Ultra Density Enterprise C19/C13 PDU+
and PDU Modules

Installation and Maintenance Guide

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and PDU Modules

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Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 67 and see the *Important Notices* and *Warranty Information* documents that comes with the PDU.

Fourth Edition (March 2013)

Contents

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་སྒྲིད་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

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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.

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.

Important:

Each caution and danger statements in this document ends 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 *IBM Systems Safety Notices* document.

For example, if a caution statement ends with number “D005,” translations for that caution statement are in the *IBM Systems Safety Notices* document under “D005.”

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

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device or the power rating label for electrical specifications. (D002)

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)

DANGER

Electrical voltage and current from power, telephone, and communication cables are hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure 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 below when installing, moving, or opening covers on this product or attached devices.**

  To Disconnect:

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

  To Connect:

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

  (D005)

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

DANGER

- **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 a shelf or work space. Do not place any object 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 before servicing any device in the rack cabinet.**
- **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.**

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 may 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 manufacturer. Attempting to move the drawer partially or completely out of the rack may cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001)

Chapter 1. Introduction

The IBM® Ultra Density Enterprise PDU products enable you to connect up to nine C19 devices plus an additional three C13 peripheral devices to a single dedicated power source. The monitored PDU (PDU+) models have power monitoring capabilities.

The following PDU models are available:

- 71762NX - IBM Ultra Density Enterprise C19 / C13 PDU Module
- 71763NU - IBM Ultra Density Enterprise C19 / C13 PDU 60 A / 208 V / three-phase
- 71762MX - IBM Ultra Density Enterprise C19 / C13 PDU+ Module
- 71763MU - IBM Ultra Density Enterprise C19 / C13 PDU+ 60 A / 208 V / three-phase

The monitored PDU models enable the IBM Systems Director Active Energy Manager product to monitor the PDU+ products. The Active Energy Manager solution is an IBM Director extension that measures and reports server power consumption as it occurs. Active Energy Manager includes a feature to associate IBM Director-managed resources with the power outlets on the PDU+ models. You can use the graphing capability of Active Energy Manager to show a trending line for power that is being drawn by load groups of the PDU+ models, showing which systems are connected to the load groups.

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

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

The IBM Documentation CD

The IBM *Documentation* CD contains documentation for the PDU 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 XP, 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

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 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 or DVD 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 or DVD drive and click **Start --> Run**. In the **Open** field, type

    ```
    e:\win32.bat
    ```

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

    ```
    sh runlinux.sh
    ```

Select the PDU from the **Product** menu. The **Available Topics** list displays all the documents for the PDU. 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 appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+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.

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 your language 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 might 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.

Installation requirements

You will need the following tools to install the PDU in a rack cabinet:

- One Phillips screwdriver
- One 10 mm (11/32 in.) wrench
- One cage-nut-insertion tool or flat-blade screwdriver (for installing cage nuts in some rack cabinets)

You can install a PDU vertically in the side of a rack cabinet or horizontally within 1U[1] of EIA mounting space in a rack cabinet.

- For vertical mounting instructions, see Chapter 2, “Installing the PDU vertically in a rack cabinet,” on page 11.
- For horizontal mounting instructions, see Chapter 3, “Installing the PDU horizontally in a rack cabinet,” on page 19.

  Attention: Horizontal installation of the PDU is not supported during relocation or shipping of a rack cabinet. Before you relocate the rack cabinet, you must remove any horizontally mounted PDU from the EIA mounting space.

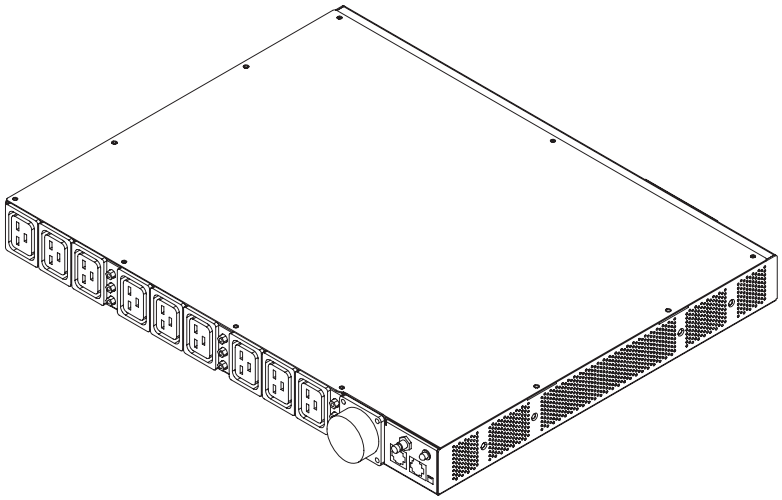
1. One U is equal to 4.45 cm (1.75 in.)

Parts that come with the PDU

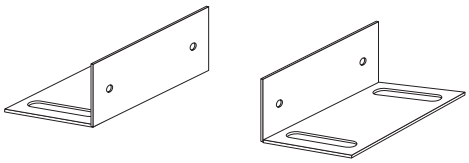
Note: The illustrations in this document might differ slightly from your hardware.

The following parts come with the PDU:

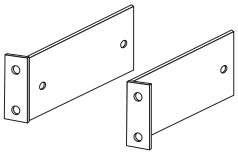
- One PDU (some models include an attachable power cord)



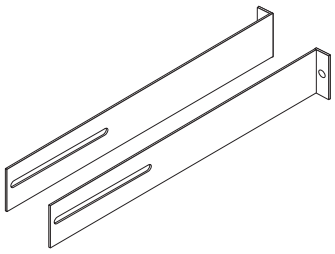
- Two vertical-mounting brackets (for all rack cabinets)



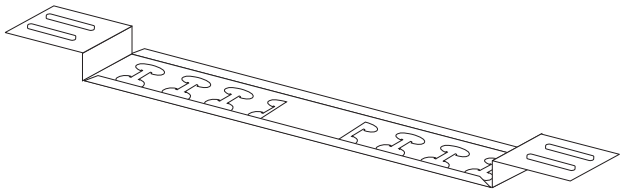
- Two short mounting brackets (for horizontal mounting for all rack cabinets; for vertical mounting in IBM Enterprise rack cabinets only)



- Two long mounting brackets (for horizontal mounting in all rack cabinets)

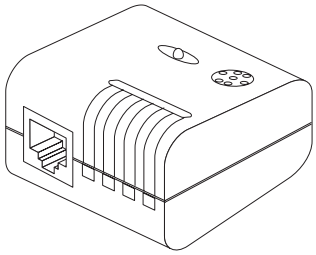


- One cable-management bracket (for vertical installations)



- One environmental monitoring probe

  Note: This part comes with only the monitored PDU (PDU+) models.



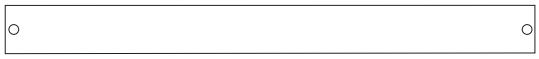
- One DB9-to-RJ-45 cable

  Note: This part comes with only the monitored PDU (PDU+) models.

- One Category 5 Ethernet cable

  Note: This part comes with only the monitored PDU (PDU+) models.

- One 1U blank filler panel



- Miscellaneous hardware kit (for attaching the mounting brackets to the PDU and installing the PDU in a rack cabinet)
- Cable straps

Notes:

1. Power cables for devices that you will connect to the PDU do not come with the PDU.
2. You will have some unused parts depending on how you install the PDU.

Features of the monitored PDU models

The monitored PDU (PDU+) models have the following features:

- Ability to access the versatile sensors in the environmental monitoring probe through the environmental monitoring probe inputs

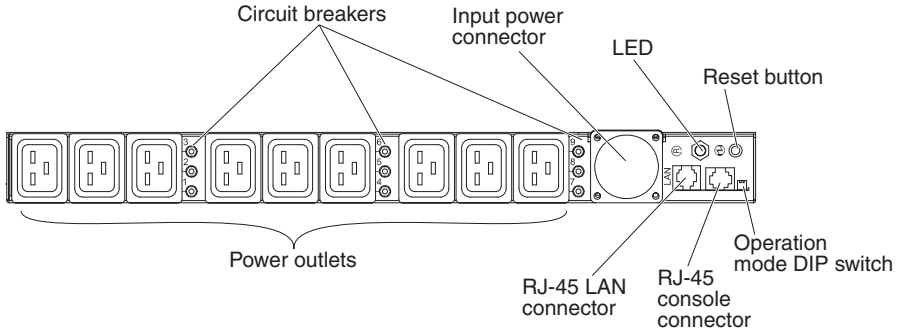
  Note: This feature requires the environmental monitoring probe, which comes with the monitored PDU models.
- Remote monitoring of connected devices and sensors
- Monitoring of the PDU locally, remotely through IBM Systems Director Active Energy Manager, or remotely through a console or network
- Comprehensive power management and flexible configuration through a Web browser, NMS, Telnet, SNMP, or HyperTerminal (console)
- Configurable user-security control
- Easy-to-use interface to display input and output status
- Detailed data-logging for statistical analysis and diagnostics
- Upgrade utility for easy firmware updates
- Event notification through SNMP trap or e-mail alerts
- Daily history report through e-mail
- Address-specific IP security masks to prevent unauthorized access

Hardware components

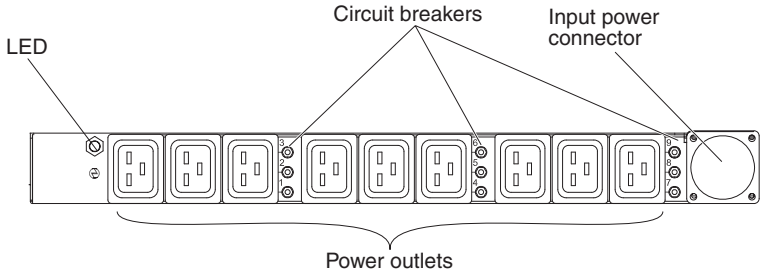
The following sections provide descriptions of the front and rear components on the PDU.

Front view

The following illustration shows the components and controls on the front of the monitored PDU (PDU+) models.



The following illustration shows the components and controls on the front of the non-monitored PDU models.



Circuit breakers

If the load current rating for a power outlet exceeds 20 A, the associated circuit breaker is activated (the breaker pole pops out) and power to the outlet is turned off automatically. To reset the circuit breaker, firmly press the breaker pole until it locks into place.

Note: To manually disconnect power to a device that is connected to the PDU, disconnect the device power cord from the PDU power outlet.

Input power connector

Connect a power cord to this connector.

Note: Some PDU models come with an attached power cord.

LED The green LED shows the PDU input voltage status. When this LED is lit, the PDU is receiving voltage. If the input voltage is too low, this LED is flashing.

Reset button (monitored PDU models only)

Use this button to reset the PDU for communication purposes only. Resetting the PDU does not affect the loads.

Operation mode DIP switch (monitored PDU models only)

Use the switch to set the mode of operation for the PDU. The default mode is S1 off, S2 off for normal operation.

1=Off, 2=Off

The PDU will run normal operational firmware.

1=On, 2=On

The PDU will start in diagnostics mode.

1=On, 2=Off

Serial upgrade mode. You can upgrade the PDU firmware from the serial connection if the network upgrade is not available.

1=Off 2=On

Read-only mode. The device will run normal operational firmware, but no parameters of the device can be changed by a user.

RJ-45 console connector (monitored PDU models only)

Connect the DB9-to-RJ-45 cable that comes with the PDU to this connector and to the serial (COM) connector on a workstation or notebook computer, and use the workstation or notebook computer as a configuration console. You can also connect an environmental monitoring probe to this connector. The environmental monitoring probe monitors humidity and temperature. The connection of an environmental monitoring probe is automatically detected.

Green LED (on the left in a horizontal orientation; on the top in a vertical orientation):

- This LED is lit when the power to the PDU is turned on.
- This LED flashes while the PDU is starting to indicate startup status.

Amber LED (on the right in a horizontal orientation; on the bottom in a vertical orientation):

- This LED flashes while the PDU is communicating with a server or computer or when it is reading data from an environmental monitoring probe.

RJ-45 Ethernet (LAN) connector (monitored PDU models only)

Use this connector to configure the PDU through a LAN. The Ethernet connector supports 10/100 auto sense network connection.

Green LED (on the left):

- This LED is lit when the PDU is connected to a 100 Mb network.
- This LED flashes while data is transmitted and received.

Amber LED (on the right):

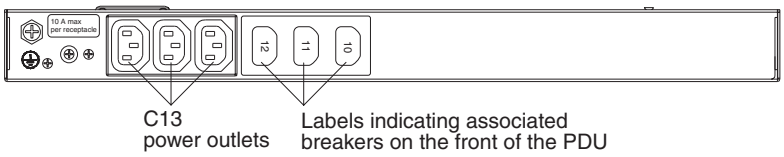
- This LED is lit when the PDU is connected to a 10 Mb network.
- This LED flashes while data is transmitted and received.

Power outlets

You can connect a device to each power outlet. There are nine C19 power outlets on the front of the PDU and there are three C13 power outlets on the rear of the PDU.

Rear view

The following illustration shows the power outlets on the rear of the PDU.



PDU load groups

The PDU load groups are described in the following table.

Table 1. Ultra Density Enterprise PDU load groups

Circuit breaker number	Associated front outlet	Associated rear outlet
1	1	10
2	2	
3	3	
4	4	11
5	5	
6	6	
7	7	12
8	8	
9	9	

Chapter 2. Installing the PDU vertically in a rack cabinet

This chapter describes how to install the PDU vertically in a rack cabinet. To install the PDU in the side of an IBM Enterprise rack cabinet, see “Installing the PDU in the side of an IBM Enterprise rack cabinet only” on page 15.

DANGER

Electrical voltage and current from power, telephone, and communication cables are hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure 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 below when installing, moving, or opening covers on this product or attached devices.**

  To Disconnect:

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

  To Connect:

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

  (D005)

Installing the PDU in the side of a rack cabinet

The mounting holes on the upper and lower side braces in a rack side compartment must be between 48.6 cm (19.1 in.) and 56.9 cm (22.4 in.) apart. If your rack cabinet has movable side braces, see the rack cabinet documentation for information about relocating the side braces if they are not already spaced for this installation.

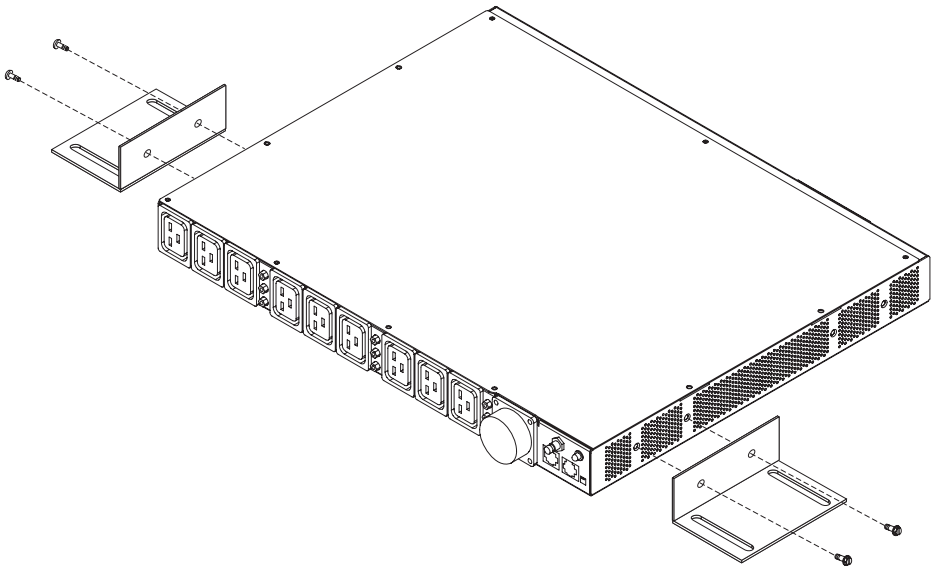
Note: Removing the rack doors and side panels might make installation easier. See the rack cabinet documentation for more information.

