Solar Off-grid Inverter

GF10K-GF60K

USER MANUAL

Solar Off-grid Inverter

GF10K-GF60K

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.

Safety Precautions

Please comply with the following items for safe use:

- ◆This system is one kind of special power supply units, therefore its installation and maintenance mustn't be done by the unauthorized technicians.
- ◆During the installation of this product, the distance between the equipment and wall must be reserved for more than 300 mm to guarantee the ventilation and heat dissipation of the system.
- ◆The temperature of the surface of the cabinet may rise to 50℃ when the product is in normal operation.
- ◆Since the battery packs of all series inverters are external, the product should be equipped with the battery packs which should meet the requirements of the rated voltage of .the equipment when in operation.
- ◆Do not open the cabinet of the inverter, otherwise it will cause an electric shock. The internal inspection and maintenance should be conducted by the authorized professional technical personnel;
- ◆After the machine is turned off, its voltage may be still high for a long time, please do not open the cabinet in case of an electric shock.
- ◆The “Manual Bypass” switch is used for maintenance and repair of the product, therefore it is forbidden for the unauthorized personnel to open it in case of the damage to the equipment or other dangers;
- ◆This system is provided with the multiple PV inputs, therefore it should be connected with the independent loop, without the electrode grounded;
- ◆The "EPO" button on the panel is used for the emergency stop power supply (power off) of the equipment, please pay attention to its operation.
- ◆The internal short circuit of the product will lead to the risk of an electric shock or a fire, therefore the container with some liquid shall not be placed on the product in case of the electric shock or other hazards;
- ◆Please use the dry powder fire extinguishers in the event of a fire, for the use of the liquid fire extinguisher may cause the risk of an electric shock.
- ◆Please install the external power switch in the place near the equipment so that the power supply can be cut off in the emergency situation.
- ◆Do not storage or use the product in the following locations:
  - ◎Outdoor
  - ◎Place are not cross-ventilated;
  - ◎Place with a combustible gas, corrosive substances or plenty of dust ;
  - ◎Place featuring unusually high or low temperatures (40℃ above or below 0℃)or high humidity (90%);

Warning!

1) The equipment must be grounded, namely when the equipment is connected to AC, the system must be reliably grounded.

2) The loss caused by the improper operation may be huge, please operate the equipment by following the requirements of specifications.

Table of contents

1. Summary

1.1 Product Overview.....02

1.2 Denomination for Product.....02

1.3 Production Profile.....03

1.4 System Architecture of Product.....03

1.5 Description of Product Control.....04

1.5.1 Control Panel.....04

1.5.2 Introduction of Buttons.....08

1.5.3 Introduction to Input Breaker.....09

1.5.4 Introduction to Line Bank.....10

1.5.5 Description of Remote Control Signal Input.....11

1.5.6 Description of Output Signal at System Dry Contact.....11

1.6 Specifications of Product.....12

2. Storage and Installation of System

2.1 Storage.....14

2.2 Installation Notices.....14

2.3 Unpacking Inspection.....14

2.4 Determination of Mounting Positions.....14

2.5 Cabinet Handling.....15

2.6 Requirements of Battery Configuration.....16

2.7 Incoming Line Way of System.....16

2.8 Requirements of External Distribution.....16

2.9 Power Cable.....16

2.10 System Wiring.....17

2.11 Connection of External Battery.....18

2.12 Communication Interface.....18

2.13 Signal Interface.....18

Table of contents

3. Operating Instructions

3.1 Daily ON/OFF.....19

3.1.1 Daily on Steps.....19

3.1.2 Daily off Steps.....19

3.2 Emergency Stop Operation.....20

3.3 Clear Operation for System Fault.....20

3.4 Operation Steps of Maintenance Bypass.....20

3.4.1 Notes.....20

3.4.2 Entering Service Mode.....20

3.4.3 Exit Service Mode.....21

3.5 System Setup.....21

3.5.1 Advanced Setup.....21

3.5.2 User Setup.....23

4. Description of Working Principle

4.1 PV and AC normal.....24

4.2 When AC abnormal or AC absent.....25

4.3 Off-peak Power Consumption.....26

4.5 System failure.....27

5. Maintenance

5.1 Preventive Maintenance.....28

5.2 Maintenance of Battery.....28

5.3 History Query and Solutions to Common Problems.....29

6.Attachment

6.1 Option.....32

6.2 System Standard Accessories.....33

7.Quality Assurance.....33

1 Summary

1.1 Product Overview

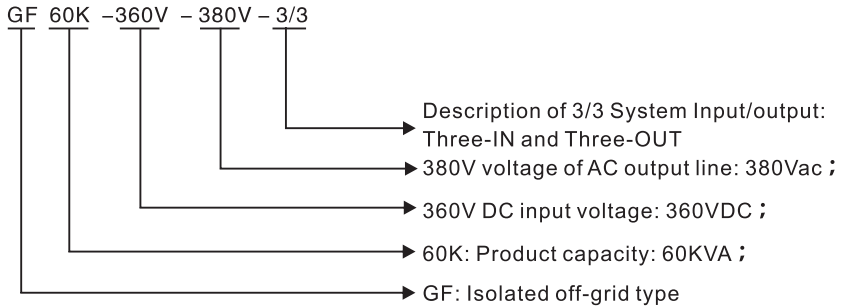
GF series products are developed by R&D experts of our company based on their decades of the research experiences in the power system, utilizing the green energy and the reliability of electricity consumption of equipment in the region of insufficient electricity or electricity shortage and combining the requirements for the electricity characteristics of domestic appliances, communication equipment and computer peripheral devices. The system is equipped with the high speed digital DSP core control devices, advanced high-speed IBGT, MOSFET and other power devices, combined with the disturbance type (SVPWM) MPPT control technology of the pulse width modulation and the double transformation system so that it can quickly track the polar plate for the control system of high power, load change and high efficient multiple levels under the control of the high speed DSP system to provide the load with the high quality power supply featuring stable voltage and frequency even in the cases of a sudden change of AC input voltage and AC frequency, over/under voltage and the serious power.

Applications:

The system serves as the photovoltaic power generation, storage and protection power supply system for the following applications, including the villas, hotels, community security systems, large base stations, offices, small manufacture enterprises, computer centers, industrial automation equipment, network machine rooms, bank equipment of IDC data center, securities, medical treatment, traffic, petrochemical and other systems

1.2 Denomination for Product

For example :



1.3 Production Profile

The off-grid photovoltaic power generation system mainly consists of the PV Panels, combiner box, off-grid solar inverter, Battery and Load. The solar energy of the PV panels is sent to the combiner, after converging， solar energy was sent to PV input of the inverter， and then it change the DC into AC to the load. At the same time, the inverter is also change AC into DC by rectifier, and change the DC into AC to the load by inverter.as shown in Fig 1.

