



User Manual

Axpert VM 1.2KW-3.2KW MPPT SOLAR INVERTER'S

Table Of Contents

ABOUT THIS MANUAL	1
Purpose.....	1
Scope.....	1
SAFETY INSTRUCTIONS.....	1
INTRODUCTION	2
Features	2
Basic System Architecture	2
Product Overview.....	3
INSTALLATION	4
Unpacking and Inspection.....	4
Preparation	4
Mounting the Unit.....	4
Battery Connection	5
AC Input/Output Connection	7
PV Connection	8
Final Assembly.....	9
Communication Connection.....	9
OPERATION.....	10
Power ON/OFF	10
Operation and Display Panel	10
LCD Display Icons	11
LCD Setting.....	13
Display Setting	21
Operating Mode Description	24
Battery Equalization Description.....	26
Fault Reference Code.....	28
Warning Indicator	28
SPECIFICATIONS	29
Table 1 Line Mode Specifications	29
Table 2 Inverter Mode Specifications	30
Table 3 Charge Mode Specifications	31
Table 4 General Specifications	31
TROUBLE SHOOTING	32
Appendix: Approximate Back-up Time Table	33

ABOUT THIS MANUAL

Purpose

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

Scope

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

SAFETY INSTRUCTIONS



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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this solar inverter, 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 solar inverter 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 solar inverter back to local dealer or service center for maintenance.

INTRODUCTION

This is a multi-function MPPT SOLAR INVERTER, combining functions of inverter, solar charger and battery charger to. Its comprehensive and Most Advance LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave MPPT SOLAR 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

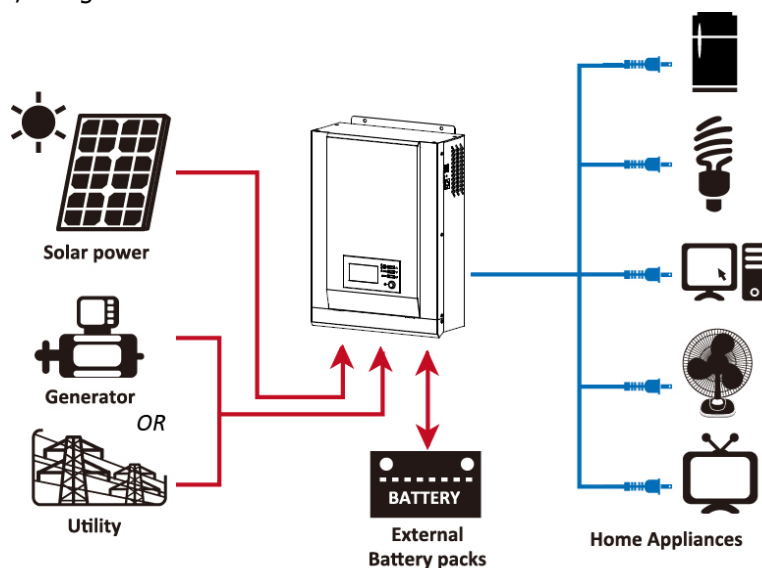
Basic System Architecture

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

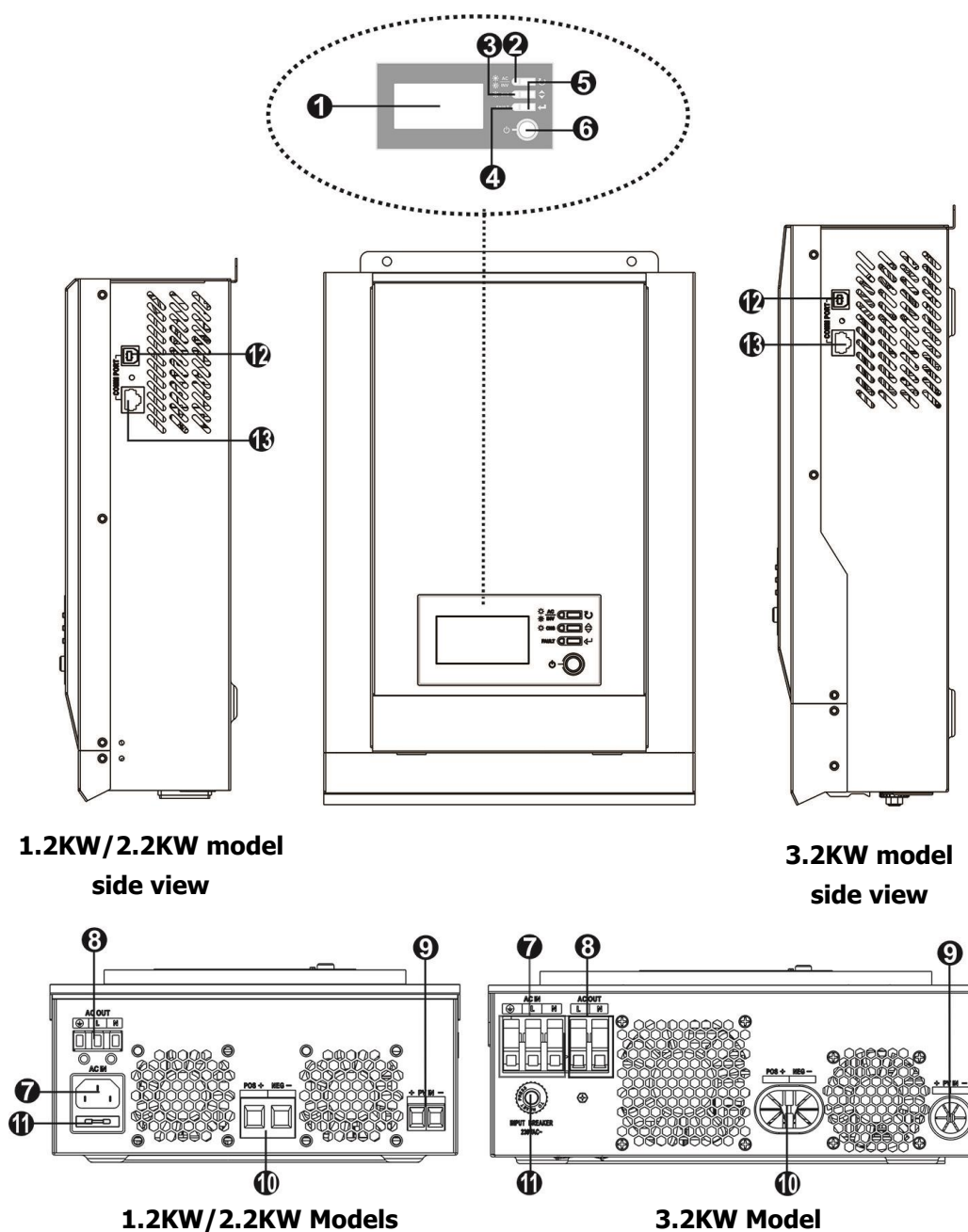
- Generator or Utility.
- PV modules

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.



