

USER'S MANUAL

-----SOLAR POWER INVERTER-----

1KW-6KW

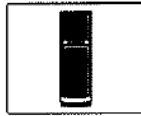
Appliances-----



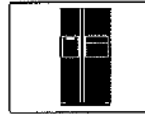
PC



TV



Air-
conditioning



Fridge



Washing
machine

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1 Figures of unit

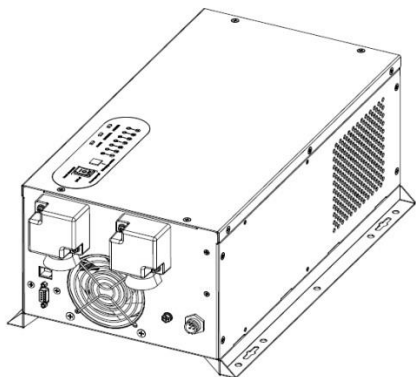


Figure1 1-3KW(E Series DC side)

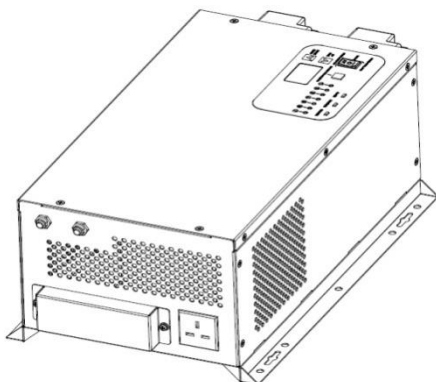


Figure2 1-3KW(C Series AC side)

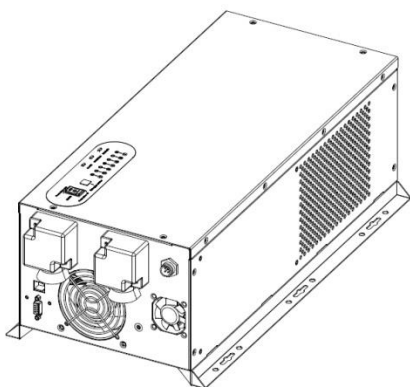


Figure3 4-6KW(E Series DC side)

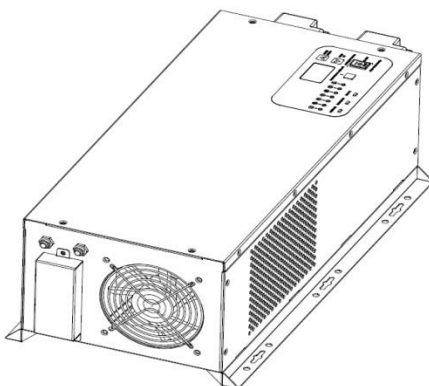


Figure4 4-6KW(C Series AC side)

2 Specification

MODEL	1KW	1.5KW	2KW	3KW	4KW	5KW	6KW
	1012	1512	2012	3012	4024	5024	6024
	1024	1524	2024	3024	4048	5048	6048
Line Mode Specifications							
Nominal Input Voltage	100/110/120Vac 220/230/240Vac				220/230/240Vac		
AC Voltage Range	120V MODEL:96Vac~132Vac 230V MODEL:155Vac~272Vac				155Vac~272Vac		
Frequency	50Hz/ 60Hz (Auto detection)						
Frequency Range	47±0.3Hz ~ 55±0.3Hz for 50Hz; 57±0.3Hz ~ 65±0.3Hz for 60Hz;						
Over-Load /Short Protection	Circuit breaker						
Efficiency	>95%						
Transfer Time	(AC to DC or DC to AC): 10ms (typical)						
Back Feed Protect	Can						
Max Bypass Overload Current	30A				40A		
Invert Mode Specifications							
Output Voltage Waveform	Sine wave						
Rated Output Power (VA)	1000	1500	2000	3000	4000	5000	6000
Rated Output Power (W)	1000	1500	2000	3000	4000	5000	6000
Power Factor	1.0						
Output Voltage (V)	230Vac						
Output Voltage Regulation	±10%						
Output Frequency	50Hz ± 0.3Hz/60Hz ± 0.3Hz						
Efficiency	>88%						
Over-Load Protection	(110%<load<125%) ±10%: Fault (shutdown output) after 15 minutes;						

