

6000 VA LCD 4U Rack UPS
6000 VA UPS 3U Extended Battery Module



Installation and Maintenance Guide

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6000 VA UPS 3U Extended Battery Module



Installation and Maintenance Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 55, the *Safety Information* and *Environmental Notices and User Guide* documents on the *IBM Documentation CD*, and the *Warranty Information* document that comes with the product.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

DANGER

Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label.

(L001)



CAUTION:

The product might be equipped with a hard-wired power cable. Ensure that a licensed electrician performs the installation per the national electrical code. (C022)



DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

To disconnect:

- 1. Turn off everything (unless instructed otherwise).**
- 2. Remove the power cords from the outlets.**
- 3. Remove the signal cables from the connectors.**
- 4. Remove all cables from the devices.**

To connect:

- 1. Turn off everything (unless instructed otherwise).**
- 2. Attach all cables to the devices.**
- 3. Attach the signal cables to the connectors.**
- 4. Attach the power cords to the outlets.**
- 5. Turn on the devices.**

(D005a)



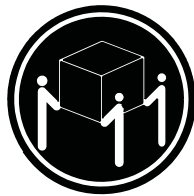
CAUTION:

Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

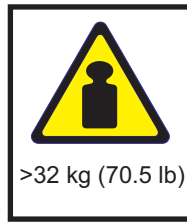
Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)



CAUTION:



or



>32 kg (70.5 lb)

or



32-55 kg (70.5-121.2 lb)

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

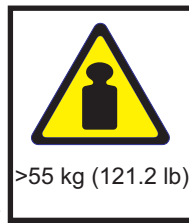


CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C010)

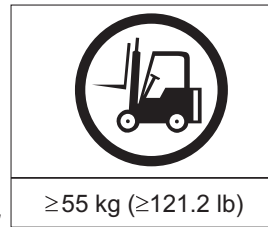


or



>55 kg (121.2 lb)

or



≥55 kg (≥121.2 lb)

The following general safety information should be used for all rack-mounted devices:



DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment—personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- *(For fixed drawers)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001 part 2 of 2)

Important:

1. To reduce the risk of fire, connect only to a circuit provided with branch circuit overcurrent protection with an ampere rating in accordance with the National Electrical Code (NEC), ANSI/NFPA 70 or your local electrical code.

Uninterruptible power supply output power	200 V	208 V	230 V
6000 VA	40 amp, 2-pole circuit breaker	40 amp, 2-pole circuit breaker	32 amp (Europe), 40 amp (North America), 2-pole circuit breaker

2. **For permanently connected equipment:** Make sure that a readily accessible disconnect device is incorporated in the building installation wiring.
3. You can connect only one extended battery module to the uninterruptible power supply.
4. For input voltage rating 115/200 – 127/220 V ac, the IBM 6000 VA LCD 4U Rack UPS (200 V / 208 V) must be connected phase-to-phase (and not phase-to-neutral), so that the input voltage of the uninterruptible power supply is 200 V or 220 V.

Contents

Safety	iii
Chapter 1. Introduction	1
The IBM Documentation CD	2
Hardware and software requirements	2
Using the Documentation Browser	2
Specifications	4
Internal circuit configuration.	5
Notices and statements in this document.	5
Chapter 2. Installing the uninterruptible power supply	7
Inventory checklist	7
Front view of the uninterruptible power supply	8
Rear view of the uninterruptible power supply	9
6000 VA LCD 4U rack uninterruptible power supply (200 V / 208 V)	9
6000 VA LCD 4U rack uninterruptible power supply (230 V)	9
Front view of the extended battery module.	10
Rear view of the extended battery module	10
Rack installation	10
Connecting an extended battery module to the uninterruptible power supply	11
Completing the installation.	13
Installing the remote emergency power-off.	13
Hard-wiring the uninterruptible power supply input (for licensed electrician only)	16
Uninterruptible power supply initial startup	18
Chapter 3. Operating the uninterruptible power supply	21
Control panel	21
Operating modes	22
Normal mode	22
Battery mode	22
Bypass mode	22
Standby mode	22
Turning on the uninterruptible power supply	23
Starting the uninterruptible power supply on battery	23
Turning off the uninterruptible power supply	23
Display functions	23
System status	24
Alarm history	24
Meters	24
Control screens.	25
Model information	25
Configuration	26
Transferring the uninterruptible power supply between modes	28
Transferring from Normal to Bypass Mode	28
Transferring from Bypass to Normal Mode	28
Retrieving the alarm history	28
Behavior on overload	29
Configuring load segments	29
Controlling load segments through the display	29
Configuring automatic start delay	30
Configuring automatic on battery shutdown	30
Configuring battery settings	31
Configuring the uninterruptible power supply for an extended battery module	31

Running automatic battery tests	32
Configuring automatic battery tests	32
Configuring automatic restart	32
Chapter 4. Additional uninterruptible power supply features	33
Installing the UPS Manager software	33
RS-232 and USB communication ports	33
RS-232 port	34
USB port	35
IBM Network Management Card	35
IBM Environmental Monitoring Probe	35
Chapter 5. Hardware maintenance information	37
Replaceable uninterruptible power supply components	37
Uninterruptible power supply and battery care	38
Storing the uninterruptible power supply and batteries	38
Replacing the battery modules (for qualified personnel only)	38
Testing a battery	44
Chapter 6. Troubleshooting	45
Accessing alarms and conditions	45
Status menu	45
Alarm history menu	46
Serial connection to a computer	46
Typical alarms and conditions	48
Silencing the alarm	51
Appendix A. Getting help and technical assistance	53
Before you call	53
Using the documentation	53
Getting help and information from the World Wide Web	53
Software service and support	54
Hardware service and support	54
IBM Taiwan product service	54
Appendix B. Notices	55
Trademarks	55
Important notes	56
Particulate contamination	57
Documentation format	57
Electronic emission notices	58
Federal Communications Commission (FCC) statement	58
Industry Canada Class A emission compliance statement	58
Avis de conformité à la réglementation d'Industrie Canada	58
Australia and New Zealand Class A statement	58
European Union EMC Directive conformance statement	58
Germany Class A statement	59
Japan VCCI Class A statement	60
Japan Electronics and Information Technology Industries Association (JEITA) statement	60
Korea Communications Commission (KCC) statement	60
Russia Electromagnetic Interference (EMI) Class A statement	60
People's Republic of China Class A electronic emission statement	61
Taiwan Class A compliance statement	61
Index	63

Chapter 1. Introduction

The IBM® line-interactive uninterruptible power supply models are designed to prevent blackouts, brownouts, sags, and surges from reaching your servers and other valuable electronic equipment. The uninterruptible power supply filters small utility line fluctuations and isolates your equipment from large disturbances by internally disconnecting from the utility line. The uninterruptible power supply provides continuous power from its internal battery until the utility line returns to safe levels or the battery is fully discharged.

Each uninterruptible power supply has the following communication features: an RS-232 port, a USB port, and a communication bay for an optional IBM Network Management Card. The following additional optional features are available: an IBM Extended Battery Module (6000 VA 3U) and an IBM Environmental Monitoring Probe.

The information in this document is for the following uninterruptible power supply and extended battery module models:

- IBM 6000 VA LCD 4U Rack UPS (200 V / 208 V)
- IBM 6000 VA LCD 4U Rack UPS (230 V)
- IBM 6000 UPS 3U Extended Battery Module

This document contains the following information:

- Setting up the uninterruptible power supply
- Connecting an extended battery module to the uninterruptible power supply
- Starting and configuring the uninterruptible power supply
- Solving problems

If firmware and documentation updates are available, you can download them from the IBM web site. The uninterruptible power supply might have features that are not described in the documentation that comes with the uninterruptible power supply, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the uninterruptible power supply documentation. To check for updates, complete the following steps.

Note: Changes are made periodically to the IBM web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Click **Hardware options and upgrades**.
3. On the “Support for IBM Hardware and Upgrades” page, in the **Product family** field, select **Uninterruptible power supply**.
4. In the **Type** field, select your uninterruptible power supply type.
5. In the **Part number** field, select your uninterruptible power supply part number.
6. Under **Support & downloads**, click **Documentation** or click **Download** (for firmware updates).

The uninterruptible power supply and extended battery module come with a limited warranty. For more information, see the *Warranty Information* document that comes with the product.

See the *Rack Installation Instructions* document for complete rack installation instructions.

Note: The illustrations in this document might differ slightly from your hardware.

The IBM Documentation CD

The *IBM Documentation* CD contains documentation for your uninterruptible power supply in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The *IBM Documentation* CD requires the following minimum hardware and software:

- Microsoft® Windows NT® 4.0 (with Service Pack 3 or later), Windows® 2000, or Red Hat® Linux®.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your computer and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
 - If you are using a Windows operating system, insert the CD into the CD drive and click **Start --> Run**. In the **Open** field, type
`e:\win32.bat`

where *e* is the drive letter of the CD drive, and click **OK**.
 - If you are using Red Hat Linux, insert the CD into the CD drive; then, run the following command from the `/mnt/cdrom` directory:
`sh runlinux.sh`

Select your uninterruptible power supply from the **Product** menu. The **Available Topics** list displays all the documents for your uninterruptible power supply. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or

documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string is displayed are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Specifications

The specifications of the uninterruptible power supply models and the extended battery modules are shown in the following tables.

Note: All dimensions include the front bezel.

Table 1. 6000 VA LCD 4U rack uninterruptible power supply specifications

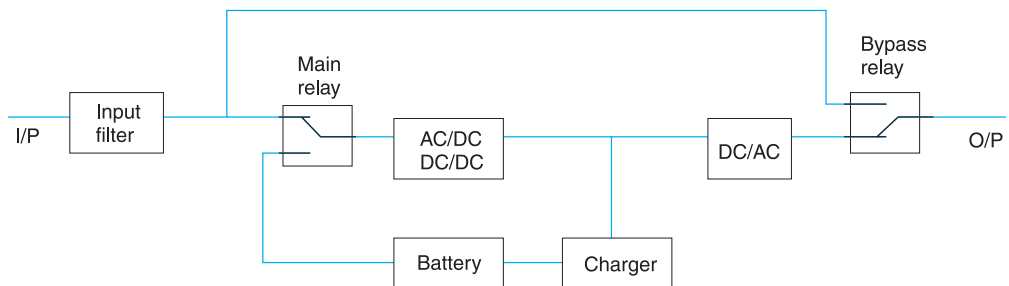
Specification	6000 VA LCD 4U rack uninterruptible power supply (200 V / 208 V)	6000 VA LCD 4U rack uninterruptible power supply (230 V)
Height	171.5 mm (6.8 in.)	171.5 mm (6.8 in.)
Width	483 mm (19 in.)	483 mm (19 in.)
Depth	735 mm (28.9 in.)	735 mm (28.9 in.)
Weight	72 kg (159 lb)	72 kg (159 lb)
Operating temperature at 0 to maximum altitude	0°C to 40°C (32°F to 104°F)	0°C to 40°C (32°F to 104°F)
24 hour transport storage temperature at 0 to maximum storage altitude	-15°C to 60°C (5°F to 140°F)	-15°C to 60°C (5°F to 140°F)
Extended storage temperature at 0 to maximum storage altitude	-15°C to 45°C (5°F to 113°F)	-15°C to 45°C (5°F to 113°F)
Maximum operating altitude	3048 m (10,000 ft)	3048 m (10,000 ft)
Maximum storage altitude	15,240 m (50,000 ft)	15,240 m (50,000 ft)
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing
Nominal input voltage	208 V (auto sensing at first power-up)	230 V (auto sensing at first power-up)
Maximum input current	30 amps	32 amps
Input voltage range for main operations (V ac)	155 to 255 V ac	160 to 286 V ac
Nominal output voltage (V ac)	208 V (auto sensing at first power-up; user configurable)	230 V (auto sensing at first power-up; user configurable)
Input frequency	50/60 Hz ± 3 Hz (auto sensing)	50/60 Hz ± 3 Hz (auto sensing)
Rated power output	6000 VA	6000 VA
Output power capacity in watts	5600 W	5600 W
Circuit breakers	Three two-pole output breakers: two for Load Segment 1 rated at 20 A, one for Load Segment 2 rated at 30 A	Three single-pole output breakers: two for Load Segment 1 rated at 20 A, one for Load Segment 2 rated at 15 A
Fixed power cord	Hard-wired	Hard-wired
Input connection type	Terminal block	Terminal block
Power outlets	Two NEMA L6-30R Four IEC 320 - C19	Six IEC 320 - C13 Four IEC 320 - C19
Audible noise at 1 meter for > 80% load	<55 dBA normal / Bypass mode <55 dBA Battery mode	<55 dBA normal / Bypass mode <55 dBA Battery mode
Runtime (for fully charged internal batteries at 25°C)	Full load: 5 min Half load: 14 min	Full load: 5 min Half load: 14 min

Table 2. 6000 VA uninterruptible power supply 3U extended battery module specifications

Specification	6000 VA uninterruptible power supply 3U extended battery module
Height	127 mm (5 in.)
Width	483 mm (19 in.)
Depth	721 mm (28.4 in.)
Weight	59 kg (130 lb)
Voltage	216 V (18 x 12 V, 9 Ah)

Internal circuit configuration

The following illustration shows the internal circuit configuration.



Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Chapter 2. Installing the uninterruptible power supply

This chapter describes the following tasks:

- Checking the package contents
- Front and rear views of the uninterruptible power supply and extended battery module
- Connecting the extended battery module to the uninterruptible power supply
- Installing a remote emergency power-off connector
- Hard-wiring the uninterruptible power supply input (for licensed electrician only)
- Uninterruptible power supply initial startup

You will need the following tools to install the uninterruptible power supply:

- One number 2 Phillips screwdriver (for use with the rack mount kit and terminal block cover)
- One flat-blade screwdriver (for wiring the terminal block)

Inventory checklist

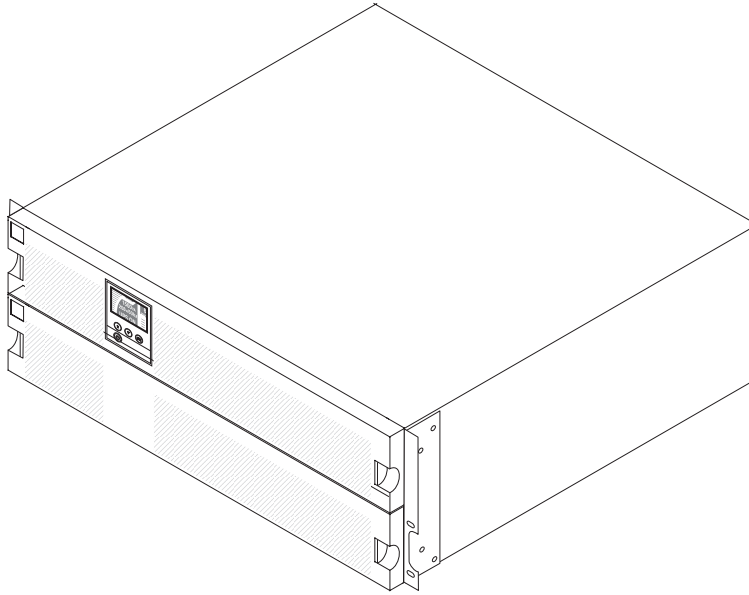
The uninterruptible power supply comes with the following items.

Note: Your uninterruptible power supply model might not come with all of the items in the following list.

- Uninterruptible power supply
- Two bezels (upper and lower)
- Rack mount kit, including rails and mounting hardware
- Documentation package
- IBM *UPS Manager* CD (power-management software)
- Serial and USB communication cables
- Remote emergency power-off connector

Front view of the uninterruptible power supply

The following illustration shows the front view of the uninterruptible power supply.



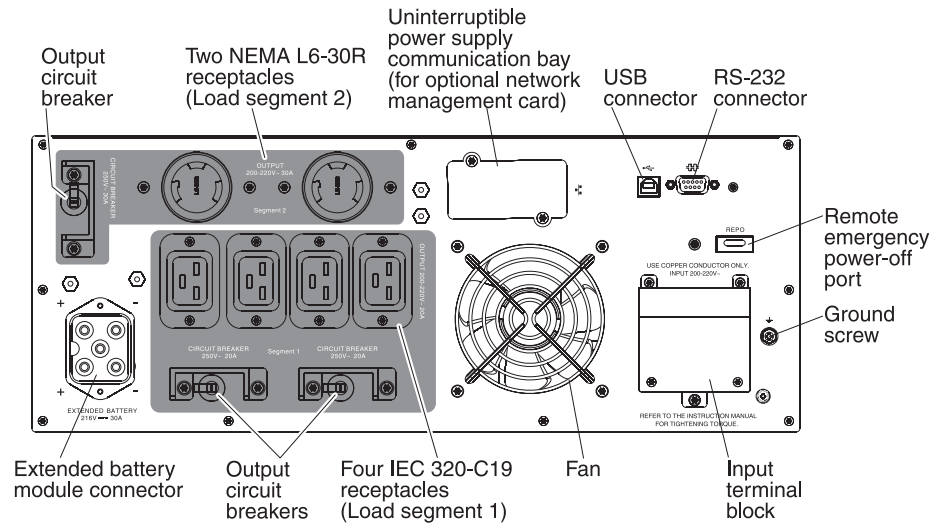
For more information about the control panel on the front of the uninterruptible power supply, see “Control panel” on page 21.

Rear view of the uninterruptible power supply

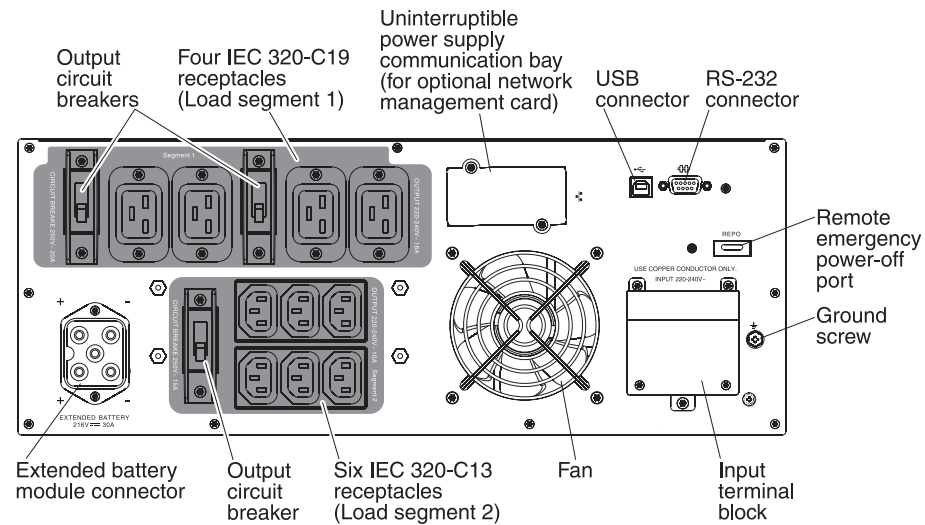
The following illustrations show the controls and connectors on the rear of the uninterruptible power supply models.

Note: The shaded breaker areas that are shown in the following illustrations indicate the load segment groupings. The shading does not appear on the chassis.

6000 VA LCD 4U rack uninterruptible power supply (200 V / 208 V)

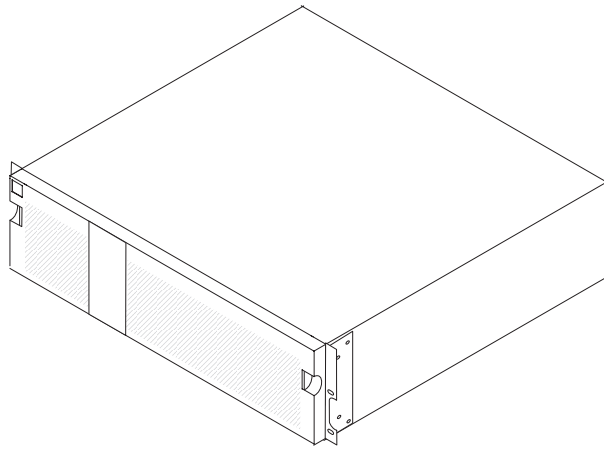


6000 VA LCD 4U rack uninterruptible power supply (230 V)



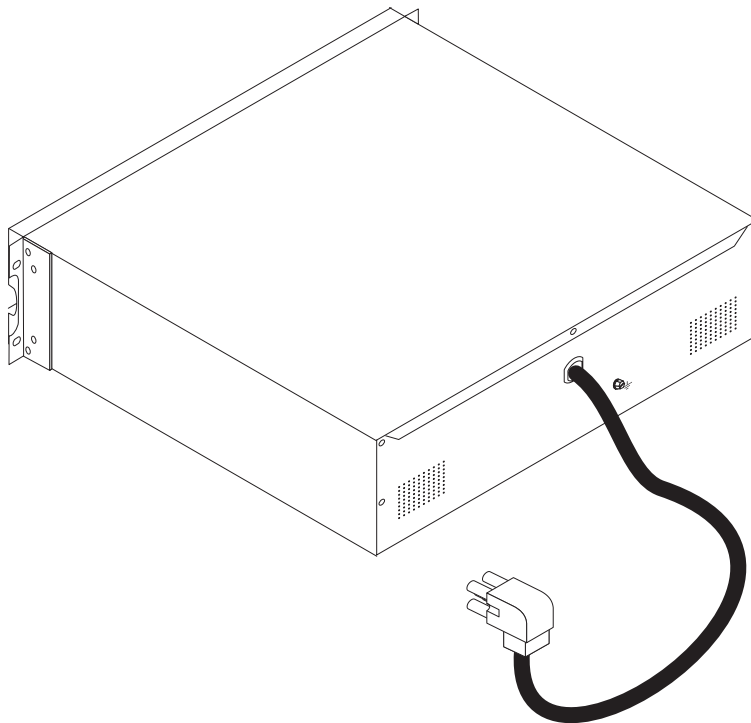
Front view of the extended battery module

The following illustration shows the front view of the extended battery module.



Rear view of the extended battery module

The following illustration shows the rear view of the 3U extended battery module.



Rack installation

To install the uninterruptible power supply or extended battery module in a rack cabinet, see the IBM *Rack Installation Instructions* document that comes with the rack mount kit.

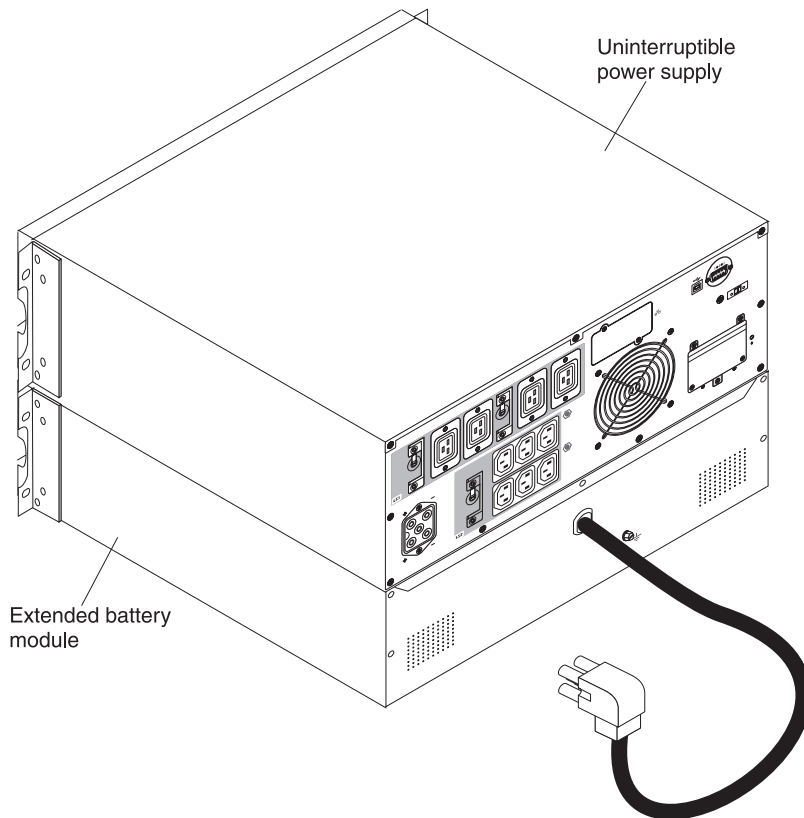
Connecting an extended battery module to the uninterruptible power supply

Important: A small amount of arcing might occur while you are connecting the extended battery module to the uninterruptible power supply. This is normal and does not damage the unit or cause any safety concern. Insert the extended battery module cable into the uninterruptible power supply battery connector quickly and firmly.

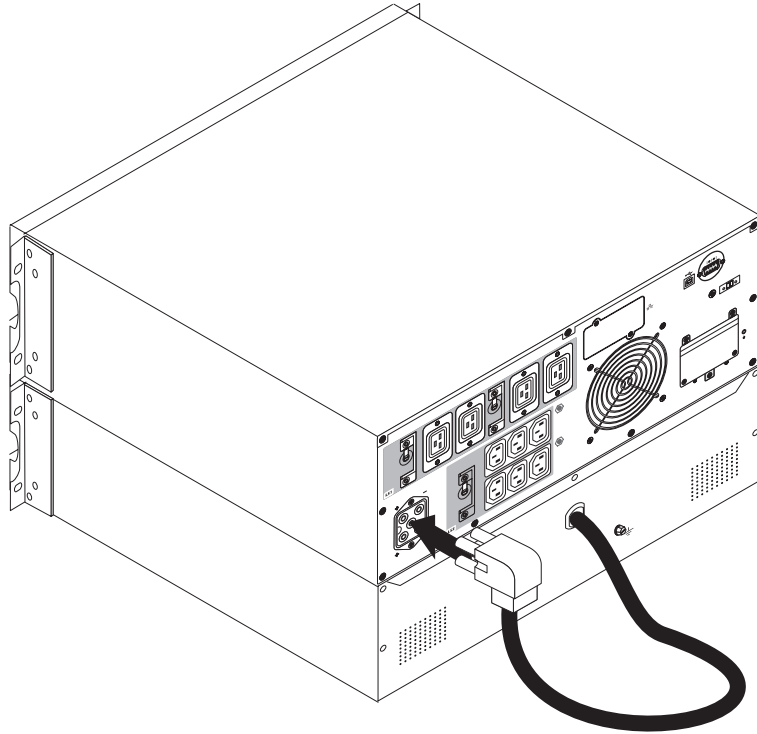
Note: You can connect only one extended battery module to the uninterruptible power supply.

To connect an extended battery module to the uninterruptible power supply, complete the following steps:

1. Make sure that the extended battery module is installed in the rack cabinet, directly below the uninterruptible power supply.



2. Align the extended battery module power cord with the extended battery module connector on the uninterruptible power supply. Firmly press the power cord into the uninterruptible power supply.



Completing the installation

To complete the installation of the uninterruptible power supply, complete the following steps:

1. If you are installing the IBM UPS Manager software, connect a computer to the uninterruptible power supply, using one of the communication cables that come with the uninterruptible power supply. For more information, see “Installing the UPS Manager software” on page 33.
2. If the rack cabinet has conductors for grounding or bonding of ungrounded metal parts, connect the ground cable (purchased separately) to the ground bonding screw. For the location of the ground bonding screw for each uninterruptible power supply model, see “Rear view of the uninterruptible power supply” on page 9.
3. If an emergency power-off (disconnect) switch is required by local codes, see “Installing the remote emergency power-off” to install the remote emergency power-off switch before you turn on the uninterruptible power supply.
4. Connect the devices that you want to protect to the applicable uninterruptible power supply output receptacles. Do not turn on the devices. For information about load segments, see “Configuring load segments” on page 29.

