THANKS

Thank you for purchasing our UPS, it is safe and reliable, needs few maintenance.

¡ High frequency series is the tower type UPS, please take note.

¡ This manual includes instructions of safety installation and operations, they help your UPS to have the longest service life. This manual also accounts the UPS work principle and relativefunctions.

¡ Please obey the instructions and notes stated in this manual. Keep this manual in a safe place, consult it before operation.

Note: The company reserves the right to make changes to product described in this manual at any time and without notice for reasons of improvement.

TABLE OF CONTENTS

INTRODUCTION

¡ This UPS is a sophisticated piece of equipment with 16 bit microprocessor and advanced software programming technology, high frequency SPWM is created to control the inverter of UPS. This simplifies the control circuit, enhances the stability of UPS, also enables the UPS to have enhanced real-time performance that makes UPS respond the variety of external environment rapidly and insure that the control circuit is compact and reliable.

∵ Digital control technology to avoid the temperature excursion of hardware specification.

¡ Self-diagnoses before startup help UPS to find potential failure to avoid any losses.

¡ Double conversion on-line topology, which makes the UPS a pure sine wave machine with constant frequency, constant voltage, low noise and no interruption with mains power fluctuation. It protect the user's equipments ideally all the time.

¡ No transfer time when main power fail or main power restore, meets the requirements of precision instruments.

¡ Standard bypass function, when UPS meets a faults, it can transfer to bypass seamlessly and provide alarm.

¡ Advanced voltage compensation technology, makes the wide input voltage range, reducing the battery usage, enhancing the adaptive ability against the bad mains power variation.

∵ Advanced wide frequency input technology, wide input frequency range of UPS gives UPS a good compatibility with generator under field circumstances.

- The advanced PFC technology on the input of UPS, improves the input power factor close to unity, raises the power efficiency, removes the harmonic noise from UPS to utility, lowers UPS operational costs, it's really a environmental friendly protection power supply.
- Smart Management Function. Under mains power blackout, UPS would transfer to battery mode to supply power to loads, when battery voltage is low, UPS would protect itself and shuts down automatically. When main power restores, UPS would be turned on automatically to supply power to loads.
- Cold start function, when there is no input, UPS can be turned on with battery pack, to meet the user's emergency needs. The cold start function is quite strong. UPS can be cold started on full load situation.
- Fault operation prevention function, every button has delay function, only when you press and hold the button for a certain time, required operation can be activated.
- Smart Management Function. Under mains power blackout, UPS would transfer to battery mode to supply power to loads, when battery voltage is low, UPS would protect itself and shuts down automatically. When main power restores, UPS would be turned on automatically.
- Via internal or external SNMP card, UPS can go on internet, you can monitor and manage the UPS status through all kinds of network management system.
- Ample LCD display information: Various operation environments and working status are available through the LCD display. You can rapidly judge the fault reasons, fault parts and make the maintenance quickly and conveniently by the LCD displayed digital fault codes and the fault information codes checking table.

SAFETY

¡Even if not connected to main power, 220V voltage may still presents at UPS outlets.

¡ If external battery cord or power cord needs to be replaced, please contact our service station or franchiser for replacing to avoid fire disaster caused by insufficient capacity of such items. Don't dispose of battery or batteries group in a fire, otherwise, it can cause explosion and harm to people.

¡ Don't open the battery or do the battery damage, for the liquid spilled from battery is strongly poisonous and do harmful to body.

¡ Please avoid short-circuit between battery anode and cathode; otherwise, this will cause electric shock or fire.

¡ Don't dismantle the UPS cover, there is danger of electric shock.

¡Don't touch batteries. Batteries are not isolated with the input circuit, there is high voltage between the battery terminals and ground.

¡ Do not connect with the electric equipment such as blower, heater, drilling machine etc. They may damage the UPS.

Notice :

There presents high voltage in UPS. If there is any abnormal problem present, please consult the service center and do not attempt to repair the equipment under any circumstances. The address of service center has been detailed on the warranty card.

INSTALLATION

A£unpacking and inspection

1、 When unpacking the UPS, please pay attention to the packing mode and the annex in which includes user-manual, warranty card, input power cable, output wiring socket. There should also have an external battery connection cable if the model of your equipment is of long backup type.