MODEL	1KW	1.5KW	2KW	3KW	4KW	5KW	6KW
	1012	1512	2012	3012	4024	5024	6024
	1024	1524	2024	3024	4048	5048	6048
	(125%<load<150%) ±10%: Fault (shutdown output) after 60s Load>150% ±10%: Fault (shutdown output) after 20s						
Surge Rating (10s) (VA)	3K	4.5K	6K	9K	12K	15K	18K
Capable of starting electric motor	1 HP			2HP	3HP		4HP
Output Short-Circuit Protection	Current limit (Fault after 10s)						
Bypass Breaker Size	10A		30A		40A		
Nominal DC Input Voltage	1012;1512;2012;3012 MODEL: 12VDC 1024;1524;2024;3024;4024;5024;6024 MODEL: 24VDC 4048;5048;6048 MODEL: 48VDC						
DC voltage range	10Vdc~16Vdc for 12VDC model(*2 for 24VDC,*4 for 48VDC) (Low alarm:10.5V; Shut-down: 10V; High fault: 16V; High recovery:15.5V for 12VDC mode)						
Power saver	Load ≤25W (Enabled on “P/S auto” setting of Remote control)						
Charger(line)							
Charge Current	35A	45A	65A	75A	65A	70A	75A
	20A	25A	35A	50A	35A	40A	50A
Charge Current Regulation	± 5A _{dc}						
Battery initial voltage	10 –15.7V _{dc} for 12VDC model (*2 for 24VDC,*4 for 48VDC)						
Charger Short Circuit Protection	Circuit breaker						
Breaker Size	10A		30A		40A		
Over Charge Protection	≥ 15.7V _{dc} for 12VDC model (*2 for 24VDC,*4 for 48VDC)						

Charger(Solar charger function)C Series & LCD Display			
MODEL	12VDC	24VDC	48VDC
Max. PV Input Voltage	70Vdc	100Vdc	200Vdc
Max. PV Open Circuit Voltage	56Vdc	80Vdc	145Vdc
MPPT Voltage Range	15 – 55Vdc	18–78Vdc	50–145Vdc
Battery Voltage Range	10–15.7Vdc	20–31.4Vdc	40–62.8Vdc
Max Output Power	600W	1100W	3200W
Solar Charger Output Current	45A	45A	60A
Short Circuit Protection	Fuse		

General Specifications	
Safety Certification	CE(EN62040-1)
EMC Classification	EN62040-2, C2
Operating Temperature Range	-15°C to 40°C
Storage temperature	-25°C ~ 60°C
Operation humidity	5% to 95%
Audible Noise	60dB max
Cooling	Forced air, variable speed fan
Size	1KW/1.5KW: 410mm*264mm*180mm 2KW/3KW : 460 mm*264mm*180mm 4KW : 510 mm*264mm*180mm 5KW/6KW : 555 mm*264mm*180mm

Unit Components (C Series & LCD Display)

This unit consists of the **inverter** and **solar charge controller**.

- 1) The main function of the inverter is converting the battery voltage into pure sine wave appliance.
- 2) The solar charge controller main function is to supply the energy for the battery and load.

Unit Components (E Series & LED Display)

This unit only consists of the **inverter**.

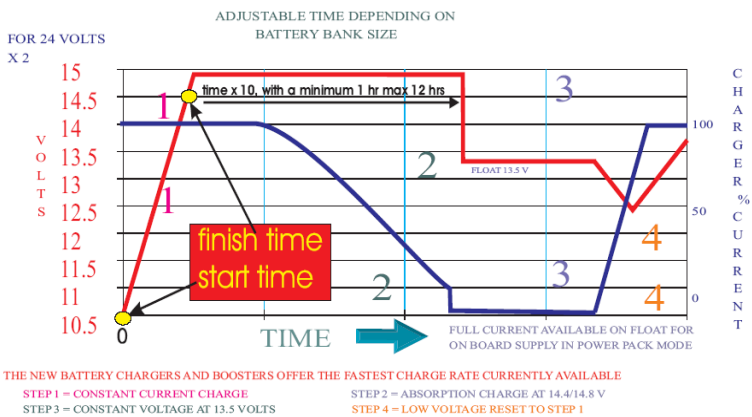
- 1) The main function of the inverter is converting the battery voltage into pure sine wave appliance.
- 2) No solar charger function.