Product Overview



**1.2KW/2.2KW model
side view**

**3.2KW model
side view**

1.2KW/2.2KW Models

3.2KW Model

1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. Fuse or Circuit breaker
12. USB communication port
13. RS-232 communication port

INSTALLATION

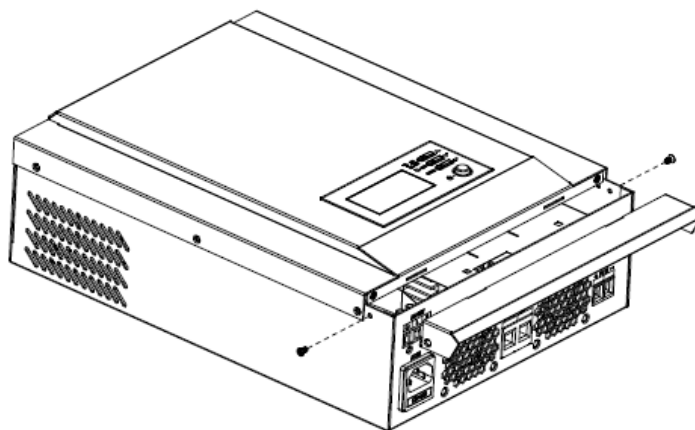
Unpacking and Inspection

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

- The unit x 1
- User manual x 1
- Communication cable x 2
- Software CD x 1
- Battery cable x 1 (only for 1.2KW/2.2KW models)

Preparation

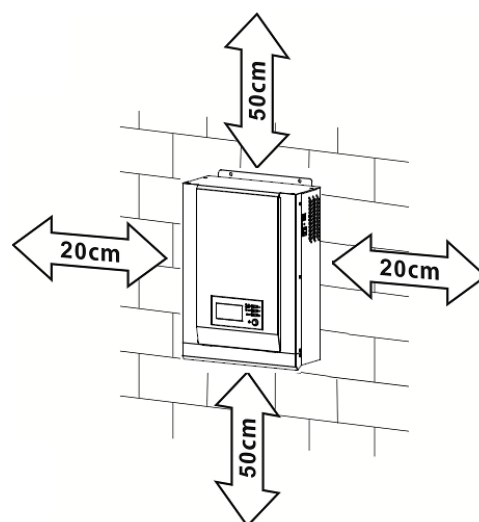
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

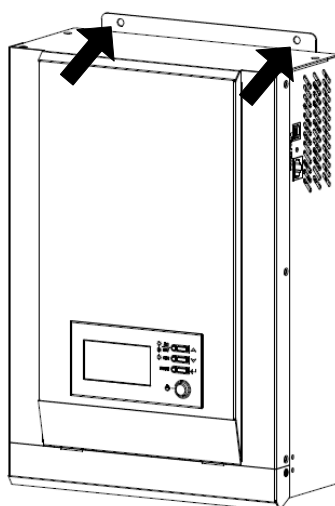
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- 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.



Battery Connection

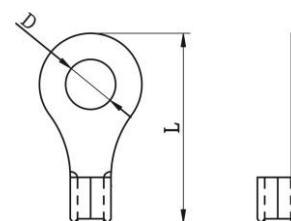
CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection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

Ring terminal for 3.2KW:

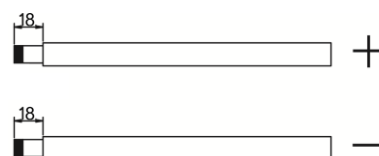


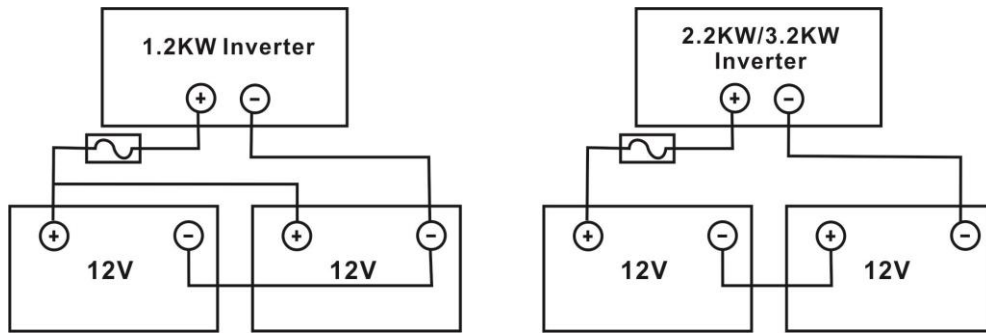
Model	Typical Amperage	Wire Size	Terminal			Torque Value
			Cable mm ²	Dimensions		
				D (mm)	L (mm)	
1.2KW	114A	1 x 4AWG	25	/	/	2~ 3 Nm
2.2KW	104A					
3.2KW	148A	1 x 2AWG	38	6.4	39.2	5Nm

Battery connection for 1.2KW/2.2KW:

Please follow below steps to implement battery connection:

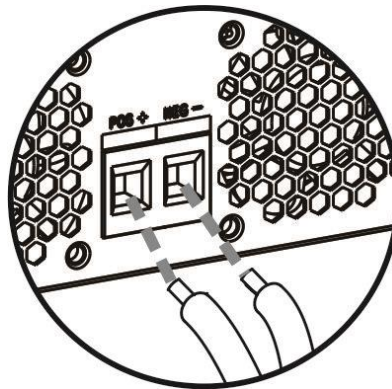
1. Remove insulation sleeve 18 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.
3. 1.2KW model supports 12VDC system and 2.2KW/3.2KW model supports 24VDC system. Connect all battery packs as below chart. It's suggested to connect at least 100Ah capacity battery.





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.

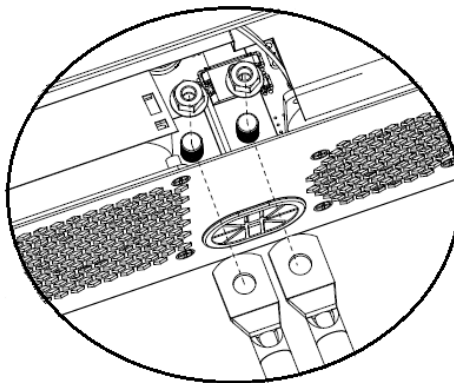
Recommended tool: #2 Pozi Screwdriver



Battery connection for 3.2KVA:

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect battery packs with 24VDC system. It's suggested to connect at least 100Ah capacity battery.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 5 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



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 (-).

