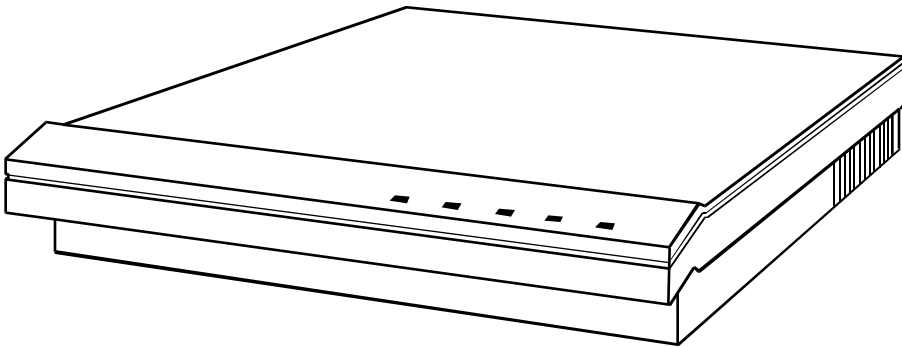




**AMERICAN POWER CONVERSION**

# **Smart-UPS®**

**Model 400**



**User's  
Manual**

# *Important safety instructions!*

---

**Please read this manual!**

**Veillez lire ce manuel!**

**Bitte lesen Sie dieses Anleitungshandbuch!**

**¡Se ruega leer este manual de instrucciones!**

This manual provides safety, installation, and operating instructions that will help you get the fullest performance and service life that the UPS has to offer.

**Please save this manual!** It includes important instructions for the safe use of this UPS, and for obtaining factory service if necessary. Future service or storage issues may arise and require reference to this manual.

**Conserver ces instructions!** Cette notice contient des instructions importantes concernant la sécurité.

## *Radio frequency interference*

---

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient the receiving antenna
- increase the separation between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that to which the receiver is needed
- consult the dealer or an experienced radio/TV technician for help.

***Shielded communications interface cables must be used with this product.***

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Hiermit wird bescheinigt, dass der Smart-UPS 400 Ununterbrechbare Stromversorgungs-Gerät in Unereinstimmung mit den Bestimmungen der Vfg 1046/1984 funk-entstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen diese Gerates angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

この装置は、商工業地域で使用されるべき第一種情報装置です。住宅地域又はその隣接した地域で使用するとラジオ、テレビジョン受信機等に受信障害を与えることがあります。VCCI-1\*

# *Table of Contents*

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|  |           |
|--|-----------|
| <b>1.0 Introduction</b> .....  | <b>3</b>  |
| 1.1 Overview .....   | 3         |
| 1.2 SmartBoost .....   | 4         |
| 1.3 Battery replacement indicators and test .....                      | 4         |
| 1.4 Remote interfaces .....  | 4         |
| 1.5 Extended capabilities .....  | 4         |
| <b>2.0 Safety! Sécurité! Sicherheit! ¡Seguridad!</b> .....             | <b>5</b>  |
| <b>3.0 Presentation</b> .....  | <b>9</b>  |
| 3.1 400VA UPS—front panel .....  | 9         |
| 3.2 400VA UPS—rear panel .....   | 9         |
| <b>4.0 Installation</b> .....  | <b>10</b> |
| 4.1 Receiving inspection .....   | 10        |
| 4.2 Placement .....  | 10        |
| 4.3 Connect UPS to service and enable .....                            | 11        |
| 4.4 Auto-on operation .....  | 12        |
| 4.5 Manual operation .....   | 14        |
| 4.6 Check Site Wiring Fault indicator—100, 120 Vac versions only ..... | 14        |
| <b>5.0 Operation</b> .....   | <b>15</b> |
| 5.1 Front-panel indicators .....                                       | 15        |
| 5.2 Test button functions .....  | 16        |
| 5.3 Audible alarms .....   | 18        |
| 5.4 Option switches .....  | 19        |
| 5.5 Extended capabilities .....  | 21        |
| <b>6.0 UPS Monitoring</b> .....  | <b>25</b> |
| 6.1 Overview .....   | 25        |
| 6.2 Interface Kits .....   | 25        |
| 6.3 PowerChute Software .....  | 25        |
| 6.4 Computer Interface port .....                                      | 26        |
| <b>7.0 Difficulty Difficulté Schwierigkeit Dificultad</b> .....        | <b>27</b> |
| 7.1 Troubleshooting .....  | 31        |
| 7.2 Battery replacement check .....                                    | 34        |
| 7.3 Obtaining service .....  | 35        |

# *Table of Contents*

---

|   |           |
|---|-----------|
| <b>8.0 Storing the UPS .....</b>        | <b>36</b> |
| 8.1 Storage conditions .....            | 36        |
| 8.2 Extended storage .....              | 36        |
| <b>9.0 Specifications .....</b>         | <b>37</b> |
| 9.1 Input .....                         | 37        |
| 9.2 Transfer characteristics .....      | 37        |
| 9.3 Output characteristics .....        | 37        |
| 9.4 Battery and charger .....           | 38        |
| 9.5 Surge and noise suppression .....   | 38        |
| 9.6 Operating Environment .....         | 38        |
| 9.7 Physical .....                      | 39        |
| 9.8 Approvals .....                     | 39        |
| 9.9 Typical run times versus load ..... | 40        |

# 1.0 Introduction

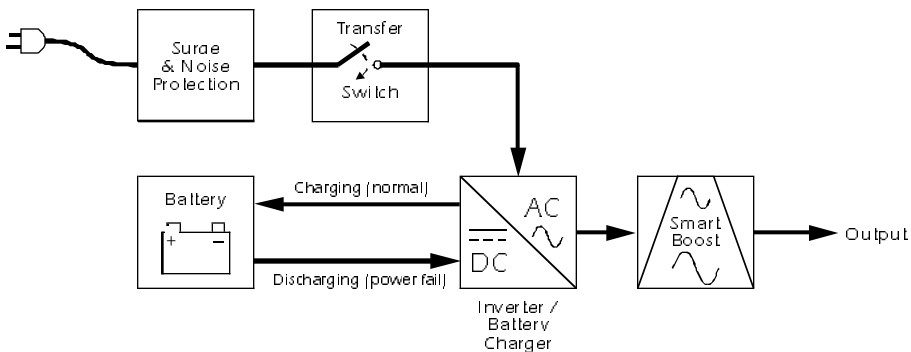
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## 1.1 Overview

This equipment is a high-performance, line-interactive, uninterruptible power source (UPS) designed to provide clean, reliable, AC power to computer loads. The UPS's line-interactive circuit topology (see figure below) offers excellent efficiency, on-line voltage regulation, and fast utility fault response.

The UPS's DC-to-AC inverter is always connected to the output and when operating on-line, part of the inverter circuitry is used "in reverse" to continuously maintain optimum float charge on the battery. The inverter also protects the load from surges and EMI/RFI noise as part of an advanced hybrid surge suppression and filtering network.

A unique mode of operation, called SmartBoost, regulates the load voltage by compensating for brownouts or sags without drawing power from the UPS's battery. The UPS continuously monitors the line for utility failure and prepares the inverter frequency for synchronous transfer of the load. When a utility voltage failure occurs such as a blackout, severe brownout, or an overvoltage condition, the UPS transfers the load to battery power. Transfer to "on-battery" operation typically takes place within 2 milliseconds. The inverter's output voltage waveshape is a low distortion sine wave. Resynchronization and transfer back to on-line operation is automatic when the line voltage returns to within normal limits.



**Line interactive UPS block diagram**

# ***1.0 Introduction***

---

## **1.2 SmartBoost**

SmartBoost allows continuous, on-line operation during extended brown-outs or low line voltage conditions. The UPS compensates for reduced line voltage by boosting the load voltage to 12% above the input. This enhances UPS reliability because the battery is saved for complete utility failure.

## **1.3 Battery replacement indicators and test**

The UPS provides visual and audible Replace Battery indications, based on a load test of the battery. The UPS exercises its battery during a startup self-test, and can detect a weak battery before it is put into service. In long-term, unattended operation the UPS automatically conducts this self test every 14 days.

## **1.4 Remote interfaces**

The UPS has a remote interface capable of full bidirectional RS-232 communications. The RS-232 port can be used with PowerDoctor UPS monitoring software on a local DOS PC to log power quality data. PowerChute *plus* offers all the features of PowerDoctor, plus the ability to execute orderly and unattended network or multi-user computer system shutdowns during an extended power outage.

A Simple Network Management Protocol (SNMP) adapter is available for remote load monitoring and management across Ethernet or Token Ring networks capable of routing IP messages. With a standard Network Management System (NMS) and the SNMP Adapter, you can manage multiple UPSs with a single interface—from across the building or across the world.

