



AC COUPLED INVERTER USER MANUAL (V1.0)



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1 Notes On This Manual

1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the AC Coupled inverter.

1.2 Target Group

	<p>This manual is for qualified personnel that have received training and have demonstrated skills and knowledge in construction and operation of this device. Qualified personnel are trained to deal with the dangers and hazards involved in installing electric devices.</p>
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1.3 Additional Information






Find further information on special topics on our website.

1.4 Storage of the manuals








The manual and other documents must be stored in a convenient place and be available at all times. We assume no liability for any damage caused by failure to observe these instructions.

1.5 Symbols Used

The following types of safety instructions and general information appear in this document as described below:




	<p>Manual – Read the Manual!</p>
	<p>DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>
	<p>WARNING indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>
	<p>CAUTION indicates a hazardous situation which, if not avoided, could result in a minor or moderate injury.</p>
	<p>NOTE Failure to observe this warning may lead to damage to property.</p>

1.6 Markings On This Product

Symbol	Description
	<p>Warning regarding dangerous voltage The product works with high voltage. All work on the product must only be performed as described in its documentation and by qualified trades people.</p>
	<p>Beware of hot surface The product can become hot during operation. Do not touch the product during operation.</p>
	<p>Observe the operating instructions Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.</p>
	<p>Point of connection for grounding protection.</p>
	<p>Direct Current (DC)</p>
	<p>Alternating Current (AC)</p>
	<p>Signals danger due to electrical shock and indicates the times (5 minutes) to allow after the inverter has been turned off and disconnected to ensure safety in any installation operation.</p>

2 Safety And Conformity

2.1 Safety Instructions

	Danger To Life Due To Lethal Voltages! Lethal voltages are present within the unit and on the power supply lines. Therefore, only authorized electricians may install and open the unit. Even when the unit is disconnected, high contact voltages may still be present within the unit.
	Danger Of Burn Injuries Due To Hot Enclosure Parts! During operation, the four sides of the enclosure lid and the heat sink may become hot. Only touch the front enclosure lid during operation.
	NOTE No one should be opening the unit

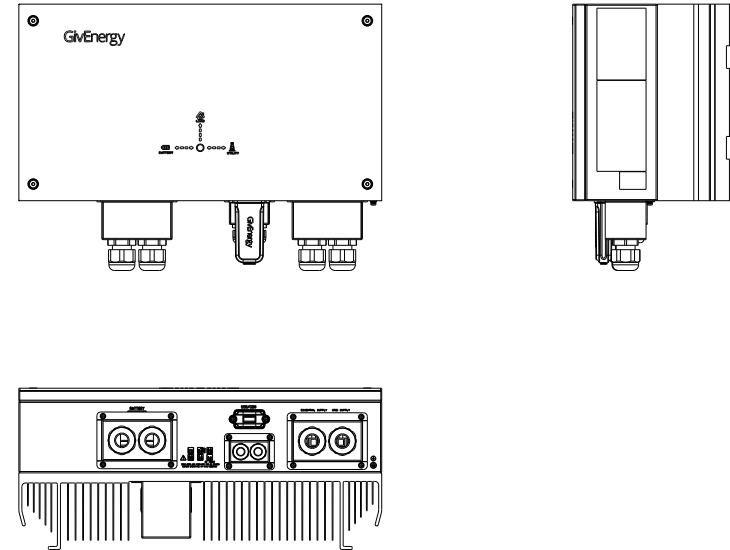
Qualification Of Skilled Workers

- ▶ Knowledge of how an inverter works and is operated
- ▶ Instruction in how to deal with the dangers and risks associated with installing and using electrical devices
- ▶ Training in the installation and commissioning of electrical devices and plants
- ▶ Knowledge of all applicable standards and guidelines
- ▶ Knowledge and observance of this manual and all safety instructions

3 Product Description

3.1 AC Coupled Overview

Figure 1

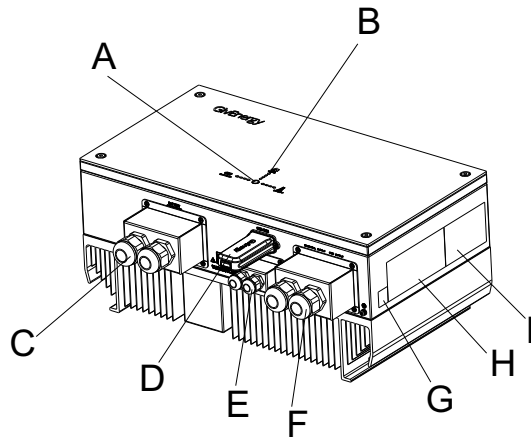


3.2 Information of the Unit

The unit is bidirectional which is connected to grid and battery storage system and grid. It also can work with existing solar system. 1. AC coupled hybrid system working separately. When the electricity price is low, use energy from grid to charge battery.

