11000 VA LCD 5U Rack UPS
11000 VA UPS 3U Extended Battery Module

Installation and Maintenance Guide

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11000 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 69, the *Systems Safety Notices* and *Environmental Notices and User Guide* documents on the IBM *Documentation* CD, and the *Warranty Information* document that comes with the product.

Third Edition (November 2012)

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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.

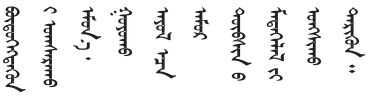
Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

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.

ཐོན་རྫས་འདི་བདེ་སྒྲིག་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་བྱ་འདུ་མེན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།



Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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 *Systems Safety Notices* document.

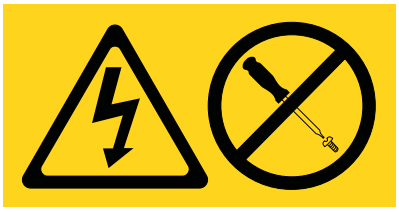
For example, if a caution statement is labeled “D005a,” translations for that caution statement are in the *Systems Safety Notices* document under “D005a.”

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:

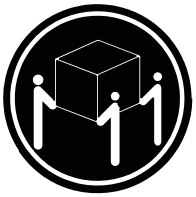
  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**

  (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.

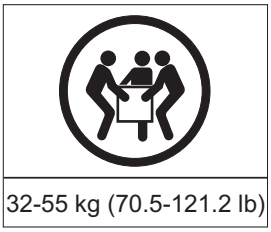
Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)

CAUTION:



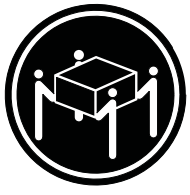
or

or



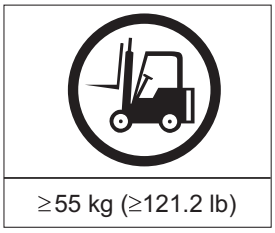
The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

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

or



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**
11000 VA	63 amp (Europe), 80 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.

Contents

Chapter 1. Introduction

The IBM® online double-conversion uninterruptible power supply (UPS) models are designed to prevent blackouts, brownouts, sags, and surges from reaching your servers and other valuable electronic equipment. The UPS filters small utility line fluctuations and isolates your equipment from large disturbances by internally disconnecting from the utility line. The UPS provides continuous power from its internal battery until the utility line returns to safe levels or the battery is fully discharged. The UPS has selectable High Efficiency and Converter modes of operation.

Each UPS 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 (11000 VA 3U) and an IBM Environmental Monitoring Probe.

The information in this document is for the following UPS and extended battery module models:

- IBM 11000 VA LCD 5U Rack UPS (200 V / 208 V / 230 V), Type 5395-9KX
- IBM 11000 VA UPS 3U Extended Battery Module, part number 69Y1986

This document contains the following information:

- Setting up the UPS
- Connecting an extended battery module to the UPS
- Starting and configuring the UPS
- Solving problems

If firmware and documentation updates are available, you can download them from the IBM website. The UPS might have features that are not described in the documentation that comes with the UPS, 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 UPS documentation. To check for updates, go to http://www.ibm.com/supportportal/.

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

The UPS 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.

For the IBM Redbooks Product Guide for the IBM 6000 VA LCD 4U Rack UPS, see http://www.redbooks.ibm.com/abstracts/tips0814.html?Open.

Important: Do not power the 11000 VA UPS from another UPS.

The IBM Documentation CD

The *IBM Documentation* CD contains documentation for your UPS 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 UPS from the **Product** menu. The **Available Topics** list displays all the documents for your UPS. 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 UPS and the extended battery module are shown in the following tables.

Note: All dimensions include the front bezel.

Table 1. 11000 VA LCD 5U rack UPS specifications

Specification	11000 VA LCD 5U rack UPS (200 V / 208 V / 230 V)
Height	212 mm (8.3 in.)
Width	483 mm (19 in.)
Depth	740 mm (29.1 in.)
Weight (including the internal batteries)	99 kg (218 lb)
Operating temperature at 0 to maximum altitude	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)
Extended storage temperature at 0 to maximum storage altitude	-15°C to 45°C (5°F to 113°F)
Maximum operating altitude	3048 m (10,000 ft)
Maximum storage altitude	15,240 m (50,000 ft)
Relative humidity	0 to 95% noncondensing
Nominal input voltage	200 V / 208 V / 230 V (auto sensing at first power-up)
Maximum RMS current (in normal mode, battery fully charged)	59.3 amps (200 V) 59.0 amps (208 V) 58.4 amps (230 V)
Input voltage range for main operations (V ac)	184 to 276 V ac
Nominal output voltage (V ac)	200 V / 208 V / 230 V (auto sensing at first power-up; user configurable)
Input frequency	50/60 Hz ± 3 Hz (auto sensing)
Rated power output	11000 VA (Normal and High Efficiency modes) 5500 VA (Converter mode)
Output power capacity in watts	10000 W (Normal and High Efficiency modes) 5000 W (Converter mode)
Circuit breakers	Four two-pole output breakers rated at 20 A (two each for Load Segment 1 and Load Segment 2)
Fixed power cord	Hard-wired
Input connection type	Terminal block
Power outlets	Eight IEC 320 - C19
Audible noise at 1 meter for > 80% load	<55 dBA normal / Bypass mode <55 dBA Battery mode
Runtime (for fully charged internal batteries at 25°C)	Full load (10 kW): 4.25 min 9 kW: 5 min 8 kW: 6.5 min 7 kW: 8 min Half load (5 kW): 14 min

Table 1. 11000 VA LCD 5U rack UPS specifications (continued)

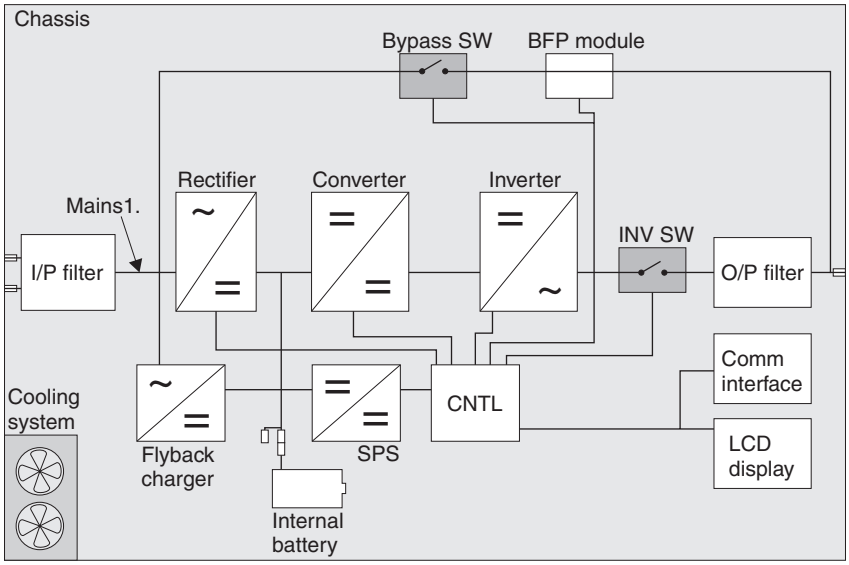
Specification	11000 VA LCD 5U rack UPS (200 V / 208 V / 230 V)
Efficiency (for fully charged battery)	Normal mode: ≥92.5% (200 V) ≥93% (208 V / 220 V) ≥94% (230 V / 240 V) Battery mode: ≥94% High Efficiency mode: 96%
Maximum root mean square (RMS) current	65.8 amps [when the input voltage is low, for example, 184 V (when it is suppose to be 230 V) with maximum load on the UPS]

Table 2. 11000 VA UPS 3U extended battery module specifications

Specification	11000 VA UPS 3U extended battery module
Height	127 mm (5 in.)
Width	483 mm (19 in.)
Depth	740 mm (29.1 in.)
Weight	79 kg (174 lb)
Voltage	288 V (24 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 *Systems Safety Notices* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Systems Safety Notices* 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 shows the front and rear views of the uninterruptible power supply (UPS) and extended battery module and includes information about the following topics:

- Checking the package contents
- Connecting the extended battery module to the UPS
- Installing a remote emergency power-off connector
- Hard-wiring the UPS input (for licensed electrician only)
- UPS initial startup

You will need the following tools to install the UPS:

- 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 UPS comes with the following items.

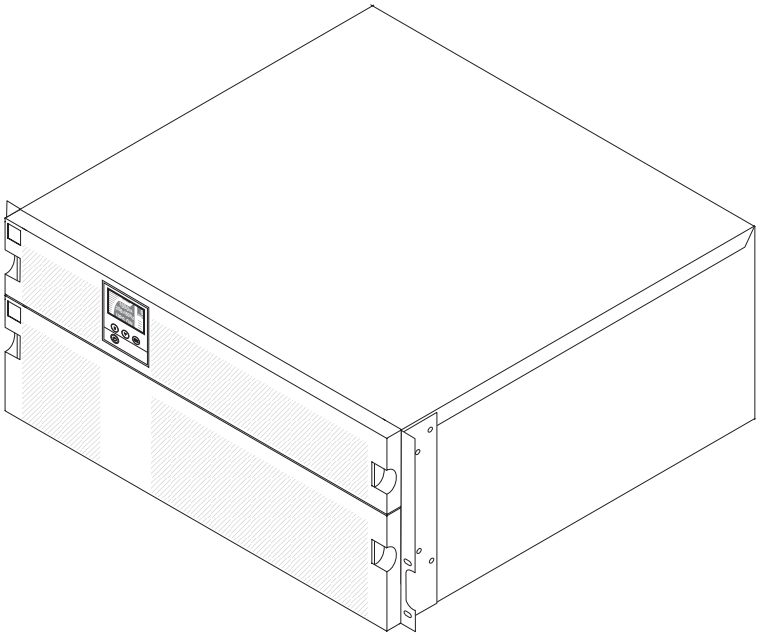
Note: Your UPS model might not come with all of the items in the following list.

- UPS
- 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
- Shipping bracket (provides extra protection for the UPS when shipped in a rack cabinet)

Front view of the UPS

The following illustration shows the front view of the UPS.

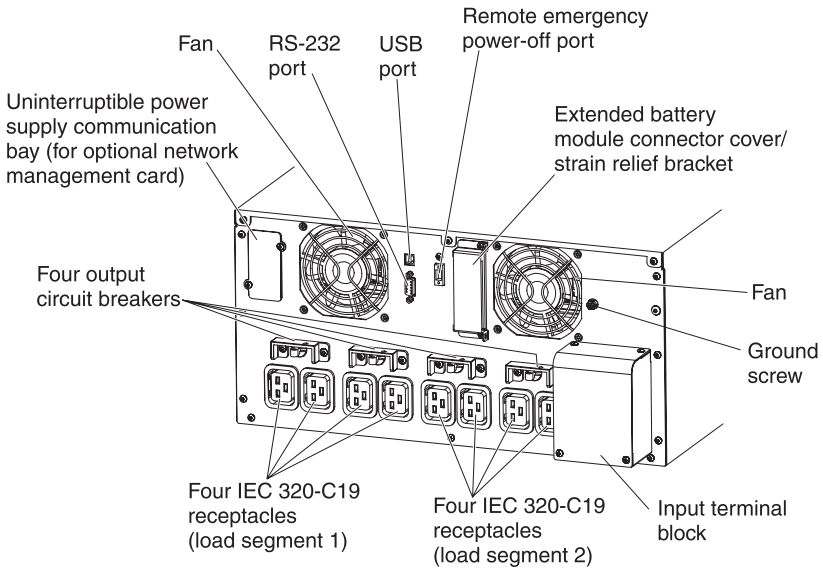
Note: The illustrations in this document might differ slightly from your hardware.