## **1.5 Extended capabilities**

Advanced monitoring, power management, and operation customizing functions are available through the UPS's remote interface. Monitored parameters include available run time, line voltage and frequency, output power and voltage, battery capacity and voltage, and internal temperature. Power management functions include scheduled shutdown, power failure simulation, and remote turn off. User customized functions include the automatic self-test and low-battery warning intervals; shutdown, turn-off and turn-on delay intervals; transfer voltage; utility-fault sensitivity; and audible alarm activation.

## 2.0 Safety!

ENGLISH

*Caution!*



### CAUTION!

- To reduce the risk of electric shock, disconnect the Uninterruptible Power Source from the mains before installing computer interface signal cable (when used). Reconnect the power cord only after all signalling interconnections have been made.
- Connect the Uninterruptible Power Source to a two-pole, three-wire grounding mains receptacle. The receptacle must be connected to appropriate branch protection (fuse or circuit breaker). Connection to any other type of receptacle may result in a shock hazard and may violate local electrical codes.
- This Uninterruptible Power Source has an internal energy source (the battery) that cannot be de-energized by the user. **The output may be energized when the unit is not connected to a mains supply.**
- To properly deenergize the Uninterruptible Power Source in an emergency, move the rear panel I/O switch to the O (off) position and disconnect the power cord from the mains.
- Avoid installing the Uninterruptible Power Source in locations where there is water or excessive humidity.
- Do not allow water or any foreign object to get inside the Uninterruptible Power Source. Do not put objects containing liquid on or near the unit.
- To reduce the risk of overheating the Uninterruptible Power Source, avoid exposing the unit to the direct rays of the sun. Avoid installing the unit near heat emitting appliances such as a room heater or stove.



### ATTENTION!

- Pour réduire le risque d'électrocution, débranchez la prise principale de la source d'alimentation permanente (Uninterruptible Power Source), avant d'installer le câble d'interface allant à l'ordinateur (si utilisé). Ne rebranchez le bloc d'alimentation qu'après avoir effectué toutes les connexions.
- Branchez la source d'alimentation permanente (UPS) dans une prise de courant à 3 dérivations (deux pôles et la terre). Cette prise doit être munie d'une protection adéquate (fusible ou coupe-circuit). Le branchement dans tout autre genre de prise pourrait entraîner un risque d'électrocution et peut constituer une infraction à la réglementation locale concernant les installations électriques.
- Cette source d'alimentation permanente (UPS) est munie d'une source d'énergie interne (accumulateur) qui ne peut pas être désactivée par l'utilisateur. **La prise de sortie peut donc être sous tension même lorsque l'appareil n'est pas branché.**
- En cas d'urgence, pour désactiver correctement la source d'alimentation permanente (UPS), poussez l'interrupteur du panneau arrière sur la position O (Off) et débranchez le cordon d'alimentation principal.
- Ne pas installer la source d'alimentation permanente (UPS) dans un endroit où il y a de l'eau ou une humidité excessive.
- Ne pas laisser de l'eau ou tout objet pénétrer dans la source d'alimentation permanente (UPS). Ne pas placer de récipients contenant un liquide sur cet appareil, ni à proximité de celui-ci.
- Pour éviter une surchauffe de la source d'alimentation permanente (UPS), conservez-la à l'abri du soleil. Ne pas installer à proximité d'appareils dégageant de la chaleur tels que radiateurs ou appareils de chauffage.





### VORSICHT!

- Um die Gefahr eines elektrischen Schlages auf ein Minimum zu reduzieren, die unterbrechungsfreie Stromversorgung vom Stromnetz trennen, bevor ggf. ein Computer-Schnittstellensignalkabel angeschlossen wird. Das Netzkabel erst nach Herstellung aller Signalverbindungen wieder einstecken.
- Die unterbrechungsfreie Stromversorgung an eine geerdete zweipolige Dreiphasen-Netzsteckdose anschließen. Die Steckdose muß mit einem geeigneten Abzweigschutz (Sicherung oder Leistungsschalter) verbunden sein. Der Anschluß der unterbrechungsfreien Stromversorgung an einen anderen Steckdosentyp kann zu Stromschlägen führen und gegen die örtlichen Vorschriften verstoßen.
- Diese unterbrechungsfreie Stromversorgung besitzt eine interne Energiequelle (Batterie), die vom Benutzer nicht abgeschaltet werden kann. **Der Ausgang kann eingeschaltet werden, wenn das Gerät nicht an das Stromnetz angeschlossen ist.**
- Um die unterbrechungsfreie Stromversorgung im Notfall ordnungsgemäß abzuschalten, den I/O-Schalter an der Rückseite auf O (Aus) stellen und das Netzkabel aus der Steckdose ziehen.
- Die unterbrechungsfreie Stromversorgung nicht an einem Ort aufstellen, an dem sie mit Wasser oder übermäßig hoher Luftfeuchtigkeit in Berührung kommen könnte.
- Darauf achten, daß weder Wasser noch Fremdkörper in das Innere der unterbrechungsfreien Stromversorgung eindringen. Keine Objekte, die Flüssigkeit enthalten, auf oder neben die unterbrechungsfreie Stromversorgung stellen.
- Um ein Überhitzen der unterbrechungsfreien Stromversorgung zu verhindern, das Gerät vor direkter Sonneneinstrahlung fernhalten und nicht in der Nähe von wärmeabstrahlenden Haushaltsgeräten (z.B. Heizgerät oder Herd) aufstellen.



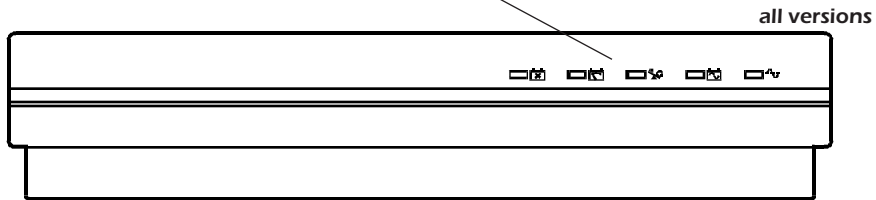
### ¡ATENCIÓN!

- Para reducir el riesgo de descarga eléctrica, desconecte de la red la Fuente de energía ininterrumpible antes de instalar el cable de señalización de interfaz de la computadora (si se usa). Vuelva a conectar el conductor flexible de alimentación solamente una vez efectuadas todas las interconexiones de señalización.
- Conecte la Fuente de energía ininterrumpible a un tomacorriente bipolar y trifilar con neutro de puesta a tierra. El tomacorriente debe estar conectado a la protección de derivación apropiada (ya sea un fusible o un disyuntor). La conexión a cualquier otro tipo de tomacorriente puede constituir peligro de descarga eléctrica y violar los códigos eléctricos locales.
- Esta Fuente de energía ininterrumpible tiene una fuente de energía interna (la batería) que no puede ser desactivada por el usuario. **La salida puede tener corriente aun cuando la unidad no se encuentre conectada al suministro de red.**
- Para desactivar correctamente la Fuente de energía ininterrumpible en una situación de emergencia, coloque el interruptor I/O del panel posterior en la posición O (Off–desconectado) y desconecte de la red el conductor flexible de alimentación.
- No instale la Fuente de energía ininterrumpible en lugares donde haya agua o humedad excesiva.
- No deje que en la Fuente de energía ininterrumpible entre agua ni ningún objeto extraño. No ponga objetos con líquidos encima de la unidad ni cerca de ella.
- Para reducir el riesgo de sobrecalentamiento, no exponga la unidad a los rayos directos del sol ni la instale cerca de artefactos que emiten calor, como estufas o cocinas.

