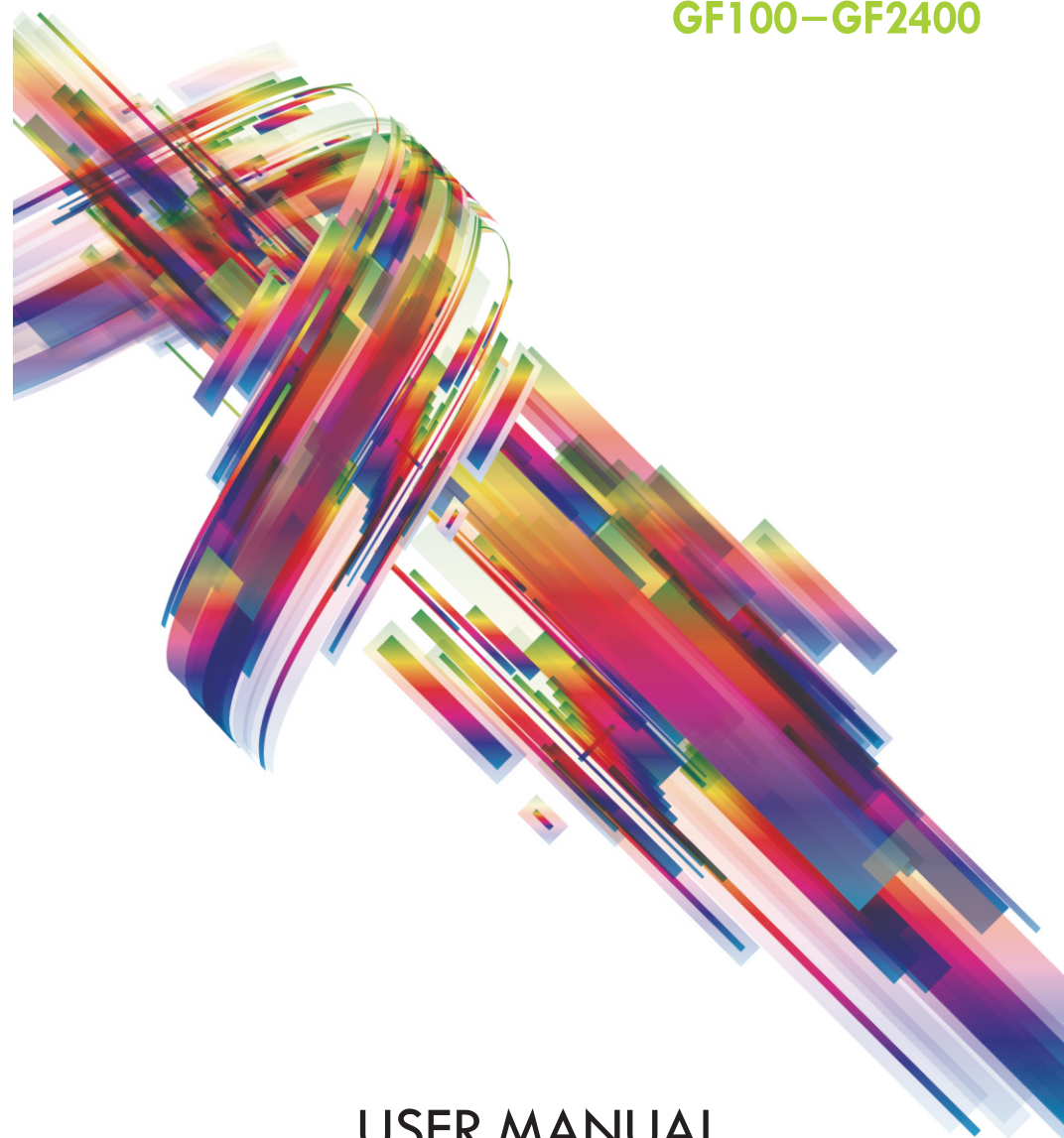
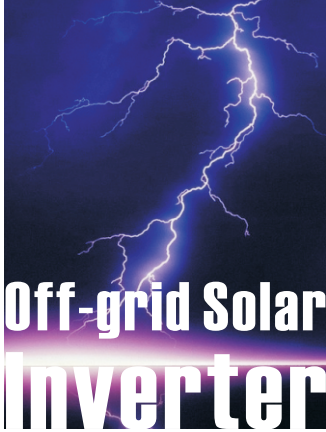


**Off-grid Solar  
Inverter**  
GF100—GF2400



**USER MANUAL**

Pure Sine Wave Off-Grid Solar Inverter



**Off-grid Solar  
Inverter**  
Pure Sine Wave  
Off-Grid Solar Inverter



Thanks for using our products.  
Please strictly obey all the instructions in this manual and pay attention to all the warning and operation information. It is not advisable to install or operate the machine before reading this manual.