When the electricity price is high, discharge battery energy to home load. (Or discharge battery energy to grid, which is optional) 2. AC coupled hybrid system working with existing solar system. If the energy of solar system is enough for load and export some to grid, AC coupled system will export energy to charge battery. If the energy of solar system is not enough for load and import some from grid, AC coupled system will discharge the energy of battery to the load.

Figure 2



A	The Inverter Power Flow Direction Indicator
B	The Inverter Operation Status Indicator
C	Battery Input Terminals And Cover
D	WIFI Or GPRS Com Module And USB Port
E	BAT_ NTC and RS485 Communication (BMS Com, Load Monitor Com,)
F	AC Output Terminals And Cover
G	Inverter Serial No.
H	Spec Label
I	Warning Signals Label

3.3 Storage of Inverter

If you want to storage the unit in your warehouse, you should choose an appropriate location to store the inverter.

- ▶ The unit must be stored in original packaging.
- ▶ The storage temperature should be always between -25°C and +60°C.
- ▶ The storage relative humidity should be always between 0 and 95%.
- ▶ If there are a batch of unit need to be stored, the maximum layers for original carton is four.

Note; The battery storage much be according with the battery manufacturers specifications.

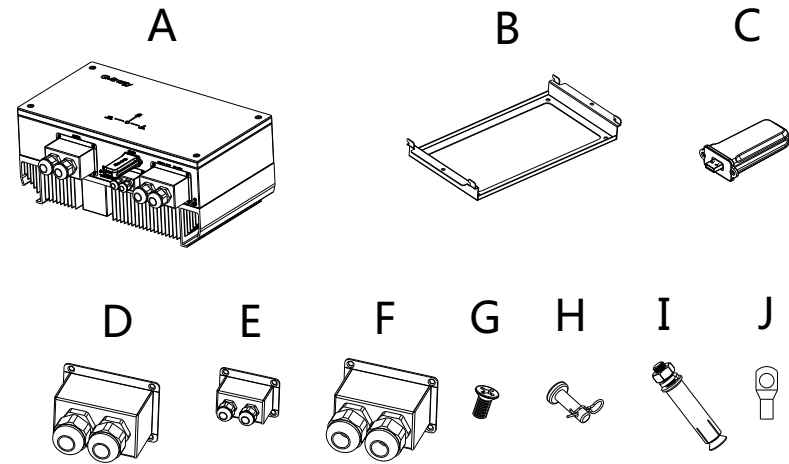
4 Unpacking

Thoroughly inspect the packaging upon receipt. If any damage to the packaging is visible, or if you find that the unit is damaged after unpacking, please notify the distributor immediately.

If there is anything damaged or missing, please contact your supplier. Do not dispose of the original packaging. If you want to transport the unit, it is better stored in the original packaging.

Complete Delivery Should Contain As Follows:




Figure 3



Item	Name	Quantity
A	AC Coupled	1
B	Mounting Frame	1
C	WIFI Or GPRS	1
D	BAT Wire Cover	1
E	BMS, RS485 Com Wire Cover	1
F	AC Output Cover	1
G	Cover Screw	14
H	Inverter Security Pin	2
I	Mounting Frame Fixings	4
J	Battery Input Terminations	2

5 Installation and Electrical Connection

5.1 Safety

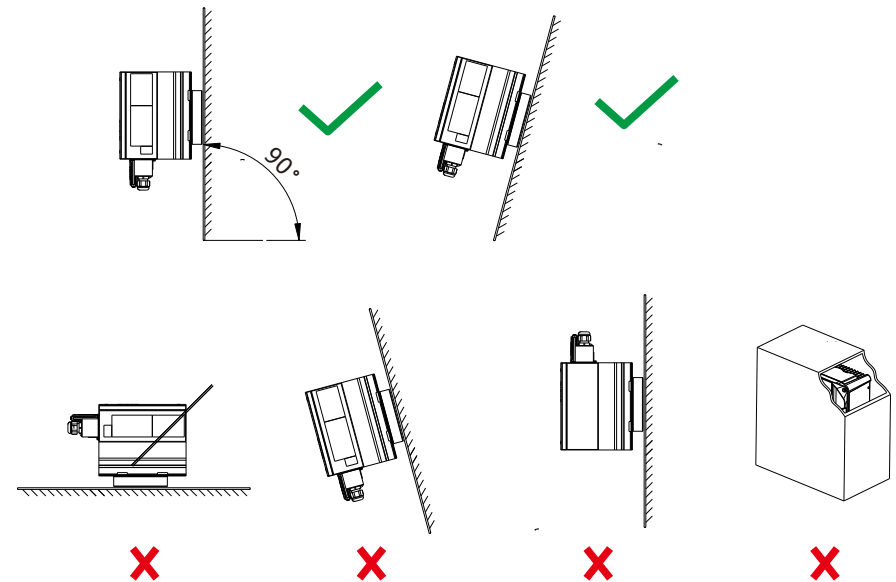
 <p>DANGER</p> <p>Danger to life due to fire or explosion Despite careful construction, electrical devices can cause fires. Do not install the inverter on easily flammable materials and where flammable materials are stored.</p>
 <p>DANGER</p> <p>Risk of burns due to hot enclosure parts Mount the inverter in such a way that it cannot be touched inadvertently.</p>
 <p>DANGER</p> <ul style="list-style-type: none"> ▶ All electrical installations shall be done in accordance with the IEE Wiring Regulations. Do not remove the casing. The inverter contains no user serviceable parts. Please refer servicing to qualified service personnel. ▶ All wiring and electrical installation should only be conducted by a qualified electrician. ▶ Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local supplier. ▶ This unit is designed to feed power to the public power grid (utility) only. Do not connect this unit to a generator. Connecting the inverter to external devices could result in serious damage to your equipment. ▶ When a photo-voltaic panel is exposed to light, it generates a DC voltage. When connected to this equipment, a photo-voltaic panel will charge the DC capacitors.