Review the documentation that comes with your rack cabinet for safety and cabling information. When you install the PDU in a rack cabinet, observe the following precautions:

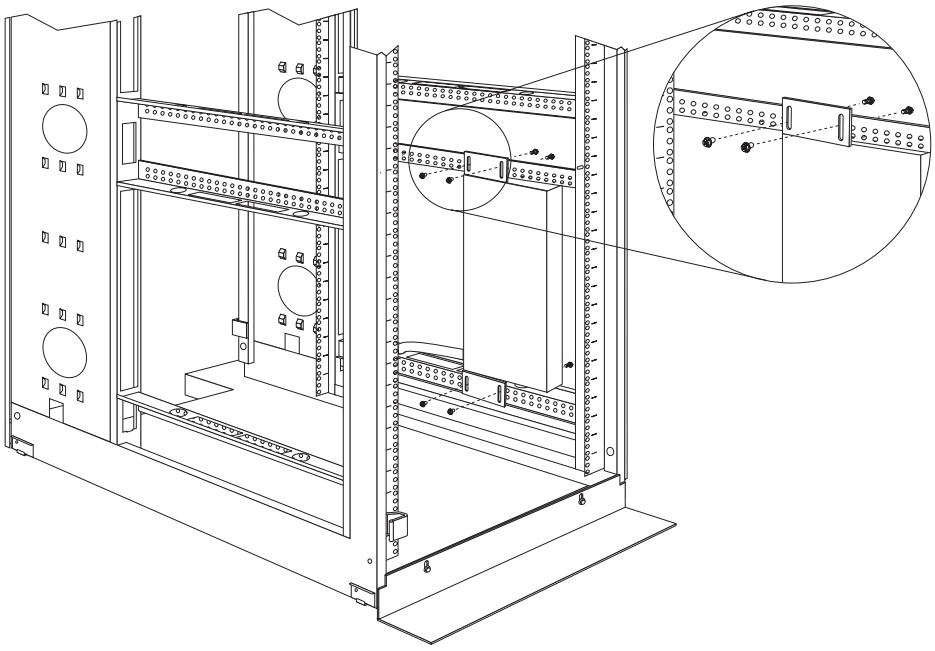
- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually 15 cm (6 in.) of air space provides proper airflow.
- Connect all power cords to properly wired and grounded electrical outlets.
- Do not overload the power outlet when you install multiple devices in the rack cabinet.

To install a PDU in the side of a rack cabinet by using the vertical mounting brackets, complete the following steps:

1. Align the vertical mounting brackets to the front of the PDU and attach the brackets to the PDU with two M3 x 5 screws per bracket. Use the screws that come with the PDU. You can install the PDU in a rack cabinet with the power outlets facing the rear or the front of the rack cabinet.



2. Hold the PDU in the side of the rack cabinet, and attach the vertical mounting brackets to the side braces with four M6 screws and nuts that come with the PDU.



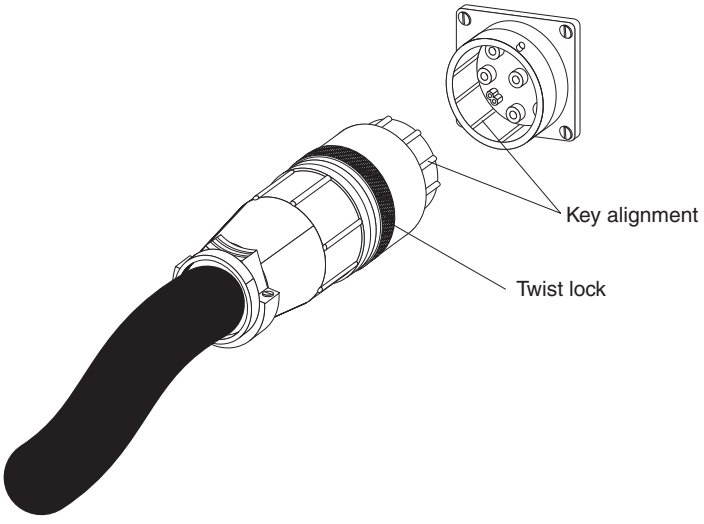
Notes:

a. Leave enough space to connect, route, and disconnect power cords.

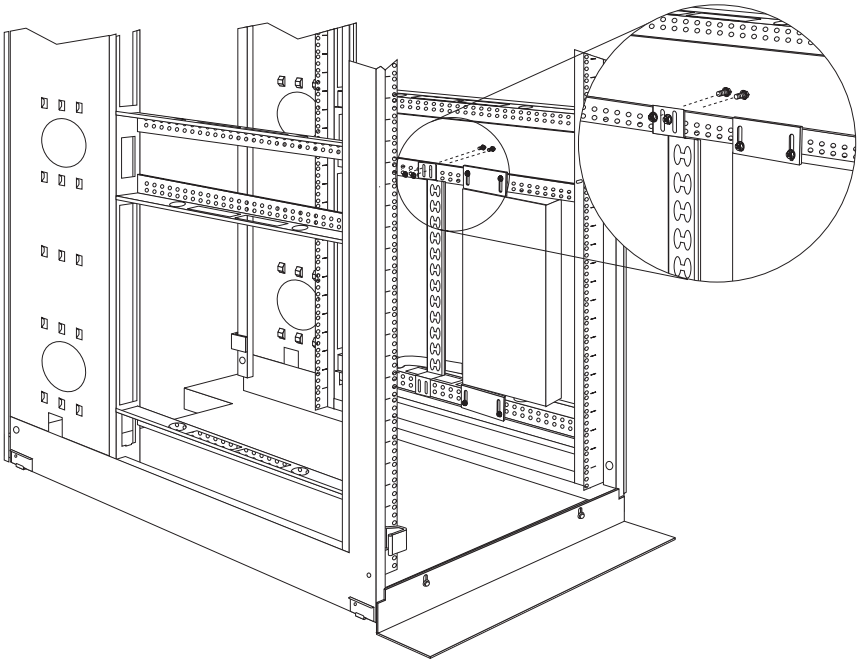
b. If you are installing a cable-management bracket in the same side of the rack cabinet, leave enough space between the outlet side of the PDU and the EIA mounting flanges for the cable-management bracket installation.

Attention: You must disconnect the main input power before you connect or disconnect the input power cord from the PDU.

3. If the PDU comes with a detached power cord, connect the power cord. Align the connector on the power cord that comes with the PDU with the connector on the front of the PDU, turning as necessary for key alignment; then, turn the twist-lock on the connector clockwise until it locks into place.

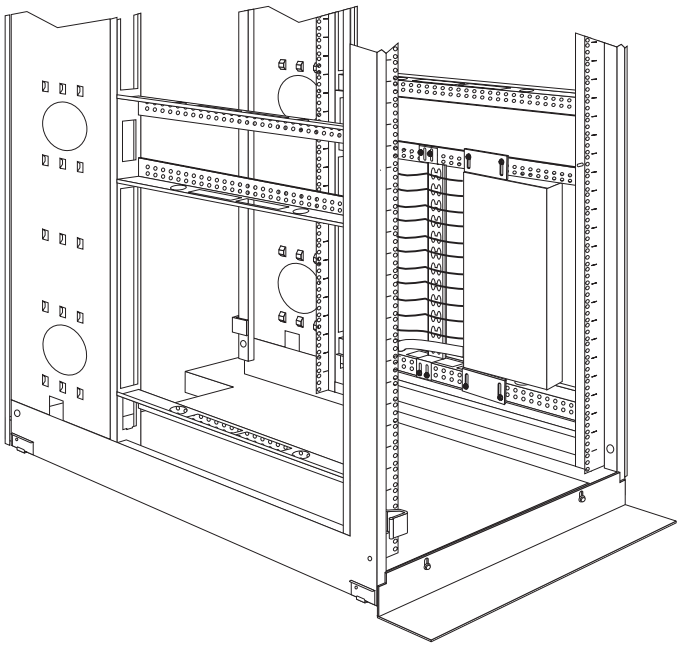


4. Install the optional cable-management bracket beside the PDU with four M6 screws and nuts that come with the PDU.

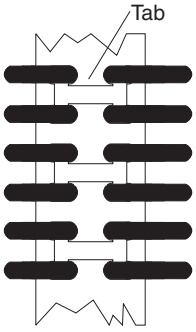


5. Route the power cord from the PDU toward the rack cabinet side braces; then, route the power cord along a side brace toward the back of the rack cabinet, and secure the power cord with the cable straps that come with the PDU.
6. Route the power cord toward a dedicated power source. Use the provided cable straps to secure the power cord along the way. If the power cord must exit the rack cabinet to connect to a power source, use the openings in the rack cabinet.
7. Connect the power cord to a properly wired and grounded dedicated power source. Then, you can connect servers or rack PDUs in the rack cabinet to the power outlets on the PDU.

8. Route all the other power cords neatly, using the cable-management bracket if it is installed, and secure the power cords with cable straps.



Note: To route a power cord through the cable-management bracket, route the cord through an opening in the bracket and against an upper or lower tab on the bracket, as shown in the following illustration. Use cable straps as required.



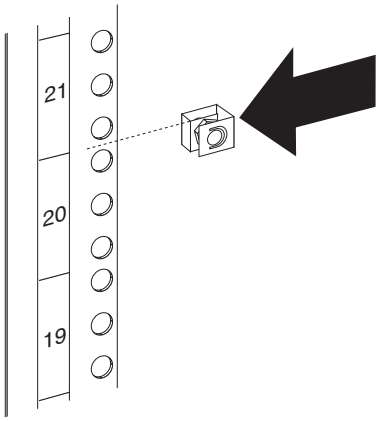
Installing the PDU in the side of an IBM Enterprise rack cabinet only

Note: Removing the rack doors and side panels might make installation easier. See the rack cabinet documentation for more information.

Review the documentation that comes with your rack cabinet for safety and cabling information. When you install the PDU in a rack cabinet, observe the following precautions:

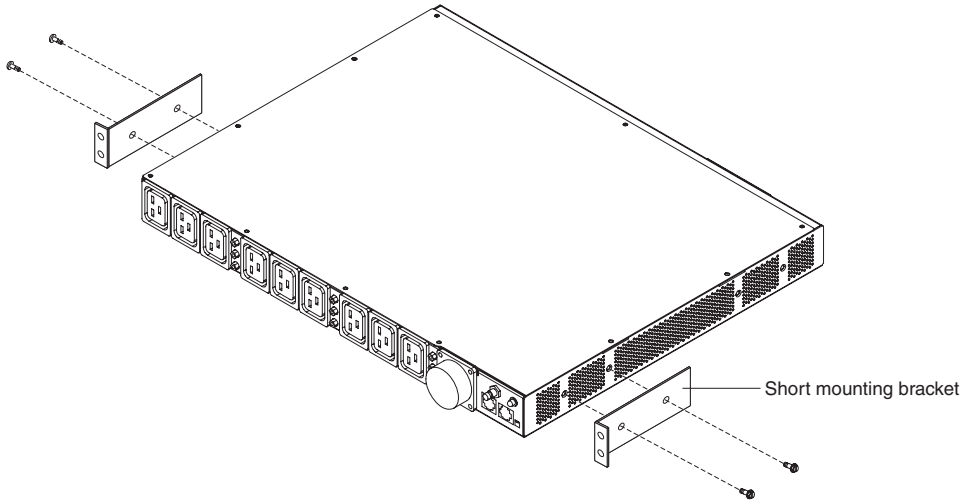
- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually 15 cm (6 in.) of air space provides proper airflow.
- Connect all power cords to properly wired and grounded electrical outlets.
- Do not overload the power outlet when you install multiple devices in the rack.

You must use clip nuts to install the mounting brackets. Clip nuts come with the PDU and are installed on the rack mounting flanges, as shown in the following illustration.



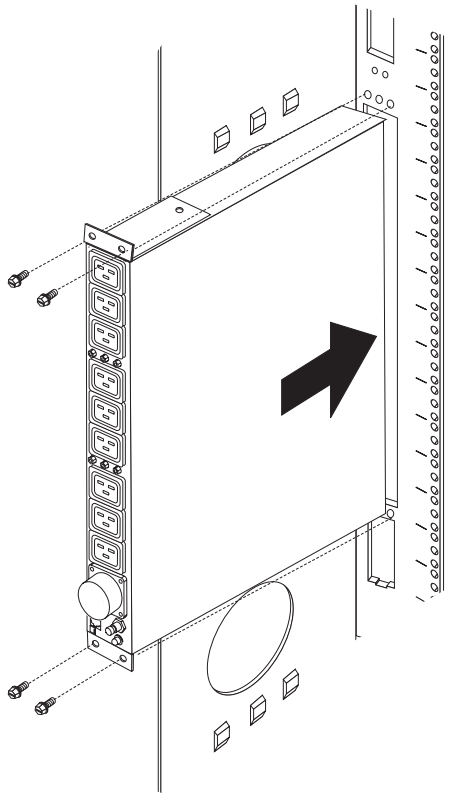
To install the PDU in the 1U mounting space in the side of an IBM Enterprise rack cabinet, complete the following steps:

1. Align the vertical-mounting brackets to the front of the PDU. Make sure that you attach the brackets so that the power outlets face the rear of the rack cabinet.



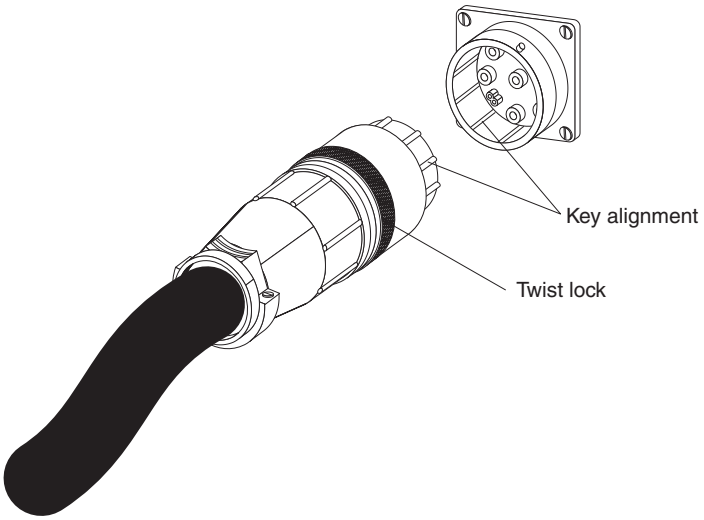
2. Attach the brackets to the PDU with two M3 x 5 screws per bracket. Use the screws that come with the PDU.

3. Align the PDU with the opening in the side of the rack cabinet; then, while you hold the PDU in place, attach the brackets to the rack-mounting flanges with four clip nuts and four M6 screws that come with the PDU.



Attention: You must disconnect the main input power before you connect or disconnect the input power cord from the PDU.

4. If the PDU comes with a detached power cord, connect the power cord. Align the connector on the power cord that comes with the PDU with the connector on the front of the PDU, turning as necessary for key alignment; then, turn the twist-lock on the connector clockwise until it locks into place.



