



USER MANUAL

**AN-SCI-EVO-10200
HYBRID SOLAR INVERTER**

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.

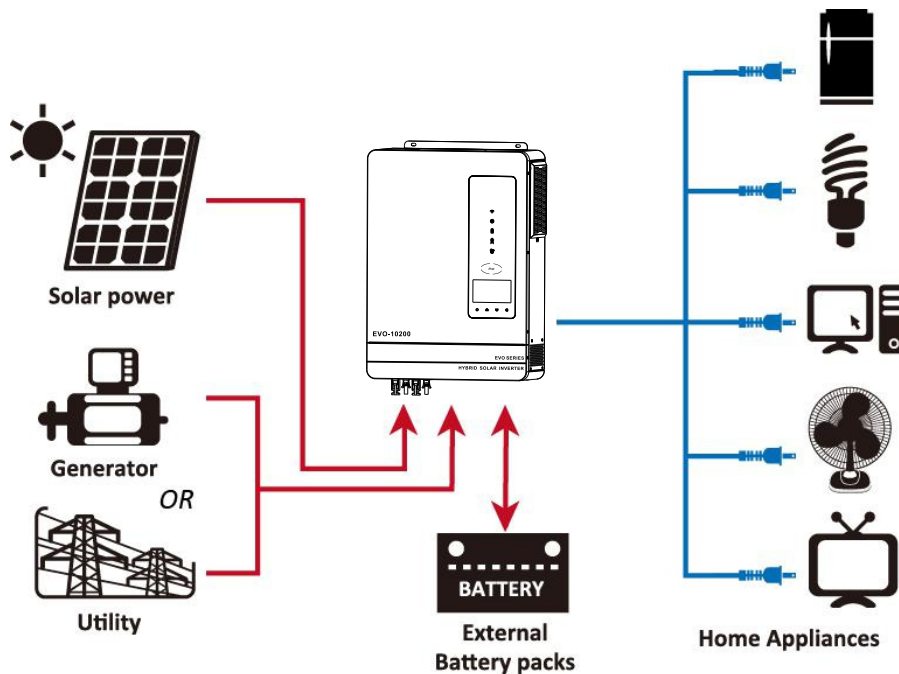
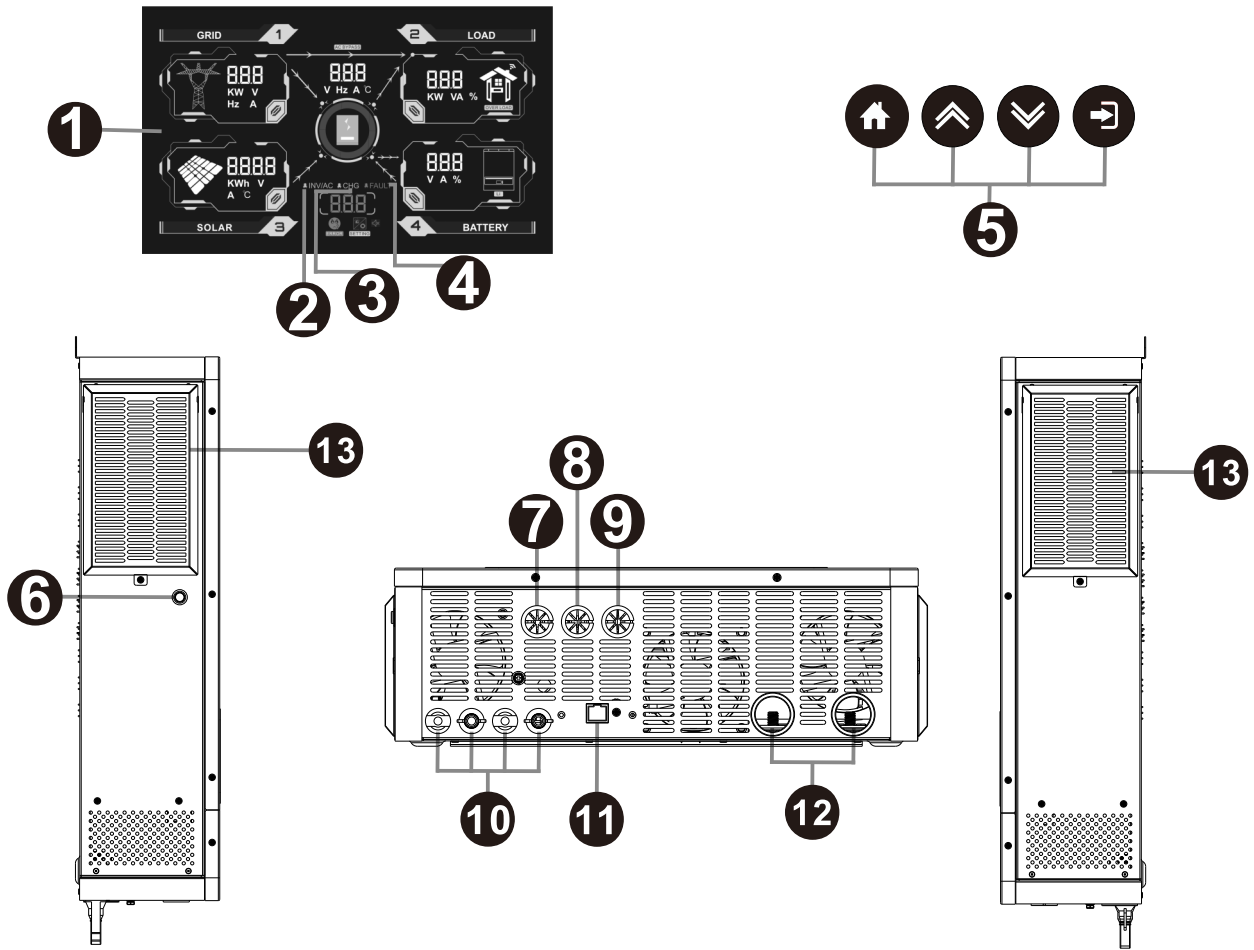