5.2 Selecting The Installation Location

This is guidance for the installer to choose a suitable installation location, to avoid potential damages to the device and operators.

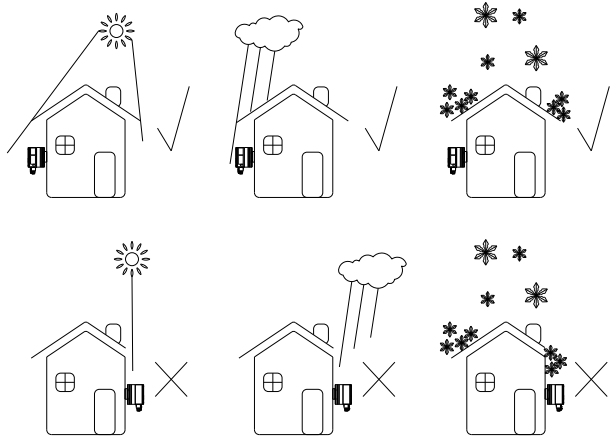
- ▶ The inverter shall not be installed where in direct contact with water or in direct sunlight.
- ▶ The unit shall be mounted at least 914 mm (3 feet) above the ground.
- ▶ The installation location must be suitable for the inverter's weight and dimensions for a long period of time.
- ▶ Select the installation location so that the status display can be easily viewed.
- ▶ Do not install the inverter on structures constructed of flammable materials.
- ▶ The humidity of the installation location should be 0 - 95%, without condensation.
- ▶ The installation location must be safely accessible to get to at all times.
- ▶ Vertical installation or tilted backwards by max. 15° and make sure the connections of inverter are at the bottom. Never install horizontally and avoid forward and sideways tilt.
- ▶ Be sure that the inverter is out of the children's reach.
- ▶ Do not put anything on the inverter. **Do not cover the inverter.**
- ▶ Do not install the inverter near television antenna or any other antennas, antenna cables.
- ▶ The Inverter requires adequate cooling space. Provide the best ventilation for the Inverter to ensure the heat escapes adequately. The ambient temperature should be below 40° C to ensure optimum operation.

Figure 4



- ▶ The inverter should not be installed in direct sunlight, direct heavy water sources or unstable locations. We recommend that the inverters be installed at a location with some cover or protection.

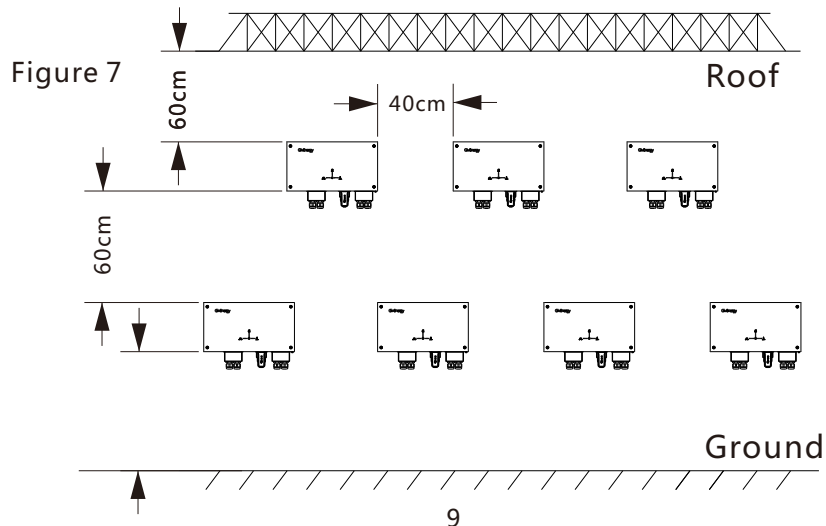
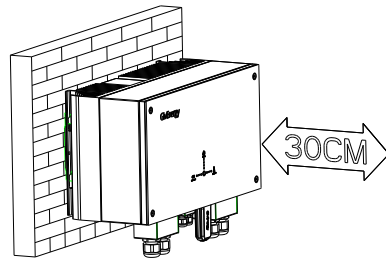
Figure 5



- ▶ Observe the minimum clearances to walls, other inverters or objects as shown in the diagram below in order to guarantee sufficient heat dissipation.