Fig1 Composition of Off-grid Photovoltaic System

1.4 System Architecture of Product

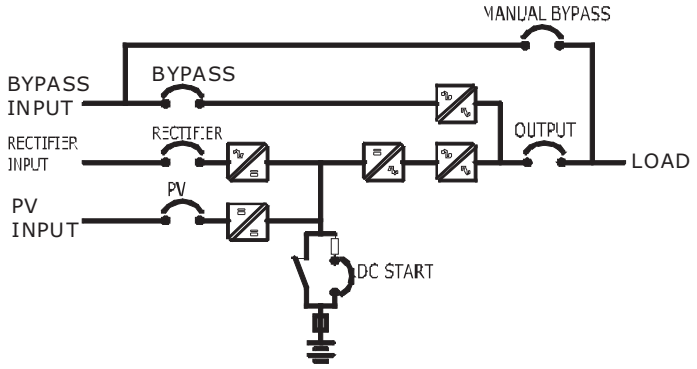


Fig 2 System Architecture of Product

1.5 Description of Product Control

1.5.1 Control Panel

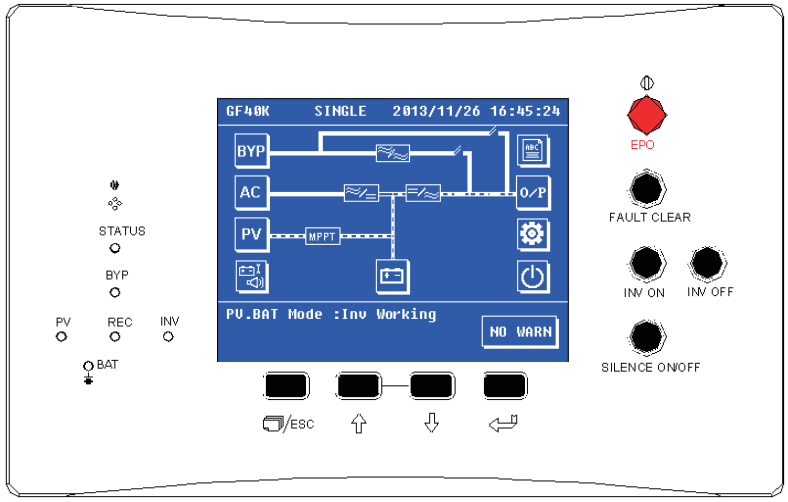


Fig 3 System Control Panel

1.5.1.1Description of Touch Screen

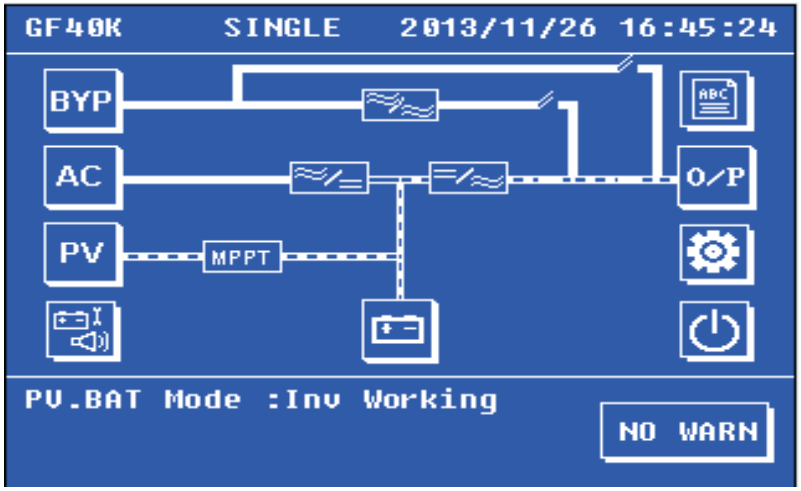


Fig 4 Description of Touch Screen

>>The system will display 320*240 raster graphics and can display the real-time alarm information, with 10000 history alarm records for user query so as to provide the reliable basis for fault diagnosis.

>>The user can perform various operating commands through the touch screen interface, and easily browse the input, output, load and battery parameters, and timely access to the current state of inverter and the warning messages. LCD can also display the version information of the control software and internal control panel software.

>>View the data of the data window

Menu Icon	Menu Name	Menu Items	Definition
AC	Input parameters	Line voltage (V)	Input line voltage of rectifier
		Current (A)	Input current of rectifier
		Frequency (Hz)	Input frequency of rectifier
		Power factor	Input power factor of rectifier
BYP	Bypass parameters	Phase voltage (V)	Phase voltage
		Frequency (Hz)	Frequency
O/P	Output parameters	Phase voltage (V)	Output phase voltage of inverter
		Phase current (A)	Output phase current of inverter
		Frequency (Hz)	Output frequency of inverter
		Power factor	Power factor of load
	Load parameters	Apparent power(KVA)	S out：Apparent power
		Active power (KW)	P out：Active power
		Load percentages (%)	Load (Inverter, shows by the rated load percentage)
	Parallel machine parameters	Apparent power(KVA)	S out：Apparent power
		Active power (KW)	P out：Active power
		Single machine system without parallel machine data	When the inverter is set as the single machine, it only includes the load itself, not includes the system load.
BAT	Battery parameters	DC BUS voltage (V)	Operating voltage of system DC BUS
		Batter voltage (V)	Voltage of system battery pack
		Battery current(A)	Battery charging and discharging current
		Battery temperature(℃)	Ambient temperature of current battery pack
		Environment temperature(℃)	Environment temperature inside the current machine
		Battery status	Battery box (pack) switch is opened;

PV	System generated energy	Generated power	Current total system generated power
		Daily generated energy	Daily gross generation of the system
		Gross generation	Accumulative gross generation of the system
	MPPT1#—n# Module parameters	Module version	Module software version
		PV voltage	PV voltage input by MPPT n# single module
		PV current	PV current input by MPPT n# single module
		Battery voltage	Battery voltage detected by the current MPPT module
		Charging current	Current battery charging voltage
		Module status	Current module status

Table 1 Data of Data Window

	Return to the superior menu	The system will return to the directory's superior menu by pressing this button.
	Page down button	Page down button
	Page up button	Press this button to turn to the front page.
	Left shift button	Press the button to move one bit to the left
	Right shift button	Press the button to move one bit to the right
	UP/DOWN switch button	Press this button to skip up/down
	OK button	Press this button to confirm the operation above.
	Delete button	Press this button fore deletion operation.

Table 2 Description of Touch Screen

1.5.1.2 Description of Touch Screen

Button Symbols	Name	Functions
	Setup	Click this button to enter the system setup interface.
	ON/OFF	Click this button to execute ON/OFF option and the operation is effective after confirmation
BAT	Battery pack parameters	Click this button to view the battery voltage and charging/discharging cutout and battery connection.
AC	Input parameters of rectifier	Press this button to view the operating parameters of the rectifier
BYP	Input parameters of bypass	Press this button to view the bypass input operating parameters.
O/P	Output parameters	Press this button to view the system output operating parameters.
	Battery self-check and maintenance	Press this button to set battery test or terminate the test.
	History button	Press this button to view the history of the inverter system.
	Skip button	Press this button to view another data message in the same directory.
	Return to the main interface	The system will return to the system main control interface by pressing this button.

1.5.1.3 STATUS(System Warning LED) and Warning

SYS-LED Status	Function Description	Buzzer Status
Red light being normally on	EPO, emergency stop	A long beep
	Communication fault	
	System fault	
The red light flashes once per second	Low voltage of battery	A beep per second
	The delay of bypass overload is over	
	Overload timeout for this machine	
	Fan fault	
	Output overload	
The red light flashes once per 4 seconds	Other normal alarm information	A beep per 4 seconds
The red light flashes once per 2 seconds	Battery test	A beep per 2 seconds
The green light is normally on.	System normal	No beep

Table 3 System LED and Alarm 1

1.5.1.4 STATUS(System Warning LED) and Warning

LED	The red light is normally on.	The green light is normally on.	OFF	Green light is normally on.
BYP(bypass power supply)	Bypass input fault	System bypass supplies the power.	Bypass standby	No
PV(MPPT LED)	PV/MPPT fault	Running normally	MPPT is not booted.	OFF/under-voltage /OFF charging of part of MPPT module
REC(Rectifier LED)	REC input / fault	Running normally	Rectifier shutdown	Rectifier in starting
INV(Inverter LED)	INV fault	The inverter can supply the power normally.	Inverter shutdown	Inverter soft startupstandby
BAT(Battery LED)	Battery under-voltage /fault	Battery supplies the power	Normal state	Battery test/ under-voltage

Table 4 System LED and Alarm 2

1.5.2 Introduction of Buttons

1.5.2.1 Description of Selection Button Functions

Key	ESC	⇧	⇩	↵
Function 1	SWITCH	UP	DOWN	ENTER
Function 2	EXIT	LEFT	RIGHT	ENTER

Table 5 Description of Selection Buttons

>>The display screen supports two control modes, namely the button control and touch control. The system default state is in the touch screen input mode, the corresponding operations are available through clicking the icon on the LCD screen.

>>Click the " ESC " button on the any interface to switch to the button control mode, and then press the" ESC "button to return to the touch screen control mode.

>>After clicking " ESC " button, the user can move the cursor through pressing " ⇧ " or " ⇩ " button to choose the required control button and then press the " ↵ " button for confirmation.

1.5.2.2 Description of Function Buttons

Button Symbols	Name	Functions
INV ON	ON button	When you press this button, the system executes the boot command and then runs after pressing the “OK” button.
INV OFF	OFF button	When you press this button, the system executes the shutdown command and the shutdown operation is effective by pressing the “OK” button. At this moment, the system and output shut down.
SILENCE ON/OFF	Beep ON/OFF	The system alarm is cancelled by this button press and the system alarm is activated by pressing this button again.
FAULT CLEAR	Clear the system fault	Press this button to clear executed abnormal protection command, the system to will restart and run.
EPO	Emergency stop	When the button is pressed, the system immediately put an end to the power supply.

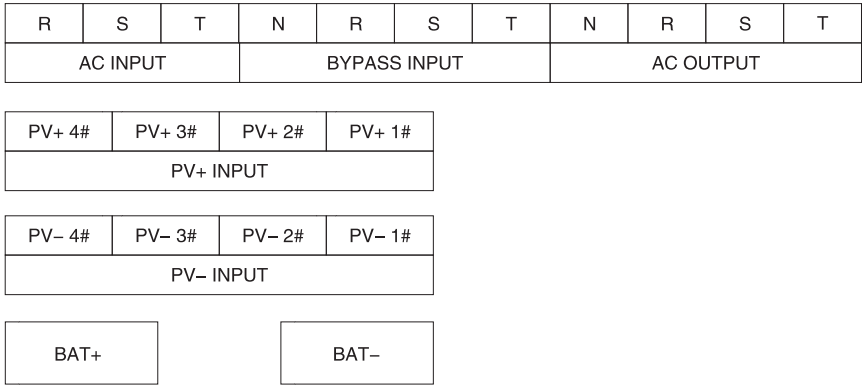
Table 6 Description of Function Buttons

1.5.3 Introduction of Breaker

Signs	Name	Function
DC START	DC start switch	When the switch is dialed, the system performs the battery soft start.
MAUNUAL BYPASS	Manual bypass switch	This switch is only operated by the professional maintenance staff and the load will be connected directly to the bypass input by switching on this button.
OUTPUT	Output switch	Dial the switch to switch on the connection between the load and the system static switch.
BYPASS	Bypass switch	Dial the switch to switch on the bypass AC input.
RECTIFIER	Rectifier switch	Dial the switch to switch on the rectifier AC input.
PV 1#	PV 1# input switch	When the switch is enabled, the system MPPT 1# will supply the power.
PV 2#	PV 2# input switch	When the switch is enabled, the system MPPT 2# will supply the power.
PV 3#	PV 3# input switch	When the switch is enabled, the system MPPT 3# will supply the power.
PV 4#	PV 4# input switch	When the switch is enabled, the system MPPT 4# will supply the power.

