

## IBM 6000VA LCD 4U Rack UPS

### IBM System x at-a-glance guide

The IBM 6000VA LCD 4U Rack uninterruptible power supply (UPS) delivers 5600 watts of power in only 4U of rack space, providing smart energy management and the highest level of power protection that today's IT infrastructures require. With an efficiency rating of 95% or greater, the UPS helps reduce energy usage and cooling costs, improves energy management, and optimizes workload performance and availability for IBM System x and BladeCenter server applications. This high-density UPS packs more real power (watts) into a space-saving 4U of rack space to protect more equipment and leaves room for expanding IT systems. The IBM 6000VA LCD 4U Rack UPS is shown in Figure 1.



Figure 1. IBM 6000VA LCD 4U Rack UPS for IBM System x

### Did You Know?

The IBM 6000VA UPS has a bright, easily customizable, and graphical LCD display that lets you configure the device and displays important UPS status information in one of nine languages (English, French, German, Spanish, Russian, Korean, Japanese, Simplified Chinese, and Traditional Chinese). The UPS is exceptionally easy to manage and an ideal solution for standardization across the global enterprise.

This UPS enhances system availability with Advanced Battery Management (ABM) technology. This technology significantly extends battery service life; allows individual control of receptacle groups to maximize run time for critical devices in the event of a prolonged power outage; provides a real-time clock that enables precise shutdown and power up of systems in a preferred sequence; and records specific power-related occurrences for more accurate trending and data analyses.

The IBM 6000VA UPS integrates with IBM Systems Director Active Energy Manager to help improve energy management.

## About uninterruptible power supplies

An uninterruptible power supply (UPS) is a device that acts as a defensive barrier between electronic equipment and incoming power problems. It conditions, regulates, and filters out power disturbances to ensure a clean power source for IT equipment. A UPS also provides battery backup in the event of a power failure.

In today's high availability server environments, unplanned power outages or line quality irregularities can have a considerable financial impact on businesses of all sizes. The typical utility power is 99.9% available, but that means that there can be almost 9 hours of downtime a year, not to mention brown-outs and other power quality problems.

Selecting the right IBM UPS can help protect against these potentially costly incidents.

## Part number information

Table 1 lists the orderable part numbers and feature codes for the IBM 6000VA UPS.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
IBM 6000VA LCD 4U Rack UPS (200/208V)	5395-6AX	5395-RU4 (FC 6660)
IBM 6000VA LCD 4U Rack UPS (230V)	5395-6KX	5395-RU4 (FC 6661)
IBM 6000VA UPS 3U Extended Battery Module (EBM)	69Y1984	5395-RU4 (FC 5734)
IBM LCD UPS Network Management Card (optional)	46M4110	6145
IBM LCD UPS Environmental Monitoring Probe (optional)	46M4113	6146

The UPS models include the following items.

- An accessory kit containing the following items:
  - Front bezel
  - Rack mount kit with rails and hardware, including 4-post rail kit
  - Serial cable (3.7 m, 12 ft)
  - USB cable
  - Remote emergency power-off (REPO) connector
- A documentation kit containing the following items:
  - Warranty flyer and Important Notices Manual
  - Documentation CD
  - Software CD, which contains IBM UPS Manager power management software

The UPS does not include an input line cord. The line cord is hard-wired to a terminal block on the rear of the UPS. A licensed electrician will need to connect the units to a dedicated branch circuit. Circuit requirements are listed in the *IBM 6000 VA UPS and 6000 VA EBM Installation and Maintenance Guide*.

## Features

The IBM 6000VA LCD 4U Rack UPS has the following features and capabilities:

- Occupies only 4U of vertical rack space.
- Has over 95% energy efficiency at 100% load.
- Offers six or 10 output receptacles:
  - Model 5395-6AX (200V/208V) has two NEMA L6-30R and four IEC 320 C19 receptacles.
  - Model 5395-6KX (230V) has four IEC 320 C19 and six IEC 320 C13 receptacles.
- Bundled intelligent IBM UPS Manager software enhances control and manageability.
- Supports IPv6 for future-proofing IP addressing and security.
- Includes a real-time clock that enables precise shutdown and power up of systems in preferred sequence, and time stamping on event logs to track and record specific power-related occurrences.
- Integrates with IBM Systems Director Active Energy Manager for power and thermal trending analysis and management.
- Has load segments that allow for individual control of receptacle groups, maximizing run time for critical devices.
- Supports an optional network management card (part number 46M4140) for enhanced UPS monitoring and control.
- Allows dual channel communication through the USB port and optional Network Management Card at the same time, which is an effective redundancy feature that maximizes communications flexibility.
- Supports an optional Extended Battery Module (EBM) for increased runtime requirements.
- Includes a Remote Emergency Power Off (REPO) port to remotely power off the UPS unit to prevent battery operation during a power failure.
- Requires the following input power:
  - Single-phase circuit with a 2-pole circuit breaker
  - 200/208V model: Requires a 40A circuit
  - 230V model: Requires a 32A (Europe) or 40A (North America) circuit
- Includes hot swap batteries for maximum uptime, availability, and ease of maintenance.
- Supports an optional Environmental Monitoring Probe (part number 46M4113) for thermal management requirements (temperature and humidity), which requires that the Network Management Card be installed.
- Offers an Advanced Battery Management (ABM) three-stage charging technology significantly extends battery service life and optimizes recharge time. The three stages are:
  1. The battery is quickly charged to 90% to make sure the UPS is prepared for the next outage.
  2. ABM finishes charging the battery with a more moderate float charge.
  3. After the battery is charged ABM turns the charger off, thereby preventing the batteries from being overcharged.