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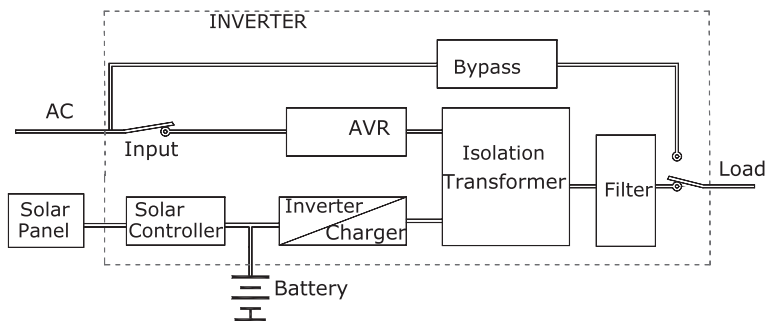
# 1 Safety and Summary

## Please obey below items to ensure the security

- It is normal that the case surface temperature go up to 50°C during using.
- Do not use Inverter with overload.
- Do not open Inverter cover in case danger of electric shock, maintenance and battery replacement should be handled by technicians.
- Inverter inner short circuit will cause electric shock or fire danger. Do not put any liquid vessel on Inverter.
- Cut off power rapidly if equipment work abnormal, and contact with local dealers or service office.
- Make sure not to keep or use the product in following environment.
  - ① No good air circulation;
  - ② Place having flammable gas corrosive material or lots of dust;
  - ③ Place under abnormal high or low temperature (above 40°C or below 0°C), and high humidity (above 90%);
  - ④ Place having direct sunlight or close to heater equipment;
  - ⑤ Place having severe vibration;
  - ⑥ Outdoor.
- Use powder extinguisher if there is fire around Inverter. Not to use liquid extinguisher in case danger of electric shock.
- Place sockets nearby Inverter, so as to pull out sockets and cut off the power in an emergency situation.

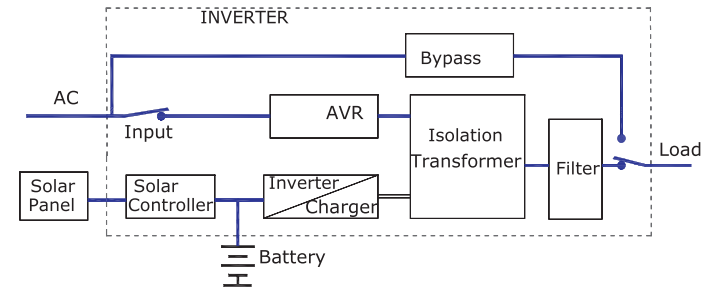
# 2 Working principle

## 2.1 System circuit diagram

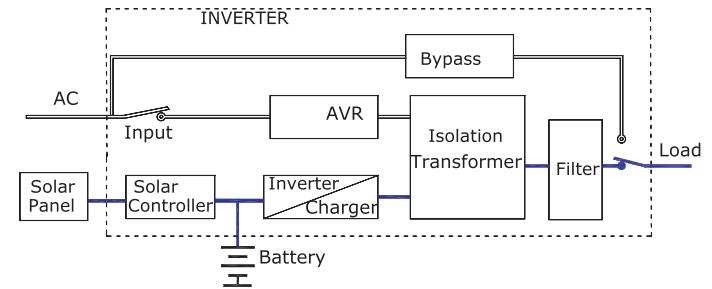


## 2.2 AC priority mode

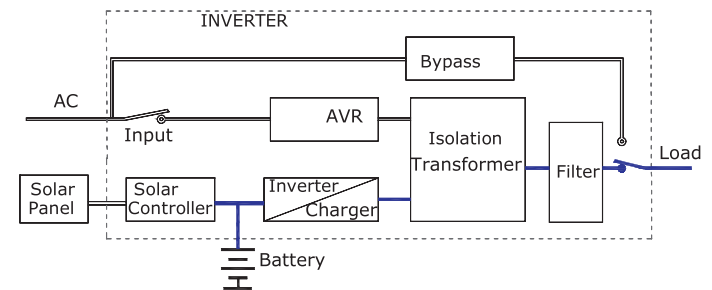
- When AC power supply is normal: AC input will provide power to equipments through regulator after removing the high frequency harmonic with filter. At this time, PV gives power to batteries only through MPPT control system;



- When Mains overrun or cut off: The system will convert the energy of battery and PV systems to the power needed by equipments promptly, and give power supply to the user equipment to ensure power supply continuity.