Table 7 Introduction of Breaker

1.5.4 Introduction to Line Bank



Signs	Functions
PV– INPUT	PV 1#– 4# input terminals "–" pole
PV+ INPUT	PV 1#– 4# input terminals "+" pole
AC INPUT	"R" line, "S" line and "T" line of rectifier input terminal
BYPASS INPUT	"R" line, "S" line and "T" line of bypass input terminal
AC OUTPUT	"R" line, "S" line, "T" line an "N" line of system output terminal
BAT +	Battery input terminals "+" pole
BAT –	Battery input terminals "–"pole

Table 8 Description of Line Bank

1.5.5 Description of Remote Control Signal Input

Signs	Name	Control method	Description of System Action
BAT.TEMP	Battery temperature	Sensing	The battery temperature coefficient is used for the charge compensation.
BAT.TEST	Battery self–check	The short circuit time is no less than 0.2S	The system performs the battery test.
INV ON	System ON		The system boots in the standby mode by pressing this sign.
INV OFF	System OFF		The system shuts down in the ON mode by pressing this sign.
FAULT CLEAR	Clear faults		Press this button to clear executed abnormal protection command, the system to will restart and run.
EPO	Emergency stop		The system responses EPO command and output is interrupted.

Table 9 Description of Remote Control Signal Input

1.5.6 Description of Output Signal at System Dry Contact

English Name	Chinese name	Normally closed nodes	Normally opened nodes
FAN FAULT	Fan fault	Fan normal	Fan fault
SYS ALRAM	System alarm	No system alarm	System alarm
GENERATOR ON/OFF	Generator ON/OFF	Generator OFF	The generator ON
BAT LOW	Battery low voltage	No low voltage alarm for battery	Battery low voltage
OVERLOAD	Output overload	Output normal	Output overload
BYP FAULT	Bypass fault	Bypass input is abnormal	Bypass fault
AC FAULT	Rectifier fault	Rectifier input is abnormal	Rectifier fault
SYS FAULT	System fault	System is normal	System fault

Table 10 Description of Output Signal at System Dry Contract

1.6 Specifications of Product

Rated capacity(KVA)		10	20	30	40	50	60
Rated powe (KW)		9	18	27	36	45	54
Rated current(A)		15	30	45	60	76	91
Output power factor		0.9					
Rated input voltage		380V ± 20%					
Rated output voltage		380V ± 1%					
Battery pack voltage		360Vdc					
The number of batteris 12V/2V		30/180					
Working mode		The PV and AC are complementary ot PV and AC					
PV Input	Maximum voltage (Voc)	750Vdc					
	Best working voltage(Vmp)	450 – 550Vdc					
	Maximum conversion efficiency	⩾98%					
	Float charging voltag(25℃)	414 V ± 1%					
	Equal charging pressure(25℃)	428V ± 1%					
	Maximum charging current	40	60	120A		180A	
	Maximum working current	40	60	120A		180A	
	Maximum power of polar plate (KW)	16	25	2*25		3*25	
	PV input channels	1+1(Reserved)		2+1(Reserved)		3+1(Reserved)	
	MPPT module	1+1(Reserved)		2+1(Reserved)		3+1(Reserved)	
AC rectifier	Range of input voltage	Three–phase 380V ± 20%					
	Rated frequency	50 Hz / 60Hz (Background Setting)					
	Frequency range	50 Hz / 60Hz ± 5Hz					
	Soft start	0–100% 10s					
	Power factor	PF = 0.8					
	Float charging voltage(25℃)	410V ± 1%					
	Equal charging(25℃)	415V ± 1%					
	Maximum charging current [A] within the permitted range the battery capacity	12	25	38	50	62	75
Inverter	Rated current (A)	15	30	45	60	76	91
	Inverter voltage	Three–phase–four–wire+G 380Vac					
	Phase voltage setting	220–230–240Vac (Set by background)					
	Output voltage accuracy	± 1%					
	Transient voltage range	± 5%					
	Transient recovery time	20ms					
	Rated frequency	50 Hz / 60Hz ± 1% (Set by background)					
	Frequency tracking range	50H/60Hz ± 3 Hz					
	Peak factor	3 : 1					
	waveform	Sine wave					
	Waveform distortion factor	⩽3% (Linear load)					
	Voltage imbalancedness	± 3% (100% Unbalanced load)					

Inverter	Overload	○105%–110%: After 1 hour, it is switched to the bypass and the load shedding is automatically restored. ○110%–125%: After10mins, it is switched to the bypass and the load shedding is automatically restored. ○25%–150%: After 1 min, it is switched to the bypass and the load shedding is automatically restored. ○150%: The system will shut down after 10 seconds and the user should confirm the load shedding boot. ○200%: The system will shut down immediately and the user should confirm the load shedding boot.					
	Short circuit	The system starts up the limited current operation and immediately shuts down, while the user should confirm the boot					
	Maximum efficiency %	⩾90%	⩾91%	⩾92%	⩾92%	⩾93%	⩾93%
Bypass	Rated voltage (V)	Three–phase–four–wire +G 380Vac					
	Voltage range	± 20%					
	Rated frequency (Hz)	50/60Hz ± 5Hz					
	Maximum current	19	38	57	76	95	114
Battery manag ement	Terminate discharging voltage	315VDC					
	Charging current Settings	Factory settings of 0.15C_{10};The user can set it for 0.07–0.3 C_{10} .					
	Intelligent battery management	Automatic conversion between even charging and floating charging; Automatic temperature compensation of the battery pack (If the system is not connected with the detection line for the battery temperature, the temperature compensation is based on the ambient temperature)					
	Depth of discharge setting for off–peak discharging	330Vdc–378Vdc (The user can set it)					
Transfer Time	Inverter to bypass	0ms					
	Bypass to inverter	0ms					
Communication interface	Remote control input	Battery self–check, inverter ON/OFF, fault clear, emergency stop					
	Computer monitoring port	RS232, RS485 and SNMP(Option)					
	Dry contact output 12Vdc/250Vac 1A max	Bypass input fault, rectifier input fault, system fault, system alarm, battery low voltage, output overload, fan fault and generator ON/OFF.					
Environment	Operating temperature	0~40℃					
	Maximum relative humidity	90% (Non–condensing)					
	Maximum altitude	Rated power per 100m (1% reduced by rising 100m) Maximum 4000m					
Others	Cooling	Forced ventilation (fan speed varies with load)					
	Noise (The value changes with the different load and temperature at the place 1 meter away from the equipment) dB	65dB					
	Mean time between failures (MTBF)	200,000hours					
	Protection grade(EN60529)	IP20					
	Incoming line way	Lower wiring pattern					
	Standards	IEC62040–1–1、EN62109–1:2010, EN62109–2:2011,					
	Body sizes (W*D*H)	600mm*700 mm *1750 mm					
	Packing sizes (W*D*H)	690mm*790 mm *1850 mm					
	Weight	250	280	300	320	345	360

2 Storage and Installation of System

2.1 Storage

If the inverter is not installed immediately, please store the inverter vertically together with its packing box in a dry room with the direction sunshine according to the mark on the packing box, in order to avoid dust and high temperature environment.

2.2 Installation Notices

This chapter gives a general description of the requirements of the inverter for the site selection and wire layout of the inverter.

Due to the particularity of each site, this chapter does not give a detailed description of installation steps, only provides the instructional general installation steps and methods to the installation personnel, who will conduct the installation based on the specific conditions of the installation site.

Notes:

- ◆The installation site must be provided with the professional engineers authorized by the company for the guidance of installation;
- ◆During the electrical connection, the inverter should be grounded at firstly and all the switches should be cut off before the installation of the inverter is completed connected.
- ◆The inverter should be installed by qualified engineers according to the descriptions in this chapter in combination with the local standards. This manual will be provided with its detailed mechanical and electrical installation information when there is no related delivery information of other devices.
- ◆When connecting the battery, the voltage at the battery terminal will be more than 360 VDC which possesses the risk of the fatal danger. Please take down the rings, bracelets, watches, bracelets and other metal wearing articles .The tools with insulated handle(s) are used. Please wear rubber gloves. If there is the leakage of the battery electrolyte or the battery is broken, please replace the battery and put it in the container with the resistance to sulfate corrosion and abandon it according to the local regulations. When your skin contacts the electrolyte, please flush it with water immediately.

