



USER MANUAL

3PHASE HYBRID INVERTER 10-200KW

Sate

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I. INTRODUCTION

A. General Instructions for inverter

The product is the DC power (battery, storage battery) into alternating current (380V, 50Hz sine wave). It consists of an inverter bridge, control logic, and filter circuit. Widely used in air conditioners, home theater, electric grinders, power tools, sewing machines, computers, televisions, washing machines, range hoods, refrigerators, VCRs, massage, fans, lighting, etc. By connecting the cable to the battery, the appliances connected to the output of the machine will be able to use a variety of electrical appliances. Appliances can be used are: mobile phones, laptop computers, digital cameras, cameras, lighting, electric shavers, game consoles, handheld computers, power tools, car refrigerator and all kinds of travel, camping, medical and first aid appliances. This is an all-digital control design, the application of intelligent DSP digital intelligent engine control, take-frequency architecture, the new inverter products. Particularly suitable for harsh environment area of power and the use of photovoltaic power generation, pure sine wave output, you can drive all types of loads.

B. CAUTIONS

1. Ground Protection. The ground wire of the input power must be connected to the ground terminal (with sign "G") of the inverter.
2. It's not allowed to dismantle any wire without permission.
3. Risk of electric shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel. And please read the used manual carefully when service required.
4. Always keep the top metal cover and rear panel fixed. The location should provide adequate air flow around the unit, in an atmosphere free of excessive dust or corrosive fumes.
5. It's prohibited to remove dirt under power connection. Wet or soaked material is not allowed to use for cleaning.
6. Risk of electric shock hazardous live parts inside this unit are energized from the battery supply even when the input AC power is disconnected.
7. To reduce the risk of fire, replace only with same type and rating of fuse.
8. The replacement of the batteries should be conducted by qualified personnel. As the used battery is deemed to be poisonous material, it should be delivered to recollection agency
9. This unit requires operation environment of around 25°C. When the inverter is not in use for long term, battery should be charged every 3 months. If the temperature is above 30°C, battery should be charged every 2 months.
10. Install this inverter strictly according to this manual.

II. INSTALLATION AND WIRING

A. Environment for Installation

Make sure the indoor environment for installation to be:

1. without dust;

2. at appropriate temperature:

Working temperature: 0~40 °C

Starting temperature: above 0°C

Optimum working temperature: 25°C

Good ventilation is required:

(1) Natural ventilation; applicable in special room without heat.

(2) Manual ventilation:

When the outer case temperature (TA) is higher than the surrounding temperature (TE), air

conditioner is needed.

The closer are these two temperatures, the larger capacity of the ventilation system would be, based on the following equation:

$$Q(\text{m}^3/\text{h}) = 3.1 + P_{\text{diss}}(\text{kcal}) / (t_a - t_e)(c)$$

kcal is the unit of P_{diss} , adjust P_{diss} 10% for allowing the loss of energy.

B. Inspection before Installation

After putting out the Inverter from the packing box, please check :
 whether there's any damage on it;
 whether the switches are OFF;
 any of the mentioned accessories missing;

C. Installation Position

Please make Sure:

1. Nothing is within 40cm to the back of the Inverter;
2. Nothing shall be put on the top of the Inverter;
3. There should be enough space to the front and top of the Inverter for inspection and repairing;
4. Battery cabinet should be placed on the right side of the machine and keep enough space in between for installing and repairing;
5. Power cable should be installed from the bottom or back of the Inverter.

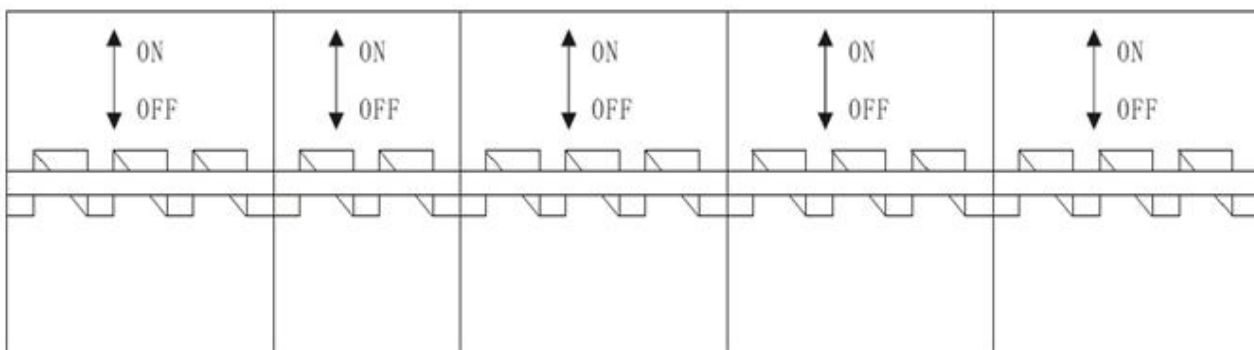
D. Wiring

Remember to turn off all the switches before connecting Inverter to the main power cable or any loads.

when wiring the main power cable, please first connect the ground line to the "G" port on the terminal board. Without ground connection, the machine can't be operated.