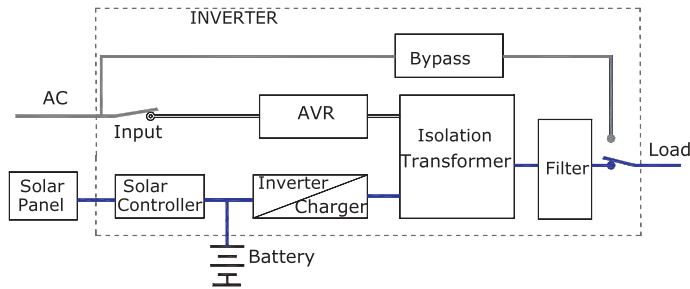


- When Mains overrun or cut off and without PV (no sun power): The system will convert the energy of battery to the power needed by equipments promptly, and give power supply to the user equipment to ensure power supply continuity.

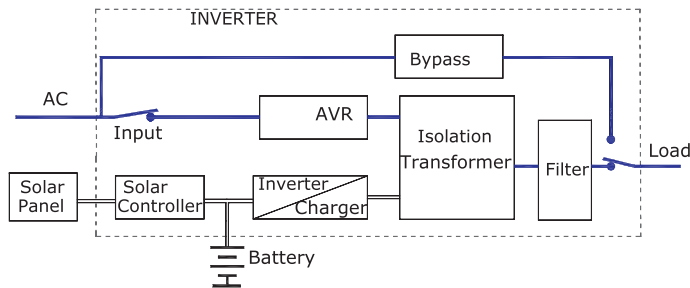


## 2.3 PV priority mode

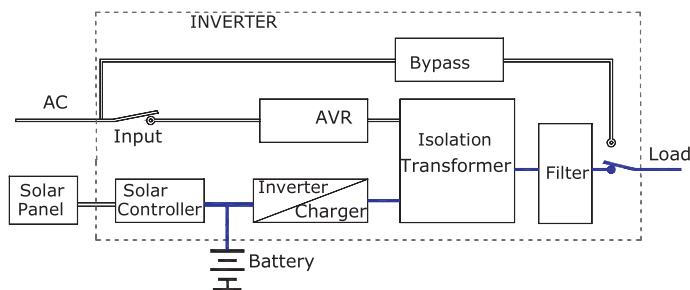
- During the day, with ample sunlight, and Mains is normal: solar panel will adjust to the largest state through solar power controller and give power to load through the inverter (Mains as a standby), and charge the battery at the same time (see below diagram);



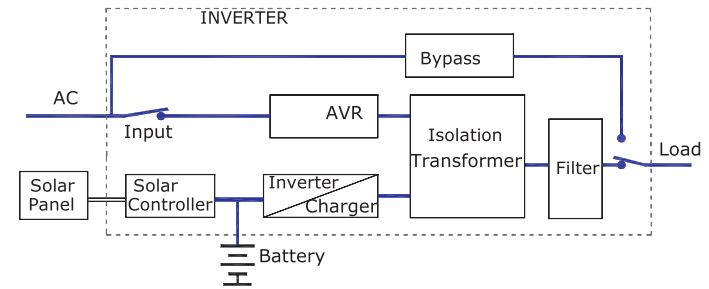
- During the evening (or rainy days, with no sun), and Mains is normal: the system will provide power through battery first, discharge until to the set value (reserved a certain power in case of emergency situation), and then automatically switch to the Mains and provide power to loads through the regulator (see below diagram);



- The evening (or rainy days, with no sun), electricity under abnormal AC input: the system will use battery power to provide power to loads through inverter system.



