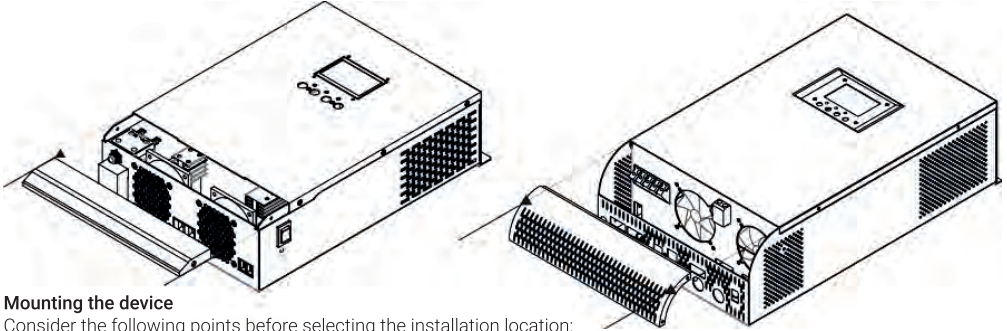


MPPT SOLAR INVERTER USER GUIDE

Preparation

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



Mounting the device

Consider the following points before selecting the installation location:

- The device is suitable for mounting on a concrete or other non-combustible surface only.
- Do not mount the inverter on or near flammable materials.
- Mount the device on a solid surface.
- It is recommended to install the inverter at eye level to enable easily accessible and comfortable reading of the LCD display.
- In order to ensure proper air circulation, leave a free space of approx. 200 mm (7.9 in) on the sides and approx. 300 mm (11.8 in) above and below the device during installation.
- The ambient temperature should be between 0 °C and 55 °C (32–131 °F) for optimal performance.
- It is recommended to mount the product vertically to the wall.
- Other objects and surfaces should be positioned as shown in the diagram to ensure sufficient heat dissipation and to provide space in case of cable removal.
- To mount the device, screw in two screws.

Connecting the battery

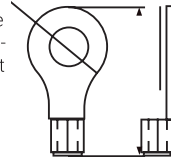
WARNING! All wiring must be performed by a qualified personnel.

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

CAUTION! To ensure safe operation and compliance with regulations, it is required to install a separate DC overcurrent protection or disconnect the device between the battery and the inverter. In some applications you may not be required to have a disconnecting device, but you still need to install overcurrent protection. Refer to the typical current rating in the table below for the required fuse or breaker size.

Recommended battery cable and terminal size:

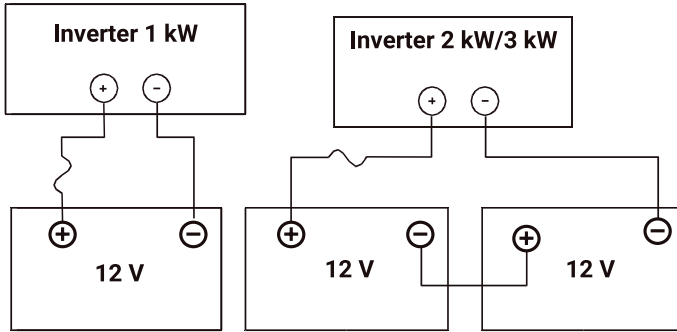
Ring terminal:



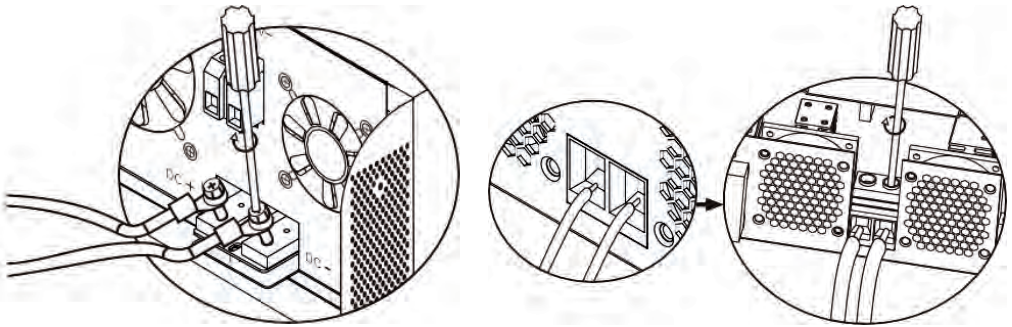
Model	Typical Amperage	Battery Capacity	Wire Size
1 kW 12 V	84 A	100 Ah	1*4 AWG
		200 Ah	2*6 AWG
2 kW 24 V	84 A	100 Ah	1*4 AWG
		200 Ah	2*6 AWG
3 kW 24 V	125 A	100 Ah	1*4 AWG
		200 Ah	2*6 AWG
3 kW 48 V	63 A	200 Ah	1*4 AWG
			2*6 AWG

Follow the steps below to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. The 1 kW model supports 12 VDC system. Connect all battery packs as in the below chart. It is suggested to connect at least 100 Ah capacity battery for 1 kW model.
The 2 kW/3 kW model supports 24 VDC system. Connect all battery packs as in below chart. It is suggested to connect at least 100 Ah capacity battery for 2 kW/3 kW model. For 3 kW model supporting 48 VDC system, it is suggested to connect at least 200 Ah battery capacity.



3. Insert the ring terminal of the battery cable flat into the battery connector of the inverter and make sure the bolts are tightened with a torque of 2–3 Nm.
4. Make sure the polarities of both the battery and the inverter are correctly connected and the ring terminals are tightly screwed to the battery terminals.



Connecting AC Input/Output

WARNING! Installation must be performed with care due to high battery voltage in series.

WARNING! All wiring must be performed by a qualified personnel.

WARNING! It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, use the proper recommended cable size as below.

CAUTION! Before connecting to AC input power source, install a separate AC breaker between inverter and AC input power source. This will ensure that the inverter can be securely disconnected during maintenance and fully protected from over-current of AC input. The recommended spec of AC breaker is 10 A for 1 kW, 20 A for 2 kW, 32 A for 3 kW.

CAUTION! There are two terminal blocks with "IN" and "OUT" markings. Remember to connect input and output connectors correctly.

CAUTION! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.

CAUTION! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

CAUTION! Before making the final DC connection or closing DC breaker/disconnector, make sure DC (+) is connected to DC (+) and DC (-) is connected to DC (-).

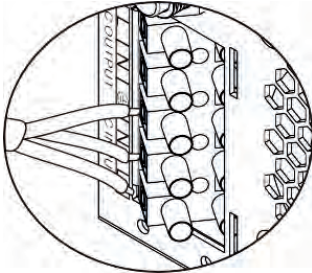
Suggested cable requirements for AC wires

Model	Gauge	Torque Value
1 kW 12 V	16 AWG	0.8~1 Nm
2 kW 24 V	14 AWG	0.8~1 Nm
3 kW 24 V	10 AWG	1.2~1.6 Nm
3 kW 48 V	12 AWG	1.2~1.6 Nm

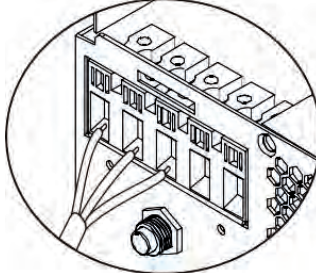
Follow the steps below to implement AC input/output connection:

1. Before making AC input/output connection, open the DC protector or disconnecter first.
2. Remove 10 mm (0.4 in) of insulation from 6 wires and additionally shorten the ground and L-phase wires by 3 mm (0.1 in).
3. Insert AC input wires according to polarities indicated on the terminal block and tighten the terminal screws. Connect PE protective conductor (⊕) first.