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 10A for 1.2KW, 20A for 2.2KW and 32A for 3.2KW.

CAUTION!! There are two terminal blocks with "AC IN" and "AC 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
1.2KW	16 AWG	1.5	0.6 Nm
2.2KW	14 AWG	2.5	0.6 Nm
3.2KW	12 AWG	4	1.2 Nm

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

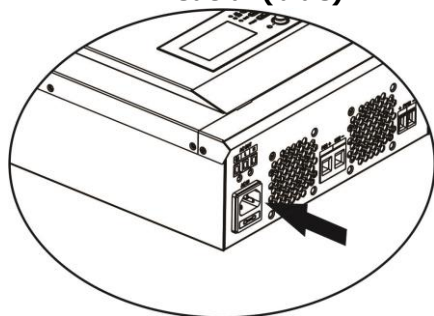
1. Before making AC input/output connection, be sure to open DC protector or disconnecter first.
2. Remove insulation sleeve 10mm for 5 conductors for 3.2K model and 7mm for 3 conductors for 1.2KW/2.2KW models.
3. For 1.2KW/2.2KW models, simply connect AC utility to AC input of the inverter with a plug.
For 3.2KW models, insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.



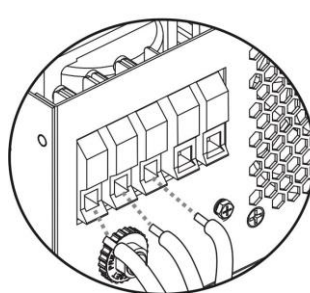
→ **Ground (yellow-green)**

L → **LINE (brown or black)**

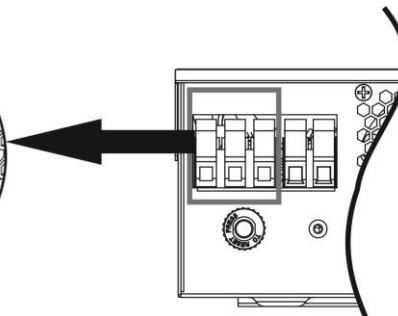
N → **Neutral (blue)**



1.2KW/2.2KW models



3.2KW model



WARNING:

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

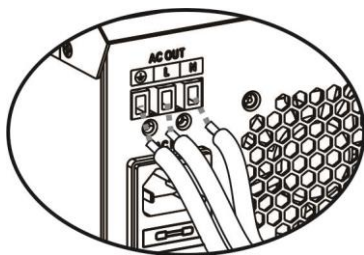
4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⊕) first.



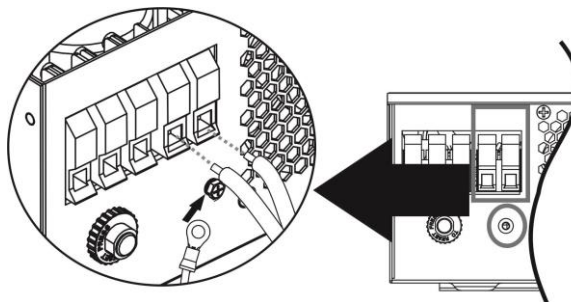
→ **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



1.2KW/2.2KW model



3.2KKW model

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.

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.

Wire Size	Cable (mm ²)	Torque value (max)
1 x 8AWG	10	1.6 Nm

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	1.2KW	2.2KW	3.2KW
Max. PV Array Open Circuit Voltage	102Vdc		
PV Array MPPT Voltage Range	15Vdc~80Vdc	30~80Vdc	

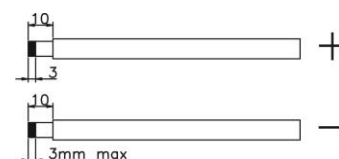
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations listed as below table.

Maximum Power (Pmax)	250W	For 1.2KW: 2 sets in parallel For 2.2KW: 2 pieces in serial and 2 sets in parallel For 3.2KW: 2 pieces in serial and 3 sets in parallel
Max. Power Voltage Vmpp(V)	30.1V	
Max. Power Current Impp(A)	8.3A	
Open Circuit Voltage Voc(V)	37.7V	
Short Circuit Current Isc(A)	8.4A	

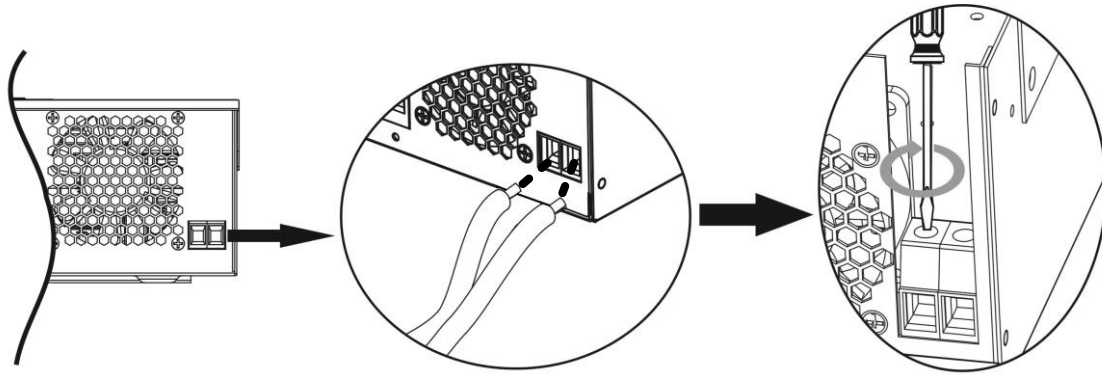
PV Module Wire Connection

Please follow below steps to implement PV module connection:

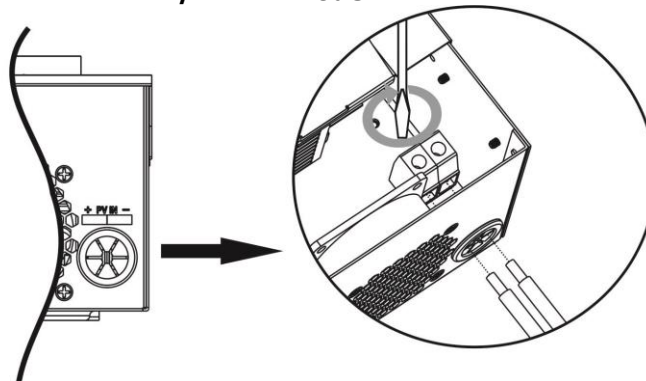
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.
3. Check correct polarity of wire connection from PV modules and PV input connectors. Then, connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector. Screw two wires tightly in clockwise direction.