5. Route the power cord from the PDU toward the rack cabinet side braces; then, route the power cord along a side brace toward the back of the rack cabinet, and secure the power cord with the cable straps that come with the PDU.
6. Route the power cord toward a dedicated power source. Use the provided cable straps to secure the power cord along the way. If the power cord must exit the rack cabinet to connect to a power source, use the openings in the rack cabinet.
7. Connect the power cord to a properly wired and grounded dedicated power source. Then, you can connect servers or rack PDUs in the rack cabinet to the power outlets on the PDU.
8. Route all the other power cords neatly and secure the power cords with cable straps.

Chapter 3. Installing the PDU horizontally in a rack cabinet

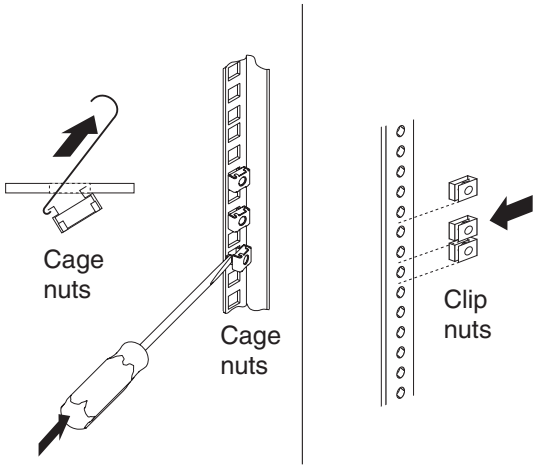
Attention: Horizontal installation of a PDU is not supported during relocation or shipping of a rack cabinet. You must remove any horizontally mounted PDUs from the EIA mounting space before you relocate the rack cabinet.

Note: Removing the rack doors and side panels might make installation easier. See the rack cabinet documentation for more information.

Review the documentation that comes with your rack cabinet for safety and cabling information. When you install the PDU in a rack cabinet, observe the following precautions:

- Make sure that the room air temperature is below 35°C (95°F).
- Do not block any air vents; usually 15 cm (6 in.) of air space provides proper airflow.
- Plan the device installation starting from the bottom of the rack cabinet.
- Install the heaviest device in the bottom of the rack cabinet.
- Do not extend more than one device out of the rack cabinet at the same time.
- Connect all power cords to properly wired and grounded electrical outlets.
- Do not overload the power outlet when you install multiple devices in the rack cabinet.

Use cage nuts for rack cabinets with square holes, and use clip nuts for rack cabinets with round holes. If your rack cabinet requires cage nuts, use a cage-nut-insertion tool or a flat-blade screwdriver to install them.



DANGER

Electrical voltage and current from power, telephone, and communication cables are hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure 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 below when installing, moving, or opening covers on this product or attached devices.**

  To Disconnect:

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

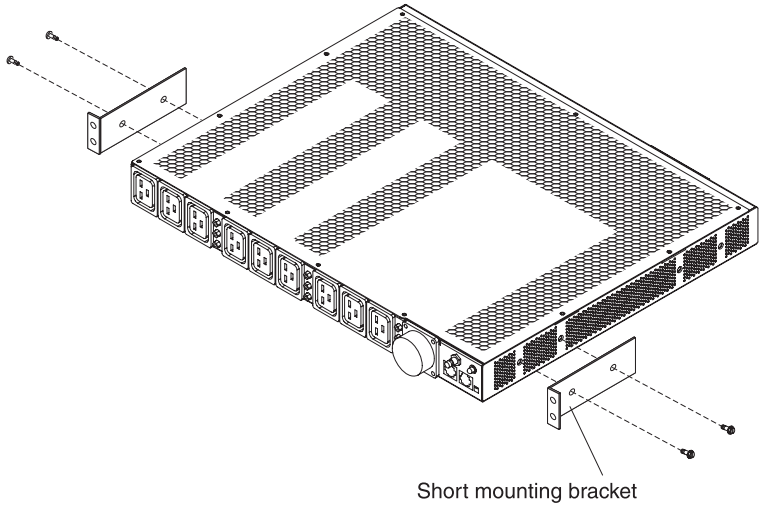
  To Connect:

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

  (D005)

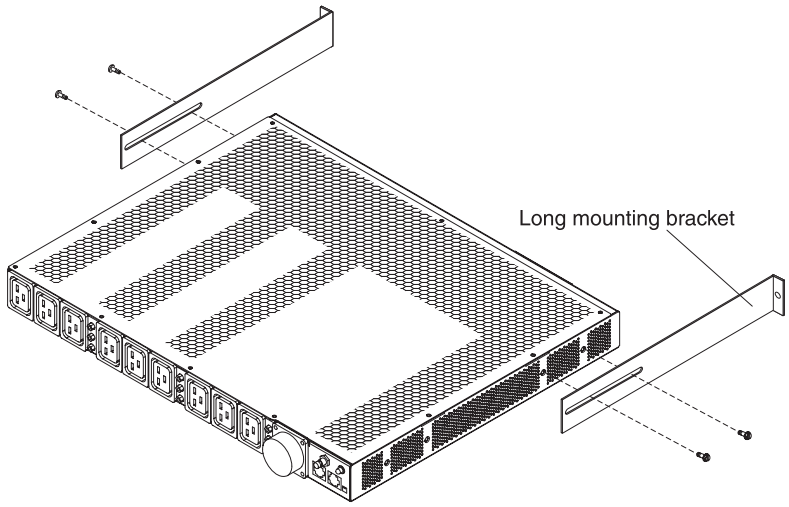
To install the PDU horizontally in a rack cabinet, complete the following steps:

1. Align the short mounting brackets with the holes in the front of the PDU and attach the brackets to the PDU with two M3 flat-head screws per bracket. Use the screws that come with the rack-mounting kit.

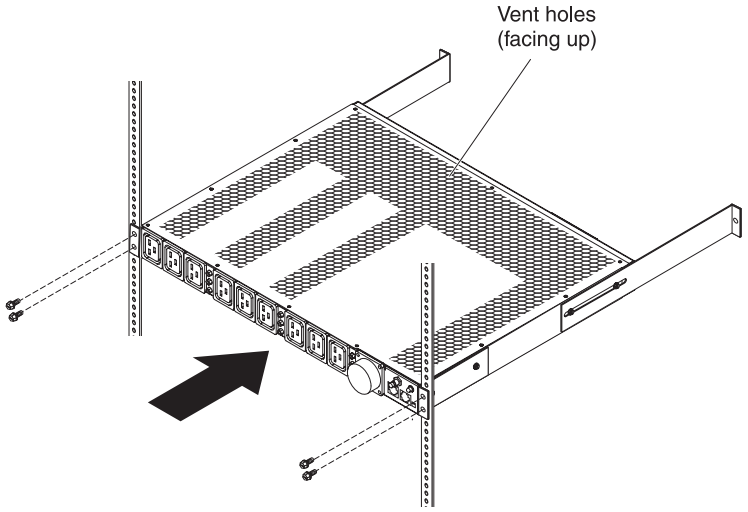


2. Align the long mounting brackets with the holes in the rear of the PDU and attach the brackets to the PDU with two M3 pan-head screws with captive lock washers per bracket. Use the screws that come with the rack-mounting kit.

   Note: If you install the PDU in the 1U space between two servers, attach only one long mounting bracket to the PDU. After the PDU is installed in the rack cabinet, you can route the power cable along the side of the PDU that does not have a long mounting bracket.

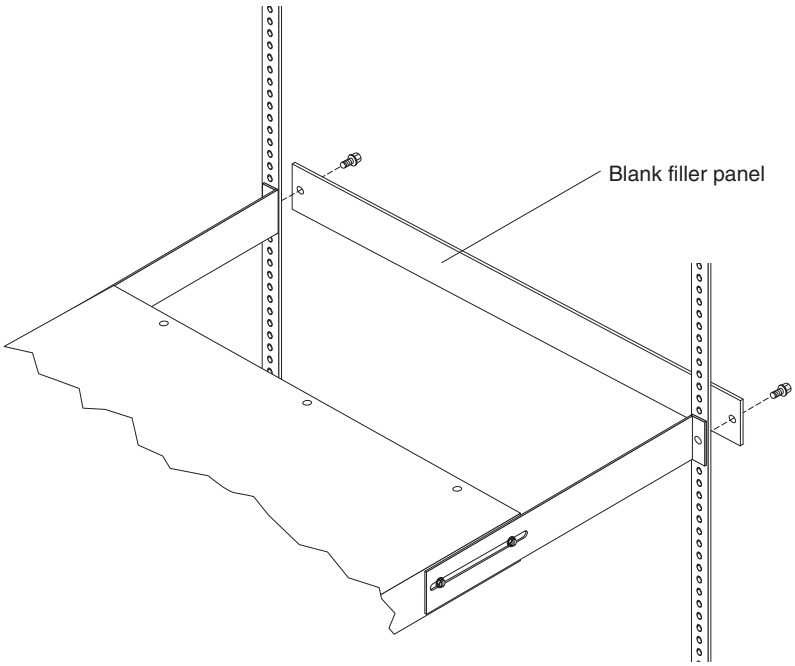


3. Orient the PDU so that the vent holes are facing up. Hold the PDU at a slight angle and carefully insert it into the 1U mounting space in the rack cabinet. Pushing in slightly on both of the long mounting brackets helps clear the brackets from the rack flanges.
4. Secure the end of the PDU that has the short mounting brackets to the rack cabinet first. Make sure that the short mounting brackets are aligned with the outside of the rack flanges. Attach the brackets to the rack flanges with two M6 screws and two cage nuts or clip nuts per bracket. Use the cage nuts or clip nuts and the screws that come with the rack-mounting kit.



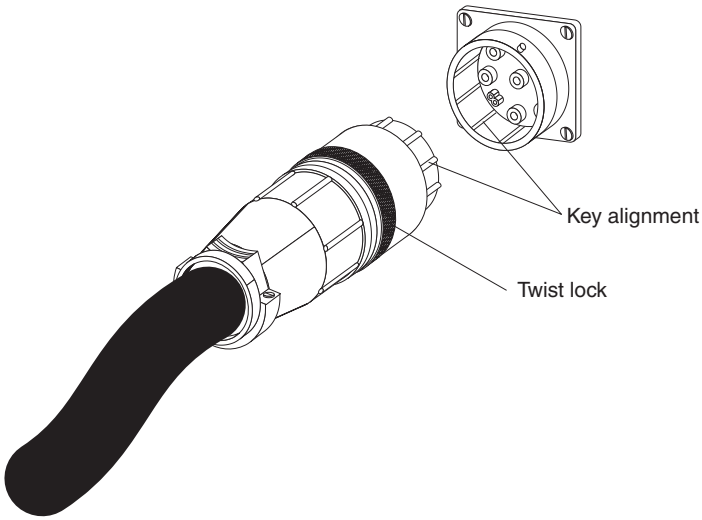
5. Secure the long mounting brackets and the 1U blank filler panel to the rack cabinet.

   Note: If you install the PDU in the 1U space between two servers, attach only one long mounting bracket to the PDU and then to the rack cabinet. You can route the power cable along the side of the PDU that does not have a long mounting bracket.



   a. Adjust the long mounting brackets to fit the depth of the rack cabinet.
   b. Make sure that the long mounting brackets are aligned with the inside of the rack flanges.
   c. Align the blank filler panel on the outside of the rack flanges.
   d. Attach the filler panel to the rack flanges and then to the long mounting bracket with one M6 screw per bracket.
   e. Tighten the M3 pan-head screws that secure the long mounting brackets to the PDU.

6. If the PDU comes with a detached power cord, connect the power cord. Align the connector on the power cord that comes with the PDU with the connector on the front of the PDU, turning as necessary for key alignment; then, turn the twist-lock on the connector clockwise until it locks into place.



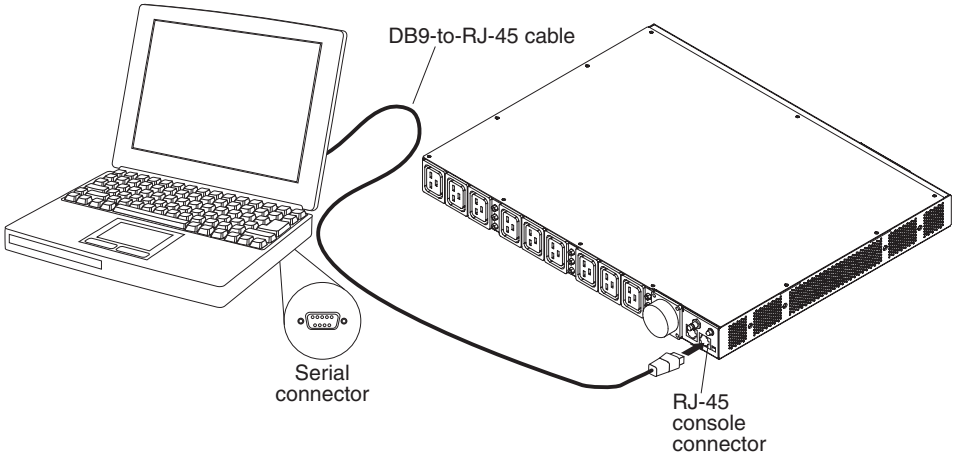
7. Route the power cord from the PDU toward the rack cabinet side braces; then, route the power cord along a side brace toward the back of the rack cabinet, and secure the power cord with the cable straps that come with the PDU.
8. Route the power cord toward a dedicated power source. Use the provided cable straps to secure the power cord along the way. If the power cord must exit the rack cabinet to connect to a power source, use the openings in the rack cabinet.
9. Connect the power cord to a properly wired and grounded dedicated power source. Then, you can connect servers or rack PDUs in the rack cabinet to the power outlets on the PDU.
10. Route all the other power cords neatly and secure the power cords with cable straps.

Chapter 4. Cabling the monitored PDU

This chapter provides information about connecting the monitored PDU to a console, LAN, and environmental monitoring probe.

Connecting to a console

Use the DB9-to-RJ-45 cable that comes with the PDU to connect the serial (COM) connector on a workstation or notebook computer to the RJ-45 console connector on the PDU, as shown in the following illustration.



If your workstation or notebook computer does not have a DB-9 serial connector, you can use a DB-9-to-USB converter cable to connect the PDU to a workstation or notebook computer.

To connect the PDU to a workstation or notebook computer using a DB-9-to-USB converter cable, complete the following steps:

1. Obtain a DB-9-to-USB converter cable (must be purchased separately).
2. On the workstation or notebook computer that you are connecting to the PDU, install the device drivers for the DB-9-to-USB converter cable, by using the instructions that come with the converter cable.
3. Connect the DB9-to-RJ-45 cable that comes with the PDU to the RJ-45 console connector on the PDU, as shown in the previous illustration.
4. Connect the DB-9 connector end of the converter cable to the cable that you connected to the PDU in step 3.
5. Connect the USB connector end of the converter cable to the workstation or notebook computer.

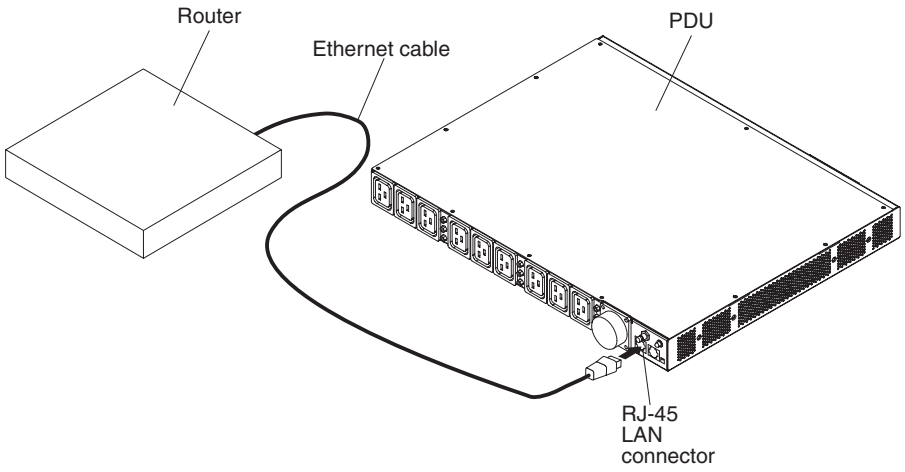
   Communication is now established with the PDU using the COM port created by the converter cable.