For more information about the control panel on the front of the UPS, see “Control panel” on page 27.

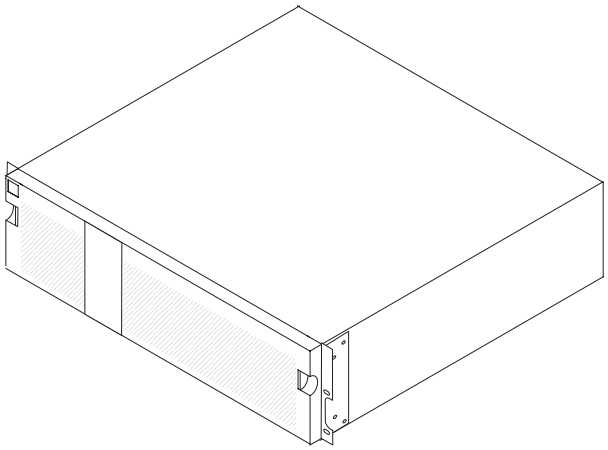
Rear view of the UPS

The following illustration shows the controls and connectors on the rear of the 11000 VA LCD 5U rack UPS (200 V / 208 V / 230 V).



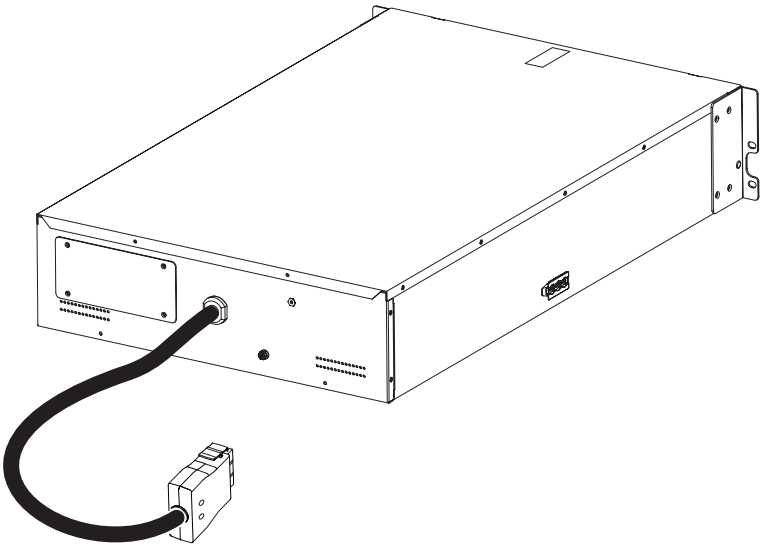
Front view of the extended battery module

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



Rear view of the extended battery module

The following illustration shows the rear view of the 11000 VA 3U extended battery module.



Rack installation

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

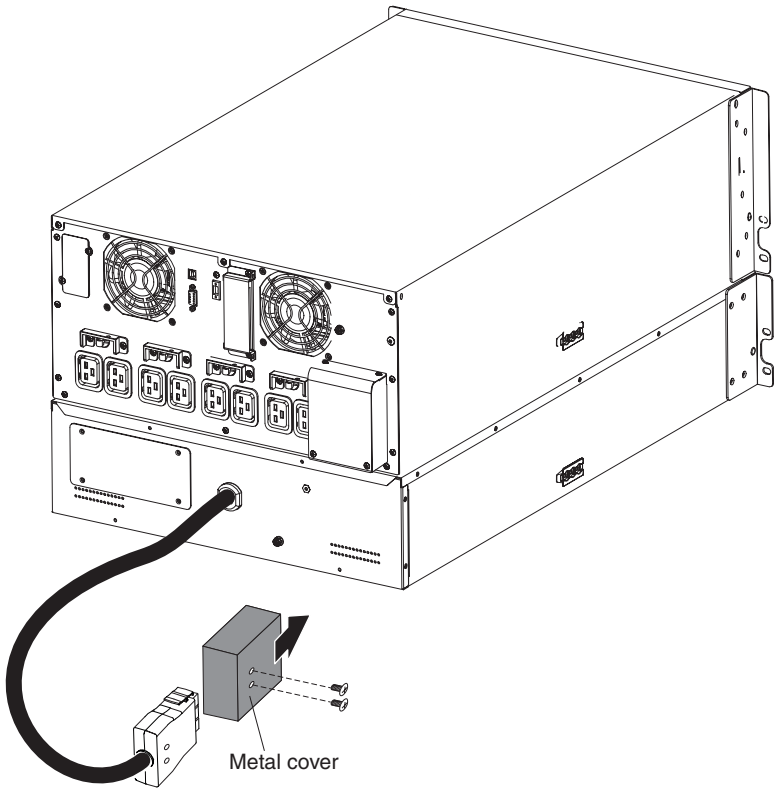
Connecting an extended battery module to the UPS

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

Note: You can connect only one extended battery module to the UPS.

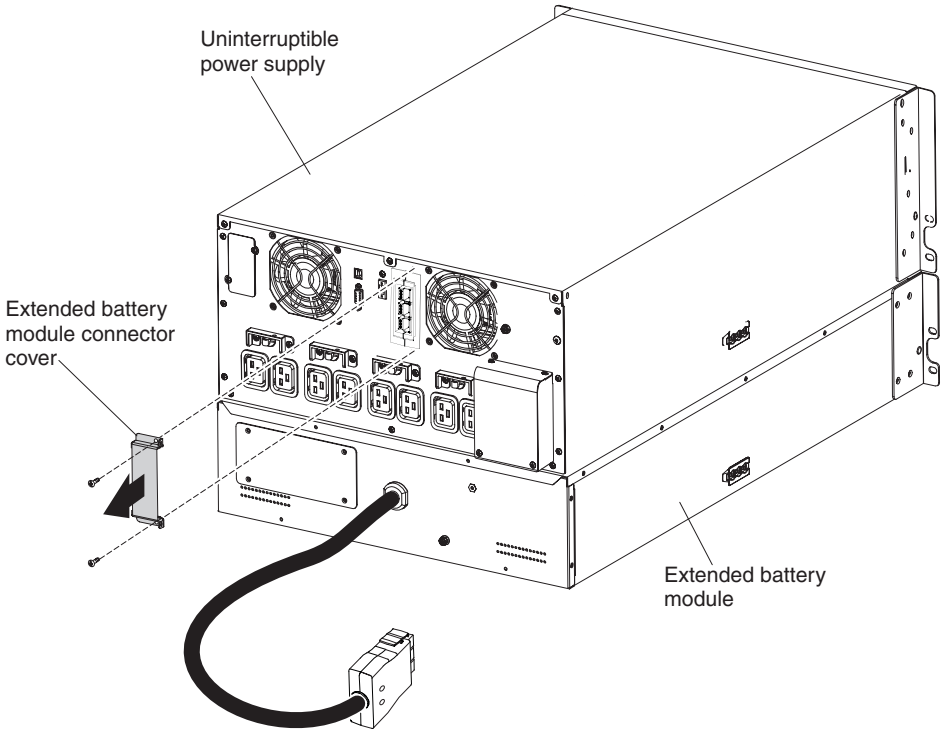
To connect an extended battery module to the UPS, complete the following steps:

1. Remove the two screws from the metal cover that protects the end of the extended battery module power cord. Remove the metal cover. Save the cover and screws for possible future use.

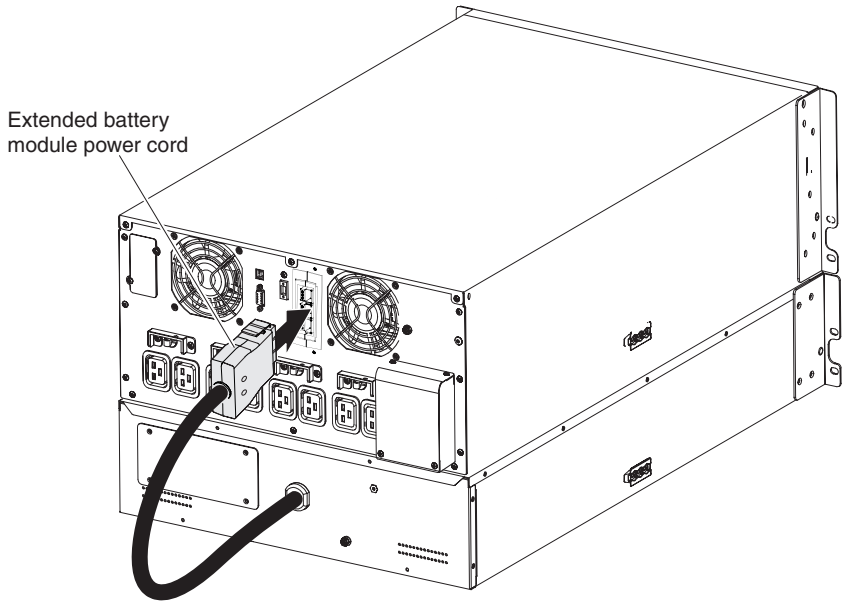


2. Remove the two screws and the battery connector cover from the rear panel of the UPS as shown in the following illustration. Save the cover and screws for possible future use.

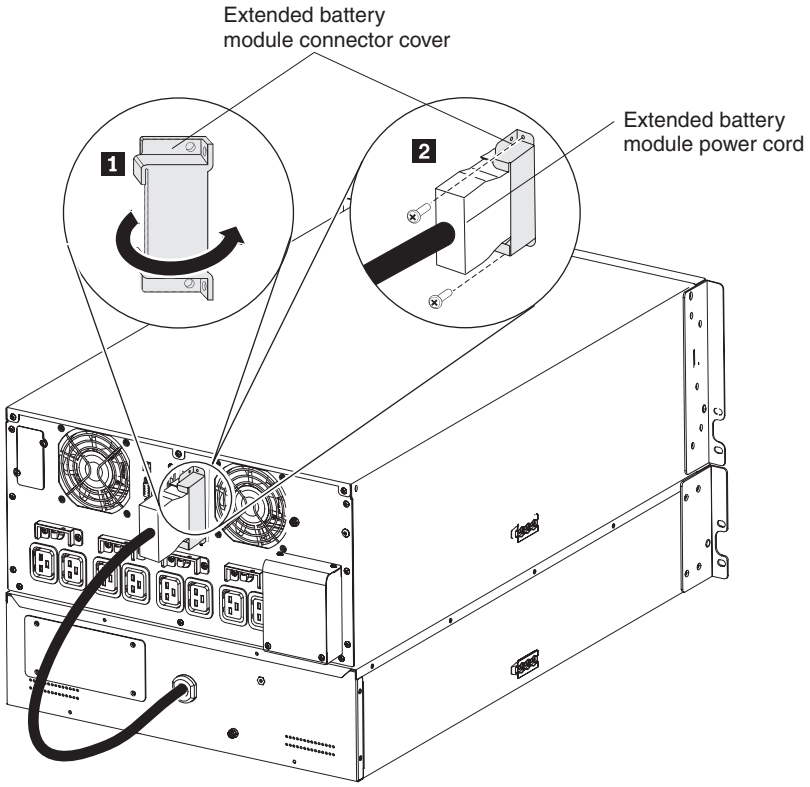
   Note: If the UPS is stored or used without an extended battery module, the extended battery module connector cover must be installed as a safety precaution.



3. Align the extended battery module power cord with the extended battery module connector on the UPS. Firmly press the power cord into the UPS until it snaps into place.



4. To provide strain relief and a secure connection for the extended battery module power cord, rotate the extended battery module connector cover on its side and position it under the extended battery module power cord **1** .



5. Secure the extended battery module connector cover to the UPS rear panel by using the screws **2** that you removed in step 2 on page 12.