Figure 6

Direction	Min. clearance(cm)
above	60
below	60
sides	40
front	30



Ambient Dimensions Using Inverters In Series

- ▶ There must be sufficient clearance between the individual inverters to ensure that the ambient air from the adjacent inverter is not taken in.
- ▶ If necessary, increase the clearance spaces and make sure there is enough fresh air supply to ensure sufficient cooling of the inverters, and heat dissipation.

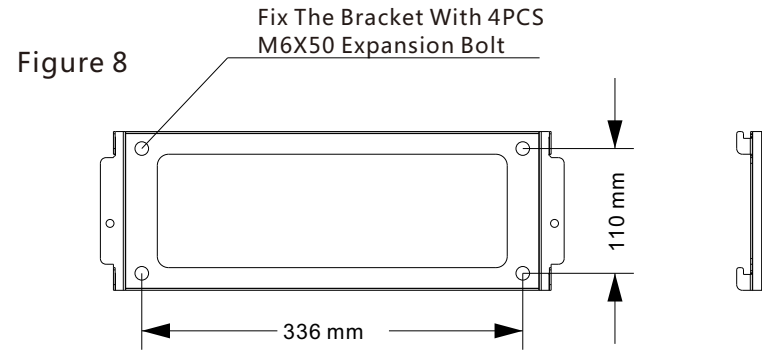
5.3 Mounting The Inverter With Bracket



WARNING

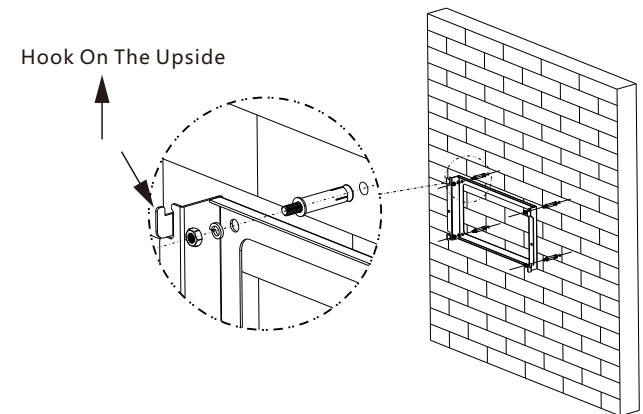
In order to avoid electrical shock or other injury, inspect existing electrical wiring systems or plumbing installations before drilling holes for bracket fixings

- ▶ The dimension of bracket as in [Figure 8]:



- ▶ Using the mounting frame as a template, drill holes as illustrated in the image below.

Figure 9



PLEASE NOTE: If damage arises to the inverter as a result of insufficient fixings so as to withstand the load of the inverter, or the installation is not carried out in accordance with the manufacturer's requirements, the warranty may be voided.

5.4 Fixed The Inverter On The Wall

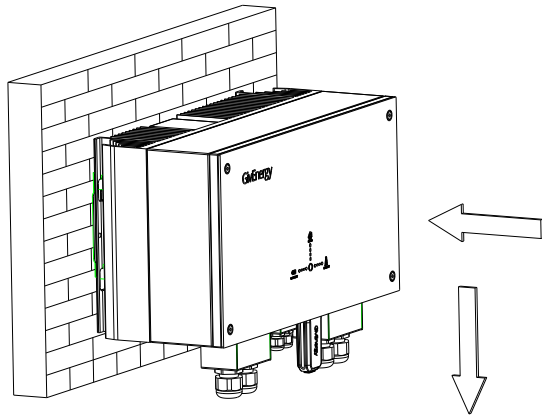


WARNING

Falling equipment can cause serious or even fatal injury. Never mount the inverter on the bracket unless you are sure that the mounting frame is securely mounted on the wall.

- ▶ Raise the inverter a little higher than the bracket. Consider the weight during the process to maintain the balance of the inverter. Hang the inverter on the bracket through the hooks on bracket.

Figure 10



- ▶ After confirming the inverter is fixed securely, insert the four M4 safety-locking screws on the left and right side to prevent the inverter from being lifted off the bracket.