Notes:

1. *Do not* protect laser printers with the uninterruptible power supply because of the exceptionally high power requirements of the heating elements.
2. Before you connect the uninterruptible power supply power cord to a power source, see “Uninterruptible power supply initial startup” on page 18.

Installing the remote emergency power-off

The uninterruptible power supply includes a remote emergency power-off connector that enables you to turn off power at the uninterruptible power supply output receptacles from a customer-supplied switch in a remote location. For example, you can use this feature to shut down the load and the uninterruptible power supply by thermal relay, in the event of a room overtemperature condition. When a remote emergency power-off is activated, the uninterruptible power supply shuts down the output and all its power converters immediately. The uninterruptible power supply logic power remains on to issue an alarm.

The remote emergency power-off feature shuts down the connected devices immediately and does not follow the orderly shutdown procedure that is initiated by any power-management software.

Any devices that are operating on battery power are also shut down immediately. When the remote emergency power-off switch is reset, the connected devices will not return to battery power until the uninterruptible power supply is restarted manually.

Notes:

1. The remote emergency power-off contacts are open by default. To change this setting, see the REPO setting in Table 8 on page 26.
2. For Europe, the emergency switch requirements are detailed in Harmonized document HD-384-48 S1, “Electrical Installation of the Buildings, Part 4: Protection for Safety, Chapter 46: Isolation and Switching.”

Table 3. Remote emergency power-off connections

Wire function	Terminal wire size rating	Suggested wire size
Remote emergency power-off	4-0.32 mm ² (12-22 AWG)	0.82 mm ² (18 AWG)

3. The pins must be open to keep the uninterruptible power supply running. If the uninterruptible power supply shuts down because the remote emergency power-off connector pins are shorted, restart the uninterruptible power supply by reopening the remote emergency power-off connector pins and turning on the uninterruptible power supply manually. Maximum resistance in the shorted loop is 10 ohm.
4. To avoid accidental load loss, always test the remote emergency power-off function before you apply your critical load.

To connect a remote emergency power-off switch, complete the following steps:

1. Turn off the uninterruptible power supply, disconnect all external cables, and make sure that the uninterruptible power supply is disconnected from utility power.
2. Remove the remote emergency power-off connector from the accessory kit.

Remote emergency power-off connector

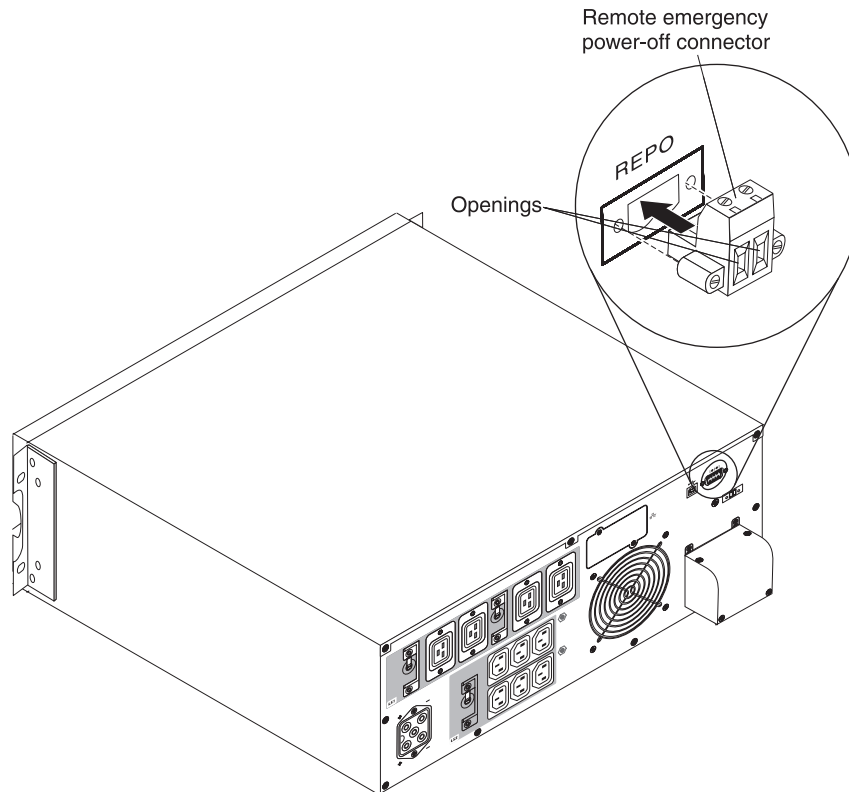


Remove jumper if installed

Note: Make sure that no jumper is installed in the remote emergency power-off connector. If a jumper is installed, remove it before you connect to the remote emergency power-off connector.

3. Install the remote emergency power-off connector in the remote emergency power-off port on the rear of the uninterruptible power supply.

Note: The orientation of the remote emergency power-off port on your uninterruptible power supply model might be different from what is shown in the following illustration. You might have to rotate the remote emergency power-off connector to install it.



4. Connect the switch or circuit to the remote emergency power-off connector on the rear of the uninterruptible power supply, using insulated size 18 - 20 AWG (0.75 mm² - 0.5 mm²) wire.

Note: A separate contact must simultaneously cause uninterruptible power supply input ac power to be removed.

5. Make sure that the externally connected remote emergency power-off switch is not activated. An activated remote emergency power-off switch disables power to the uninterruptible power supply receptacles.

Hard-wiring the uninterruptible power supply input (for licensed electrician only)



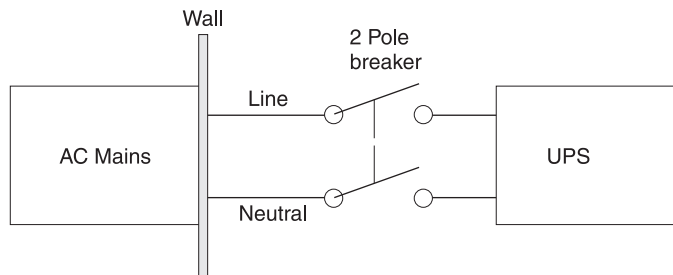
CAUTION:

The product might be equipped with a hard-wired power cable. Ensure that a licensed electrician performs the installation per the national electrical code. (C022)

The 6000 VA uninterruptible power supply models require a dedicated branch circuit that meets the following requirements:

- A breaker that is wall-mounted and readily accessible to the operator:
 - 6000 VA, 200 V / 208 V models only:** A 40 A 2-pole circuit breaker to provide short circuit and overcurrent protection.
 - 6000 VA, 230 V models only:** A 32 A (for Europe) or 40 A (for North America) 2-pole circuit breaker to provide short circuit and overcurrent protection.(For Europe) The breaker meets the IEC/EN 60934 standard and has a contact air gap of at least 3 mm.
- A two-pole disconnection device between the uninterruptible power supply output and the load (see the circuit breaker diagram).
- 200 - 240 V ac, 50/60 Hz.
- Single-phase:
 - The 6000 VA, 200 V / 208 V models are phase-to-phase (can also be used on a split-phase 120/240 V ac input).
 - The 6000 VA, 230 V models are phase-to-neutral.
- Flexible metal conduit (for ease of service and maintenance).

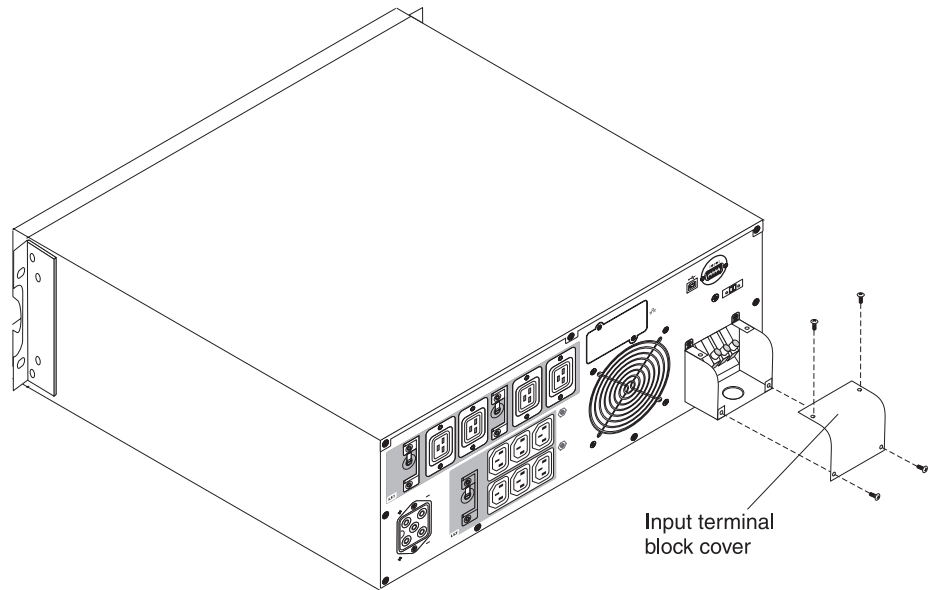
The following illustration shows the circuit breaker diagram.



To hard-wire the uninterruptible power supply input, complete the following steps:

1. Turn off the utility power at the distribution point where you will connect the uninterruptible power supply. Be absolutely sure that there is no power.

2. Remove the four screws that secure the terminal block cover to the uninterruptible power supply. Save the screws.



3. Punch a hole in the terminal block cover for the input conduit, using a round knockout punch or similar device. The hole must accommodate a 0.75 - 1 in. Intermediate Metal Conduit (IMC).
4. Pull the input wire through the conduit, leaving approximately 0.5 m (2 ft) of exposed wire. Attach a flexible metal fitting to the end of the conduit.
5. Insert the conduit through the wiring access entry and attach the conduit fitting to the panel. Strip 1.5 cm (0.5 in.) of insulation from the end of each incoming wire.

- Connect the input and ground wires to the terminal block according to the following illustration and Table 4.

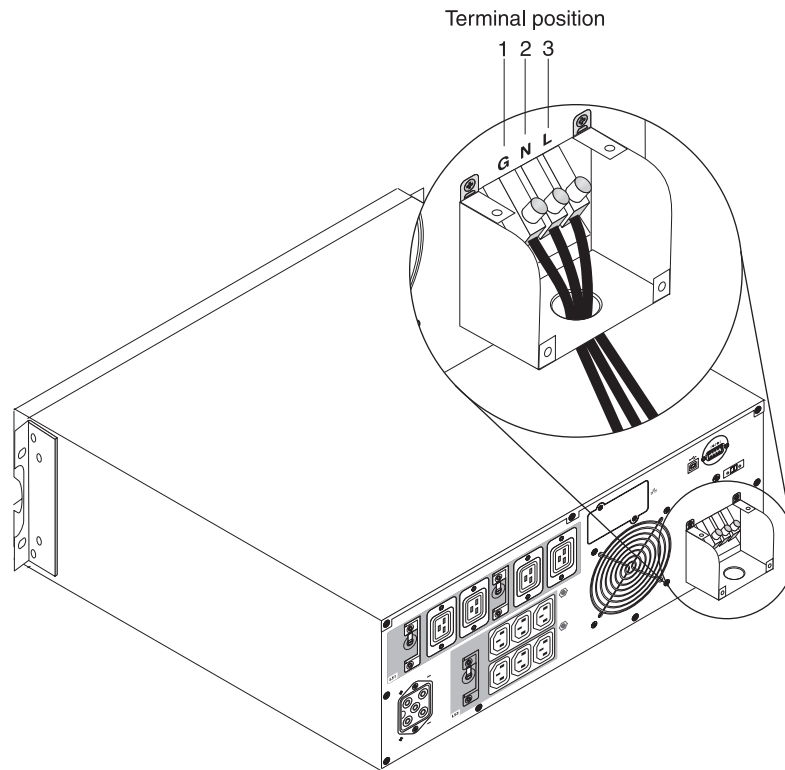


Table 4. Uninterruptible power supply wiring specifications

Wire functions	Terminal position	Uninterruptible power supply wire function	Terminal wire size rating ¹	Tightening torque
Input	1	Input ground	5.26 - 16 mm ² (10-6 AWG)	2.49 Nm (22 inch-pounds)
	2	L2 / Neutral In		
	3	L1 In		
¹ Use the following minimum wire size: <ul style="list-style-type: none"> • 10 AWG for equipment grounding wire, 75°C copper wire minimum • 8 AWG for input line and neutral wires, 75°C copper wire minimum 				

- Replace the terminal block cover.
- Continue to “Uninterruptible power supply initial startup.”

Uninterruptible power supply initial startup

To start the uninterruptible power supply for the first time, complete the following steps:

- Make sure that the internal batteries are connected. For more information, see the *IBM Rack Installation Instructions* document.
- If an optional extended battery module is installed, make sure that the extended battery module is connected to the uninterruptible power supply. For more information, see “Connecting an extended battery module to the uninterruptible power supply” on page 11.
- Make sure that all load segment circuit breakers are in the On position.

4. Turn on the main utility breaker. The uninterruptible power supply front panel display is illuminated. The IBM startup screen changes to the uninterruptible power supply status summary screen. Standby status is displayed on the front panel of the uninterruptible power supply.
5. Press the on/off button on the uninterruptible power supply front panel.
After the startup is complete, the status changes according to the uninterruptible power supply operating mode.
6. Press the down (▼) button to check for active alarms or notices. Resolve any active alarms before you continue. For more information, see Chapter 6, “Troubleshooting,” on page 45.
If there are no active alarms, the message No Active Alarms is displayed.
7. If an optional extended battery module is installed, see “Configuring the uninterruptible power supply for an extended battery module” on page 31.
8. To set the date and time and to change other factory-set defaults, see Chapter 3, “Operating the uninterruptible power supply,” on page 21.
9. If you installed an optional remote emergency power-off switch, make sure that the function is working correctly by performing the following tests:
 - Activate the external remote emergency power-off switch. Make sure that the status changes on the uninterruptible power supply are displayed.
 - Deactivate the external remote emergency power-off switch and restart the uninterruptible power supply.
10. Charge the batteries. With load, the internal batteries charge to 90% capacity in less than 4 hours. However, you must charge the batteries for 48 hours after installation or long-term storage.
11. To prevent an uninterruptible power supply overload condition, connect one load at a time and make sure that each protected device starts up completely before you connect the next load.