## Specifications

Table 2 lists the specifications for the three 6000VA UPS models.

Table 2. Specifications (Part 1 of 2)

Specification	IBM 6000VA LCD 4U Rack UPS (200V/208V)	IBM 6000VA LCD 4U Rack UPS (230V)
IBM part number	5395-6AX	5395-6KX
VA/Watts rating	6000 VA / 5600W	6000 VA / 5600W
Nominal output voltage (Vac)	208V AC	230V AC
Load groups	Two	Two
Output connections	Two NEMA L6-30R Four IEC 320 C19	Four IEC 320 C19 Six IEC 320 C13
Nominal output voltage regulation	184-228V (208V)	208-253V (230V)
<b>Input</b>		
Nominal input voltage (auto sensing at first power-up)	208V	230V
Input frequency (auto sensing)	50/60 Hz +/- 3 Hz	50/60 Hz +/- 3 Hz
Input connection Type	Hard-wired to terminal block	Hard-wired to terminal block
Included line (input) cords	None	None
Input voltage range, mains operations	155-255V for 208V	160V-286V for 230V
<b>Batteries</b>		
Typical backup times	See Table 3	See Table 3
Battery type	Valve Regulated Lead Acid (VRLA) - maintenance-free, sealed, leak-proof	
Optional External Battery Pack	Yes, 69Y1984	Yes, 69Y1984
Typical recharge time	4 hours to 90% charge from a UPS/battery discharge of 50% rated load	
<b>Communications and management</b>		
USB port	Yes	Yes
RS-232 serial port	Yes	Yes
Ethernet port	Optional using Network Management Card, 46M4110	
Environmental Monitoring Probe	Optional Environmental Monitoring Probe, 46M4113	
<b>Surge Protection and Filtering</b>		
Surge energy rating	1300 Joules	1300 Joules
Filtering	ANSI/IEEE C62.41; 1991 CATEGORYB3 (SURGE)	

## Battery run times and recharge times

Table 3 lists the expected period that the 6000VA UPS will operate solely on batteries. The run times for the 230V model are the same as the 200/208V model.

Table 3. IBM 6000VA UPS runtime chart

Load			Run time on batteries	
Percent Load	VA	Watts	Run time with standard internal battery only	Run time with internal battery plus External Battery Module (EBM)
25%	1500	1400	51 minutes	112 minutes
50%	3000	2800	21 minutes	51 minutes
75%	4500	4200	12 minutes	31 minutes
100%	6000	5600	8 minutes	19 minutes

Note: Battery backup times are approximate and may vary with equipment, configuration, battery age, and temperature.

## Physical specifications

The physical specifications of the 4U uninterruptible power supply are as follows:

- Height: 172 mm (6.8 in.)
- Width: 483 mm (19 in.)
- Depth: 735 mm (28.9 in.)
- Weight: 72 kg (159 lb)

The physical specifications of the 3U Extended Battery Module are as follows:

- Height: 127 mm (5.0 in)
- Width: 483 mm (19 in.)
- Depth: 721 mm (28.4 in.)
- Weight: 59 kg (130 lb)

## Operating environment

The IBM 6000VA LCD 4U Rack UPS is supported in the following environment:

- Maximum operating altitude: 3,048 m (10,000 ft)
- Maximum storage altitude: 15,240 m (50,000 ft)
- 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)
- Relative humidity: 0 to 95% noncondensing

## Warranty

The IBM 6000VA LCD 4U Rack UPS has a three-year limited warranty.

## Supported rack installation

The IBM 6000VA LCD 4U Rack UPS requires 4U of rack space in one of the following rack cabinets:

- IBM 42U Enterprise rack
- IBM S2 42U Dynamic rack
- IBM S2 42U rack
- IBM S2 25 U rack
- IBM 11U Office Enablement kit

## Front panel controls

With a bright and easy-to-navigate panel that provides configurability and displays important status information, the IBM 6000VA UPS is easy to manage and an ideal solution for standardization across the global enterprise. Runtime, load, and other vital information and troubleshooting are also displayed.

Figure 2 shows the front panel of the UPS.