Figure 1 Hybrid Power System

3.3 Product Overview



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Touch Function buttons
6. Power on/off switch
7. AC input
8. Main output
9. Second output
10. PV1 and PV2 input
11. RS-232/WIFI/Remove LCD communication port
12. Battery input
13. Anti dust kit

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
- ☑ DC Fuse x 1
- ☑ Ring terminal x 1
- ☑ Mc4 terminal head x 2

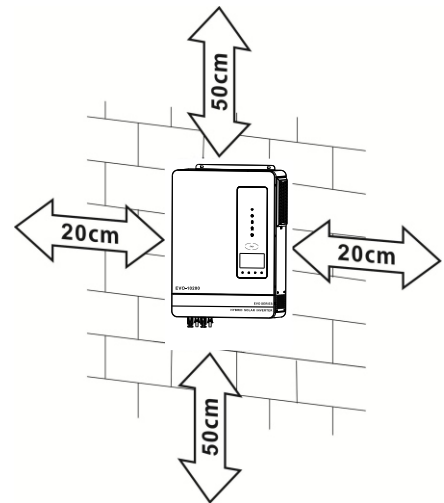
4.2 Preparation

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 M4 or M5 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.

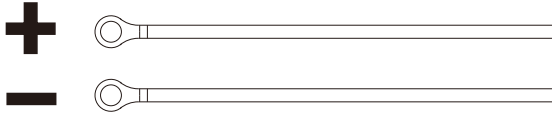
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

Recommended battery cable size:

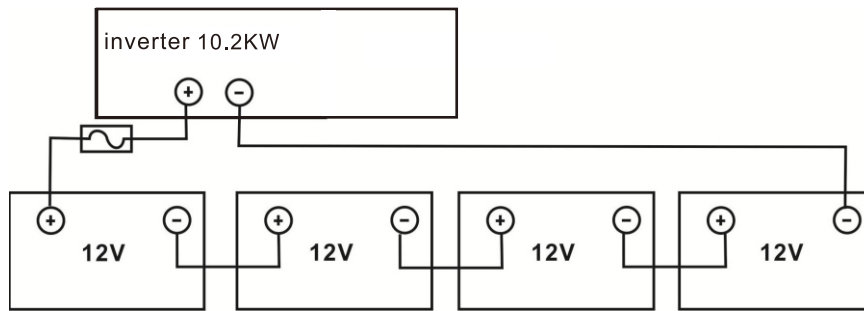
Model	Wire Size	Cable (mm ²)	Torque value (max)
10.2KW	1 x 2AWG	25	2 Nm

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.