2、 Inspect your machine to see whether it's damaged in the transportation. If damaged or some parts missing, please inform the transporter or the franchiser, don't start up your UPS,

3、 Check if the equipment is just what you wanted to purchase. You can affirm through inspecting the model number on back panel

◆ MODEL NO: Model

MODEL NO	Unit sort	MODEL NO	Unit sort
1250VA	1.25KVA standard unit	1250VA(H)	1.25KVA long-time unit
2000VA	2KVA standard unit	2000VA(H)	2KVA long-time unit
3000VA	3KVA standard unit	3000VA(H)	3KVAlong-time unit

Common tower type

B£Safety Notes

1、Keep good air circulation around UPS and far away from water, flammable gas and corrosive.

2、 Don't place UPS on the slope and there should keep good air circulation between in-vent on front panel bottom and fan out-vent on back panel.

3¡The environment temperature around UPS should keep in arange of 0¡~40¡.

4¡There will be phenomena of condensing if the equipment is dismantled or installed under low temperature. The equipment can't be installed unless it is full dry at internal and external of the equipment, otherwise, there will be danger of electric shock.

5、The socket that supply power to UPS should be placed near the UPS, and easy to get.

Note:

¡When connecting load to UPS, first turn off load and then connect the power cable and finally turn on load one-by-one.

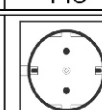
¡Plug UPS on the special power receptacle with over-current protection, the power receptacle should be connected with ground wire.

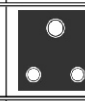
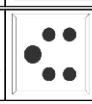
¡UPS is likely to have output voltage no matter whether the power input cable is plugged in utility socket. If you wish UPS don't have output, firstly break off the switch and then cancel utility power supply.

∽ For standard unit, it is recommended the batteries are charged for eight hours prior to use. UPS can automatically charge batteries as long as UPS put through power. UPS can also be used at once if battery hasn't been charged , but the back-up time will be less than the standard value.

∽ When connect inductance load such as laser printer to UPS, the capacity of UPS is reckoned according to the loads startup power because the startup power is higher.

C£UPS rear panel

NAME	PIC	SOCKET No.		NAME	PIC	SOCKET No.	
CHINESE STANDARD SOCKET		1250VA/H	3	GERMANY STANDARD SOCKET		1250VA/H	2
		2000VA/H	4			2000VA/H	3
		3000VA/H	4			3000VA/H	3

NAME	PIC	SOCKET No.		NAME	PIC	SOCKET No.	
USA STANDARD SOCKET		1250VA/H	3	AUSTRALIAN STANDARD SOCKET		1250VA/H	3
		2000VA/H	4			2000VA/H	4
		3000VA/H	4			3000VA/H	4
IEC SOCKET		1250VA/H	3	SOUTH AFRICA SOCKET		1250VA/H	3
		2000VA/H	4			2000VA/H	4
		3000VA/H	4			3000VA/H	4
UNIVERSAL SOCKET		1250VA/H	3	HIGH CURRENT OUTPUT SOCKET		1250VA/H	0
		2000VA/H	4			2000VA/H	1
		3000VA/H	4			3000VA/H	1
INDIAN STANDARD SOCKET		1250VA/H	3	WIRING SOCKET	1250VA/H	NO	
		2000VA/H	4		2000VA/H	YES	
		3000VA/H	4		3000VA/H	YES	