1. Output System for 10-200KW inverter 3 phases type

- (1) 3 Phases Input and one neutral line (3 ϕ 4W 380V)
- (2) The positions of Input/Output in the distributor are as below:



Graph 1

- (3) The Graph 2 shows all of the terminal boards:

Ground		Rectifier Input				Battery		Bypass Input				Output				Ground
G		N	R	S	T	+	-	R	S	T	N	R	S	T	N	G

Graph 2

(4) Cable size for Input / Output , shown as the below table: (mm²)

Model	Input (including Bypass)					Output				Battery	
	R	S	T	N	G	R	S	T	N	Positive	Negative
10KW	6	6	6	6	6	6	6	6	6	10	10
15KW	6	6	6	6	6	6	6	6	6	10	10
20KW	16	16	16	16	6	16	16	16	16	20	20
30KW	16	16	16	16	10	16	16	16	16	20	20
40KW	25	25	25	25	10	25	25	25	25	30	30
50KW	25	25	25	25	25	25	25	25	25	35	35
60KW	35	35	35	35	25	35	35	35	35	50	50
80KW	35	35	35	35	30	35	35	35	35	50	50
100KW	50	50	50	50	30	50	50	50	50	80	80
120KW	50	50	50	50	35	50	50	50	50	80	80
140KW	80	80	80	80	35	80	80	80	80	100	100
160KW	80	80	80	80	50	80	80	80	80	100	100
200KW	100	100	100	100	50	100	100	100	100	120	120

2.Wiring Inspection

After finishing wiring all of the input/output cables, the following should be inspected:

- (1) whether the order of the phases is correct;
- (2) whether battery input cable is connected with the correct polarity;
- (3) whether the ground connection cables of the Input and Output have been connected to the terminal board firmly.

Notice: The Bypass input cables (R,S,T) and the Rectifier input cables (R,S,T) are paralleled connected.

III.Operation of the Inverter -1

A.Procedures of Switching on Single Machine

Please switch on the inverter according to the following procedures after wiring all of the necessary cables properly

1. Close up the input switch of rectifier to start the rectifier of the inverter after confirming that all the phases have voltage;

If no display on the LCD screen, and there's long buzzes, it indicates that the input phases are not in correct order; then rectifier switch should be turned off and input power bus should be disconnected until the input phases (R,S,T) are wired in correct order;

Close up the rectifier switch again and LCD screen shall have display. Then it takes around 30s for self-inspection before starting the inverter;

The spinning fans indicate that the inverter has started up .

2. The Battery Switch can not be closed up until the inverter has started;
3. Close up the Bypass Switch;
4. Close up the Output Switch.

Note: When the inverter is working normally, the Repair Switch should be disconnected, otherwise the mains power would go through repair switch directly to the loads.

B.Procedures of Regular Switching Off

1. Disconnect the output switch;
2. Disconnect the Bypass Switch;
3. Disconnect the Battery Switch;
4. Disconnect the Rectifier Input Switch;
5. Disconnect the main power switch.

Warning:

1. Please strictly follow the above procedures to turn off the inverter;
2. The above actions should be done continuously until all of the switches are disconnected.