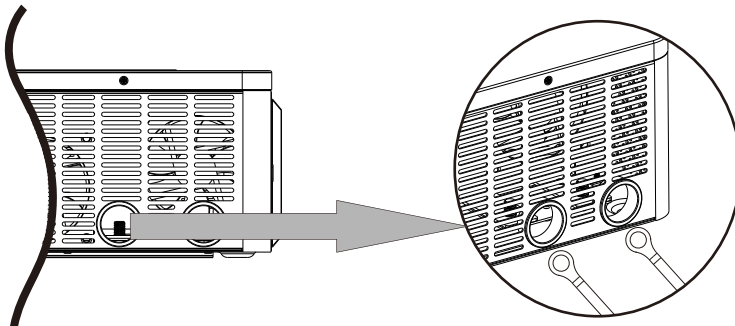




3. Connect all battery packs as below chart.



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 Pozzi 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 63A for 10.2KW.

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.

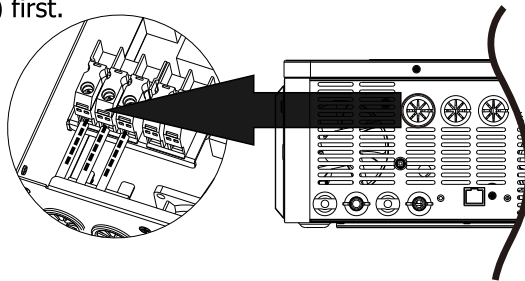
Suggested cable requirement for AC wires

Model	Gauge	Cable (mm ²)	Torque Value
10.2KW	10 AWG	6	1.2 Nm

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

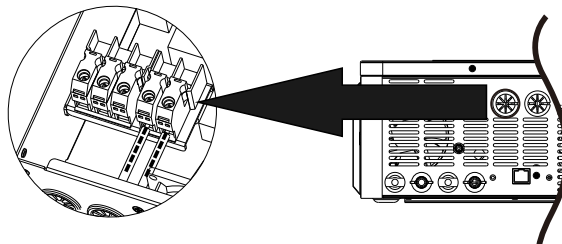
1. Before making AC input/output connection, be sure to open DC protector or disconnecter first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal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

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

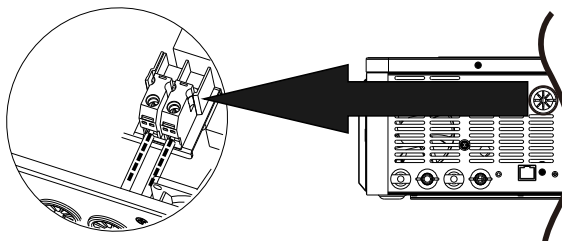


	<p>WARNING: Be sure that AC power source is disconnected before attempting to hardwire it to the unit.</p>
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4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.
L → LINE (brown or black)
N → Neutral (blue)



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. 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)
10.2KW	1 x 10AWG	6	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.

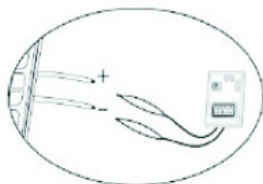
INVERTER MODEL	10.2KW
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	90Vdc~450Vdc

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	12 pieces in serial and 3 sets in parallel		36 pcs	8200W
- Cells: 60	10 pieces in serial and 4 sets in parallel		40 pcs	10200W

PV Module Wire Connection

Step 1: Check the input voltage of PV array modules. The acceptable input voltage of the inverter is 120VDC - 500VDC. Please make sure that the maximum current load of each PV input connector is 10A.



CAUTION: Exceeding the maximum input voltage can destroy the unit!! Check the system before wire connection.

Step 2: Disconnect the DC circuit breaker.

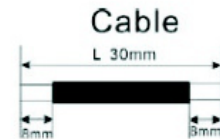
Step 3: Assemble provided PV connectors with PV modules by the following below steps.

Components for PV connectors and Tools:

Female connector housing		Male terminal	
Female terminal		Crimping tool and spanner	
Male connector housing			

Cable preparation and connector assembly process:

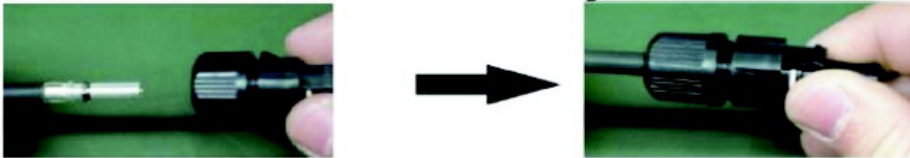
Strip one cable 8 mm on both end sides and be careful NOT to nick conductors.



Insert striped cable into female terminal and crimp female terminal as shown below charts.