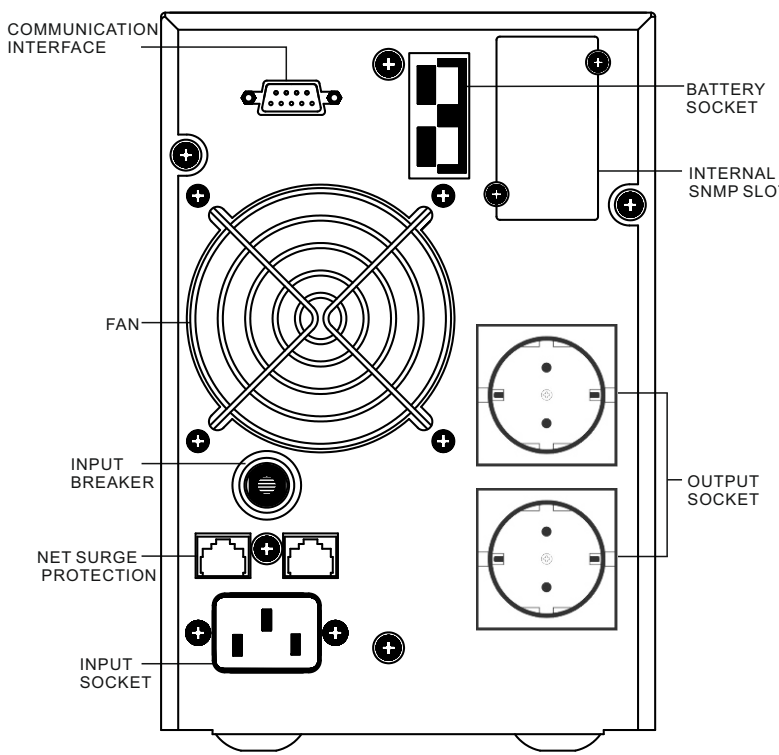


Fig 1 1250VA BACK PANEL

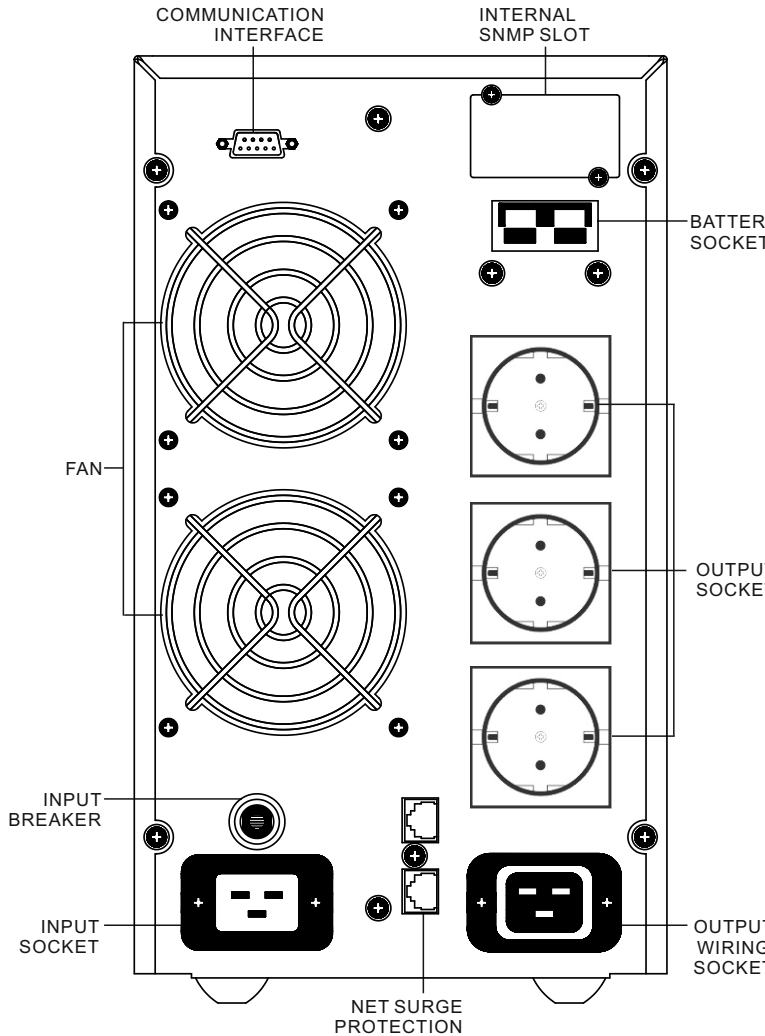


Fig 2 2000VA/3000VA BACK PANEL

D） The description of front panel and display lamp

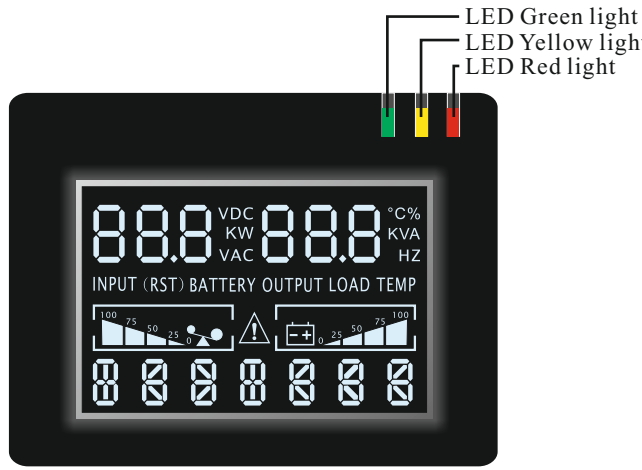


Fig 3 Description of the front panel

LCD panel section

- The first line is the numeric section, and is consisted of two small numeric sections and the related unit section on the right side. It is used to display the numerical value of the certain item on the second line.
- The second line is the section of the items which include input, battery, output, load and temperature, etc.
- The third line is the graphic section which has the load (left) and battery capacity (right) displayed in graphics. The failure icon will be displayed when there is a failure.
- The fourth line is the status section, and is the area of machine status in English. The utility mode is displayed as “on line”. The battery mode is displayed as “on batt”. The bypass mode is displayed as “on bps”.

LCD panel sectionLED indicators function

- Red LED is on: UPS is fault and has no output. For example: Overload beyond the allowed time, inverter fault, BUS fault, over temperature fault etc..
- Yellow LED is on: UPS is alarming. For example: With utility in but not turn on the UPS, Bypass mode, batteries are over charged, charger fault, fan stop working, batteries are discharged to battery low voltage when UPS works on battery mode.