2.3 Unpacking Inspection

When unpacking the case of the system, please take the inspections as follows:

1. Take a visual inspection to make sure whether there is deformation, damage and dislocation or other damage in transportation on the internal or external surface of the inverter and the battery. If there is any damage, do not install or use the system, please notify the carrier for disposal immediately.

2. Check the technical data sheet of the product to confirm whether it is the right equipment. The technical data sheet of the inverter is located on the label on the internal side of the front door, with the model, capacity and main parameters of the inverter indicated on the label.

2.4 Determination of Mounting Positions

Please pay attention to the following requirements for the selection of the inverter's installation space:

1) This inverter must be installed in clean and dry room (the environment temperature within 0 ~ 40℃, the relative humidity of 5% ~ 90%, and the optimal operating temperature of 25℃). If the room temperature is 40 ℃, the indoor exhaust fan should be installed to guarantee the sufficient air flow in the room so that the equipment gets a full heat dissipation in case of the room temperature rise. It is best to be equipped with A/C system.

2) To facilitate the wiring daily maintenance, diagnosis, and repair of the inverter, please make sure the safe space of the front and the back doors is reserved (The advisable space is 1000 mm or more to ensure that the door of the inverter can be fully opened and the operators can pass the door freely).

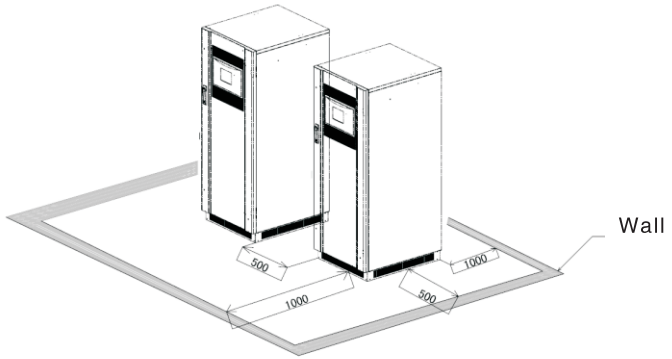


Fig 13 Schematic Diagram of System Installation

1)The altitude is less than1000 meters, otherwise, the derating inverter should be uses.
2)In the environment where the bearing capacity should be greater than the equipment weight (The equipment weight is as shown in the technical specifications).

2.5 Cabinet Handling

Please remove the surrounding ratproof baffles below the machine at first, and then get the mechanical arms of the special handling equipment (hoisting equipment, stackers or forklift) with the sufficient lifting capacity (please see Table 4 for the total weight of the inverter) stretched into the bottom of the base of the equipment. When the mechanical arms are stretched into the base in place, jack up the equipment and then place it in the predetermined installation location.

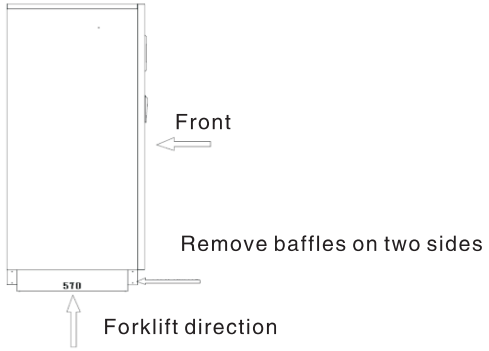


Fig 14 Schematic Diagram of System Handling

2.6 Requirements of Battery Configuration

- ◆ The use environment of the battery directly affects the service life of the battery, please refer to the characteristic curve of "Service Life of Battery" and "Environmental Temperature" for the environmental management. The optimal standard working temperature is 25 ℃. The long time use of the battery in the high of low temperatures will influence the discharge time of the system and the service life of the battery pack.
- ◆The battery should be far away from the heat source and be provided with the proper ventilation to avoid the generation of explosive hydrogen and oxygen mixed gas.
- ◆The battery switch should be installed in the position where is close to the battery as far as possible and ensure that the wiring distance between the battery and the inverter is shortest as far as possible.

2.7 Incoming Line Way of System

The incoming lines of this product series are the lower wiring pattern. When wiring, open the front door of the inverter, unpack the downside baffle, you can view the connection bar connected with the power cable.

2.8 Requirements of External Distribution

- ◆In order to guarantee the reliable operation of the equipment, please make sure that the power of the external power supply should be more than 1.5 times of the equipment's rated power and the rated current of the power circuit breaker supply nearby the supply equipment should be more than 1.2 times (not the switch with one grade higher than the breaker) of that of the air switch of the equipment itself (RECTIFIER or BYPASS).
- ◆ The "BYPASS INPUT" and "AC INPUT" power supply system of the equipment should be equipped with the separate "Circuit Breaker" or "Over–current Protection Switch" in order to improve the reliability of equipment.
- ◆The external power switch should be installed near the equipment so as to cut off the power supply in the emergency situation.

Special notes: Because there is the filter capacitor of the RFI filters to earth, which may generate some leakage current, therefore the leakage protection switch should not be used for the inverter power supply in this system in case of the false triggering protection of the device.

2.9 Power Cable

In the design of external connecting cables, the following factors should be taken into account: including the current capacity of power cable, requirements of the system overload capacity, the environment temperature and physical support media. Based on this, it is recommended that the selection of connection cable's cross-section dimension indicated in Table 5 only serves as a reference, the qualified installation engineers should make the comprehensive selection in reference to local related standards and Table 5. The length of the connecting cables are commonly 2~10 meters, for too long cables can lead to the low voltage and the cross-section area of the corresponding cable should be increased.

Rated Capacity (KVA)	Standards	10	20	30	40	50	60
Bypass input lead	National Standard (mm2)	⩾ 8	⩾ 16	⩾ 25	⩾ 35	⩾ 35	⩾ 50
	American Standard (AWG)	⩾ 8	⩾ 4	⩾ 2	⩾ 1	⩾ 1	⩾ 0
AC input lead	National Standard (mm2)	⩾ 8	⩾ 16	⩾ 25	⩾ 35	⩾ 50	⩾ 70
	American Standard (AWG)	⩾ 8	⩾ 4	⩾ 2	⩾ 1	⩾ 0	⩾ 000
Output lead area	National Standard (mm2)	⩾ 8	⩾ 16	⩾ 25	⩾ 35	⩾ 35	50
	American Standard (AWG)	⩾ 8	⩾ 4	⩾ 2	⩾⩾ 1	⩾ 1	⩾ 0
Battery input lead	National Standard (mm2)	⩾ 16	⩾ 25	⩾ 35	⩾ 70	⩾ 95	⩾ 95
	American Standard (AWG)	⩾ 4	⩾ 2	⩾ 1	⩾ 000	⩾ 0000	⩾ 0000
PV input	National Standard (mm2)	⩾ 25					
	American Standard (AWG)	⩾ 2					

Table 13 Reference List of Power Cable

2.10 System Wiring

1)Please make sure all external distribution switches of the inverter are disconnected and simultaneously provide the "no closing" warning signs to guard against the wrong operation to switches by others.

2)Open the front door of the inverter to make sure that the input switch of the inverter is in “off” state;

3)Take down the protective cover plate of the lower terminal of the machine;

4)Connect the protective grounding cables and other necessary grounding cables to the connectors of the ground lines at the bottom of the inverter's power supply equipment;

5)Connect the “R, S, T and N” ports of the BYP INPUT(bypass input) terminal board to the corresponding with the “R, S, T and N” ports of the external BYP INPUT power switch or breaker with the qualified connecting cables in the correct phase sequence and then fasten them;

6)Connect the “R, S, T and N” ports of the AC INPUT(rectifier input) terminal board to the corresponding with the “R, S, T and N” ports of the external BYP INPUT power switch or breaker with the qualified connecting cables in the correct phase sequence and then fasten them;

7)Connect the “R, S, T ” ports of the AC INPUT(rectifier input) terminal board to the corresponding with the “R, S, T and N” ports of the external AC INPUT(rectifier input) power switch or breaker with the qualified connecting cables in the correct phase sequence and then fasten them;

8)Connect "BAT +” and “BAT -" ports of the inverter to the output "+” and “ -" poles of the battery box (pack) with the qualified connecting cables;

9)Connect "PV INPUT1#—4# +” and “PV INPUT1#—4# -" poles of the inverter to the " output +” and “output -" poles of the corresponding PV combiner boxes of PV1 # - PV4# with the qualified connecting cables; Besides the electrode and the grounding terminal cannot be shared among the different groups;

10)Insert one end of the temperature sensor of the battery pack freely supplied with the device into BAT. TEMP, with the other end stretched into the center of the battery box (pack) close to the battery along the battery line (option);

11)Confirm that all switches of the inverter are completely shut down and the external switches of "rectifier power supply, the bypass power supply and the battery box (pack)" are switched on, and then use the multimeter to test and make sure that the voltage and polarity of the system should comply with the relevant requirements of the system rated voltage.