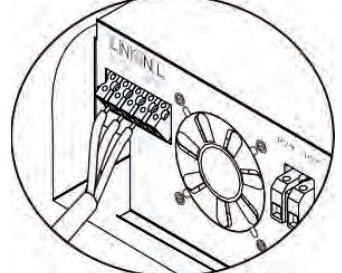
⊕ -> Ground (yellow-green) / L -> Line (brown or black) / N -> Neutral (blue)



1 kW

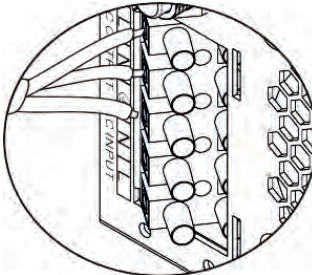


2-3 kW

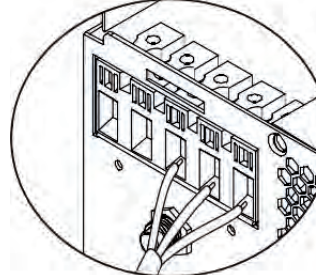


4. Insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⊕) first.

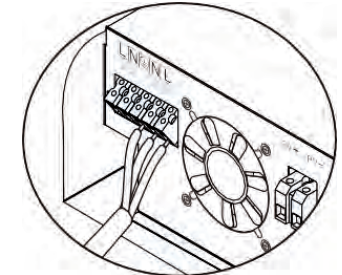
⊕ -> Ground (yellow->green) / L -> Line (brown or black) / N -> Neutral (blue)



1 kW



2-3 kW



5. Make sure the wires are securely connected.

CAUTION! Make sure that the AC wires are connected with the correct polarization. If L and N wires are connected contrarily, the risk of utility short circuit increases.

CAUTION! Appliances such as air conditioners require at least 2~3 minutes to restart the refrigerant gas balance inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to the connected appliances. To prevent this kind of damage, make sure before installation if the air conditioner is equipped with time-delay function. Otherwise, this inverter will trigger overload error and automatically cut off output power in order to protect your appliance. Unfortunately, the air conditioner may still suffer damage.

Connecting PV

WARNING! All wiring must be performed by a qualified personnel.

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

CAUTION! Before connecting to PV modules, install separate DC circuit breaker between inverter and PV modules.

Model	Standard Amperage	Cable Size	Torque
1 kW/2 kW/3 kW	50 A	8 AWG	1.4~1.6 Nm
	60 A	8 AWG	1.4~1.6 Nm
	80 A	6 AWG	2~2.4 Nm

Selecting PV modules

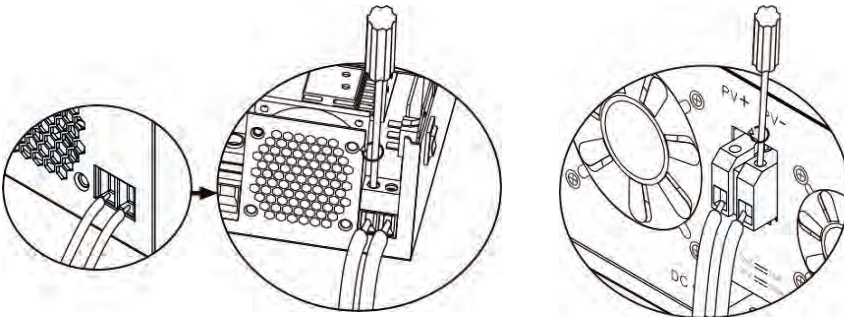
When selecting proper PV modules, consider below requirements first:

1. Open circuit voltage (VOC) of PV modules does not exceed max. PV array open circuit voltage of inverter.
2. Open circuit voltage (VOC) of PV modules should be higher than min. battery voltage.