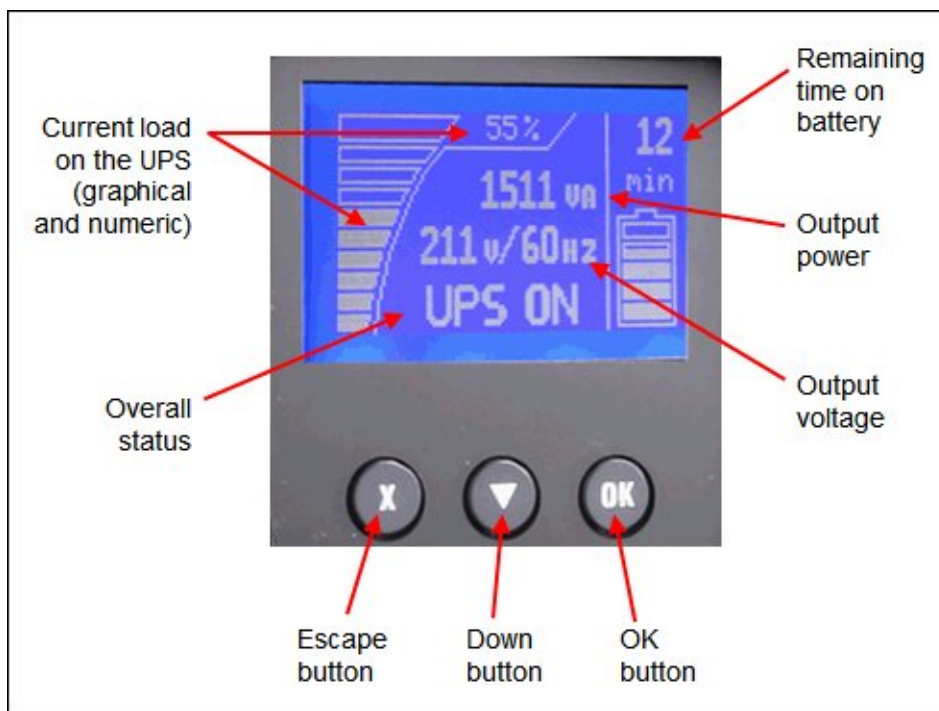


Figure 2. Front panel (showing System Status)

The following functions are available on the control panel:

- System status: Displays the battery status, load percentage, output power, output voltage and frequency, mode, notice or alarm status.
- Alarm history: Displays the alarm history for the 50 most recent events.
- Meters: Displays the output watts VA, current, power factor, voltage, frequency, input voltage, input frequency, battery voltage and percentage charged.
- Control screens: Displays the battery test, reset error state, configure load segments, and restore settings.
- Model information: Displays the machine type, model, and serial number of the unit as well as the firmware level of the UPS, including the optional Network Management Card's firmware level and IP address, if installed.
- Configuration: Allows you to change up to 17 user settings with minimal navigation.

The buttons have the following functions:

- 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.
- OK: Press this button to select the current menu or option.
- On/off: Press this button to turn on the UPS. Press and hold this button for 3 seconds to turn off the UPS.

On some screens, the OK button has an additional function if you press and hold the 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.

## Rear panel

Figure 3 shows the rear panel of the IBM 6000VA LCD 4U Rack UPS (200V/208V).

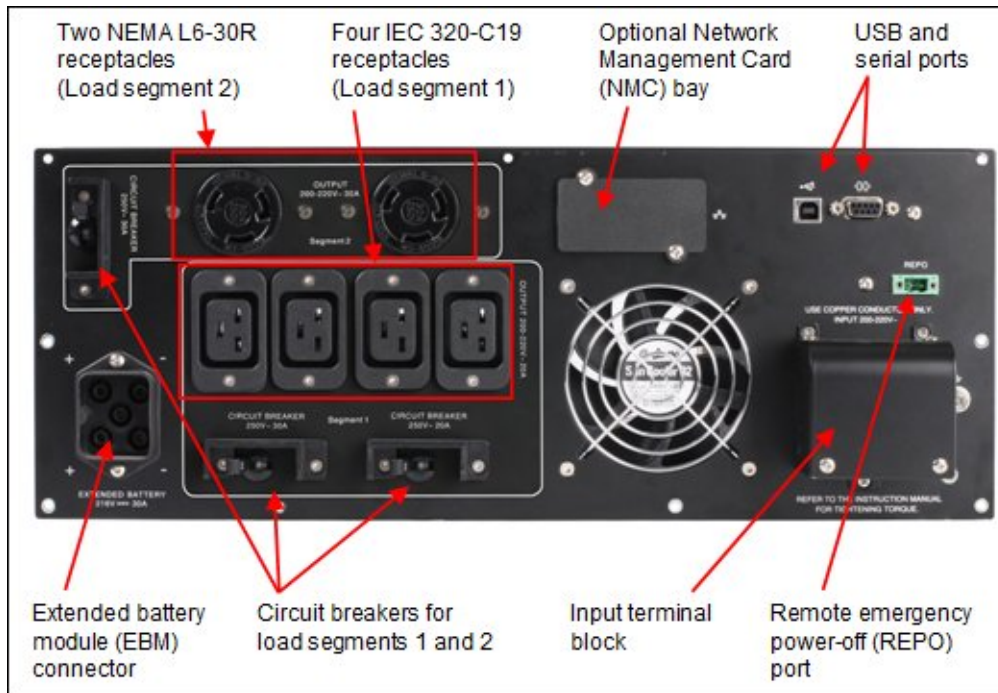


Figure 3. Rear panel of the IBM 6000VA LCD 4U Rack UPS (200V/208V)

Figure 4 shows the rear panel of the IBM 6000VA LCD 4U Rack UPS (230V).

