

Power Systems

*Planning for the IBM PurePower
System*

IBM

Power Systems

*Planning for the IBM PurePower
System*

IBM

Note

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 25, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM Power Systems™ servers that contain the POWER8 processor and to all associated models.

© Copyright IBM Corporation 2015, 2016.

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Safety notices	v
Site and hardware physical planning overview	1
Planning activities	3
Planning task checklist	3
General considerations	3
Site preparation and physical planning guidelines	4
IBM PurePower System specifications	7
Single-rack configuration system specifications	7
Multi-rack configuration system specifications	9
Power distribution unit and power cord specifications	12
Roles and responsibilities	15
Roles and responsibilities for installation	15
Roles and responsibilities for hardware service	15
Roles and responsibilities for hardware upgrade	16
Additional roles and responsibilities	16
Planning for web browsers	19
Planning for storage and network configuration	21
Planning for upgrades and security	23
Notices	25
Accessibility features for IBM Power Systems servers	26
Privacy policy considerations	27
Trademarks	28
Electronic emission notices	28
Class A Notices	28
Class B Notices	32
Terms and conditions	36

Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Laser safety information

IBM® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.

DANGER

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

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

- If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:

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

To Connect:

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

Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.

(D005)

(R001 part 1 of 2):

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

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.

- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.



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

(R001 part 2 of 2):

CAUTION:

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



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

CAUTION:

Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
 - Remove all devices in the 32U position (compliance ID RACK-001 or 22U (compliance ID RR001) and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001 or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)



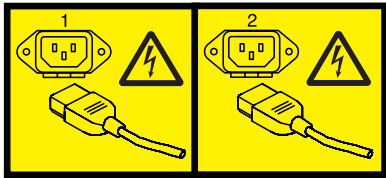
DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

(L002)



DANGER: Rack-mounted devices are not to be used as shelves or work spaces. (L002)

(L003)



or



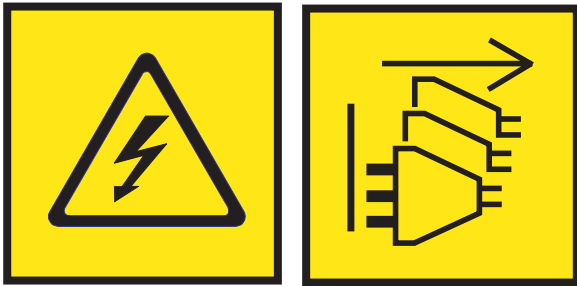
or



or



or



DANGER: Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)

(L007)



CAUTION: A hot surface nearby. (L007)

(L008)



CAUTION: Hazardous moving parts nearby. (L008)

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:

This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)

CAUTION:

Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers many not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (C027)

CAUTION:

This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

CAUTION:

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

CAUTION:

The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do Not:

- ___ Throw or immerse into water
- ___ Heat to more than 100°C (212°F)
- ___ Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

(C048)

CAUTION regarding IBM provided **VENDOR LIFT TOOL**:

- Operation of **LIFT TOOL** by authorized personnel only.
- **LIFT TOOL** intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of **LIFT TOOL** operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the **LIFT TOOL** with stabilizer brake engaged.
- Do not move **LIFT TOOL** while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See **LOAD CAPACITY CHART** regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against **LIFT TOOL**.
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning **LIFT TOOL** machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare **LIFT TOOL MACHINE** with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave **LIFT TOOL** machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048)

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

The dc-powered system is intended to be installed in a common bonding network (CBN) as described in GR-1089-CORE.

Site and hardware physical planning overview

Successful installation requires effective planning of your physical and operational environment. You are the most valuable resource in site planning because you know where and how your system, and devices attached to it, will be used.

Site preparation for the complete system is the responsibility of the customer. The primary task of your site planner is to ensure that each system is installed so that it can operate and be serviced efficiently.

This topic collection provides the basic information you need to plan for your system installation. It provides an overview of each planning task, as well as valuable reference information useful throughout the performance of these tasks. Depending on the complexity of the system you ordered and your existing computing resource, you might not need to perform all the steps noted here.

