9 Series 6KVA
Uninterruptible Power System
User’s Manual

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CHARTER 1 Overview

The uninterruptible power system (UPS) replaces the utility mains instantaneously when there is an outage. Due to the limited capacity, it is generally used for protecting important equipment such as computers, peripherals, fire-fighting equipment, medical instruments, communication equipment and etc. There are restrictions when using the UPS especially for inductive load products like fans and air-conditions which are not applicable as the inductive load may cause back electromotive force (back E.M.F.) In addition the equipment that has large initializing current such as Xerox copy machines and LaserJet printers are also not applicable as it may cause the UPS to act incorrectly.

1.1 Introduction

The On-Line Series UPS provides you with the advanced technology to protect computer equipment, telecommunication instrument, electrical facilities, and medical equipment and so on from damage or loss of data due to power line disturbance or interruption. The design philosophy of power stage is through the combination of a double-conversion circuit and a control circuit of digital signal processing for instant sampling to create continuous power for the load. This product is capable of resolving various power problems such as interruption, weakening, noise, surge, instant voltage drop, thunderbolt, transient and frequency change.

1.2 Features

- DSP (Digital Signal Processing) Controller
  The state-of-art DSP controller supplies pure and stable power for 3% distortion and 2% stability pure power. The DSP monitors the UPS output state in real time, and provides excellent transient response comparing to the intelligent program. This major change digitalized the traditional circuits and makes them faster as well as more accurate. It also lowers down the components quantity and resolves the aging problem to enhance the reliability.

- PFC (Power Factor Correction)
  The reflected harmonic generated by load in the centralized area of non-linear load has bad influence to other power devices or systems. The PFC technology is very

important in the On-Line Series UPS and it inhibits the harmonic reflection created by load to the power system. The On-Line Series UPS is able to isolate the load change effectively to avoid polluting the power source and meet the environment protection requirement.

- APLL (Advanced Phase Lock Loop)
  APLL is able to synchronize the power frequency automatically and track continuously in the adjustable range. When the input frequency change is larger than default, the system will release the Phase Lock to supply stable frequency to load. This way can prevent the devices from being affect due to rapid frequency change.

- Cold Start
  The UPS internal battery will supply backup power for output when there are no utility mains or different frequencies are required.

- Auto Shut Down/Auto Restart
  When in battery mode and the battery voltage is low, the UPS will shut down automatically to prevent the battery from over discharge. When the utility mains are recovered and the settings are valid after reactivation, the UPS will restart automatically.

- Automatic/Maintenance Bypass
  Under the circumstances of overload, protection or malfunction, the main power will switch to load automatically via the built-in Bypass Circuit. When servicing the Maintenance Bypass Switch on the rear panel can be disconnected manually. Thus the power is supplied by input side directly.

- Graphic LCD Display
  The unique display has the capability of high contrast. It can show the system internal operation in graphs and give users a friendly touch.

- Battery Supervision
  The internal battery program manages the charge and discharge of battery to prolong its life.

- Self-Diagnosis
  The DSP is to monitor the system operation. When the system is in abnormal condition or other protection mode like Over Current Protection (OCP), Over Voltage Protection (OVP), Over Power Protection (OPP), and Over Temperature Protection (OTP), or the component is failure, the DSP will take actions to remain its safety. In the mean time, the DSP will show an Error Code on the display to remind service personnel about the errors.

1.3 Safety Consideration

The following general safety precautions must be observed during operation and service.

- Do not remove the covers. The system is to be maintained by service personnel only.
- The protective grounding terminal has to be grounded exactly.
- High leakage hazard! It must be grounded before connecting the power supply.
- Install in a temperature and humidity controlled indoor area, which is free of conductive contaminants.
- This UPS has various types of power source. The AC source, external batter and internal battery fuse are required to de-energize before servicing.
- Even if the AC source is cut off, the UPS can still get energy from battery for the internal electric parts and this may be dangerous.
- Battery circuit is not isolated from the AC input. Hazardous voltage may exist between battery terminals and ground.
- Mishandling of batteries may cause high energy and chemical hazard.
- Lead acid batteries may cause chemical hazard.