Notes:

1. At initial startup, the uninterruptible power supply sets system frequency according to input line frequency (input frequency auto sensing is enabled by default). After initial startup, auto sensing is disabled until you manually enable it by using the output frequency setting.
2. At initial startup, input voltage auto sensing is enabled by default. After the subsequent startup, auto sensing is disabled until you manually enable it by using the output voltage setting.
3. Battery start is automatically enabled after one power cycle.
4. The Site Wiring Fault is disabled by default.

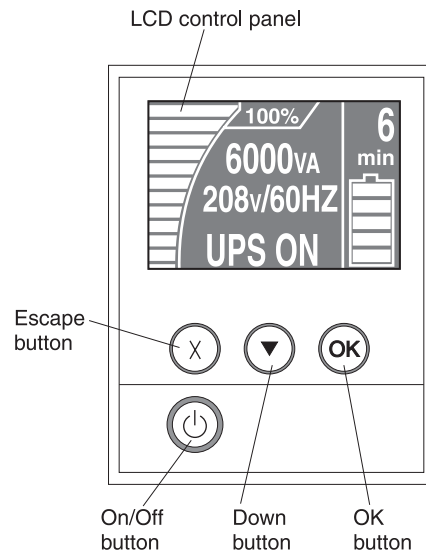
Chapter 3. Operating the uninterruptible power supply

This chapter describes how to use the uninterruptible power supply and includes information about the following topics:

- Control panel
- Operating modes
- Turning on and turning off the uninterruptible power supply
- Display functions
- Retrieving the alarm history
- Behavior on overload
- Configuring load segments, battery settings, and automatic restart

Control panel

The following illustration shows the display and controls on the front of the uninterruptible power supply.



The uninterruptible power supply has a graphical liquid crystal display (LCD) with dual color backlight. Standard backlight is used to light up the display with white text and a blue background. The display flashes if any alarms are active.

There are three control buttons and one on/off button on the front panel:

Escape (X): Press this button to return to the previous menu without running a command or saving any changes.

Down (▼): Press this button to scroll down to the next menu option. Holding down this button provides faster scrolling on some menus.

OK: Press this button to select the current menu or option. On the following screens, press and hold this button longer than 1 second:

- On the User Setting screens, to save the displayed setting.

- On the Meter and Notice/Alarm screens, to lock the screen (prevent the screen from returning to its default after timeout). A locked screen displays a small key image near the status icon. To unlock the screen, press any button to perform its usual function.

On/off: Press this button to turn on the uninterruptible power supply. Press and hold this button for 3 seconds to turn off the uninterruptible power supply.

The following display button shortcuts are available.

Table 5. Display button shortcuts

Shortcut	Buttons
Disable the battery start feature	Press and hold the escape (X) and down (▼) buttons for 3 seconds. The uninterruptible power supply beeps once to indicate that Battery Start is disabled for the next ac power cycle.
Set the display to English	Press and hold the escape (X), down (▼), and OK buttons for 5 seconds.

Operating modes

The uninterruptible power supply has the following operating modes:

- Normal
- Battery
- Bypass
- Standby

Normal mode

The uninterruptible power supply supplies the load power from utility power. The uninterruptible power supply monitors and charges the batteries as needed and provides filtered power protection to your equipment.

Battery mode

The uninterruptible power supply supplies the load power from battery. The status text flashes and the uninterruptible power supply beeps every 5 seconds. When the utility power returns, the uninterruptible power supply transfers to Normal mode operation while the battery recharges.

Bypass mode

The uninterruptible power supply supplies the load power through an automatic internal bypass. Battery mode is not available. The uninterruptible power supply transfers to Bypass mode when you activate Bypass mode through the front panel (manual bypass) or when the uninterruptible power supply detects a condition requiring bypass (automatic bypass).

Standby mode

When the uninterruptible power supply is turned off and remains connected to the power source, the uninterruptible power supply is in Standby mode. The uninterruptible power supply is not supporting the load but is ready to assume the load on command.

Turning on the uninterruptible power supply

After the uninterruptible power supply is connected to the power source, it enters Standby mode.

To turn on the uninterruptible power supply, press the on/off button for approximately 1 second. The display changes from the start screen to the uninterruptible power supply Status Summary screen and shows the Standby icon flashing while the uninterruptible power supply starts.

Starting the uninterruptible power supply on battery

Note: Before you use this feature, the uninterruptible power supply must have been powered by utility power at least one time.

To turn on the uninterruptible power supply without using utility power, press and hold the on/off button for 3 seconds. The uninterruptible power supply supplies power to the connected devices, and it switches into Battery mode.

Turning off the uninterruptible power supply

To turn off the uninterruptible power supply, complete the following steps:

1. Prepare the connected devices for shutdown.
2. Press and hold the on/off button until the long beep ceases (approximately 3 seconds). The uninterruptible power supply switches to Standby mode (if utility power is available) and removes power from the connected devices.

Note: You must turn off the uninterruptible power supply at the power source; otherwise, it remains in Standby mode. After the power source is removed, the uninterruptible power supply fully shuts down in 10 seconds.

Display functions

The uninterruptible power supply provides information about the load status, events, measurements, identification, and settings through the front panel display.

While any screen is displayed, press the escape (X) button until the main menu is displayed, and then press the down (▼) button to scroll through the following main menu choices:

- System Status
- Alarm History
- Meters
- Control Screens
- Model Information
- Configuration

Press the OK button to select a menu item.

System status

The System Status provides the following information:

- Battery status, including state and charge level
- Status summary (load percentage, output power, output voltage and frequency, and mode)
- Notice or alarm status, if any are present

If the message ALARM is displayed, press the down (▼) button to display the active notices, alarms, and battery status messages. For more information, see Table 6 and Chapter 6, “Troubleshooting,” on page 45.

The following table describes the available battery status messages. Only one battery status is available at a time.

Table 6. Battery status messages

Battery status	Description
Battery charging	Batteries are charged in constant current mode.
Battery floating	Batteries are charged in constant voltage mode.
Battery resting	Batteries are connected but are not being charged or discharged. (This is part of the normal charging cycle.)
Battery discharging	Batteries are discharging.
Battery disconnected	Batteries are unavailable because they are disconnected.

Alarm history

The alarm history holds up to 50 events. You can scroll through the event screens, beginning with the most recent event.

Note: The date format is dependent on the language selection.

The first row of each alarm history screen contains the date (MM/DD/YYYY) and time (hh:mm:ss) at which the event occurred. The second row contains the type of event and code. The event description begins on the third row and might continue to the fourth row. The bottom right corner of the alarm history screen displays two numbers: an ordering number of the event in the log, followed by the total number of events in the log.

If there are no events in the log, the message No events in log is displayed on the alarm history screen.

For more information, see “Retrieving the alarm history” on page 28.

Meters

The meters screens provide the following meters information:

- Output watts, VA, current, power factor, voltage, and frequency
- Input voltage and frequency
- Battery voltage and percentage charged

Control screens

The following table describes the available control screens.

Table 7. Control screens

Control screen	Description
Go to Bypass	Transfers the uninterruptible power supply system to internal Bypass mode. When the Go to Bypass command is issued, the screen displays the Manual Bypass Comment Sent message for five seconds. The option then changes to Go to Normal. When the Go to Normal command is issued, the screen displays the Normal Mode Command Sent message for five seconds. The option then changes to Go to Bypass.
Battery test	Schedule Battery Test: yes Cancel Battery test: no Starts a manual battery test. See “Testing a battery” on page 44.
Reset error state	Reset Alarms: yes no Manually clears any latched alarms, such as bad battery detected or DC Bus OV/UV, and then performs a self-diagnostics test of the LCD, alarm sounds, and fans. If a bad battery alarm was also active, reset the battery test status to Not Tested.
Load segments	Load segment 1: on off Load segment 2: on off These on/off commands override automatic load segment on/off controls made by the Automatic Start Delay and Automatic On Battery Shutdown settings. See “Configuring load segments” on page 29.
Restore factory settings	Restore Factory Settings: yes no Available only in Standby mode. Restoring the factory settings: <ul style="list-style-type: none"> • Returns all user-configurable EEPROM settings to default factory settings • Resets all pending on/off commands • Clears the alarm history and resets all statistic values and time stamps • Resets the battery test status • Initiates the Self Diagnostics test

Model information

The model information screens display the following uninterruptible power supply information:

- **Model/Type:** Chassis style and supply power rating
- **MT, Product ID, SN:** Machine type, product identification (model number), serial number
- **NMC firmware:** Firmware version for the network management card
- **NMC IP address:** IP address for the network management card
- **Comm Firmware:** Firmware version for the second processor on the uninterruptible power supply
- **UPS firmware:** Firmware version for the primary processor on the uninterruptible power supply

Note: The network management card firmware screens are displayed only if an IBM Network Management Card is installed. See “IBM Network Management Card” on page 35.

Configuration

Only the available options are displayed.

User settings are not protected by default. You can enable the password through the User Password setting.

The following table describes the options that you can change.

Table 8. Configuration settings

Description	Available settings	Default setting
Change language	[English] [French] [German] [Spanish] [Japanese] [Simplified Chinese] [Russian] [Korean] [Traditional Chinese]	English
User password	[Enabled] [Disabled] If Enabled, the default password is USER. Note: If you enter an incorrect password, the message Wrong Password is displayed. Press any button to return to the password screen and retry the password.	Disabled
Audible alarms	[Enabled] [Disabled] Note: If you disable audible alarms, it takes effect instantly and remains disabled, even after a power cycle. This differs from the mute feature, by which the horn is temporarily silenced when any button is pressed but turns on again if a new alarm is triggered.	Enabled
Set date and time	Set Month, Day, Year, Hours, Minutes, and Seconds Date: mm/dd/yyyy Time: hh:mm:ss Notes: 1. The date format is dependent on the language selection. 2. Time is a 24-hour clock.	01/01/2010 12:00:00
Control commands from serial port	[Enabled] [Disabled] If Enabled, control commands are accepted through the serial port, USB ports, or option card. If Disabled, configuration and load control commands are restricted to LCD only.	Enabled
Output voltage	[Auto-sensing] [200V] [208V] [220V] [230V] [240V] Note: Numerical output voltage settings that are configured in Standby mode take effect immediately. Auto sensing and any settings that are configured outside of Standby mode take effect after the next power off and restart. Selecting auto sensing disables the battery start feature until after the next successful startup on utility power.	Auto sensing Note: The default auto sensing runs once to set the output voltage and then is disabled.
Output frequency	[50Hz] [60Hz] [Auto-sensing] Note: Numerical output frequency settings that are configured in Standby mode take effect immediately. Auto sensing and any settings that are configured outside of Standby mode take effect after the next power off and restart. Selecting auto sensing disables the battery start feature until after the next successful startup on utility power.	Auto sensing Note: The default auto sensing runs once to set the output frequency and then is disabled.

Table 8. Configuration settings (continued)

Description	Available settings	Default setting
Overload alarm level	[10%] [20%] [30%]...[100%] If 100%, the uninterruptible power supply issues an Output Overload alarm at load > 100%. Note: Output Overload Level 1 by default is set to 100% and is configurable from 10% to 100% in 10% increments through the LCD setting menu. This enables you to be alerted before the uninterruptible power supply has reached its rated capacity limits.	100%
Automatic start delay	[Off] [0s] [1s] [2s]...[32767s] See “Configuring load segments” on page 29.	0s for Load Segment 1 1s for Load Segment 2
Automatic on battery shutdown	[Off] [0s] [1s] [2s]...[32767s] See “Configuring load segments” on page 29.	Off
Site wiring fault alarm	[Enabled] [Disabled]	Disabled
Bypass voltage low limit	[-6%] [-7%]...[-20%] of nominal The Bypass operation is disabled if the measured bypass voltage level is below the nominal output voltage (-15%). Note: The Qualify Bypass setting might overrule the Bypass Voltage Low Limit setting.	-15% of nominal
Bypass voltage high limit	[+6%] [+7%]...[+20%] of nominal The Bypass operation is disabled if the measured bypass voltage level is above the nominal output voltage (+10%). Note: The Qualify Bypass setting might overrule the Bypass Voltage High Limit setting.	+10% of nominal
Qualify bypass	[Always] [Never] [Bypass Disabled] If Always, Bypass operation is allowed when: <ul style="list-style-type: none"> • Bypass voltages > the value set for Bypass Voltage Low Limit • Bypass voltages < the value set for Bypass Voltage High Limit • Bypass frequency > (nominal frequency -3 Hz) • Bypass frequency < (nominal frequency +3 Hz) • Inverter is synchronized with Bypass when unsynchronized transfers are disabled by the value set for Unsynchronized Transfers If Never, Bypass operation is always allowed, if the utility is within the uninterruptible power supply operating limits; voltage and frequency limits are not in use. If Bypass Disabled, Bypass operation is prohibited.	Always
Extended battery modules (EBMs)	[0] [1] See “Configuring the uninterruptible power supply for an extended battery module” on page 31.	0
Battery low alarm	[Immediate] [2 min] [3 min] [5 min] If you select a value, the battery low alarm is triggered when the set amount of backup time (approximately) remains in the batteries.	3 minutes
Automatic battery tests	[Enabled] [Disabled] See “Running automatic battery tests” on page 32.	Enabled
Clear alarm history	The number after “Total events” shows how many events are currently stored in the log. Press the OK button for 1 second to reset the event count to zero and clear the log.	Not applicable

Table 8. Configuration settings (continued)

Description	Available settings	Default setting
LCD contrast	[-5], [-4], [-3], [-2], [-1], [+0], [+1], [+2], [+3], [+4], [+5] The display contrast is adjustable from -5 to +5. This range covers the maximum adjustment for contrasting the background with the text in the visual display of the control panel.	[+0]
REPO input polarity	[Open] [Closed] If Open, the normally-open contacts activate the alarm when the contacts close. If Closed, the normally-closed contacts activate the alarm when the contacts open.	Open

Transferring the uninterruptible power supply between modes

Transferring between modes includes:

- Transferring from Normal to Bypass mode
- Transferring from Bypass to Normal mode

Transferring from Normal to Bypass Mode

To transfer from Normal to Bypass mode, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the Control menu, and press the OK button.
2. Press the down (▼) button to scroll to Go to Bypass, and press the OK button.