First, with the help of your systems engineer, sales representative, or with the help of those coordinating your installation, list the hardware for which you need to plan. Use the summary of your order to help you when making your list. This list is now your "To Do" list. You can use the Planning task checklist to assist you.

While you are responsible for planning, vendors, contractors, and your sales representative are also available to help with any aspect of the planning. For some system units, a customer service representative will install your system unit and verify correct operation. Some system units are considered customer-installed. If you are not sure, check with your sales representative.

The physical planning section of this topic collection provides the physical characteristics of many system units, and associated products. For information on products not included in this topic collection, contact your sales representative or your authorized dealer.

Before proceeding with planning, ensure that the hardware and software you have chosen meets your needs. Your sales representative is available to answer questions.

While this information is for hardware planning, the system memory and disk storage needed are a function of the software to be used, therefore some things to consider are listed below. Information on software products is generally in or with the software Licensed Program Product itself.

In assessing the adequacy of hardware and software, consider the following:

- Available disk space and system memory for accommodating software, online documentation, and data (including future growth needs resulting from additional users, more data, and new applications)
- Compatibility of all devices
- Compatibility of software packages with each other and with the hardware configuration
- Adequate redundancy or backup capabilities in hardware and software
- Software portability to the new system, if necessary
- Prerequisites and corequisites of chosen software have been satisfied
- Data to be transferred to the new system

Planning activities

You can use this information to help you plan the physical installation for your server.

Proper planning for your system will facilitate a smooth installation and fast system start-up. Sales and installation planning representatives are also available to help you with installation planning.

As part of your planning activity, you will make decisions about where to locate your server and who will operate the system

Planning task checklist

Use this checklist to document your planning progress.

Working with your sales representative, establish completion dates for each of the tasks. You might want to review your planning schedule periodically with your sales representative.

Table 1. Planning task checklist

Planning step	Person responsible	Target date	Completion date
Plan your office or computer room layout (physical planning)			
Prepare for power cords and electrical needs			
Prepare for cables and cabling			
Create or modify communications networks			
Perform building alterations, as needed			
Prepare maintenance, recovery, and security plans			
Develop an education plan			
Order supplies			
Prepare for system delivery			

General considerations

Planning your system requires attention to the numerous details.

When determining the placement of your system, consider the following:

- Adequate space for the devices.
- Working environment of personnel who will be using the devices (their comfort, ability to access the devices, supplies, and reference materials).
- Adequate space for maintaining and servicing the devices.
- Physical security requirements necessary for the devices.
- Weight of the devices.
- Heat output of the devices.
- Operating temperature requirements of the devices.

- Humidity requirements of the devices.
- Air flow requirements of the devices.
- Air quality of the location where the devices will be used. For example, excess dust could damage your system.

Note: The system and devices are designed to operate in normal office environments. Dirty or other poor environments might damage the system or the devices. You are responsible for providing the proper operating environment.

- Altitude limitations of the devices.
- Noise emission levels of the devices.
- Any vibration of equipment near where the devices will be placed.
- Paths of power cords.

The following pages contain the information you need to evaluate these considerations.

Site preparation and physical planning guidelines

These guidelines help you prepare your site for the delivery and installation of your server.

Information contained in the Site preparation and physical planning might be helpful for preparing your data center for the arrival of a server.

The Site preparation and physical planning topic covers the following information:

Site selection, building and space considerations

- Site selection
- Access
- Static electricity and floor resistance
- Space requirements
- Floor construction and floor loading
- Raised floors
- Conductive contamination
- Computer room layout

Site environment, safety, and security

- Vibration and shock
- Lighting
- Acoustics
- Electromagnetic compatibility
- Computer room location
- Material and data storage protection
- Emergency planning for continuous operations

Electrical power and grounding

- General power information
- Power quality
- Voltage and frequency limits
- Power load
- Power source

- Dual power installations

Air conditioning

- Air conditioning determination
- General guidelines for data centers
- Temperature and humidity design criteria
- Temperature and humidity recording instruments
- Relocation and temporary storage
- Acclimation
- System air distribution

Planning for the installation of rear door heat exchangers

- Planning for the installation of rear door heat exchangers
- Heat exchanger specifications
- Water specifications for the secondary cooling loop
- Water delivery specifications for secondary loops
- Layout and mechanical installation
- Suggested sources for secondary loop components

Communications

- Planning for communications

IBM PurePower System specifications

System specifications provide detailed information for IBM PurePower Systems including dimensions, electrical data, power, temperature, and environmental requirements.