For information about initially setting up the PDU and to configure PDU settings, see “Using the IBM DPI Configuration Utility” on page 29.

Connecting to a LAN

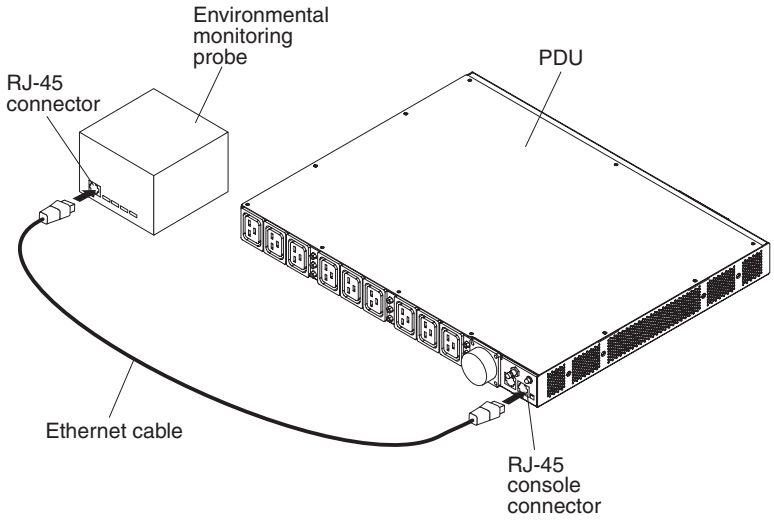
You can monitor the PDU power outlets and digital outputs over a network through the Web interface, using a LAN connection.

Connect a router or switch to the RJ-45 LAN connector on the PDU, using an Ethernet cable. You can then monitor the PDU from a workstation or notebook computer that is connected to the same network. For more information about how to monitor the PDU and its output devices through the Web, see “Using the Web interface” on page 37.



Connecting to an environmental monitoring probe

The environmental monitoring probe that comes with the monitored PDU has a built-in temperature and humidity sensor and enables you to remotely monitor the temperature and humidity of the environment that the PDU is operating in. Connect the environmental monitoring probe to the RJ-45 console connector on the PDU, as shown in the following illustration.



For more information about the environmental monitoring probe, see Chapter 6, “Using the environmental monitoring probe,” on page 49.

Connecting output devices

The PDU has 12 power outlets for connecting devices such as workstations, servers, and printers. You can monitor the power status of a connected device either manually or remotely through the LAN and console connectors. Connect a device that you want to monitor to a power outlet on the PDU with the power cord that comes with the device.

Chapter 5. Monitoring the power status (monitored PDU models only)

You can monitor the power status of any device that is connected to the PDU, either locally or remotely, through the PDU Web interface. You can use the IBM DPI Configuration Utility to initially set up the PDU and to configure PDU settings such as network parameters, access control table, and trap receivers table. You can also use IBM Systems Director Active Energy Manager to monitor power usage of the PDU+ and its load groups.

Note: All of the Configuration Utility configuration menu choices are available through the Web interface after the PDU is set up on the local network.

Using the IBM DPI Configuration Utility

This section describes how to use the IBM DPI Configuration Utility to configure the PDU settings, such as the IP address, network parameters, access control table, and trap receivers table.

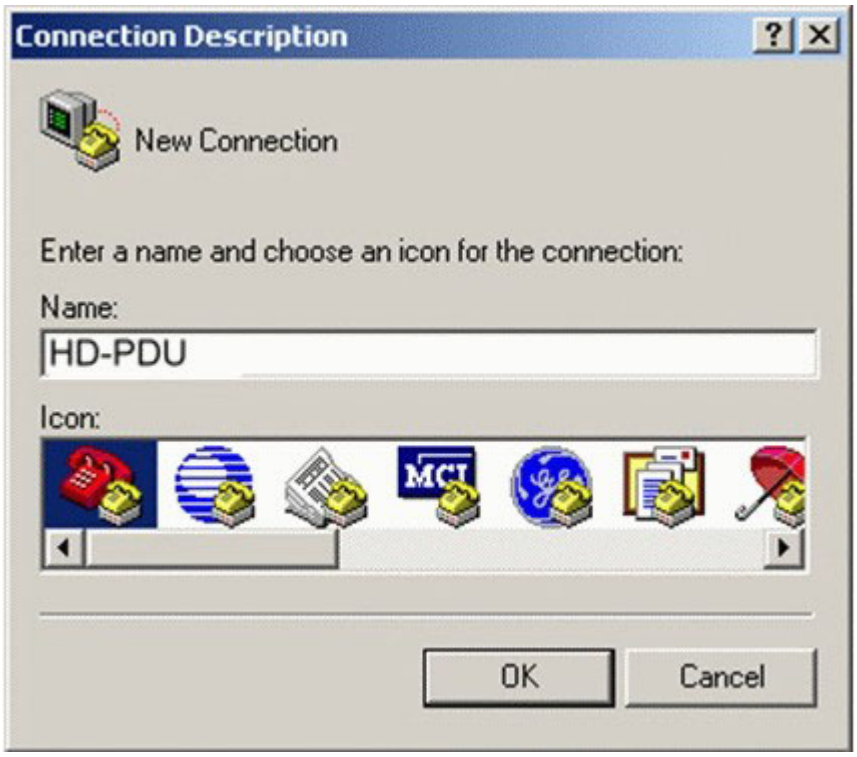
You can configure the PDU by using a workstation or notebook computer that is connected to the PDU. Connect the DB9-to-RJ-45 cable that comes with the PDU to the RJ-45 console connector on the PDU and to a RS-232 serial (COM) connector on a workstation or notebook computer. For more information, see “Connecting to a console” on page 25.

Using HyperTerminal

HyperTerminal is a terminal program in a Microsoft Windows operating system that you can use to configure or control a device, using command line parameters. You can configure the PDU parameters and its outlets, using numerical commands from a keyboard. You can also use Telnet or any other terminal program to configure the PDU after the IP address is set.

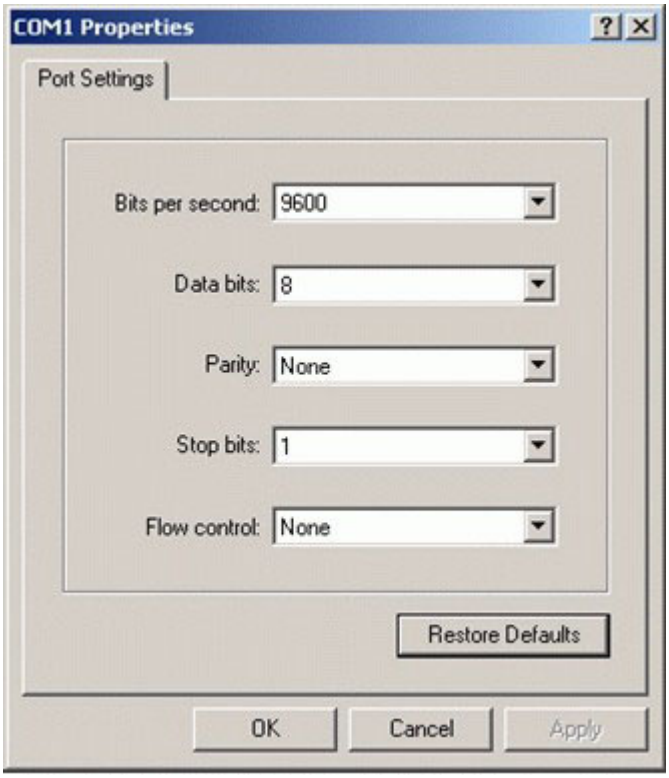
To start HyperTerminal and communicate with the PDU, complete the following steps:

1. To start HyperTerminal, click **Start → Programs → Accessories → Communications → HyperTerminal**. The Connection Description window opens.



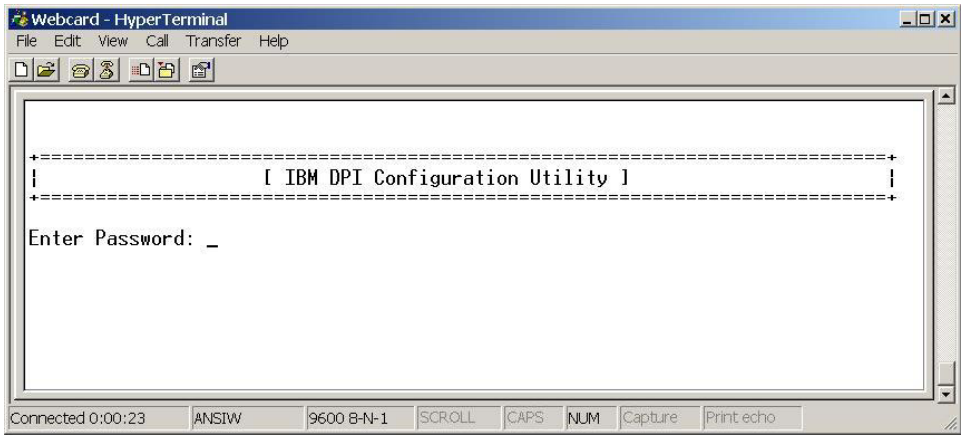
2. In the **Name** field, type the name for the connection and select an icon for the connection. Click **OK**. The Connect To window opens.

3. From the **Connect using** list, select the COM port that is connected to the PDU. Click **OK**. The Properties window opens.

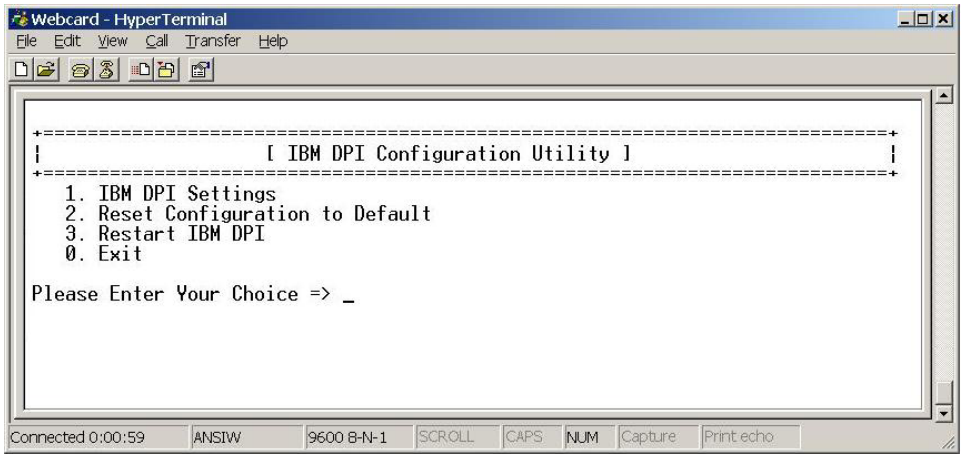


4. Click **Restore Defaults** to use the default settings. Make sure that **9600** is selected in the **Bits per second** list and that **None** is selected in the **Flow control** list. Click **OK**.

5. Press any key. The IBM DPI Configuration Utility main menu opens, and you are prompted for a password. Type `passw0rd` (all lowercase letters with a zero, not O) and press Enter.



The IBM DPI Configuration Utility main window opens.



See “Configuration Utility menu choices” on page 33 for descriptions of the choices in this window.

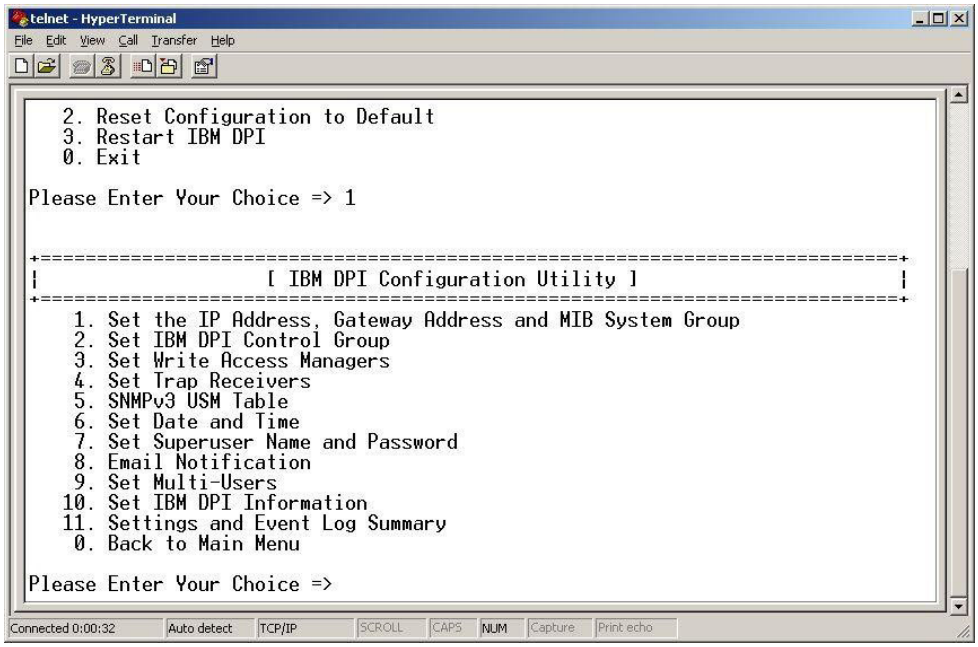
Configuration Utility menu choices

The following choices are on the Configuration Utility main menu.

Note: The Configuration Utility menu choices and commands might be different, depending on the PDU model.

- **IBM DPI Settings**

  When you select **IBM DPI Settings**, the following window opens.



  The following choices are available:

  – **Set the IP Address, Gateway Address and MIB System Group**

    Select this choice to view and change the IP address, date, time, and system information.

  – **Set IBM DPI Control Group**

    Select this choice to set the administrator user name, password, and access protocols.

  – **Set Write Access Managers**

    Select this choice to set up a list of users who can access and control the PDU.

  – **Set Trap Receivers**

    Select this choice to configure remote network management system (NMS) servers to receive traps.

  – **SNMPv3 USM Table**

    Select this choice to set the SNMPv3 USM Table to configure the PDU using SNMPv3 tools.

  – **Set Date and Time**

    Select this choice to adjust the date and time information for the PDU.

  – **Set Superuser Name and Password**

    Select this choice to set the user name and password of the administrator who will use a Web browser to configure the PDU.

– **E-mail Notification**

  Select this choice to set up a list of users who will be alerted with event messages if an unusual event is triggered on the PDU.

– **Set Multi-Users**

  Select this choice to configure other user and password logins and the read and write access levels.

– **Set IBM DPI Information**

  Select this choice to configure the PDU logging interval, refresh rate, and custom name fields for the load groups.

– **Settings and Event Log Summary**

  Select this choice to view all PDU configuration settings.

- **Reset Configuration to Default**

  Select this choice to reset all PDU settings to their factory default values.