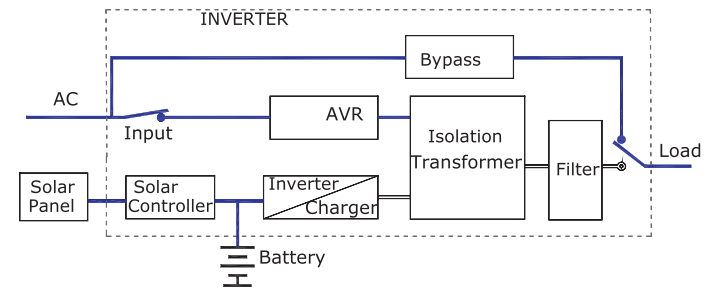
- The evening (or rainy days, with no sun), battery has been discharged to empty and Mains recover: System will switch to Mains and give power supply to loads through system regulator. At the same time, charger will start working and charge the battery (see below diagram);



## 2.4 Bypass Power:

### Four conditions under bypass

- OVER LOAD;
- Inverter FAILURE;
- ON: press the ON button by 3seconds. inverter starts within 15seconds;
- OFF: press the OFF button by 3seconds. inverter shuts down.



# 3 Alarm and Protection

## 3.1 Alarm

### 1) PV Priority

- When the solar battery is low, Alarming is called once per 5 seconds, auto-mute after 40seconds, no longer interfere with the work environment.

- When the battery is running out, the inverter will start rapid alarming again, the frequency is once per 0.2 seconds one time, to remind staff, run out of battery, the inverter will shut down.
- When the battery is running out, the inverter will be off automatically to protect battery.

### 2) AC Priority

- When the solar battery provides power at the beginning, Alarming is called once per 5 seconds, auto-mute after 40seconds , no longer interfere with the work environment.
- When the battery is running out, the inverter will start rapid alarming again, the frequency is once per 0.2 seconds one time, to remind staff, run out of battery, the inverter will shut down.
- When the battery is running out, the inverter will be off automatically to protect battery.

## 3.2 Protection

### 1) Online protection function

- Normal inverter overload: alarming exceeds 110% load, load will reduce under the rated range within 60 seconds, the system normally provide power supply; timeout, the system will automatically shut down. When AC restore (or manual start), the system will recovery power supply.
- Abnormal inverter overload: alarming exceeds 125% load, it automatically shut down within 5 seconds. When AC restores, the system will recovery power supply.
- Overload in Mains power: The inverter will give alarm when over 110% load, it switches to bypass within 60 seconds. When reducing load, it automatically restore normal.
- Short circuit protection: If the inverter output instantaneous state of shock, short circuit, output current limiting device, if more than 10ms, the system will automatically shut down.

### 2) No-load off function (Option)

- The battery (or under the solar supply power state), the system will automatically detect the load, if the load is less than 5%, the inverter will determine the "no-load" to reduce the loss in no-load state for 1 minute, the system will automatically turn off.

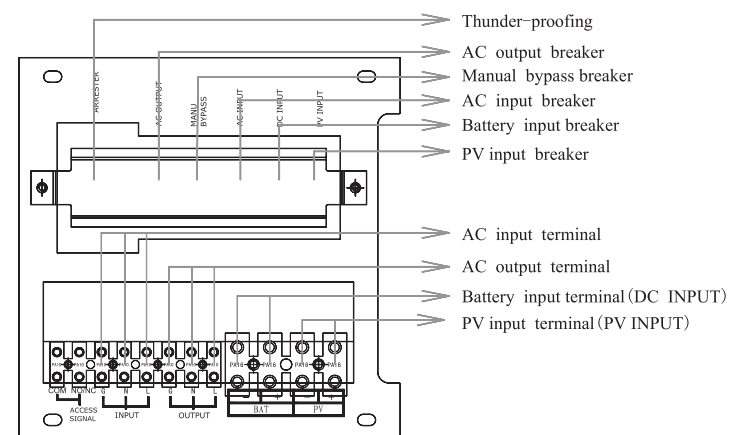
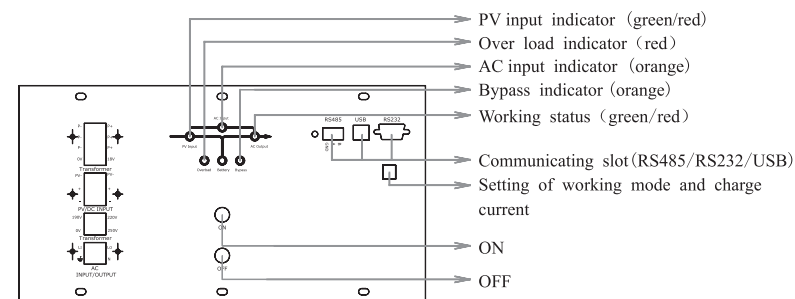
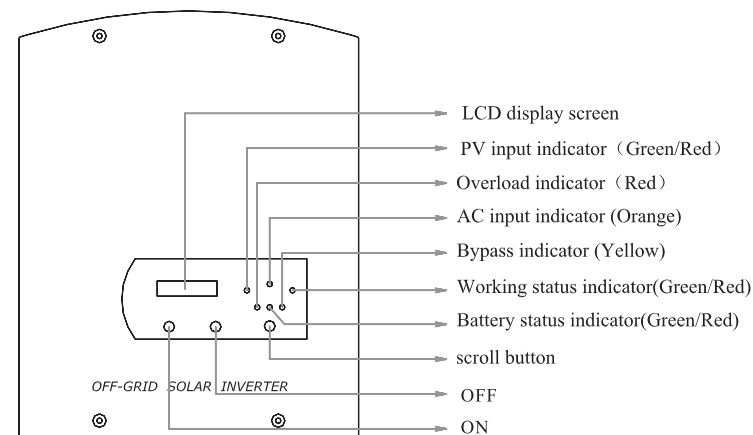
### 3) Frequency auto-sensing