Recommended tool: 4mm blade screwdriver



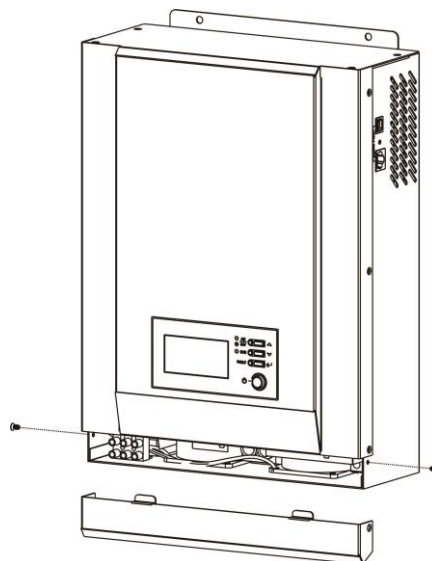
1.2KW/2.2KW model



3.2KW model

Final Assembly

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

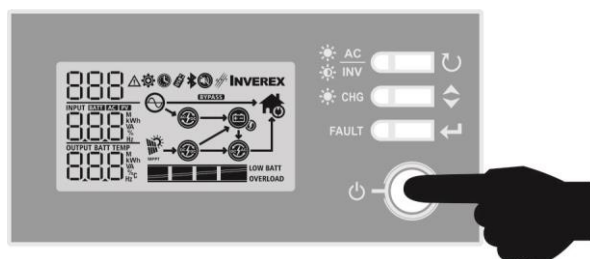


Communication Connection

Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

OPERATION

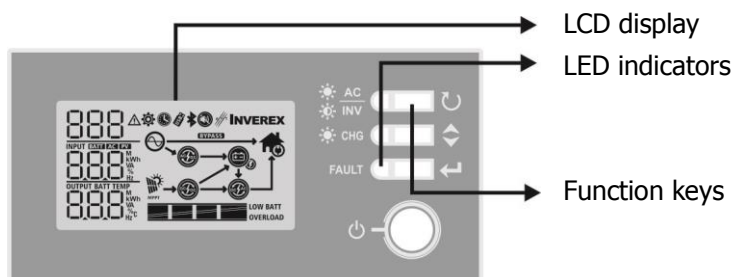
Power ON/OFF



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

Operation and Display Panel

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



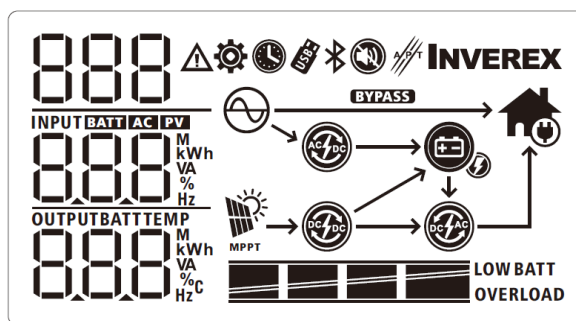
LED Indicator


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

Function Keys









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

LCD Display Icons









Icon	Function description	
Input Source Information		
AC	Indicates the AC input.	
PV	Indicates the PV input	
INPUT BATT AC PV 888 M kWh 888 VA 888 % 888 Hz	Indicate input voltage, input frequency, PV voltage, charger current, charger power, battery voltage.	
Configuration Program and Fault Information		
888 ⚙️	Indicates the setting programs.	
888 ⚠️	Indicates the warning and fault codes. Warning: 888 ⚠️ flashing with warning code. Fault: 888 ⚠️ lighting with fault code	
Output Information		
OUTPUT BATT TEMP 888 M kWh 888 VA 888 % 888 Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.	
Battery Information		
 BATT	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.	
In AC mode, it will present battery charging status.		
Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.






In battery mode, it will present battery capacity.

Load Percentage	Battery Voltage	LCD Display
Load > 50%	< 1.85V/cell	 LOW BATT
	1.85V/cell ~ 1.933V/cell	 BATT
	1.933V/cell ~ 2.017V/cell	 BATT
	> 2.017V/cell	 BATT
Load < 50%	< 1.892V/cell	 LOW BATT
	1.892V/cell ~ 1.975V/cell	 BATT
	1.975V/cell ~ 2.058V/cell	 BATT
	> 2.058V/cell	 BATT

Load Information

OVERLOAD	Indicates overload.	
  OVERLOAD	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.	
	0%~24%	25%~49%
	 LOAD	 LOAD
	50%~74%	75%~100%
	 LOAD	 LOAD

Mode Operation Information

	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
BYPASS	Indicates load is supplied by utility power.
	Indicates the utility charger circuit is working.
	Indicates the solar charger circuit is working.
	Indicates the DC/AC inverter circuit is working.

Mute Operation

	Indicates unit alarm is disabled.
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LCD Setting

After pressing and holding “←” button for 3 seconds, the unit will enter setting mode. Press “◆” button to select setting programs. And then, press “←” button to confirm the selection or “↺” button to exit.

Setting Programs:












Program	Description	Selectable option	
00	Exit setting mode	Escape 00 ⚙️ ESC	
01	Output source priority: To configure load power source priority	Utility first (default) 01 ⚙️ UTI	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 01 ⚙️ SOL	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to low-level warning voltage or the setting point in program 12.
		SBU priority 01 ⚙️ SBU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.

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 ⚙ 10R	20A 02 ⚙ 20R
		30A 02 ⚙ 30R	40A (default for 1.2KW/2.2KW) 02 ⚙ 40R
		50A (default for 3.2KW) 02 ⚙ 50R	60A 02 ⚙ 60R
		70A (only available for 3.2KW model) 02 ⚙ 70R	
03	AC input voltage range	Appliances (default) 03 ⚙ RPL	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 ⚙ RGN	Flooded 05 ⚙ FLD
		User-Defined 05 ⚙ USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
06	Auto restart when overload occurs	Restart disable (default) 06 ⚙ LTD	Restart enable 06 ⚙ LTE





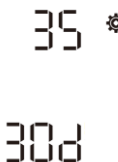


07	Auto restart when over temperature occurs	Restart disable (default) 07  67d	Restart enable 07  67E
09	Output frequency	50Hz (default) 09  50 _{Hz}	60Hz 09  60 _{Hz}
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	Available options in 1.2KW/2.2KW model:	
		10A 11  10A	20A (default) 11  20A
		Available options in 3.2KW model:	
		15A 11  15A	25A (default) 11  25A
12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 1.2KW model:	
		11.0V 12  11.0 _V TBATT	11.3V 12  11.3 _V TBATT
		11.5V (default) 12  11.5 _V TBATT	11.8V 12  11.8 _V TBATT
		12.0V 12  12.0 _V TBATT	12.3V 12  12.3 _V TBATT
		12.5V 12  12.5 _V TBATT	12.8V 12  12.8 _V TBATT