12)Install all protective cover plates in place.

2.11 Connection of External Battery

Please refer to Chapter 4.5 of the EN50091-1 standard for the connection of battery.

2.12 Communication Interface

- This system is equipped with RS485 and RS232 interfaces directly serving as the interface of the background monitoring software to provide the serial data. When the customers want to use it, they only needs to connect the USB freely supplied with the device to the communication interface module (RS485 communication lines are optional) directly.
- The system is provided with the preset "SNMP" card port (SNMP card for option) to facilitate the users to realize the remote monitoring (option).

2.13 Signal Interface

- The control signal input interface refers to the 2Pin interface, therefore the corresponding order can be conducted when in short circuit, as shown in the following figure.

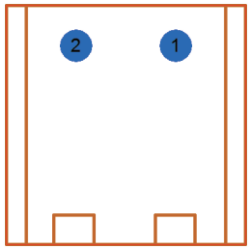
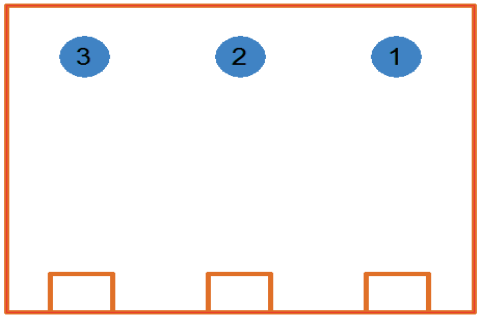


Fig 15 Signal Interface of Remote Control

- The output signal interface (dry contact) belongs to 3Pin interface, therefore the user can choose the "normally open" mode or "normally closed" mode (as shown in the following figure) according to the demand of the site.



Pin 1 for normally open contact
Pin 2 for common port
Pin 3 for normally closed contact

Fig 16 Signal Interface of Output Dry Contact

3 Operating Instructions

Note 1: All buttons for the user operation involved in the operation steps and LED display are shown in the "Product Profile".

Note 2: Before conducting any operation step described in this chapter, please carefully read the instructions in order to avoid the personnel injury or equipment damage caused by the improper operation.

3.1Daily ON/OFF

(Click " ⏻ " button or press the "INV ON / INV OFF" button on the panel for the ON/OFF operation.)

Notes

This step is used to boot the inverter under the complete power-down condition, It is assumed that the inverter is installed and has passed the debugging by the engineers, as well as the external power switch has been closed.

Warning!

- The operation steps can make the output terminal of the inverter voltage.
- If necessary, please disconnect the connection of the lower load and then paste the warning sign on the joint of the load.
- The component with its protective cover plate opened with the tool is the part which the user cannot operate.
- Only the maintenance support personnel given the technology licensing by the company can open the protective cover plate of such products.

3.1.1 Daily on Steps

1)Switch on the output switch of the battery box (battery pack);
2)Switch on the input switch of the external power (RECTIFIER, BYPASS) of the inverter;
3)Switch on the DC START switch of the inverter;
4)Switch on the RECTIFIER and BYPASS switches of the inverter;
5)Switch on the switches of "PV 1 # - PV 4 # " in turn.
6)Press the "INV ON" button of the panel and confirm the dialogue information of the touch screen (Touch operation: Click the " ⏻ " button on the main interface and then select the "Boot"option and click "OK" button) to boot the machine.
7)Switch on the output switch.

3.1.2 Daily off Steps

1)Press the "INV OFF" button of the panel and confirm the dialogue information of the touch screen (Touch operation: Click the " ⏻ " button "OFF" button and "OK" button in turn), the system will switch off the machine.
2)Turn off the output switch.
3)Switch off the switches of "PV 1 # - PV 4 # " in turn;
4)Switch off the RECTIFIER and BYPASS switches of the inverter;
5)Switch off the DC START switch of the inverter;
6)Switch off the RECTIFIER and BYPASS input switches of the external power of the inverter;
7)Switch off the switches of the battery box (battery pack).

3.2 Emergency Stop Operation

In case of an emergency (such as an electric shock, a fire, a flood, etc.), please press the red "EPO" button on the panel to perform the emergency stop command. After the button is pressed, the system immediately cuts off all the outputs (including the inverter output and the bypass output, battery charging or discharging). When the machine is shut down, please perform "OFF" operation and then conduct the “ON” operation when the display screen and LED of the system are fully closed, please pay attention to all operations above!

3.3 Clear Operation for System Fault

When the inverter is shut down due to the following reasons, including the disabled over-temperature protection of the rectifier and the inverter, overload being more than or equal to 150%, DC BUS instantaneous overvoltage, abnormal protection, etc., please confirm that the fault has disappeared according to the prompt of the alarm information on the screen, and then press "FAULT CLEAR" button on the panel. At the moment, the system will automatically clear away the history faults and restart so as to enter the normal working condition.

Note: The system itself has functions of self-diagnosis and self-restore, therefore it is stated that three times of faults will be effective within an hour, however, if the fault still exists, and when the frequency of the fault occurrence exceeds the stated value, the system will run automatically after waiting for 1 hour.

3.4 Operation Steps of Maintenance Bypass

3.4.1 Notes

- Please read the warning information in the Chapter 1 and operate the maintenance bypass carefully. Otherwise, it may do damage to the inverter or cause the power failure of the load, even may threaten the people's lives.
- During the maintenance and repair, please firstly enter the "Inverter Setup" interface of the control panel to set the system for “Manual Bypass ON” mode before conducting the operation of "Manual Maintenance” switch, and then turn on the “Manual Bypass” switch and turn off the system output switch in order to guarantee the normal use for the user.

3.4.2 Entering Service Mode

The power supply of the load by the inverter is switched into the direct connection state of the load with the AC input bypass power supply through the maintenance bypass switch by conducting the following steps.

1) After the bypass parameters is detected and confirmed being normal, please click " " button on the main interface→ "USER" button→input PASSWORD (the default password is “87654321”) and " " button in turn, and then enter " INV SET" interface → " MANU BYP" interface successively to select "ON" option and click "YES" button. At this point, the inverter supplies the power to the load through the static bypass system.

2)Take down the buckle on the air switch of the "MAUNUAL BYPASS" and then switch on the "MAUNUAL BYPASS" switch; at this point, the loads are powered up by the maintenance BYPASS power supply and the static BYPASS power of the inverter in parallel.

3)When you press the "OFF" button on the panel and then click "OK" button on the touch screen, the system will immediately be shut down;

4) Manually disconnect the following switches, including "RECTIFIER”, “BYPASS”, “DC START”, “OUTPUT”, “PV 1 # - PV 4 #" and external "battery box (pack)" switches;

5)At this moment, the operation switching the inverter output into the maintenance bypass has been completed, the load is powered up by the maintenance bypass, the fans of the complete machine stop running and the inverter is shut down completely. At this moment, the voltage of the DC BUS in the internal of the machine is still high pressure, only after the DC BUS is discharged, can the maintenance personnel take the routine maintenance or repair to the inverter, while in the repair mode, the load equipment is not provided with the AC power fault protection.

3.4.3 Exit Service Mode

When the maintenance work is complete, the state of no fault protection of AC power for the load is switched into the state with the power supply protection by the inverter by conducting the following steps.

1)Carefully confirm that there is nothing left in the cabinet of the inverter and the internal connecting wires of the inverter recover to the state before the maintenance.

2)Boot the system in the same way of “Daily ON Steps", at this moment, the inverter is in standby state and the "INV " LED flashes;

3)Turn off the maintenance bypass switch and then put on the dismantled buckle in place.

4)Click " " button on the main interface→ "USER" button→ and input the password (the default password is “87654321”) and then click " " button, and then enter " INV SET " interface → " MANU BYP" interface successively to select "OFF" option and click "YES" button. At this point, the system exits the maintenance mode to put an end to the maintenance work, and the load is powered up by the inverter instead of the bypass system.

3.5 System Setup

(Click “ ” button to enter the system setup interface)

3.5.1Advanced Setup

(Click the "Advanced Setup" button and enter the advanced setup interface by entering the advanced password, which is only done by the authorized technical personnel)

3.5.1.1 System Mode setting

Click the "SYS CONF" button to select one kind of mode： "MODE GF" or “MODE G/GF”. Press “YES” for confirmation.

3.5.1.2PV Auto Power-on Setting

PV automatic power-on: When the PV automatic power-on mode is set to the “OPEN” state and the automatic power-on operation can be done in the following two situations.

1)After the battery low voltage protection is shut down, the system will execute the automatic power-on command when the MPPT is sufficient.

2)After the system sends the fault information and be shut down, the system automatically clears away the fault once when the PV is sufficient.

Operation steps of PV automatic power-on: Click the “AUTO ON" button to turn on or turn off this function. The system is in “OPEN” status by default.