- **Restart HD-PDU**

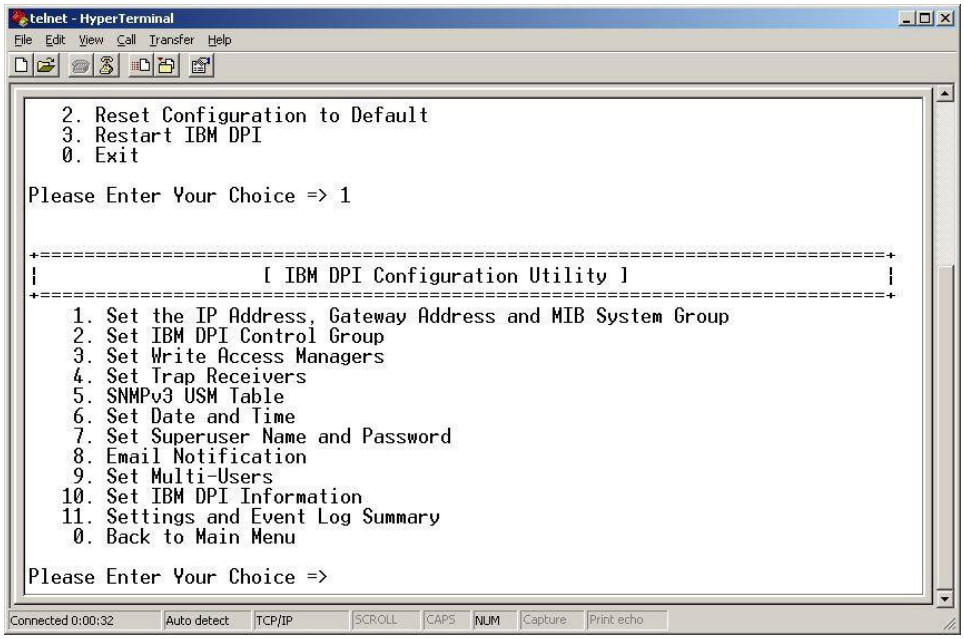
  Select this choice to restart the PDU.

Setting the IP address

Note: You must set the IP address before you can use the Web interface. If you do not know the IP address, contact your network administrator.

To set the IP address of the PDU, complete the following steps:

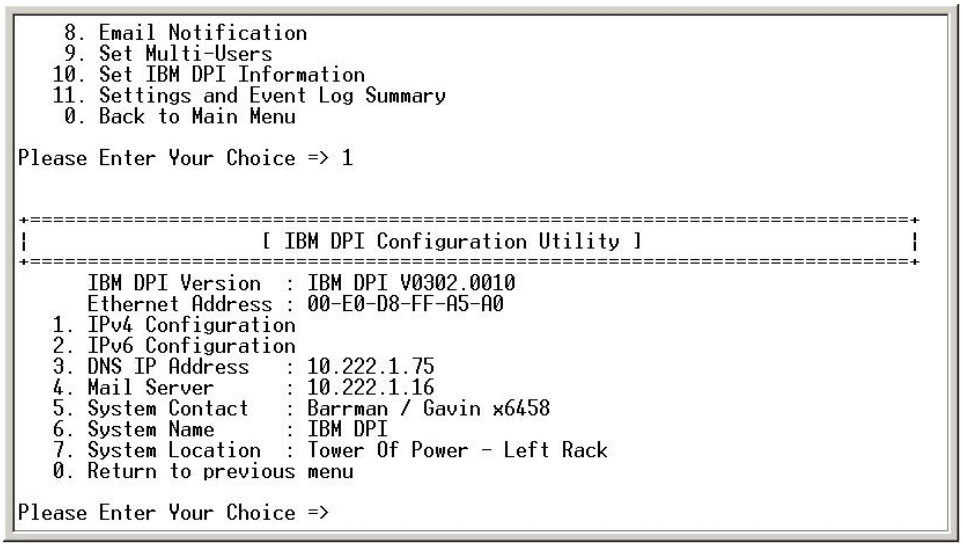
1. In the Configuration Utility main menu, select **IBM DPI Settings**. The following window opens.



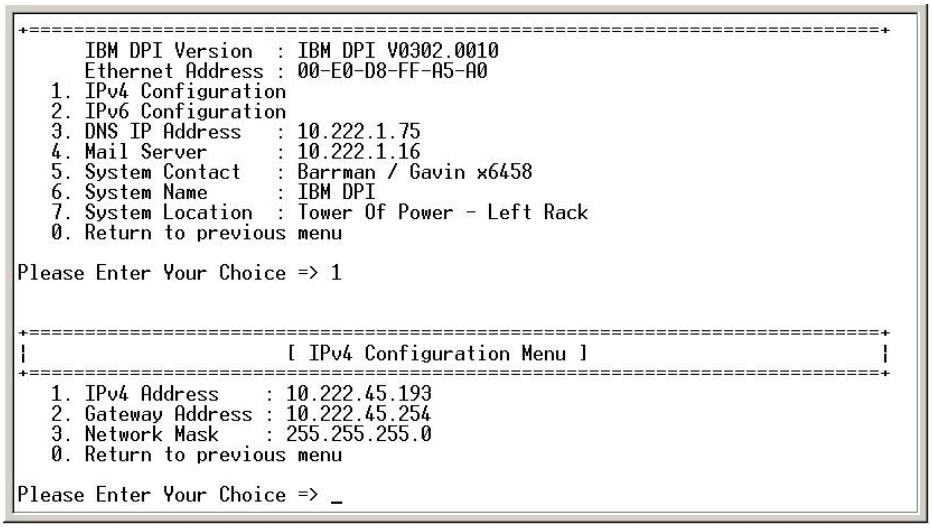
2. Select **Set the IP Address, Gateway Address and MIB System Group**. You must set the IP address before you can access the PDU in an IP network (LAN/WAN).

   Note: The MIB System Group contains the system name, system contact, and system location information. This information is returned through the system group in SNMP and is also displayed through the Web interface.

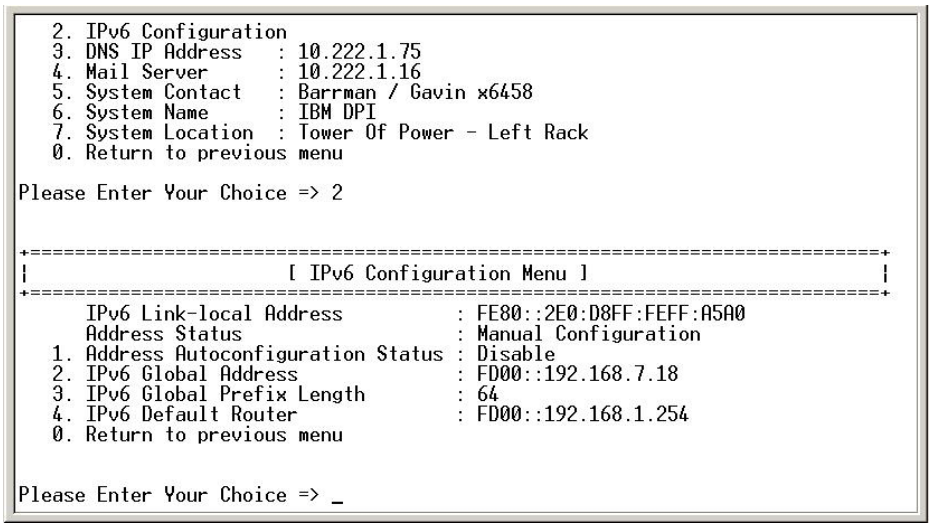
   A window similar to the one in the following illustration is displayed.



3. To configure the Internet Protocol, choose one of the following:
   - To configure Internet Protocol version 4, select **IPv4 Configuration**. A window similar to the one in the following illustration is displayed.



- To configure Internet Protocol version 6, select **IPv6 Configuration**. A window similar to the one in the following illustration is displayed.



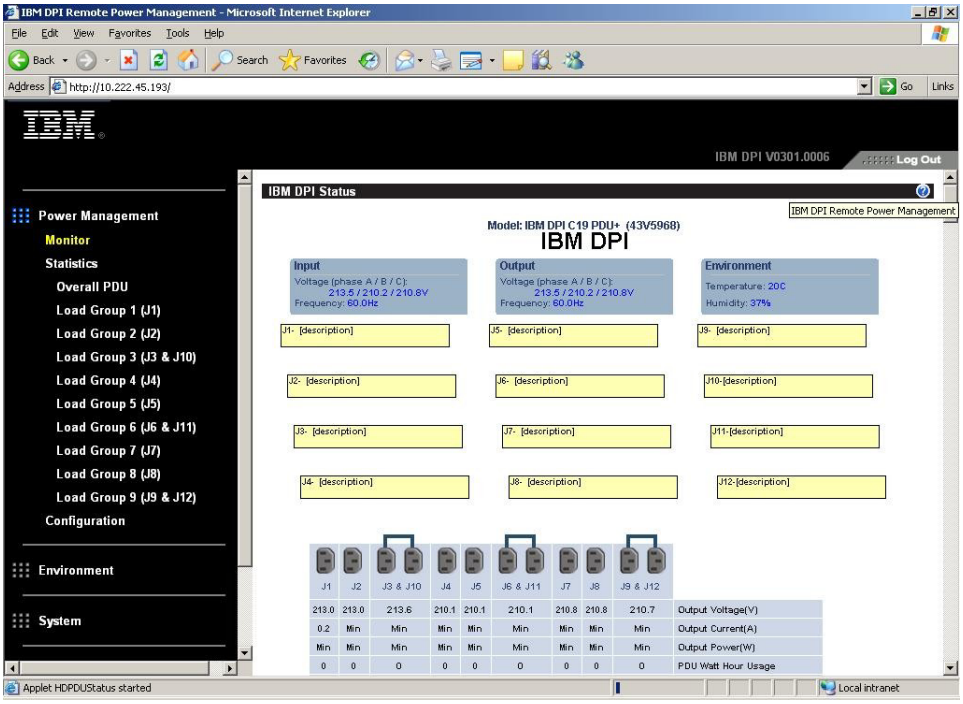
Using the Web interface

This section provides information about using the Web interface to configure and monitor the PDU remotely. The PDU provides a graphical user interface that you can view from a Web browser. Using a Web browser, you can access and monitor the PDU power outlets and output devices remotely from a workstation or notebook computer.

Starting the Web interface

To start the Web interface, complete the following steps:

1. Start a Web browser from a workstation or notebook computer and enter the IP address of the PDU in the address field. For more information about setting the IP address of the system, see “Setting the IP address” on page 34.
2. The “Connect to” window opens. In the **User name** field, type `USERID` (all uppercase letters). In the **Password** field, type `passw0rd` (all lowercase letters with a zero, not O).
3. Click **OK**. The main status page opens.



The main page shows a graphical representation of the PDU power outlets and input status:

- The left pane shows the menus and submenus for the PDU. Click a menu to display the menu choices, expand the menu items, and modify the menu choices as required.
- The graphic in the right pane shows the status of the outlets, input voltage, output voltage, frequency, current and power, watt-hour consumption, and cumulative kilowatt hour power consumption. If you connect an optional environmental monitoring probe, the temperature and humidity environment conditions are displayed.

Each menu page provides online help to assist you with configuring the PDU. Click the Help icon at the top of each page to view the help.

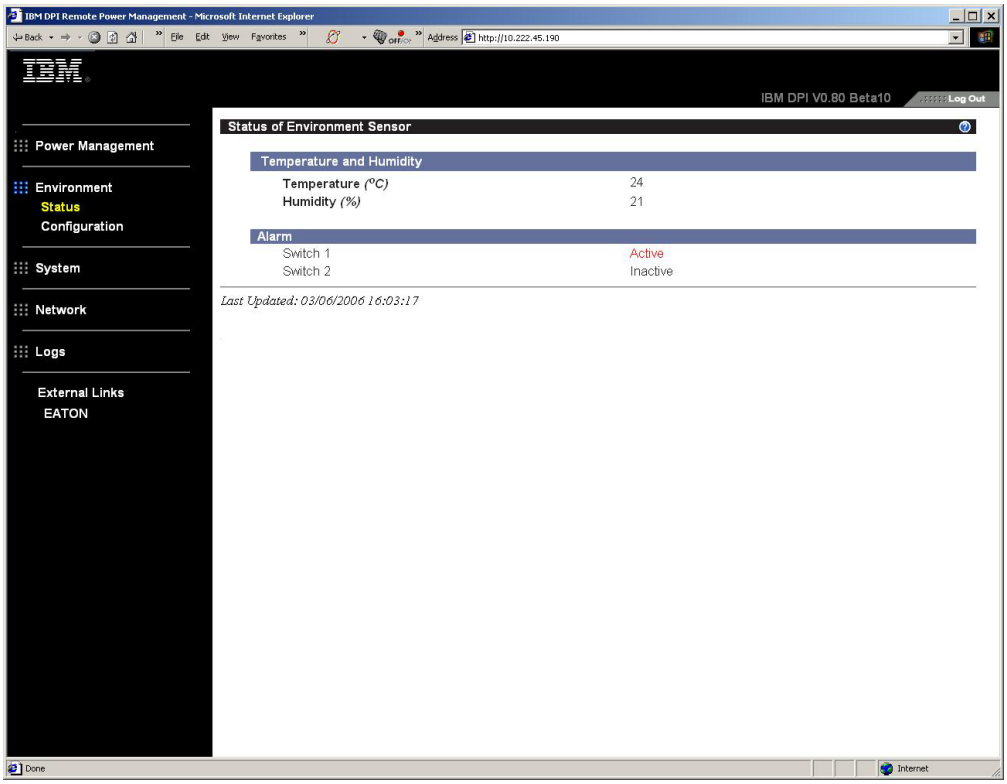
Environment status and configuration

If an environmental monitoring probe is connected to the PDU, you can view the temperature and humidity information. For more information about installing and using the environmental monitoring probe, see Chapter 6, “Using the environmental monitoring probe,” on page 49.

Viewing the status

On the Status of Environment Sensor page, you can view the environment status (temperature and humidity).

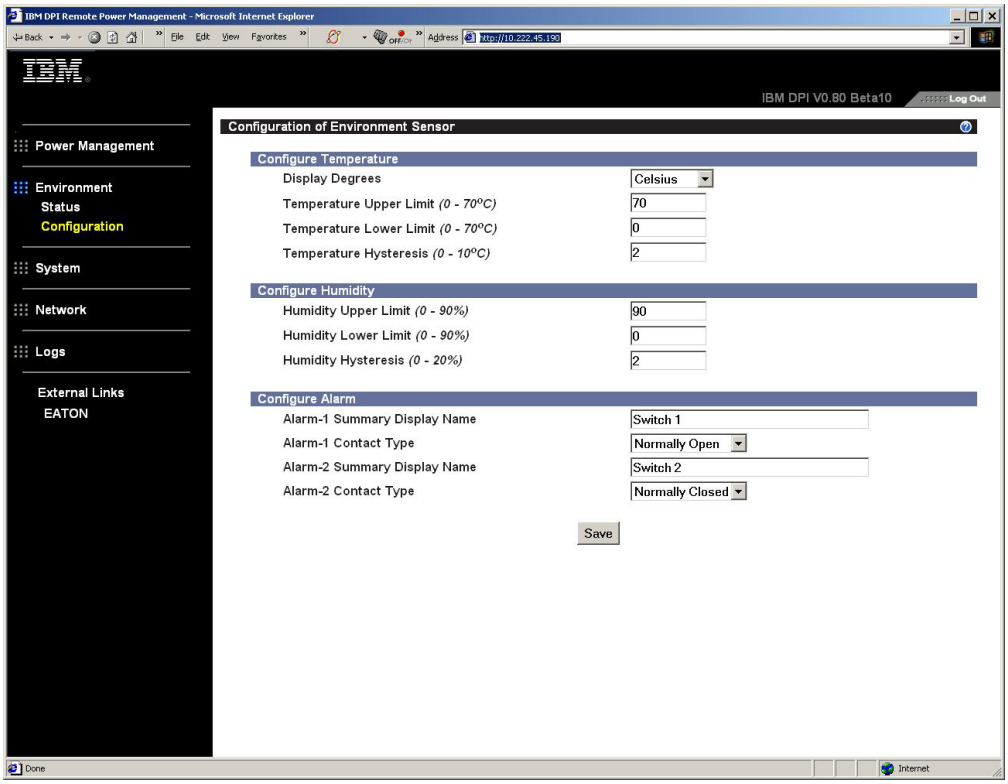
To view the status of an environmental monitoring probe that is connected to the PDU, click **Status** under **Environment**. The Status of Environment Sensor page opens, and the temperature and humidity of the environment sensor are displayed.