Charge Stage Transition

Stage transition	Three stage: Boost CC (constant current stage) → Boost CV (constant voltage stage) → Float (constant voltage stage)
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Charge Stage Transition Definitions:

- ◆ **Boost CC Stage:** If AC input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- ◆ Software timer will measure the time from AC start until the battery charger reaches 0.3V below the boost voltage, then take this time as T_0 and $T_0 \times 10 = T_1$.
- ◆ **Boost CV Stage:** Start a T_1 timer; the charger will keep the boost voltage in Boost CV mode until the T_1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- ◆ **Float Stage:** In float mode, the voltage will stay at the float voltage.
- ◆ If the AC is reconnected or the battery voltage drops below 24Vdc, the charger will reset the cycle above.
- ◆ If the charge maintains the float state for 10 days, the charger will reset the cycle.



AC Priority Model								
Battery Type Setting	Switch setting	Description	Boost Voltage			Float Voltage		
			12V	24V	48V	12V	24V	48V
	0	To be used by factory for set up	-	-	-	-	-	-
	1	Gel USA	14.0	28.0	56.0	13.7	27.4	54.8
	2	AGM 1	14.1	28.2	56.4	13.4	26.8	53.6
	3	AGM 2	14.6	29.2	58.4	13.7	27.4	54.8
	4	Sealed lead acid	14.4	28.8	57.6	13.6	27.2	54.4
	5	Gel EURO	14.4	28.8	57.6	13.8	27.6	55.2
	6	Open lead acid	14.8	29.6	59.2	13.3	26.6	53.2
	7	Calcuim	15.1	30.2	60.4	13.6	27.2	54.4
8	De sulphation	15.5	31.0	62.0	4 hours then off			
9	Not used	-			-			

Remark:

- 1) "0"--- Line charge off
- 2) If in doubt call your battery supplier and ask which charge voltage they want you to use for their battery type, and select the closest to it.
- 3) The switch position "8" is a very dangerous setting if you do not know what you are doing. This cycle is a very high voltage charge cycle designed to try to break down the sulphate "crust" that is preventing the plates taking a charge and thus allow the plates to clean up and so accept charge once again.
- 4) How to use the switch position "8" function.(only suitable for open lead acid batteries)
 - a. Ensure the battery bank is totally isolated from anything else on the boat or vehicle. The high voltage applied by this setting could destroy all your electronics and other electrical equipment still connected.
 - b. Make sure the battery compartment is very well ventilated and battery caps are removed.
 - c. Switch the battery type selector switch to the correct position, then switch the AC power on.
 - d. Because this is such dangerous setting there is a 4hr time out period build into the software, however on a very large battery bank this may not be enough and the unit may need to be switched off and on again to do another cycle.

Battery Priority Model								
Battery Type Setting	Switch setting	Description	Boost Voltage			Float Voltage		
			12V	24V	48V	12V	24V	48V
	0	To be used by factory for set up	-	-	-	-	-	-
	1	Gel USA	14.0	28.0	56.0	13.7	27.4	54.8
	2	AGM 1	14.1	28.2	56.4	13.4	26.8	53.6
	3	AGM 2	14.6	29.2	58.4	13.7	27.4	54.8
	4	Sealed lead acid	14.4	28.8	57.6	13.6	27.2	54.4
	5	Gel EURO	14.4	28.8	57.6	13.8	27.6	55.2
	6	Open lead acid	15.5	31.0	62.0	4 hours then off		
	7	Battery priority	Low trip to AC 11V/22V/44V			High trip to battery 14V/28V/56V		
8	Battery priority	Low trip to AC10.5V/21V/42V			High trip to battery 13.5V/27V/54V			
9	Battery priority	Low trip to AC10V/20V/40V			High trip to battery 13V/26V/52V			