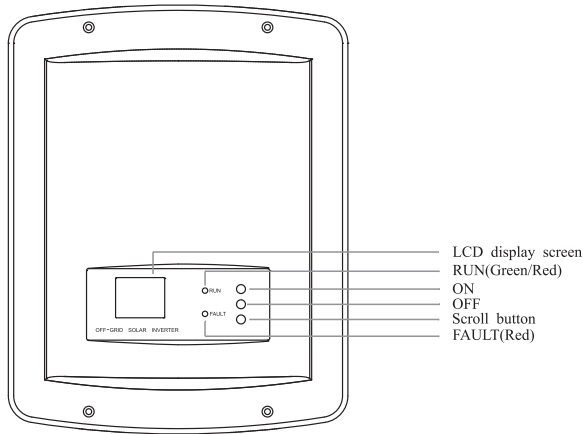
- When the inverter connected to utility power, the frequency is 50Hz or 60Hz, the system will automatically detect the mains frequency, when AC power failed, output frequency will be the same with the mains frequency (50Hz or 60Hz).

# 4 Product components

## 4.1 LCD front panel

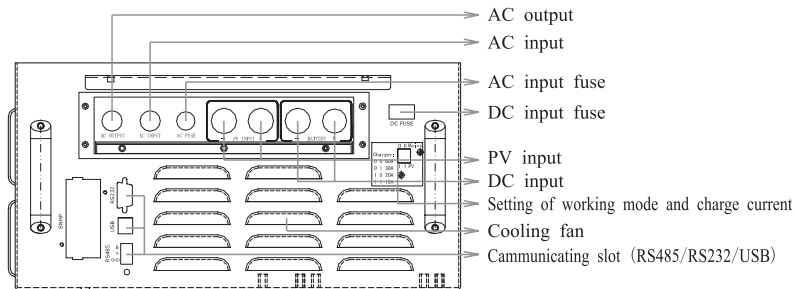
### 1) Picture of Front panel:





## 4.2 Rear panel

### 1) Rear panel picture



### 2) Setting mode & charge current



SW-1	SW-2	SW-3	Function
**	**	Mains	AC Priority mode
**	**	PV	PV Priority mode
0	0	**	PV Max. charge current 40A/60A
0	1	**	PV Max. charge current 30A
1	0	**	PV Max. charge current 20A
1	1	**	PV Max. charge current 10A

# 5 Installation and usage

## 5.1 Product installation

- Put the inverter to the suitable position with good ventilation, at least 150mm ambient space around the vent and fan.
- Close the equipments (for example: computer master), pull power wire into the inverter input socket.
- As per the requirement of the system, install the plus plate and negative plate of the battery as well the air switch first (the current of the battery connected wires and the switch should be 1.3-2 times of rated current); secondly, connect the battery with series connection wires (make sure to right connect the plus plate and negative plate); finally, connect the wires which were allocated with the inverter, then put the plug into DC input of the inverter (please note red for plus plate, black for negative plate, make sure not to reverse connection).