- Green LED is on: UPS is normally powered by utility or battery inverter mode.

Fig 4 Description of the Buttons

Buttons part function

- START/OFF button

  Press and hold for some time to turn on/off the UPS.

- FUNCTION button

  Press and hold for some time on utility mode: UPS

  runs a self-test function.

  Press and hold for some time on battery mode: Mute

  function.

- INQUIRING button

  Press for short time: Indicate the items of the second row item section orderly. Press and hold for some time: Circularly and orderly display the items from " INPUT, BATTERY, OUTPUT, LOAD, TEMPERATURE" every 2 seconds. When you press and hold the button for some time again, it will turn to static output status.

E£UPS Input Connection

∈ When connect power cable, please use suitable socket with over-current protection. The socket rating for 1250VA should be above 6A, for 2000VA should be above 12A, for 3000VA should be above 16A.

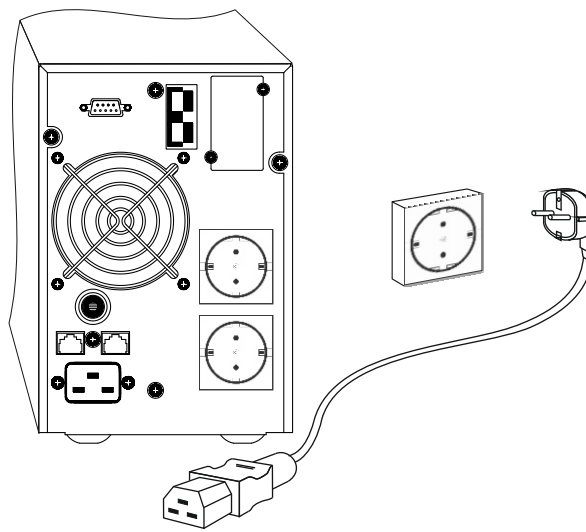


Figure 5 UPS Input Connection

F£UPS Output Connection

1、 Output of 1250VA use socket only, please directlyplug the load cable into the output socket.

2、 Output of2000VA and3000VA notonly provide socket but also offer high-currency output wiring socket, which make output wiring become easy.