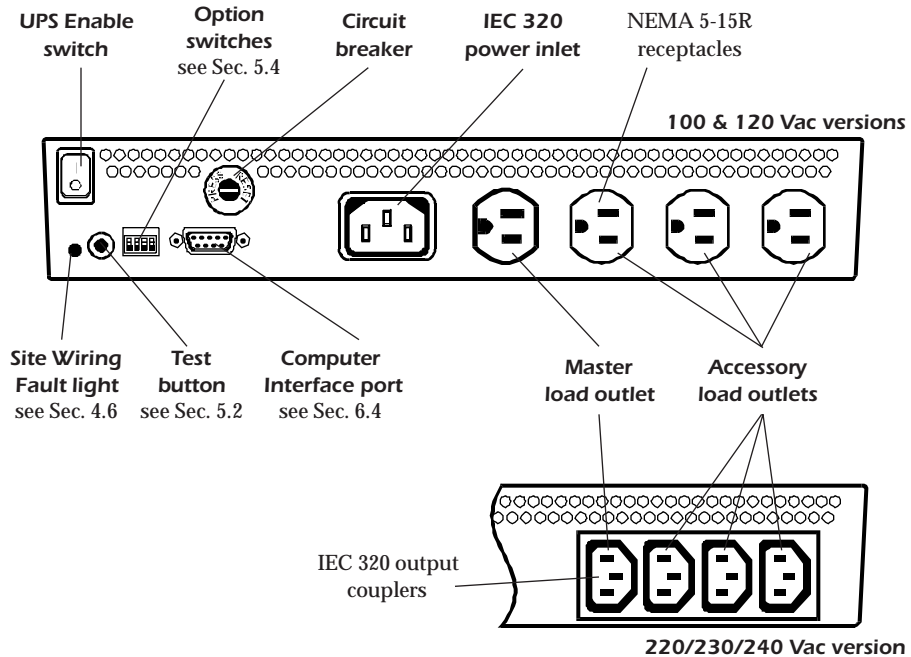
# 3.0 Presentation

## 3.1 400VA UPS—front panel

Front-panel indicators  
see Sec. 5.1, 5.2.1, 5.2.2



## 3.2 400VA UPS—rear panel



# 4.0 Installation

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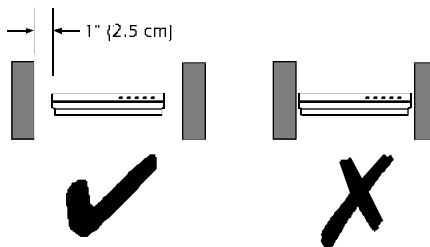
## 4.1 Receiving inspection

Once you remove the UPS from its shipping container, inspect it for damage that may have occurred while in transit. Immediately notify the carrier and place of purchase if any damage is found. The packing materials are made from recyclable materials and should be saved for reuse or disposed of properly.

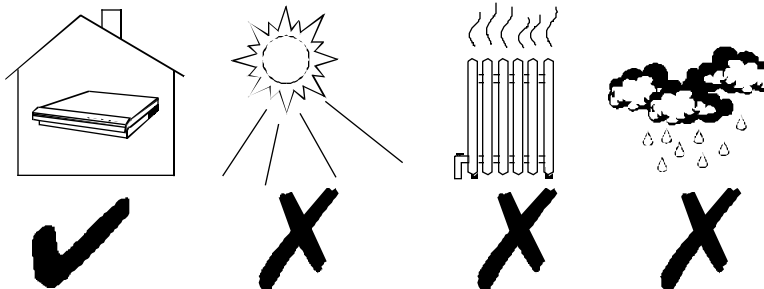
## 4.2 Placement

You may install the UPS in any protected environment. The location should provide adequate air flow around the unit, in an atmosphere free from excessive dust.

**Note:** Allow 1 inch (2.5 cm) minimum clearance on all sides for proper ventilation.



Do not operate the UPS in an environment where the ambient temperature or humidity is outside the limits given in the Specifications section of this manual (see Sec. 9.6).



## 4.0 Installation

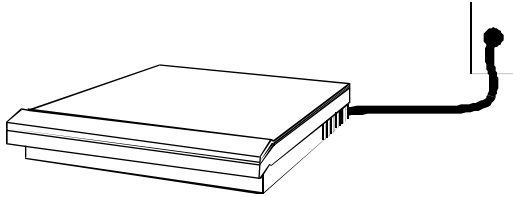
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### 4.3 Connect UPS to service and enable

#### 4.3.1 Connect UPS to service

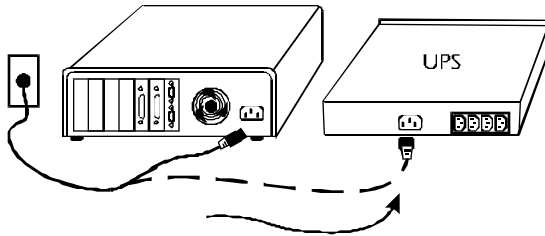
##### ■ 100, 120 Vac versions

Plug the UPS into a two-pole, three-wire grounding receptacle only. Avoid the use of extension cords and adapter plugs.



##### ■ 220/230/240 Vac version

The 220/230/240 Vac version UPS is not furnished with an input line cord. Instead, two output cords are supplied. However, in most installations you will not need to purchase a UPS input power cord. Simply swap the line cords from your equipment with the furnished output cords, and plug in the UPS using one of the equipment cords.



If your equipment does not have a removable line cord, the provided rewirable plug may be installed on the line cord. Additional output cords and adapter plugs are available from your dealer and from the factory.

The UPS may be configured to operate where 240 Vac, 50 Hz service is provided. When Option Switch 2 is set to the on (down) position, the UPS's transfer and on-battery output voltages are adjusted for proper operation on 240 Vac service (see Sec. 5.4).

# 4.0 Installation

## 4.3.2 Charge the batteries

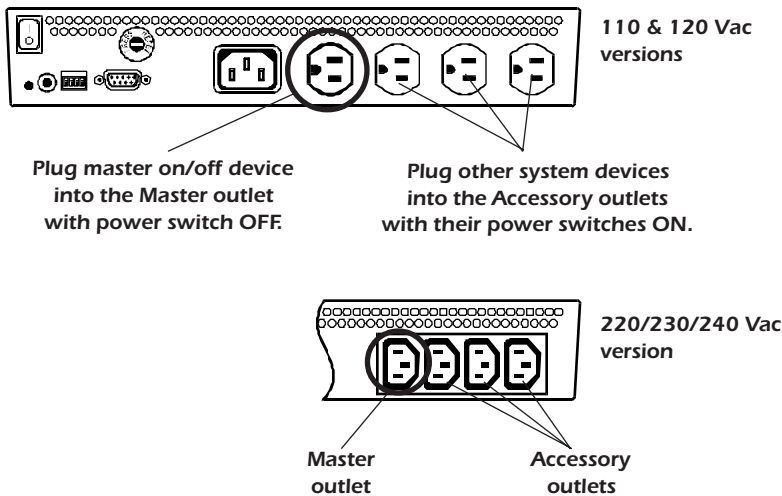
The UPS recharges its batteries whenever it is plugged into a working outlet. Allow the UPS to charge its battery for at least 5 hours before use. The UPS was shipped from the factory with the batteries fully charged, but the batteries may lose some charge during shipping and storage. You may use the UPS without charging, but the Low-battery indicator may light and backup time may be reduced until the batteries have charged.

## 4.4 Auto-on operation

The UPS's Auto-on feature allows you to turn on the UPS and connected equipment using the power control of any device plugged into the Master outlet.

For example, if your computer has a conveniently located power control (on the front panel or keyboard), this switch can turn on the UPS and all the equipment connected to it. In this case, you would plug the computer into the Master outlet on the rear of the UPS. You would then plug your monitor and other peripherals into the accessory outlets (see figure).

Sections 4.4.1 through 4.4.5 detail how to set up your system for Auto-on operation.



## 4.0 Installation

---

### 4.4.1 Plug in the master device

Plug the device whose switch you want to use to power on the entire system (such as the computer, or any device with an accessible power switch) into the UPS's Master outlet. Make sure this device is turned off. The equipment plugged into the Master outlet must draw more than 40 Watts.

### 4.4.2 Plug in the accessory devices

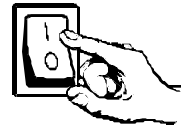
Plug the devices to be powered when the master device is turned on (such as the monitor, an external drive, CD-ROM, or other devices that require backup power protection) into the UPS's Accessory outlets.

**Note:** *Do not plug laser printers into this UPS. Laser printers can draw a considerable amount of power, which reduces the available backup time and, in some cases, causes the UPS to signal an overload.*



### 4.4.3 Configure Option Switch 4 and UPS Enable switch

Set Option Switch 4 on the rear of the UPS to the off (up) position. Set the UPS Enable switch to the on position (↓).



### 4.4.4 Turn on accessories

Set all the power switches of the devices plugged into the Accessory outlets to their on positions. Note that the UPS and the accessories are not yet powered.

### 4.4.5 Turn on the master device

Turn on the device plugged into the Master outlet of the UPS. The entire system, including the UPS and accessories, will power on too.

The UPS performs a brief self-test of its battery and operation. In normal operation, the On Line indicator will remain lit after the self test.