IV.Operation of the Inverter -2

B.Mains priority

AC first , DC standby INVERTER mode

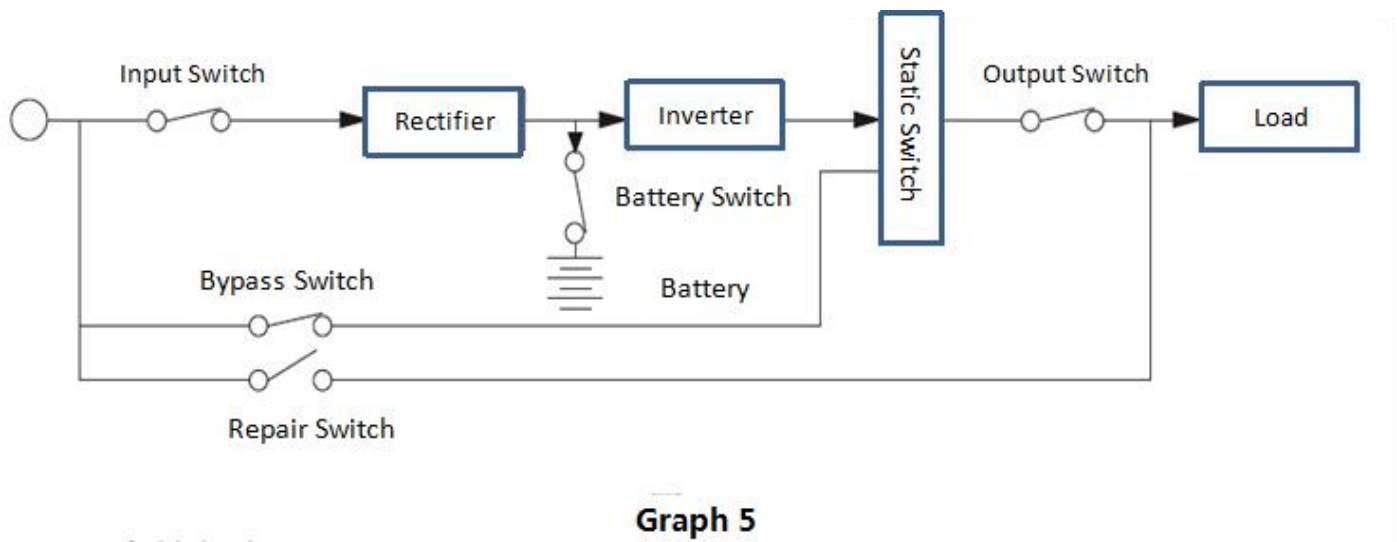
When both utility and battery are connected to the machine, utility will supply power to the loads prior to the battery. When utility is cut off, the battery will automatically continue to supply power.

Step 1: When utility power is available, it will output directly after voltage being stabilized and charge batteries at the same time.

Step 2: When utility power is cut off suddenly, the inverter will convert DC power to AC power automatically to ensure uninterrupted power supply within 5ms.

Step 3: When utility power becomes available again, it will automatically transfer to utility supplying power to loads and charge batteries at the same time.

See Workflow as below:



B.Battery priority

DC first, AC standby:

When both utility and battery are connected to the inverter, battery will supply power to the loads prior to utility. When battery capacity is not enough, utility will continue to supply power automatically.

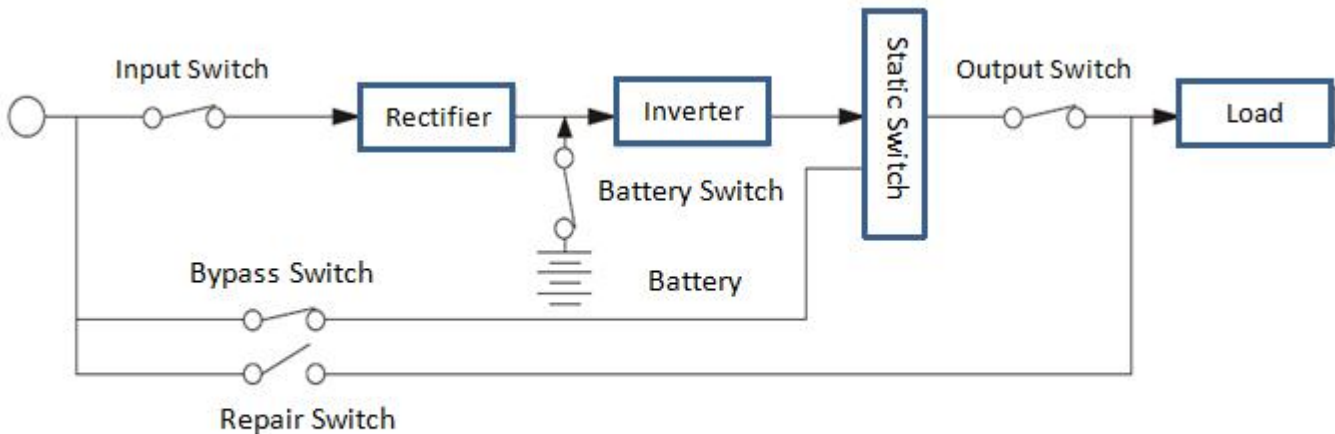
Steps are as follows:

Step 1: When battery has enough power, it will supply power to the loads directly

Step 2: When battery does not have enough power, it will automatically transfer to utility supplying power to the loads

Step 3: After the battery is fully charged (e.g. by solar or wind charge controller), it will then automatically transfer to battery supplying power to the loads.

See Workflow as below:



Graph 6

Note: Battery supporting time would be affected by the power consumption of the loads and temperature. Removing some of the loads can extend battery time.

Under the battery mode, the alarm would buzz interruptedly, and the indicators of Output and Battery on the control panel would show green light.