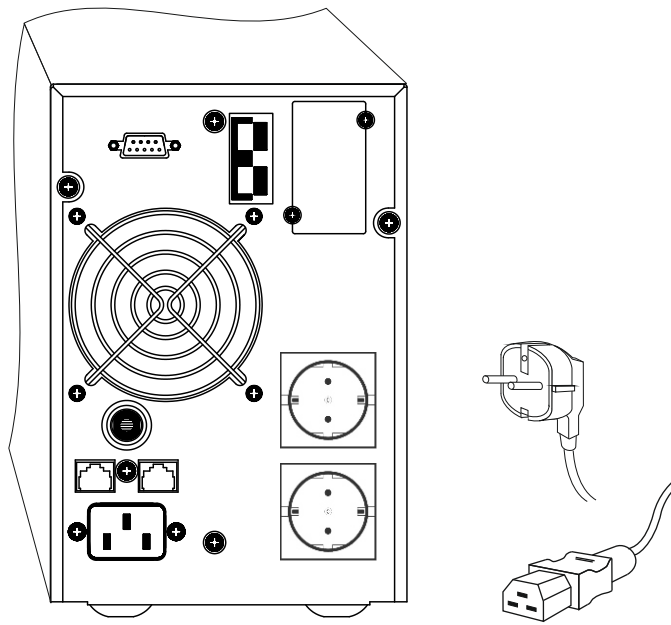


Figure 6 UPS Output Connection

G£External battery connection

1¡Choose correct battery voltage according to the UPS model. The batteries can't be more or less connected, otherwise UPS will work abnormal or be damaged.
Battery voltage for 1250VA is 36VDC;
for 2000VA is 96VDC;
for 3000VA is 96VDC.

2¡ One end of external battery cable is connected to UPS, the other end is open style two cables used to connect to battery pack. The process of connecting battery is very important. Operator must obey the instructions.

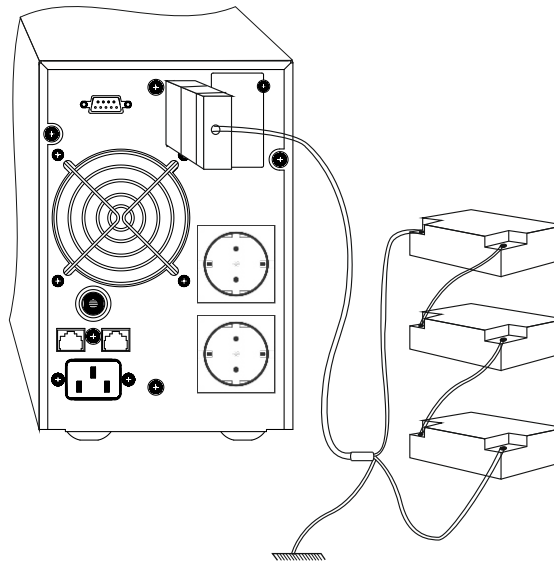


Figure 7 Long backup external battery connection

1£First connect battery group in series and ensure correct battery voltage.

2£ Extended battery cable must be connected to battery first (do not connect to UPS first; otherwise there will be danger of electric shock). Red cable connect with battery anode ¡+¡ and black cable connect with cathode ¡-¡ .

3£Don't connect any load to UPS, put through utility to UPS after the input wire has been connected well.

4£ After plug the battery extended cable into UPS battery socket , the connection is completed , at the same time UPS starts to

OPERATION AND RUNNING

The operation is simple, operator needn't any special training, they only need follow the operation instructions listed in this manual.

A£Operation

1.Operation on utility mode

1). Once utility is plugged in, the internal charger starts to charge batteries, at this point the yellow LED is on and LCD displays ¡on bps¡ and the output voltage is zero, which means UPS has no output.

2). Press and hold the START/OFF button for more than 2 seconds to turn on the UPS, then it will turn on the internal inverter.

3). Once turned on, the UPS will perform a self-test function, when the yellow LED turns to green, LCD displays ¡on line¡, it means UPS is working in utility mode.

2. Start up UPS by DC when utility is disconnected

1). When utility is disconnected, press and hold the START/OFF button for more than 2 seconds to cold start the UPS.

2). The cold start is the same operation as when UPS is started with the utility in, and LCD displays ¡on batt¡, which means UPS is working in battery mode.

3. Turn off UPS in utility mode

1). Press and hold the START/OFF button for more than 2 seconds to turn off the UPS, then it will turn off the internal inverter.

2). When turning off the UPS, UPS will run a self-test function, green LED will be off and yellow LED will be on, LCD displays ¡on bps ", which means UPS has no output.

4. Turn off UPS in battery mode

1). Press and hold the START/OFF button for more than 2 seconds to turn off the UPS.

2). When turning off the UPS, UPS will run a self-test function, UPS has no output once there is no display on front panel.

5. UPS self-test/mute test operation

1). When UPS is on utility mode, press and hold the FUNCTION button for 1s, the buzzer will sound once every 4s, the LED lights light around at the same time as the UPS runs self-testing, and it will last for 10 seconds.