**Note:** *If the red Overload indicator lights, the UPS is overloaded. Unplug equipment that does not require backing up, such as a printer, and restart. If the Replace Battery indicator lights, recharge the UPS overnight and retest.*

**Note:** *If you have problems, refer to Section 7.0 for troubleshooting information.*

# 4.0 Installation

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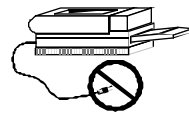
## 4.5 Manual operation

If you do not wish to use the UPS's Auto-on feature (see Sec. 4.4), first verify that Option Switch 4 is in the on (down) position. Next, follow the procedures detailed in Sections 4.5.1 through 4.5.4.

### 4.5.1 Plug loads into UPS

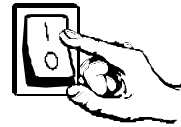
Plug all equipment to be protected by backup power into the outlets on the rear of the UPS. Make sure that all of the devices you plug into the UPS's outlets are turned on.

**Note:** *Do not plug laser printers into this UPS. Laser printers can draw a considerable amount of power, which reduces the available backup time and, in some cases, causes the UPS to signal an overload.*



### 4.5.1 Enable the UPS

Turn on the rear-panel UPS Enable switch. The entire system will switch on. The UPS Enable switch can act as the on/off switch for your UPS and computer system.



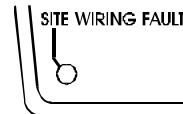
The UPS performs a brief self-test of its battery and operation. In normal operation, the On Line indicator remains lit after the self test.

**Note:** *If the red Overload indicator lights, the UPS is overloaded. Unplug equipment that does not require backing up, such as a printer, and restart the UPS. If the Replace Battery indicator lights, recharge the UPS overnight and retest.*

**Note:** *If you have problems, refer to Section 7.0 for troubleshooting information.*

## 4.6 Check Site Wiring Fault indicator—100, 120 Vac versions only

After you connect the loads to the UPS and turn on the UPS, check the Site Wiring Fault indicator on the UPS's rear panel. It will light when the UPS is plugged into an improperly wired wall outlet. Wiring faults detected include missing ground, hot-neutral polarity reversal, and overloaded neutral circuit.



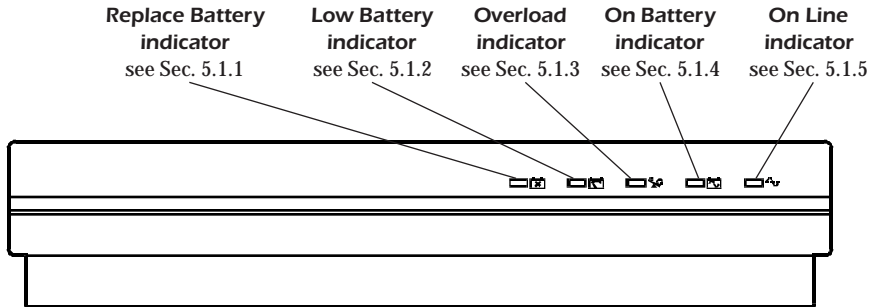
**Note:** *If the UPS indicates a site wiring fault, a qualified electrician should be summoned to correct the building wiring.*



# 5.0 Operation

---

## 5.1 Front-panel indicators



### 5.1.1 Replace Battery indicator

The Replace Battery indicator lights when the UPS's battery fails the self-test. The indicator turns off after a successful self-test.



### 5.1.2 Low Battery indicator

The Low Battery indicator lights when less than 2 minutes of backup power are available from the battery.



### 5.1.3 Overload indicator

The Overload indicator lights when the load exceeds the UPS's rating of 400 VA (250 W).



### 5.1.4 On Battery indicator

The On Battery indicator lights when the load has been transferred to UPS battery power, and the utility voltage is not within specified limits.



### 5.1.5 On Line indicator

The On Line indicator lights when the load is being supplied conditioned power from the utility service. This indicator blinks during the self-test.



# 5.0 Operation

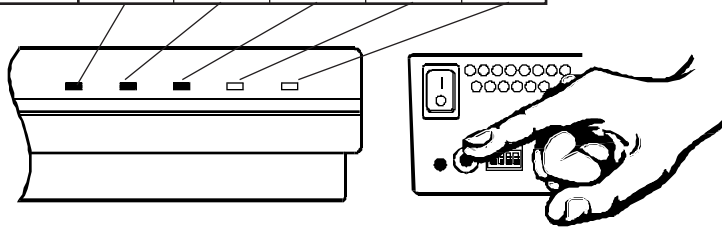
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## 5.2 Test button functions

### 5.2.1 Line Voltage bar graph

When you press and release the rear-panel Test button, the LED front-panel indicators display a bar graph of the input line voltage connected to the UPS.

| UPS version | Input Vac |     |     |     |     |
|-------------|-----------|-----|-----|-----|-----|
| 120 Vac     | 104       | 110 | 116 | 122 | 128 |
| 100 Vac     | 90        | 96  | 102 | 108 | 114 |
| 220/230/240 | 210       | 221 | 232 | 245 | 257 |



This example shows the input line voltage is between 116 and 122 Vac (120 Vac UPS, see table for other versions).

If no indicators light and the UPS is plugged into a known working outlet, the line voltage is extremely low. Low voltage could be the result of an overloaded branch circuit, a misadjusted service pole transformer, or an intentional local service brownout. The UPS compensates for this problem using SmartBoost to increase the supplied load voltage.

If all five indicators light, the line voltage is high and should be checked by a qualified electrician.

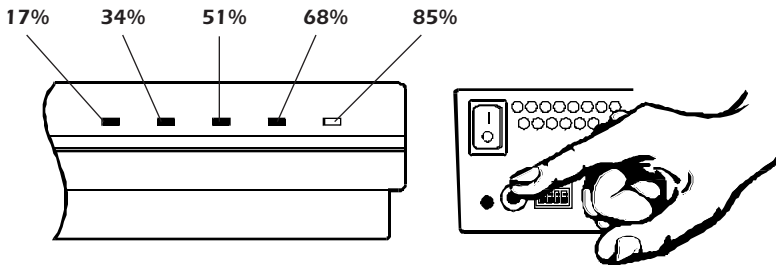
**Note:** After approximately 4 seconds, the UPS beeps and replaces the Line Voltage bar graph with the Output Voltage bar graph display (see Sec. 5.2.2).

## 5.0 Operation

---

### 5.2.2 Output Power bar graph

When you press and hold the rear-panel Test button for at least 4 seconds, the LED indicators on the front panel display a bar graph of the power being drawn by the load connected to the UPS. The load is shown as a percentage of the UPS's rated capacity.



This example shows that the equipment plugged into the UPS is drawing between 68 and 85 percent of the UPS's rated capacity. This is a typical load configuration.

If all five indicators light, the load is drawing close to the UPS's maximum capacity! You should thoroughly test your entire system to be sure the UPS will not become overloaded. A thorough test includes running backup tape drives, disk drives, etc. If the UPS is overloaded, the Overload indicator lights and the UPS sounds an alarm.

To avoid an overload, reduce the UPS's load by unplugging non-critical components such as printers.

**Note:** When you release the Test button after viewing the Output Power bar graph, the UPS performs a self-test. Refer to Section 5.2.3.

### 5.2.3 UPS self-test

When you press and hold the Test button for at least 4 seconds and then release it, the UPS performs a self-test. During this test the UPS operates the load from battery (On Battery indicator lights) for about 4 seconds and then returns to line power. If the battery cannot support the load during the test, the UPS immediately returns to on-line operation (the load is not affected). When the On Battery indicator goes out and the On Line indicator lights, the test is done.

# ***5.0 Operation***

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## **5.3 Audible alarms**

The UPS features an audible alarm that beeps to indicate certain conditions (see Secs. 5.3.1–5.3.4). Operation of the audible alarm is configurable using UPS monitoring software (see Sec. 5.5.4).

### **5.3.1 On-battery alarm**

The UPS emits four short beeps every 30 seconds when the UPS is operating on battery power.

### **5.3.2 Low battery**

The UPS beeps steadily to indicate that less than 2 minutes of power remains before shutdown from battery exhaustion. The low-battery warning interval is configurable (see Sec. 5.5.4).

### **5.3.3 Replace battery**

The UPS emits short beeps for 1 minute if the UPS's batteries fail the self-test. If the UPS is left operating in this condition, the UPS emits short beeps once every 5 hours until a successful battery test is completed.

### **5.3.4 Overload**

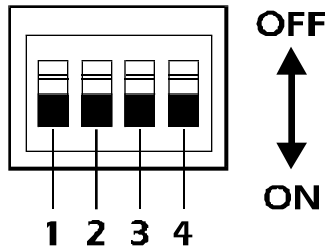
The UPS emits a loud, sustained tone when overloaded. When the load exceeds the UPS's rating during on-line operation, the alarm sounds until the overload is removed. If the overload occurs during on-battery operation, the alarm sounds until the UPS Enable switch on the rear panel is turned off.