1.4 Functions

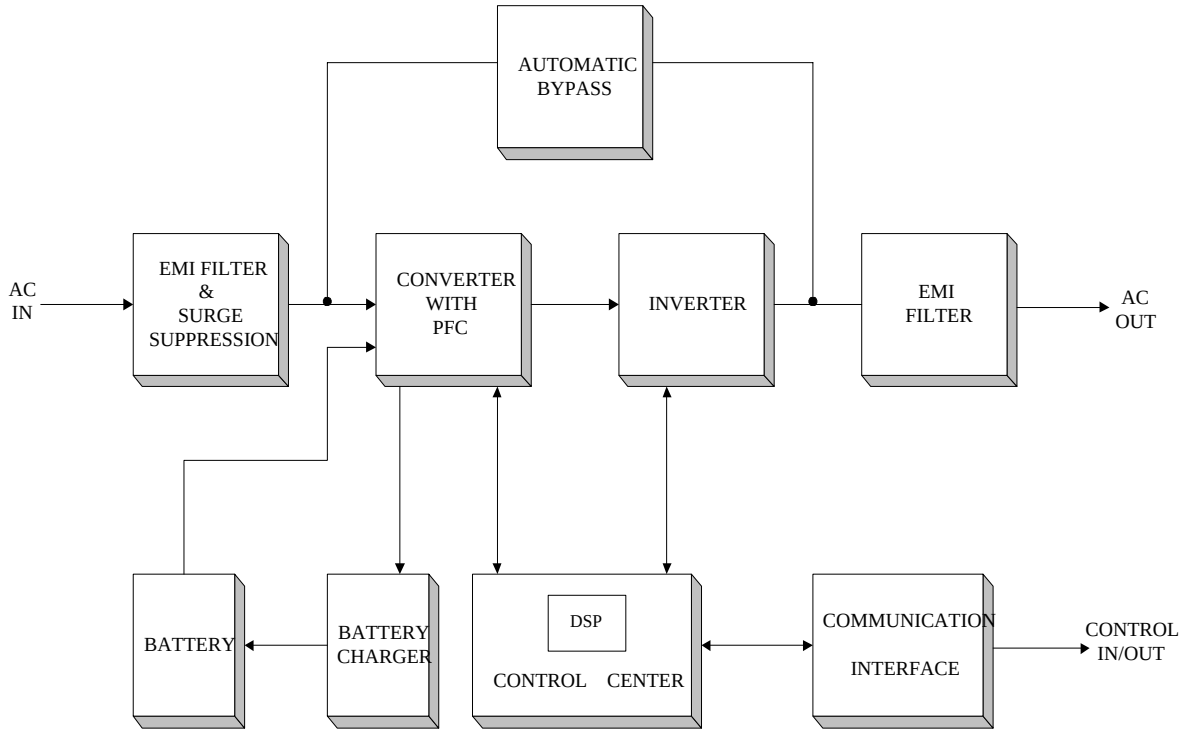
By dual level conversion and DSP technology, this UPS provides excellent power. Basically, the system is designed into three modes of operation: NORMAL, BATTERY, and BYPASS. Each mode can supply power to load for operation.

In NORMAL mode, AC line power is filtered by EMI filter to reduce spike and noise. Then, it is passed to a converter. The converter rectifies and regulates the AC to a

stable DC for inverter power. Meanwhile it makes the input current follows the input voltage dynamically to create a sine curve of input current waveform and similar power factor, and this minimizes the harmonics that reflected to power. By way of the combination of pulse width modulation (PWM), the inverter gets power from DC source for operation and the low distortion sine wave is formed again. This sine wave which is composed of real time sampling technology and intelligent program is compared and modified by DSP chip internally to drive power stage output for stable and highly efficient AC – DC – AC conversion.

When the AC source fails or is over the limit, the operation mode will be switched to battery mode. The AC rectifier circuit and UPS charge activity will stop in battery mode. The system runs in this mode until the battery power is down to the final limit. When the power is restored, the UPS will examine the power source quality and trace the frequency for synchronization. The UPS will return to normal mode after they are done.