2). When UPS is on battery mode, the buzzer stops beeping if you press and hold the FUNCTION button for 1s, and it will restart to beep if you press and hold the START button for one more

B£Run Mode

1. Bypass mode

UPS will transfer to bypass mode and provide alarming only when it's turned on with utility present, or overloaded or detected a fault. Indication and display status on front panel are as following: Yellow LED is on, LCD displays as below: Status is ¡on bps¡, load and battery displays are according to the exact load capacity and battery capacity.

When UPS is working on bypass mode, it has no back up function, and load is powered directly by utility.

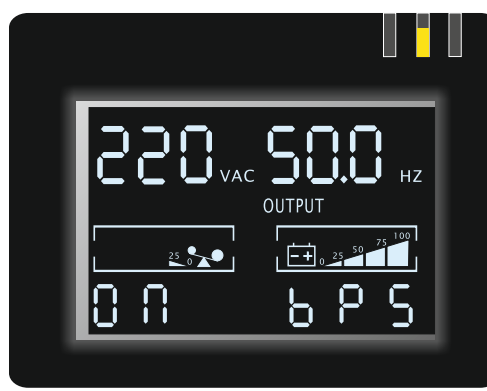


Figure 8 Bypass Mode

2. Utility mode

On utility mode, the indication and displays are as following figure:

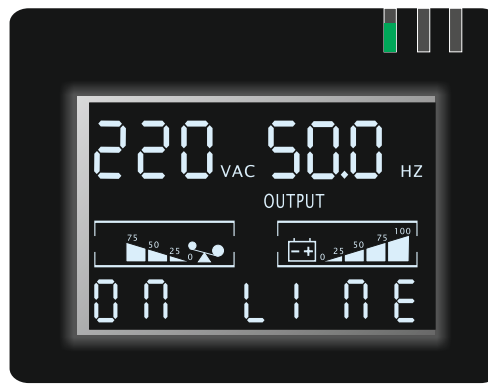


Figure 9 Utility Mode

Green LED is on, LCD displays: Status is ¡on line¡.

1). If the ¡INPUT¡ letters in the item section (the second row on LCD display) flashes, it indicates the line and neutral are incorrect.

2). If load capacity graph in the graphic section (the third row on LCD display) flashes, yellow LED is on and the buzzer beeps once half second, it reminds that UPS carries over 100% load and you should remove the unnecessary load until the displayed load is below 100%.

3). If battery capacity graph in the graphic section (the third row on LCD display) flashes, yellow LED is on, it reminds that UPS is disconnected with batteries or battery voltage is low, and you should firstly check whether the battery connection is ok, if yes, the batteries may be fault and need to be replaced. You can press the FUNCTION button for 1 second to do the manual self-test, for more details please refer to the Troubleshooting Table.

3. Battery mode

On battery mode, the indication and displays are as following figure:

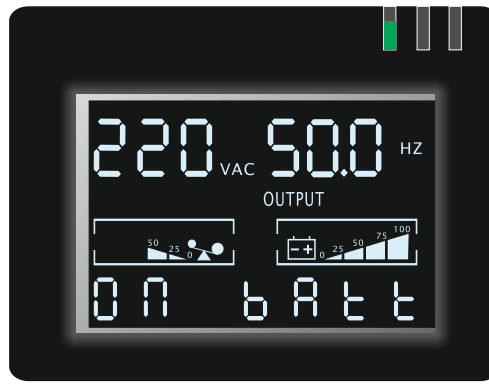


Figure 10 Battery Mode

Green LED is on, LCD displays: Status is ¡on batt¡.

1). On battery mode, the buzzer will beep once every 4 seconds to provide an audible alarm, press and hold the function button for more than 1 second, the buzzer will stop beeping, press and hold the FUNCTION button for one more second, the buzzer will beep again.

2). If battery capacity graph in the graphic section (the third row on LCD display) flashes, yellow LED is on, the buzzer beeps once every second, it means the battery voltage is discharged to minimum protection voltage, and reminds users that the battery capacity is diminished and should save all datas and works and then switch off the equipments.

3). You can test UPS back up function by disconnecting the utility.

4). If the ¡INPUT¡ letters in the item section (the second row on LCD display) flashes, it means the input voltage or frequency is beyond the extension.