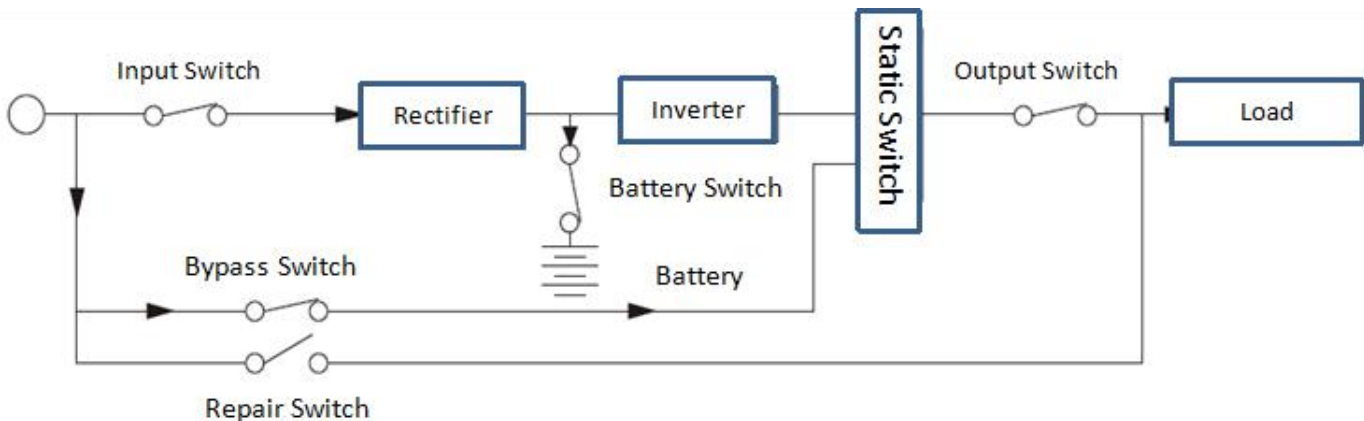
The closer to the exhaustion of the batteries, the more frequent would the buzzers go, with battery indicator flashing at the same time. Inverter will stop working when the batteries exhaust until the power come back for supplying and charging the batteries.

C.Static Bypass Mode

The inverter will turn to Static Bypass mode under any of the following situations:

1. order of transfer to Bypass (manually or automatically);
2. Output over-loaded;
3. Fault.

Under this mode, the bypass LED indicator on the control panel (Yellow light) will light on.



Graph 7

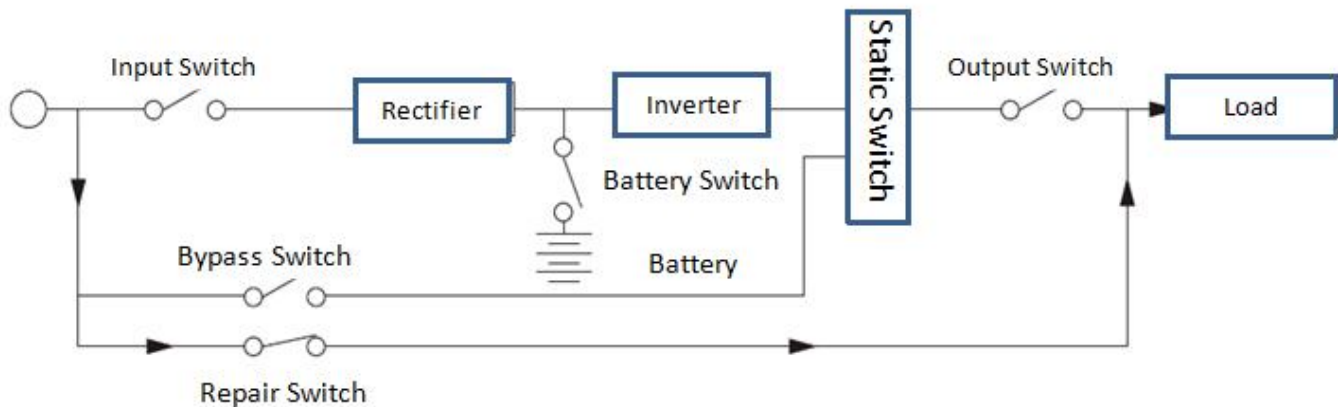
Note: The static bypass switch should be synchronized with AC power; It can be manually or automatically set to 0 transfer time from protective load (inverting output) to non-protective load (Bypass output)

D.Repairing Mode

Used when the inverter needs repairing without cutting the power for the loads.

When Repair Switch is closed, the control panel stops displaying, and electricity goes from bypass route to the load and the load will be affected by any interference on the power grid.

Batteries cannot supply the power for loads; Shown as the Graph 8



Graph 8

Note: Before repairing the machine, manually close up the Repair Switch and disconnect all the other switches (Input Switch, Output Switch, Battery Switch and Bypass Switch). Then apart from the voltage on the switch part, there's no current going through the internal components of the inverter and the loads are still having power supply.

But non-qualified personnel is not allowed to use the Repair Switch.

E.SLU

All of the operation action of this inverter is controlled by DSP chip.

F.Battery

It supplies the power for inverter. Choose battery quantity and capacity according to the type of the inverter and the required back-up time.