## 5.0 Operation

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### 5.4 Option switches

The UPS has a set of four DIP switches on the rear panel which allow you to configure several options (see Secs. 5.4.1–5.4.4).



**Note:** You can set option switches at any time, and the effect is immediate.

**Note:** If all of the option switches are set to the on position, the option switches are disabled. However, the functions controlled by the option switches are still available using UPS monitoring software (see Sec. 5.5.4).

#### 5.4.1 Option Switch 1

The UPS contains utility fault detection circuitry that is extremely sensitive to line voltage distortions including spikes, notches, sudden dips, and swells. The UPS is factory-set to react to such line voltage distortions by immediately transferring the load to on-battery operation, affording maximum protection for all load types. Where power quality is poor because of local cyclic heavy load-switching, or the use of inexpensive fuel generators, the UPS may frequently transfer to on-battery. If the UPS is powering loads that operate normally under such conditions, battery capacity may be spent unnecessarily.

Setting Option Switch 1 to the on (down) position desensitizes the UPS to rapid low-amplitude line-voltage fluctuations, and increases the UPS's upper transfer voltage by 3%, for a total of 13% above the nominal input voltage. This helps maintain maximum battery capacity for major utility failures.

## ***5.0 Operation***

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### **5.4.2 Option Switch 2**

Option Switch 2 functions differently for different versions of the UPS.

■ **100 Vac version**

No function; not used.

■ **120 Vac version**

The UPS's factory-set input voltage limits for on-line and SmartBoost operation are centered on the nominal input voltage of 120 Vac (see also Sec. 9.1). When Option Switch 2 is in the on (down) position, the upper and lower transfer voltages are lowered by 4% and centered on a nominal input of 115 Vac. This is useful where nominal input voltage is 110 to 115 Vac.

■ **220/230/240 Vac version**

The UPS's factory-set on-battery output voltage and input voltage limits for on-line and SmartBoost operation are designed for use in regions where the nominal line voltage is 220 to 230 Vac. When Option Switch 2 is set to the on (down) position, the upper and lower transfer voltages are raised by 4% and centered on a nominal input of 240 Vac. In addition, the on-battery output voltage is increased to 240 Vac.

### **5.4.3 Option Switch 3**

When Option Switch 3 is set to the on (down) position, the UPS's audible alarm is disabled for the first 30 seconds of on-battery operation. This function is useful where brief power interruptions are frequent and cause the alarm to become annoying.

### **5.4.4 Option Switch 4**

When Option Switch 4 is set to the on (down) position, the UPS's Auto-on mode is disabled, and the UPS must be turned on and off with the rear-panel UPS Enable switch. When Option Switch 4 is set to the off (up) position, the UPS and the devices plugged into the accessory outlets are turned on when the device plugged into the master outlet is turned on. Refer to Section 4.4 for more information about Auto-on operation.

The factory default setting for Switch 4 is down (Auto-on disabled).

# 5.0 Operation

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## 5.5 Extended capabilities

Sections 5.5.1 through 5.5.4 briefly describe the UPS's extended capabilities—advanced functions accessed using a computer running optional PowerDoctor or PowerChute *plus* UPS monitoring software. Refer to the monitoring software documentation for more information on these functions.

*Note: The extended capabilities of the UPS and operation of UPS monitoring software may be subject to change without notice.*

### 5.5.1 Status reporting

#### ■ General

The UPS reports its electronic serial number, version number, date of manufacture, and date of last battery replacement.

#### ■ Operating status

The UPS reports its current operating status including on-line, on-battery, SmartBoost, overloaded output, low battery, shut down, and internal fault.

#### ■ Test results

The UPS reports the results of the last battery test. You may also test the operation of the UPS's visual and audible indicators.

### 5.5.2 Monitoring

#### ■ Run time

When on-battery, the UPS continuously monitors the remaining run time in minutes. The UPS monitors available run time when operating on-line.

#### ■ Line voltage and frequency

The UPS continuously monitors the rms line voltage and line frequency. Transients lasting less than 0.5 seconds are not reported. This information may be logged using UPS monitoring software, plotted using a spreadsheet application, and used to track power quality over extended periods.

#### ■ Minimum and maximum line voltage

The UPS records the minimum and maximum line voltage to provide a snapshot of power quality over a user-specified interval. Transients lasting less than 0.5 seconds are not recorded.

## ***5.0 Operation***

---

### **■ Output power**

The UPS continuously monitors the power consumed by the load. The value given is a percentage of the full load rating of the UPS. This information may be logged using UPS monitoring software, plotted using a spreadsheet application, and used to track load usage over extended periods.

### **■ Output voltage, internal temperature, battery voltage, battery capacity**

The UPS continuously monitors the rms output voltage, internal temperature (°C), battery voltage, and the remaining battery capacity as a percentage of the fully charged condition. This information is valuable for troubleshooting.

### **5.5.3 Power management**

#### **■ Shut down**

While the UPS is operating on-battery, you may direct it to shut down after a user-specified delay. Controlled shutdown of the UPS conserves battery capacity and helps to extend battery life.

#### **■ Shut down with delayed restart**

You may direct the UPS to shut down in any mode following a user-specified delay, and then restart after a user-specified interval. The restart delay may be used to stagger the power-up of multiple network servers protected by multiple UPSs.

#### **■ Simulate power failure**

You may direct the UPS to simulate a power failure by briefly operating on-battery. This function is useful for test purposes.

#### **■ Turn off**

You may direct the UPS to turn off immediately, or after a user-specified delay.



## ***5.0 Operation***

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### **5.5.4 Operation customizing**

You may configure many UPS operations for specific applications. To use the customizing features of the UPS, you must set all option switches to the on (down) position. The functions ordinarily controlled by the switches are duplicated in the UPS monitoring software. Once any of the option switches are returned to the off (up) position, functionality of the option switches is restored.

#### **■ Battery test operation**

You can set the battery test to run automatically at startup, at startup and once every 7 days, at startup and once every 14 days, or never. The default setting is at startup and every 14 days.

#### **■ Transfer voltage**

You can configure the UPS's upper and lower transfer voltages over a wide range (see Sec. 9.2.)

#### **■ On-battery output voltage (220/230/240 Vac version only)**

You may set the UPS's on-battery output voltage to a nominal 220, 225, 230 or 240 Vac. The default setting is 225 Vac.

#### **■ Utility failure sensitivity**

You may configure the UPS's sensitivity to line-voltage distortions to allow use of the UPS in different electrical environments. You may choose high, medium, or low sensitivity settings. The high setting provides the best protection from all utility voltage distortions. The medium setting is intended for use where rapid low-amplitude line voltage fluctuations occur frequently as the result of motor load switching in air conditioners, elevators, etc. The low setting is intended for use when the UPS is operated from an inexpensive fuel powered generator. The default setting is high.

#### **■ Low battery warning interval**

The UPS's low battery warning may be set to activate 2, 5, 7 or 10 minutes before shutdown. The default is 2 minutes.

## ***5.0 Operation***

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### **■ Audible alarm operation**

The UPS's audible alarm beeps four times every 30 seconds during on-battery operation. The alarm beeps continuously when low-battery conditions are reached. This is the default operation. You may configure the audible alarm operation such that response to utility failure is delayed by 30 seconds, silenced until low-battery conditions are reached, or muted during both on-battery and low-battery conditions.

### **■ Minimum battery capacity to restart**

You may configure the UPS so that it will not restart upon restoration of the utility until the battery has been recharged to 90%, 25%, 10%, or 0% of capacity. This function helps eliminate short run times when repetitive utility failures occur. The default setting is 0%.

### **■ Shut down, turn off delay**

You may set the UPS's shutdown or turn-off delay interval to 20, 180, 300, or 600 seconds. The default setting is 20 seconds. Extension of the delay is useful when an operating system's final shutdown routine is longer than 20 seconds.

### **■ Turn on delay**

You may set the UPS's turn-on delay to 0, 60, 180, or 300 seconds. The default setting is 0 seconds.

# 6.0 UPS Monitoring

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## 6.1 Overview

A UPS system alone provides excellent protection from brief power problems. During an extended power outage, an unattended computer system will eventually shut down because of battery capacity exhaustion. To prevent data corruption when the UPS shuts down, the UPS must inform the computer of *impending* shutdown so the computer can take appropriate file-saving measures. This important function is called “UPS monitoring.” The UPS’s computer interface port allows it to communicate with the computer system.