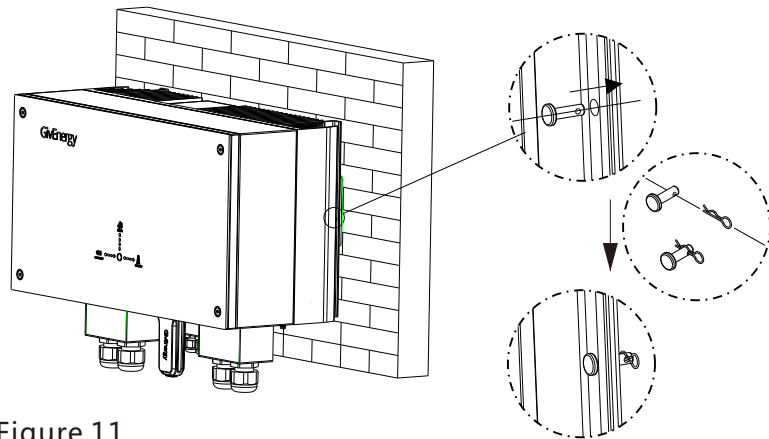


Figure 11

5.5 Check Inverter Installation Status

- ▶ Check the mounting of the inverter by trying to raise it from the bracket. The inverter should remain firmly attached.
- ▶ Please ensure that the correct mounting surface is selected to allow for vibration of the inverter during normal operation.

5.6 Electrical Connection

5.6.1 Safety



Danger To Life Due To Lethal Voltages!

High voltages which may cause electric shocks are present in the conductive parts of the inverter. Prior to performing any work on the inverter, disconnect the inverter on the AC side, battery side.



DANGER

Do not reverse the polarity of the battery! It will damage the inverter and void any warranty.



DANGER

Danger of damage to electronic components due to electrostatic discharge. Take appropriate ESD precautions when replacing and installing the inverter.



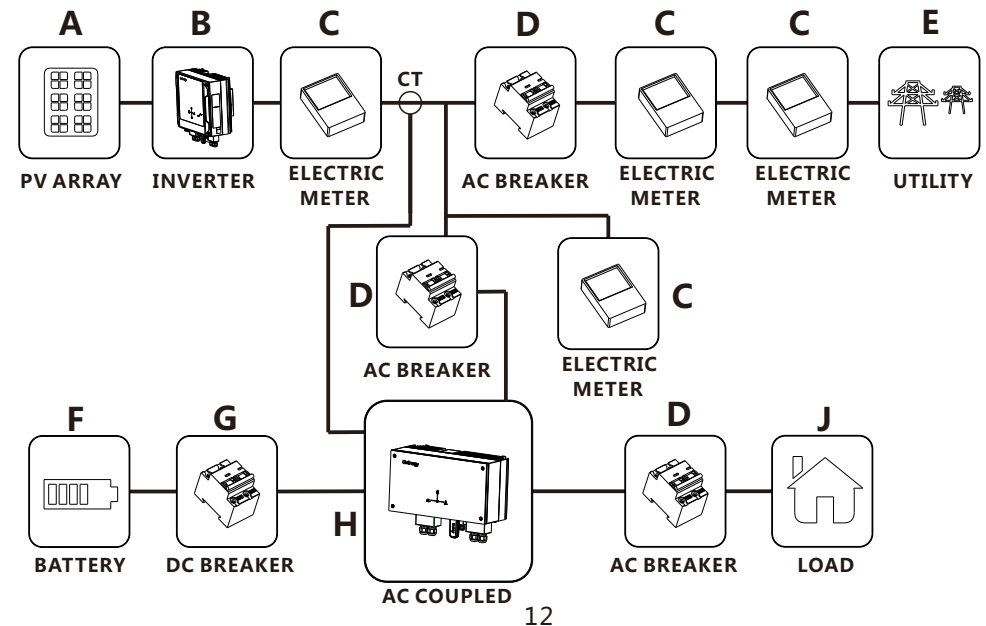
DANGER

Earthing.

Before connecting the DC power cables, the AC supply must be earthed.

5.6.2 System Diagram With Inverter Electrical

Figure 12



Position	Description
A	PV Modules
B	Inverter
C	Energy Meter
D	AC Breaker
E	Utility Grid
F	Battery
G	Battery DC Breaker
H	AC Coupled


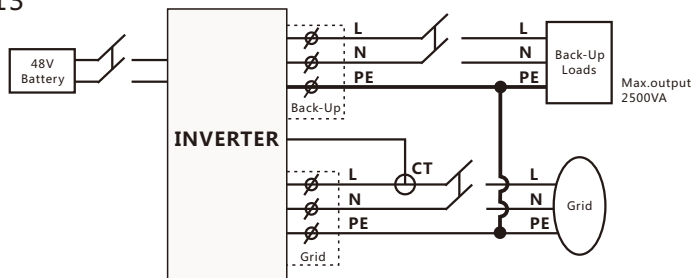
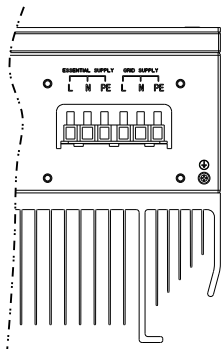
 **NOTE**
Ensure all wiring is correctly selected and erected in accordance with BS7671:2015, IEE wiring regulations.