To remove the extended battery module power cord from the UPS, remove the two screws that connect the extended battery module connector cover to the UPS. Then, squeeze the two clamps on the sides of the plug and pull the plug out of the extended battery module connector.

Completing the installation

To complete the installation of the UPS, complete the following steps:

1. If you are installing the IBM UPS Manager software, see “Installing the UPS Manager software” on page 43.
2. If you have not already done so, connect a computer to the UPS, using one of the communication cables that come with the UPS.
3. 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, see “Rear view of the UPS” on page 9.
4. If an emergency power-off (disconnect) switch is required by local codes, see “Installing the remote emergency power-off” on page 14 to install the remote emergency power-off switch before you turn on the UPS.
5. Connect the devices that you want to protect to the applicable UPS output receptacles. Do not turn on the devices. For information about load segments, see “Configuring load segments” on page 38.

Notes:

1. *Do not* protect laser printers with the UPS because of the exceptionally high power requirements of the heating elements.
2. Before you connect the UPS power cord to a power source, see “UPS initial startup” on page 25.

Installing the remote emergency power-off

The UPS includes a remote emergency power-off connector that enables you to turn off power at the UPS 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 UPS by thermal relay, in the event of a room overtemperature condition. When a remote emergency power-off is activated, the UPS shuts down the output and all its power converters immediately. The UPS 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 do not return to battery power until the UPS 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 32.
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.” For more information, see the European Committee for Electrotechnical Standardization website at http://www.cenelec.eu/.

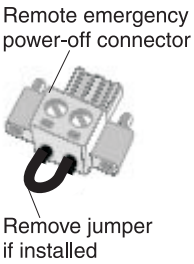
Table 3. Remote emergency power-off connections

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 UPS running. If the UPS shuts down because the remote emergency power-off connector pins are shorted, restart the UPS by reopening the remote emergency power-off connector pins and turning on the UPS 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:

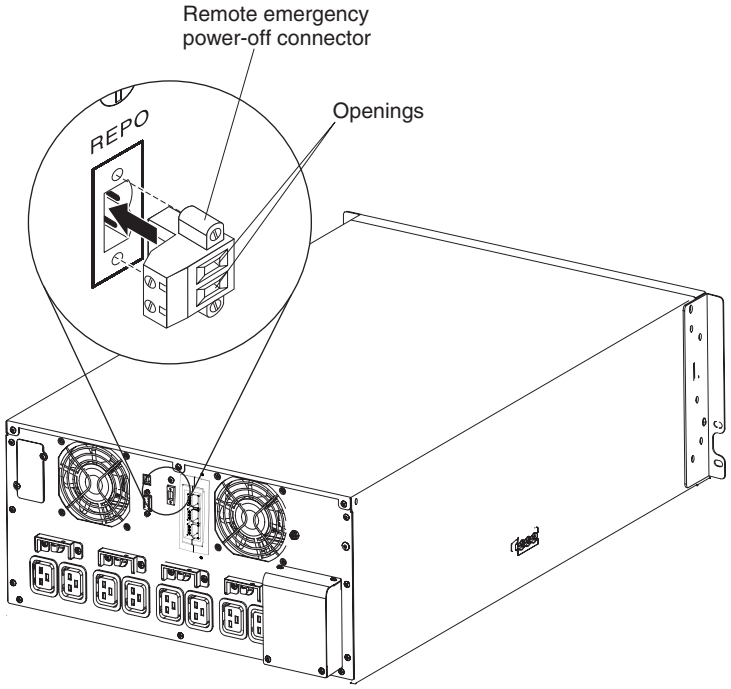
1. Turn off the UPS, disconnect all external cables, and make sure that the UPS is disconnected from utility power.
2. Remove the remote emergency power-off connector from the accessory kit.



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 UPS.

Note: The orientation of the remote emergency power-off port on your UPS 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 UPS, using insulated size 18 - 20 AWG (0.75 mm^2 - 0.5 mm^2) wire.

Note: A separate contact must simultaneously cause UPS 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 UPS receptacles.

Hard-wiring the UPS 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 11000 VA UPS model requires a dedicated branch circuit that meets the following requirements:

- A breaker that is wall-mounted and readily accessible to the operator:

  A 63 A (for Europe) or 80 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.
- 200 - 240 V ac, 50/60 Hz.
- Flexible metal conduit (for ease of service and maintenance).

The following illustration shows the circuit breaker diagram.

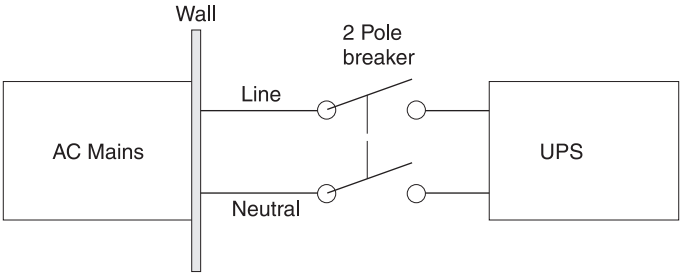


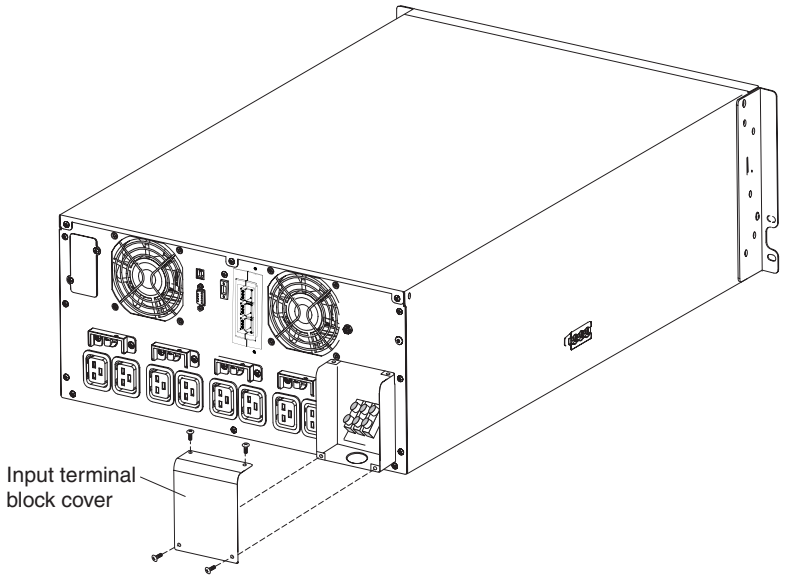
Table 4. UPS wiring specifications

Wire functions	Terminal position	UPS wire function	Terminal wire size rating[1]	Tightening torque
Input	1	Input ground	9 - 35 mm^2 (8 - 2 AWG)	1.69 Nm (15 inch-pounds)
	2	L2 / Neutral In		
	3	L1 In		
[1]Use the following minimum wire size: • 8 AWG for equipment grounding wire, 75°C copper wire minimum • 4 AWG for input line and neutral wires, 75°C copper wire minimum				

To hard-wire the UPS input, complete the following steps:

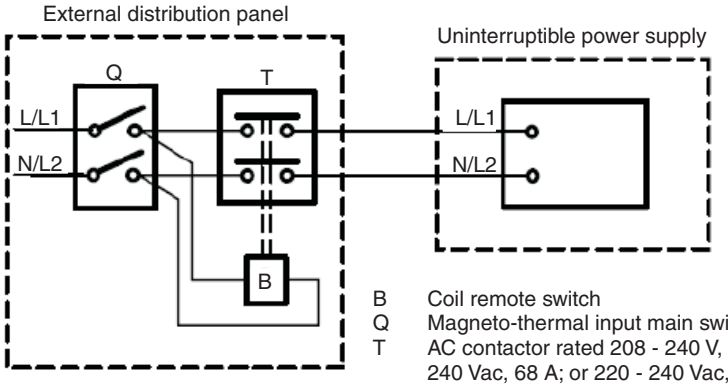
1. Turn off the utility power at the distribution point where you will connect the UPS. Be absolutely sure that there is no power.

2. Remove the four screws that secure the terminal block cover to the UPS. Save the screws.



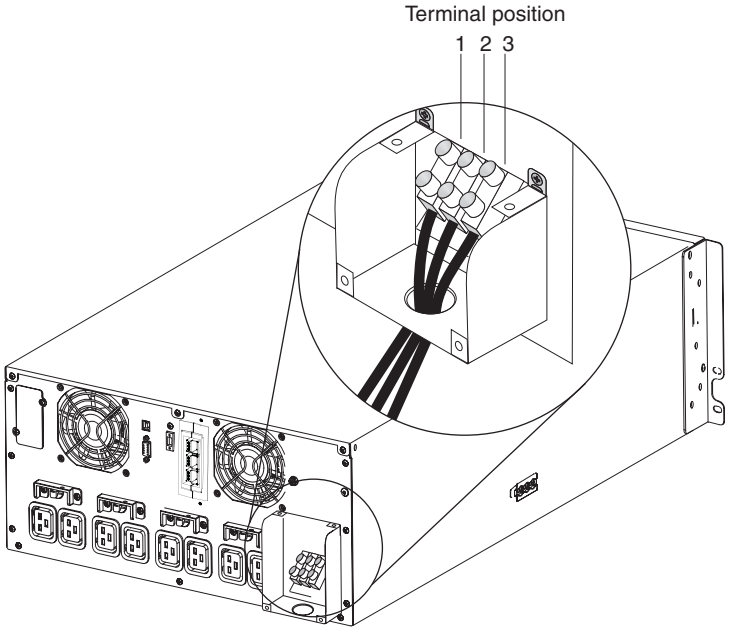
3. Punch a hole in the terminal block cover for the input conduit, using a round knockout punch or similar device. The hole must accommodate a 19 - 25.4 mm (0.75 - 1 in.) Intermediate Metal Conduit (IMC).
4. Pull the input wire through the conduit, leaving approximately 0.6 m (2 ft) of exposed wire. 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.
6.

CAUTION: The UPS does not have an automatic protection device against current backfeed. Install an external isolating device as shown in the following illustration. Check for hazardous voltage between all terminals before operating on this circuit.



B Coil remote switch
Q Magneto-thermal input main switch
T AC contactor rated 208 - 240 V, 68 A; 220 - 240 Vac, 68 A; or 220 - 240 Vac, 80 A
N/L2 Neutral/L2
L/L1 L1 Line input

7. Connect the input and ground wires to the terminal block according to the following illustration and Table 4 on page 16.

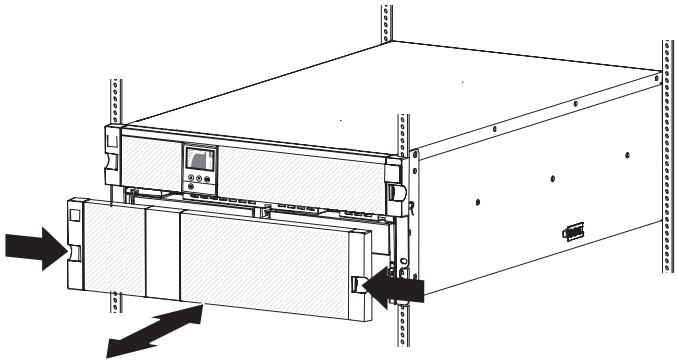


8. Replace the terminal block cover.
9. Continue to “UPS initial startup” on page 25.

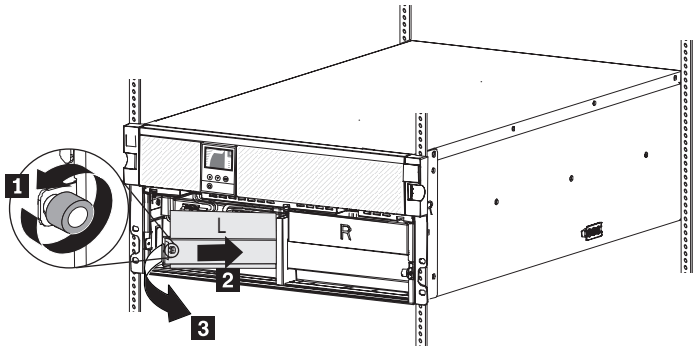
Connecting the UPS internal batteries

To connect the UPS internal batteries, complete the following steps:

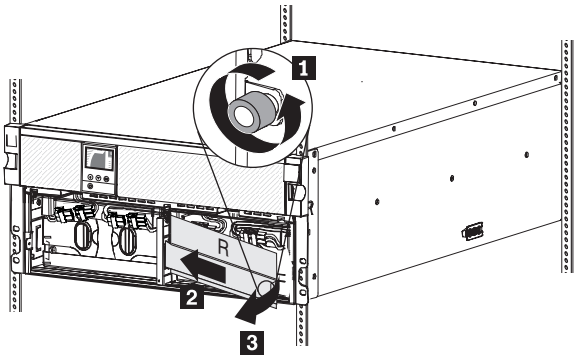
1. Remove the UPS lower front bezel. Press the two side latches toward each other to release the bezel, and pull the bezel away.