The text on the screen changes to Manual Bypass Command Sent.

Transferring from Bypass to Normal Mode

To transfer from Bypass to Normal mode, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the Control menu, and press the OK button.
2. Press the down (▼) button to scroll to Go to Normal, and press the OK button.

The text on the screen changes to Normal Mode Command Sent.

Retrieving the alarm history

To retrieve the alarm history through the display, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the **Alarm History** menu, and press the OK button.
2. Press the down (▼) button to scroll through the listed events, notices, and alarms.
3. Press the escape (X) button to return to the previous menu.

Behavior on overload

The following table explains how the uninterruptible power supply responds to an overload condition.

Table 9. Behavior on overload

Overload severity	Load level	On utility power	On Bypass	On battery
Level 1	100% to 101%	Overload alarm only and support load indefinitely	Overload alarm only and support load indefinitely	Overload alarm only, support load until low battery shutdown level is reached
Level 2	102% to 110%	Transfer to Bypass after 12 seconds (± 1 sec) If Bypass is not available, transfer to Fault mode after 12 seconds (± 1 sec)	Overload alarm plus "Level 2 Overload" alarm only and support load indefinitely	Transfer to Fault mode after 12 seconds (± 1 sec) or until low battery shutdown level is reached
Level 3	> 110%	Transfer to Bypass immediately If Bypass is not available, transfer to Fault mode in 300 ms to 1 sec	Overload alarm plus "Level 2 Overload" alarm plus "Level 3 Overload" alarm only and support load indefinitely	Transfer to Fault mode in 300 ms to 1 sec

Configuring load segments

Load segments are sets of receptacles that can be controlled through the LCD, by the network management card, or by power-management software, providing an orderly shutdown and startup of the connected devices. For example, during a power outage, you can keep key devices running while you turn off other devices. This feature enables you to save battery power. For more information, see your power-management software documentation.

Each uninterruptible power supply has two load segments. The load segments for each uninterruptible power supply model are shown in the illustrations in "Rear view of the uninterruptible power supply" on page 9.

Controlling load segments through the display

To control the load segments through the display, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the **Control** menu, and press the OK button.
2. Press the down (▼) button to scroll to **Load Segments**, and press the OK button.
3. Press the down (▼) button to scroll to the load segment that you want and press the OK button.
4. Press the down (▼) button to set the desired load segment to On or Off.
5. Press the OK button for 1 second to confirm.
6. Repeat step 3 to step 5 to set the other load segment, if applicable.

Configuring automatic start delay

You can configure the load segment to turn on automatically after the utility power returns, if it was shut down by any of the following means:

- The on/off button
- An external command with the auto-restart option
- Battery under voltage state
- Automatic on battery shutdown command

To set the restart delay times for each load segment, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the **Configuration** menu, and press the OK button.
2. Press the down (▼) button to scroll to **Automatic Start Delay**, and press the OK button.
3. Press the down (▼) button to select the load segment that you want to set and press the OK button.
4. Press the down (▼) button to select the restart delay for the load segment.

You can specify one of the following options for the restart delay time for each load segment:

- Select zero seconds to restart immediately.
 - Select 1 - 32767 seconds to delay for the specified time.
 - Select Off.
5. Press the OK button for 1 second to confirm.
 6. Repeat step 3 to step 5 to set the other load segment, if applicable.

Notes:

1. Load segment on/off commands that are issued through the **Control** menu override the user settings for load segments.
2. A single load segment delay applies to both receptacles. However, there is an additional automatic 1-second delay between closing segments 1 and 2. The delay is always present when an On command is issued for both segments at the same time.

Configuring automatic on battery shutdown

You can use the **Automatic on Battery Shutdown** setting to configure how soon the load segment shuts down when the uninterruptible power supply transfers to Battery mode:

- If the **Automatic on Battery Shutdown** setting is set to Off (default), the load segment turns off only when you manually press the button, issue an external command, or turn it off through the display (**Control > Load Segments**).
- If the **Automatic on Battery Shutdown** setting is set to zero seconds (0s), the load segment turns off automatically when the uninterruptible power supply on Battery state is activated.
- If you select a value, the load segment turns off automatically after the selected delay while the uninterruptible power supply operates on battery, but the shutdown is canceled if the utility power returns before the delay has expired.

To set the shutdown times for each load segment, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the **Configuration** menu, and press the OK button.
2. Press the down (▼) button to scroll to **Automatic on Battery Shutdown**, and press the OK button.
3. Press the down (▼) button to select the load segment that you want to set and press the OK button.
4. Press the down (▼) button to select the shutdown delay for the load segment.
5. Press the OK button for 1 second to confirm.
6. Repeat step 3 to step 5 to set the other load segment, if applicable.

Configuring battery settings

Configure the uninterruptible power supply settings for an installed extended battery module, including whether to run automatic battery tests.

Configuring the uninterruptible power supply for an extended battery module

If the uninterruptible power supply is not configured for the extended battery module, the uninterruptible power supply reports less battery time remaining on the uninterruptible power supply front panel and to any remote software. You might receive a shutdown warning prematurely.

Conversely, if the uninterruptible power supply is configured for the extended battery module but the extended battery module is not connected to the uninterruptible power supply, the uninterruptible power supply reports more battery time remaining, and it might shut down before it issues a warning.

Note: The default configuration is to issue an alarm when the batteries reach their lowest limit, which enables an orderly shutdown.

For the maximum battery runtime when you are using power management software, complete the following steps to configure the uninterruptible power supply for the extended battery module:

1. From the main menu, press the down (▼) button to scroll to the **Configuration** menu, and press the OK button.
2. Press the down (▼) button to scroll to **External Battery Modules**, and press the OK button.
3. Press the down (▼) button to select the battery number value that you want.

Configuration	Setting
Uninterruptible power supply only (internal batteries)	0 (default)
Uninterruptible power supply and one extended battery module	1

Note: Runtime is automatically adjusted according to present load levels and whether an extended battery module is configured.

4. Press the OK button for 1 second to confirm.

Running automatic battery tests

The automatic discharge test is enabled by default and runs during the transition from Float to Rest mode. After the test is complete, the charge cycle restarts to completely charge the batteries and then continues to Rest mode. The automatic test runs approximately once every three months and does not run again until after three more Float to Rest mode transitions. If a manual battery test is requested, the automatic battery test timer is reset so that it does not run for the next three months.

For an automatic battery test to run, make sure that the following requirements are met:

- The Automatic Battery Tests setting is enabled. (See “Configuring automatic battery tests.”)
- The batteries are fully charged.
- The uninterruptible power supply is in Normal mode with no active alarms.
- The load is greater than 10%.

Configuring automatic battery tests

To configure the automatic battery tests, complete the following steps:

1. From the main menu, press the down (▼) button to scroll to the **Configuration** menu, and press the OK button.
2. Press the down (▼) button to scroll to **Automatic Battery Tests**, and press the OK button.
3. Press the down (▼) button to select whether to enable or disable the automatic battery test.
4. Press the OK button for 1 second to confirm.

Configuring automatic restart

The uninterruptible power supply automatically restarts if the utility power returns after the output was shut off because of depleted batteries, a shutdown input signal, or an automatic shutdown command.

You can set the load segment for the amount of time to delay the restart when utility power returns by using the Automatic Start Delay setting (see Table 8 on page 26).

Chapter 4. Additional uninterruptible power supply features

This chapter describes the following features:

- IBM UPS Manager software
- Communication ports (RS-232 and USB)
- Network management card
- Environmental monitoring probe

Installing the UPS Manager software

The uninterruptible power supply comes with the IBM UPS Manager software. The management software provides up-to-date graphics of uninterruptible power supply power and system data and power flow. It also gives you a complete record of critical power events, and it notifies you of important uninterruptible power supply or power information. If there is a power outage and the uninterruptible power supply battery power becomes low, the software can automatically shut down the system to protect the data before the uninterruptible power supply shutdown occurs.

You can install the IBM UPS Manager software on a computer running a Microsoft Windows or Linux operating system, as either a standalone application or part of a network. To install the software, complete the following steps:

1. Connect a computer to either the RS-232 port or USB port on the uninterruptible power supply. See “RS-232 and USB communication ports.”
2. Insert the IBM *UPS Manager* CD that comes with the uninterruptible power supply into the CD or DVD drive. Open the CD_ReadMe.txt file.
3. Run the Software Wizard, which guides you through the installation process.

For more information about configuring and operating the software, see the online help.

For more information about disabling control commands from the software, see the **Control commands from serial port** setting in Table 8 on page 26.

RS-232 and USB communication ports

The uninterruptible power supply has an RS-232 port and a USB port that you can use for uninterruptible power supply monitoring, control, and firmware updates. After communication is established between the uninterruptible power supply monitoring and a computer, you can use the IBM UPS Manager software to exchange data between the uninterruptible power supply and the computer. The software polls the uninterruptible power supply for detailed information about the status of the power environment. If a power emergency occurs, the software initiates the saving of all data and an orderly shutdown of the devices that are connected to the uninterruptible power supply.

For the communication port locations, see “Rear view of the uninterruptible power supply” on page 9.

Note: Only one of the communication ports can be active at one time. The USB port has priority over the RS-232 port.

RS-232 port

To establish communication between the uninterruptible power supply and a computer, connect one end of the serial communication cable that comes with the uninterruptible power supply to the RS-232 port on the uninterruptible power supply. Connect the other end of the serial cable to the RS-232 port on a computer.

The cable pins for the RS-232 connector are identified in the following illustration. The pin functions are described in Table 10.

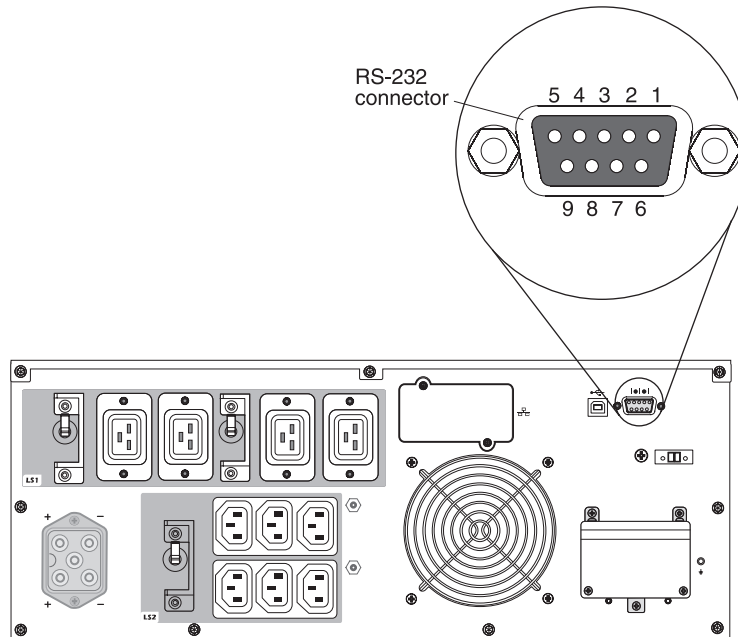


Table 10. RS-232 connector pin assignments

Pin	Signal name	Function	Direction from the uninterruptible power supply
1		Unused	Not applicable
2	Tx	Transmit to external device	Out
3	Rx	Receive from external device	In
4		Unused	Not applicable
5	GND	Signal common (tied to chassis)	Not applicable
6		Unused	Not applicable
7		Unused	Not applicable
8		Unused	Not applicable
9		Unused	Not applicable

Note: Unused pins must remain free on all models.

USB port

The uninterruptible power supply can communicate with a USB-compliant computer by using the IBM UPS Manager software, which is compatible with a human interface device (HID). To establish communication between the uninterruptible power supply and a computer, connect the USB cable that comes with the uninterruptible power supply to the USB port on the uninterruptible power supply. Connect the other end of the USB cable to a USB port on a computer.

IBM Network Management Card

Each uninterruptible power supply has one available communication bay, which supports an IBM Network Management Card. The network management card must be purchased separately.

After you install a network management card, you can perform the following tasks:

- Connect an IBM Environmental Monitoring Probe (purchased separately) to the uninterruptible power supply
- Use power management software to control load segments, set the time and date, and configure other settings
- Update the uninterruptible power supply firmware

Note: You do not have to shut down the uninterruptible power supply before you install a network management card.

For information about installing, configuring, and using the network management card, see the *IBM Network Management Card User's Guide* on the IBM *Documentation CD* that comes with the uninterruptible power supply.

For details about disabling control commands from the network management card, see the **Control commands from serial port** setting in Table 8 on page 26.

IBM Environmental Monitoring Probe

The IBM Environmental Monitoring Probe (purchased separately) is a connectivity device that enables you to remotely monitor the temperature, humidity, and status of two contact devices through a standard web browser, providing greater power-management control and flexible monitoring.

When the environmental monitoring probe is connected to the network management card, temperature and humidity readings are automatically displayed in the web interface. To access the readings, you must run a web browser and connect to the network management card IP address.

For more information about connecting and configuring the environmental monitoring probe, see the *IBM Network Management Card User's Guide* on the IBM *Documentation CD* that comes with the uninterruptible power supply.

Chapter 5. Hardware maintenance information

This chapter contains information about IBM customer replaceable units (CRUs) and field replaceable units (FRUs) for the uninterruptible power supply and instructions for replacement parts that are not installed during a typical installation.