Figure 13



5.6.3 Connect To The Grid (AC Utility)

Figure 14



Output Connection Terminals

Figure 14



- A Conductor Cross-section:
See the conductor cross section in the flowing chart
- B Bare Length: 8mm around

We suggest the AC separate unit spec as follow,

Output cable requirements

Product Model	Current	Area CSA (mm ²)
Giv-AC3.0	15A	2.5 ~4.0



NOTE

The cable length should not exceed 50 m as the resistance of the cable will consume inverter output power and reduce the inverter efficiency.



WARNING

You must install a separate AC circuit-breaker or other load disconnection unit between the inverter and utility, in order to ensure that the inverter can be safely disconnected under load.

5.6.4 Connect To The Back-Up

The back-up can provide a maximum output power of 2500w. You can connect the essential load to the back-up terminals.

You must install an AC Isolator or other load disconnection unit between the inverter back-up output and the essential load, in order to ensure that the inverter can be safely disconnected under load. We suggest the separate unit spec is **20A**.



WARNING

The back-up MAX output power is 2500w. If the load is greater than 2500w, the inverter will stop outputting and draw from the grid. The output power of back-up depends on the battery capacity.

5.6.5 Connect To The Battery

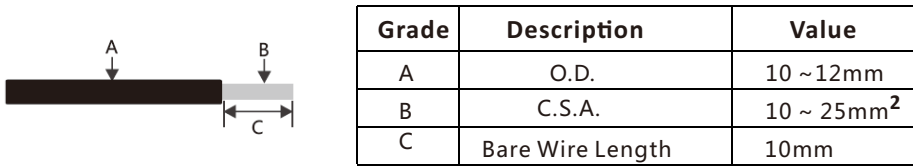
- ▶ Before connecting to the battery, you must install a separate DC breaker (not less than 120A) between the inverter and battery. That will ensure the inverter can be securely disconnected during maintenance.



DANGER Reversed polarity will damage the inverter!!!

- ▶ It is very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, you must use the proper recommended cable size, refer to the following;

Figure 18



- ▶ The battery must be installed in accordance with the manufacturer's instructions.
- ▶ The MAX charge / discharge current of the inverter is 50A.
- ▶ The inverter's battery rated voltage is 48V. The battery series connection voltage must not exceed 48V or it will damage the inverter and void any warranty.

Follow the below steps to implement the battery connection:

- (1) Check the battery nominal voltage meets the inverter spec.
- (2) Disconnect the breaker between inverter and battery.
- (3) Check out the polarity of the battery and the inverter.
- (4) Terminate battery DC cables by means of the lugs provided.
- (5) Screw the DC cables to the inverter's battery input terminal.
- (6) The correct battery technology must be selected upon commission, so that it can be controlled via the BMS

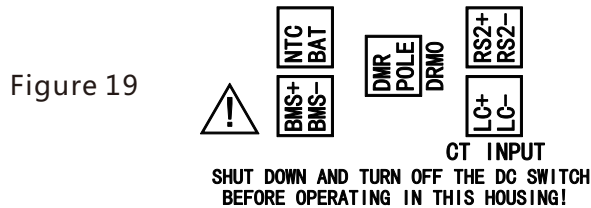





Figure 19

 **NOTE** we recommend using the Solarshop appointed lithium battery, because the battery BMS communication has been designed to be compatible with the Solarshop Hybrid Inverter.

 **DANGER to life due to voltages!** Before you install the BAT.NTC, you must turn off the inverter, check all the separate breakers are off, and the inverter's LED is off. Then you can safely install the BAT.NTC terminal to the inverter.

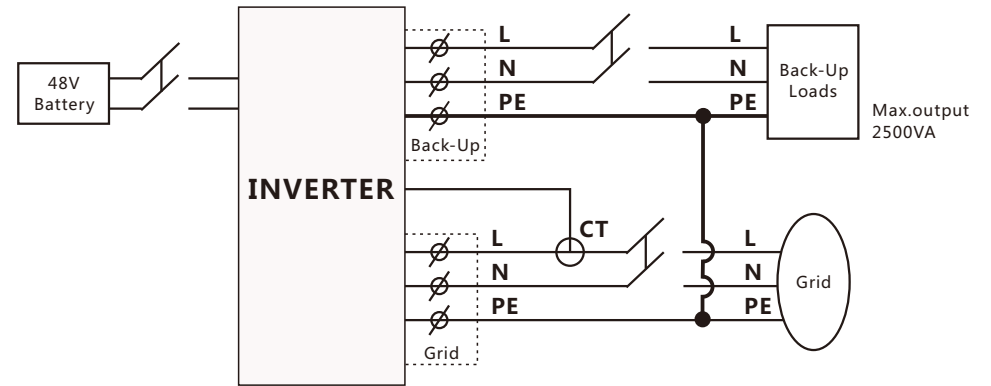
 **DANGER**

5.6.6 Connect CT Clamp Or Mid Approved Meter To Inverter

In the system, a CT or mid approved meter must be installed to monitor the power of the house to decide the inverter status: charge or discharge.