Some computer operating systems have built-in UPS monitoring. These systems require only a hardware interface for the UPS. PowerChute software is available to enhance built-in UPS monitoring, or to add the UPS monitoring function to operating systems that do not provide it.

## 6.2 Interface Kits

Hardware interface kits are available for operating systems that provide UPS monitoring. Each kit includes a special interface cable to convert status signals from the UPS into signals the operating system recognizes. Systems for which interface kits are offered include Novell, LAN Manager, LAN Server, LANtastic, Banyan VINES, Windows NT, and IBM AS/400.

## 6.3 PowerChute Software

PowerChute software provides complete data protection for most operating systems. This software is a background process that monitors the UPS through an RS-232 serial port on the host. PowerChute offers user notification of impending shutdown, power event logging, auto-restart upon power return, and UPS battery conservation features. For selected operating systems, PowerChute offers sophisticated power diagnostic and network power management features including interactive battery testing; scheduled server shutdowns, reboots, and battery testing; detailed power quality logging; and a remote, real-time, graphic power status display that show UPS loading and battery conditions. PowerChute is available for platforms including Novell, OS/2, Windows NT, AppleShare, XENIX, most UNIX-based operating systems, and DEC VAX/VMS.

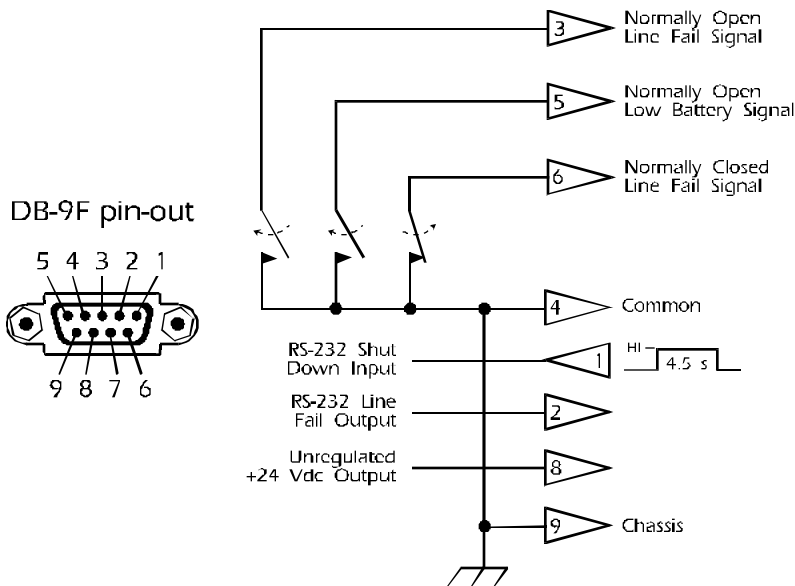
**Caution:** Use only factory supplied or authorized UPS monitoring cables.

# 6.0 UPS Monitoring

## 6.4 Computer Interface port

The Computer Interface port is diagramed below. Those with technical abilities wishing to use this port in a special application should be aware of the following limitations and capabilities of the interface.

- Outputs at Pins 3, 5, and 6 are open collector outputs which must be pulled up to a common referenced supply no greater than +40 Vdc. The transistors are capable of a maximum noninductive load of 25 mAdc. Use only Pin 4 as the common.
- The output at Pin 2 generates a low-to-high RS-232 level upon transfer of the output load to UPS battery power. The pin is normally at a low RS-232 level.
- The UPS shuts down when a high RS-232 level is applied to Pin 1 for 4.5 seconds. The UPS responds to this signal, after a delay, only during on-battery operation.
- An unregulated +24 Vdc appears at Pin 8 of the interface port whenever the UPS is powered. The supply is limited to 40 mAdc maximum.





**CAUTION!**

- This Uninterruptible Power Source contains potentially hazardous voltages. Do not attempt to disassemble the unit. The unit contains no user serviceable parts. Repairs are performed only by factory trained service personnel.
- This Uninterruptible Power Source uses batteries. The batteries will eventually become too weak to provide rated autonomous operation. Due to the potential health and environmental hazards posed by the batteries, they may be replaced only at factory authorized Service Centers. To obtain battery replacement or repair service, please call the Customer Service telephone number written on the cover of this manual for information on the Service Center nearest you.



- **The batteries used by this Uninterruptible Power Source are recyclable. Proper disposal of the batteries is required. The batteries contain lead and pose a hazard to the environment and human health if not disposed of properly. Please refer to local codes for proper disposal requirements or return the unit to a factory authorized Service Center for battery replacement or disposal.**
- Battery replacement should be performed or supervised by personnel familiar with the danger of batteries and the required precautions. Keep unauthorized personnel away from batteries. When replacing batteries, use the same number and type of sealed lead acid batteries as were originally contained in your UPS.
- **CAUTION**—Do not dispose of batteries in a fire. The batteries may explode.
- **CAUTION**—Do not open or mutilate batteries. They contain an electrolyte which is toxic and harmful to the skin and eyes.
- **CAUTION**—A battery can present a risk of electrical shock and high short circuit current. When replacing batteries, wrist watches and jewelry such as rings should be removed. Use tools with insulated handles.



### ATTENTION!

■ Cette source d'alimentation permanente (UPS) contient des circuits haute tension présentant un danger. Ne jamais essayer de le démonter. Il n'y a aucun composant qui puisse être réparé par l'utilisateur. Toutes les réparations doivent être effectuées par du personnel qualifié et agréé par le constructeur.

■ Cette source d'alimentation permanente (UPS) contient des accumulateurs. Ces accumulateurs deviendront un jour trop faibles pour pouvoir assurer un fonctionnement autonome correct. En raison des risques que posent les accumulateurs à la santé et à l'environnement, ils ne peuvent être remplacés que dans les Centres de Service agréés par le fabricant. Pour toute réparation ou remplacement des accumulateurs, composez le numéro du Service à la clientèle inscrit sur la couverture de ce manuel afin d'obtenir les coordonnées du Centre de Service le plus proche.



■ Les accumulateurs contenus dans cette source d'alimentation sont recyclables. L'élimination des batteries est réglementée. Consulter les codes locaux à cet effet. Ils contiennent du plomb et représentent donc un risque pour l'homme et pour l'environnement si les règles de mise au rebut ne sont pas respectées. Veuillez retourner l'unité à un Centre de Service agréé lorsque vous désirez remplacer ou vous débarrasser des accumulateurs usagés.

■ **ATTENTION**—Pour le remplacement, utiliser le même nombre de batteries du modèle suivant: accumulateur au plomb.

■ **ATTENTION**—Une batterie peut présenter un risque de choc électrique, de brûlure par transfert d'énergie. Suivre les précautions qui s'imposent.



**VORSICHT!**

- Im Inneren dieser unterbrechungsfreien Stromversorgung herrschen potentiell gefährliche Spannungen. Nicht versuchen, das Gerät zu öffnen. Es enthält keine vom Benutzer reparierbaren Teile. Reparaturen dürfen nur von ausgebildetem Kundendienstpersonal durchgeführt werden.
- Diese unterbrechungsfreie Stromversorgung enthält Batterien, die nach einer bestimmten Zeit so schwach werden, daß der autonome Nennbetrieb nicht mehr gewährleistet ist. Aufgrund der potentiellen Gesundheits- und Umweltgefahren, die von den Batterien ausgehen, dürfen sie nur in einem vom Werk autorisierten Kundendienstzentrum ausgewechselt werden. Wenn die Batterien ausgewechselt werden müssen oder Reparaturen fällig sind, die auf der Umschlagseite dieser Gebrauchsanweisung angegebene Kundendienst-Telefonnummer anrufen. Dort teilt man Ihnen mit, welches Kundendienstzentrum für Sie zuständig ist.



- Die Batterien in dieser unterbrechungsfreien Stromversorgung sind wiederverwertbar. Sie sind bleihaltig und stellen eine Gefahr für die Umwelt und die Gesundheit dar, wenn sie nicht ordnungsgemäß entsorgt werden. Das Gerät an ein vom Werk autorisiertes Kundendienstzentrum einsenden, um die Batterien auszuwechseln oder entsorgen zu lassen.



### ¡ATENCIÓN!

■ Esta Fuente de energía ininterrumpible contiene niveles de voltaje peligrosos en potencia. No intente desarmar la unidad, pues no contiene piezas que puedan ser reparadas por el usuario. Las reparaciones deben efectuarse únicamente por parte del personal de mantenimiento capacitado en la fábrica.