Changing the configuration settings

On the Configuration of Environment Sensor page, you can change the system configuration of the environment sensor.

To configure the environmental monitoring probe that is connected to the PDU, click **Configuration** under **Environment**. You can set the sensor names, high and low set points, and the calibration offsets of the sensors.



Modifying the basic settings

Use the System menu to configure the PDU system parameters such as the superuser name, password, IP address, date, time, and so on. Some of these settings are described in the following sections.

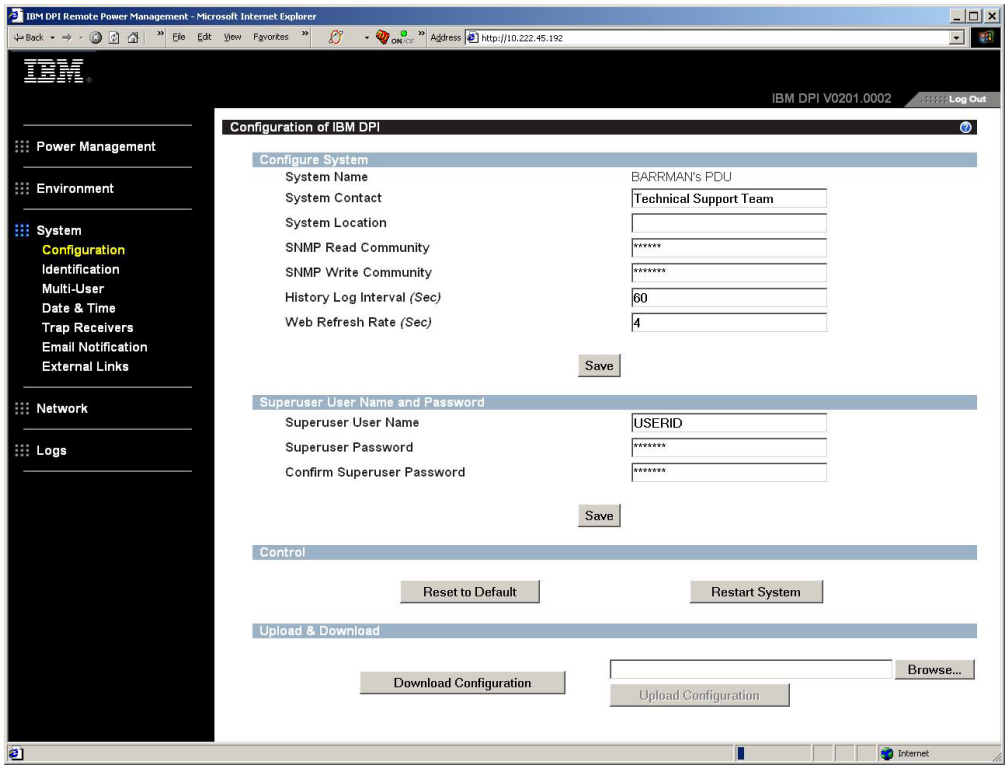
Changing the superuser name and password

On the Configuration page, you can set the user name and password of the administrator who will use a Web browser to configure the PDU.

Note: To change the superuser name and password, you must have read/write access to the PDU.

To change the superuser name and password, complete the following steps:

1. From the main status page, in the left navigation pane, click **System**.
2. Click **Configuration** to view and modify the system configuration and superuser user name and password.

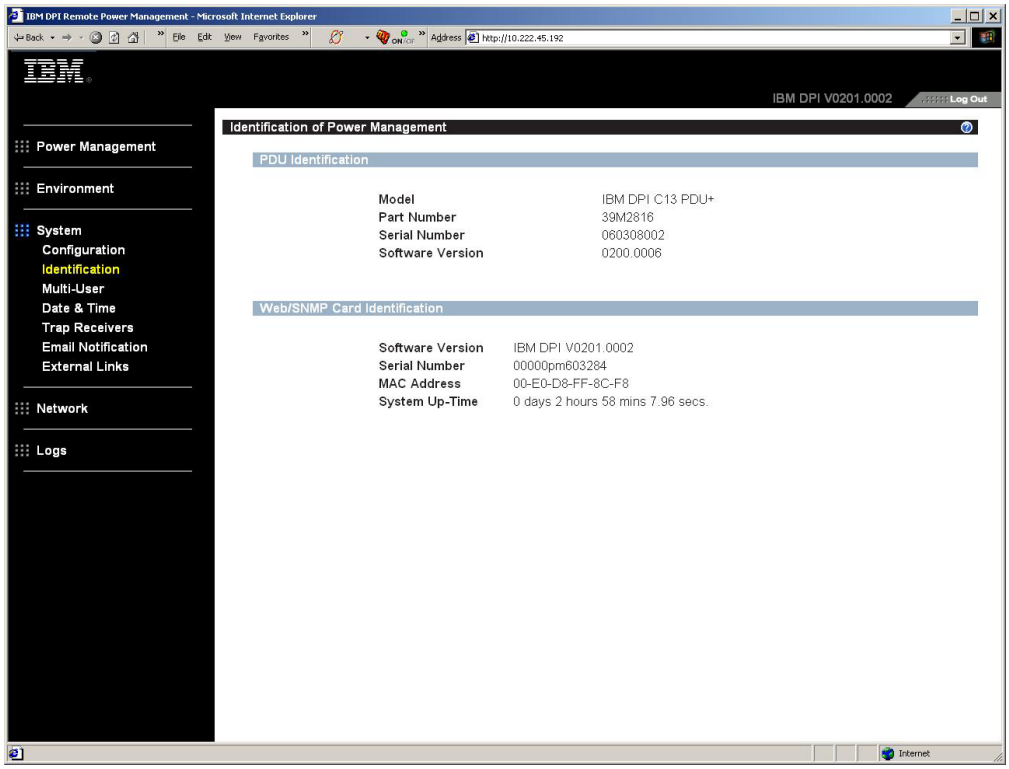


Identifying the PDU and Web/SNMP card

On the Identification of Power Management page, you can view the PDU and Web/SNMP card information.

To view the power management information of the PDU and Web/SNMP card, complete the following steps:

1. From the main status page, in the left navigation pane, click **System**.
2. Click **Identification** to view the PDU and Web/SNMP card information.

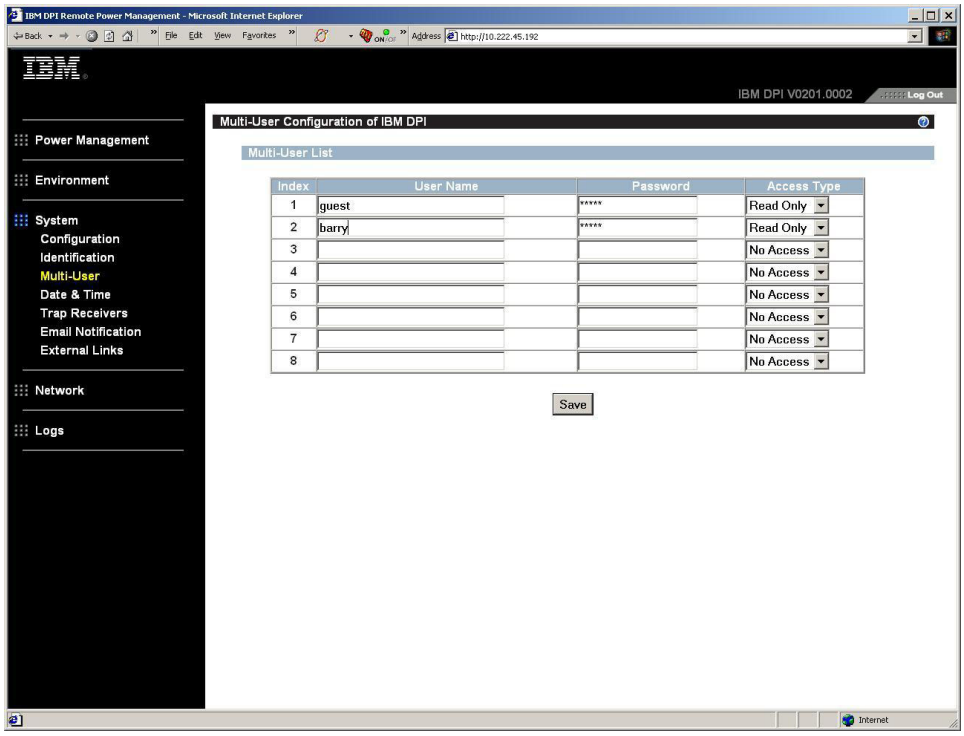


Adding users

On the Multi-User Configuration page, you can add users who can access and control the PDU.

To create a list of users who can access and control the PDU, complete the following steps:

1. From the main status page, in the left navigation pane, click **System**.
2. Click **Multi-User**. You can add users who can only view the PDU status or users who can change the PDU settings.



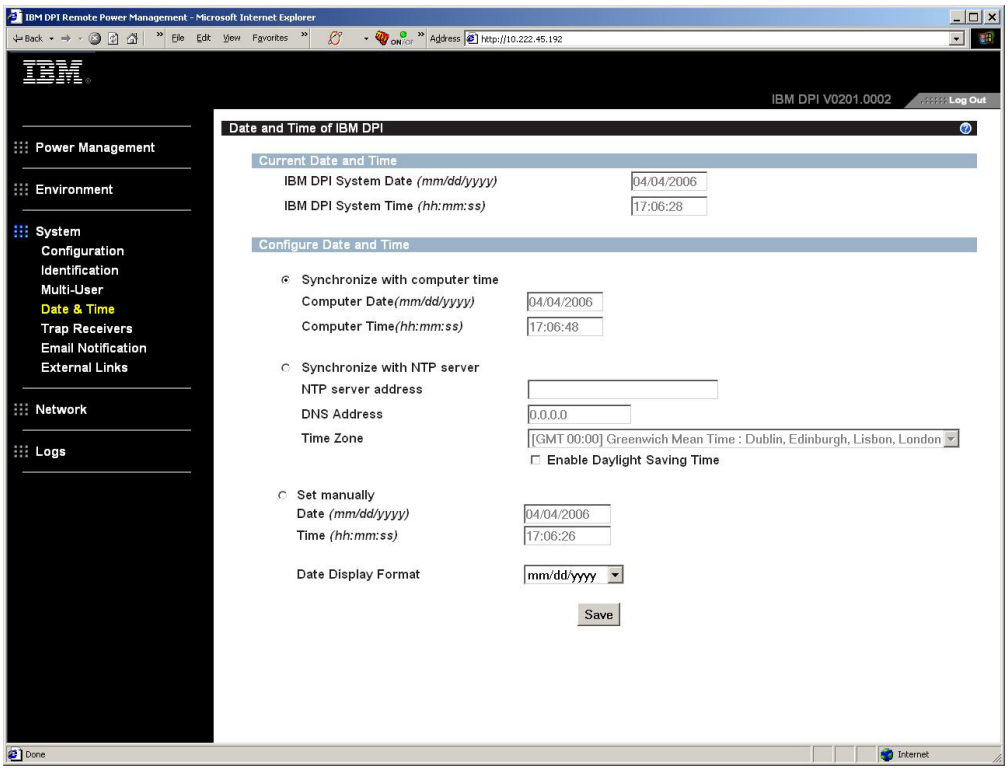
Changing the date and time

On the Date and Time page, you can change the date and time of the PDU.

Note: Changing the PDU date and time affects other PDU settings such as e-mail, traps, and logs.

To change the date and time, complete the following steps:

1. From the main status page, in the left navigation pane, click **System**.
2. Click **Date and Time** to view and modify the system date and time. You can set the date and time manually, synchronize it with the computer time, or synchronize it with an NTP server.

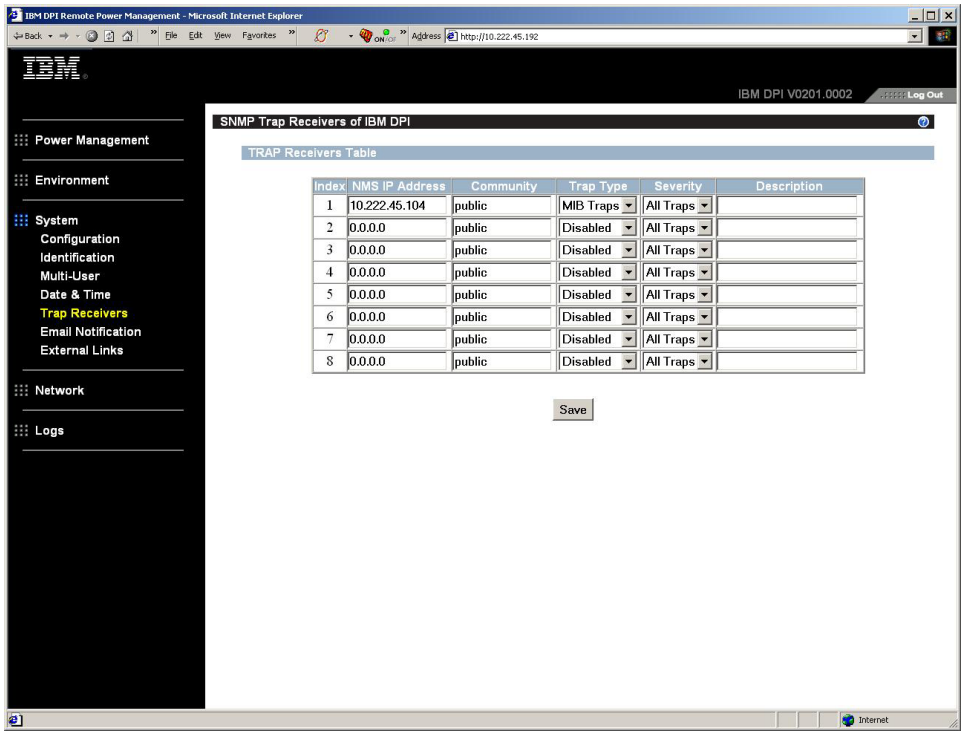


Changing event alerts

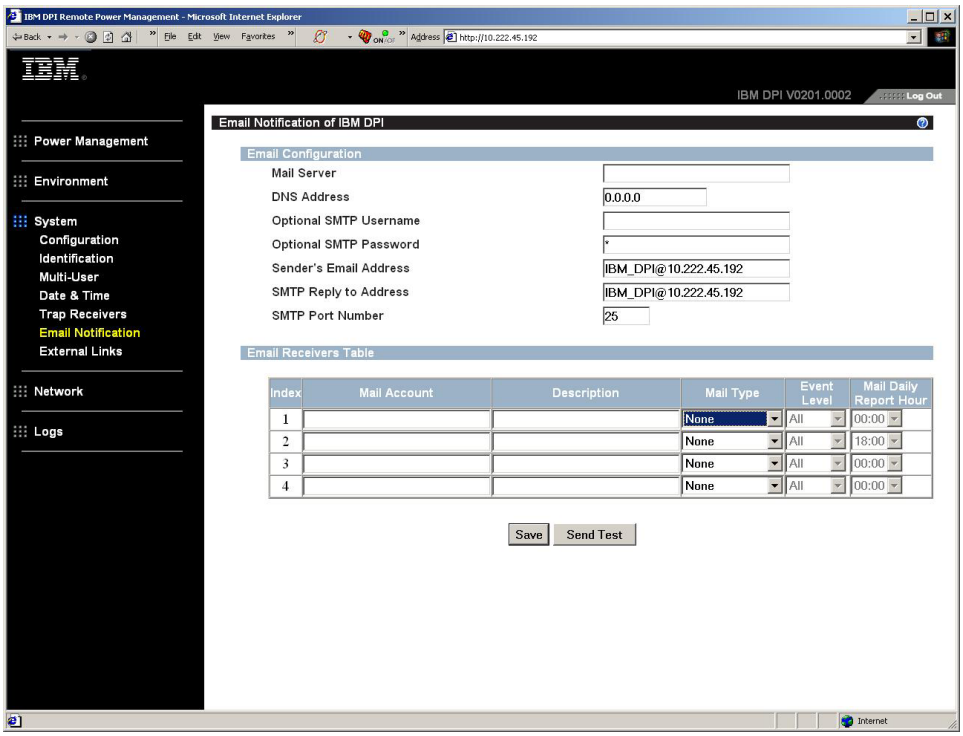
On the SNMP Trap Receivers page, you can change event alerts.