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	Available options in 2.2KW/3.2KW model:	
		22.0V 12 ⚙ TBATT 22.0 _v	22.5V 12 ⚙ TBATT 22.5 _v
		23.0V (default) 12 ⚙ TBATT 23.0 _v	23.5V 12 ⚙ TBATT 23.5 _v
		24.0V 12 ⚙ TBATT 24.0 _v	24.5V 12 ⚙ TBATT 24.5 _v
		25.0V 12 ⚙ TBATT 25.0 _v	25.5V 12 ⚙ TBATT 25.5 _v
13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	Available options in 1.2KW model:	
		Battery fully charged 13 ⚙ BATT FUL	12.0V 13 ⚙ BATT 12.0 _v
		12.3V 13 ⚙ BATT 12.3 _v	12.5V 13 ⚙ BATT 12.5 _v
		12.8V 13 ⚙ BATT 12.8 _v	13.0V 13 ⚙ BATT 13.0 _v
		13.3V 13 ⚙ BATT 13.3 _v	13.5V (default) 13 ⚙ BATT 13.5 _v
		13.8V 13 ⚙ BATT 13.8 _v	14.0V 13 ⚙ BATT 14.0 _v


13	Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01.	14.3V 13 ⚙ BATT 14.3V	14.5V 13 ⚙ BATT 14.5V
		Available options in 2.2KW/3.2KW model:	
		Battery fully charged 13 ⚙ BATT FUL	24V 13 ⚙ BATT 24.0V
		24.5V 13 ⚙ BATT 24.5V	25V 13 ⚙ BATT 25.0V
		25.5V 13 ⚙ BATT 25.5V	26V 13 ⚙ BATT 26.0V
		26.5V 13 ⚙ BATT 26.5V	27V (default) 13 ⚙ BATT 27.0V
		27.5V 13 ⚙ BATT 27.5V	28V 13 ⚙ BATT 28.0V
		28.5V 13 ⚙ BATT 28.5V	29V 13 ⚙ BATT 29.0V
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 16 ⚙ C50	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.

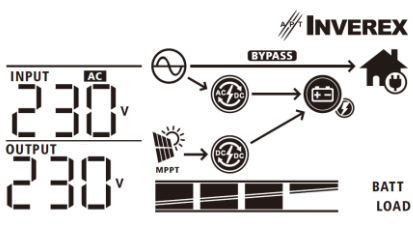
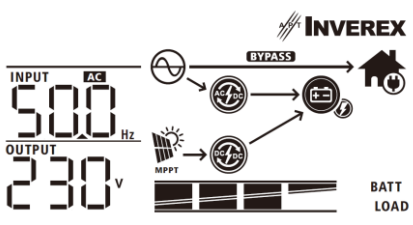
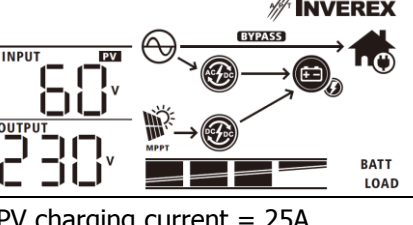
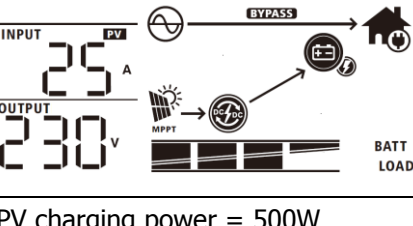
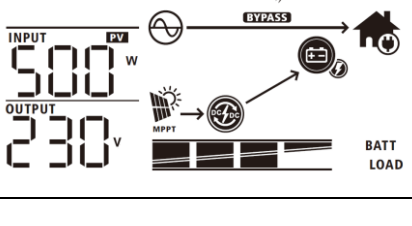
16	Charger source priority: To configure charger source priority	Utility first 16  CUL	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.
		Solar and Utility (default) 16  SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16  OSO	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Alarm control	Alarm on (default) 18  6ON	Alarm off 18  6OF
19	Auto return to default display screen	Return to default display screen (default) 19  ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19  1EP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20  LON	Backlight off 20  LOF
22	Beeps while primary source is interrupted	Alarm on (default) 22  RON	Alarm off 22  ROF

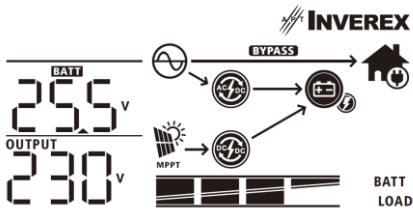
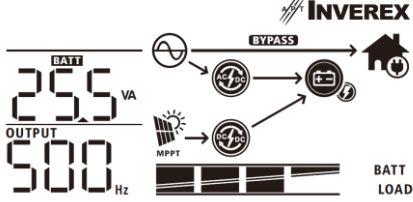
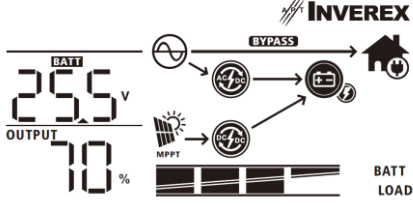
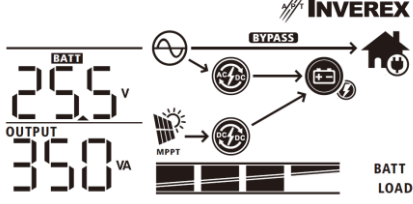
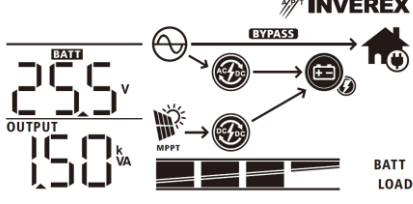
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 23 ⚙ b9d	Bypass enable 23 ⚙ b9E
25	Record Fault code	Record enable (default) 25 ⚙ FEN	Record disable 25 ⚙ FdS
26	Bulk charging voltage (C.V voltage)	1.2KW default setting: 14.1V 26 ⚙ Cv 14.1 ^v	2.2KW/3.2KW default setting: 28.2V 26 ⚙ Cv 28.2 ^v
		If self-defined is selected in program 5, this program can be set up. Setting range is from 12.5V to 15.0V for 1.2KW model, 25.0V to 30.0V for 2.2KW model and 25.0V to 31.5V for 3.2KW model. Increment of each click is 0.1V.	
27	Floating charging voltage	1.2KW default setting: 13.5V 27 ⚙ FLV 13.5 ^v	2.2KW/3.2KW default setting: 27.0V 27 ⚙ FLV 27.0 ^v
		If self-defined is selected in program 5, this program can be set up. Setting range is from 12.5V to 15.0V for 1.2KW model, 25.0V to 30.0V for 2.2KW model and 25.0V to 31.5V for 3.2KW model. Increment of each click is 0.1V.	
29	Low DC cut-off voltage	1.2KW default setting: 10.5V 29 ⚙ C0V 10.5 ^v	2.2KW/3.2KW default setting: 21.0V 29 ⚙ C0V 21.0 ^v
		If self-defined is selected in program 5, this program can be set up. Setting range is from 10.5V to 12.0V for 1.2KW model, 21.0V to 24.0V for 2.2KW/3.2KW model. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.	
30	Battery equalization	Enable 30 ⚙ EEN	Disable (default) 30 ⚙ EdS
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