4. Fault mode

The front panel indication and display is as following:

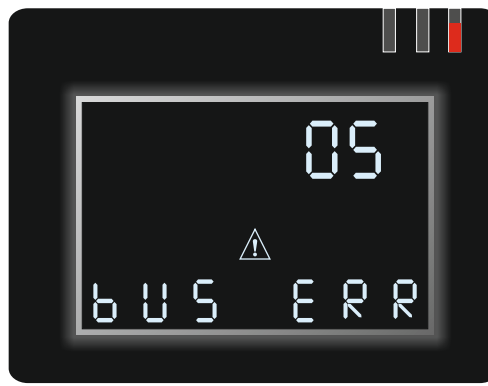


Figure11 Fault Mode

Red LED is on, LCD displays: Status is Fault indication mark as the marker in the figure above, The digital section indicates the fault code, and there is some simple fault information in the status section. For more details please refer to the abnormal process table.

Notice:

¡The following process must be performed if UPS is connected with generator:

First turn on generator , after it runs stably (at this time ensure UPS is no-load connected) connect output power of generator to UPS input terminal , then turn on UPS. After UPS turned on, please connect load one-by-one.

¡It is recommended that the generator capacity is as twice as UPS rated capacity.

MAINTENANCE

∵ MAKELSAN UPS needs few maintenance. The battery of standard unit is of valve regulated, maintenance free. It can attain expectant life only by keeping frequent charging. Regardless of UPS STAR or STOP when UPS connects to utility power, the battery is charged all the time and UPS offers protection for over-charge and over-discharge。

∵ It is recommended that the batteries are charged once every four
to six months if UPS hasn't been used for long time.

∵ Normally the battery life is three to five years and the battery must be replaced ahead of time once there presents any abnormal status. The battery replacement must only be performed by qualified personnel.

∵ It is inadvisable to replace a single battery. Operator should obey the instruction of battery distributor when replacing all batteries.

∵ The batteries should be charged and discharged once every four to six months. After UPS discharged to off, the batteries should be recharged. The charge time of standard unit must be more than 12 hours.

∵ The battery must be charged and discharged once every two months in high-temperature area. The charge time of standard

Notice:

¡Before replacing batteries, first please break off the utility switch and remove all your metallic adornment such as finger ring, watch and so on.

¡ Please use the screwdriver with insulating handle.Do not lay the tools or metallic goods on the battery

¡ It is normal to have sparks when you connect battery wire to battery, it does not do harm to your body safety .

¡No anti-connection or short circuit between the battery anode and cathode forever

TROUBLESHOOTING

∵ The following messages are the messages that users would find on UPS when it meets some problem, with the use of such messages, users can know where the problems are and how to deal with such problems.

∈ Fault indicator on, indicates UPS has detected some fault.

∈ Buzzer beeps, indicate UPS need to be paid attention to.

∈ Several fault indicators and status indicators on, is to help the

When you contact with the service personnel, following messages is required.

∈ UPS MODEL No. and SERIAL NO.

∈ Date of fault happened

∈ The whole statement of fault (include indicator statements on panel)

INFORMATION TABLE

∵ Information Table

	Byp mode	Line mode	Bat mode	Bat test mode
Bus Fault	62	05¡25	01¡21	40¡41
Inv Fault	61¡63	04	24	42
Over Heat	33	06	08	43
OP short	\	16	02	44
Overload	\	03	09	45
Fan Fault	36	28	38	46
Charge Fault	07	07	\	\
Bat Over	11	11	11	11

TROUBLE SHOOTING TABLE

∵ MAKELSAN UPS Troubleshooting Table

Fault	Causation	Solution
the ¡INPUT¡ letters in the item section (the second row on LCD display) flashes	Utility voltage or frequency exceeds UPS input range (beep 2 times every 1s when startup, beep for 8 times)	UPS is working on battery mode, save disk and close the programs, make sure utility voltage and frequency is in the range of normal
	Anti-connection of utility line and neutral, UPS beeps once per 2m	Re-connect, make a correct connection
Battery indicator flashes	Battery low voltage or battery not connected	Check UPS battery, re-connect battery well, if battery damaged, replace it.
Utility normal, but UPS has no input	UPS input breaker open circuit	Manually reposit breaker
Short back up time	Battery not charged enough	Keep UPS connecting with utility for more 8 hours, recharge battery
	UPS overloaded	Check load capacity, remove some redundant loads
	Battery aged	Remove battery, please contact franchiser to get battery and relative subassembly.
UPS don't startup after pressing the ON button	Short holding time	Press and hold the ON button for more than 1s to startup UPS
	UPS has no battery connected or battery voltage low and too many loads connected	Connect UPS battery well, if battery voltage low, please turn off UPS and take off some loads, then startup UPS
	Fault occur inside UPS	Contact supplier for servicing