Single-rack configuration system specifications

System specifications provide detailed information for IBM PurePower Systems single-rack configurations including dimensions, electrical data, power, temperature, and environmental requirements.

Use the following specifications to plan for your server.

Table 2. Empty rack dimensions

Width	Depth	Height	EIA units	Weight
644 mm (25.4 in.)	1098 mm (43.3 in.)	2015 mm (79.3 in.)	42	289 kg (636 lb)

Table 3. Maximum weight of each building block

Building block	Weight
IBM Power® System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node	29.5 kg (65 lb)
8374-01M management node	15.9 kg (35 lb)
IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	10.4 kg (23 lb)
8831-NF2 Mellanox MSX1710-BS2F2	9.5 kg (21 lb)
IBM RackSwitch G8052 (7120-48E) 48-port management switch	5.4 kg (12 lb)
2498-F48 Brocade SAN48B-5 Fibre Channel switch	9.1 kg (20 lb)
IBM 2076-524 Storwize® V7000 SFF Control Enclosure Model 524	36.7 kg (81 lb)
IBM 2076-24F Storwize V7000 Small Form Factor Expansion Enclosure Model 24F	24.9 kg (55 lb)

Table 4. Electrical characteristics

Electrical characteristics	IBM Power System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node ¹	8374-01M management node	IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	8831-NF2 Mellanox MSX1710-BS2F2
Maximum kVA	1.276	0.306	0.031	0.247
Amps	6.38 A	1.53 A	0.16 A	1.24 A
Voltage ^{2,3}	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac
Frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Maximum thermal output	4266 BTU/hr	1024 BTU/hr	75 BTU/hr	802 BTU/hr

Table 4. Electrical characteristics (continued)

Electrical characteristics	IBM Power System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node ¹	8374-01M management node	IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	8831-NF2 Mellanox MSX1710-BS2F2
Maximum power consumption ⁴	1250 W	300 W	22 W	235 W
<p>1. The maximum measured power consumption for the 8247-22L and 8284-22A that are used in IBM PurePower Systems is less than the maximum measured power consumption for fully configured 8247-22L and 8284-22A stand-alone servers. Because the PurePower System™ is an integrated offering that is comprised of multiple servers, operating all of the servers at their maximum utilization simultaneously is unlikely. However, workload diversity with some applications might result in higher power consumption at times. Because there is no control over hardware or software content after the PurePower System is shipped, IBM recommends that the power consumption is monitored and reviewed periodically. The power consumption data can be used to manage the electrical environment, including, but not limited to, rack power distribution units (PDUs), universal power supplies (UPSs), and facility phase balancing. In some jurisdictions, the electrical code might dictate the need to measure power and adjust the installation so that switch gear and over-current protection margins are adhered to.</p> <p>2. The input voltage is based on the PDU and associated power cord. In countries that support line-to-line 200 - 208 V ac, the PDU input voltage matches the PDU output voltage. In countries that support line-to-line 380 - 415 V ac, the PDU output voltage is in the range of 220 - 240 V ac. For more information, see “Power distribution unit and power cord specifications” on page 12.</p> <p>3. All drawers mounted in the rack are rated 200 - 240 V ac. The power supplies automatically accept any voltage within the rated voltage range. With dual power supplies installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</p> <p>4. When planning the electrical system, it is important to use maximum values to account for internal or environmental conditions that result in power consumption that increases beyond typical values.</p>				

Table 5. Electrical characteristics (continued)