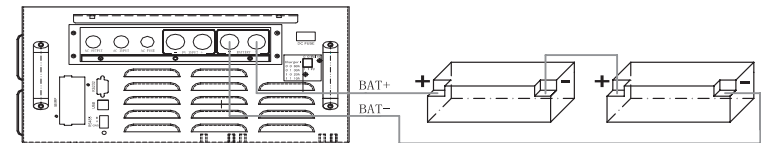
### Note !



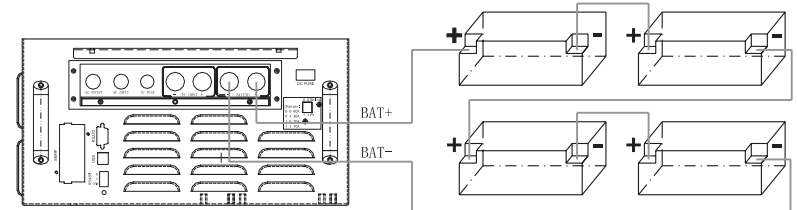
the following connected diagram of the tower type is a example, for wall mounted and outdoor inverter, just connect the battery positive and negative terminal(DC INPUT) and solar positive and negative terminal(PV INPUT) to the corresponding terminals.

### Battery connection:

#### • 24V products battery connection



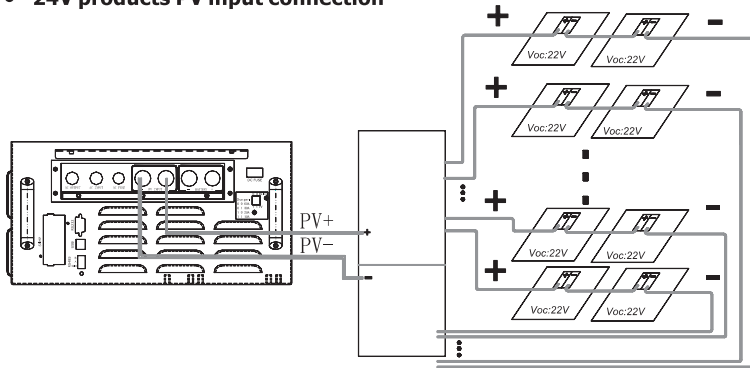
#### • 48V products battery connection



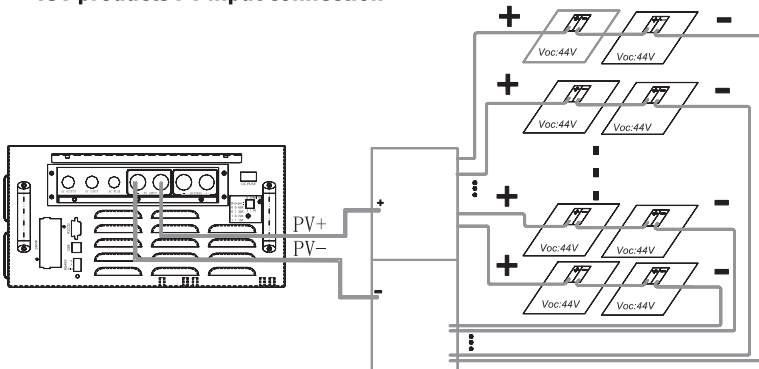
- Connect connection box of solar panel with the allocated wires (when the wires short, add extension wires), then put the plug into DC input of the inverter (please note red for plus plate, black for negative plate, make sure not to reverse connection).

## PV Connection:

### • 24V products PV input connection



### • 48V products PV input connection



- Connect the input plug of the inverter to main power socket. (make sure L、N be right and the ground line is ok)
- Make sure the battery voltage/PV input voltage/AC voltage/plate all accord with the product usage requirement.

#### Note !



- Current specification of the cables and breaker should be 1.3 to 2 times than the rated current.
- When connect the cables with the machine, cables connected to the DC terminals, red is "+", black is "-".

#### Warning !



When connect the cables between the batteries, confirm that "+", "-" properly connected, can't connected reversed, otherwise short circuit there will be danger.