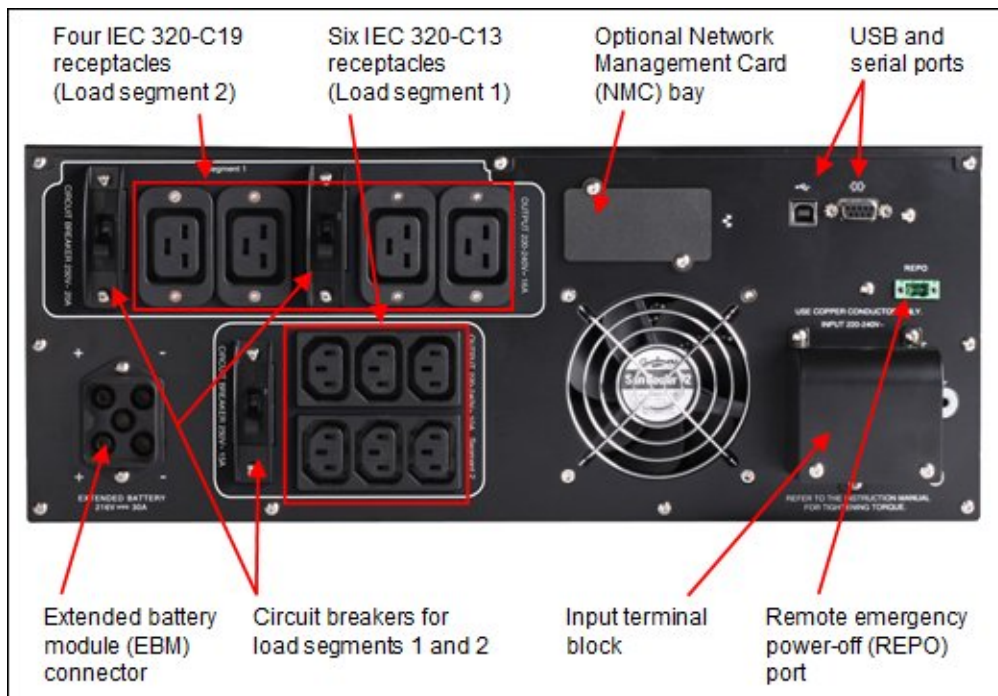


Figure 4. Rear panel of the IBM 6000VA LCD 4U Rack UPS (230V)



## Use with power distribution units

The 6000VA LCD 4U Rack UPS is designed to work with power distribution units (PDUs) such as the new IBM 0U 24 C13 30A PDU, which mounts vertically in a rack pocket and does not consume any of the rack units used for servers and storage. PDUs allow you to increase the number of power sockets available to servers while still being under the control and security of the uninterruptible power supply. Figure 5 shows an example configuration.