Electrical characteristics	IBM RackSwitch G8052 (7120-48E) 48-port management switch	2498-F48 Brocade SAN48B-5 Fibre Channel switch	IBM 2076-524 Storwize V7000 SFF Control Enclosure Model 524	IBM 2076-24F Storwize V7000 Small Form Factor Expansion Enclosure Model 24F
Maximum kVA	0.211	0.132	0.541	0.304
Amps	1.05 A	0.66 A	2.71 A	1.52 A
Voltage ^{1,2}	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac
Frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Maximum thermal output	683 BTU/hr	427 BTU/hr	1846 BTU/hr	1038 BTU/hr
Maximum power consumption ³	200 W	125 W	541 W	304 W
<p>1. The input voltage is based on the PDU and associated power cord. In countries that support line-to-line 200 - 208 V ac, the PDU input voltage matches the PDU output voltage. In countries that support line-to-line 380 - 415 V ac, the PDU output voltage is in the range of 220 - 240 V ac. For more information, see “Power distribution unit and power cord specifications” on page 12.</p> <p>2. All drawers mounted in the rack are rated 200 - 240 V ac. The power supplies automatically accept any voltage within the rated voltage range. With dual power supplies installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</p> <p>3. When planning the electrical system, it is important to use maximum values to account for internal or environmental conditions that result in power consumption that increases beyond typical values.</p>				

Table 6. Environment requirements

Environment	Recommended operating	Allowable operating	Nonoperating
ASHRAE class		A3	
Airflow direction		Front-to-back	
Temperature ¹	18°C - 27°C (64°F - 80°F)	5°C - 40°C (41°F - 104°F)	5°C - 45°C (41°F - 113°F)
Humidity range	5.5°C (42°F) dew point (DP) to 60% relative humidity (RH) and 15°C (59°F) dew point	-12.0°C (10.4°F) DP and 8% - 85% RH	8% - 85% RH
Maximum dew point		24°C (75°F)	27°C (80°F)
Maximum operating altitude		3050 m (10000 ft)	
Shipping temperature			-40°C to 60°C (-40°F to 140°F)
Shipping relative humidity			5% - 100%
1. Derate maximum allowable dry-bulb temperature 1°C/175 m above 950 m.			

Electromagnetic compatibility compliance

Electromagnetic compatibility compliance: FCC 47 CFR Part 15, ICES-003, EN 55022, EN 55024, CISPR-22, AS/NZS CISPR-22, CNS 13438, VCCI, GB 9254.

Product safety compliance

Product safety compliance: IEC 60950-1; UL 60950-1; CSA 60950-1.

Delivery and subsequent transportation of the equipment

DANGER

Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)

You must prepare your environment, with assistance from an authorized service provider, to accept the new product based on the installation planning information provided. In anticipation of the equipment delivery, prepare the final installation site in advance so that professional movers or riggers can transport the equipment to the final installation site within the computer room. If, for some reason, this is not possible at the time of delivery, you must make arrangements to have professional movers or riggers return to finish the transportation at a later date. Only professional movers or riggers should transport the equipment. The authorized service provider can only perform minimal frame repositioning within the computer room, as needed, to perform required service actions. You are also responsible for using professional movers or riggers when you relocate or dispose of equipment.

Multi-rack configuration system specifications

System specifications provide detailed information for IBM PurePower Systems multi-rack configurations including dimensions, electrical data, power, temperature, and environmental requirements.

Multi-rack configurations include one base rack and up to seven expansion racks. The base rack and any expansion rack may optionally include a storage overflow rack.

Use the following specifications to plan for your expansion and storage overflow racks.

Table 7. Empty rack dimensions

Width	Depth	Height	EIA units	Weight
644 mm (25.4 in.)	1098 mm (43.3 in.)	2015 mm (79.3 in.)	42	289 kg (636 lb)

Table 8. Maximum weight of each building block

Building block	Weight
IBM Power System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node	29.5 kg (65 lb)
IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	10.4 kg (23 lb)
8831-NF2 Mellanox MSX1710-BS2F2	9.5 kg (21 lb)
IBM RackSwitch G8052 (7120-48E) 48-port management switch	5.4 kg (12 lb)
2498-F48 Brocade SAN48B-5 Fibre Channel switch	9.1 kg (20 lb)
IBM 2076-524 Storwize V7000 SFF Control Enclosure Model 524	36.7 kg (81 lb)
IBM 2076-24F Storwize V7000 Small Form Factor Expansion Enclosure Model 24F	24.9 kg (55 lb)