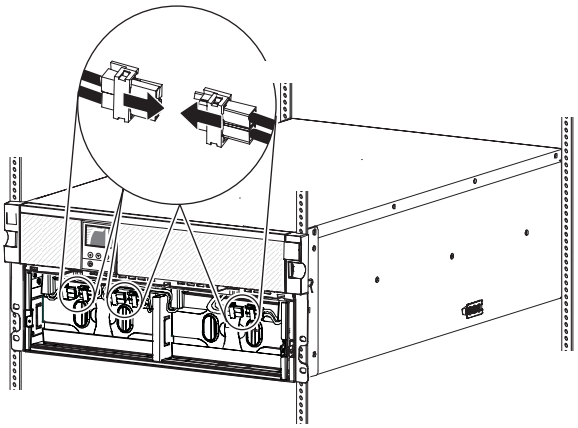
2. Loosen the thumbscrew on the left battery retention bracket **1**, slide the bracket to the right **2**, rotate the bracket out **3**, and then remove it.



3. Loosen the thumbscrew on the right battery retention bracket **1**, slide the bracket to the left **2**, rotate the bracket out **3**, and then remove it.

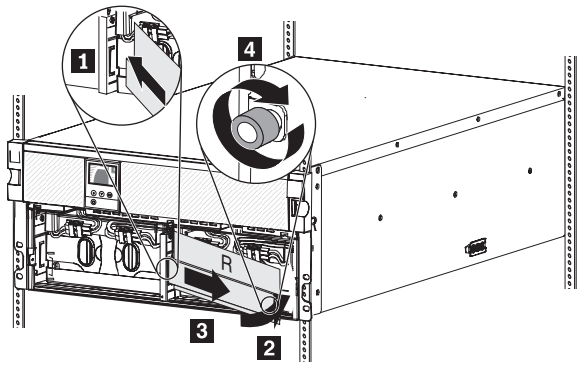


4. Connect the three internal battery connectors.

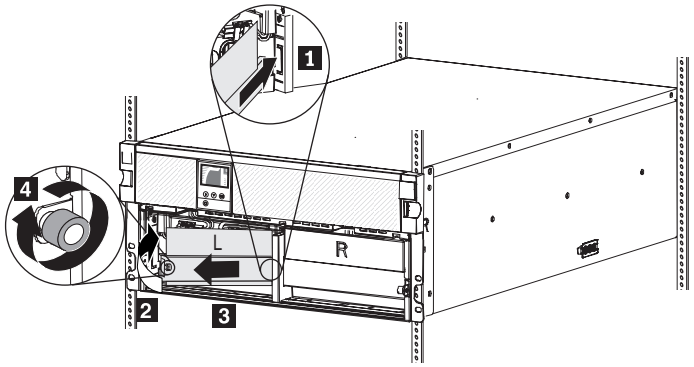


Note: A small amount of arcing might occur when you connect the batteries. This is normal and does not damage the unit or present any safety concern.

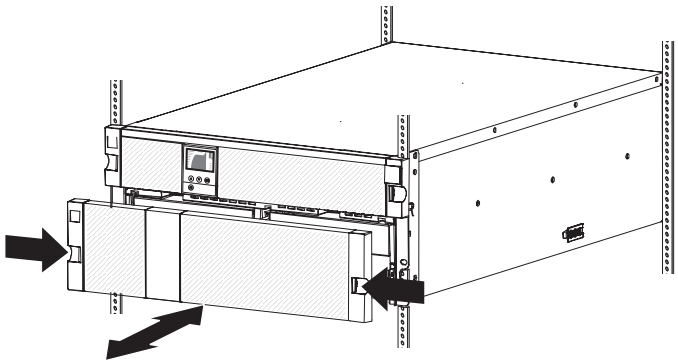
5. Reinstall the right battery retention bracket:
   a. Slide the right battery retention bracket to the left and into the slot **1** .



   b. Rotate the battery retention bracket toward the UPS **2** . Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the right **3** and tighten the thumbscrew on the right battery retention bracket **4** .
6. Reinstall the left battery retention bracket:
   a. Slide the left battery retention bracket to the right and into the slot **1** .



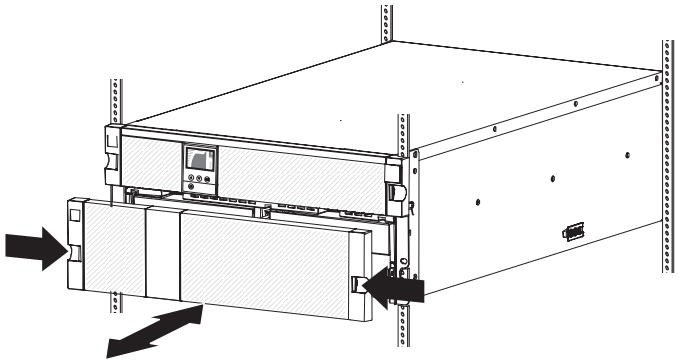
   b. Rotate the battery retention bracket toward the UPS **2** . Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the left **3** and tighten the thumbscrew on the left battery retention bracket **4** .
7. To attach the UPS lower front bezel, press the two side latches toward each other, align the bezel underneath the upper bezel, and snap it into place.



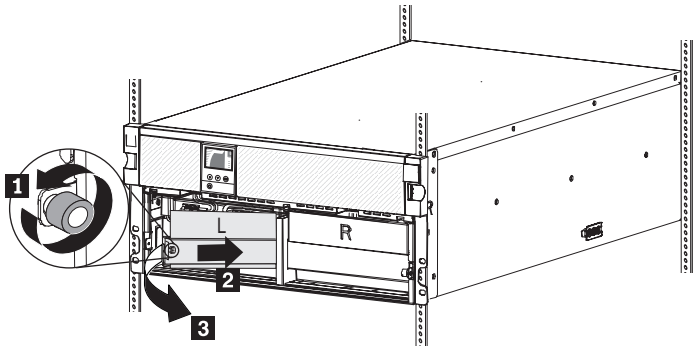
Disconnecting the UPS internal batteries

To disconnect the UPS internal batteries, complete the following steps:

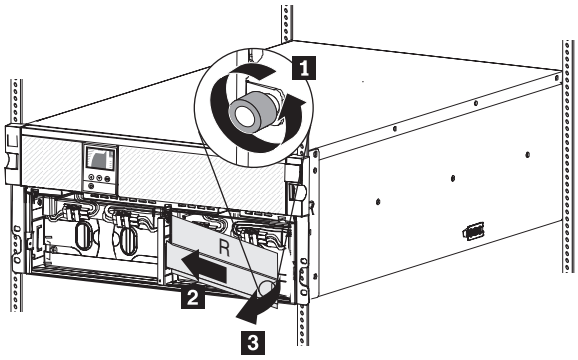
1. Remove the UPS lower front bezel. Press the two side latches toward each other to release the bezel, and pull the bezel away.



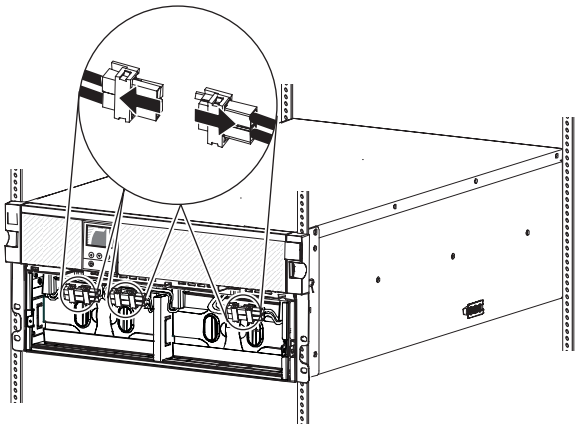
2. Loosen the thumbscrew on the left battery retention bracket **1**, slide the bracket to the right **2**, rotate the bracket out **3**, and then remove it.



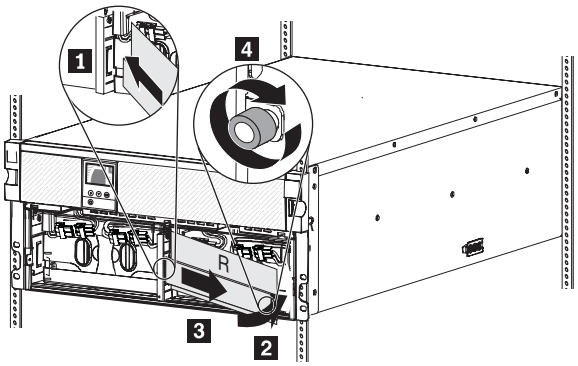
3. Loosen the thumbscrew on the right battery retention bracket **1**, slide the bracket to the left **2**, rotate the bracket out **3**, and then remove it.



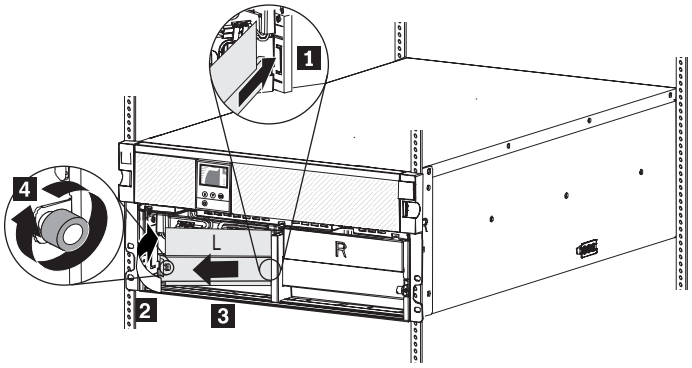
4. Disconnect all three internal battery connectors.



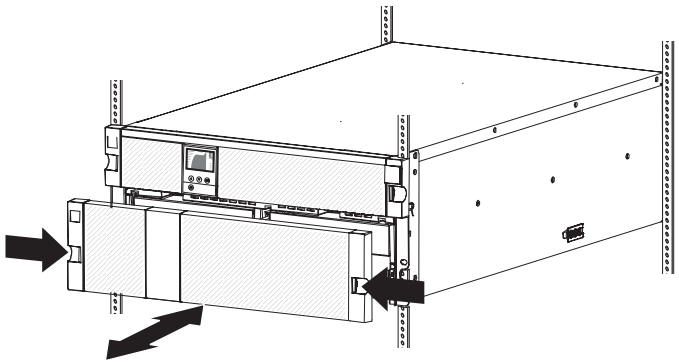
5. Reinstall the right battery retention bracket:
   a. Slide the right battery retention bracket to the left and into the slot **1**.



   b. Rotate the battery retention bracket toward the UPS **2**. Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the right **3** and tighten the thumbscrew on the right battery retention bracket **4**.
6. Reinstall the left battery retention bracket:
   a. Slide the left battery retention bracket to the right and into the slot **1**.



   b. Rotate the battery retention bracket toward the UPS **2**. Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the left **3** and tighten the thumbscrew on the left battery retention bracket **4**.
7. To attach the UPS lower front bezel, press the two side latches toward each other, align the bezel underneath the upper bezel, and snap it into place.