Appendix 1. EMC grade standard

The MAKELSAN UPS are manufactured according to the following EMC international grade standard:

International standard code	Grade
*EMC	
IEC61000-4-2(ESD)	Level 4
IEC61000-4-3(RS)	Level 3
IEC61000-4-4(EFT)	Level 4
IEC61000-4-5(Surge)	٤Level
*EMI	
IEC62040-2	Class B

Appendix 2. Product Performance

¡ Electric performance

Model	1250VA	2000VA	3000VA
Rated load	800W	1400W	2100W
Rated voltage	220Vac		
Rated frequency	50Hz		

¡AC input

MODEL	1250VA	2000VA	3000VA
Voltage range (Single phase)	When load<70% Input voltage range is 115÷5V ~ 295÷5V When load◎70% Input voltage range is 160÷5V ~ 295÷5V		
Frequency	46 ~ 54Hz(50Hz)		
Power factor	◎0.97		

¡DC input

MODEL	1250VA	2000VA	3000VA
DC supply voltage	36VDC	96VDC	96VDC
Internal battery type	12V sealed lead acid maintenance free battery		
Internal battery capacity	3PCS 7AH/12V	8PCS 7AH/12V	8PCS 7AH/12V

MODEL	1250VA	2000VA	3000VA
Backup time (half load)	>12min	>19min	>16min
Backup time (full load)	>5min	>8min	>5min

Note: The backup time of long time unit depends on the battery capacity

∈ Output

MODEL		1250VA	2000VA	3000VA
Voltage tolerance		220Vac(1÷2%)		
Frequency tolerance (Battery mode)		50Hz(1÷0.2%)		
THD/ full load	Linear load	<3%		
	Non-linearLoad	< 4%	< 5%	< 5%
Overload		>110%∪30s transfer to bypass >150%∪200ms transfer to bypass		
Crest ratio		3:1 (max)		
Output waveform		Standard sine wave		
Utility mode transfer to/from battery mode		Transfer time: 0ms		
Utility mode transfer to/from bypass mode		Transfer time is 4ms, standard value is 2.5ms		
Efficiency		◎83%	◎85%	

¡ Environment

MODEL	1250VA	2000VA	3000VA
Temperature	0→ ~40→		
Relative humidity	0 ~ 95%, non-condensing		
Altitude	<1500m		
Store temperature	-25→ ~ 55→		

∈ Mechanical Specification (Common temple type)

MODEL		1250VA/H	2000VA/H	3000VA/H
Dimension W*D*H(mm)		144*412*213	191*470*338	191*470*338
Weight	Net Weight	14/7.5	33/14	34/15
Kilogram	Gross Weight	16/9	35/16	36/17

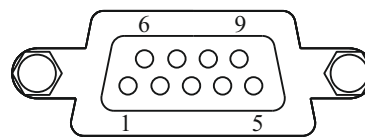
***No announcement if the specifications have to vary**

***Default means standard type , "H "means long time type**

Appendix 3. Communication interface

¡ RS232 Communication interface

MAKELSAN UPS provides a standard DB9 communication interface on its rear panel, the definition of the pins is as following:



Pin	Definition
1¡¤4¡¤6	No use
2	Transmit
3	Receipt
5	GND
7	GND
8	V5+
9	Remote wake up

Note: 7, 8 pins provides 5V power for external SNMP card

¡ Net communication SNMP card

MAKELSAN UPS provides an intelligent slot for internal or external network card, special intelligent network card can be compatible with the popular software and hardware on the web and operating systems, it can support operating systems such as HP Openview, IBM Netview, SUN Netmanager and so on, enable the UPS go on net function, provides instant UPS and power information, can be communicated and managed by various net operating systems.

Please contact your franchiser for details.