Remark:

- 1) "0": Do not charge at AC input, charge by solar energy at level 1.
- 2) "1"~"6" level: AC input priority mode, namely AC input is preferred for offering load energy and the above three-stage charging mode will be applied to the battery based on the set charging voltage; however, when AC input exceeds AC input range, it will convert to inverter mode for offering load energy, namely the battery discharges. After AC input restores again, switch to AC input accordingly and recharge the battery per three stages.
- 3) "7"~"9" level: Battery priority mode, namely battery discharge will take precedence. When battery voltage is lower than the voltage corresponds to each level, convert to AC input for offering energy to load, during which AC input will charge the battery at 25% of above AC charge current value to avoid insufficient charge via solar. When solar energy and AC input charges the battery to the voltage higher than that of each level, inverter discharge will be applied to offer energy to the load.
- 4) If in doubt call your battery supplier and ask which charge voltage they want you to use for their battery type. Then select the closest to it to ensure battery lifetime.
- 5) In solar charge, battery will be charged based on the voltage corresponds to each level. For instance (24V model) : In "1" level, when battery voltage is lower than 28V, solar energy charges at max power; when it is close to 28V, convert to constant voltage charge.

Protection

Over temperature protection	Heat sink temp. $\geq 105^{\circ}\text{C}$, Fault (shutdown Output) after 30 seconds. solar charger heat sink temp. $\geq 75^{\circ}\text{C}$, de-rating;
Fault recovery	By restart the machine

FAN Operation

Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temp. in an operating ambient temperature upto 50°C .

- Speed to be controlled in a smooth manner as a function of internal temperature and/or current.
- Fan should run at minimum speed needed to cool unit.
- Fan noise level target $< 60\text{db}$.

The fan logic as below:

Condition		Enter condition	Leave condition	Speed
AC Priority Model	Heat sink temperature	$T \leq 60^{\circ}\text{C}$	$T > 65^{\circ}\text{C}$	OFF
		$65^{\circ}\text{C} \leq T < 85^{\circ}\text{C}$	$T \leq 60^{\circ}\text{C}$ or $T \geq 85^{\circ}\text{C}$	50%
		$T > 85^{\circ}\text{C}$	$T \leq 80^{\circ}\text{C}$	100%
	Charge Current	$I \leq 15\%$	$I \geq 20\%$	OFF
		$20\% < I \leq 50\% \text{Max}$	$I \leq 15\%$ or $I \geq 50\% \text{Max}$	50%
		$I > 50\% \text{Max}$	$I \leq 40\% \text{Max}$	100%
	Load% (Invert mode)	Load $< 30\%$	Load $\geq 30\%$	OFF
		$30\% \leq \text{Load} < 50\%$	Load $\leq 20\%$ or Load $\geq 50\%$	50%
		Load $\geq 50\%$	Load $\leq 40\%$	100%
Battery Priority Model	Heat sink temperature	$T \leq 85^{\circ}\text{C}$	$T > 85^{\circ}\text{C}$	50%
		$T > 85^{\circ}\text{C}$	$T \leq 80^{\circ}\text{C}$	100%
	Line Charge Current	$I \leq 50\%$	$I > 50\%$	50%
		$I > 50\% \text{Max}$	$I \leq 40\% \text{Max}$	100%
	Load% (Invert mode)	Load $< 50\%$	Load $\geq 50\%$	50%
Load $\geq 50\%$		Load $\leq 40\%$	100%	