In bypass mode, the UPS switches to AC source automatically to supply power to load directly. In extreme condition or during malfunction, the UPS will either remain in bypass mode or attempt to return to normal mode depending on the range set by parameter.

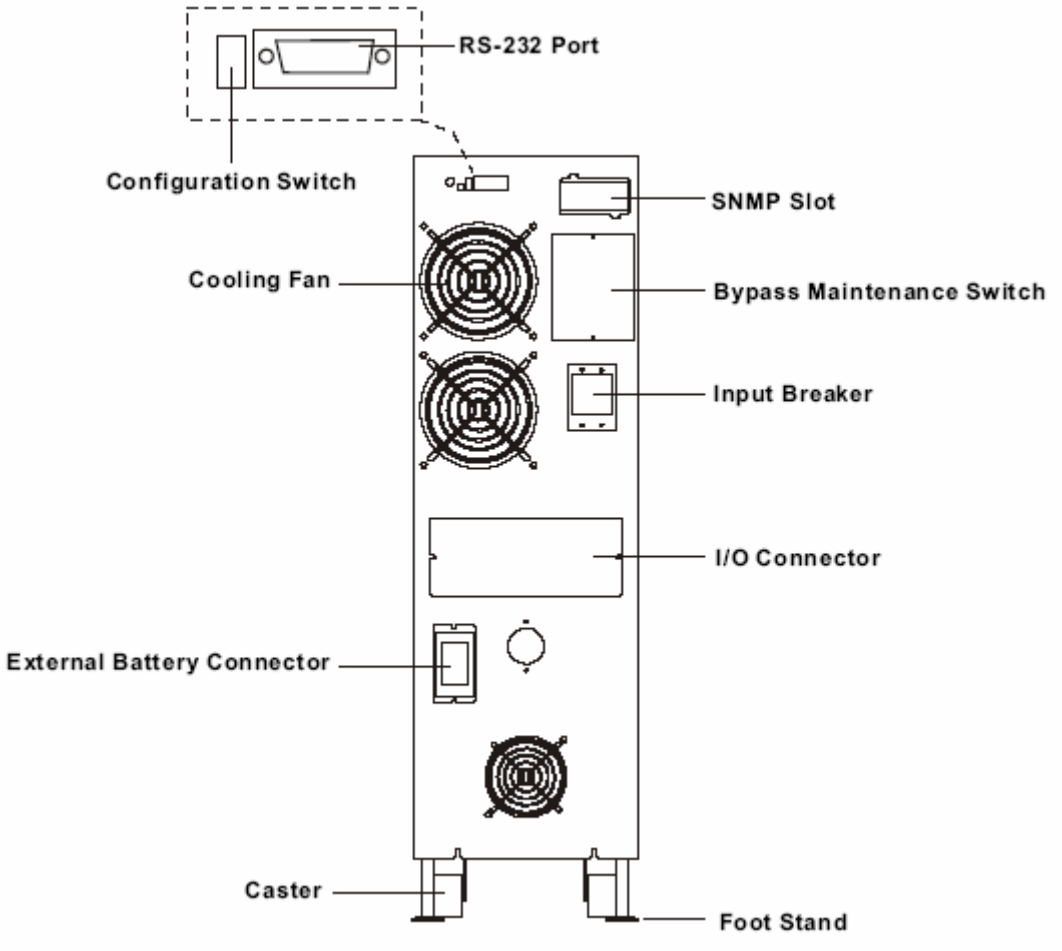


CHARTER 2 Installation & Operation

2.1 Overview

2.1.1 Rear Panel

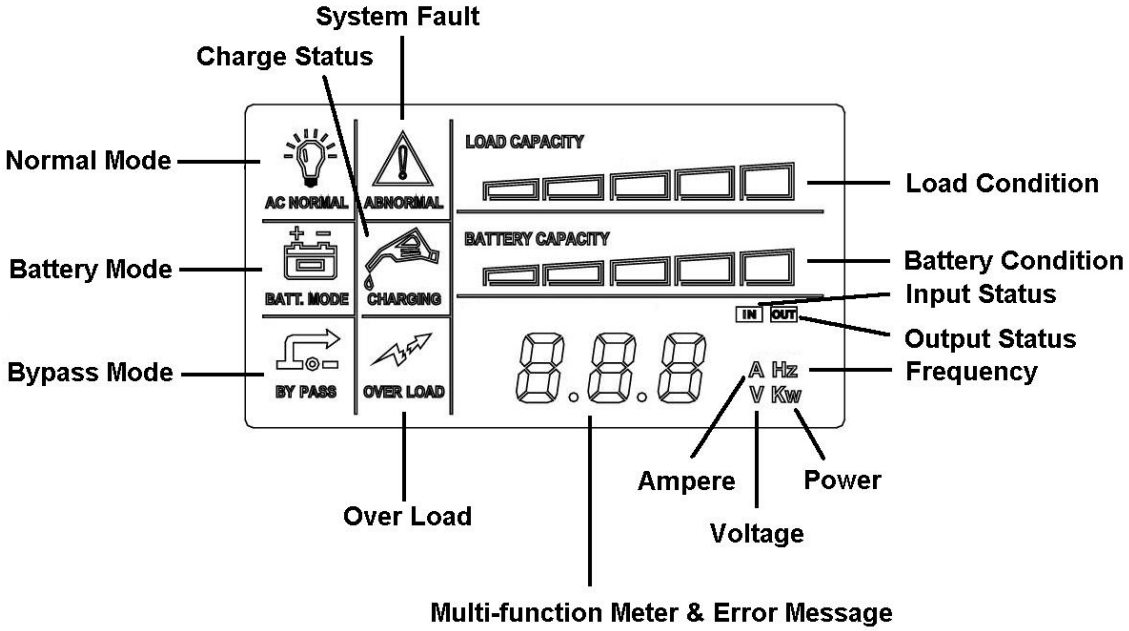
System Configuration and RS-232 Serial Port



Setting and Definition of Configuration Switch

SW 1	SW 2	Description
On	On	240 Vac
On	Off	230 Vac
Off	On	220 Vac
Off	Off	200 Vac

2.2.2 Display Description



NORMAL: It indicates the UPS is running in normal mode and supplying stable voltage via inverter for output. When the indicator LCD is blinking, it means need to replace battery.

BATTERY: It indicates the UPS is running in battery mode and supplying stable voltage via inverter for output. The battery will need to be replaced when this indicator blinks.

BYPASS: The UPS will enter into bypass mode during power on or when protection occurs.

FAULT: It indicates system failure (see Error Code.) The system may in bypass mode, output suspend or shutdown state.

CHARGE: It indicates the battery is charging.

OVERLOAD: It indicates the output current or power is over loaded.

LOAD: The 5 LEDs indicate the output power percentage for the UPS power.

BATTERY CAPACITY: The 5 LEDs indicate the battery capacity percentage after full charged or discharged.

Input Voltage: XXX V indicates input voltage.

Input Frequency: XX.X Hz means the input frequency.

Output Voltage: XX.X V means the output voltage.

Output Frequency: XX.X Hz means the output frequency.

The above values are a little different in display, so they are for reference only.

2.2.3 Keys Description

“ON/OFF”: The UPS will be on by pressing this key, and be off by pressing again.

“Selectable button”: This key for the UPS selects the status of output value.

2.2 Precautions

This manual contains **IMPORTANT SAFETY INSTRUCTIONS**, please **KEEP THE INSTRUCTIONS** for future reference.