G.Turn to Bypass with Inverter's Off

Under the normal situation, if the orders to turn off the inverter part, the loads will be supplied by power from static bypass. If the mains power fails, the loads will not have power supply.

Under the emergency situation, if the inverter receives order of turning off the inverter part, the inverter will shut down completely until the power getting back to normal, then it will start the normal working mode automatically.

Note: Since Input Switch and Battery Switch shall have voltage remains even they are disconnected, only qualified personnel is permitted to repair the inverter. Otherwise the inverter may be damaged or worse, accidents occurs to human being.

V.Maintenance

A.Periodically Maintenance

Batteries and cooling fans are the items that should be inspected periodically.

1. Inspect the cooling fans and clean its dust;
2. Replacing the batteries should be done by qualified personnel. All the disused batteries should be returned to the related re-collection institute as the disused battery is deemed to be "Poisonous Waste".

3. Battery life is related to the designed cycles of charging-discharging and the working temperature. Usually, under 20 °C, battery life can be 3~5 years. If the environmental temperature of the battery is above 30 °C, battery life would 1.5~2.5 years.

After a few times of charging-discharging cycles, the battery capacity would increase and be stable for the next hundreds of cycles. Then it will shrink.

B. Battery Maintenance

Battery maintenance should be executed as follows:

1. Keep the environment temperature at around: 20~25 °C;
2. In the first month, 2~3 times of charging and discharging the batteries is advised;
3. After the first month, batteries should be charged and discharged once every 3 months.

C. Adjusting a Suitable Working Environment

Adjustable items: Battery alarm setting; Automatic Switch-off; Bypass Voltage Range; Bypass Frequency

VI. Parameters :

A. Inverter System

1. Input Rectifier shown as table 1

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Max. Input Current	25A	38A	51A	75A	101A	125A	150A	199A	240A	300A	340A	388A	480A
Working Principle	Online Power supply, with static bypass switch (uninterruptible transfer), output power isolated												
Phase	3 phases, R S T +N+G												
Nominal Voltage	380vac ±25%												
Nominal Frequency	50Hz / 60Hz ±10%												
Voltage Harmonic Distortion	<5%												
Soft Start Time	0~100% 5 seconds												

Table 1

2. Output Rectifier shown as Table 2

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Max. Output Voltage	216VDC			408VDC					432VDC				
Charging Current	5A ~30A (adjustable)												

Table 2

B.Battery

Shown as Table 3

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Max. Discharge Current	52A	78A	104A	156A	125A	156A	187A	249A	311A	373A	435A	497A	559A
Battery Voltage	192 VDC				360VDC				384VDC				
Float Charging Voltage	216VDC				408VDC				432VDC				
Charging Current	5A ~30A (adjustable)												

Table 3

C.Inverter

Shown as Table 4

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Power (KW)	10	15	20	30	40	50	60	80	100	120	140	160	200
Working Method	SVPWM Full Bridge Inverting												
Phase	3 phases, R S T +N+G												
Nominal Voltage	380vac ±1% (Stable Load)												
Nominal Frequency	50Hz / 60Hz ±0.5% (in Battery mode)												
Frequency Variation	<±0.05% (non-synchronized); <±2% (synchronized with Mains power);												
Crest Factory	3:1												
Wave Form	Pure Sine Wave												
THD	Linear loads: <3%; Non-linear loads: <5%												
Fluctuation of Voltage for Unstable Load	from 0~100% : <±5%												
Transient Recovery Time	<10ms												
On-Load Voltage	Balance:<±1% Unbalance: <±5%												
Overload Capability	125% overload lasting 10Mins, 150% overload lasting 1min.												

Inverter Efficiency on 100% load	90	92	92	92	93	93	93	93	95	95	95	95	95
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Table 4

D.Bypass

Shown as Table 5

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Input Current	25A	38A	50A	75A	105A	125A	150A	199A	240A	300A	340A	388A	480A
Phase	3 phases, R S T +N+G												
Nominal Voltage	380vac ±15% (Stable Load)												
Nominal Frequency	50Hz / 60Hz ±0.5% (in Battery mode)												
Transfer time to bypass	10 ms												

Table 5

D.MPPT

Shown as Table 6

Model	MPPT22050	MPPT36040
Input Max Current	45A	35A
PV Max Input Power	11KW	16KW
Nominal Voltage	330Vdc	480Vdc
PV Voltage Range	250~450Vdc	420~650Vdc
Output Max Power	10KW	14KW
Output Nominal Voltage	240Vdc	387Vdc
Output Voltage Range	192~264Vdc	310~425Vdc
Ourput Max Current	50A	40A

Table 6

F.System

Physical data shown as Table 7

Model	10KW	15KW	20KW	30KW	40KW	50KW	60KW	80KW	100KW	120KW	140KW	160KW	200KW
Output Bypass Current	25A	38A	50A	75A	105A	125A	150A	199A	240A	300A	340A	388A	480A