To configure the PDU to send e-mail or SNMP trap alerts to specified users when specific events occur, complete the following steps:

1. From the main status page, in the left navigation pane, click **System**.
2. Click **Trap Receivers** to create a list of users or workstations who will be alerted with an SNMP trap message. You can specify the IP addresses of up to eight trap receivers, the community information, type of trap, severity of trap, and description of the events that cause the traps.



3. Click **Email Notification** under **System** to create a list of up to four users who will be alerted with an e-mail. Use this menu to specify the mail server, user account, DNS, and other information that is necessary to set up a mail server for sending mail alerts. Use the Email Receivers Table to add the e-mail addresses.

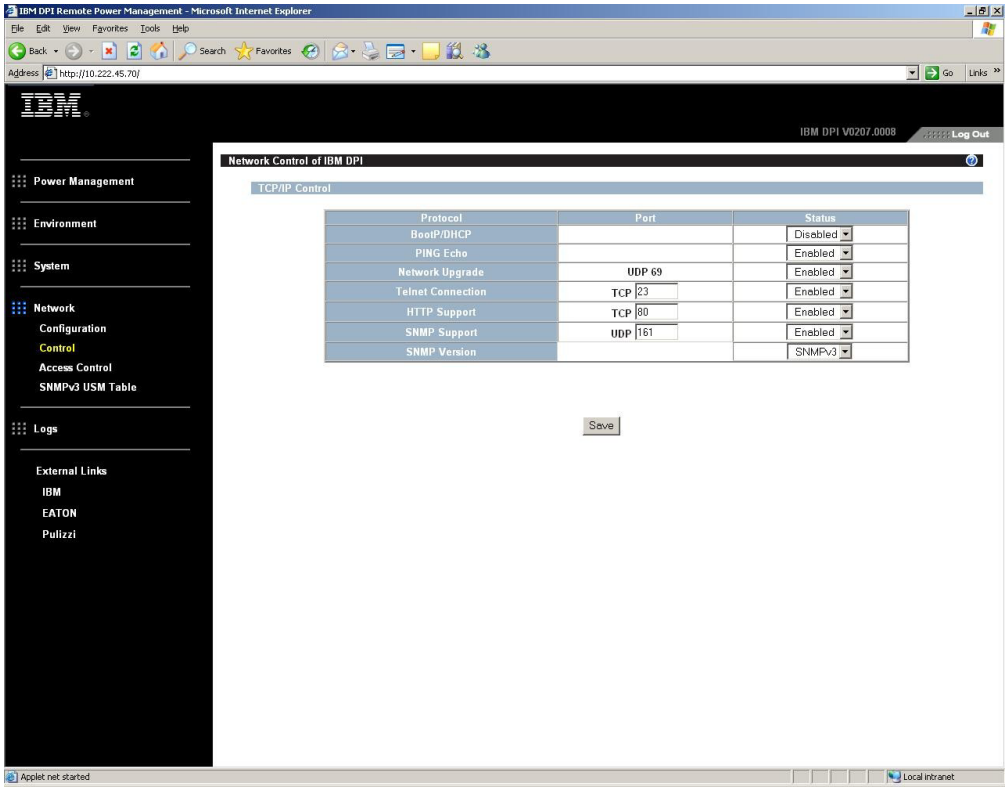


Changing the network information

Use the Network menu to change the network information for the PDU, for example, the IP address.

Changing the network configuration

To view or change the network configuration of the PDU, under **Network**, click **Configuration**. You can set the PDU IP address, gateway address, subnet mask, and Domain Name System (DNS) address.



Click **Control** under **Network** to configure TCP/IP settings.

Click **Access Control** under **Network** to set access control to prevent unauthorized users from accessing the PDU.

Click **SNMPv3 USM Table** to configure SNMPv3 settings.

History and event log summaries

The Logs menu provides a detailed description of all events and a record of the PDU status. System administrators can use this page to analyze problems with network equipment.

Viewing the history log

On the History Log page, you can view the complete history of the PDU inputs, outputs, and environmental monitoring probe.

To view the history of the PDU, under **Logs**, click **History**. Each log file shows a record of the input power, output power of each outlet, and environmental monitoring probe temperature and humidity.

History Log of HD-PDU

Log Date (yyyy-mm-dd)	Log Time (hh:mm:ss)	Input				Output										EMP	
		Frequency (Hz)	Voltage A (V)	Voltage B (V)	Voltage C (V)	Frequency (Hz)	Voltage A (V)	Voltage B (V)	Voltage C (V)	Current A (V)	Current B (V)	Current C (V)	True Power A (V)	True Power B (V)	True Power C (V)	Temperature (C)	Hum (%
2006-01-12	07:30:00	60.0	101.5	24.8	24.1	60.0	101.5	24.8	24.1	0.1	0.0	0.0	0	0	0	28	36
2006-01-12	07:30:30	60.0	101.5	24.8	24.1	60.0	101.6	24.8	24.1	0.1	0.0	0.0	0	0	0	28	36
2006-01-12	07:31:00	59.8	101.5	24.8	24.1	59.8	101.5	24.8	24.1	0.1	0.0	0.0	0	0	0	28	36
2006-01-12	07:31:30	59.8	101.5	24.8	24.1	59.8	101.5	24.8	24.1	0.1	0.0	0.0	0	0	0	28	36
2006-01-12	07:32:00	60.0	101.5	24.8	24.1	60.0	101.5	24.8	24.1	0.1	0.0	0.0	0	0	0	28	36

Viewing the event log

On the Event Log page, you can view the complete record of the PDU events.

To view the complete record of the PDU events, under **Logs**, click **Event**. Each event log file shows the time, date, and description of all the events that have occurred on the PDU.

Event Log of HD-PDU

Date(yyyy-mm-dd)	Time(hh:mm:ss)	Event Description
2006-01-06	16:34:43	Date and Time change made by RTC
2006-01-06	16:34:45	HD-PDU Warm Boot
2006-01-06	16:34:53	External Contact Monitoring Cable Installed
2006-01-06	16:34:53	External Contact #1 Status Monitoring Enabled
2006-01-06	16:34:53	External Contact #2 Status Monitoring Enabled
2006-01-06	16:35:29	Communication with UPS/PDU restored
2006-01-06	16:43:24	Parameters reset to default
2006-01-06	16:43:25	External Contact #1 Status Monitoring Disabled
2006-01-06	16:43:25	External Contact #2 Status Monitoring Disabled
2006-01-06	16:47:33	HD-PDU Adapter Restart

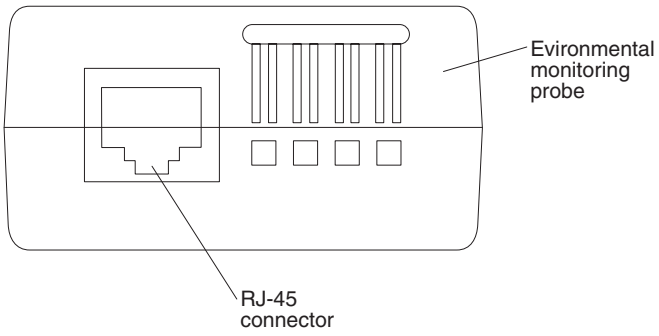
Chapter 6. Using the environmental monitoring probe

Note: The environmental monitoring probe comes with the monitored PDU (PDU+) models only.

The environmental monitoring probe 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.

You can use the environmental monitoring probe with any IBM Ultra Density Enterprise monitored PDU (PDU+) models.

When the environmental monitoring probe is connected to the RJ-45 console connector on the PDU, temperature and humidity readings are automatically displayed in the Web interface. To access the readings, you must run the Web browser and connect to the PDU IP address.



The environmental monitoring probe kit comes with one environmental monitoring probe, screws, hook-and-loop fasteners, tie wrap, and cable. You can install the device anywhere you want on the rack. To attach the environmental monitoring probe, use either the hook-and-loop fasteners or mount the probe on the screw (the environmental monitoring probe has a universal slot on the back that makes it mount easily on the screw and in any direction).

Features

The environmental monitoring probe has the following features:

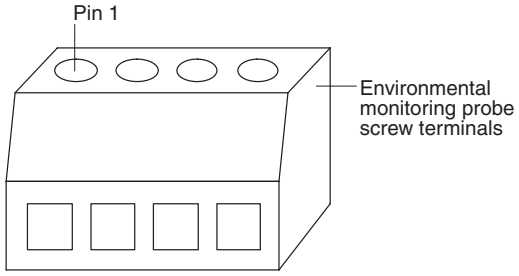
- The hot-swap feature simplifies installation by enabling you to install the probe safely without turning off power to the PDU or to the loads that are connected to it.
- It monitors temperature and humidity information of any environment that you want to protect your critical equipment.
- It measures temperatures between 0 and 80°C (32 and 176°F) with an accuracy of ±1°C.
- It measures relative humidity between 10 and 90% with an accuracy of ±5%.
- It can be located away from the PDU with a CAT5 network cable up to 20 m (65.6 ft) long.
- It monitors the status of the two user-provided contact devices.
- Temperature, humidity, and contact closure status can be displayed through a Web browser.

- User-selectable alarm thresholds enable you to define acceptable temperature or humidity limits
- E-mail notification through Simple Mail Transfer Protocol (SMTP), using e-mail client software when acceptable alarm limits are exceeded or contact status changes.
- Changes in external contact status are logged in the PDU event history log.
- When temperature and humidity values exceed user-selectable limits, the event is logged in the PDU event history log.

Installing the environmental monitoring probe

To install the environmental monitoring probe, complete the following steps:

1. If applicable, connect external contact inputs to the screw terminals on the environmental monitoring probe.



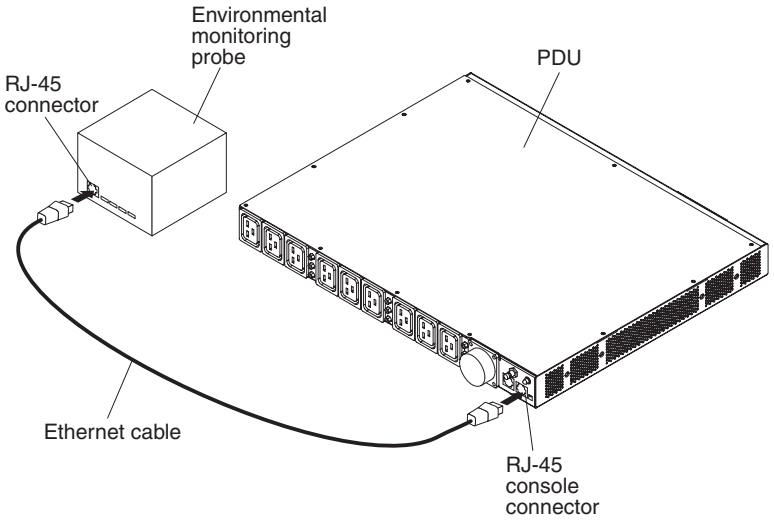
Note: External contact device 1 is connected between pins 1 and 2. Device 2 is connected between pins 3 and 4 (as labeled to show device 1 and 2). External contact devices can be normally open or normally closed.

Table 2. Environmental monitoring probe screw terminal pin assignment

Pin number	Description	Normally open/ normally closed
1	Contact 1 return	Normally closed
2	Contact 1 signal input	Normally open
3	Contact 2 return	Normally closed
4	Contact 2 signal input	Normally open

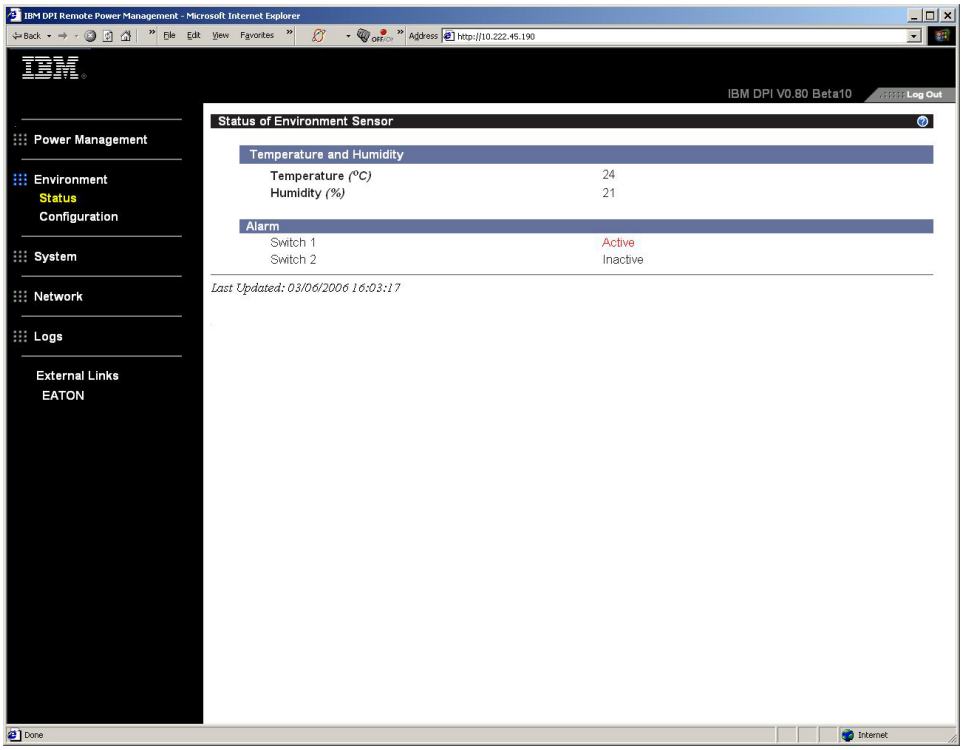
2. Connect the Category 5 Ethernet cable that comes with the PDU to the environmental monitoring probe RJ-45 connector and to the RJ-45 console connector on the PDU.