3.5.1.3 Input Setup of Battery Parameters

◆Operation method: (Click the “BAT CONF" button to enter the corresponding setup interface)

Warning: The battery parameter setup will affect the reliability and security of the system, and may lead to the battery damage, please input the actual data of the system to ensure the safe use of the battery and the system reliability.

◆Battery capacity input: Click the "CAPACITY" button to choose the appropriate battery capacity (if the default capacity is less than the actual capacity, please select from the parameter with the capacity being the integral multiples of the actual capacity so that the number of battery packs is multiplied by this multiples for the accurate system capacity), the operation above will be effective after confirmation.

◆Number setup of battery packs: Click the "BAT GROUP" to choose the actual number of battery packs the numerical (Pay attention to the coefficient when being multiplied by the battery capacity), the operation above will be effective after confirmation.

◆Setup of charging rate: Click the “CHGRATE" button and then input of the charging coefficient (C for battery capacity, the system will calculate the standard charging current based on the total capacity of the battery, with the system default for “0.15 C * 100 AH = 15 A”) which should conform to the battery characteristics according to the requirements of the battery characteristics, at last click the " " to confirm the operation above.

◆Setup of Battery Type (Reserved option): Click the "BAT TYPE" button to select "LEAD" or "LITH" option and then confirm the operation by pressing “” button.

◆Setup of Quantity of Batteries (Fine-tuning setup): Click the " BAT CELL" to enter the corresponding setting interface, and then input the standard quantity of the batteries used in this system (Base on the standard of 2V unit batteries, the standard quantity of batteries for this system is 180, with the maximum set value of166-182) and then press "YES" button to confirm the operation.

◆Setup of Temperature Compensation: Click on "TEMPCMP" button to enter the corresponding setting interface (The default setting of the system is 2 MV, but the engineers can choose the appropriate parameter according to the requirements of the battery characteristics), and then click "YES" button to confirm the operation (without the temperature sensor, the system will conduct the ambient temperature compensation).

3.5.1.4 Password Setting

Operation method: (Click the “OPEN SET" button to enter the corresponding setting interface)

When you click "Password Lock" button, the system will display “LOCK PWD” information (click the button again, the system will display “OPEN” or “CLOSE” information), and then you can click the "YES" button to confirm the setting; when the system needs to implement the important settings, a password should be input before execution of the setting.

3.5.1.5 Other Settings

◆Operation method: (Click the “OTHERSET" button to enter the corresponding setup interface)

◆Factory Reset: When you click the " DEFAULT" button and then click "YES" button to confirm the operation, the system will be switched to the factory setting state and all the original user settings will be cleared away, please conduct the operations above carefully! If the operation is necessary, be sure to set the relevant parameters according to the requirements of the site system configuration to ensure the system is in safe and reliable operation.

◆Clear Records: When you click the “CLRLOG” button and then click "YES" button to confirm the operation, the system will clear away all historical information.

3.5.2 User Setup

Operation method: (Click the “USER" button and input the password to enter the corresponding setting interface. The user setting operation can only be done by the user or the technicians)

3.5.2.1MPPT Setup

MPPT setup is used to turn on or turn off the MPPT module.

3.5.2.2INV Setup

The INV setup menu includes two options as follows:

1)Depth of Discharge: The depth of discharge refers to the end points of off–peak electricity consumption, the end points of the battery test and alarm points of battery low voltage and the set range of the depth of discharge is from 1.85V to 2.10V, with the default value of 1.85V.

2)Manual Bypass: When the system maintenance is required, the manual bypass system should be opened, the power supply of the system by the inverter is forcedly switched to that by the bypass system. When the system maintenance is completed, the inverter output of the system can be realized only when the manual bypass system is shut down.

3.5.2.3Off-Peak Setup

The off–peak setup menu includes three options as follows:

1)Off–peak electricity consumption: During the set time, the system will shut off the rectifier. The PV and the battery supply the power to the load until the battery is in the low voltage, can the system open the rectifier to conduct the limited current (1A) charging.

2)Normal charging: When the current time reaches the set time, the system will turn on the rectifier and the PV and the rectifier supply the power to the load and the battery.

3)Limited current charging: During the set time, the rectifier conducts the limited current charging.

3.5.2.4Protocol Setup

The protocol setup refers to the setup of 485 communication protocol, including three setup options as follows:

1)Address: It is 1 by default.

2)Baud rate: It is 2400 by default.

3)Calibration: no

3.5.2.5Language Selection

The menu and data on the touch screen can be indicated in Chinese and English. The system will enter the "USER" interface by clicking the " setup icon on the main interface, you can click the "LANGUAGE" button to select the desired language.

3.5.2.6Setup of Data and Time

The system will enter the "USER" interface by clicking the " " setup icon on the main interface, you can click the "Date/time" button to set the current time and date of the inverter.

3.5.2.7Setup of Date Format

The date can be displayed in the following two formats by setting "DATE FOR".
1) Year/month/day
2) month/day/year

3.5.2.8User Password/Control Password

The system will provide the password protection to limit the operator for some control operations, with the initial password of "87654321". After the control password enables, the test of the inverter and the battery cannot be conducted until inputting the password and confirming it.

3.5.2.9Touch Screen Calibration

The touch screen calibration "CALIB" is used to calibrate the center of the screen, that is, when the system factory settings is restored, it is necessary to calibrate the touch screen and during the calibration of the touch screen, please click the cross center of the screen according to the prompt.

4 Description of Working Principle

4.1 PV and AC normal

1)When PV Power is bigger than load power, the PV power will supply power to the load at first, then the extra power will be used for charge the battery, in this case, if PV charge current is big enough, AC will not working ,if PV charge current is not enough, AC will help to charge the battery auto.

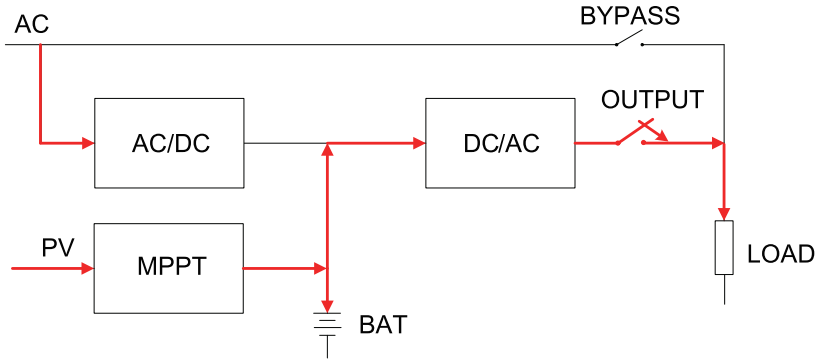


Fig 5 Normal Mode 1 of PV and AC

2)When the PV power is less than the load power, the PV together with the AC will supply the power to the load and battery

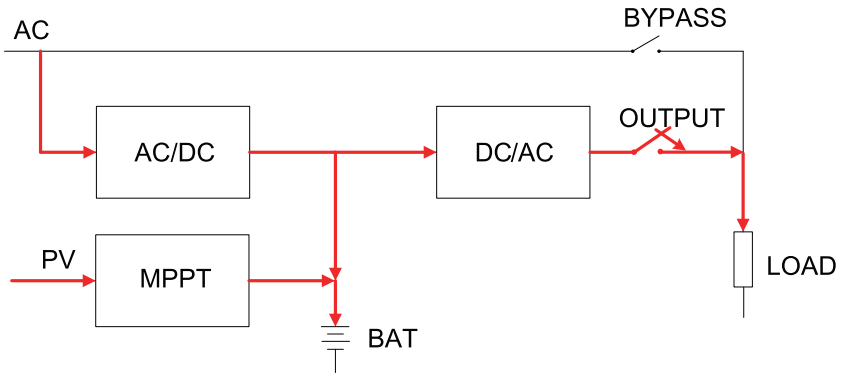


Fig 6 Normal Mode 2 of PV and AC

4.2 When AC abnormal or AC absent

1)When the PV power is bigger than the load power and AC fails, the PV power will support the load at first and the extra power will be used for charge the battery

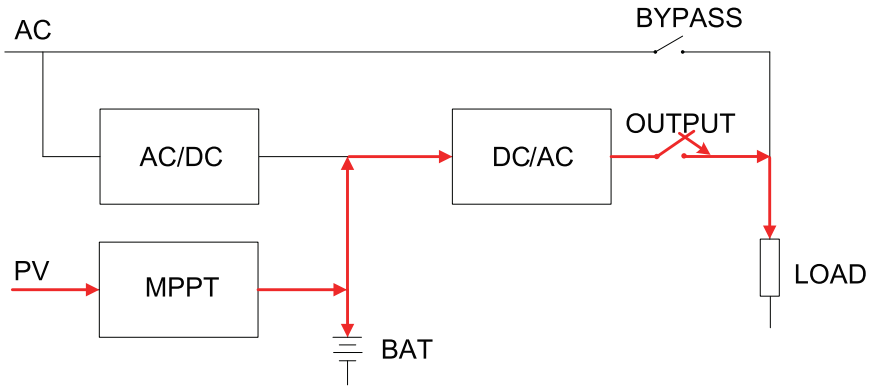


Fig 7 AC Abnormal Mode 1

2)When the PV power is less than the load power and AC fails, the PV together with the battery will supply the power to the loads. When the battery discharges stop, the system automatically shuts down and the PV will charge the battery. When the battery is fully recharged or AC runs normally, the system automatically be ON.