3 Front panel

<p>POWER SAVER AUTO</p> <p>UNIT OFF</p> <p>POWER SAVER OFF</p> <p>BATTERY TYPE SELECTOR</p> <p>ALARM INVERTER CHARGE</p> <p>① ② ③ ④ ⑤ ⑥ ⑦</p>		
<p>Switch</p>	<p>Power saver auto</p>	Power on with saver mode(power saver≤25W)
	<p>Unit Off</p>	Power totally off
	<p>Power saver off</p>	Power on without saver mode
<p>ALARM INVERTER CHARGE</p>	<p>Alarm</p>	Alarm mode on : Have Alarm
	<p>Inverter</p>	Inverter mode: Power by battery
	<p>Charge</p>	Power by utility & Fast Charging by Line (without “o” switch setting)
<p>BATTERY TYPE SELECTOR</p>	<p>Battery type selector</p>	Battery type selector : Different battery type with different charger voltage(select the closest to your battery)
<p>① ② ③ ④ ⑤ ⑥ ⑦</p>	<p>State LED</p>	Show inverter state on

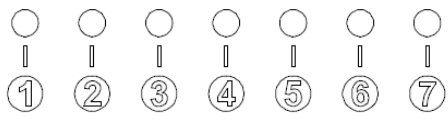
4 AC side panel

(1KW-3KW)		(4KW-6KW)	
Line Input		Line connect: L, N, PE	
AC Output		Output connect: N, L, PE	
Solar Input		Solar input connect (just only use for have solar charge model): PV+, PV-	
IEC Socket		Only allowed Max 10A output current. 1K-3KW of the inverter is consists of IEC Socket.	
Protect breaker		Charge input protect & inverter output protect: Over current will protect	
AC FAN		4K-6KW of the inverter is consists of AC FAN	

5 DC side panel

<p style="text-align: center;">(1KW-3KW)</p>	<p style="text-align: center;">(4KW-6KW)</p>	
<p>Battery Input</p>	<p style="text-align: center;">Battery Negative Battery Positive</p>	<p>Battery input connect: Negative(-), Positive(+)</p>
<p>Earth</p>	<p style="text-align: center;">Earth</p>	<p>Earth connect: PE</p>
<p>RS232</p>	<p style="text-align: center;">RS232</p>	<p>RS232 connect: Communicate with the PC</p>
<p>Other communicate</p>	<p style="text-align: center;">WIFI/GPRS/RS485</p>	<p>Only for customer choice: WiFi, GPRS, RS485</p>
<p>DC FAN</p>		<p>DC FAN</p>
<p>Remote control (only use for the front switch on "unit off" stage)</p>	<p>Remote control connect (RJ11): Allow remote power on or power off the inverter. 3(white line):Power safe auto 5 (black line):Unit off 4(red line):Power safe off</p>	

6 LED indication (E Series& LED Display)

	
① POWER SAVER ON	Green LED lighting on Power Saver Mode (power saver load ≤25W)
② OVER LOAD TRIP	Red LED lighting on Over Load
③ OVER TEMP TRIP	Red LED lighting on Over Temperature
④ FLOAT CHARGE	Green LED lighting on Float Charging Mode
⑤ FAST CHARGE	Yellow LED lighting on Fast Charging Mode
⑥ INVERTER ON	Green LED lighting on Inverter Mode
⑦ SHORE POWER ON	Green LED lighting on AC Mode

Indication&fault finding chart												
Status	Function	L.E.D.s on bottom						audible alarm	L. E. D. s on top			
		①	②	③	④	⑤	⑥		⑦	Yellow (ALARM)	Green (INVERTER)	Green (CHARGE)
Line Charge Function	Constant current charge					on		on				on
	Constant voltage charge					Flash		on				on
	Float				on			on				on
	Standby							on				
Inverter mode	Inverter on							on				on
	Power saver on	on										
Alarms	Battery low voltage							on	beep 0.5s every 5s	on	on	
	Battery high voltage							on	beep 0.5s every 5s	on	on	
	Over load(inverter mode)		on					on	beep 0.5s every 5s	on	on	
	Over temp(inverter mode)			on				on	beep 0.5s every 5s	on	on	
	Over temp(line mode)			on		on		on	beep 0.5s every 5s	on		on
	Over charge					on		on	beep 0.5s every 5s	on		on
Fault Mode	Fan lock								beep continuous			
	Battery high voltage							on	beep continuous		on	
	Inverter mode overload		on						beep continuous			
	Over temperature			on					beep continuous			
	Back voltage							Flash	beep continuous	Flash		