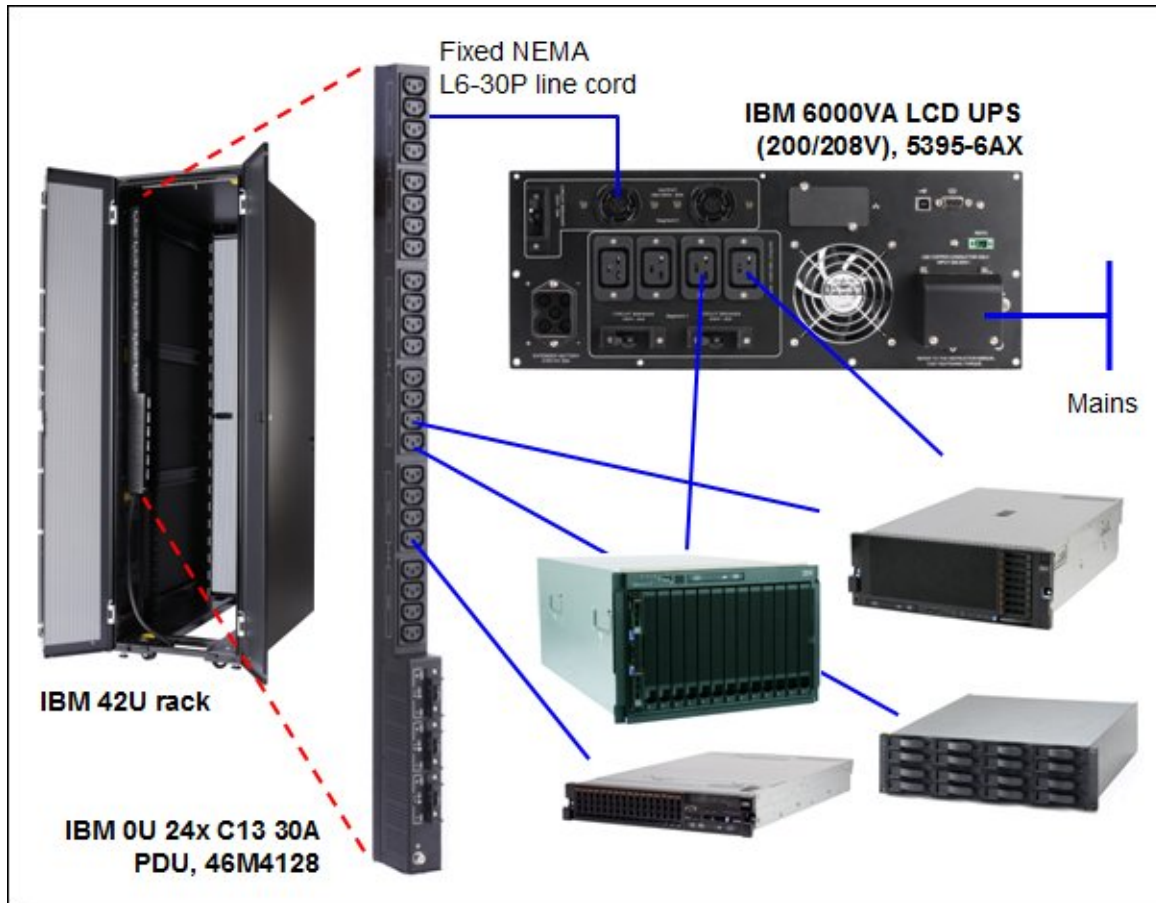


Figure 5. Sample configuration showing use of the 6000VA LCD 4U Rack UPS (200/208V) with a PDU

## IBM UPS 3U Extended Battery Module

For applications requiring extended backup times, an external battery module can also be added to the 6000VA models to deliver hours of run time to critical systems during a prolonged power outage. The IBM 3U Extended Battery Module (EBM) is a 3U rack-mounted device that contains additional batteries. Tables 4 to 6 show the additional run times achieved with the EBM connected. Figure 6 shows the front of the 3U Extended Battery Module.



Figure 6. IBM 6000VA UPS 3U Extended Battery Module (EBM)

## Network Management Card

The IBM 6000VA LCD 4U Rack UPS also comes equipped with a communication bay for the installation of an optional Network Management Card (46M4110). The Network Management Card provides convenient over-the-network UPS remote monitoring and management through a standard web browser. Figure 7 shows the IBM LCD UPS Network Management Card (NMC).



Figure 7. IBM LCD UPS Network Management Card (NMC)

The IBM LCD UPS Network Management Card:

- Allows simultaneous shutdown of protected servers
- Allows configuration of automatic email messages in response to UPS alarms and to transmit periodic reports (see Figure 8)
- Allows control of UPS on/off switching with a web browser
- Allows adjustment and control of load segments through the HTML interface, including sequential starting of the installation and optimization of backup time by shutting down non-priority systems
- Allows protection by using an encrypted password
- Allows protection by using a secure SSL connection
- Allows log storage in the nonvolatile memory
- Allows card firmware updates through the network
- Allows fast Ethernet 10/100 Mbps compatibility with auto-negotiation on the RJ-45 connector
- Allows recording of events and measurements in the card log
- Has a humidity/temperature/dry contact sensor (optional EMP)
- Has support for IPv6
- Can be installed while the UPS is online maintaining the highest system availability

Figure 8 shows the Network Management Card UPS properties window.