Replaceable uninterruptible power supply components

The replaceable components in the uninterruptible power supply are Tier 1 customer replaceable units (CRUs). Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

For information about the terms of the warranty and getting service and assistance, see Appendix A, "Getting help and technical assistance," on page 53 and the *Warranty Information* document that comes with the product.

Important: Next-day delivery of the batteries might not be possible in all locations because of transportation and logistics.

Table 11. Uninterruptible power supply and extended battery module CRU listing

Description	MTM or part number	CRU part number (Tier 1)
Uninterruptible power supply chassis 6000 VA (200 V / 208 V)	5395-6AX	81Y2313
Uninterruptible power supply chassis 6000 VA (230 V)	5395-6KX	81Y2319
Battery module (This CRU part contains the two battery modules that are required for the uninterruptible power supply.)	5395-6AX, 5395-6KX	81Y2315
Bezel, upper (6000 VA uninterruptible power supply)	5395-6AX, 5395-6KX	69Y6095
Bezel, lower (6000 VA uninterruptible power supply)	5395-6AX, 5395-6KX	81Y2317
USB cable		69Y6073
RS-232 cable		69Y6074
Rack mount kit		69Y6094
Remote emergency power-on (REPO) switch		69Y6075
Environmental monitoring probe kit		41Y9210
Network management card		46M4112
Network management card setup cable (serial communication cable)		81Y2372

Table 12. Extended battery module CRU and FRU listing

Description	MTM or part number	CRU part number (Tier 1)
Extended battery module (6000 VA)	69Y1984	81Y2329
Bezel, 3U extended battery module		81Y2325

Uninterruptible power supply and battery care

For the best preventive maintenance, keep the area around the uninterruptible power supply clean and dust-free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner. For full battery life, keep the uninterruptible power supply at an ambient temperature of 25°C (77°F).

Storing the uninterruptible power supply and batteries

If you store the uninterruptible power supply for a long period, recharge the batteries every 6 months by connecting the uninterruptible power supply to a power source. The batteries charge to 90% capacity in approximately 4 hours. However, you should charge the batteries for 48 hours after long-term storage. Check the battery recharge date on the shipping carton label. If the expiration date has passed and the batteries were never recharged, do not use the uninterruptible power supply. Contact your technical-support representative.

Replacing the battery modules (for qualified personnel only)

CAUTION:

Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)

Servicing of batteries must be performed or supervised by personnel who are knowledgeable about batteries and the required precautions. Keep unauthorized personnel away from batteries. Batteries can present a risk of electrical shock or burn from high short-circuit current.

Determine whether the battery is inadvertently grounded. If it is inadvertently grounded, remove the utility source from the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies that do not have a grounded supply circuit).

Replace batteries with the same number and type of batteries as originally installed in the uninterruptible power supply. Do not dispose of batteries in a fire. Batteries might explode when exposed to flame.

Do not open or mutilate the batteries. Released electrolyte is harmful to the skin and eyes and can be extremely toxic.

The 6000 VA uninterruptible power supply might have an extended battery module option.

If the message Service Battery is displayed and the audible alarm is on continuously, you might have to replace the battery module. Contact your technical-support representative to order new batteries.

Important: *Do not* disconnect the batteries while the uninterruptible power supply is in Battery mode. Consider all warnings, cautions, and notes before you replace batteries. Disconnect the charging source before you connect or disconnect the battery terminals.

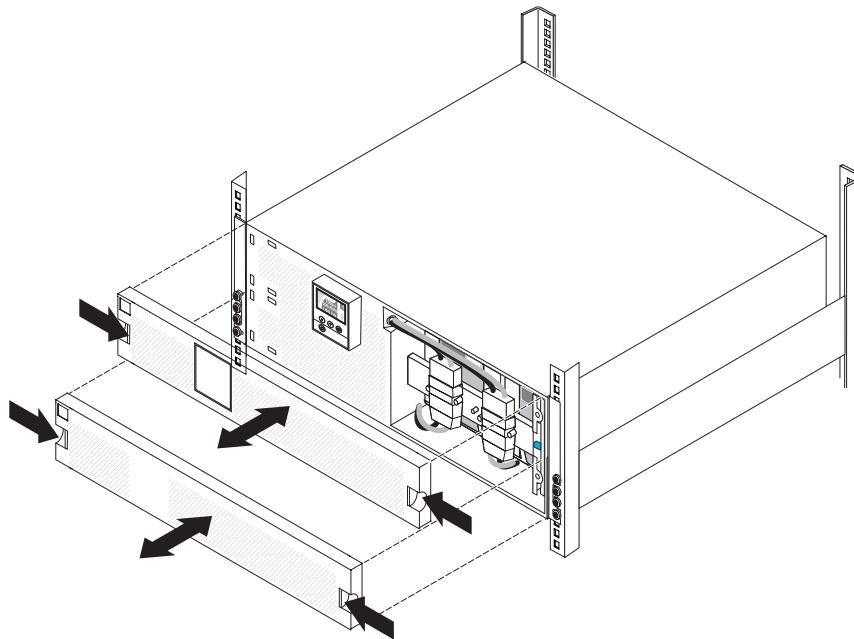
To remove input power to change the battery modules, complete the following steps.

Note: Qualified personnel can replace internal batteries without shutting down the uninterruptible power supply and without having to remove the uninterruptible power supply from the rack cabinet.

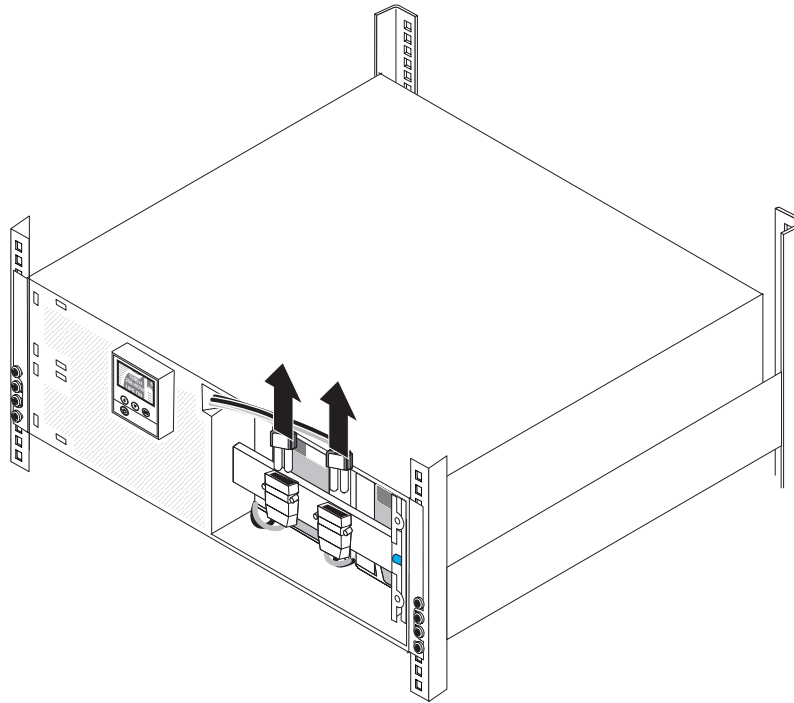
1. Press and hold the on/off button until the long beep ceases (approximately 3 seconds), and then disconnect the uninterruptible power supply.
2. Wait 60 seconds while the internal processor shuts down before you disconnect the battery.

To replace the battery modules, complete the following steps:

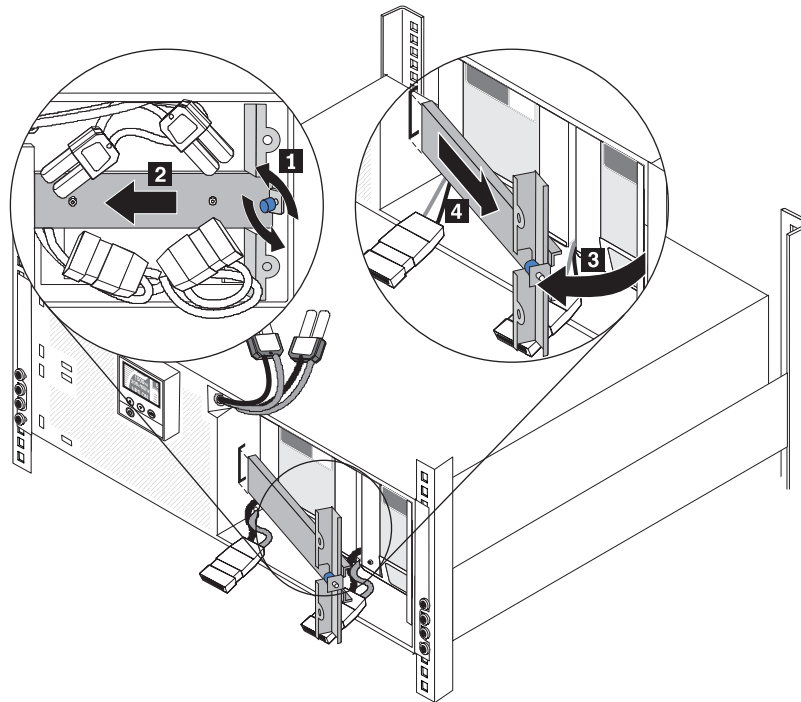
1. Remove the upper and lower uninterruptible power supply front bezels. Press the two side buttons toward each other to release the bezel, and pull the bezel away. Repeat for the second bezel.



2. Disconnect both internal battery connectors, unclip the connectors from the studs, and move the connectors out of the way.



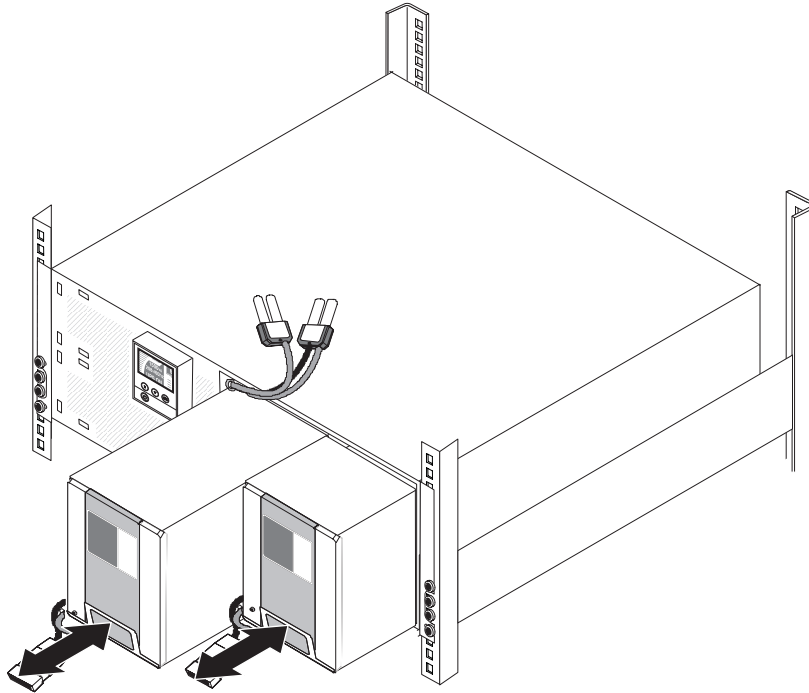
3. Remove the battery retaining bracket:
 - a. Loosen the thumbscrew on the battery retaining bracket **1**.



- b. Slide the battery retaining bracket to the left **2**.
 - c. Rotate the battery retaining bracket out **3**.
 - d. Slide the battery retaining bracket to the right and remove it **4**.

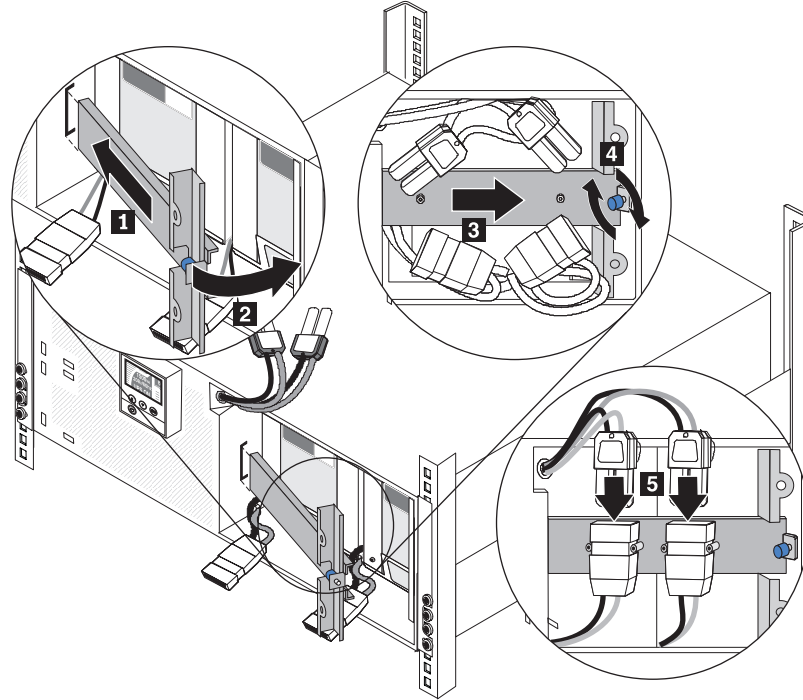
4. Use the plastic tabs to pull both battery modules partially out of the bay.

Important: Each internal battery module weighs 24 kg (53 lb) and requires two people to lift it.



5. With two people, pull each battery module fully out of the bay and recycle or discard them as instructed by local regulations.
6. With two people, carefully slide one new battery module into the uninterruptible power supply. Repeat this step for the second battery module.