UPS initial startup

To start the UPS for the first time, complete the following steps:

1. Make sure that the internal batteries are connected. For more information, see “Connecting the UPS internal batteries” on page 19.
2. If an optional extended battery module is installed, make sure that the extended battery module is connected to the UPS. For more information, see “Connecting an extended battery module to the UPS” on page 11.
3. Make sure that all load segment circuit breakers are in the On position.
4. Turn on the main utility breaker. The UPS front panel display is illuminated. The IBM startup screen changes to the UPS status summary screen. Standby status is displayed on the front panel of the UPS.

   The UPS starts charging the batteries as soon as the power to the UPS is turned on. If the batteries are extremely low, the UPS might issue a “Battery Not Connected” alarm due to the very low voltage, but the UPS still charges the batteries.
5. Press the on/off button on the UPS front panel.

   After the startup is complete, the status changes according to the UPS 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 57.

   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 UPS for an extended battery module” on page 40.
8. To set the date and time and to change other factory-set defaults, see Chapter 3, “Operating the uninterruptible power supply,” on page 27.
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 UPS are displayed.
   - Deactivate the external remote emergency power-off switch and restart the UPS.
10. Charge the batteries. With load, the internal batteries charge to 90% capacity in less than 3 hours. However, you must charge the batteries for 48 hours after installation or long-term storage.

    During the 48-hour battery charge time, it does not matter if the load is on or off. The batteries are charged whenever ac power is supplied to the UPS, regardless of the mode of the UPS (for example, on, off, or standby).

    For more information about recharging the batteries, see Retain tip H193929 at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5077486.
11. To prevent an UPS 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 UPS 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.

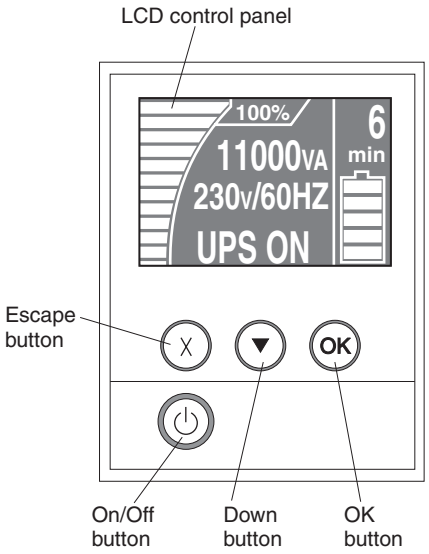
Chapter 3. Operating the uninterruptible power supply

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

- Control panel
- Operating modes
- Turning on and turning off the UPS
- Display functions
- Transferring the UPS between modes
- Setting power strategy
- 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 UPS.



The UPS has a graphical liquid crystal display (LCD) with dual color backlight. Standard backlight is used to light 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. When the end of the menu is reached, the menu starts over at the top.

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 outputs of the UPS. Press and hold this button for 3 seconds to turn off the outputs of the UPS. For more information about turning the UPS on and off, see “Turning on the UPS” on page 29 and “Turning off the UPS” on page 29.

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 UPS 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 UPS has the following operating modes:

- Normal
- High Efficiency
- Converter
- Battery
- Bypass
- Standby

Note: If the UPS is unable to continue operating normally, it might attempt to save data and follow an orderly shutdown sequence. However, some unrecoverable failures and overload conditions cause the UPS to transfer to Fault mode without saving data, and turn off immediately to protect the UPS and the load from damage.

Normal mode

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

High Efficiency mode

The UPS supplies the load power from the bypass source and stands ready to automatically transfer to standard double-conversion (Normal) operation as needed. The battery recharges when necessary. The High Efficiency setting minimizes heat contribution to the rack environment.

Converter mode

The UPS supplies the load from utility power while acting as a frequency converter, locking the UPS into a stable output frequency and transferring to Battery mode as necessary. Bypass mode is not available. Use Converter mode to lock the UPS output frequency at 50 Hz or 60 Hz to suit power-sensitive equipment, or to provide 50 Hz output when the available standard utility input is 60 Hz (or the reverse).

Battery mode

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

Bypass mode

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

Standby mode

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

Turning on the UPS

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

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

Starting the UPS on battery

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

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

Turning off the UPS

To turn off the UPS, 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 UPS switches to Standby mode (if utility power is available) and removes power from the connected devices.

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

Display functions

The UPS 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 change 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 57.

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 37.

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
- DC bus voltages

Control screens

The following table describes the available control screens.

Table 7. Control screens

Control screen	Description
Go to Bypass / Go to Normal	Transfers the UPS system to internal Bypass mode. When the Go to Bypass command is issued, the screen displays the `Manual Bypass Comment Sent` message for 5 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 5 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 55.
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, resets 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 that are made by the Automatic Start Delay and Automatic On Battery Shutdown settings. See “Configuring load segments” on page 38.
Restore factory settings	Restore Factory Settings: yes | no Available only in Standby mode. Restoring the factory settings: • 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 information about the UPS:

- **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
- **UPS firmware:** Firmware version for the UPS

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 45.

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 and cannot be changed. **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 the 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 control commands are disabled, configuration and load control commands are restricted to LCD only.	Enabled

Table 8. Configuration settings (continued)

Description	Available settings	Default setting
Output voltage	[200V] [208V] [220V] [230V] [240V] [Auto sensing] **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.
Overload alarm level	[10%] [20%] [30%]...[100%] If 100%, the UPS 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 UPS has reached its rated capacity limits.	100%
Power strategy	[Normal] [High Efficiency] [Converter] See “Setting the power strategy” on page 36. **Note:** The power strategy can be changed only when the UPS is in Standby mode.	Normal
Automatic start delay	[Off] [0s] [1s] [2s]...[32767s] See “Configuring load segments” on page 38.	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 38.	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

Table 8. Configuration settings (continued)

Description	Available settings	Default setting
Qualify bypass	[Always] [Never] [Bypass Disabled] If **Always** is selected, the Bypass operation is allowed when: • 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** is selected, the Bypass operation is always allowed, if the utility is within the UPS operating limits; voltage and frequency limits are not in use. If **Bypass Disabled** is selected, the Bypass operation is prohibited.	Always
Extended battery modules (EBMs)	[0] [1] See "Configuring the UPS for an extended battery module" on page 40.	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 41.	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
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** is selected, the normally open contacts activate the alarm when the contacts close. If **Closed** is selected, the normally closed contacts activate the alarm when the contacts open.	Open

Transferring the UPS 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.

Setting the power strategy

The UPS has the following three settings for power strategy:

- **Normal**. The UPS operates in Normal mode (powering the load from utility power).
- **High Efficiency.** The UPS operates in High Efficiency mode (powering the load from the bypass source but ready to transfer to Normal mode as needed). The UPS is highly sensitive to line fluctuations and transfers out of High Efficiency mode at ±5% of nominal voltage or ±1% of nominal frequency. If the UPS transfers to Normal mode, the UPS automatically transfers back to High Efficiency mode after 5 minutes of stable power. Transfers to High Efficiency mode are limited to three times in 1 hour.

  Note: The bypass source is the same input source as the ac input to the UPS. It is split off internally at the UPS ac input connection and bypasses the other components of the UPS in case of a UPS failure.
- **Converter.** The UPS operates as a frequency converter, powering the load from acceptable utility power while providing a stable output frequency. Bypass operation and bypass-related alarms are disabled.

The following table describes the UPS behavior in Converter mode in detail. To set the output frequency, see “Configuration” on page 32.

Table 9. UPS behavior in Converter mode

Load	Output frequency setting	Input frequency (Hz)	Output frequency (Hz)	UPS behavior
≤50%	50 Hz	47 - 53	47 - 53	UPS in Converter mode synchronizes the output frequency with the input frequency.
		45 - 46 or 54 - 65	50	UPS in Converter mode converts the input frequency to 50 Hz output frequency.
		<45 or >65	50	UPS transfers to Battery mode to provide 50 Hz output frequency.
	60 Hz	57 - 63	57-63	UPS in Converter mode synchronizes the output frequency with the input frequency.
		45 - 56 or 64 - 65	60	UPS in Converter mode converts the input frequency to 60 Hz output frequency.
		<45 or >65	60	UPS transfers to Battery mode to provide 60 Hz output frequency.
>50%	50 Hz	47 - 53	47 - 53	UPS in Converter mode synchronizes the output frequency with the input frequency.
		45 - 46 or 54 - 55	50	UPS in Converter mode converts the input frequency to 50 Hz output frequency.
		<45 or >55	50	UPS transfers to Battery mode to provide 50 Hz output frequency.
	60 Hz	57 - 63	57 - 63	UPS in Converter mode synchronizes the output frequency with the input frequency.
		55 - 56 or 64 - 65	60	UPS in Converter mode converts the input frequency to 60 Hz output frequency.
		<55 or >65	60	UPS transfers to Battery mode to provide 60 Hz output frequency.

To set the power strategy, complete the following steps:

1. Make sure that the UPS is in Standby mode.
2. From the main menu, press the down (▼) button to scroll to the **Configuration** menu, and press the **OK** button.
3. Press the down (▼) button to scroll to **Power Strategy**, and press the **OK** button.
4. Press the down (▼) button to select the power strategy that you want to set and press the **OK** button.
5. Press the **OK** button for 1 second to confirm.

Note: The UPS tests the bypass source for 5 consecutive minutes of stable power before it transfers to High Efficiency mode.

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.

You can also retrieve the UPS alarm history through the serial port. For more information, see “Serial connection to a computer to collect alarm history” on page 58.

Behavior on overload

The following table explains how the UPS responds to an overload condition.

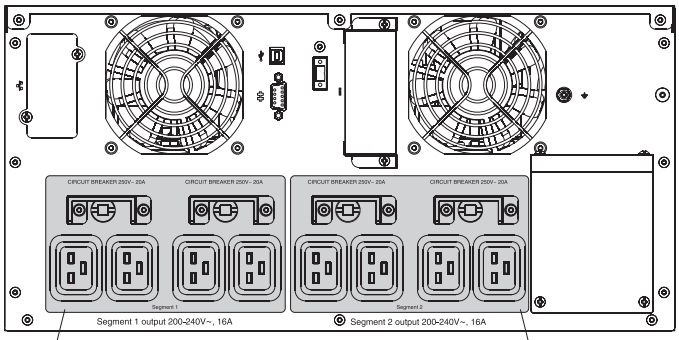
Table 10. Behavior on overload

Overload severity	Load level	On utility power	On Bypass / High Efficiency	On Battery / Converter
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)	Transfer to Fault mode in 2 minutes (± 1 sec)	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	Transfer to Fault mode in 300 ms to 1 sec	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.

The UPS has two load segments that are shown as shaded areas in the following illustration. The shading does not appear on the chassis.



Load segment 1 Load segment 2

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 selected 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

The load segments turn on automatically after the utility power returns, if they were 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

You can change the length of the restart delay time or disable automatic restart. 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 UPS 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 UPS on Battery state is activated.
- If you select a value, the load segment turns off automatically after the selected delay while the UPS 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 UPS settings for an installed extended battery module, including whether to run automatic battery tests.