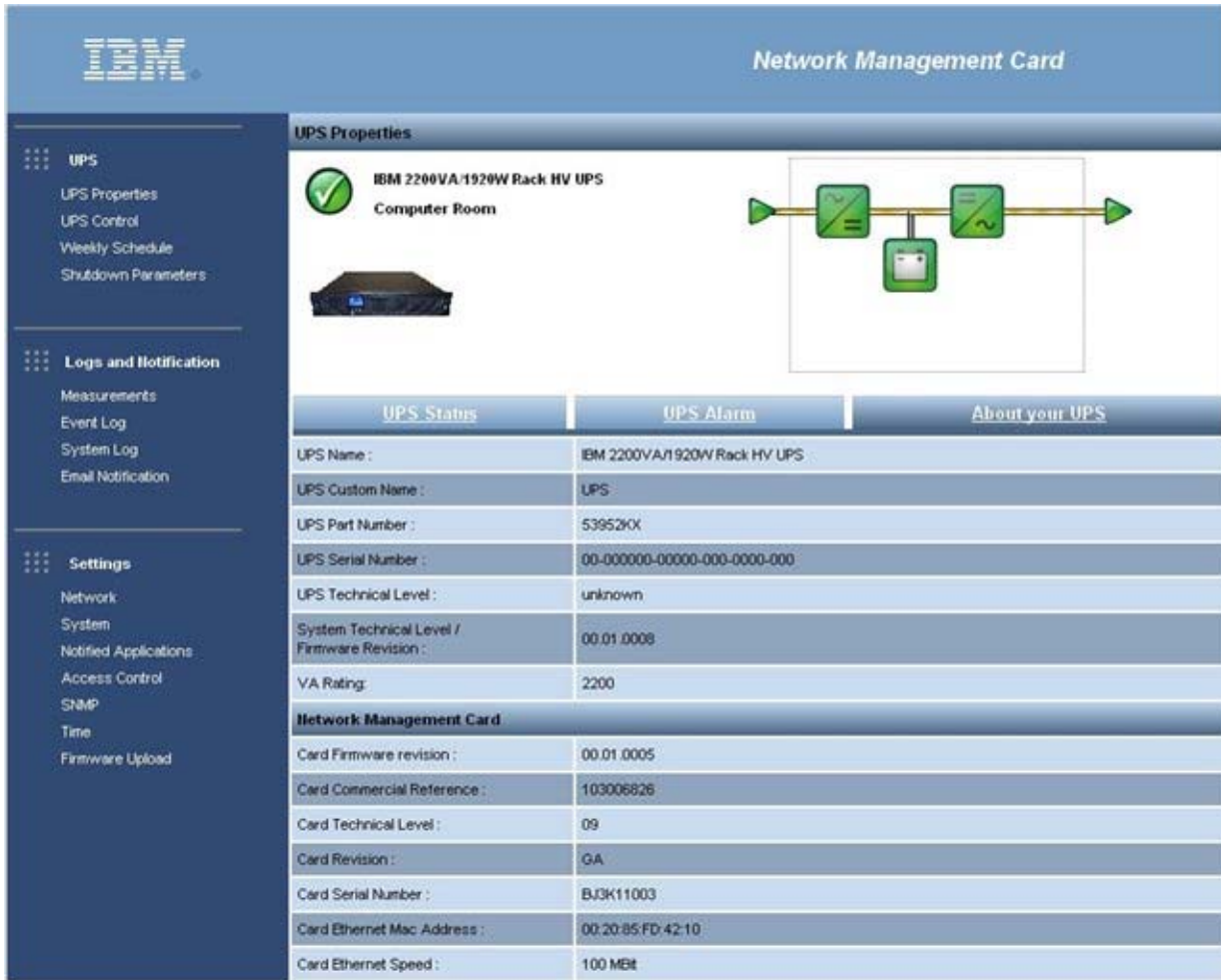


Figure 8. IBM LCD UPS Network Management Card (NMC) UPS properties window

## IBM 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 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.

Figure 9 shows normal operating using the IBM UPS Manager. The input voltage is 122V, which is within the acceptable range, and is shown in the left pane. The output voltage of the UPS is 121V and is also within the acceptable range. The battery is in "floating" mode, which is the second stage of the Eaton Advanced Battery Management (ABM) three-stage charging technology.

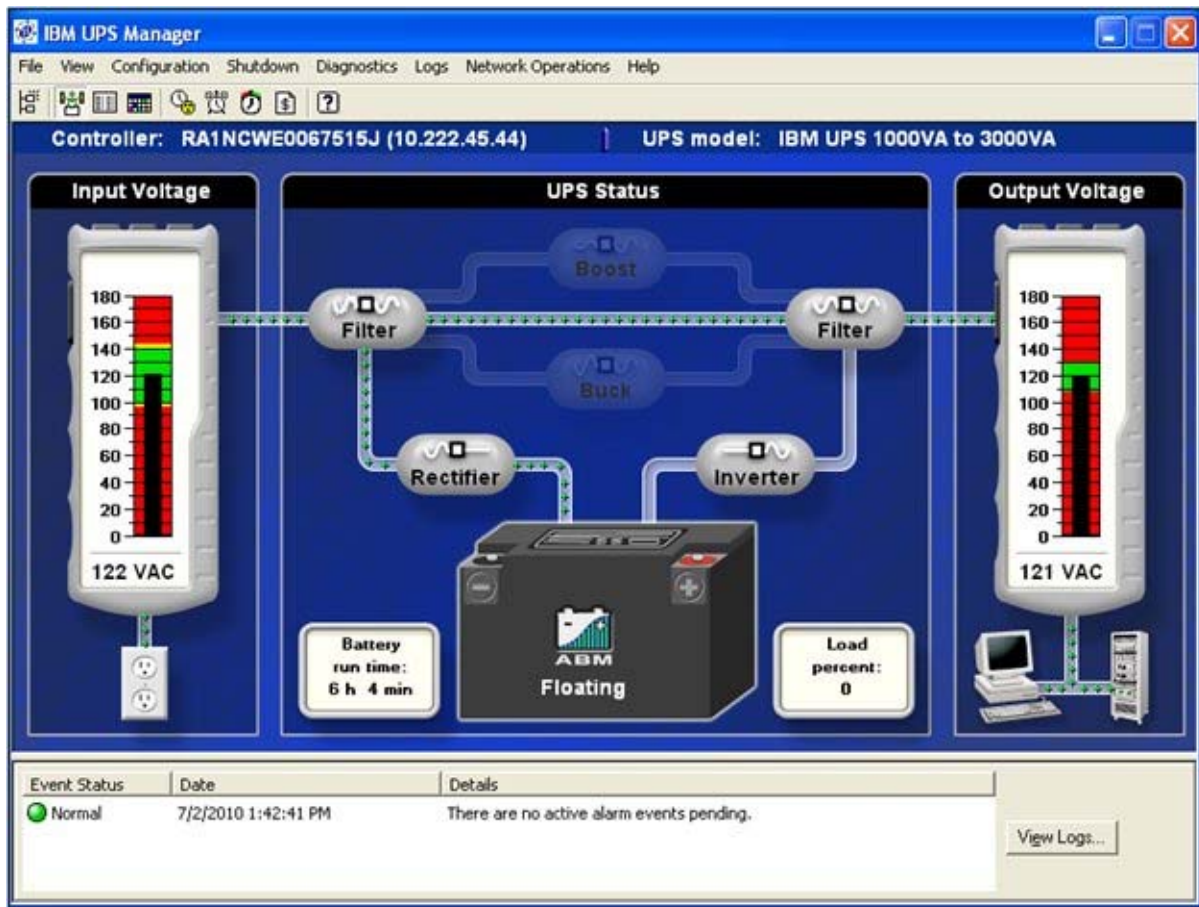


Figure 9. IBM UPS Manager normal status window

Figure 10 shows that the utility power supply has failed and that the UPS is now operating on battery. The UPS Manager software indicates that there is 10 minutes of battery time available based on the current load.