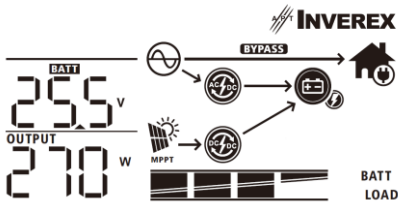
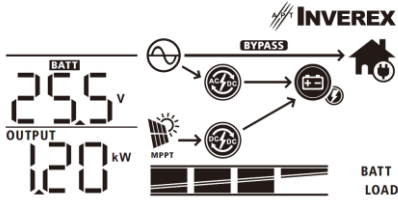
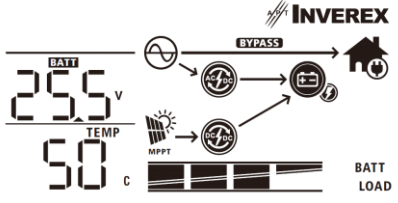
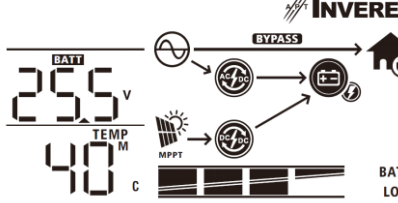
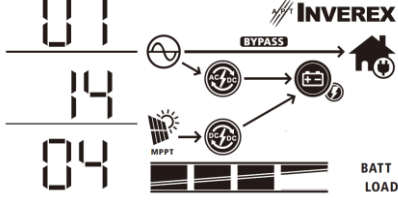
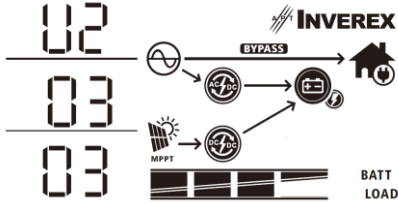
31	Battery equalization voltage	1.2KW default setting: 14.6V 	2.2KW/3.2KW default setting: 29.2V 
		Setting range is from 12.5V to 15.0V for 1.2KW model, 25.0V to 30.0V for 2.2KW model and 25.0V to 31.5V for 3.2KW model. Increment of each click is 0.1V.	
33	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 	Disable (default) 
		If equalization function is enabled in program 30, 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 35 setting. At this time, "E9" will not be shown in LCD main page.	

Display Setting

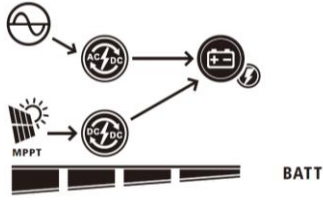
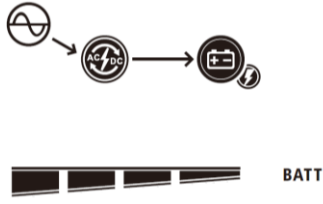
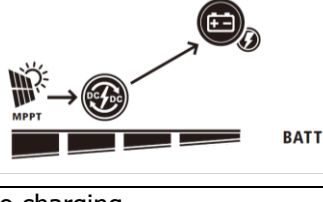

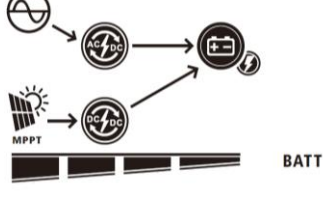
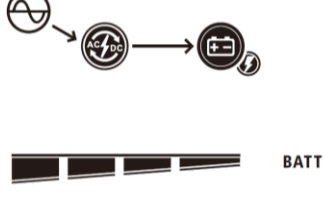
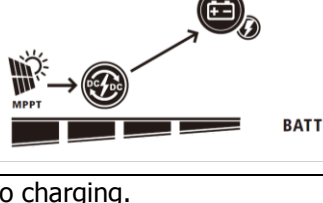
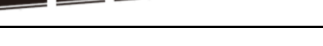
The LCD display information will be switched in turns by pressing “” button. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.

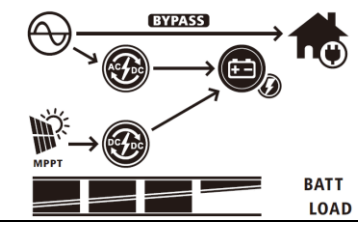
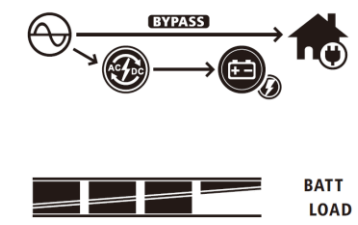
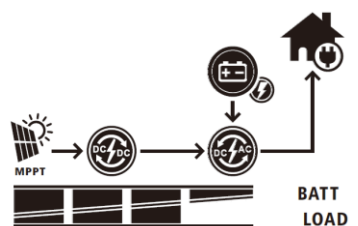

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V 
Input frequency	Input frequency=50Hz 
PV voltage	PV voltage=60V 
PV charging current	PV charging current = 25A 
PV charging power	PV charging power = 500W 

Battery voltage and output voltage	<p>Battery voltage=25.5V, output voltage=230V</p> 
Output frequency	<p>Output frequency=50Hz</p> 
Load percentage	<p>Load percent=70%</p> 
Load in VA	<p>When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.</p>  <p>When load is larger than 1kVA ($\geq 1\text{kVA}$), load in VA will present x.xkVA like below chart.</p> 

<p>Load in Watt</p>	<p>When load is lower than 1kW, load in W will present xxxW like below chart.</p>  <p>When load is larger than 1kW ($\geq 1\text{kW}$), load in W will present x.xkW like below chart.</p> 
<p>Battery voltage/Inverter temperature and Solar charger controller temperature inside (Inverter temperature and SCC temperature is displayed in turns)</p>	<p>Battery voltage=25.5V, Inverter temperature =50°C</p>  <p>Battery voltage=25.5V, SCC temperature =40°C</p> 
<p>Main CPU version checking.</p>	<p>Main CPU version 00014.04.</p> 
<p>Secondary CPU version checking.</p>	<p>Secondary CPU version 00003.03.</p> 