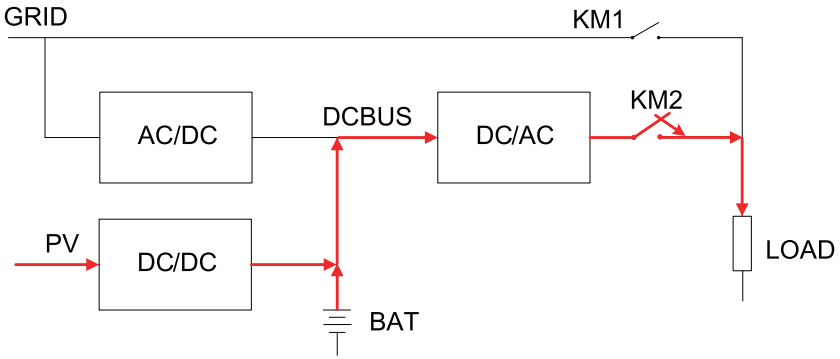


Fig 8 AC Abnormal Mode 2

4.2 Off-peak Power Consumption

1)Limited current charging: After set up the limited current charging of the system, the system will shut off the charging function of the rectifier within the set time, in this time PV will supply power to the load at first, the extra power will be used for charge the battery. If PV power not enough, AC will help to supply power to the load . Out of the limited current set time, the rectifier charge function will recover to charge the battery.

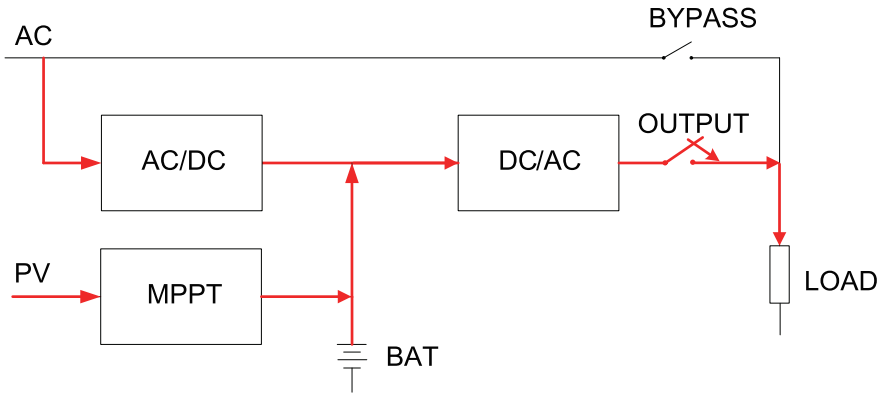


Fig 9 Mode 1 for Off-peak Electricity Consumption

2)Off-peak of electricity consumption: After the off-peak of electricity consumption is set up, the system will shut off the rectifier within the limit time, the PV and the battery will provide the power to the loads until the battery discharge stop, the system automatically enters the limited current charging mode;

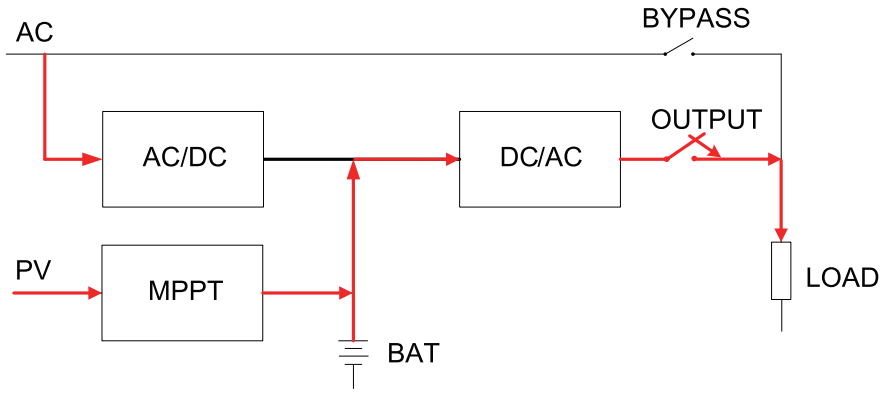


Fig 10 Mode 2 for Off-peak Electricity Consumption

3)After the peak of electricity consumption; the system will start the function of the rectifier to recharge the battery based on setting of the use, and the loads are also powered by the rectifier;

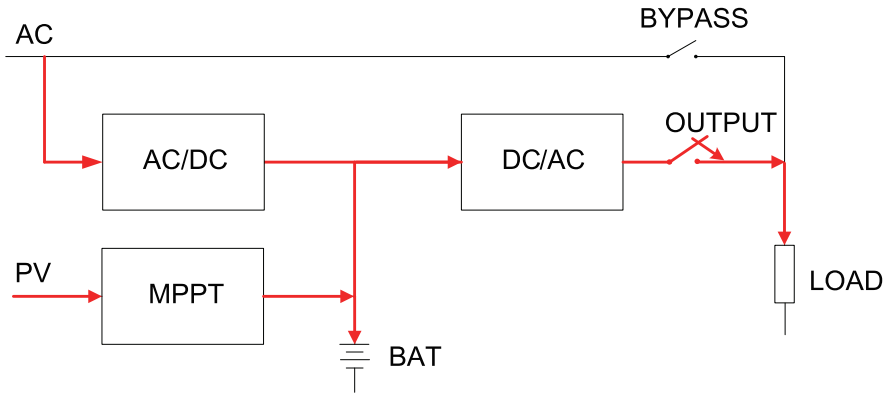


Fig 11 Mode 3 for Off-peak Electricity Consumption

4.5 System failure

When the system fails, the system power supply mode will be switched to the bypass power supply mode, and the PV panels will recharge the battery through the MPPT system.

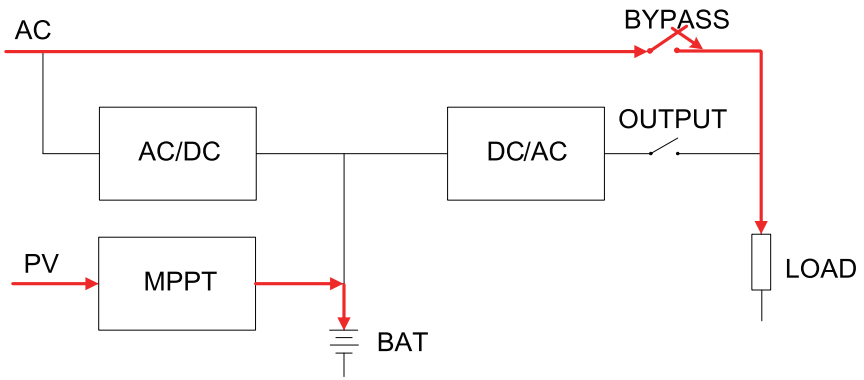


Fig 12 Mode 4 for Off-peak Electricity Consumption

5 Maintenance

5.1 Preventive Maintenance

The preventive maintenance for the inverter system can guarantee the reliability and a long service of the inverter.
The following inspections should be conducted every month:
1. Turn off the inverter (see the operation steps);
2. Inspect and make sure that the vent can't be blocked;
3. Inspect whether there is too much dust on the cover;
4. Inspect whether the connecting cables of input, output and the battery are connected firmly and whether the insulation layer of the cables is in good condition;
5. Ensure that the product should not be affected with damp;
6. Start-up operation (ON/OFF operation for the product);

5.2 Maintenance of Battery

The sealed lead-acid battery is used for this machine. Its service life will be shortened dramatically with the preservation and use environment, the discharge frequency of the battery and the temperature rise. Even if the battery is not used, its performance will gradually decline, therefore it is recommended that one discharge test (Make sure the battery test should be executed in the condition of the normal bypass power supply.) is conducted every three months when there is no power outage for a long term. The inspection methods of the battery are shown as follows (At the end of the use limit of the battery, the battery performance will decline sharply, therefore be sure to keep in mind of the following inspection and maintenance methods):

1)Click the " " button on the main interface of the display screen to select the "BAT TEST" option and then input the "Control Password" (The default password: 87654321) and click"YES" button to choose "Battery Self-check" option. At this point, the inverter closes the MPPT and the rectifier; the battery discharges; the "REC" LED on the panel is off; the “MPPT” red light is on and the "BAT" LED flashes in green.

