v	49V 12 <sup>BATT</sup> 49v			
		50V 12 <sup>BATT</sup> 50v	51V 12 <sup>BATT</sup> 51v			
		13	Setting voltage point back	Available options in 3.6KW/4.2KW model:		

to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Battery fully charged	24V
	13 <sup>BATT</sup> FUL	13 <sup>BATT</sup> 24.0 <sub>v</sub>
	24.5V	25V
	13 <sup>BATT</sup> 24.5 <sub>v</sub>	13 <sup>BATT</sup> 25.0 <sub>v</sub>
	25.5V	26V
	13 <sup>BATT</sup> 25.5 <sub>v</sub>	13 <sup>BATT</sup> 26.0 <sub>v</sub>
	26.5V	27V (default)
	13 <sup>BATT</sup> 26.5 <sub>v</sub>	13 <sup>BATT</sup> 27.0 <sub>v</sub>
	27.5V	28V
	13 <sup>BATT</sup> 27.5 <sub>v</sub>	13 <sup>BATT</sup> 28.0 <sub>v</sub>
	28.5V	29V
	13 <sup>BATT</sup> 28.5 <sub>v</sub>	13 <sup>BATT</sup> 29.0 <sub>v</sub>
	Available options in 6.2KW model:	
	Battery fully charged	48V
13 <sup>BATT</sup> FUL	13 <sup>BATT</sup> 48.0 <sub>v</sub>	
49V	50V	
13 <sup>BATT</sup> 49.0 <sub>v</sub>	13 <sup>BATT</sup> 50.0 <sub>v</sub>	
51V	52V	
13 <sup>BATT</sup> 51.0 <sub>v</sub>	13 <sup>BATT</sup> 52.0 <sub>v</sub>	
53V	54V (default)	
13 <sup>BATT</sup> 53.0 <sub>v</sub>	13 <sup>BATT</sup> 54.0 <sub>v</sub>	