Table 9. Electrical characteristics

Electrical characteristics	IBM Power System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node ¹	IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	8831-NF2 Mellanox MSX1710-BS2F2
Maximum kVA	1.276	0.031	0.247
Amps	6.38 A	0.16 A	1.24 A
Voltage ^{2,3}	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac
Frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Maximum thermal output	4266 BTU/hr	75 BTU/hr	802 BTU/hr
Maximum power consumption ⁴	1250 W	22 W	235 W

Table 9. Electrical characteristics (continued)

Electrical characteristics	IBM Power System S822L (8247-22L) or IBM Power System S822 (8284-22A) compute node ¹	IBM 7316-TF4 Flat Panel Rack-Mounted Monitor and Keyboard	8831-NF2 Mellanox MSX1710-BS2F2
<ol style="list-style-type: none"> 1. The maximum measured power consumption for the 8247-22L and 8284-22A that are used in IBM PurePower Systems is less than the maximum measured power consumption for fully configured 8247-22L and 8284-22A stand-alone servers. Because the PurePower System is an integrated offering that is comprised of multiple servers, operating all of the servers at their maximum utilization simultaneously is unlikely. However, workload diversity with some applications might result in higher power consumption at times. Because there is no control over hardware or software content after the PurePower System is shipped, IBM recommends that the power consumption is monitored and reviewed periodically. The power consumption data can be used to manage the electrical environment, including, but not limited to, rack power distribution units (PDUs), universal power supplies (UPSs), and facility phase balancing. In some jurisdictions, the electrical code might dictate the need to measure power and adjust the installation so that switch gear and over-current protection margins are adhered to. 2. The input voltage is based on the PDU and associated power cord. In countries that support line-to-line 200 - 208 V ac, the PDU input voltage matches the PDU output voltage. In countries that support line-to-line 380 - 415 V ac, the PDU output voltage is in the range of 220 - 240 V ac. For more information, see "Power distribution unit and power cord specifications" on page 12. 3. All drawers mounted in the rack are rated 200 - 240 V ac. The power supplies automatically accept any voltage within the rated voltage range. With dual power supplies installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load. 4. When planning the electrical system, it is important to use maximum values to account for internal or environmental conditions that result in power consumption that increases beyond typical values. 			

Table 10. Electrical characteristics (continued)

Electrical characteristics	IBM RackSwitch G8052 (7120-48E) 48-port management switch	2498-F48 Brocade SAN48B-5 Fibre Channel switch	IBM 2076-524 Storwize V7000 SFF Control Enclosure Model 524	IBM 2076-24F Storwize V7000 Small Form Factor Expansion Enclosure Model 24F
Maximum kVA	0.211	0.132	0.541	0.304
Amps	1.05 A	0.66 A	2.71 A	1.52 A
Voltage ^{1,2}	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac	200 - 240 V ac
Frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Maximum thermal output	683 BTU/hr	427 BTU/hr	1846 BTU/hr	1038 BTU/hr
Maximum power consumption ³	200 W	125 W	541 W	304 W
<ol style="list-style-type: none"> 1. The input voltage is based on the PDU and associated power cord. In countries that support line-to-line 200 - 208 V ac, the PDU input voltage matches the PDU output voltage. In countries that support line-to-line 380 - 415 V ac, the PDU output voltage is in the range of 220 - 240 V ac. For more information, see "Power distribution unit and power cord specifications" on page 12. 2. All drawers mounted in the rack are rated 200 - 240 V ac. The power supplies automatically accept any voltage within the rated voltage range. With dual power supplies installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load. 3. When planning the electrical system, it is important to use maximum values to account for internal or environmental conditions that result in power consumption that increases beyond typical values. 				