Solar Charging Mode			
MPPT Charger			
INVERTER MODEL	1 kW 12 V	2~3 kW 24 V	3 kW 48 V
Charging Current	50 A	50 A/60 A	80 A
Max. PV Array Open Circuit Voltage	75 VDC	100 VDC	145 VDC
PV Array MPPT Voltage Range	15 ~ 60 VDC	30 ~ 130 VDC	60 ~ 130 VDC
Min. Battery Voltage for PV Charge	8.5 VDC	17 VDC	34 VDC
System DC voltage	12 VDC	24 VDC	48 VDC

Follow the steps below to implement PV module connection:

1. Remove 10 mm (0.4 in) of insulation sleeve from for positive and negative conductors.
2. Check correct polarity of connection cable of PV modules and PV input connectors.
3. 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.

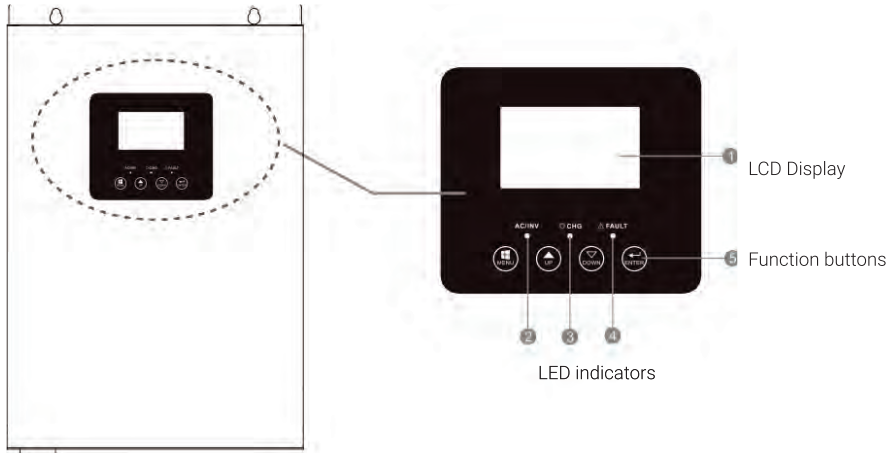


4. Make sure the wires are securely connected.
5. After connecting all wires, put the bottom cover back by screwing two screws as shown in the picture.

Recommended PV module configuration

PV Module Spec. (reference)	Inverter Model	Solar Input	Number of Modules
- 260 Wp - V_{mp} : 30.9 VDC - I_{mp} : 8.42 rA - V_{OC} : 37.7 VDC - I_{sc} : 8.89 rA - Cells: 60	MPPT-50A/60A	2S4P	8 PCS
	MPPT-60A	3S3P	9 PCS
	MPPT-80A	3S4P	12 PCS













Operation and Display Panel







Function Buttons	Description
MENU	Enter reset mode or setting mode, go to previous selection.
UP	Increase the setting value.
DOWN	Decrease the setting value.
ENTER	Enter setting mode and confirm the selection in setting mode, go to next selection or exit the reset mode.

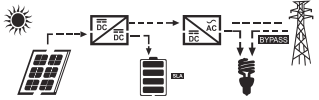
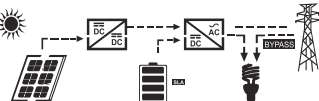
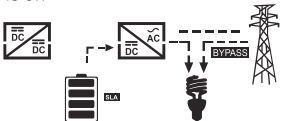
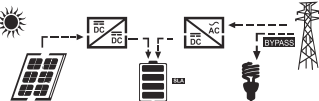
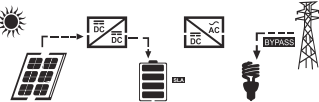
LED Indicator			Messages
AC/INV	Green	Solid On	Output is powered by grid in line mode.
		Flashing	Output is powered by battery or PV in battery mode.
CHG	Yellow	Flashing	Battery is charging or discharging.
FAULT	Red	Solid On	Error occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

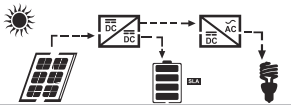
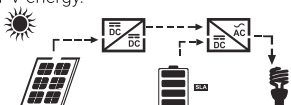