Efficiency (100% load)	>85%												
Communication Port	RS232												
Operating Temperature	0~40℃ ;												
Operating Relative Humidity	5%~95%												
Operating Altitude	>1000M (1% Power decreased in every 100M increased. Maximum 4000M)												
Cooling Method	Force Ventilation												
Color	Black												
Input Cable	From Bottom and Back												
Maintenance Side	Front / Top/ Flank side												
Input Setup	Terminal Board												
Output Setup	Terminal Board												
Size (mm)	720*565*1140			790*660*1550				1100*900*1500		1380*950*1800			
Weight(kg)	220	260	290	400	480	580	650	900	1100	1300	1350	1480	2000

Table 6

VII..Alarms

A.Alarm1:Fault of Bypass Voltage or Bypass Fuse, SCR

It alarms in the following situations:

1. Bypass input voltage fault;
2. Bypass Input Switch is disconnected;
3. Bypass SCR fuse disconnected or melt due to short circuit.

B.Alarm2:Fault of Main Input Power or Input Rectifier Switch Disconnects

It alarms in the following situations:

1. Input voltage is beyond 176~264 vac;
2. Input frequency is beyond 45~56 HZ;
3. Input Rectifier Switch is disconnected;
4. Rectifier fault.

C.Alarm3:Under-Voltage of the Battery

It alarms in the following situations:

1. Battery is under-voltage;
2. Battery running time is lower than the preset time;

D.Alarm4:Battery Discharging

It alarms once the batteries start to discharge. In about 2 minutes, the alarm stops.

It alarms when the batteries capacity is close to exhausted voltage.

(The above happens without "Mute" being pressed)

E.Alarm5:Over-loaded

It alarms when load power exceeds 100% of the output power of the inverter;

Loads need to be reduced, otherwise the inverter will turn to bypass automatically.

F.Alarm6:Temporary Bypass

It alarms in the case of over-loaded, the inverter would turn to bypass mode temporarily , waiting for the inverter to supply the inverting current.

G.Alarm7:Turn to Bypass due to Over-loaded

It alarms when over-loaded for long time. For example, the inverter can supply normal power for 10 minutes when under 125% overloaded, then it will turn to bypass mode. If the load is reduced to <125%, the inverter resume to the normal working mode.

H.Alarm8:Order to Bypass

By typing special order into the inverter , it can switch off the inverter and turn to Bypass without leaving record.

But the inverter will turn back to normal working mode after 1 minute unless a locked time has been set.

I.Alarm9:Over-heat or Fault of Cooling Fans

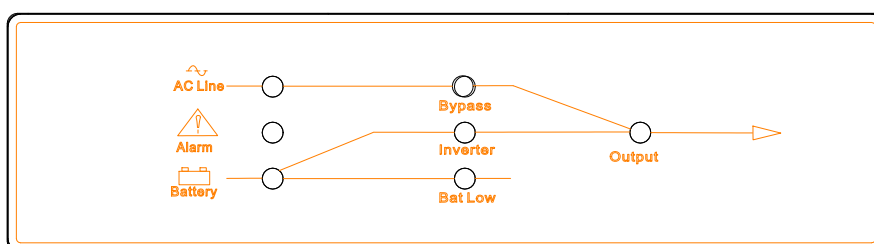
It alarms when the control system, inverter power module or rectifier power module gets over-heat or the cooling fan is fault. Then the inverter turns to bypass mode.

VIII.Display Function

A.General Introduction

1.Instruction on LCD Indicators

The operation control display panel is located on the front door.Through the operation control display panel, operation control and query all parameters, battery status, and alarm information.As shown in figure 4-1, the operation control display panel can be divided into three parts according to functions: analog current diagram, LCD display and menu key, control operation key.The description of operation control display panel is shown in table 4-1



4-1Operation control display panel part description

LED number	Function	LED number	Function
AC LINE	Ac input LED	BATLOW	Battery low voltage
BATTERY	Battery LED		
BYPASS	Bypass LED		

INVERTER	Inverter LED		
OUTPUT	Load LED		
ALARM	ALARM LED		

1.2 LED

LED	STATUS	MEANS
Ac Input LED	Green normally on	AC input works properly
	Green flashing	Ac input anomaly
	does not light	There is no AC input
Battery LED	Green normally on	Battery discharge inverter
	Green flashing	Battery low pressure alarm
	does not light	Battery does not work
Bypass LED	Yellow normally on	Load power is supplied by AC power
	does not light	Bypass not working
Inverter LED	Green normally on	The load power supply is provided by the inverter
	Green flashing	Inverter fault
	does not light	The inverter is not working
Load LED	Green normally on	Output, and normal
	does not light	There is no output
ALARM LED	Red normally on	There are warning signs
	does not light	No alarm fault
BATLOW	Green normally on	Battery low voltage