Configuring the UPS for an extended battery module

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

Conversely, if the UPS is configured for the extended battery module but the extended battery module is not connected to the UPS, the UPS 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 UPS 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
UPS only (internal batteries)	0 (default)
UPS 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 UPS is in Normal mode or High Efficiency mode with no active alarms.
- The load is greater than 10%.
- The bypass voltage is usable.

For more information, see "Testing a battery" on page 55.

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 UPS 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 32).

Using a generator during a power loss

If there is a loss of ac power from the utility company, the UPS powers the load by using the energy stored in the batteries. You can use a generator to provide power while the main power is off. The UPS provides time for the generator to start and become stable.

The 11000 VA UPS is compatible with generator power as long as the generator is large enough to handle the load. Make sure that the generator is at least 2 to 3 times the size of the UPS for correct operation.

There can be issues with very small generators that are not large enough. For example, the UPS might cause the generator to lose frequency and voltage regulation because the generator changes engine speed (sags) when the UPS accepts the generator ac input. If this happens, the generator output will be outside the normal acceptable ac input range for the UPS, which causes the UPS to cycle to battery power. Then the generator will probably stabilize again, which allows the UPS to accept the generator input once again. This scenario can cause an unwanted slow oscillation back and forth between the generator ac input and UPS battery power, until the UPS batteries are eventually exhausted and the load is shed or dumped.

Chapter 4. Additional uninterruptible power supply features

This chapter describes the following uninterruptible power supply (UPS) features:

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

Installing the UPS Manager software

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

You can install the IBM UPS Manager software on a computer running a Microsoft Windows or Linux operating system, as either a stand-alone 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 UPS. See "RS-232 and USB communication ports."
2. Insert the IBM *UPS Manager* CD that comes with the UPS into the CD or DVD drive. If the Software Wizard install menu does not automatically open, see the CD_ReadMe.txt file and follow the steps to manually open the wizard.
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 32.

RS-232 and USB communication ports

The UPS has an RS-232 port and a USB port that you can use for UPS monitoring, control, and firmware updates. After communication is established between the UPS and a computer, you can use the IBM UPS Manager software to exchange data between the UPS and the computer. The software polls the UPS 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 UPS.

For the communication port locations, see "Rear view of the UPS" 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 UPS and a computer, connect one end of the serial communication cable that comes with the UPS to the RS-232 port on the UPS. Connect the other end of the serial cable to the RS-232 port on a computer.

Important: Some USB-to-serial cable adapters do not always work correctly with the RS-232 serial connector and cable that come with the UPS. For the best results, use a direct connection to a computer with a serial port.

The cable pins for the RS-232 connector are identified in the following illustration. The pin functions are described in Table 11.

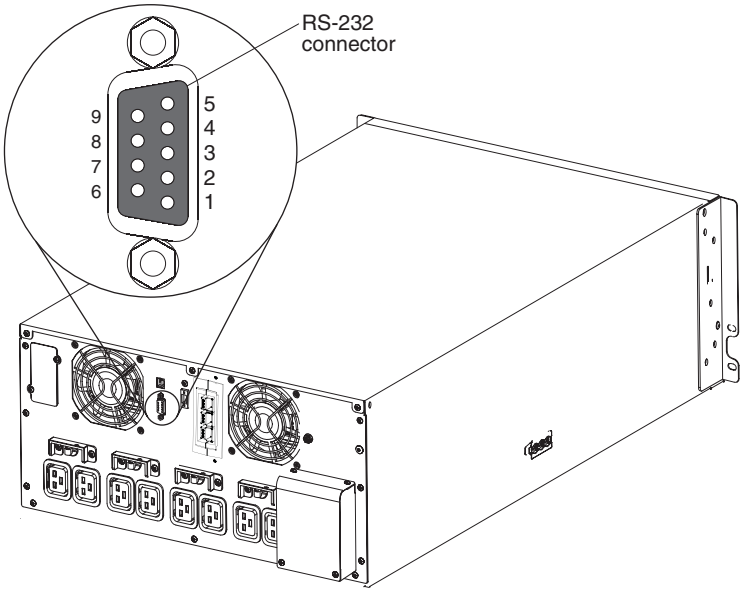


Table 11. RS-232 connector pin assignments

Pin	Signal name	Function	Direction from the UPS
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 UPS 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 UPS and a computer, connect the USB cable that comes with the UPS to the USB port on the UPS. Connect the other end of the USB cable to a USB port on a computer.

IBM Network Management Card

Each UPS 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 UPS
- Use power management software to control load segments, set the time and date, and configure other settings
- Update the UPS firmware

Note: You do not have to shut down the UPS 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 UPS.

For details about disabling control commands from the network management card, see the **Control commands from serial port** setting in Table 8 on page 32.

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 UPS.

Advanced battery management

The UPS comes with the Advanced Battery Management (ABM) function. ABM is a set of charger controls and automated battery tests. The cyclic charging schemes enable periods of time when the battery is being fully charged and periods of time when the charger is disabled. The ABM function operates constantly and cannot be turned off.

The life of the battery depends on the ambient temperature, the number of duty cycles, and the prevention of internal corrosion of a battery. Internal battery corrosion is caused by current flowing through the battery. Internal corrosion can be reduced if the battery is charged and discharged as little as possible. When the battery is charged only when necessary, it is called intermittent charging. After the battery is fully charged, it has the following charge cycles:

2 days charging
28 days resting
2 days charging
28 days resting

Intermittent charging means that corrosion is occurring only during the 2-day charging cycle. This means that 90% of the time there is no additional corrosion. During this 30-day cycle, the battery voltage drops by less than 2%, which has no effect on the backup time of the UPS. During the resting time, the ABM function constantly monitors the battery status. If the voltage drops below a predetermined alarm level, the charging cycle is started again. The same happens if the UPS is needed during the rest period to backup a power failure. This increases the battery life by an average of 50%.

If the voltage per cell reaches 2.1 volts on the batteries within the first 10 days of the rest period, a battery failure alarm occurs.

If the voltage per cell reaches 2.1 volts after the first 10 days of rest, the batteries are charged again for two days. In this case, the rest cycle might be shorter than 28 days as the batteries age.

The ABM function has no impact on the daily operation of the UPS.

For more information about the ABM function, see Retain tip: H205146 at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5089474.

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 (UPS) and instructions for replacement parts that are not installed during a typical installation.

Replaceable UPS components

The replaceable components in the UPS 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 67 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 12. 11000 VA UPS CRU listing

Description	MTM or part number	CRU part number (Tier 1)
UPS chassis 11000 VA (208 V / 230 V)	5395-9KX	81Y2321
Battery module (This CRU part contains one battery module. You must order two battery modules to be sure that the UPS runs correctly. For more information, see “Battery replacement guidelines” on page 48.)	5395-9KX	81Y2323
Bezel, upper (11000 VA UPS)	5395-9KX	69Y6095
Bezel, lower (11000 VA UPS)	5395-9KX	81Y2325
USB cable		69Y6073
RS-232 cable		69Y6074
Rack mount kit		69Y6094
Remote emergency power-on (REPO) switch		69Y6075
Environmental monitoring probe kit	46M4113	41Y9210
Network management card	46M4110	46M4112
Network management card setup cable (serial communication cable)		81Y2372

Table 13. 11000 VA extended battery module CRU listing

Description	MTM or part number	CRU part number (Tier 1)
Extended battery module (11000 VA)	69Y1986	81Y2330
Bezel, 3U extended battery module		81Y2325

Battery replacement guidelines

If you have to replace the UPS internal battery, make sure that you replace both internal battery modules and also replace the connected extended battery module at the same time. Replacing these batteries at the same time avoids internal damage to the UPS and the battery modules.

Notes:

1. The internal battery module CRU contains only one battery module. Make sure that you order two each of CRU part number 81Y2323.
2. The extended battery module CRU comes without the front bezel.

UPS and battery care

For the best preventive maintenance, keep the area around the UPS 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 UPS at an ambient temperature of 25°C (77°F).

Storing the UPS and batteries

If you store the UPS for a long period, recharge the batteries every 6 months by connecting the UPS to a power source. The batteries charge to 90% capacity in approximately 3 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 UPS. Contact your technical-support representative.

For more information, see Retain tip H193929 at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5077486.

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 UPS. 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 11000 VA UPS 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.

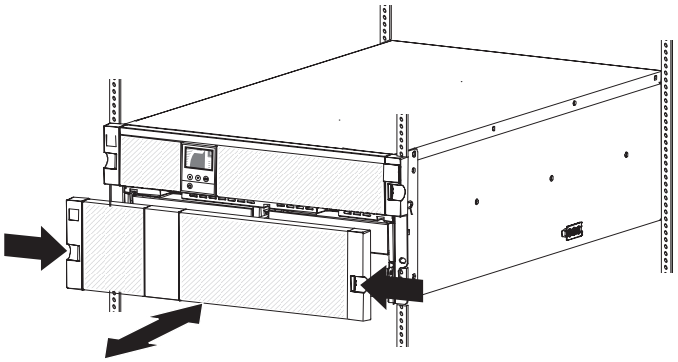
Important: *Do not* disconnect the batteries while the UPS is in Battery mode. Consider all warnings, cautions, and notes before you replace batteries. Disconnect the charging source before you connect or disconnect the battery terminals.

To remove input power to change the battery modules, schedule down time for the load; then, complete the following steps.

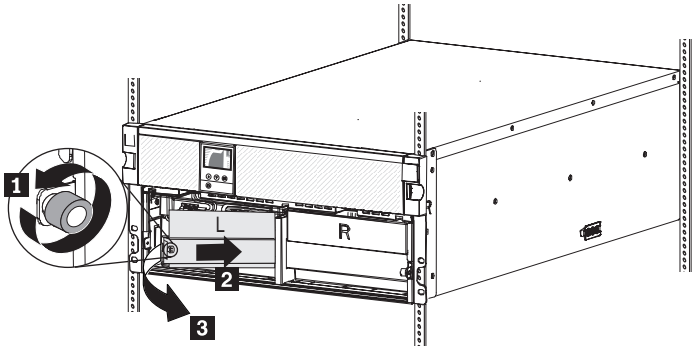
1. Press and hold the on/off button until the long beep ceases (approximately 3 seconds), and then disconnect the UPS.
2. Wait 60 seconds while the internal processor shuts down before you disconnect the battery.

To replace the battery modules, complete the following steps:

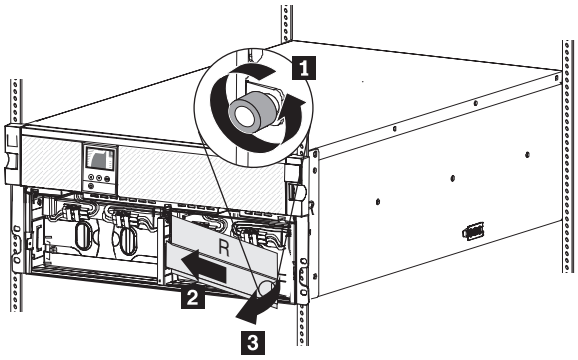
1. Remove the UPS lower front bezel. Press the two side latches toward each other to release the bezel, and pull the bezel away.



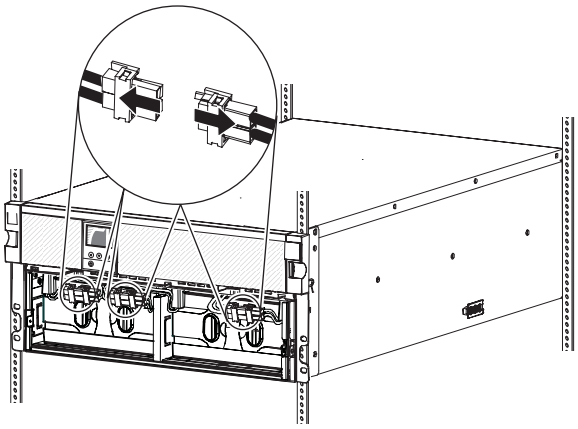
2. Loosen the thumbscrew on the left battery retention bracket **1** , slide the bracket to the right **2** , rotate the bracket out **3** , and then remove it.