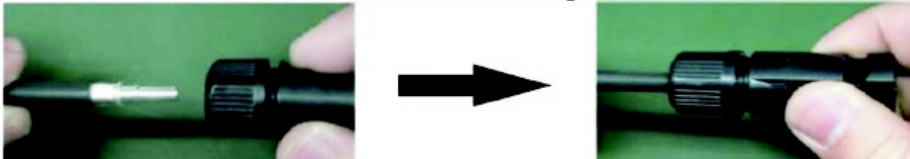
Insert assembled cable into female connector housing as shown below charts.



Insert striped cable into male terminal and crimp male terminal as shown below charts.

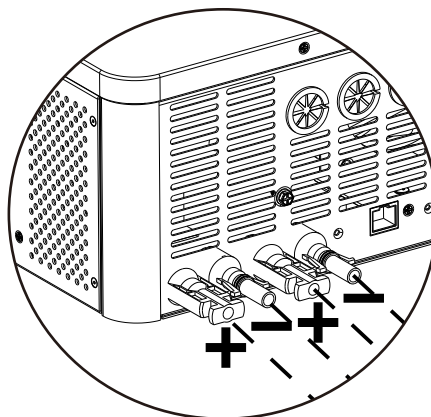


Insert assembled cable into male connector housing as shown below charts.



Then, use spanner to screw pressure dome tightly to female connector and male connector as shown below.

Step 4: 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.



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.

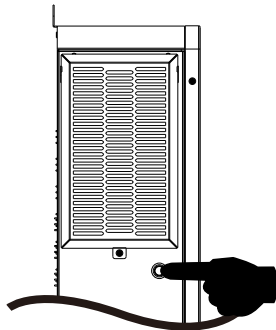
RGB Light (option)

- ① **Battery Mode:red Light**
- ② **Utility Mode:blue Light**
- ③ **PV Mode:purple Light**

5 OPERATION

5.1 Power ON/OFF

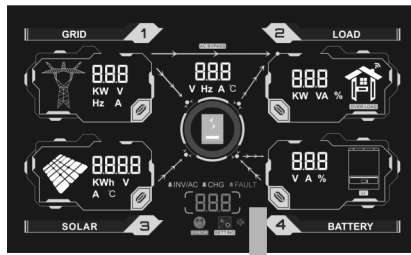
Side view of unit



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.



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.






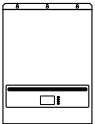







Function Keys

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 10.2KW 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.
		MKS priority 01 <u>nTs</u>	Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, utility energy will supply power to the loads at the same time. The battery only supplies energy to the load as a backup power.
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^A</u>	20A 02 <u>20^A</u>
		30A 02 <u>30^A</u>	40A 02 <u>40^A</u>

02	50A	02	50 ^A	60A	02	60 ^A	70A	02	70 ^A	
	80A	02	80 ^A	90A	02	90 ^A	100A (default)	02	100 ^A	
	110A	02	110 ^A	120A	02	120 ^A	130A	02	130 ^A	
	140A	02	140 ^A	150A	02	150 ^A	160A	02	160 ^A	
03	AC input voltage range	Appliances (default)	03	APL	If selected, acceptable AC input voltage range will be within 90-280VAC.					
		UPS	03	UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.					
05	Battery type	AGM (default)	05	AGM	Flooded					
		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.					
06	Auto restart when overload occurs	Restart disable (default)	06	LTD	Restart enable					
07	Auto restart when over temperature occurs	Restart disable (default)	07	ETD	Restart enable					
09	Output frequency	50Hz (default)	09	50 ^{Hz}	60Hz					
10	Output voltage	220V	10	220 ^v	230V (default)					
		240V	10	240 ^v						
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	11	30A	40A	11	40A	50A	11	50A

	current from program 02 for utility charger.	60A 11 60A ⊙	70A 11 70A	80A (default) 11 80A ⊙	
		90A 11 90A	100A 11 100A	110A 11 110A	120A 11 120A
		130A 11 130A	140A 11 140A		
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 10.2KW model:			
		42V 12 BATT 42v	43V 12 BATT 43v	44V 12 BATT 44v	
		45V 12 BATT 45v	46V (default) 12 BATT 46v	47V 12 BATT 47v	
		48V 12 BATT 48v	49V 12 BATT 49v		
		50V 12 BATT 50v	51V 12 BATT 51v		
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Available options in 10.2KW model:			
		Battery fully charged 13 BATT FUL	48V 13 BATT 48.0v		
		49V 13 BATT 49.0v	50V 13 BATT 50.0v		
		51V 13 BATT 51.0v	52V 13 BATT 52.0v		
		53V 13 BATT 53.0v	54V (default) 13 BATT 54.0v		