■ Esta Fuente de energía ininterrumpible contiene baterías. Con el tiempo las baterías se gastan demasiado para poder sustentar el funcionamiento autónomo a la capacidad nominal. Debido a que presentan un peligro potencial para la salud y el medio ambiente, las baterías pueden reemplazarse únicamente en los Centros de Servicio autorizados por la fábrica. Para solicitar el reemplazo de baterías o servicio de reparaciones, se ruega llamar al número telefónico de Atención a los Clientes indicado en la tapa de este manual y averiguar el Centro de Servicio más cercano.



■ Las baterías que se encuentran en esta Fuente de energía ininterrumpible son reciclables. Las baterías contienen plomo y constituyen un peligro para el medio ambiente y para la salud de las personas si no se las desechan como corresponde. Se ruega devolver la unidad a un Centro de Servicio autorizado por la fábrica para el reemplazo o la eliminación de las baterías.



# 7.0 Difficulty

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## 7.1 Troubleshooting

|                        |   |
|------------------------|---|
| <b>PROBLEM:</b>        | UPS will not turn on  |
| <b>Possible cause:</b> | No load or insufficient load at the Master outlet.  |
| <b>Solution:</b>       | To turn on UPS and accessories, load must be larger than 40 Watts and be turned on.   |
| <b>Possible cause:</b> | UPS Enable switch is in the off ( O ) position.   |
| <b>Solution:</b>       | Turn on the rear panel UPS Enable switch.   |
| <b>Possible cause:</b> | UPS's circuit breaker is tripped (button is extended).  |
| <b>Solution:</b>       | Reduce the UPS's load by unplugging equipment and reset the circuit breaker (press button on rear panel).   |
| <b>Possible cause:</b> | Very low utility voltage or dead outlet.  |
| <b>Solution:</b>       | Check outlet with a table lamp. If very dim, have utility voltage checked by an electrician.  |
| <b>PROBLEM:</b>        | UPS operates on-battery even though normal line voltage is thought to exist.  |
| <b>Possible cause:</b> | UPS's circuit breaker is tripped (button is extended).  |
| <b>Solution:</b>       | Unplug equipment to reduce the UPS's load. Press the button on the rear panel to reset circuit breaker.   |
| <b>Possible cause:</b> | Very high, low, or badly-distorted line voltage.  |
| <b>Solution:</b>       | Test the input voltage with UPS's Line Voltage bar graph (see Sec. 5.2.1). Inexpensive fuel powered generators can cause distorted line voltages—set Option Switch 1 to the on (down) position. |
| <b>PROBLEM:</b>        | UPS “beeps” occasionally.   |
| <b>Possible cause:</b> | This is normal; the UPS is protecting your computer equipment from momentary sags or swells.  |
| <b>PROBLEM:</b>        | UPS beeps more than once or twice an hour.  |
| <b>Possible cause:</b> | Chronically high or distorted line voltage.   |
| <b>Solution:</b>       | Set Option Switches 1 and 2 to match input voltage range. Alternatively, set Option Switch 3 to the on (down) position (see Secs. 5.4 and 5.5.4).   |

# 7.0 Difficulty

## 7.1 Troubleshooting (continued)

|                        |   |
|------------------------|---|
| <b>PROBLEM:</b>        | UPS does not provide expected back up time.   |
| <b>Possible cause:</b> | UPS's battery is weak from recent outage or wear.   |
| <b>Solution:</b>       | The battery needs recharging after an extended outage. The battery wears faster when put into service often and when used at higher temperatures. |
| <b>Possible cause:</b> | UPS is overloaded.  |
| <b>Solution:</b>       | Check load using UPS's Output Power display (see Sec. 5.2.2). Unplug non-critical equipment and printers.   |
| <b>PROBLEM:</b>        | UPS shuts down if the Test button is held for more than 4 seconds.  |
| <b>Possible cause:</b> | UPS is overloaded.  |
| <b>Solution:</b>       | Reduce the UPS's load by unplugging equipment. Check load using Output Power display (see Sec. 5.2.2).  |
| <b>Possible cause:</b> | Weak battery.   |
| <b>Solution:</b>       | Allow UPS to charge for at least five hours. If problem persists, battery may need to be replaced.  |
| <b>PROBLEM:</b>        | Indicators on front panel flash in a "marquee" fashion.   |
| <b>Possible cause:</b> | UPS has been shut down by computer software.  |
| <b>Solution:</b>       | UPS will restart when AC power returns.   |
| <b>PROBLEM:</b>        | All indicators are lit and UPS emits constant tone.   |
| <b>Possible cause:</b> | Internal UPS fault.   |
| <b>Solution:</b>       | Do not attempt to use UPS. Turn off UPS and have it serviced immediately.   |
| <b>PROBLEM:</b>        | Site wiring fault light is lit—UPS operates normally.   |
| <b>Possible cause:</b> | Building wiring error such as missing ground or hot-neutral reversal.   |
| <b>Solution:</b>       | A qualified electrician should be summoned to correct the building wiring.  |

## ***7.0 Difficulty***

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### **7.1 Troubleshooting** (continued)

|                        |  |
|------------------------|--|
| <b>PROBLEM:</b>        | Replace Battery indicator is lit.  |
| <b>Possible cause:</b> | Weak battery.  |
| <b>Solution:</b>       | Allow the battery to recharge for at least 8 hours. If the problem persists, the battery should be replaced. |
| <b>PROBLEM:</b>        | Computer monitor interference.   |
| <b>Possible cause:</b> | Some monitors are sensitive to emissions from the UPS.   |
| <b>Solution:</b>       | Move the UPS farther away from the monitor, or call customer service.  |

## ***7.0 Difficulty***

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### **7.2 Battery replacement check**

The UPS automatically performs a battery test at startup and again every 14 days. This test briefly loads the batteries and can detect a weak battery before it is put into service during a power failure. If the battery is too weak to support the load during this test, the UPS instantly returns to on-line operation. The Replace Battery indicator lights when the batteries can no longer sustain sufficient charge for the UPS to provide power for more than half the normal time (see Sec. 9.9) during an extended utility failure.

You can expect to receive 3 to 6 years of service from the UPS's battery when used in a cool, dry location. Battery life is shortened when the UPS is operated in an environment where the ambient temperature is normally above 30°C (86°F).

If the Replace Battery indicator lights, perform the following procedure to verify that the batteries need replacing.

1. Use the UPS's Line Voltage bar graph to check that the utility voltage is within a normal range (see Sec. 5.2.1). The UPS charges its battery more slowly when operated from very low input voltages. Where low line voltages and frequent disturbances are common, set the UPS's Option Switch 1 to on (down; see Sec. 5.4).
2. Allow the UPS to charge the battery for at least 8 hours after an extended utility failure.
3. Turn the UPS off and then on to initiate a battery test.
4. Check the Replace Battery indicator.
  - If the Replace Battery indicator does not light after the battery test, the batteries do not require replacement. Extended storage without recharge, or successive power outages can cause false indications.
  - If the Replace Battery indicator lights after the self test, the batteries are worn and need to be replaced.
5. Call the Customer Service phone number listed on the cover of this manual to obtain information about battery replacement service or battery replacement kits.

**Note:** *Please see the battery cautions at the beginning of this section.*

# 7.0 Difficulty

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## 7.3 Obtaining service

The troubleshooting chart in Section 7.1 covers most of the difficulties that you may encounter under conditions other than a failure of the UPS itself. For problems not covered in the chart, follow the procedure outlined below.

If your UPS requires service:

1. Refer to the troubleshooting chart (Sec 7.1) to eliminate any obvious causes.
2. Verify that the circuit breaker is not tripped.
  - **A tripped circuit breaker is the most common UPS problem! You may reset the breaker after unplugging excessive loads from the UPS.**
3. Call the Customer Service Department to obtain a return material authorization number (RMA#).
  - Before you call, note your UPS model, serial number, and date of purchase. Contact Customer Service at the phone number listed on the cover of this manual. Be prepared to provide a description of the problem. A technician will help you solve the problem over the phone, if possible, or will give you a RMA#.
  - If the UPS is under warranty, repairs will be performed free of charge. If the warranty has expired, there will be a charge for repair.
4. Pack the UPS in its original packaging. *If you do not have the original shipping materials, ask the Customer Service technician about obtaining a new set.*
  - It is very important that you pack the UPS properly to avoid damage in transit. Never use styrofoam beads for packaging the UPS because it will settle through beads and become damaged. Damages sustained in transit are not covered under warranty. Enclose a letter in the package with your name, RMA#, address, copy of the sales receipt, description of the trouble, your phone number, and a check (if necessary).
5. Mark your RMA# on the outside of the package.  
*The factory cannot accept any package without this marking.*
6. Return your UPS by insured, prepaid carrier to the address on the rear of this manual.