- Safety Precautions
  Be sure to read the safety precautions carefully before installing the UPS.
- Do not remove the covers
  Only qualified personnel can remove the covers.
- Ventilation Openings
  Do not block the ventilation openings and open the covers during operation as this may cause malfunction when temperature rises.
- Malfunction
  Do not use the UPS if the malfunction is caused by abnormal sound, smell or smog from the cabinet.
- Cleaning
  Be sure to examine or clean the front/rear panels and fans periodically. It is necessary to cut off the power before cleaning the cover or any other parts.
- Never install the device in any of the following places, where
  - the temperature and humidity are out of specification.
  - the sunlight is direct, or the heat sources are near.
  - an excessive amount of soot, steam, dust, or corrosive gases are present.
  - high voltage or strong magnetic field sources are near.
  - uneven place.
- **Avoid using unbalanced load, half rectifier, or motor load such as dryer, starter, motor, etc.**

2.3 Installation

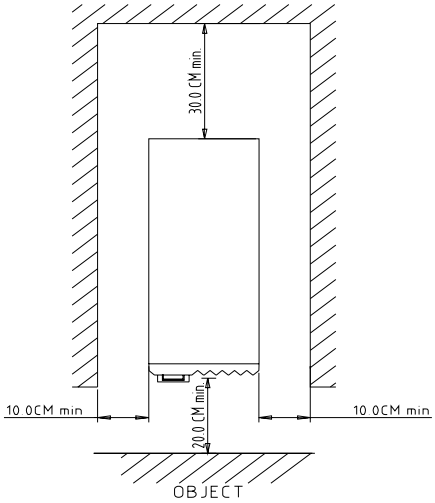
2.3.1 Inspection

Inspect the shipment for the following items while receipt and take necessary action if required.

1. Inspect the shipment to see if the packing material is broken, polluted to affect the machine.
2. Unpack the machine carefully and inspect it. If you find the machine is damaged, please keep the packing material, notify the carrier at once, and contact the nearest agent or distributor for appropriate actions.
3. Check if the items and amount match the packing list.

2.3.2 Placing the UPS

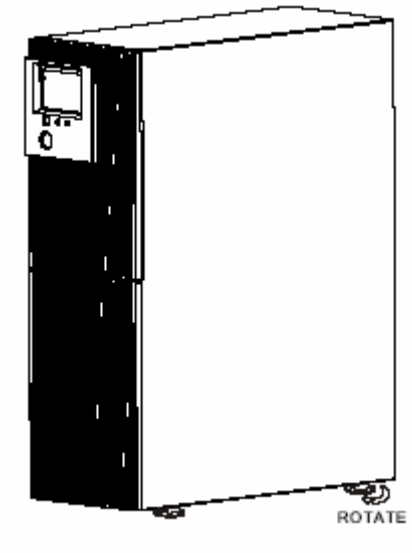
Place the UPS as the figure shown below. Since the UPS is often running 24 hours a day, it should have a space of 30cm from the back and 10cm from each side for ventilation to ensure its stability and high performance.



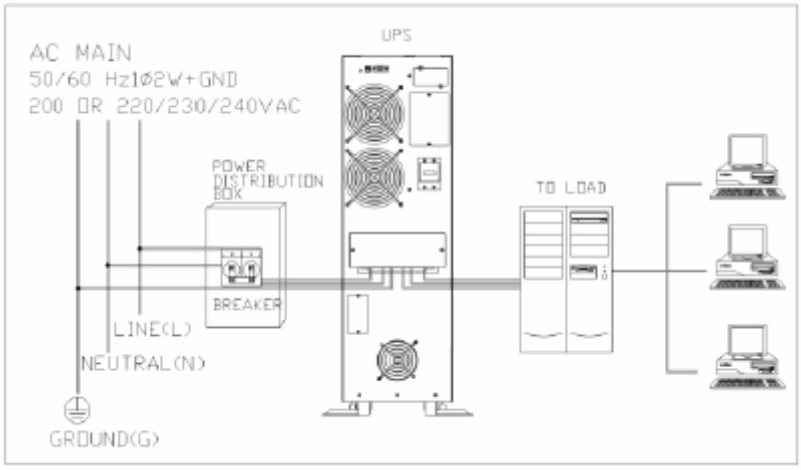
- The surface for placing the UPS must be flat, hard, and can stand the weight of the UPS.
- The temperature in operation environment is from 0°C to 40°C.
- The humidity in operation environment is from 0% to 95% (non-condensing).
- The temperature for storage is from −15°C to 50°C.
- If there is one or more than one extended battery banks (optional), connect them by the attached accessory kit.