Table 11. Environment requirements

Environment	Recommended operating	Allowable operating	Nonoperating
ASHRAE class		A3	
Airflow direction		Front-to-back	
Temperature ¹	18°C - 27°C (64°F - 80°F)	5°C - 40°C (41°F - 104°F)	5°C - 45°C (41°F - 113°F)
Humidity range	5.5°C (42°F) dew point (DP) to 60% relative humidity (RH) and 15°C (59°F) dew point	-12.0°C (10.4°F) DP and 8% - 85% RH	8% - 85% RH
Maximum dew point		24°C (75°F)	27°C (80°F)
Maximum operating altitude		3050 m (10000 ft)	
Shipping temperature			-40°C to 60°C (-40°F to 140°F)
Shipping relative humidity			5% - 100%
1. Derate maximum allowable dry-bulb temperature 1°C/175 m above 950 m.			

Electromagnetic compatibility compliance

Electromagnetic compatibility compliance: FCC 47 CFR Part 15, ICES-003, EN 55022, EN 55024, CISPR-22, AS/NZS CISPR-22, CNS 13438, VCCI, GB 9254.

Product safety compliance

Product safety compliance: IEC 60950-1; UL 60950-1; CSA 60950-1.

Delivery and subsequent transportation of the equipment

DANGER

Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)

You must prepare your environment, with assistance from an authorized service provider, to accept the new product based on the installation planning information provided. In anticipation of the equipment delivery, prepare the final installation site in advance so that professional movers or riggers can transport the equipment to the final installation site within the computer room. If, for some reason, this is not possible at the time of delivery, you must make arrangements to have professional movers or riggers return to finish the transportation at a later date. Only professional movers or riggers should transport the equipment. The authorized service provider can only perform minimal frame repositioning within the computer room, as needed, to perform required service actions. You are also responsible for using professional movers or riggers when you relocate or dispose of equipment.

Power distribution unit and power cord specifications

Learn about the power distribution unit (PDU) and power cord specifications and options for your IBM PurePower System.

Power distribution unit

Each rack ships with four 7109 PDUs.

Table 12. PDU rating

Electrical characteristics				
Voltage	200 - 240 V ac	200 - 240 V ac	200 - 208 V ac	380 - 415 V ac
Amps	24	48	48	32
kVA	4.8	9.6	16.6	21.1
Frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Phase	1	1	3	3

Table 13. PDU and power cord options

PDU	Power cord	Power cord description
7109	6489	3 phase, 32 A (Internationally available)
	6491	Single phase, 63 A (North America)
	6492	Single phase, 60 A (North America)
	6653	3 phase, 16 A (Internationally available)
	6654	Single phase, 30 A (North America)
	6655	Single phase, 30 A (North America)
	6656	Single phase, 32 A (Europe, Middle East, Africa)
	6657	Single phase, 32 A (Australia and New Zealand)
	6658	Single phase, 30 A (South Korea)
	6667	3 phase, 32 A (Australia and New Zealand)

Roles and responsibilities

The IBM PurePower System is installed, upgraded, and maintained in a cooperative manner between the customer, IBM Support, and optionally IBM Systems Lab Services. Learn about the key division of responsibilities between the various groups.

Roles and responsibilities for installation

Learn about the roles and responsibilities that are required for the successful installation of your IBM PurePower System.

Customer responsibilities for installation and operation

You are responsible for the following activities that are associated with the installation and operation of your PurePower System:

1. Complete all of the steps in Planning for the IBM PurePower System.
2. Complete all of the steps in Installing your IBM PurePower System.
3. Complete all of the steps in Configuring and managing an IBM PurePower System, unless you optionally acquire IBM Systems Lab Services for this activity.

Optional IBM Systems Lab Services for installation

IBM Systems Lab Services can be contracted to complete the following activities that are related to installation:

1. Startup services.
2. Basic network integration.
3. Personnel training on configuring and managing the PurePower System.

Roles and responsibilities for hardware service

Learn about the roles and responsibilities that are required for the successful service of your IBM PurePower System.

The IBM PurePower System is designed to enable customer repair as the primary method of service. You are responsible for determining the problem before you call IBM to report service requests. You are responsible for replacing all Tier 1 customer replaceable units (CRUs) and you have the option of either replacing Tier 2 CRUs or requesting that IBM Service complete the repair activity. IBM Service repairs all parts that are field replaceable units (FRUs).