7 LCD indication (C Series & LCD Display)

Display Parameter Definition			
Display item	Definition		
V- pv: 0.0V	Solar panel input voltage		
I – pv: 0.0A	Solar panel input current		
W-pv: 0.0W	Solar panel input power		
V- Bat: 0.0V	Battery voltage		
I – Bat: 0.0A	Solar charger output current		
Load: 0%	Inverter output power (load percent)		
F- out: 50Hz	Inverter output frequency		
Input – V: 0.0V	AC input voltage		
Output –V: 0.0V	AC output voltage		
State: standby	Inverter work state		
No Fault: 180S	If the unit check no fault, the solar charger will run after 180 seconds		
Control panel setting			
Control panel	Item	Definition	
Setup Menu	Solar Charge	0%	Setting the percent of the solar charge controller output current (without control the inverter charge current)
		25%	
		50%	
		75%	
		100%	
	Language	English	Language choice
Chinese			
Remark:			
1) Button operation: Every button have two function was based on the continue press time.			
2) Up button: Press one second— up function; Press three seconds— back function;			
3) Down button: Press one second— down function; Press three seconds— enter function;			
4) Press both the up & down button with 5 seconds— If shut down the inverter, the solar charge controller will have a communication fault. Press both the up & down button with 5 seconds can clear the "Communication fault "of the unit in hand. The solar charge controller can continuously charge to the battery.			
5) LCD display will flash every five seconds.			

8 Check list

- 1) Ensure that the inverter has the correct DC voltage for your boat or vehicle system. ie 12V or 24V or 48V.
- 2) Fit as close to the batteries as possible. The shorter the DC cables the better. The voltage drop on long cables effect the unit's performance.
- 3) Do not reverse the cables! Connect the positive cable of the battery to the positive terminal(red) and the negative cable positive of the battery to the negative terminal(black).
- 4) Always use the inverter in an environment which is well ventilated, not exposed to direct sunlight or a heat source, away from water, moisture, oil or grease, away from any highly inflammable substance, out of reach from children.
- 5) The output voltage of this unit must never be on your AC system at the same time as any other AC source such as the 230V external mains line or a generator. All external power must go through the UNIT.
- 6) Always switch on the UNIT first, before plugging in any appliance.
- 7) Under new electrical legislation only professional electric should install this product.
- 8) The output frequency of the unit set consistency with the first AC input frequency on. The factory default to 50HZ.



- Do not dispose of the inverter together with household waste. The user has the responsibility and obligation to send it to the designated organization for recycling and disposal.

9 Installation

- 1) Position the unit as close as the main battery bank as possible.
- 2) Position in a cool, dry & well ventilated space.
- 3) Orientation of the unit is not critical.
- 4) Either purchase the standard cable ser from Dealer which is about 1.5 meters, or if using your own cable, use the cable size chart provided on the installation drawing on ensure you have thick enough cable for the DC leads. In the event of not being able to get the size requested(it can be hard to get thick cable) then simply add multiple length of thinner cable, i.e. if you cannot get 90mm*mm cable then use 3*35mm*mm cable, at the end of the day it just copper we need.
- 5) Fit a fuse suitable for the job, again look at the installation drawing, we have a full range of high current fuses in the GANLR range of gold fuse products, ranging from 100-500A Ps. on the DC side .
- 6) Connect the cables from the batteries to the fuse then to the unit, this way if there is a fault at the unit the fuse is already in place and this will be safe. In the event of a isolation switch being used, please ensure the rating of the switch can handle the power of the unit.
- 7) Ensure the unit is switched off during installation.
- 8) On the AC side ensure the shore power(all external AC sources)are totally disconnected, connect the output from the inverter to suitable Residual Current Breaker (R.C.D. for earth protection) and current over load trips. Fuse the AC input side depending on through power requirements, 1KW-3KW model, the max through power is 30Amps, so fuse at 40A (allowing also for charger consumption) if you intend to use the full through power for standard 13-16 Amps throughput then a 30A fuse would be appropriate. 4KW-6KW model, the max through power is 40Amps,you intend to use the full through power for standard 10-12 Amps throughput then a 40A fuse would be appropriate.
- 9) We recommend Multi core tri rated AC cable, if used on a boat or vehicle, as this is much safer where vibration is likely. Only use single solid household AC cable if the product is being used as a power source for a house or platform free of vibration.
- 10) Before attempting to switch on the unit, please ensure you have selected the correct battery type on the small battery type selector switch on the front of the main box, rotate the switch to your battery type. The progressive charge control software will automatically adjust for battery bank size and sate.