2.3.3 Securing the UPS

Following the figure above to secure the UPS by rotating the food stand to against the ground after it is well placed. Try to push the UPS from the front and side to see it moves; and repeat the above actions until it is firmly secured.



2.3.4 Configuring the Power

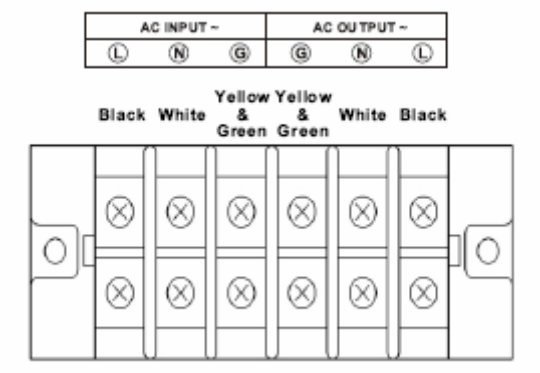


Input Current and Breaker List

	6kVA
Max. Input Current	34.0A
Current Breaker	40.0A

Input/Output Connector Layout

1. The input 220V/output 220V non-isolation transformer



- This UPS uses the single-phase 3-wire power (1∅, 2W + GND).
- Use an appropriate power cable that meets the National Standard, UL or IEC regulation.
  a. Cable Width: > 8 mm^2
  b. Cable Type: SO, SOO, ST, STOO, SJ, SJO or SJOO
  c. Conducting Wire: 3 (Line, Neutral, Ground)

The measured AC voltage between Neutral and Ground wire should be less than 30Vac, or the enhancement of grounding quality is required. Usually the grounding terminal indicates the floor post of the building; otherwise connect the Ground wire to the Neutral wire.

2.3.5 RS-232 Communication

To connect the UPS with an IBM compatible PC using the standard RS-232 port, the UPS can be controlled and managed by the monitoring software purchased additionally. Or, connect the UPS with SNMP external card to transmit the data.

■ Communication Settings

Control	Setting
Baud Rate	2400
Data Bits	8
Parity	None
Stop Bit	1

■ Pin Definition

Pin	I/O	Description
6	Input	RXD (Data Receiving)
7	Input	Gnd (Common)
9	Output	TXD (Data Transmitting)

2.4 Operation

In order to make the On-Line Series UPS as user-friendly as possible, only power switch is designed on the front panel. The UPS operated by microprocessor provides the functions of Mode Transfer, Feedback, Control Display, Communication, Protection and etc. Once the UPS is powered on, it can guard your equipment against the various power problems.

2.4.1 Checking before Power-On

The On-Line Series UPS is designed to prevent the system from failure or damage caused by human errors as much as possible. However, it may cause hazard due to incorrect settings, operations or usage; thus be sure to check the following before power-on.

Checkpoint	Result
• Is the Input/Output polarity correct?	
• Are the Input/Output cables secured?	
• Is the Input/Output grounding correct?	
• Has the desired output voltage been set?	
• Is the maintenance switch at UPS position?	
• Has input circuit breaker been off?	

2.4.2 Power-On

1. Press the power switch on the front panel.
2. The system runs self test automatically.
    a. Check if the buzzer beeps normally.
    b. Check if the circuit block is normal.
3. The UPS enters into Bypass mode for supplying power source to load and runs synchronization by tracing the input frequency.

4. When the AC power fits the conditions and finishes synchronization, LCD will show the value of output voltage, and the UPS will enter into Normal Mode.

2.4.3 Auto Shutdown & Restart

In Battery Mode and under the circumstance of low battery voltage, the system will shut the inverter off, keep minimum power consumption, and display error messages. If the AC power does not recover after a period of time, the system will shut down automatically to protect the batteries from over discharge. After automatic shutdown, if the AC power recovers, and is in the specification, the UPS will restart again.