3. Loosen the thumbscrew on the right battery retention bracket **1**, slide the bracket to the left **2**, rotate the bracket out **3**, and then remove it.

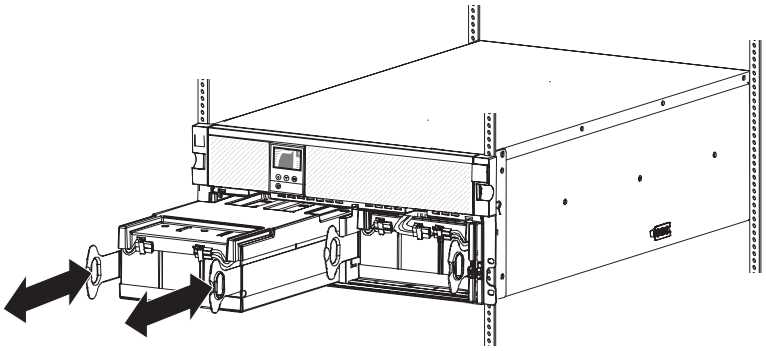


4. Disconnect all three internal battery connectors and move the connectors out of the way.

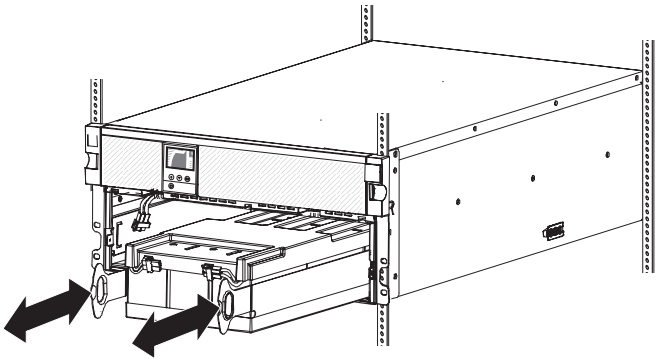


5. Remove the left internal battery module.

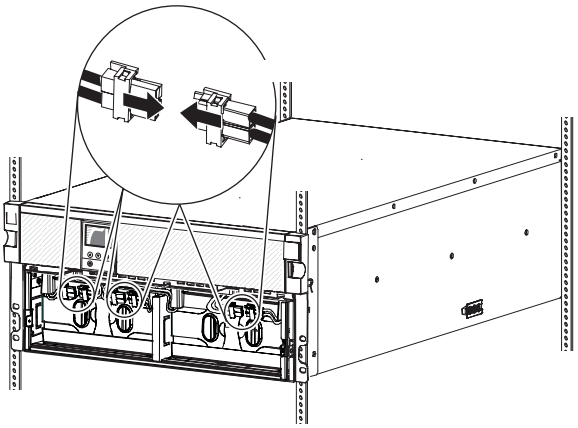
   Important: Each internal battery module weighs 32 kg (71 lb) and requires three people to safely to lift it.
   With the required three people, use the plastic tabs to pull the left internal battery module completely out of the bay and recycle or discard it as instructed by local regulations.



6. Remove the right internal battery module. With the required three people, use the plastic tabs to pull the right internal battery module completely out of the bay and recycle or discard it as instructed by local regulations.

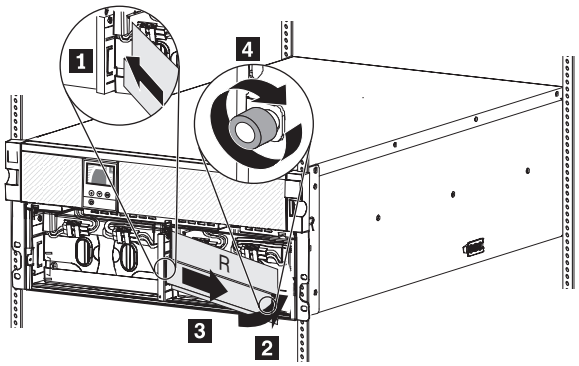


7. With the required three people, carefully slide one new battery module into the UPS. Repeat this step for the second battery module.
8. Connect the three internal battery connectors.

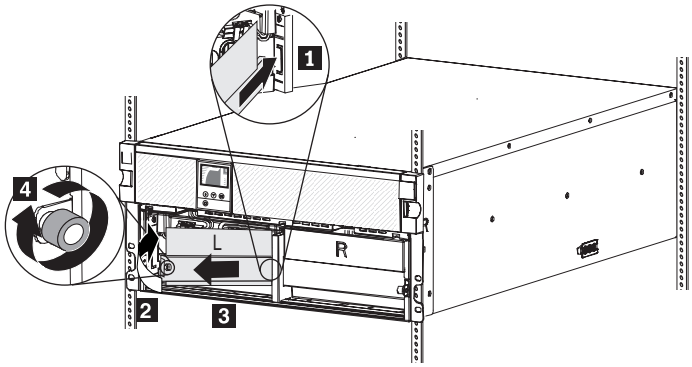


Note: A small amount of arcing might occur when you connect the batteries. This is normal and does not damage the unit or present any safety concern.

9. Reinstall the right battery retention bracket:
   a. Slide the right battery retention bracket to the left and into the slot **1** .

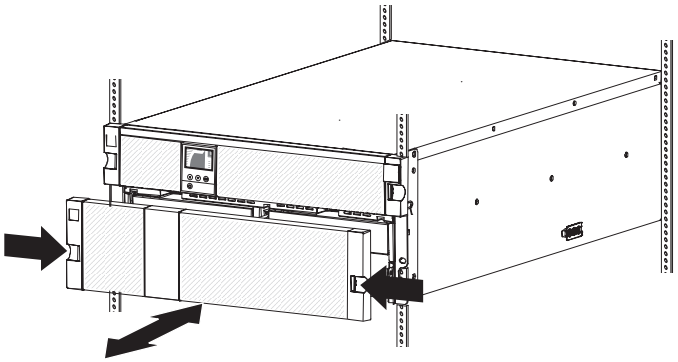


   b. Rotate the battery retention bracket toward the UPS **2** . Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the right **3** .
   d. Tighten the thumbscrew on the right battery retention bracket **4** .
10. Reinstall the left battery retention bracket:
   a. Slide the left battery retention bracket to the right and into the slot **1** .



   b. Rotate the battery retention bracket toward the UPS **2** . Make sure that the internal battery connectors are out of the way.
   c. Slide the battery retention bracket to the left **3** .
   d. Tighten the thumbscrew on the left battery retention bracket **4** .

11. To attach the UPS lower front bezel, press the two side latches toward each other, align the bezel with the UPS, and snap it into place.



Testing a battery

Before you run a battery test, make sure that:

- The batteries are fully charged (the LCD displays the battery status message `Battery resting`).
- The UPS is in Normal mode or High Efficiency 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 UPS 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.

   Note: If the battery test is already scheduled or running, you can choose to cancel the test. If the previous battery test failed or did not complete, see Table 15 on page 61 for more information before scheduling another test.
5. If necessary, press the down (▼) button to select **Yes** for **Schedule battery test**.
6. Press the OK button to schedule the battery test for the next available test time.

During the battery test, the UPS 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.

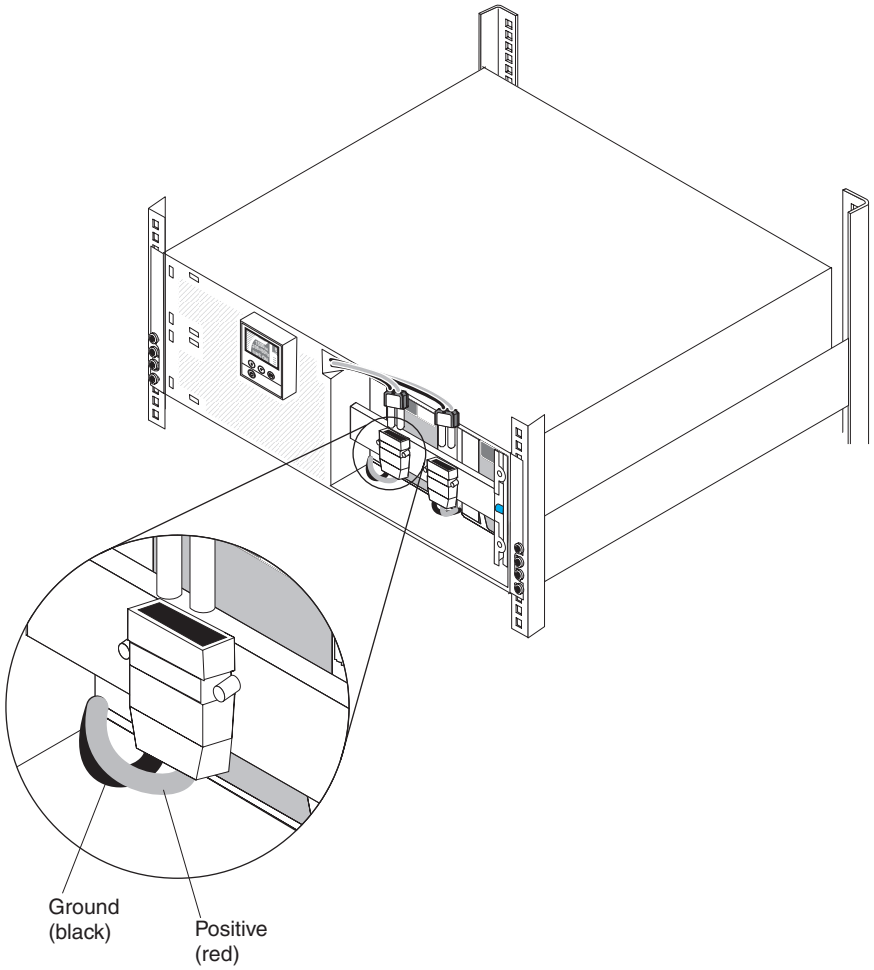
Battery charge values without loads

The fully-charged, no-load connected battery voltages for the UPS models are described in the following table.

Table 14. Battery voltages

UPS	Type-model	Battery VDC	
		Nominal	**Minimum**
IBM 11000 VA UPS (230 V)	5395-9KX	108	113.4

The voltage values are indicated for one battery only. To measure the voltage value, you must disconnect any batteries that are connected to each other. The battery voltage must be measured at the battery connectors as shown in the following illustration.



For more information about battery charge values without loads, see the Retain tip: H202830 at http://ibm.com/support/entry/portal/docdisplay?lndocid=migr-5087624.

Chapter 6. Troubleshooting

The uninterruptible power supply (UPS) is designed for durable, automatic operation. If a potential operating problem occurs, the UPS 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 UPS alarm history through a serial cable connected to a computer.

Status menu

From the UPS **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 an active notice or alarm, the UPS automatically displays the active alarms screen and flashes the display.
- **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 **Alarm history** 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 **Alarm history** 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.