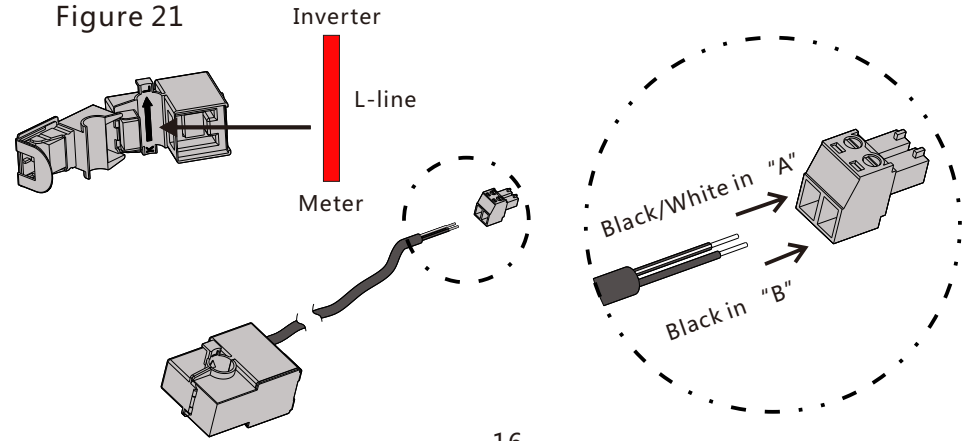
CT or meter must be installed at the origin of supply. In this case, the inverter can monitor all household consumption of power. According to the sensor, the inverter will control the PV power feeding to the grid to balance the level of household power use.

Figure 20



Place the CT reader inbetween the meter and the inverter. This must be positioned in front of local load and around the LIVE wire only with the arrow pointing TOWARDS the inverter.

Figure 21



6 The Inverter Parameter Setting

Connect to the inverter via the Engineers software to set the battery parameter, grid charger time, inverter discharge time and various other functions.



NOTE

Without setting the parameters, the inverter will not be commissioned.



WARNING

Check that all the wires are securely connected before the battery breaker and the AC isolator is switched on. The PV should be switched on first to start the inverter, and you **MUST** set the parameter of battery according to your battery system.

7 Communications

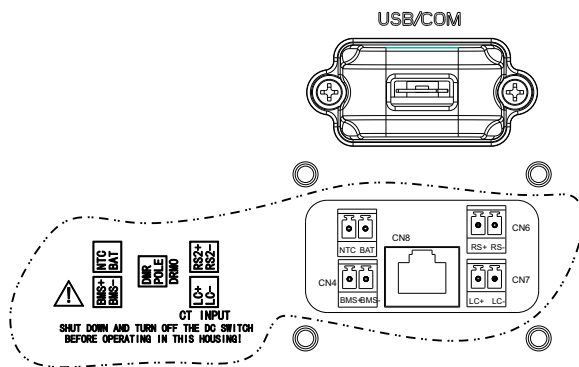
7.1 Wi-Fi/GPRS

Hybrid inverter uses Wi-Fi/GPRS as standard wireless communication.

7.2 The DRM0 Function For SAA Certification

The DRM0 function of hybrid inverter is provided for SAA. The DRM0 connection CN5 in the front plate, as the picture:

Figure 22



When it receives the order from DRM0 connection, the inverter will act responding to the order, the inverter must POWER OFF or POWER ON.

8 Start-Up And Shut Down Of The Inverter

8.1 Start-Up The Inverter

- (1) Connect the AC circuit breaker;
- (2) Turn on the DC switch;
- (3) Turn on the battery breaker;
- (4) The inverter will start automatically when the PV voltage is higher than 150V and the battery voltage is higher than 46.4V ;

8.2 Disconnecting The Inverter

- (1) Disconnect the AC circuit breaker to prevent it from being reactivated;
- (2) Disconnect the Battery breaker to prevent it from being reactivated;
- (3) Turn off the PV switch;
- (4) Check the inverter operating status;
- (5) Wait until LED display has gone out, the inverter is shut down.

9 Maintenance And Cleaning

9.1 Checking Heat Dissipation

If the inverter regularly reduces its output power due to high temperatures, please improve the heat dissipation conditions. You need to clean the heat sink, or look for other obstructions.

9.2 Cleaning The Inverter

If the inverter is dirty, please shut down the inverter and clean the enclosure lid.