LCD Display

Icon	Description
Input and Output Source Information	
	Indicates AC information
	Indicates DC information
	Indicates input voltage, input frequency, PV voltage, battery voltage and charger current. Indicate output voltage, output frequency, load in VA, loads in Watts and discharging current.
Setting Program and Error Codes	
	Indicates setting program
	Indicates warning and error codes: Warning: 88  flashes Error: 88  lights up
Battery Information	
	Indicates battery capacity in battery mode and battery charging status in line mode.
Load Information	
	Indicates overload
	Indicates load level
Mute Operation	
	Indicates that the device alarm is disabled
Operating State Information	
	Indicates that the device connects with the mains

	Indicates that the device connects with the PV panel
	Indicates that load is supplied by utility power
	Indicates that the solar power circuit is working
	Indicates that the DC/AC inverter circuit s working















Operating states description

Operating State	Description	LCD Display
Match load state Note: DC power produced from your solar array is converted by the inverter into AC power, which is then sent to you main electrical panel to be used by your household appliances. Any excess power generated is not sold back to the grid, but stored in battery.	PV energy is charged into the battery or converted by the inverter to the AC load.	
		
		
Charge state	PV energy and grid can charge batteries.	
Bypass state	Errors are caused by inside circuit error or external reasons such as overtemperature, output short circuit, etc.	

Off-Grid state	The inverter provides output power from battery and PV power.	<p>Inverter powers loads from PV energy.</p>  <p>Inverter powers loads from battery and PV energy.</p>  <p>Inverter powers loads from battery only.</p> 
Stop mode	The inverter stops working if you turn it off with the soft key or an error occurred if there is no grid available.	






Data displayed on LCD
















The data displayed on LCD can be switched in turns by pressing „UP“ or „DOWN“ key. The information is switched in below order: battery voltage, battery current, inverter voltage, inverter current, grid voltage, grid current, load in Watts, load in VA, grid frequency, inverter frequency, PV voltage, PV charging power, PV charging output voltage, PV charging current.

Selectable Information	LCD Display	
Battery voltage/DC discharging current	^{BATT} 	
Inverter output voltage/Inverter output current		^{INV} 
Grid voltage/Grid current		^{GRID} 
Load in Watts		^{LOAD} 
Grid frequency/Inverter frequency	^{INPUT} 	^{INV} 
PV voltage and power	^{PV} 	
PV charger output voltage and PV charging current	^{PV} 	^{OUTPUT} 

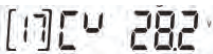



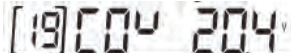
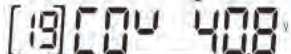


Setting programs

After pressing and holding "ENTER" button for 2 seconds, the device enters the setting mode. Press "UP" or "DOWN" button to select a program. Then, press "ENTER" or "MENU" button to confirm the selection and exit, respectively.

Program	Description	Selected option	
00	Exiting setting mode		
01	Output source priority selection		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 energy will supply power to the load only if the utility is unavailable. If the solar is unavailable, the utility will charge the battery until the battery voltage reaches the setting point in program 21. If the solar is available, but the voltage is lower than the setting point in program 20, the utility will charge the battery until the battery voltage reaches the setting point in program 20 to protect the battery from damage.
			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 20 or solar and battery is not sufficient. The battery energy will supply power to the load if the utility is unavailable or the battery voltage is higher than the setting point in program 21 (when BLU is selected) or program 20 (when LBU is selected). If the solar is available, but the voltage is lower than the setting point in program 20, the utility will charge the battery until the battery voltage reaches the setting point in program 20 to protect the battery from damage.
			Solar energy provides power to the loads as first priority. If battery voltage has been higher than the setting point in program 21 for 5 minutes, and the solar energy has been available for 5 minutes too, the inverter will turn to battery mode, solar and battery will provide power to the loads at the same time. When the battery voltage drops to the setting point in program 20, the inverter will turn to bypass mode, utility provides power to the load only, and the solar will charge the battery at the same time.
			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.