If the optional enhanced warranty or maintenance agreement is purchased, IBM Service replaces the CRU and FRU parts.

Customer responsibilities for hardware service

If the hardware problem is not automatically reported to IBM by using Call Home tasks on the Hardware Management Console (HMC) or storage controllers, complete the following activities:

1. Complete all the steps in Troubleshooting an IBM PurePower System.
2. Complete all the steps in Contacting IBM Support and Exchanging information with IBM Support.

3. Perform the removal and replacement of the failing CRU on the appropriate IBM PurePower System component by linking to the appropriate product maintenance package from the Troubleshooting the hardware components.

IBM Support responsibilities for hardware service

IBM Service replaces any components that are designated as FRUs that require IBM Service for the IBM PurePower System. If the replaced FRU requires firmware or microcode to be loaded on it, IBM Service completes the necessary update to correct the level of the code to match the specified level for your specific system.

If the optional enhanced warranty or maintenance agreement is purchased, IBM Service installs any CRU or FRU parts and corrects the level of the code to match the specified level for your specific system.

Roles and responsibilities for hardware upgrade

Learn about the roles and responsibilities that are required for the successful upgrade of your IBM PurePower System.

The IBM PurePower System is designed to enable customer upgrade as the primary method of adding features to your PurePower System. You are responsible for installing all hardware components that are classified as Tier 1 CRUs for an upgrade. IBM Service installs all other non-Tier 1 CRU parts.

If the optional enhanced warranty or maintenance agreement is purchased, IBM Service completes the installation of the MES parts.

Customer responsibilities for hardware upgrade service

If the hardware problem is not automatically reported to IBM by using Call Home tasks on the Hardware Management Console (HMC) or storage controllers, complete the following activity:

- Install the hardware component on the PurePower System building block by linking to the appropriate product maintenance package from the Troubleshooting the hardware components section and navigating to the remove and replace procedures of the provided hardware component.

IBM Support responsibilities for hardware upgrade service

IBM Service installs all hardware upgrade components for the PurePower System that are designated as FRUs that require IBM service. If the replaced FRU requires firmware or microcode to be loaded on it, IBM Service completes the necessary update to correct the level of the code to match the specified level for your specific system.

If the optional enhanced warranty or maintenance agreement is purchased, IBM Service installs any CRU or FRU part and corrects the level of the code to match the specified level for your specific system.

Additional roles and responsibilities

Learn about the additional roles and responsibilities that are required for your IBM PurePower System.

Additional customer responsibilities

You are responsible for all other tasks that are associated with the operation and administration of the PurePower System. The following list provides examples of additional responsibilities:

- Creation and maintenance of passwords
- Performing software stack updates including firmware, operating system, and application updates
- Assigning TCP/IP address ranges for the network

- Managing security

Planning for web browsers

Learn about the supported web browsers for your system.

The following web browsers are supported for all devices in the PurePower System:

- Internet Explorer version 11, or later
- Firefox version 31.4 and 31.7 Extended Support Release (ESR), or later

Other browsers might be supported for specific devices. See the related documentation for each specific device to determine whether more browsers are supported. You can find the device-specific information at: [Overview for the IBM PurePower System](#).

Planning for storage and network configuration

Learn how to plan for the configuration of your system.

Use this information to plan for the storage and network configuration of your IBM PurePower System.

- Adding the PurePower System to your network
- Managing Power nodes and storage expansion units by using the PurePower Integrated Manager

Note: The default IP addresses for the PurePower System are contained within the 192.168.93.x (255.255.240.0) subnet. If the rack network switch, SAN switch, Storwize V7000, or IBM FlashSystem 900 management IP addresses are changed in the PurePower Integrated Manager, the network might need to be reconfigured.

Planning for upgrades and security

Learn how to plan for upgrades and the security of your IBM PurePower System, including planning for port availability, updating, backing up, and restoring.

The PurePower System uses various ports that must be available for use by the system. For more information about ports that are used in the PurePower System, see [Identifying operating system ports](#).