## 5.2 ON/OFF

- According to users' configuration and requirement, make sure the working mode (AC Priority or PV Priority).
- When there is Mains power: Turn on the AC input switch on rear panel of inverter; inverter will start self-testing and output through bypass and will be in normal condition in 15 seconds, the user can start PC and other load at this moment.
- When PV/Battery supply power (no Mains): Turn on the switch of battery group and PV confluence box, press "ON" button on the front panel in 3 second. The system will supply power normally.
  - ① Daily start: Press the start button ("ON") for 3 seconds, inverter will output normally in 15 seconds.
  - ② Daily shut-down: Press the shut-down button ("OFF") for 3 seconds, inverter will turn to bypass mode if the Mains power is on. And bypass LED will be on at the moment. Otherwise the inverter will shut down.

#### Note !



When start the machine ,please turn on inverter first then load; when shut down the machine, please do the load first then inverter.

## 5.3 ON and OFF operation after long time storage of inverter

- When unused the inverter for 7 days, please push the shut-down bottom to turn off the inverter firstly, then turn off input switch/PV connection box switch/battery switch on the rear panel again.
- If unused above 3 months, please turn on battery and PV connection switch, let the system charge above 12 hours to keep the battery in a full power situation, to extend the life span of the battery.

#### Warning !



In order to ensure equipment and human safety, it must be installed by qualified technicians.

## 5.4 Manual breaker operation (specially for outdoor inverter)

- Start procedure for using "MANU BYPASS" :
  - ① Before close the manual breaker, please turn off the inverter or UPS, make sure machine is in bypass mode.
  - ② Remove "MANU BYPASS" breaker lock, close "MANU BYPASS" breaker.
  - ③ Turn off the inverter or UPS "AC INPUT" "DC INPUT" "PV INPUT" and "AC OUTPUT" breaker, at the same time, lock the "AC OUTPUT" breaker of the UPS or inverter (non-closing this breaker).
  - ④ Take out the chip, start the maintain and testing work of the UPS.

➤ Closed procedure for using "MANU BYPASS" :

- ① Open "MANU BYPASS" breaker, take out the lock of "AC OUTPUT" breaker, at the same time, lock the "MANU BYPASS" breaker(non-closing this breaker).
- ② Close "AC INPUT"、"DC INPUT"、"PV INPUT" and "AC OUTPUT" breaker, turn on the UPS or inverter.

### Warning !



Normally, closing the breaker of the machine and opening the machine is acceptable, when machine is failure, operation must with the professional engineer's help in order to be safe.

## 6 Specifications

Model		GF100	GF500	GF800	GF1000	GF1500	GF2000	GF2400
Power		100W	500W	800W	1000W	1500W	2000W	2400W
Battery voltage		12Vdc	12Vdc 24Vdc	24Vdc	24Vdc 48Vdc	48Vdc		
Working mode		PV(Photovoltaic priority) / AC(AC priority)Optional						
PV	Input voltage range	12Vdc -- 25Vdc		24Vdc -- 45Vdc		48Vdc -- 90Vdc		
	PV panels configuration(Suggestion)(Vmp)	15Vdc -- 17.8Vdc		30Vdc -- 36Vdc		60Vdc -- 71Vdc		
	PV panels configuration(Suggestion)(Imp≤rated current)	≤20A	≤40A		≤50A	≤60A	≤80A	
	Max charge current	5-20A Optional	10-40A Optional				10-60A Optional	
	Max transfer efficiency	98 %						
	Display	Display panel	LCD + LED					
Mains status (option)	Input voltage range	165Vac-275Vac / 150Vac-275Vac (customized)						
	Input frequency range	45-65 Hz (over this range transfer to inverter model auto.)						
	Output voltage range	220Vac ± 10%						
	MAX Input PF (AC/DC)	98%						
	MAX efficiency	96%						
	MAX Charge current	12A Max( battery discharge ends; Start charging when PV charge current less than the set value)						
	AC over load	110% load, after 255s, transfer to bypass, 120% load ,after 60s transfer to bypass, 150% load, after 10s, transfer to bypass, auto recover after decrease load						
	Short circuit	Input fuse / breaker						