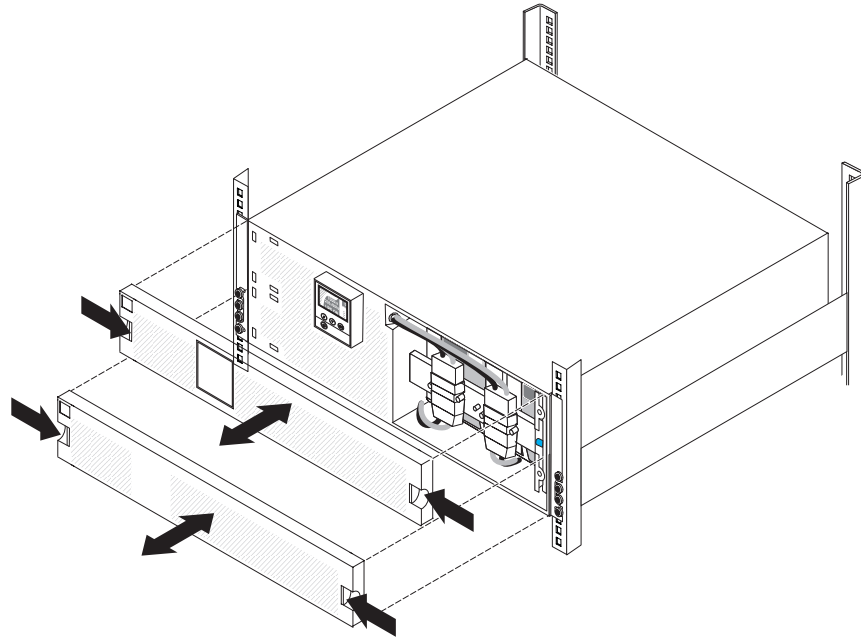
7. Reinstall the battery retaining bracket:
 - a. Slide the battery retaining bracket to the left into the slot **1**.



- b. Rotate the battery retaining bracket toward the uninterruptible power supply **2**. Make sure that the internal battery connectors are out of the way.
 - c. Slide the battery retaining bracket to the right **3**.
 - d. Tighten the thumbscrew on the battery retaining bracket **4**.
 8. Connect each internal battery connector **5** and attach the connectors to the battery retaining bracket between the studs.

Note: A small amount of arcing might occur when you connect the batteries. This is normal and does not damage the unit or present any safety concern.

9. To attach the uninterruptible power supply front bezel, press the two side latches toward each other, align the bezel with the uninterruptible power supply, and snap it into place. Repeat for the second bezel.



Testing a battery

Before you run a battery test, make sure that:

- The batteries are fully charged.
- The uninterruptible power supply is in Normal mode with no active alarms.
- The load is greater than 10%.
- The bypass voltage is usable.

To test the battery, complete the following steps:

1. Connect the uninterruptible power supply to a power source for at least 48 hours to charge the batteries.
2. While the main menu is displayed, press the down (▼) button to scroll to the **Control** menu, and press the OK button.
3. Press the down (▼) button to scroll to **Battery Test**.
4. Press the OK button to view the Battery Test status.
5. If necessary, press the down (▼) button to select **Yes** for **Schedule battery test**.

Note: If the battery test cannot be scheduled at this time, select **Yes** to **Cancel the test**.

6. Press the OK button to schedule the battery test for the next available test time.

During the battery test, the uninterruptible power supply transfers to Battery mode and discharges the batteries for 25% of the original expected runtime. The front panel displays Battery test running and the percentage of the test that is completed. The results are displayed on the front panel when the test is completed.

Chapter 6. Troubleshooting

The uninterruptible power supply is designed for durable, automatic operation. If a potential operating problem occurs, the uninterruptible power supply issues an alarm to alert you. Usually, an alarm that is displayed on the control panel does not mean that the output power is affected. An active alarm or active notice is accompanied by an audible sound.

Events are silent conditions that are recorded in the alarm history as status information, such as Clock Set Done. Events do not require a response.

Notices and alarms are records of when events occurred and, if applicable, when they were cleared.

- Notices, including active notices, are recorded in the alarm history. Active notices, such as Input Under/Over Frequency, are announced by a slow intermittent beep. Notices do not normally require a response.
- Alarms, including active alarms, are recorded in the alarm history. Active alarms are announced by a continuous sound or a fast beeping. Examples are Shutdown Imminent and Heatsink Overtemperature. Active alarms require a response.

Accessing alarms and conditions

The control panel provides troubleshooting information from two main menus on the display:

- **UPS status:** Access to all active alarms and battery data
- **Alarm history:** Access to the most recent 50 events, which might include active and closed alarms

You can also access the uninterruptible power supply alarm history through a serial cable connected to a computer.

Status menu

From the uninterruptible power supply **Status** menu, you can access the following screens for troubleshooting information:

- **Status summary:** The status summary screen provides information about both mode and load. When there is a critical alarm, the status summary screen flashes and alternates displaying the alarm and battery status screens.
- **Notice or alarm:** A separate screen is displayed for each active notice or alarm. If there are no active alarms or notices, the message No Active Alarms is displayed.
- **Battery status:** The battery status screen indicates the battery charge mode, the percentage that the battery is charged, and the runtime with the present load level.

Note: When an alarm is active, the control panel automatically displays an active alarm screen unless you enable the screen lock feature.

To access troubleshooting information by using the **Status** menu, complete the following steps:

1. While the main menu is displayed, press the down (▼) button to scroll to the **System Status** menu, and press the OK button.

2. Press the down (▼) button to scroll through the active notice and alarm screens, and then the battery status screens.

Alarm history menu

From the **Event Log** menu, you can access the last 50 events, which include events, notices, and alarms, arranged from latest to oldest.

To access troubleshooting information by using the **Event Log** menu, complete the following steps:

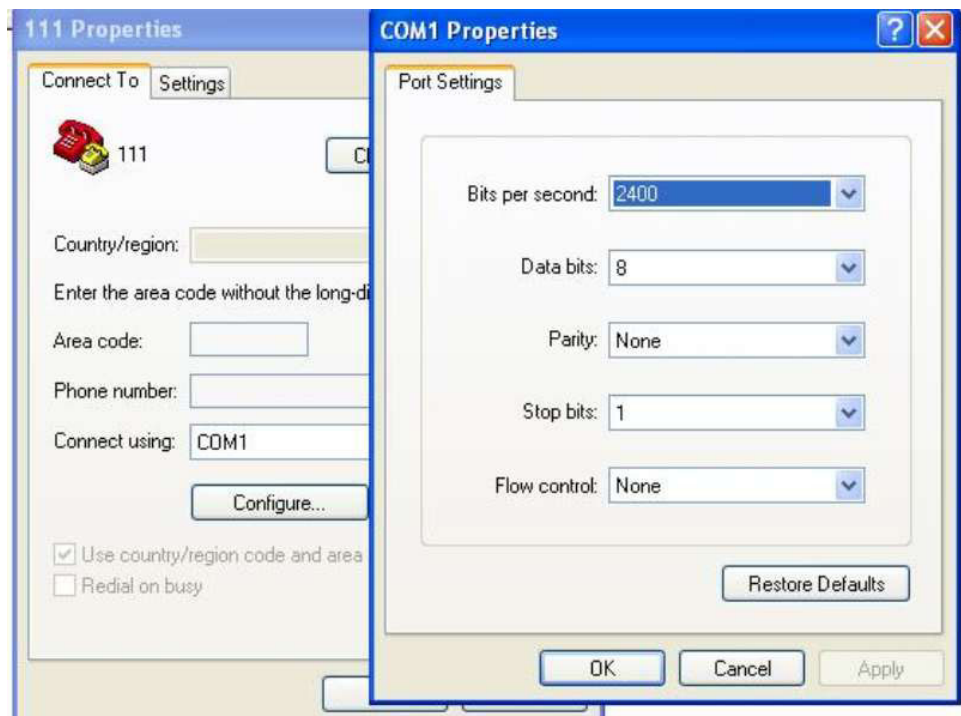
1. From the main menu, press the down (▼) button to scroll to the **Alarm History** menu, and press the OK button.
2. Press the down (▼) button to scroll through the listed events, notices, and alarms.

Serial connection to a computer

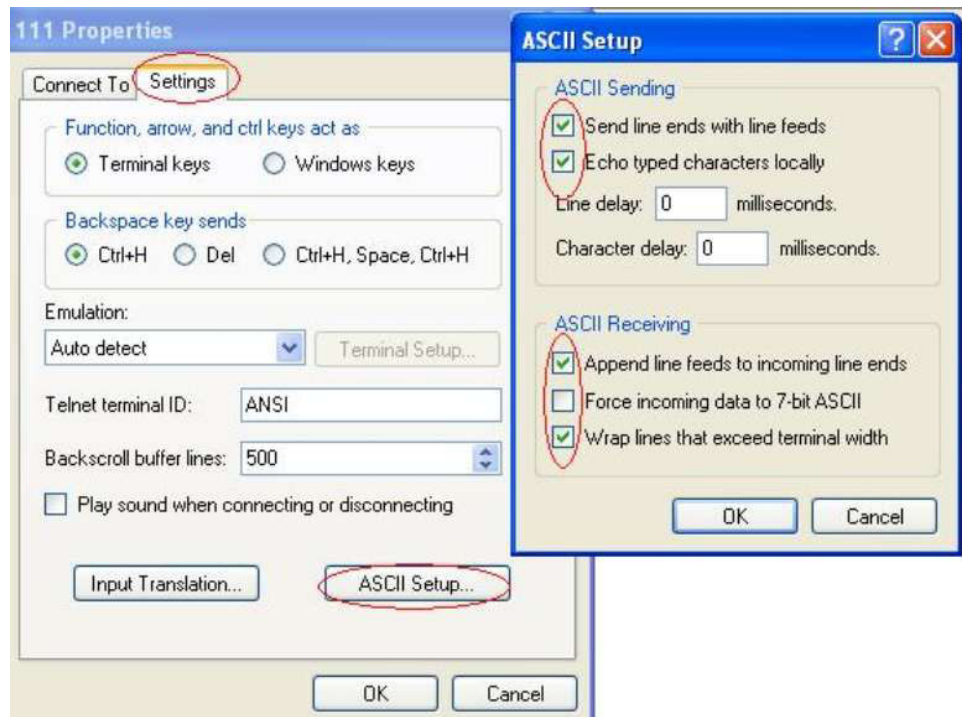
Through a serial connection, you can access the last 50 events, notices, and alarms that are recorded in the uninterruptible power supply alarm history. The events are arranged from latest to oldest.

To access the alarm history from a computer, complete the following steps:

1. Connect a serial cable to the uninterruptible power supply and to a computer.
2. On the computer, start a terminal emulation program, such as HyperTerminal, to establish communication with the uninterruptible power supply. Set the computer COM port to the following settings (see the following illustration):
 - Bits per second: 2400
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None



3. Click **OK**. The computer creates a communication connection.
4. Click **Call**, then click **Disconnect**.
5. Click **File -> Properties**. Set the computer ASCII settings as shown in the following illustration.



6. Type GH and press Enter.
The uninterruptible power supply replies with a list of events that includes the event type, ID, date and time, and name. For example:

```
Alarm #199 03/10/2010 10:55:38 Battery Disconnected
Notice #025 03/09/2010 08:30:40 Output Overload
Event #181 03/09/2010 07:29:39 UPS Control Power ON
```
7. Select the text that you want, right-click the mouse, and click **Copy**. The list of events is copied to your computer clipboard.
8. Press Ctrl-V to paste the text into an email or document.

Typical alarms and conditions

The typical alarms and conditions are described in the following table.

Table 13. Typical alarms and conditions

Alarm or condition	Possible cause	Action
The uninterruptible power supply does not provide or indicate the expected backup time.	The batteries need charging or service.	Apply utility power for 48 hours to charge the batteries. If the condition remains, contact your service representative.
Power is not available at the uninterruptible power supply output receptacles.	The uninterruptible power supply is in Standby mode.	Supply power to the connected equipment by pressing the on/off button until the status summary screen is displayed on the uninterruptible power supply front panel.
The uninterruptible power supply does not start. (The LCD is off.)	The power is not connected.	Check the input power connections.
The uninterruptible power supply operates normally, but some or all of the protected equipment is not on.	The equipment is not connected correctly to the uninterruptible power supply.	Make sure that the equipment is connected to the uninterruptible power supply receptacles. Also make sure that the load segment is on.
Battery test did not run or was interrupted.	One of the conditions listed in "Running automatic battery tests" on page 32 was not present.	Resolve the condition, then restart the test.
UPS on Battery (Event 168) No Alarm Note: The utility alarm that caused the transfer to Battery mode sounds its alarm.	A utility power failure has occurred and the uninterruptible power supply is in Battery mode.	The uninterruptible power supply is powering the equipment with battery power. Prepare the equipment for shutdown.
The uninterruptible power supply does not transfer to Bypass mode.	The bypass utility does not qualify.	Check the bypass utility. The uninterruptible power supply is receiving bypass utility power that may be unstable or in brownout conditions.
	Bypass mode is disabled.	Check that the Bypass settings are configured correctly. See "Settings" on page 41.
UPS on Bypass (Notice 169) Slow Intermittent Alarm	The uninterruptible power supply is operating from Bypass mode.	The equipment transferred to bypass utility power. Battery mode is not available and your equipment is not protected; however, the utility power continues to be passively filtered by the uninterruptible power supply. Check for one of the following alarms: overtemperature, overload, or uninterruptible power supply failure.
On Manual Bypass (Notice 143) Slow Intermittent Alarm	The uninterruptible power supply was manually commanded to transfer to Bypass mode and will remain in bypass until commanded.	None