Operating Mode Description

Operation mode	Description	LCD display
<p>Standby mode / Power saving mode</p> <p>Note:</p> <p>*Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.</p> <p>*Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.</p>	<p>No output is supplied by the unit but it still can charge batteries.</p>	<p>Charging by utility and PV energy.</p> 
		<p>Charging by utility.</p> 
		<p>Charging by PV energy.</p> 
		<p>No charging.</p> 
<p>Fault mode</p> <p>Note:</p> <p>*Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.</p>	<p>PV energy and utility can charge batteries.</p>	<p>Charging by utility and PV energy.</p> 
		<p>Charging by utility.</p> 
		<p>Charging by PV energy.</p> 
		<p>No charging.</p> 

Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	<p>Charging by utility and PV energy.</p>  <p>Charging by utility.</p> 
Battery Mode	The unit will provide output power from battery and PV power.	<p>Power from battery and PV energy.</p>  <p>Power from battery only.</p> 

Battery Equalization Description

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.

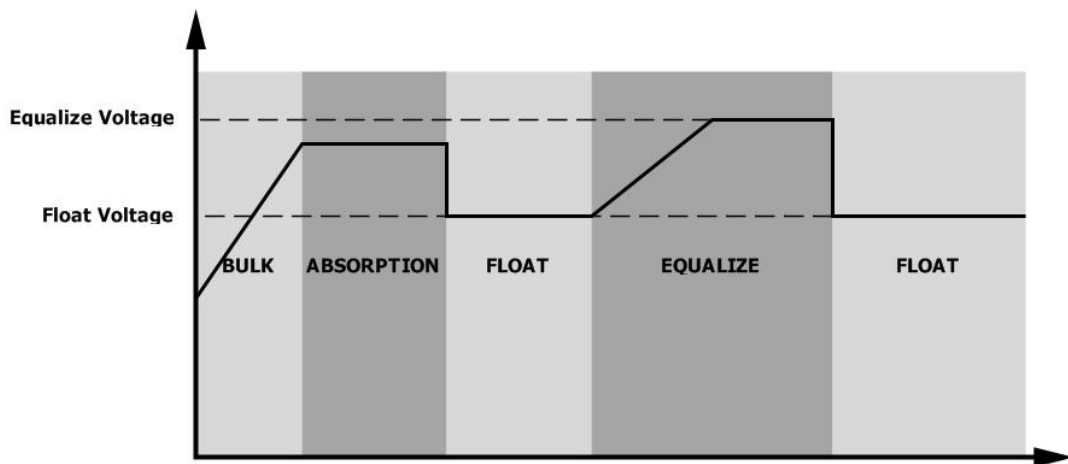
- **How to Apply Equalization Function**

You must enable battery equalization function in monitoring LCD setting program 30 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 35.
2. Active equalization immediately in program 36.

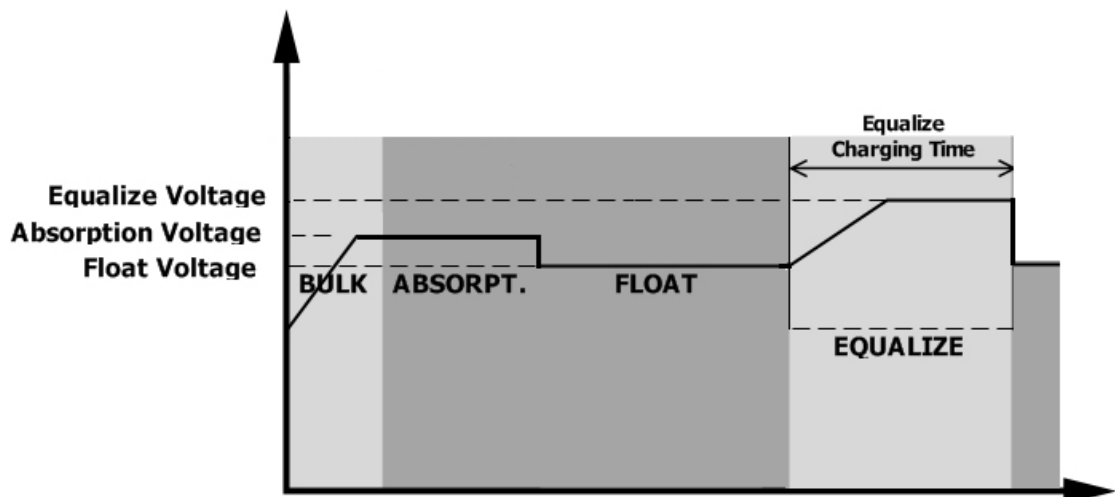
- **When to Equalize**

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.

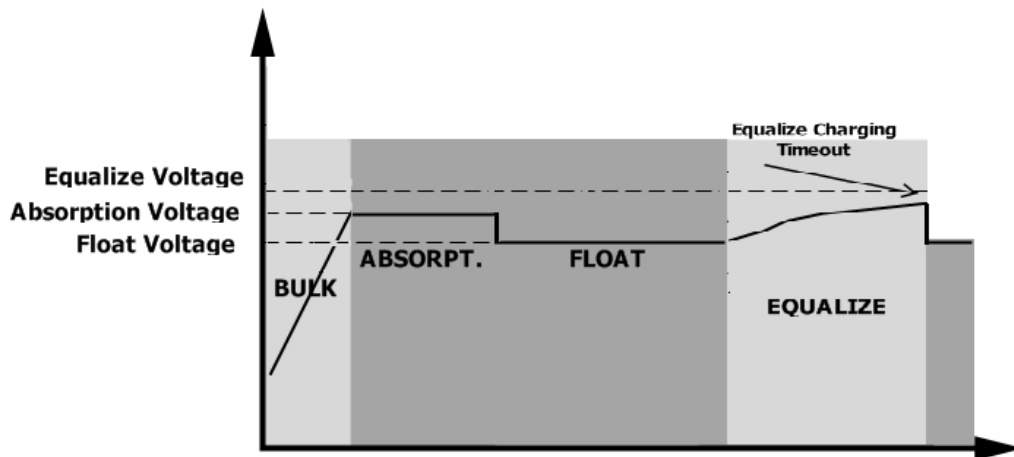


- **Equalize charging time and timeout**

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.