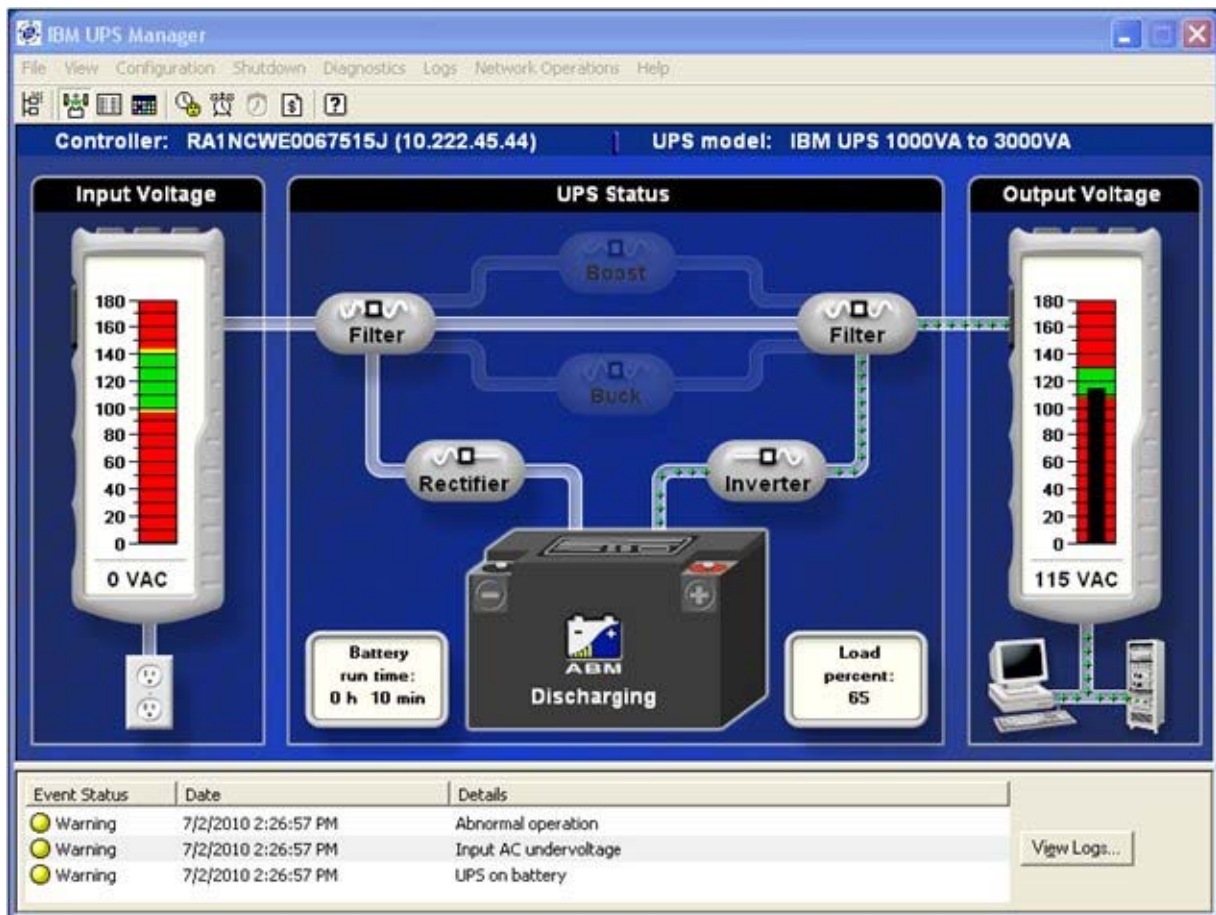


Figure 10. IBM UPS Manager warning status window

Figure 11 shows the event notification window where you can configure how you (and other users) want to be notified when certain events occur.