02	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90–280 VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170–280 VAC.
		GEN 	When the user uses the device to connect the generator, select the generator mode.
		VDE 	If selected, acceptable AC input voltage range will conform to VDE4105 (184–253 VAC).
03	Output voltage		Set the output voltage amplitude (220–240 VAC).
04	Output frequency	50 Hz (default) 	60 Hz 
05	Solar supply priority	(default) 	Solar energy provides power to charge battery as first priority. When the utility is available, if the battery voltage is lower than the setting point in program 21, the solar energy will never supply to the load, only charge the battery. If the battery voltage is higher than the setting point in program 21, the solar energy will supply to the load or recharge the battery.
		LBU 	Solar energy provides power to the loads as first priority. If the battery voltage is lower than the setting point in program 20, the solar energy will never supply to the load, only charge the battery. If the battery voltage is higher than the setting point in program 20, the solar energy will supply to the load or recharge the battery.
06	Overload bypass: when enabled, the device will transfer to Line mode if overload occurs in battery mode.	Bypass disabled 	Bypass enabled (default) 
07	Auto restart when overload occurs	Restart disabled (default) 	Restart enabled 
08	Auto restart when overtemperature occurs	Restart disabled (default) 	Restart enabled 

10	Charge source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first [10]CS0	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) [10]SNU	Solar energy and utility will charge battery at the same time.
		Only Solar [10]OS0	Solar energy will be the only charger source no matter utility is available or not.
If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it is available and sufficient.			
11	Maximum charging current: to configure total charging current for solar and utility chargers (max. charging current = utility charging current + solar charging current)	60 A (default) [1] 60	Setting range is from 1 A to 120 A. Increment of each click is 1 A.
		80 A (default) [1] 80	Setting range is from 1 A to 140 A. Increment of each click is 1 A.
		100 A (default) [1] 100	Setting range is from 1 A to 160 A. Increment of each click is 1 A.
13	Maximum utility charging current	[13] 30	Setting range is from 1 A to 60 A. Increment of each click is 1 A.
14	Battery type	AGM [14]AGM	Flooded [14]FLD
		GEL [14]GEL	LEAD [14]LEA
		Lithium-ion [14]L	User-Defined [14]USE
		If "User-Defined" type is selected, battery charge voltage and low DC cut-off voltage can be set up in program 17, 18 and 19.	

17	Bulk charging voltage	24 V model default setting: 
		If "User-Defined" type is selected in program 14, this program can be set up. Setting range is from 24.0 V to 29.2 V for 24 V model. Increment of each click is 0.1 V.
		48 V model default setting: 
		If „User-Defined“ LI is selected in program 14, this program can be set up. Setting range is from 48.0 V to 58.4 V for 48 V model. Increment of each click is 0.1 V.
18	Floating charging voltage	24 V model default setting: 
		If "User-Defined" type is selected in program 14, this program can be set up. Setting range is from 24.0 V to 29.2 V for 24 V model. Increment of each click is 0.1 V.
		48 V model default setting: 
		If "User-Defined" type is selected in program 14, this program can be set up. Setting range is from 48.0 V to 58.4 V for 48 V model. Increment of each click is 0.1 V.
19	Low DC cut off battery voltage setting	24 V model default setting: 
		If "User-Defined" type is selected in program 14, this program can be set up. Setting range is from 20.0 V to 24.0 V for 24 V model. Increment of each click is 0.1 V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
		48 V model default setting: 
		If "User-Defined" type is selected in program 14, this program can be set up. Setting range is from 48.0 V to 58.4 V for 48 V model. Increment of each click is 0.1 V.
20	Battery stop discharging voltage when grid is available	Options available for 24 V model
		 Setting range is from 22.0 V to 29.0 V. Increment of each click is 0.1 V.
		Options available for 48 V model
		 Setting range is from 44.0 V to 58.0 V. Increment of each click is 0.1 V.