Table 13. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Battery Disconnected (Alarm 199) Fast Beeping Alarm	The uninterruptible power supply does not recognize the internal batteries. The battery voltage is lower than the batteries disconnected level that is defined for the uninterruptible power supply. This might be due to a blown fuse, intermittent battery connection, or a battery cable that is disconnected.	Make sure that all batteries are correctly connected. If the condition remains, contact your service representative.
Low Battery Warning (Alarm 56) Fast Beeping Alarm	The battery time remaining or battery capacity is lower than the battery low warning level that is defined for the uninterruptible power supply.	This warning is approximate. The actual time to shutdown might vary depending on the uninterruptible power supply load and presence of an extended battery module.
Shutdown Imminent (Alarm 55) Continuous Alarm	The communication to external devices stops because the uninterruptible power supply has entered a state in which it might abruptly stop operating without further notice unless utility power returns.	The alarm is issued when the remaining battery time reaches zero. All connected devices should have already gone through an orderly shutdown.
Low Battery Shutdown (Alarm 174) Continuous Alarm	The uninterruptible power supply has exhausted the battery capacity and shut down.	Resolve the condition that led to shutdown, then apply utility power for 48 hours to recharge the batteries.
Battery Test Failed (Notice 191) Slow Intermittent Alarm	A weak battery string was detected during the last battery test.	This is a warning notice. Replace the batteries soon.
Service Battery (Alarm 149) Fast Beeping Alarm	A faulted battery string has been detected, and as a result, the charger is disabled.	Contact your service representative.
Utility Not Present (Notice 59) Slow Intermittent Alarm	The utility power level has fallen below the Utility Not Present threshold (typically <25 to 50 V).	The uninterruptible power supply transfers to Battery mode if it is supporting the load. The uninterruptible power supply shuts down if it is not supporting the load.
Bypass Not Available (Event 105) No Alarm	Utility is outside of the bypass limits defined in the uninterruptible power supply.	Check the bypass settings. See “Configuration” on page 26.
Input AC Over Voltage (Alarm 6) Fast Beeping Alarm	The utility power voltage exceeds the maximum operating range.	The uninterruptible power supply transfers to Battery mode if it is supporting the load.
Input AC Under Voltage (Notice 7) Slow Intermittent Alarm	The utility power voltage is below the minimum operating range.	The uninterruptible power supply transfers to Battery mode if it is supporting the load. The uninterruptible power supply shuts down if it is not supporting the load.
Input Under/Over Frequency (Notice 8) Slow Intermittent Alarm	The utility power frequency is out of usable frequency range.	The uninterruptible power supply transfers to Battery mode if it is supporting the load.

Table 13. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Site Wiring Fault (Alarm 194) Fast Beeping Alarm	An alarm is triggered when the difference between the ground and neutral voltage is ≥ 25 V (tolerance +50 V, -0 V).	Have a qualified electrician correct the wiring problem. If the uninterruptible power supply is not wired with a neutral wire, change the Site Wiring Fault Alarm setting to Disabled in the Settings menu (see Table 8 on page 26).
Remote Emergency Power Off (Alarm 12) Fast Beeping Alarm	The external contacts in the rear of the uninterruptible power supply are configured for remote emergency power-off operation, and they are activated.	The uninterruptible power supply de-energizes the load and enters Standby mode. For more information, see "Installing the remote emergency power-off" on page 13.
Output Overload (Notice 25) Slow Intermittent Alarm	The load level is at or has exceeded the configurable threshold limit for a Level 1 Overload condition. See "Behavior on overload" on page 29.	The uninterruptible power supply can support the load indefinitely at this load level. The alarm clears when the load drops below 5% of the set point.
Output Overload Level 2 (Alarm 159) Fast Beeping Alarm	The load level is $>101\%$ and $<110\%$ of the uninterruptible power supply rating. See "Behavior on overload" on page 29.	Immediately remove some of the equipment from the uninterruptible power supply. The alarm clears when the load drops below 5% of the set point.
Output Overload Level 3 (Alarm 162) Continuous Alarm	The load is $>110\%$ of the uninterruptible power supply rating. See "Behavior on overload" on page 29.	Shutdown is imminent. The alarm clears when the load drops below 5% of the set point.
Battery DC Over Voltage (Alarm 68) Fast Beeping Alarm	The battery voltage levels have exceeded the maximum allowable limits.	The uninterruptible power supply turns off the charger until the next power recycle. Contact your service representative.
Charger Failure (Alarm 34) Continuous Alarm	A battery charger fault has been detected.	The uninterruptible power supply turns off the charger until the next power recycle. Contact your service representative.
Inverter AC Over Voltage (Alarm 0) Fast Beeping Alarm	The uninterruptible power supply has detected abnormally high output voltage levels.	The uninterruptible power supply transfers to Bypass mode if supporting the load.
Inverter AC Under Voltage (Alarm 1) Fast Beeping Alarm	The uninterruptible power supply has detected abnormally low output voltage levels.	The uninterruptible power supply transfers to Bypass mode if supporting the load.
Rectifier Input Over Current (Alarm 26) Fast Beeping Alarm	The uninterruptible power supply has detected that rectifier input current limits have been exceeded.	The uninterruptible power supply transfers to Battery mode if supporting the load.
Inverter Output Over Current (Alarm 27) Fast Beeping Alarm	The uninterruptible power supply has detected that the inverter output current limits have been exceeded.	The uninterruptible power supply transfers to Bypass mode if supporting the load.
DC Link Over Voltage (Alarm 28) Fast Beeping Alarm	The link or rail voltage has exceeded its upper threshold limit.	The uninterruptible power supply transfers to Bypass mode if supporting the load.

Table 13. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Output Short Circuit (Alarm 58) Fast Beeping Alarm	The uninterruptible power supply has detected an abnormally low impedance placed on its output and considers it a short circuit.	If the uninterruptible power supply is in Normal mode, the uninterruptible power supply transfers to Bypass mode if available, otherwise, the uninterruptible power supply shuts down after five line cycles. If the uninterruptible power supply is in Battery mode, the uninterruptible power supply shuts down after five line cycles.
Heatsink Over Temperature (Alarm 73) Fast Beeping Alarm	The uninterruptible power supply has detected that one of its heat sinks has exceeded the maximum defined operating temperature. Possible fan failure.	The uninterruptible power supply transfers to Bypass mode if available. If bypass is not available or the uninterruptible power supply is in power on or Standby mode, the uninterruptible power supply transfers to fault mode. Make sure that the fans are spinning and that the air intake vents on the uninterruptible power supply are not blocked. The alarm clears when the heatsink temperature drops 5°C (9°F) below the warning level.
Fatal EEPROM Fault (Alarm 53) Continuous Alarm	There is EEPROM data corruption due to a failed device or incorrect flash upgrade.	Contact your service representative.
Fan Failure (Alarm 193) Continuous Alarm	The uninterruptible power supply has detected that one or more fans are not functioning correctly.	This is an alarm only. Contact your service representative immediately and remove the load.
Bypass AC Over Voltage (Notice 3) Slow Intermittent Alarm	The measured voltage on Bypass has exceeded the upper voltage limit specification for bypass operation.	Check the bypass utility. Check that the Bypass settings are configured correctly for your location. See Table 8 on page 26.
Bypass AC Under Voltage (Notice 4) Slow Intermittent Alarm	The measured voltage on Bypass is less than the lower voltage limit specification for bypass operation.	Check the bypass utility. Check that the Bypass settings are configured correctly for your location. See Table 8 on page 26.
Bypass Under/Over Frequency (Notice 5) Slow Intermittent Alarm	The measured frequency on Bypass is outside of either the upper or lower frequency limit specification for bypass operation.	Check the bypass utility. Check that the Bypass settings are configured correctly for your location. See Table 8 on page 26.

Silencing the alarm

Press any button on the control panel to silence the alarm. Check the alarm condition and perform the applicable action to resolve the condition. If any new alarm becomes active, the audible alarm resumes, overriding the previously silenced alarm.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the *IBM Documentation CD* that comes with your system.
- Go to the IBM support website at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/systems/support/> and follow the instructions. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x[®] and xSeries[®] information is <http://www.ibm.com/systems/x/>. The address for IBM BladeCenter[®] information is <http://www.ibm.com/systems/bladecenter/>. The address for IBM IntelliStation[®] information is <http://www.ibm.com/intellistation/>.

You can find service information for IBM systems and optional devices at <http://www.ibm.com/systems/support/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B. Notices

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 14. Limits for particulates and gases

Contaminant	Limits
Particulate	<ul style="list-style-type: none"> The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹. Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. The deliquescent relative humidity of the particulate contamination must be more than 60%². The room must be free of conductive contamination such as zinc whiskers.
Gaseous	<ul style="list-style-type: none"> Copper: Class G1 as per ANSI/ISA 71.04-1985³ Silver: Corrosion rate of less than 300 Å in 30 days

¹ ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

² The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

³ ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

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205/A015*

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

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Responsible manufacturer:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:
IBM Technical Regulations, Department M456
IBM-Allee 1, 71137 Ehningen, Germany
Telephone: +49 7032 15-2937
E-mail: tjahn@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

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Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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IBM-Allee 1, 71137 Ehningen, Germany
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高調波ガイドライン準用品

Japanese Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

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Index

A

- accessible documentation 57
- alarm history display function 24
- Alarm history menu 46
- alarm history, retrieving 28
- alarm, silencing 51
- alarms and conditions 48
- assistance, getting 53
- attention notices 5
- automatic on battery shutdown
 - configuring through LCD 30
- automatic restart
 - configuring 32
- automatic start delay
 - configuring through LCD 30

B

- Battery mode 22
- battery module
 - care 38
 - replacing (qualified personnel only) 38
 - storing 38
- battery tests
 - configuring automatic 32
 - running 32
- battery, testing 44
- behavior on overload for uninterruptible power supply 29
- Bypass mode 22

C

- caution statements 5
- circuit breaker diagram (for hard-wiring uninterruptible power supply input) 16
- circuit configuration, internal 5
- Class A electronic emission notice 58
- configuration display function 26
- connecting
 - uninterruptible power supply and extended battery module 11
- contamination, particulate and gaseous 57
- control screens display function 25
- controlling load segments through LCD 29
- CRU listing 37

D

- danger statements 5
- display function
 - alarm history 24
 - configuration 26
 - control screens 25
 - meters 24
 - model information 25
 - system status 24

- documentation CD 2
- documentation format 57

E

- electronic emission Class A notice 58
- environmental monitoring probe 35
- extended battery module 5
 - configuring with uninterruptible power supply 31
 - connecting to uninterruptible power supply 11
 - front view 10
 - rear view 10

F

- FCC Class A notice 58
- front view (extended battery module) 10
- front view controls 8
- front view LCD and controls 21
- FRU listing 37

G

- gaseous contamination 57
- getting help 53

H

- hard-wiring uninterruptible power supply input
 - circuit breaker diagram 16
 - overview 16
 - wiring specifications 18
- hardware service and support 54
- help, getting 53

I

- IBM Support Line 54
- important notices 5
- installation, completing 13
- internal circuit configuration 5
- inventory checklist 7

L

- LCD
 - alarm history 24
 - Battery operating mode 22
 - button descriptions 21
 - Bypass operating mode 22
 - configuration 26
 - control screens 25
 - meters 24
 - model information 25
 - Normal operating mode 22
 - Standby operating mode 22
 - system status 24

- load segments
 - configuring automatic on battery shutdown 30
 - configuring automatic start delay 30
 - controlling through LCD 29
 - overview 29

M

- meters display function 24
- model information display function 25
- models, uninterruptible power supply 1
- modes, operating
 - Battery 22
 - Bypass 22
 - Normal 22
 - Standby 22

N

- network management card 35
- Normal mode 22
- notes 5
- notes, important 56
- notices 55
 - electronic emission 58
 - FCC, Class A 58
- notices and statements 5

O

- operating modes
 - Battery 22
 - Bypass 22
 - Normal 22
 - Standby 22
- overload condition for uninterruptible power supply 29

P

- particulate contamination 57
- power-management software, installing 33

R

- rack installation 10
- rear view (extended battery module) 30
- rear view controls and power 9
- remote emergency power-off
 - connecting a switch 14
 - connectors 13
 - overview 13
- replaceable components 37
- replacing battery module (qualified personnel only) 38
- REPO
 - see remote emergency power-off 13
- RS-232 port 34

S

- serial connection to computer 46
- silencing alarm 51
- software service and support 54
- specifications 4, 5
 - extended battery module 5
 - uninterruptible power supply 4
- Standby mode 22
- starting on battery 23
- statements and notices 5
- Status menu 45
- support, website 53
- switch, remote emergency power-off, connecting 14
- system status display function 24

T

- telephone numbers 54
- trademarks 55
- transferring between uninterruptible power supply
 - modes 28
- troubleshooting
 - alarm history 46
 - audible alarms 45
 - silencing the alarm 51
 - Status menu 45
 - typical alarms and conditions 48
- turning off uninterruptible power supply 23
- turning on uninterruptible power supply 23

U

- uninterruptible power supply 4
 - alarm history 28
 - Alarm history menu 46
 - alarms and conditions 48
 - audible alarms 45
 - battery care 38
 - behavior on overload 29
 - completing installation 13
 - configuring automatic battery tests 32
 - configuring automatic restart 32
 - configuring for an extended battery module 31
 - connecting to extended battery module 11
 - CRU 37
 - environmental monitoring probe 35
 - front view controls and power 8
 - front view LCD and controls 21
 - hard-wiring 16
 - initial startup 18
 - installing UPS Manager software 33
 - inventory checklist 7
 - load segments 29
 - models 1
 - network management card 35
 - rear view controls and power 9
 - replaceable components 37
 - replacing battery module (qualified personnel only) 38
 - RS-232 port 34

- uninterruptible power supply *(continued)*
 - running battery tests 32
 - serial connection to computer 46
 - silencing the alarm 51
 - starting on battery 23
 - Status menu 45
 - storing battery 38
 - testing a battery 44
 - transferring between modes 28
 - turning off 23
 - turning on 23
 - USB port 35
- United States electronic emission Class A notice 58
- United States FCC Class A notice 58
- UPS Manager software, installing 33
- USB port 35

W

- website
 - publication ordering 53
 - support 53
 - support line, telephone numbers 54
- wiring specifications (for hard-wiring uninterruptible power supply input) 18



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