   Note: If the cable is not long enough for your configuration, you can use a cable that is 20 m (65.6 ft) or less.

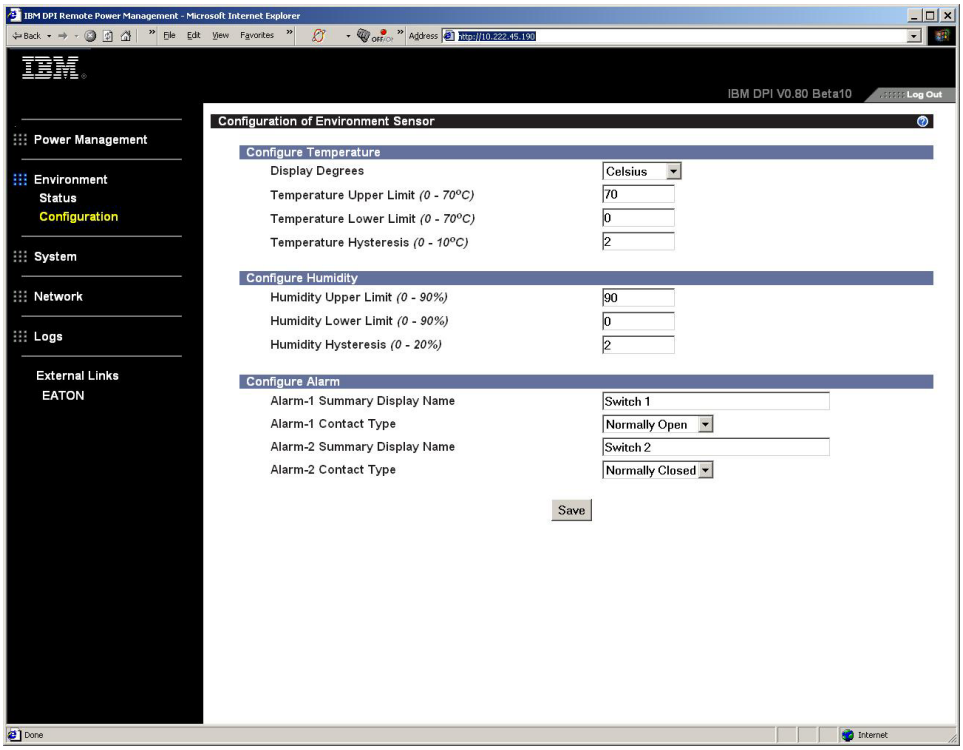


3. Make sure that the PDU has a network connection, the power cord is connected, and the power to the PDU is turned on. The environmental monitoring probe is automatically recognized by the PDU.

4. Start a Web browser and connect to the PDU IP address (for more information, see “Using the Web interface” on page 37). The Web interface main status page opens. Click **Environment**, and then click **Status**. The Status of Environment Sensor page opens. The temperature and humidity status is automatically displayed.



5. Before the status of the contact closures is displayed, you must configure and enable this feature on the PDU Web interface. Click **Environment**, and then click **Configuration**. The Configuration of Environment Sensor page opens.



You can configure and enable both contacts and set upper and lower ranges of temperature and humidity that will generate SNMP traps and e-mail notification if the PDU is configured to do so.

Chapter 7. Customer replaceable unit parts

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** 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.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty, see the *IBM Warranty Information* document that comes with the PDU.

Important: The PDU does not contain any serviceable parts.

PDU description	PDU machine type and model	Option part number	Tier 1 CRU part number
Ultra Density Enterprise C19 / C13 PDU+ module with removable power cord	71762MX	43V5967	43V5979
Ultra Density Enterprise C19 / C13 PDU+ 60 A / 208 V / three-phase with attached power cord	71763MU	43V5968	43V5980
Ultra Density Enterprise C19 / C13 PDU module with removable power cord	71762NX	43V5969	43V5981
Ultra Density Enterprise C19 / C13 PDU 60 A / 208 V / three-phase with attached power cord	71763NU	43V5970	43V5982
NX environmental monitoring probe kit	NA	NA	41Y9210
Mounting hardware kit	NA	NA	41Y9284
DB9-to-RJ-45 cable	NA	NA	40K9640
IEC 309 32 A / 250 V 3P+N+Gnd power cord	NA	40K9611	39M5427
IEC 309 32 A / 250 V P+N+Gnd power cord	NA	40K9612	39M5428
IEC 309 63 A / 250 V P+N+Gnd power cord	NA	40K9613	39M5429
NEMA L6 - 30P 30 A / 208 V P+P+Gnd power cord	NA	40K9614	39M5430
IEC 309 2P+Gnd 60 A / 208 V power cord	NA	40K9615	39M5431
Australia 32 A / 250 V P+N+Gnd power cord	NA	40K9617	39M5433
Korea 30 A / 250 V P+N+Gnd power cord	NA	40K9618	39M5434

Chapter 8. PDU specifications

The tables in this chapter contain the product specifications of the PDUs. The PDUs in the following list correspond by number (1 through 14) to the rated voltages, maximum power ratings, and power cords in the tables.

Note: In the following list, the PDU machine type and model, and the power cord option part number, are shown in parentheses under the PDU description.

1. DPI 32 amp / 250 V single-phase Enterprise C19 / C13 PDU+ with IEC 309 P+N+Gnd connector (71762MX; 40K9612)
   *** Note:** Special connector for Australia and New Zealand (not IEC 309): (71762MX; 40K9617)
2. DPI 60 amp / 208 V single-phase Enterprise C19 / C13 PDU+ with IEC 309 2P+Gnd connector (71762MX; 40K9615)
3. DPI 63 amp / 250 V single-phase Enterprise C19 / C13 PDU+ with IEC 309 P+N+Gnd connector (71762MX; 40K9613)
4. DPI 32 amp / 250 V three-phase Enterprise C19 / C13 PDU+ with IEC 309 3P+N+Gnd connector (71762MX; 40K9611)
5. DPI 30 amp / 208 V single-phase Enterprise C19 / C13 PDU+ with NEMA L6-30P (2P+Gnd) connector
   (71762MX; 40K9614)
6. DPI 60 amp / 208 V three-phase Enterprise C19 / C13 PDU+ with IEC 309 3P+Gnd connector (71763MU with attached power cord)
7. DPI 60 amp / 208 V single-phase Enterprise C19 / C13 PDU with IEC 309 2P+Gnd connector (71762NX; 40K9615)
8. DPI 63 amp / 250 V single-phase Enterprise C19 / C13 PDU with IEC 309 P+N+Gnd connector (71762NX; 40K9613)
9. DPI 32 amp / 250 V three-phase Enterprise C19 / C13 PDU with IEC 309 3P+N+Gnd connector (71762NX; 40K9611)
10. DPI 60 amp / 208 V three-phase Enterprise C19 / C13 PDU with IEC 309 3P+Gnd connector (71763NU with attached power cord)
11. DPI 32 amp / 250 V single-phase EnterpriseC19 / C13 PDU with IEC 309 P+N+Gnd connector (71762NX; 40K9612)
    **** Note:** Special connector for Australia and New Zealand (not IEC 309): (71762NX; 40K9617)
12. DPI 30 amp / 208 V single-phase Enterprise C19 / C13 PDU with NEMA L6-30P (2P+Gnd) connector (71762NX; 40K9614)
13. DPI 30 amp / 250 V single-phase Enterprise C19 / C13 PDU+ (with special Korea connector) P+N+Gnd connector
    (71762MX; 40K9618)
14. DPI 30 amp / 250 V single-phase Enterprise C19 / C13 PDU (with special Korea connector) P+N+Gnd connector
    (71762NX; 40K9618)

Height	43.9 mm (1.73 in.)
Width	447 mm (17.6 in.)
Depth	350 mm (13.78 in.)
Additional clearance	25 mm (0.98 in.) for circuit breakers 3 mm (0.12 in.) for outlets
Weight (not including power cord)	6.3 kg (13.8 lb)
Weight of power cord (approximate, varies by PDU model)	5.4 kg (11.8 lb)
Operating temperature at 0 - 914 m (0 - 3000 ft) (room ambient)	10° - 60°C (50° - 140°F)
Operating temperature at 914 -2133 m (3000 - 7000 ft) (room ambient)	10° - 60°C (50° - 140°F)
Operating humidity	8 - 80% (noncondensing)
Localized air temperature in PDU	60°C (140°F) maximum

Rated voltage	**Maximum power rating**
1. 220 - 240 V ac, 32 amps, single-phase	1. 7680 VA
2. 200 - 208 V ac, 48 amps, single-phase	2. 9984 VA
3. 220 - 240 V ac, 63 amps, single-phase	3. 15120 VA
4. 220 - 240 V ac, 32 amps, three-phase Wye	4. 23040 VA
5. 200 - 208 V ac, 24 amps, single-phase	5. 4992 VA
6. 200 - 208 V ac, 48 amps, three-phase Delta	6. 17292 VA
7. 200 - 208 V ac, 48 amps, single-phase	7. 9984 VA
8. 220 - 240 V ac, 63 amps, single-phase	8. 15120 VA
9. 220 - 240 V ac, 32 amps, three-phase Wye	9. 23040 VA
10. 200 - 208 V ac, 48 amps, three-phase Delta	10. 17292 VA
11. 220 - 240 V ac, 32 amps, single-phase	11. 7680 VA
12. 200 - 208 V ac, 24 amps, single-phase	12. 4992 VA
13. 220 - 240 V ac, 30 amps, single-phase	13. 7200 VA
14. 220 - 240 V ac, 30 amps, single-phase	14. 7200 VA
Rated frequency 50-60 Hz	
Circuit breakers Nine double-pole branch rated circuit breakers rated at 20 amps	

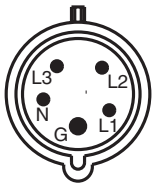
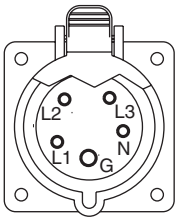
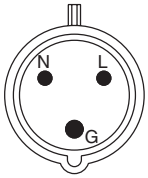
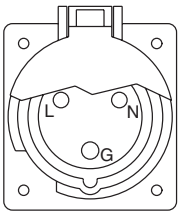
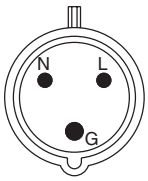
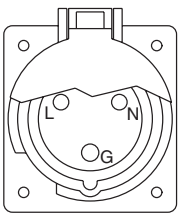
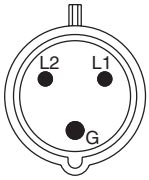
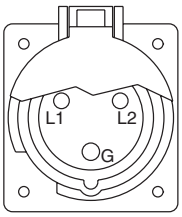
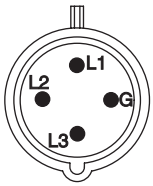
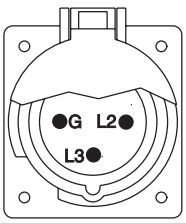
Power cord

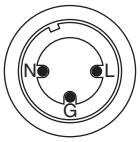
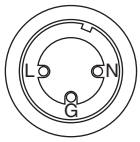
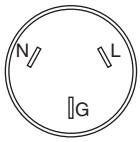
1. One IEC 309 P+N+Gnd connector rated at 32 amps
   (See the * Note about the special connector for Australia and New Zealand.)
2. One IEC 309 2P+Gnd connector rated at 60 amps
3. One IEC 309 P+N+Gnd connector rated at 63 amps
4. One IEC 309 3P+N+Gnd connector rated at 32 amps
5. One NEMA L6-30P (2P+Gnd) connector rated at 30 amps
6. One IEC 309 3P+Gnd connector rated at 60 amps
7. One IEC 309 2P+Gnd connector rated at 60 amps
8. One IEC 309 P+N+Gnd connector rated at 63 amps
9. One IEC 309 3P+N+Gnd connector rated at 32 amps
10. One IEC 309 3P+Gnd connector rated at 60 amps
11. One IEC 309 P+N+Gnd connector rated at 32 amps
    (See the ** Note about the special connector for Australia and New Zealand.)
12. One NEMA L6-30P (2P+Gnd) connector rated at 30 amps
13. One Korea P+N+Gnd connector rated at 30 amps
14. One Korea P+N+Gnd connector rated at 30 amps

Power outlets

Nine IEC 320 - C19 outlets rated at 16 amps (VDE) / 20 amps (UL/CSA) and
Three IEC 320 - C13 outlets rated at 10 amps (VDE) / 15 amps (UL/CSA)

You must connect the connector on the power cord that comes with your PDU to a properly wired and grounded outlet. The following table shows illustrations of the power cord connector and the correct outlet for each of the PDUs.

PDU number from the list on page 57	PDU	Plug	Outlet	Rating
4 and 9	DPI 32 amp / 250 V three-phase Enterprise C19 / C13 PDU+ (or PDU) with IEC 309 3P+N+Gnd connector			32 amps, 250 V ac IEC 309 3P+N+Gnd
1 and 11	DPI 32 amp / 250 V single-phase Enterprise C19 / C13 PDU+ (or PDU) with IEC 309 P+N+Gnd connector			32 amps, 250 V ac IEC 309 P+N+Gnd
3 and 8	DPI 63 amp / 250 V single-phase Enterprise C19 / C13 PDU+ (or PDU) with IEC 309 P+N+Gnd connector			63 amps, 250 V ac IEC 309 P+N+Gnd
5 and 12	DPI 30 amp / 208 V single-phase Enterprise C19 / C13 PDU+ (or PDU) with NEMA L6-30P (2P+Gnd) connector			30 amps, 250 V ac NEMA L6-30P (2P+Gnd)
2 and 7	DPI 60 amp / 208 V single-phase Enterprise C19 / C13 PDU+ (or PDU) with IEC 309 2P+Gnd connector			60 amps, 250 V ac IEC 309 2P+Gnd
6 and 10	DPI 60 amp / 208 V three-phase Enterprise C19 / C13 PDU+ (or PDU) with IEC 309 3P+Gnd connector			60 amps, 250 V ac IEC 309 3P+Gnd

PDU number from the list on page 57	PDU	Plug	Outlet	Rating
1 and 11 See the Note about the special connector for Australia and New Zealand.	DPI 32 amp / 250 V single-phase Enterprise C19 / C13 PDU+ (or PDU) P+N+Gnd (PDL P/N 56P332) Australia/New Zealand connector			32 amps, 250 V ac P/N 56S0332 P+N+Gnd
13 and 14	DPI 30 amp / 250 V single-phase Enterprise C19 / C13 PDU+ (or PDU) P+N+Gnd (Shin Ju P/N SJ-P3302) Korea connector			30 amps, 250 V ac P+N+Gnd

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. Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine 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.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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/. 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, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The address for IBM System x® 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/.

How to send Dynamic System Analysis data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM. Before you send diagnostic data to IBM, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data to IBM:

- **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
- **Standard upload with the system serial number:** http://www.ecurep.ibm.com/app/upload_hw
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

At http://www.ibm.com/support/mynotifications/, you can create a personalized support web page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

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Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products. 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

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

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

IBM Taiwan product service

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

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

Appendix B. Notices

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Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

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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.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as “total bytes written” (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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

Particulate contamination

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

Table 3. 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.

Documentation format

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

Information Development
IBM Corporation
205/A015
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P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195
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This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

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.

European Union EMC Directive conformance statement

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.

Attention: This is an EN 55022 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.

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

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

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

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

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.

VCCI Class A statement

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This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

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This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

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В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

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