Selection of the wire diameter	AC INPUT(mm <sup>2</sup> )	≥1			≥1.5			≥2.5			
	AC OUTPUT(mm <sup>2</sup> )										
	PV INPUT(mm <sup>2</sup> )	≥4	≥12	≥6	≥10	≥12	≥6	≥10	≥12	≥12	
	DC INPUT(mm <sup>2</sup> )										
Inverter Output	Output voltage	220Vac ± 5%									
	Output frequency	50Hz / 60Hz ± 1% Auto.									
	Output PF	≥0.8									
	Distortion	Line load≤5%									
	PV-AC transfer time	5Ms typical value Max.8 Ms									
	Max efficiency	84.5%									
	Inverter overload	110% load 255s shut down, 120% load 60s shut down, 150% load 10s shut down									
	No load off (Optional)	Load < 5% after 1min , transfer to bypass mode									
	Short circuit	System Shut down automatically									
	AC abnormal	Beeping 1time/4S, 40Ssilence auto.									
Alarm	Battery low	Beeping 1time/ 0.2S									
	Over load	1time/ 1S									
Communication port (optional)		RS232 / USB / SNMP (Setup available for regular start/shutoff)									
Dry contact		PV failure、 battery low-voltage、 overload、 bypass、 inverter failure/ remote start generator dry contact signal									
Others	Output sockets	RS232/USB/SNMP(Setup available for regular start/shutoff)									
	Surge protection	Optional									
	EMC	EN62040-2:2006;EA61000-3-2:2006; EA61000-3-3:2008									
	IP class	IP20									
	Ambient temperature	0℃ ~ 40℃									
	Ambient humidity	10% ~ 90% (Non Condensed)									
	Noise	≤50dB									
	Working altitude	2000m (Every 100m increase derating 1%)									
	Inverter Size D*W*H (MM)	Wall-mounted	314×147×456			380×195×478					
		Outdoor	545×245×900 / 545×460×900								
Packing Size D*W*H (MM)	Wall-mounted	380×190×500			455×255×522						
	Outdoor	605×320×975 / 605×535×975									



### Note !

the solar panel power configuration is related with the inverter working mode and charging current, we suggest match the PV power according to project needs.



# 7 Maintenance

## 7.1 Preventative Maintenance

Preventative maintenance to the inverter can guarantee the reliability and long-time service; do some test per month as follows:

- Shut-down the inverter (Refer the operation steps for details);
- Check the vents not be blocked;
- Check whether there is much dust covering the surface;
- Check the connection of input, output as well as batteries to see whether it is firm and the insulating barrier of cable;
- Make sure the product not damp;
- Start inverter (ON/Off);

## 7.2 Battery Maintenance

Valve Regulated Lead Acid battery is used in this system. The life time of battery will be reduced by bad operating environment, frequently discharging, and sharply temperature rising. Even battery is not in use, its performance can be gradually degraded. That is why we advise to discharge it every 3 months if there is no power-off for long time.

There are maintenance steps as follows (the performance will get degraded very fast, please keep the following operations of battery maintenance in mind).

- When the battery stay at idle status for 3 months or more than 3 months, switch on the battery and PV confluence box, charge battery up to 12 hours, to keep the battery stay at full potential, to make battery life longer.
- Make records of the load status and the total power, then shut off the PV convergence box switch, start the system, getting into the battery discharge mode until auto-off. Make records of the discharge time. Also keep the initial discharge time records for future reference.
  - ① The total power of load (power consumption) is calculated in unit of "Watt".
  - ② If the inverter marking just shows power capacity in "VA", then need to multiply power factor (if no marking, it is 0.8) to calculate in unit of "Watt".
  - ③ If there is just Ampere value marked, then multiply rated voltage and power factor to calculate in "Watt".
- Under normal using condition, the life time of battery is near 1-3 years. If battery temperature and discharging frequency is high, the life time will be near 0.5-1 year.
- Along with the running time, the performance of battery is generally degraded (regarding discharging time). If the discharging time reduces to be 80% of its initial time, performance is degrading fast. So, battery maintenance should be done monthly.
- Dust treatment:
  - ① Clear the dust on battery.
  - ② Check the connection cables between batteries to see whether they are loose or not, if necessary, replace the cable even the battery.
  - ③ Keep the battery and cable connection tight.

## 7.3 Trouble shootings

Phenomenon	Confirmation and Solution
Main power is normal, main power indicator is off	1, whether Cable is loose. 2, whether fuse is burnt.
In AC priority mode, system doesn't transfer to mains mode, even mains power is ready, and switch is on, but ac LED off, and buzzer beeps.	Over current protection is ejected, reset over current protection.
In PV priority mode, PV is normal, but AC supply power.	PV solar power is not strong enough. The system is charging, it is normal situation.

# 8 Packing List

- Inverter: 1 unit
- User Manual: 1pcs
- Others are according to customer needs