2.4.4 Auto Bypass

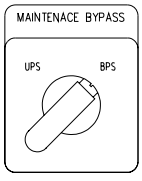
The UPS has a built-in bypass circuit, which can switch itself to line power for the load automatically so as to reduce the risk of blackout when it is under abnormal condition. The bypass will switch to line power automatically under the following circumstances.

a. Initial power-on in NORMAL mode.
b. Overload: 105 ~ 125 % over 30 Sec.
   126 ~ 150 % over 1 Sec.
c. The UPS temperature is over.
d. The UPS is abnormal.

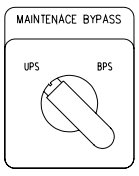
2.5 Maintenance and Service

2.5.1 Maintenance Switch

The maintenance switch, a manual bypass switch, is located at the rear panel for inspection, repairs and battery replacement. The switch is at UPS in normal mode; however, if any of the above condition occurs, have a qualified service personnel switch it to BPS.



Maintenance Mode



UPS Normal Mode

2.5.2 Maintenance

1. Cleaning

- Please clean the panels and the machine with non-volatile liquid on soft cotton cloth.
- Inspect the cleanness of the air intake regularly, and clean it with a vacuum cleaner.

2. Maintenance

Besides the basic maintenance, inspection and battery replacement, there is not special service required for this device. Generally a newly purchased pack of batteries can last for three to five years depending on the environment, battery type used and hardware operation. Thus it is necessary to maintain the battery by qualified technicians or service personnel.

a. If the battery is not in use for a long period, it needs to be charged for 4 hours for every 3 months.
b. Be sure to power on the UPS and charge for 4 hours before using it. The device is usable while charging. However, if outage occurs the discharge time may less than the standard.
c. Normally the battery should charge and discharge once every 4 to 6 months. Discharge the battery until the UPS shuts down and then charge again. The standard charge time cannot be fewer than 4 hours.
d. In high temperature area, the battery should charge and discharge once every 3 months, and the standard charge time cannot be fewer than 4 hours.

3. Battery Replacement (Only qualified maintenance personnel is allowed to perform it.)

- Do not put the battery in fire to avoid explosion.
- Do not open or destruct the battery, for the electrolyte is toxic to skin and eyes.
- Recycle properly according to the local codes on the battery.
- The battery must be replaced with the same type and rating.
- The battery must be replaced by entire pack. Do not mix the batteries of new and used.
- Hazardous voltage may exist between battery terminals and ground. Test it before touching.

4. Replacement Procedures

- Power off the UPS and its input power. Remove the wiring and signal connectors of the UPS input and output power.
- Open the cabinet top and side covers of UPS properly following the service manual.
- Remove the batteries correctly following the service manual.

- Connect the new batteries following the wiring layout in service manual. Be noted that the wiring is different at back and all batteries are connected in serial.
- Ensure the battery voltage is within the specification after the battery pack is replaced.
- Put back the outer cabinet, and recover the original wiring.
- Restart the UPS and observe its running situation.

CHARTER 3 Troubleshooting

Condition	Possible Cause	Action
Nothing shows on LCD after the power switch is ON.	The internal battery voltage is out of specifications.	Contact local service personnel.
The system enters into Battery Mode after power on.	There is no AC source input or converter is failure.	Check the AC input power supply or wiring. Contact local service personnel if you are in trouble.
The system enters into Battery Mode after power on and shows E12.	It indicates the input of line power is abnormal.	Connect the UPS to the line power that meets the specification
The UPS stops midway for overload or short circuit. Shows E05	The use of load is too much.	Reduce the use of load, and eliminate short circuit.
It shows E01 when running.	The battery voltage is abnormal or charger is out of order.	Contact local service personnel.
It shows E11 when doing battery capacity test.	It indicates the battery may be damaged.	Contact local service personnel.
It shows E10 when running.	It indicates the UPS internal temperature is too high.	Try to cool the UPS to lower down the UPS internal temperature for normal operation.
It shows E03 when running.	It indicates the output voltage is abnormal.	Contact local service personnel.