9.3 Checking The DC Switch

Check for externally visible damage and discoloration of the breaker, and the cables at regular intervals. If there are any signs of visible damage to the breaker, or visible discoloration or damage to the cables, contact the installer.



WARNING

Once a year, turn the rotary switch of the DC switch from the On position to the Off position 5 times in succession. This cleans the contacts of the rotary switch and prolongs the electrical endurance of the DC Disconnect.

10 Decommissioning

10.1 Dismantling The Inverter

- (1) Disconnect the inverter as described;
- (2) Remove all connection cables from the inverter;
- (3) Screw off all projecting cable glands;
- (4) Lift the inverter off the bracket and unscrew the bracket screws;



DANGER

Danger of burn injuries due to hot enclosure parts!
Wait 20 minutes before disassembling until the housing has cooled down.

10.2 Packing The Inverter

If possible, always pack the inverter in its original packaging and secure it with tension belts. If this is no longer available, you may also use an equivalent sized carton. The box must be capable of being closed completely and made to support both the weight and the size of the inverter.

10.3 Storing The Inverter

Store the inverter in a dry place where ambient temperatures are always between -25°C and +60°C.

11 Work Modes

The Solar Shop Series Hybrid Inverter has the following main work modes:

<p>DAYTIME MODE</p> <p>The system optimizes the delivery of generated PV power, prioritizing LOCAL loads then BATTERY if necessary and finally ending excess generated power to the GRID.</p>	
<p>NIGHT TIME MODE / ON PEAK EVENING</p> <p>This is prioritized to discharge the battery ready for the OFF PEAK time to refill if necessary at the cheapest rate. When the battery is depleted automatic switching will occur and GRID power will be used.</p>	
<p>EMERGENCY BACK UP AND ISLAND MODE</p> <p>The system has the ability to be a stand alone system in ISLAND MODE. There is also an essential backup power system available for use when there is a power cut.</p>	
<p>DEMAND SIDE RESPONSE</p> <p>There is an option in our software to allow remote data collection/analytics. This gives vital information to utility providers and can allow a high level of indication to when demand will occur.</p>	

12 Manufacturer Warranty

This inverter is covered by a 10 year warranty. Completion of the online registration certificate validates a standard factory warranty of 10 years from the date of commission.

13 Technical Date

SPEC	Giv-AC3.0
Output Date (AC)	
Nominal AC Output Power	3000W
Max.AC Apparent Power	3000VA
Max.Output Current	15A
AC Nominal Voltage; Range	220V/230V/240V
AC Grid Frequency; Range	50,60Hz; ± 5 Hz
Power factor at rate power	1
Power Factor	0.8leading...0.8lagging
THDi	<3%
AC connection	Single phase
Battery	
Battery Type	Lead-acid or Li-ion
Norminal voltage	48V
Battery Capacity	> =100Ah(depending requirement)
Energy	4.88kWh(depending requirement)
Max. discharging /Charging Power	3000W / 3000W
Charging Curve	3-stage adaptive with maintenance
Operating Voltage Range	46.4-57.6V
Max. Charging/Discharging Current	60A / 60A
Back-Up Output	
Outpu Rate Power	3000VA
Peak Power	3450VA,10s
Output Voltage	230Vac $\pm 2\%$, 50Hz(60Hz Optional) $\pm 0.2\%$, THDV<3%(linear load)
Efficiency	
Max. efficiency	97%
Euro - eta	96.50%
MPPT efficiency	99.50%
Protection Devices	
Output over current protection	Yes
Output overvoltage protection-varistor	Yes
Ground fault monitoring	Yes
Grid monitoring	Yes
Max. inrush current	30A peak
Max. output fault current	40A peak
Max. output overcurrent protection	25A rms
Integrated all - pole sensitive leakage current monitoring unit	Yes

SPEC	Giv-AC3.0
General Date	
Dimensions (W / H / D)	480 X 260 X 220mm
Weight	18.9KG
Operating temperature range	-25...+60°C (-13...+ 140°F) With derating above 45°C (113°F)
Noise emission (typical)	≤ 25 dB(A)
Altitude	Up to 2000m (6560ft) Without power derating
Relative humidity	95%
Consumption: operating (standby) / night	<5W / < 0.5 W
Topology	Transformerless
Cooling concept	Natural
Environmental Protection Rating	IP65
Features	
Battery connection	Screw terminal
AC connection	Screw terminal
Display	LED
Interfaces: Wi-Fi/USB/GPRS/RS485	Yes/Yes/Opt/Opt
Warranty:	10 Years
Certificates and approvals	CE,IEC 62109-1&2, VDE 0126-1-1 G83/2, AS4777&NZS 3100, EN 50438

Note:

- (1) Back-Up output power depends on the battery.
- (2) Specifications are subject to change without further notice.