## ***8.0 Storing the UPS***

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### **8.1 Storage conditions**

When you store the UPS, cover it and keep it upright in a cool, dry location. Store the UPS with its battery fully-charged. Before storage, allow the UPS to charge for at least 8 hours. Disconnect any accessories and cables connected at the computer interface port, because these may unnecessarily drain the battery charge.

### **8.2 Extended storage**

- To achieve optimal run time after extended storage, you should refresh the UPS's batteries every 6 months in environments where the ambient temperature is  $-15$  to  $+30^{\circ}\text{C}$  ( $+5$  to  $+86^{\circ}\text{F}$ ).
- For extended storage in environments where the ambient temperature is  $+30$  to  $+45^{\circ}\text{C}$  ( $+86$  to  $+113^{\circ}\text{F}$ ), you should refresh the UPS's batteries every 3 months.

# 9.0 Specifications

## 9.1 Input

UPS version (Vac):      **100**                      **120**                      **220/230/240**

|  |              |       |       |
|--|--------------|-------|-------|
| <b>Nominal input voltage (Vac):</b> single phase   | 100          | 120   | 230   |
| <b>Nominal input frequency:</b><br>Internally selected by microprocessor.  | 50 or 60 Hz. |       |       |
| <b>Input protection:</b><br>Push-to-reset circuit breaker.   | 7 Amp        | 7 Amp | 5 Amp |
| <b>Input connections:</b> IEC 320 male inlet coupler. 120 and 100 Vac versions include 6 ft (2 m) line cord, with a NEMA 5-15P three pronged plug. |              |       |       |

## 9.2 Transfer characteristics

|   |                                |         |         |
|---|--------------------------------|---------|---------|
| <b>Frequency limits for on-line operation:</b>              | 50 or 60 Hz, $\pm 5\%$         |         |         |
| <b>Lower input voltage<sup>†</sup>, on-line operation:</b>  | 80 Vac                         | 90 Vac  | 173 Vac |
| <b>Upper input voltage<sup>†</sup>, on-line operation:</b>  | 110 Vac                        | 132 Vac | 253 Vac |
| <b>SmartBoost operation line voltage<sup>†</sup> (Vac):</b> | 80–90                          | 90–103  | 173–196 |
| <b>Transfer time:</b><br>(1 ms is 0.001 seconds).           | 2 ms typical;<br>4 ms maximum. |         |         |

<sup>†</sup> Note that these are the default values. Transfer parameters may be configured using UPS monitoring software.

## 9.3 Output characteristics

|   |   |               |               |
|---|---|---------------|---------------|
| <b>On-battery output voltage (Vac):</b>   | 100 $\pm 5\%$                           | 115 $\pm 5\%$ | 225 $\pm 5\%$ |
| <b>Maximum output current:</b>  | 4.0 Amp                                 | 3.5 Amp       | 1.8 Amp       |
| <b>Maximum load:</b>  | 400 VA or<br>250 W at 0.63 power factor |               |               |
| <b>On-battery Frequency:</b><br>Synchronized to mains frequency during brownout.  | 50 or 60 Hz, $\pm 0.1$ Hz.              |               |               |
| <b>On-battery waveshape:</b>  | sinewave.                               |               |               |
| <b>Protection:</b> Overcurrent and short-circuit protected, latching shutdown upon overload.  |   |               |               |
| <b>Output connections:</b> 100 and 120 Vac versions have four NEMA 5-15R receptacles. 220/230/240 Vac version has four IEC 320 output couplers and includes two 6 ft (2 m) output cords with IEC 320 couplers and one IEC rewirable plug adapter. |   |               |               |

## 9.0 Specifications

### 9.4 Battery and charger UPS version (Vac): 100 120 220/230/240

|   |
|---|
| <b>Battery type:</b> Spill proof, maintenance free sealed lead-calcium.   |
| <b>Typical battery life:</b> 3 to 6 years.<br>Battery life dependent on number of discharges and ambient temperature.                         |
| <b>Low battery signaling:</b> Continuous visual and audible alarm 2 minutes before shutdown.  |
| <b>Recharge time:</b> 5 hours typical from total discharge. UPS may be used immediately after discharge but will provide shorter backup time. |

### 9.5 Surge and noise suppression

|  |                   |       |       |
|--|-------------------|-------|-------|
| <b>Surge energy rating (Joules, maximum):</b><br>One occurrence, 10/1000 $\mu$ s waveform. | 160               | 320   | 320   |
| <b>Surge current capability (maximum):</b><br>One occurrence, 8/20 $\mu$ s waveform.       | 6500 Amp peak.    |       |       |
| <b>Surge response time:</b> 0 ns (instantaneous) normal mode; less than 5 ns common mode.  |                   |       |       |
| <b>Surge voltage let-through:</b><br>per ANSI C62.41 Cat. A 6 kV test.                     | <0.7%             | <0.7% | <2.0% |
| <b>Noise filter range:</b><br>Normal and common mode EMI/RFI suppression.                  | 100 kHz to 10 MHz |       |       |

### 9.6 Operating Environment

|   |                                |
|---|--------------------------------|
| <b>Operating temperature:</b>   | 0 to +40°C (+32 to +104°F)     |
| <b>Storage temperature:</b>   | -15 to +45°C (+5 to +113°F)    |
| <b>Operating &amp; storage relative humidity:</b>   | 0 to 95%, non-condensing       |
| <b>Operating elevation:</b>   | 0 to 3,000 m (0 to 10,000 ft)  |
| <b>Storage elevation:</b>   | 0 to 15,000 m (0 to 50,000 ft) |
| <b>Electromagnetic immunity:</b><br>IEC 801-2 level IV, 801-3 level III, 801-4 level IV, 801-5 level III. |                                |
| <b>Audible noise:</b>   | <45 dBA at 1 m (3 ft)          |



## 9.0 Specifications

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### 9.7 Physical

|                                    |   |
|------------------------------------|---|
| <b>Size (H×W×D):</b>               | 2.4 × 11.9 × 15.5 in.<br>(6.0 × 30.2 × 39.4 cm) |
| <b>Weight:</b><br>Shipping weight: | 17 lbs (7.7 kg)<br>20 lbs (9.1 kg)              |

### 9.8 Approvals

|  |
|--|
| <b>Safety approvals:</b> UL per 1778, CSA per C22.2, TUV per IEC 950.                                      |
| <b>EMC verification:</b> FCC/DOC Class B certified; VCCI Class 1 compliance; VDE/EN55022 Class B verified. |

## 9.0 Specifications

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### 9.9 Typical run times versus load

| Load (VA†) | Run Time (minutes‡) | Typical computer equivalents  |
|------------|---------------------|---|
| 50         | 100                 | Typical ASCII terminal  |
| 100        | 54                  | Apple Macintosh SE<br>Apple Macintosh Classic                                     |
| 150        | 33                  | PS/2 25 w/monochrome monitor<br>Apple Macintosh SE/30                             |
| 200        | 22                  | DeskPro 386s w/VGA monitor<br>Apple Macintosh IIsi w/color monitor                |
| 250        | 15                  | Apple Macintosh IIfx w/color monitor<br>Compaq Presario 400/600 Series w/monitor  |
| 300        | 11                  | Gateway 486/33 tower w/VGA monitor<br>Apple Macintosh IIfx w/19-in. color monitor |
| 350        | 8                   | NEC PowerMate 386 w/VGA monitor<br>Gateway PS-60 Pentium w/monitor                |
| 400        | 5                   | Gateway 4DX2-66E w/19-in. color monitor<br>Dell System 433TE w/VGA monitor        |

† VA = volt-amperes; 0.63 VA = 1 Watt.

‡ Run times are typical at 25°C (77°F).

## *Limited Warranty*

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American Power Conversion (APC) warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. To obtain service under warranty you must obtain a Returned Material Authorization (RMA) number from APC or an APC service center. Products must be returned to APC or an APC service center with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. This warranty does not apply to equipment which has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser who must have properly registered the product within 10 days of purchase.

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EXCEPT AS PROVIDED ABOVE, IN NO EVENT WILL APC BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THIS PRODUCT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## *Life support policy*

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As a general policy, American Power Conversion (APC) does not recommend the use of any of its products in life support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. APC does not recommend the use of any of its products in direct patient care. APC will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as "critical" by the U.S. FDA.

Hospital grade wiring devices and leakage current may be ordered as options on many APC UPS systems. APC does not claim that units with this modification are certified or listed as Hospital Grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.



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***Please note:*** The troubleshooting chart in Section 7.0 offers solutions for most of the difficulties you may encounter with this UPS. Before calling the customer service number, please have available your UPS's serial number (see label at the rear of the UPS).

Serial number: \_\_\_\_\_

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