CHARTER 4 Specification

Electrical Input

	Online 6000VA Standard	Online 6000VA Extend
Number of Phase	Single Phase	
Voltage Range	160V ~ 280V	
Frequency Range	50/60HZ ± 5Hz Auto Sensing	
Input Power Factor	>0.95 Full Load	

Electrical Output

	Online 6000VA Standard	Online 6000VA Extend
Number of Phase	Single Phase	
Nominal Voltage	200 / 220 / 230 / 240 Vac	
Low Power Factor Range	Power Factor 0.7 Lagging	
Transient Response (ms)	± 7% 100ms	
Synchronization	Slew Rate: 1 Hz/Sec. Max. Synchronizing Window ± 5%	
Voltage Regulation	± 2%	
Voltage T.H.D	< 3 % (Linear Load)	
Load Crest Factor Ratio	3:1	
Frequency Regulation	± 0.5Hz (Free Running)	
Efficiency (AC to AC)	> 86%	
Over Load Capacity	AC Mode: 105% ~ 125% for 30 seconds Transfer to Bypass, 125% ~ 150% for 1 second Transfer to Bypass, > 150% Shutdown Immediately; Tolerance 10%) Backup Mode: 105% ~ 125% for 30 seconds Fault (Error Code), 125% ~ 150% for 1 second Fault (Error Code), > 150% Shutdown Immediately; Tolerance 10%)	
Transfer Time	0 ms (Zero Transfer)	
Output Receptacles(IEC/Local) 230 Vac	Terminals	

Battery

	Online 6000VA Standard	Online 6000VA Extend
Quantity	20pcs	N/A

Specification	12V / 7Ah	N/A
Battery Voltage	240V	
Battery Type	Sealed, Maintenance-free Lead Acid	
Run Time (Full Load)	> 5 min	Depends on the External Battery
Recharge Time	8 hours to 90%	Depends on the External Battery

Interface

	Online 6000VA Standard	Online 6000VA Extend
Communications	RS232	
Protocol	Magatec Protocol	
Compatibility of Bundled Software	UPSilion 2000 for Novell NetWare, Windows 95/98, Windows NT, Windows ME, Windows 2000, Windows XP or other Windows Operation Systems, Linux and Free BSD (Basic Version)	
SNMP Capability	Slot for Standard SNMP Card (Optional)	
Optional Software	UPSilion for Unix, IBM AS/400 & SNMP Adapter, USBMate (RS232 transfer to USB by Cable), etc	

Feature

	Online 6000VA Standard	Online 6000VA Extend
Overheat	Switch to Bypass	
High Voltage Trip	Switch to Backup Mode	
Battery Low	Alarm and Switch Off	
Noise Suppression	Complies with EN50091-2	
Spike Suppression	Complies with EN61000-4-5	
Display	LCD display and data information request	
Audible and Visual	Line Failure, Battery Low, Transfer to Bypass, Over Load, System Fault Conditions	

Agency

	Online 6000VA Standard	Online 6000VA Extend
Marks	CE	

Environmental

	Online 6000VA Standard	Online 6000VA Extend
Operating Temperature	0 ~ 40°C	
Altitude	0~2000m up to 40°C, 3000m up to 35°C	
Humidity	90% RH Maximum, Non-Condensing	
Audible Noise	< 55 dBA @ 1m	

Weights and Dimensions

	Online 6000VA Standard	Online 6000VA Extend
Dimensions (W×D×H)(mm)	216 x 700 x 713	
Weight (Kg)	100	53

Appendix A Error Code Description

Error Code	Description
E01	It indicates the battery is abnormal.
E02	It indicates it is unable to do phase lock in AC Mode.
E03	It indicates the output voltage is abnormal.
E04	It indicates the BUS voltage is abnormal.
E05	It is the warning for over load or short circuit.
E10	It is the warning for over temperature.
E11	It indicates the battery is abnormal during self-test.
E12	It indicates the input voltage is abnormal during power-on.