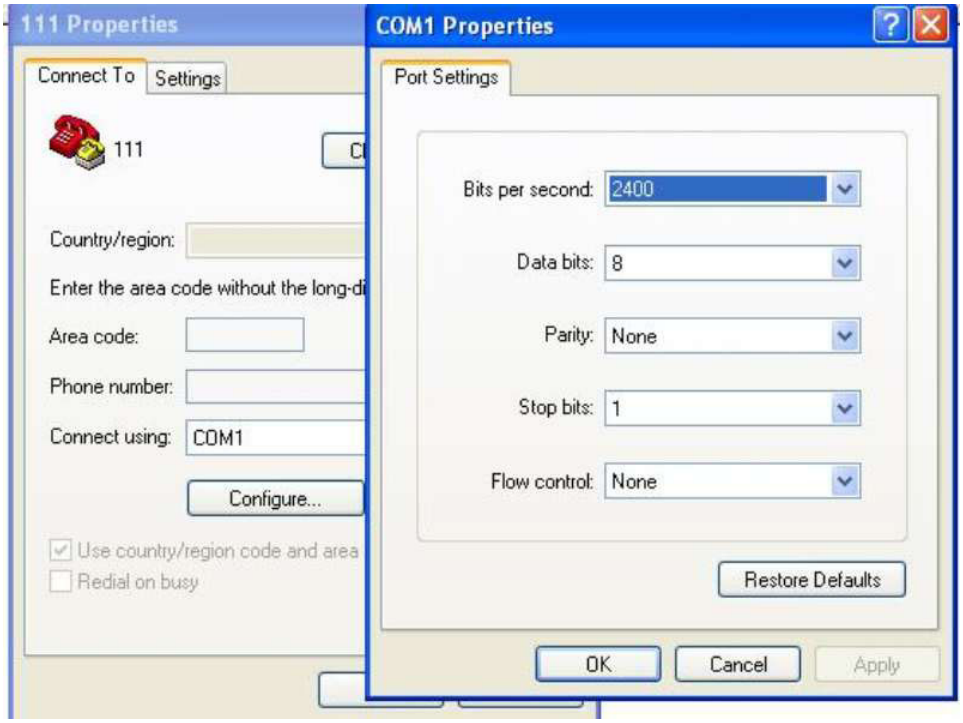
Serial connection to a computer to collect alarm history

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

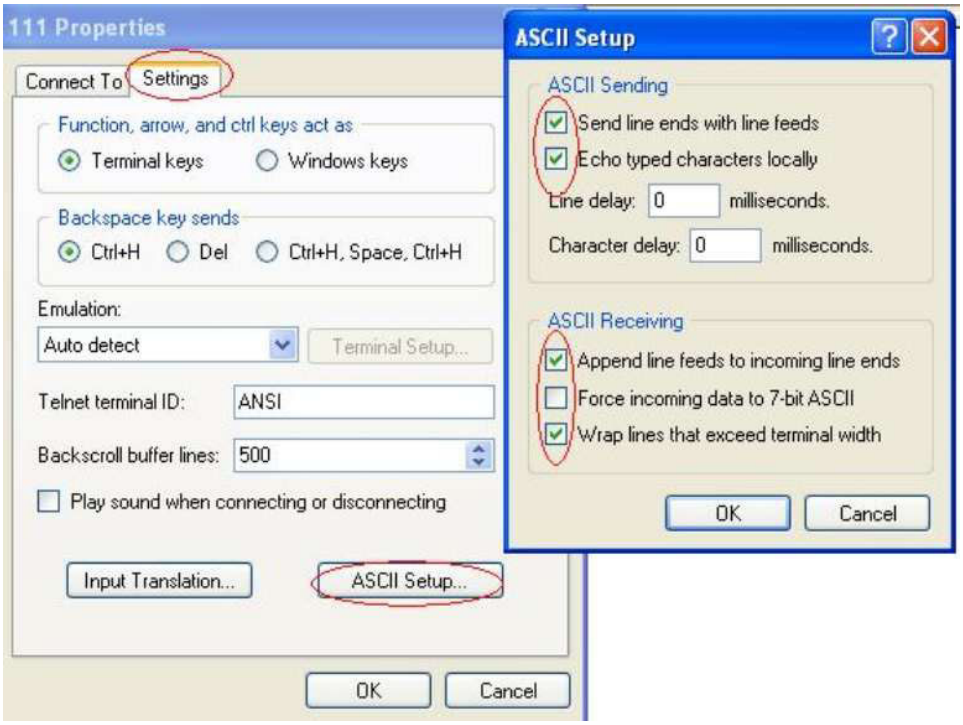
Note: For the best results, use a physical RS-232 DB-9 port on the computer that you are connecting to the UPS. Some RS-232 to USB converter cables do not work correctly.

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

1. Connect a serial cable to the UPS and to a computer.
2. On the computer, start a terminal emulation program, such as HyperTerminal, to establish communication with the UPS. 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**, and 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 UPS 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. Right-click the text that you want, 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 15. Typical alarms and conditions

Alarm or condition	Possible cause	Action
The UPS 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 UPS output receptacles.	The UPS 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 UPS front panel.
The UPS does not start. (The LCD is off.)	The power is not connected.	Check the input power connections.
The UPS operates normally, but some or all of the protected equipment is not on.	The equipment is not connected correctly to the UPS.	Make sure that the equipment is connected to the UPS receptacles. Also make sure that the load segment is on.
A communication port or an optional communication card does not operate.	The communication cable is not compatible.	Make sure that the correct communication cable is connected to the port or card.
The battery test did not run or was interrupted.	One of the conditions listed in “Running automatic battery tests” on page 41 was not present.	Resolve the condition, and then restart the test.
In High Efficiency Mode (Event 227) No alarm	The UPS is operating in High Efficiency mode.	None
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 UPS is in Battery mode.	The UPS is powering the equipment with battery power. Prepare the equipment for shutdown.
The UPS does not transfer to Bypass mode.	The bypass utility does not qualify.	Check the bypass utility. The UPS is receiving bypass utility power that might 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 UPS 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 UPS. Check for one of the following alarms: overtemperature, overload, or UPS failure.
On Manual Bypass (Notice 143) Slow Intermittent Alarm	The UPS was manually commanded to transfer to Bypass mode and will remain in bypass until commanded.	None

Table 15. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Battery Disconnected (Alarm 199) Fast Beeping Alarm	The UPS does not recognize the internal batteries.	Make sure that all batteries are correctly connected. If the condition remains, contact your service representative.
	The battery voltage is lower than the batteries disconnected level that is defined for the UPS. This might be due to a blown fuse, intermittent battery connection, or a battery cable that is disconnected.	
Low Battery Warning (Alarm 56) Fast Beeping Alarm	The remaining battery time or battery capacity is lower than the battery low warning level that is defined for the UPS.	This warning is approximate. The actual time to shutdown might vary depending on the UPS load and presence of an extended battery module.
Shutdown Imminent (Alarm 55) Continuous Alarm	The communication to external devices stops because the UPS 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 UPS has exhausted the battery capacity and shut down.	Resolve the condition that led to shutdown, and 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 UPS transfers to Battery mode if it is supporting the load. The UPS 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 UPS.	Check the bypass settings. See “Configuration” on page 32.
Input AC Over Voltage (Alarm 6) Fast Beeping Alarm	The utility power voltage exceeds the maximum operating range.	The UPS 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 UPS transfers to Battery mode if it is supporting the load. The UPS 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 UPS transfers to Battery mode if it is supporting the load.
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 UPS 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 32).

Table 15. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Remote Emergency Power Off (Alarm 12) Fast Beeping Alarm	The external contacts in the rear of the UPS are configured for remote emergency power-off operation, and they are activated.	The UPS de-energizes the load and enters Standby mode. For more information, see “Installing the remote emergency power-off” on page 14.
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 37.	The UPS 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 UPS rating. See “Behavior on overload” on page 37.	Immediately remove some of the equipment from the UPS. The alarm clears when the load drops below 5% of the set point.
Output Overload Level 3 (Alarm 162) Fast Beeping Alarm	The load is >110% of the UPS rating. See “Behavior on overload” on page 37.	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 UPS 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 UPS turns off the charger until the next power recycle. Contact your service representative.
Inverter AC Over Voltage (Alarm 0) Fast Beeping Alarm	The UPS has detected abnormally high output voltage levels.	The UPS transfers to Bypass mode if supporting the load.
Inverter AC Under Voltage (Alarm 1) Fast Beeping Alarm	The UPS has detected abnormally low output voltage levels.	The UPS transfers to Bypass mode if supporting the load.
Rectifier Input Over Current (Alarm 26) Fast Beeping Alarm	The UPS has detected that rectifier input current limits have been exceeded.	The UPS transfers to Battery mode if supporting the load.
Inverter Output Over Current (Alarm 27) Fast Beeping Alarm	The UPS has detected that the inverter output current limits have been exceeded.	The UPS 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 UPS transfers to Bypass mode if supporting the load.
DC Link Under Voltage (Alarm 29) Fast Beeping Alarm	The link or rail voltage has dropped below its lower threshold limit.	The UPS transfers to Bypass mode if available and supporting the load, or Fault mode if not.
Inverter Fault (Alarm 31) Continuous Alarm	The UPS has detected a fault in the inverter circuit while attempting a recovery from Bypass mode or Fault mode.	Contact your service representative.
Rectifier Fault (Alarm 30) Continuous Alarm	The UPS has detected a fault in the rectifier circuit while attempting a recovery from Bypass mode or Fault mode.	Contact your service representative.
Output Short Circuit (Alarm 58) Fast Beeping Alarm	The UPS has detected an abnormally low impedance placed on its output and considers it a short circuit.	The UPS shuts down after five line cycles.

Table 15. Typical alarms and conditions (continued)

Alarm or condition	Possible cause	Action
Heatsink Over Temperature (Alarm 73) Fast Beeping Alarm	The UPS has detected that one of its heat sinks has exceeded the maximum defined operating temperature. Possible fan failure.	The UPS transfers to Bypass mode if available. If bypass is not available or the UPS is in power on or Standby mode, the UPS transfers to Fault mode and shuts down. Make sure that the fans are spinning and that the air intake vents on the UPS are not blocked. The alarm clears when the heat sink 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.
DC Link Imbalance (Alarm 1234) Fast Beeping Alarm	The internal ±DC bus (DC rail) voltages generated in the UPS are imbalanced.	The UPS transfers to Bypass mode if available and supporting the load, or Fault mode if not.
Fan Failure (Alarm 193) Continuous Alarm	The UPS 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 32.
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 32.
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 32.

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.

Low battery alarm or error message

Symptom: The UPS does not power on or there is an immediate or near immediate low battery alarm or error message.

Solution: If you are installing a new UPS, check the battery date sticker on the body of the battery. If the date is less than one year, replace the battery. If it is older than one year and it is a new installation, do one of the following actions:

- If the UPS came directly from IBM, replace the batteries.
- If the UPS came from an IBM Business Partner, contact the IBM Business Partner for battery replacement.

For the latest UPS FRU and CRU parts, see http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-64944.

For more information about replacing the batteries, see Retain tip H193929 at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5077486.

Recharging internal batteries

The UPS internal batteries are charged to approximately 80 percent before they are shipped. The UPS is shipped with the internal battery connector disconnected, to avoid premature discharge of the battery. The battery is expected to last at least six months from the manufacture date, before requiring a recharge of the battery. If the UPS is kept in storage after the first recharge, repeat subsequent recharges every six months. Batteries must be connected before each recharge and disconnected after each recharge. However, do not recharged the batteries more than twice because it might limit the overall battery storage period to 18 months or less.

The recharge period for a battery is 24 hours without any load attached to the UPS and if the following conditions are met:

- Storage temperature: +10 - 40°C (+50 - 104°F)
- Storage relative humidity: 0 - 95%
- Storage elevation: 0 - 15,000 m (0 - 49,212 ft)

If the storage length of time goes beyond the recharge date, the battery of the UPS unit might drain completely. In this case, the batteries cannot be recharged and are considered to be damaged and must be replaced.

For more information about recharging the internal batteries, see Retain tip H193929 at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5077486.

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 information in Chapter 6, “Troubleshooting,” on page 57.
- Go to the IBM support website at http://www.ibm.com/supportportal/ 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/supportportal/ 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/systems/intellistation/.

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

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/supline/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

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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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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 16. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • 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	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • 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.

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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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Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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 Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

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

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

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高調波ガイドライン準用品

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