2)When the inverter detects the low voltage alarm of the battery (The depth of discharge can be adjusted by itself), and the "battery manual maintenance succeeds" information is indicated on the lower left corner on the LCD of the panel, it shows that the battery manual maintenance has been completed. After the completion of the manual maintenance, the inverter and the rectifier are normally started, and the output is continuously switched to the AC inverter output and recharges the battery. If necessary, the maintenance staff only needs to select the "CLR TEST" option in the "Test Order" menu to stop the battery manual maintenance, at this moment, the inverter will run in the normal working mode.

3)Under the condition of normal use, the service life of the battery is about 1~3 years. Under the conditions of higher temperature, more frequent discharging and deeper depth of discharge, the service life of the battery may be 0.5-1 year.

4)The longer of the service time, the poorer the performance of the battery is (the performance is measured by the discharge time). After the discharge time down to 80% of the initial value or so, the performance degradation is quickened, accordingly, the battery test frequency should be a month once instead of six months once.

5)Dustproof treatment:

- ◆Remove the dust and dirt on the battery.
- ◆Check whether all internal wires of the battery are connected firmly or broken, and when necessary, it must be replaced and repaired.
- ◆Make sure that the batteries and battery terminals are tightened.

5.3 History Query and Solutions to Common Problems

Operation methods: (Click“ ”for check)

5.3.1Common Warning Information and Troubleshooting

Alarm Information	Explanation	Solutions
AC fault	The phase sequence, voltage, frequency or voltage unbalance of the rectifier's input power supply goes wrong.	Check and make sure that the voltage and the frequency of the input power supply should conform to the requirements of the system equipment and whether the switch is normal.
AC Volt Fail	The AC voltage exceeds the system rated voltage.	Adjust the system input power or wait for recovery (short fault).
AC Freq Fail	The AC frequency exceeds the system rated value.	Adjust the system input power or wait for recovery (short fault).
AC Phase Abnormal	The AC phase sequence is not correctly connected.	Adjust any two phases of the system input lines.

Byp Over Load Protect	When the bypass load is more than or equal 150%, the bypass output will be cut off.	When the load shedding is less than 90%, the bypass output will be restored by pressing “FAULT CLEAR” button.
Inv Over Load	When the inverter load is no less than 150% and the overloads is over time, or the inverter is shut down for protection.	
Output Over Load	The load is more than 105%.	Get the load shedding to be less than 90%.
REC Fault	After the rectifier is started, the rectified voltage is lower than the system set value.	◆ Press “FAULT CLEAR”button for recovery ; ◆ If the fault still exits, please ask the local authorized technician for service.
Bus Over Volt	High-voltage protection of DC BUS	
BUS Soft Start Fail	The soft boot of the rectifier fails.	
Charge Fault	The charging current is larger than the set value.	
Bus Low Volt Shutdown	The voltage of batter discharge and DC BUS is lower than minimum set value.	The system won’t automatically boot until the AC recovers or the PV is sufficient and the battery capacity is no less than 90%.
Bat Low Volt	The battery voltage is lower than the set value.	
Bat EOD	The battery voltage is lower than the minimum.	
Limit Num Of Hour Switch	When the switching frequency of the inverter is five within an hour, no matter whether the frequency is increased, only the total times should be calculated.	After waiting for one hour, the system will judge the switching frequency is OK and then automatically boot.
Byp Fault	The phase sequence, voltage, frequency or voltage unbalance of the bypass input power supply goes wrong.	Check and make sure that the voltage and frequency of the input power supply comply with the requirements of the system equipment and whether the switches are in normal operation.
BYP Phase Abnormal	The bypass phase sequence is reverse.	Adjust any two phases of the system input lines.
Bypass volt abnormal	AC voltage exceeds the system rated value.	Adjust the system input power or wait for recovery (short fault).
Bypass frequency ultratrace	The inverter bypass frequency is out of the bypass tracking.	
BYP STS Fault	Bypass SCR fault	◆ Press “FAULT CLEAR”button for recovery ; ◆ If the fault still exits, please ask the local authorized technician for service.
INV STS Fault	Inverter SCR fault	
NV-A Under /Over Volt	The output voltage of inverter A is higher/lower than the required value.	
INV-B Under /Over Volt	The output voltage of inverter B is higher/lower than the required value.	
INV-C Under /Over Volt	The output voltage of inverter C is higher/lower than the required value.	
INV IGBT Over Current	The current of the inverter is larger than the set value.	
INV Soft Start Fail	The soft boot of the inverter fails.	
OverTemp	System high-temperature protection	
Fan fault	The system has detected the normal rotation of the fan.	Please ask the local authorized technician for service.
Output Short	The effective maximum output current of the three-phase is more than 5 times of the rated value within 100ms, namely short circuit protection;	Confirm whether the connecting wire of the load or the load itself is in normal state and then press “FAULT CLEAR” button for recovery.
EPO	Press the red button on the panel or conduct the remote EPO operation	Remove the remote EPO order and execute the “OFF” operation steps; and then execute the “ON” steps after the system power is cut off.
BAT disconnect	The air switch of the battery is switched off.	Check whether the output air switch of the batter or the batter itself is in good condition.
Parallel connection fault	The PE2 refers to single parallel set interface ("1—parallel operation") ; PF13 refers to the parallel wires being connected well. ("1"—OK for connection, one of the following cases goes wrong : 1. The connection of the parallel wires for the single machine is OK; 2. The connection of the parallel wires for the parallel machines fails;	
Remarks: “exist”refers that the fault arises and “clear” refers that the fault disappears.		

Table 14 Comparison Table of Common Faults

5.3.2 MPPT Warning Information (Click “ ”to switch the inverter and MPPT information for check)

Alarm Information	Explanation	Solutions
PV In Reverst	The polarity of PV input line of the MPPT*# module is reversed.	Check and adjust polarity of PV input line of the MPPT*# module
Module Fail	MPPT system fault	Please ask the local authorized technician for service.
Comm Fail	MPPT communication in interrupted.	◆ Confirm whether screws of MPPT module are loose. ◆ Please ask the local authorized technician for service.

Over Curr	The power of PV polar plate is too high and there is instant overcurrent.	Judge whether the power of the polar pole conforms to the system rated value.
Over-Temp	The power of the polar plate is too high or the local environment temperature rises too high or the The high-temperature of the module is caused by the fan fault.	◆ Confirm whether the power of the polar pole and the environment temperature exceed the system requirements; ◆ Please ask the local authorized technician for service.
BUS Over Volt	The transient loading/unloading causes the fluctuation of DC BUS.	◆ The system automatic adjustment recovers one minute later; □ If the overvoltage phenomenon lasts for a long time, please ask the local authorized technician for service.
PV In.C Over.V	The transient loading/unloading causes the fluctuation of DC BUS.	
PV Over Volt	The set voltage of the polar plate is too high.	Reduce the Voc voltage of the polar plates in series.
PV under-voltage	Poor illumination	Confirm the direction and the pavement gradient of the polar plate.
MPPT is not detected.	MPPT shutdown of the communication blackout.	◆ The MPPT system shuts down and exits automatically at night. ◆ Turn on input switches of PV1#- PV4# ; ◆ The fixed screws of MPPT module are loose, please fasten them. ◆ Please ask the local authorized technician for service.
Remarks: “exist” refers that the fault arises and “clear” refers that the fault disappears.		

Table 15 MPPT Warning Information

6 Attachment

6.1 Option

- ◆Harmonic suppression filter
- ◆SNMP card：It can realize the remote wireless communication.
- ◆Parallel accessories: Parallel connecting wires
- ◆485 communication line
- ◆Battery temperature sensor

6.2 System Standard Accessories

- ◆A USER MANUAL
- ◆RS232 communication connecting wire 1 pieces

7 Quality Assurance

Warranty Period

The warranty period of this product is 12 months and it is subject to the provisions stated in the contract, if any.

Voucher

The customers are required to provide the invoice of the product and date of purchase during the warranty period. Besides, the logo on the product should be clear, otherwise the company has the right to refuse the quality assurance.

Conditions

- ◆During the warranty period, if the product fails, the company will repair it or replace it with the new product for free.
- ◆The defective replaced products should be returned to the company.
- ◆The client shall give the company with the reasonable reserved time to repair the fault equipment.

The company shall have the right not to provide the quality assurance for the following cases:

- ◆The complete machine and parts are beyond warranty period.
- ◆Transportation damage.
- ◆Improper installation, modification or use.
- ◆The product runs in the very harsh environment beyond the provision stated in this manual.
- ◆The machine fault or damage caused by the improper installation, repair, modification or disassembly by the technician without the authorization of the company.
- ◆The machine fault or damage caused by the use of the non-standard or the non-authorize components or software.
- ◆The installation and use range beyond the provisions specified in the relevant international standards.
- ◆Damage caused by the unusual natural environment.
- ◆For the product faults caused by the situations above, the customer asks for maintenance and the paid maintenance service can be provided after the judgement by the technical personnel of our company.
- ◆If sizes and technical parameters of the product are changed, these sizes and parameters should be subject to the real object without prior notice.