4-2 Description of led status

Sound warning (buzzer)

The alarm sound	Description
Half a second in singing	Battery low pressure alarm
Continue to sing	Battery high voltage, overload warning

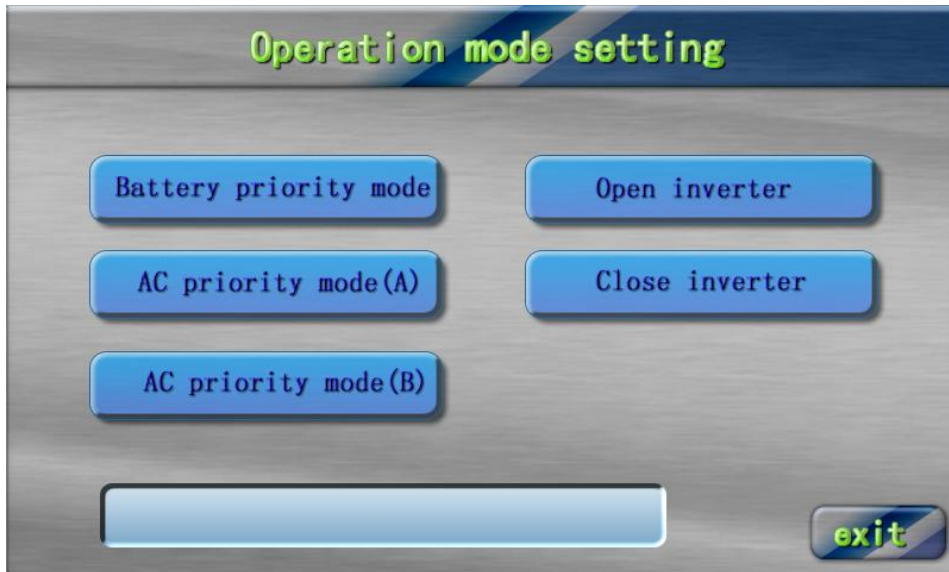
2. LCD display



graphics	instructions
1	Power input parameters
2	Entry operation
3	Battery voltage
4	Battery capacity % value
5	AC charging current
6	Current running mode
7	Output voltage parameter
8	Output load parameters
9	Mute and cancel the mute button
10	Current time date
11	Inverter on or off
12	Solar Voltage
13	Solar Current



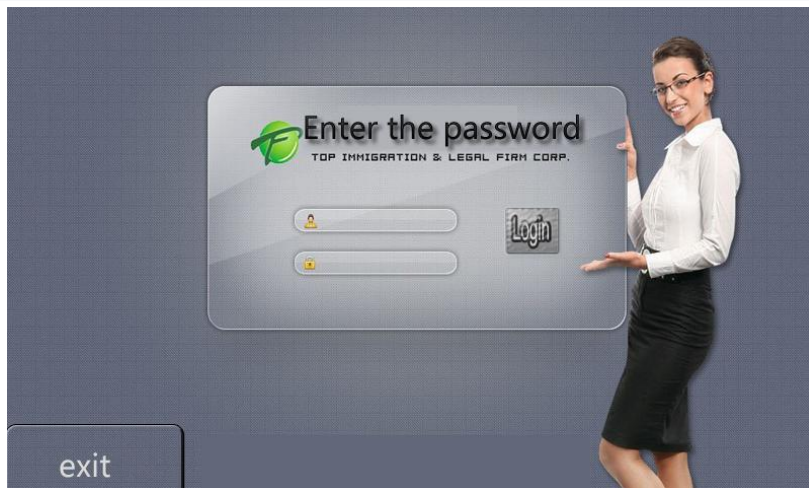
3. Operation Mode Setting:

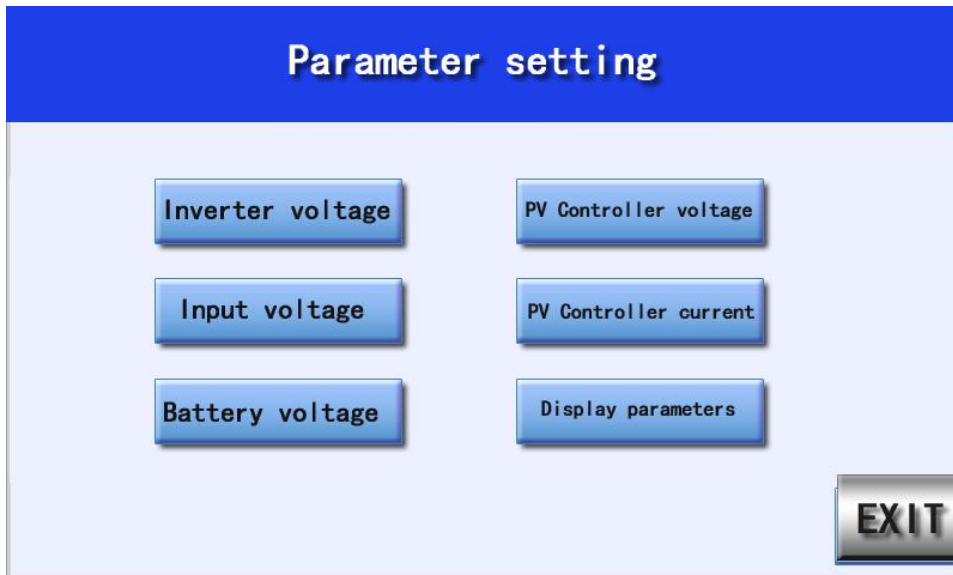


3C.1 modification parameters:

Enter the password to modify and set parameters.

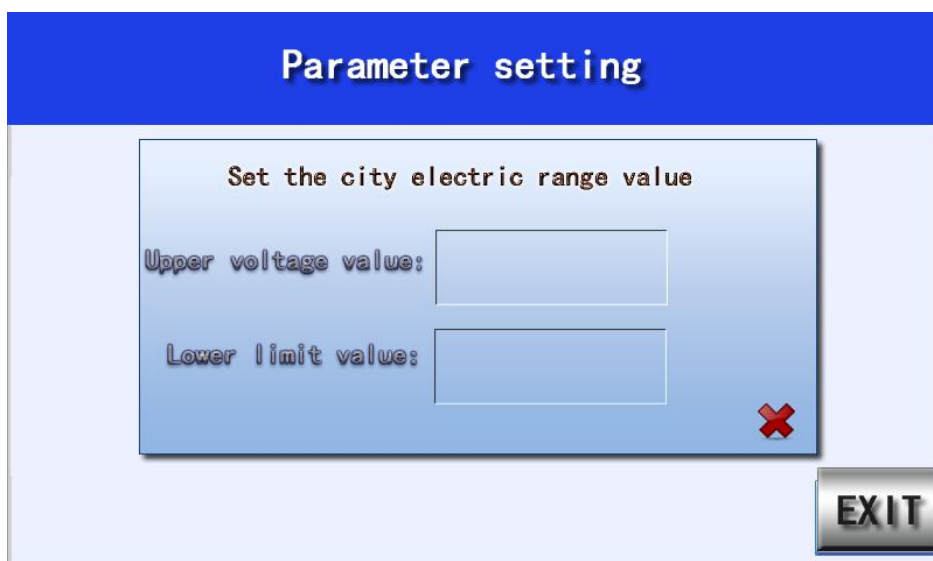
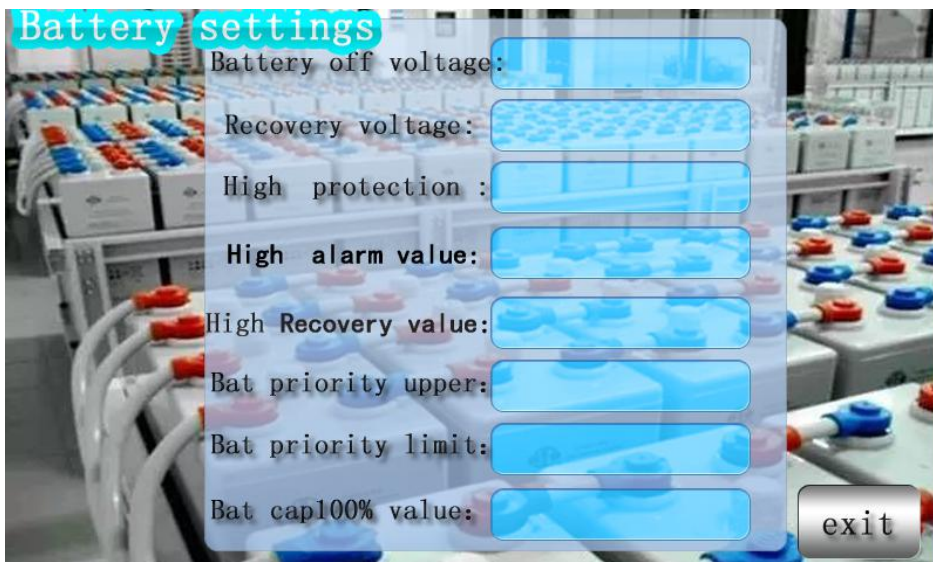
The factory password is: 123456





3C.2 modify battery parameters:

Click directly in the blank of the battery and input the voltage value the user wants



Packing List	
Inverter	1 piece
User Manual	1 piece

Optional Accessories (Extra Charge)
1. N+1 Parallel Redundancy
2. SNMP Network card (Non inbuilt)
3. RS 422/RS 232 transferable port
4. Signal board for dry contact alarm
5. 12-pulse rectifying
6. All kinds of non-regular machine



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