Fault Reference Code

Fault Code	Fault Event	Icon on
02	Over temperature	F02
03	Battery voltage is too high	F03
04	Battery voltage is too low	F04
05	Output short circuited or over temperature is detected by internal converter components.	F05
06	Output voltage is abnormal.	F06
07	Overload time out	F07
08	Bus voltage is too high	F08
09	Bus soft start failed	F09
12	NTC temperature sensor on the heatsink is failed	F 12

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
03	Battery is over-charged	Beep once every second	03 [△]
04	Low battery	Beep once every second	04 [△]
07	Overload	Beep once every 0.5 second	07 [△] 
10	Output power derating	Beep twice every 3 seconds	10 [△]
E9	Battery equalization	None	E9 [△]
20	Communication error between MPPT SCC board and main board	None	20 [△]
21	MPPT solar charger board cannot match with main board even communication is normal	None	21 [△]

SPECIFICATIONS

Table 1 Line Mode Specifications

SOLAR INVERTER MODEL	1.2KW	2.2KW	3.2KW
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	Circuit Breaker		
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 170V, the output power will be derated.	<p>The graph illustrates the output power derating characteristics of the solar inverter. The vertical axis represents Output Power, with specific levels for 50% Power and Rated Power. The horizontal axis represents Input Voltage, with key points at 90V, 170V, and 280V. The power remains at a baseline level until 90V, where it steps up to 50% of the rated power. From 90V to 170V, the output power increases linearly to reach the full Rated Power. Between 170V and 280V, the inverter maintains its full Rated Power output. Beyond 280V, the output power drops to zero.</p>		

Table 2 Inverter Mode Specifications

SOALR INVERTER MODEL	1.2KW	2.2KW	3.2KW
Rated Output Power	1.2KVA/1.2KW	2.2KVA/2.2KW	3.2KVA/3.2KW
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Regulation	230Vac±5%		
Output Frequency	50Hz		
Peak Efficiency	93%		
Overload Protection	5s@≥150% load; 10s@105%~150% load		
Surge Capacity	2* rated power for 5 seconds		
Nominal DC Input Voltage	12Vdc	24Vdc	24Vdc
Cold Start Voltage	11.5Vdc	23.0Vdc	23.0Vdc
Low DC Warning Voltage			
@ load < 50%	11.5Vdc	23.0Vdc	23.0Vdc
@ load ≥ 50%	11.0Vdc	22.0Vdc	22.0Vdc
Low DC Warning Return Voltage			
@ load < 50%	11.7Vdc	23.5Vdc	23.5Vdc
@ load ≥ 50%	11.5Vdc	23.0Vdc	23.0Vdc
Low DC Cut-off Voltage			
@ load < 50%	10.7Vdc	21.5Vdc	21.5Vdc
@ load ≥ 50%	10.5Vdc	21.0Vdc	21.0Vdc
High DC Recovery Voltage	15Vdc	30Vdc	32Vdc
High DC Cut-off Voltage	16Vdc	31Vdc	33Vdc
No Load Power Consumption	<25W		

Table 3 Charge Mode Specifications

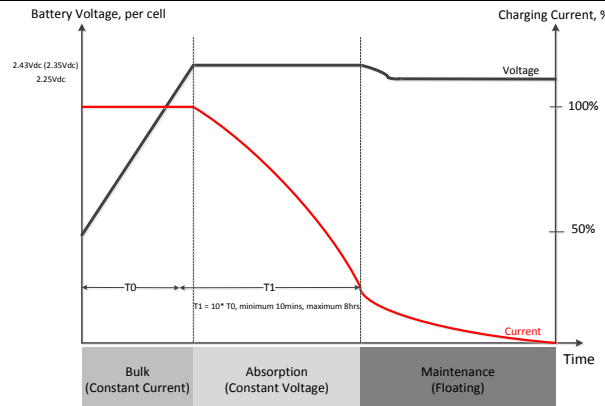
Utility Charging Mode				
SOLAR INVERTER MODEL		1.2KW	2.2KW	3.2KW
Charging Algorithm		3-Step		
AC Charging Current (Max)		20Amp(@V _{I/P} =230Vac)		25Amp (@V _{I/P} =230Vac)
Bulk Charging Voltage	Flooded Battery	14.6	29.2	
	AGM / Gel Battery	14.1	28.2	
Floating Charging Voltage		13.5Vdc	27Vdc	
Charging Curve				
MPPT Solar Charging Mode				
INVERTER MODEL		1.2KW	2.2KW	3.2KW
Charging Current		40Amp	40Amp	50Amp
PV Array MPPT Voltage Range		15Vdc~80Vdc	30~80Vdc	
Max. PV Array Open Circuit Voltage		102Vdc		
Max Charging Current (AC charger plus solar charger)		60Amp		70Amp

Table 4 General Specifications

SOLAR INVERTER MODEL	1.2KW	2.2KW	3.2KW
Operating Temperature Range	-10°C to 50°C		
Storage temperature	-15°C~ 60°C		
Humidity	5% to 95% Relative Humidity (Non-condensing)		
Dimension (D*W*H), mm	95 x 225 x 320	95 x 245 x 330	100 x 285 x 359
Net Weight, kg	4.6	5.3	6.9

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 (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Internal fuse tripped.	1. Contact repair center for replacing the fuse. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 105% and time is up.	Reduce the connected load by switching off some equipment.
		If PV input voltage is higher than specification, the output power will be derated. At this time, if connected loads are higher than derated output power, it will cause overload.	Reduce the number of PV modules in series or the connected load.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02	Internal temperature of inverter component is over 100°C.	
	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	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	Internal components failed.	Return to repair center.

Appendix: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 12Vdc 100Ah (min)	Backup Time @ 12Vdc 200Ah (min)
1.2KW	100	618	1235
	200	259	594
	300	155	396
	400	109	271
	500	87	210
	600	65	177
	700	57	139
	800	49	109
	900	43	96
	1000	38	85
	1200	26	71

Model	Load (VA)	Backup Time @ 24Vdc 100Ah (min)	Backup Time @ 24Vdc 200Ah (min)
2.2KW	200	587	1235
	400	256	587
	600	155	393
	800	109	263
	1000	87	210
	1200	65	177
	1400	56	139
	1600	50	109
	1800	43	96
	2000	31	85
	2200	28	78

Model	Load (VA)	Backup Time @ 24Vdc 100Ah (min)	Backup Time @ 24Vdc 200Ah (min)
3.2KW	300	393	843
	600	155	393
	900	95	233
	1200	72	157
	1500	52	127
	1800	44	98
	2100	30	84
	2400	26	73
	2700	23	57
	3000	20	51
	3200	14	47

Note: Backup time depends on the quality of the battery, age of battery and type of battery.
Specifications of batteries may vary depending on different manufacturers.