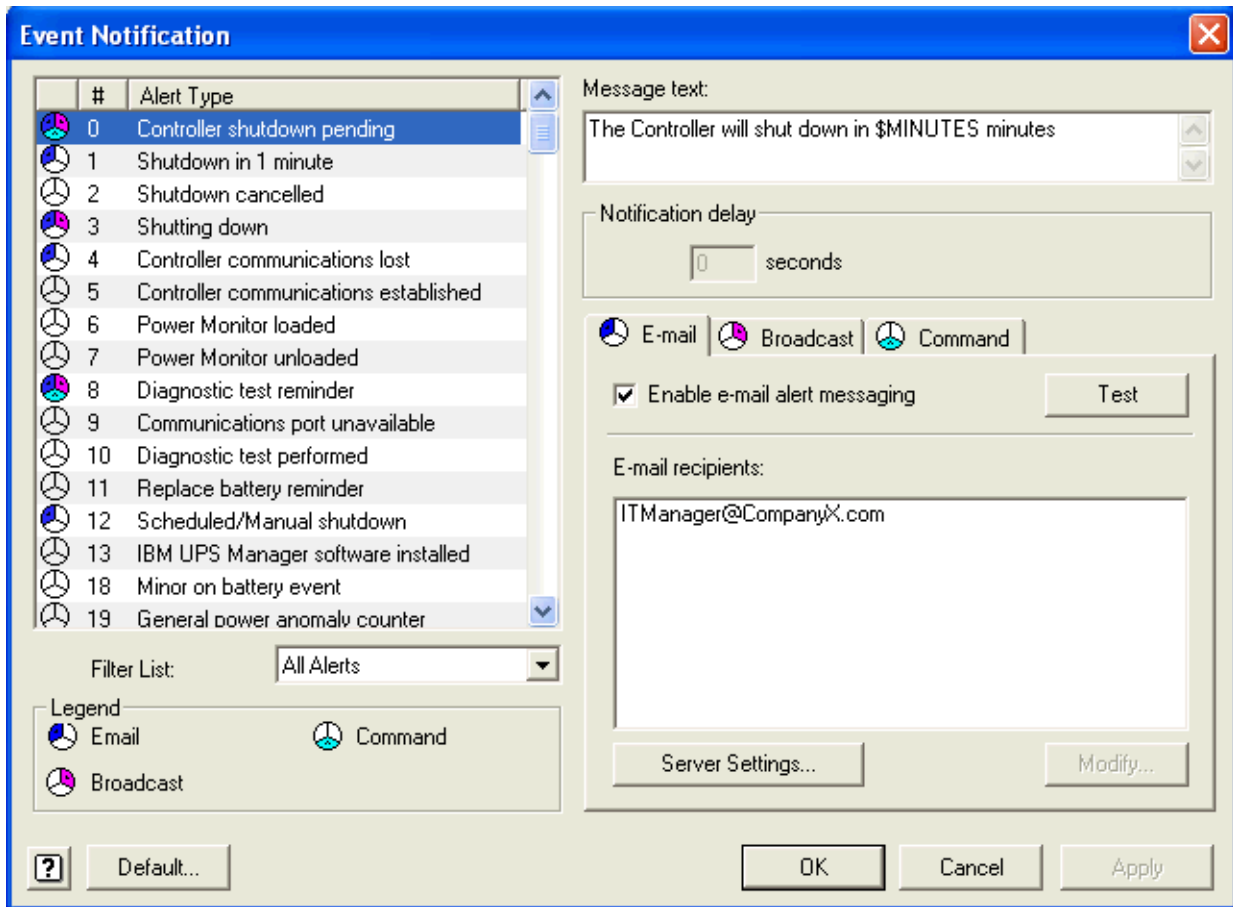


Figure 11. Event Notification window

## IBM Environmental Monitoring Probe (EMP)

The Environmental Monitoring Probe (EMP) (part number 46M4113) is used to report local temperature and humidity values and make that information available to management tools such as IBM Systems Director Active Energy Manager (AEM). The EMP connects to the UPS via the Network Management Card. The EMP is shown in Figure 12.



Figure 12. IBM Environmental Monitoring Probe (EMP)

The Environmental Monitoring Probe has the following characteristics:

- It connects to the Network Management Card (NMC) settings/sensor connection.
- Its temperature and humidity thresholds are easily set to trigger alarm notifications or shut down the protected system.
- Its status can be monitored from the IBM Systems Director AEM or from the Network Management Card web interface.
- It measures temperatures between 0 and 80°C (32 and 176°F) with an accuracy of  $\pm 1^{\circ}\text{C}$ .
- It measures relative humidity between 10 and 90% with an accuracy of  $\pm 5\%$ .
- It can be located away from the UPS with a CAT5 network cable (up to 20 m (65.6 ft)).
- Its user-selectable alarm thresholds enable you to define acceptable temperature or humidity limits.
- It allows email notification through SMTP.

Figure 13 shows information retrieved from an EMP using the NMC web interface.





Figure 13. Environmental Monitoring Probe data as viewed from the Network Management Card web interface

## IBM Systems Director Active Energy Manager

IBM Systems Director Active Energy Manager (AEM) provides an array of new features that allow power and thermal trending analysis for improved power management. AEM collects power information for each device attached to an IBM UPS, presenting a more complete view of energy usage within the data center.

The IBM Systems Director Active Energy Manager (AEM) helps:

- Collect power information from each device attached to an IBM UPS, thus presenting a more complete view of energy usage.
- With server consolidation plans, because of the increased server and rack power densities that have driven the requirement for advanced power management solutions.
- In combination with the optional Environmental Monitoring Probe, AEM enables cross-platform power and thermal trending analysis for improved power management. This configuration allows IT and facility managers to manage data centers for optimal energy efficiency, migrate workloads to eliminate hot spots, and transfer work from underutilized systems to conserve energy.

## Related publications

For more information, refer to these documents:

- IBM US Product Announcement  
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS110-159>
- IBM System x UPS product page  
<http://www.ibm.com/systems/x/hardware/options/upsrack.html>
- *IBM 6000VA LCD 4U Rack Uninterruptible Power Supply Installation and Maintenance Guide*  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5085548>
- *Network Management Card User Guide*  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5085199>
- *IBM System x Configuration and Options Guide*  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=SCOD-3ZVQ5W>

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