10 What cable to use can be better?

AC input& output wire

Inverter Model	Nominal operation AC voltage	AC breaker size minimum wire size
1KW-3KW	110Vac/230Vac	30 amps-12AWG
4KW-6KW	230Vac	40 amps-10AWG

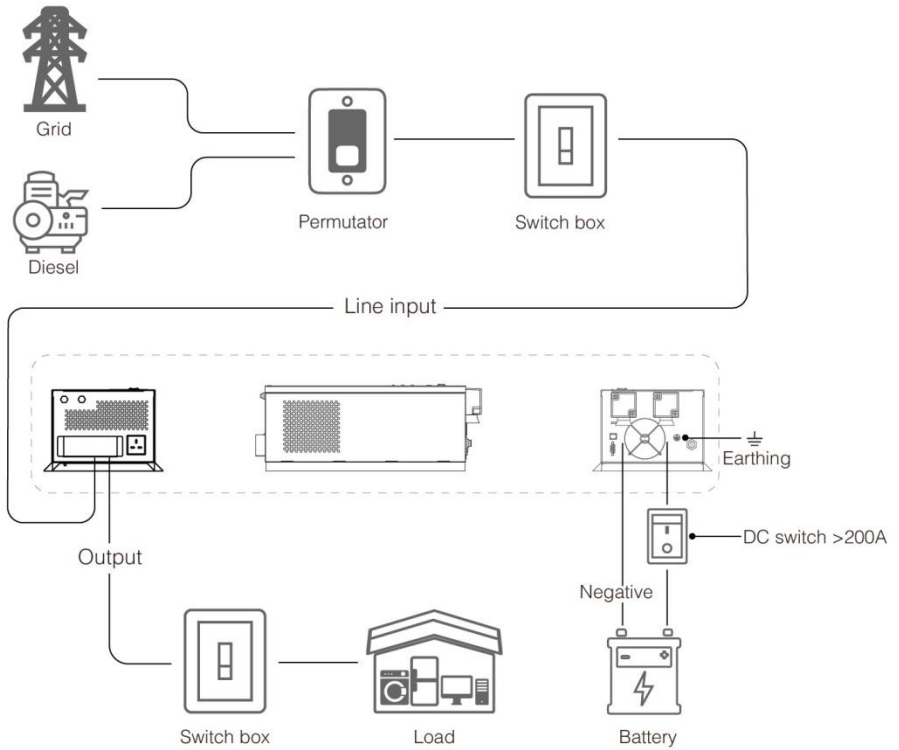
DC input wire

Inverter Model	Minimum DC Voltage	Cable run distance 0-1.5m	Cable run distance 1.5-4.0m
1012	10V	4AWG	2*4AWG
1024	20V	6AWG	2*6AWG
1512	10V	2*4AWG	2*4AWG
1524	20V	6AWG	2*6AWG
2012	10V	2*4AWG	2*4AWG
2024	20V	4AWG	2*4AWG
3012	10V	2*2AWG	2*2AWG
3024	20V	4AWG	2*4AWG
4024	20V	2*4AWG	2*4AWG
4048	40V	4AWG	2*4AWG
5024	20V	2*4AWG	2*4AWG
5048	40V	4AWG	2*4AWG
6024	20V	2*2AWG	2*2AWG
6048	40V	4AWG	2*4AWG

Solar panel input wire

Inverter Model	Cable
10/15/20/3012C	10AWG
10/15/20/3024C	10AWG
40/50/6024C	10AWG
40/50/6048C	10AWG

Appendix A: System connect



* Boat's earth or bonding system or vehicle chassis