It is important that you back up your system. For more information about backing up and restoring your system, see [Backing up the components of your PurePower System](#).

Regular updates and service packs are available for your PurePower System from the Fix Central website. For more information about updating your system, see [Getting fixes and updating firmware for the PurePower System](#).

Notices

This information was developed for products and services offered in the US.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

The performance data and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to actual people or business enterprises is entirely coincidental.

If you are viewing this information in softcopy, the photographs and color illustrations may not appear.

The drawings and specifications contained herein shall not be reproduced in whole or in part without the written permission of IBM.

IBM has prepared this information for use with the specific machines indicated. IBM makes no representations that it is suitable for any other purpose.

IBM's computer systems contain mechanisms designed to reduce the possibility of undetected data corruption or loss. This risk, however, cannot be eliminated. Users who experience unplanned outages, system failures, power fluctuations or outages, or component failures must verify the accuracy of operations performed and data saved or transmitted by the system at or near the time of the outage or failure. In addition, users must establish procedures to ensure that there is independent data verification before relying on such data in sensitive or critical operations. Users should periodically check IBM's support websites for updated information and fixes applicable to the system and related software.

Homologation statement

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.

Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help (www.ibm.com/support/knowledgcenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

The IBM Power Systems servers include certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
(within North America)

For more information about the commitment that IBM has to accessibility, see IBM Accessibility (www.ibm.com/able).

Privacy policy considerations

IBM Software products, including software as a service solutions, (“Software Offerings”) may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering’s use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as the customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM’s Privacy Policy at <http://www.ibm.com/privacy> and IBM’s Online Privacy Statement at <http://www.ibm.com/privacy/details> the section entitled “Cookies, Web Beacons and Other Technologies” and the “IBM Software Products and Software-as-a-Service Privacy Statement” at <http://www.ibm.com/software/info/product-privacy>.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at Copyright and trademark information at www.ibm.com/legal/copytrade.shtml.

Electronic emission notices

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

Class A Notices

The following Class A statements apply to the IBM servers that contain the POWER8[®] processor and its features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

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 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.

European Community Compliance 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 non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
email: halloibm@de.ibm.com

Warning: 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.

VCCI Statement - Japan

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

The following is a summary of the VCCI Japanese statement in the box above:

This is a Class A product based on the standard of the VCCI Council. 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 Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値： Knowledge Centerの各製品の
仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

Electromagnetic Interference (EMI) Statement - People's Republic of China

声 明

此为 A 级产品,在生活环境中,该产品可能会造成无线电干扰。在这种情况下,可能需要用户对其干扰采取切实可行的措施。

Declaration: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may need to perform practical action.

Electromagnetic Interference (EMI) Statement - Taiwan

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

The following is a summary of the EMI Taiwan statement above.

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

IBM Taiwan Contact Information:

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

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Germany Compliance 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.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

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

Tel: 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

Tel: +49 (0) 800 225 5423 or +49 (0) 180 331 3233

email: halloibm@de.ibm.com

Generelle Informationen:

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

Electromagnetic Interference (EMI) Statement - Russia

**ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать
радиопомехи, для снижения которых необходимы
дополнительные меры**

Class B Notices

The following Class B statements apply to features designated as electromagnetic compatibility (EMC) Class B in the feature installation information.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM-authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this 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 Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Community Compliance 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 non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
email: halloibm@de.ibm.com

VCCI Statement - Japan

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値 : Knowledge Centerの各製品の
仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

IBM Taiwan Contact Information

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

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 가정용(B급)으로 전자과적합기기로
서 주로 가정에서 사용하는 것을 목적으로 하
며, 모든 지역에서 사용할 수 있습니다.

Germany Compliance Statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B 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 B ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

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 B

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
Tel: 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
Tel: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
email: halloibm@de.ibm.com

Generelle Informationen:

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

Terms and conditions

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability: These terms and conditions are in addition to any terms of use for the IBM website.

Personal Use: You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative works of these publications, or any portion thereof, without the express consent of IBM.

Commercial Use: You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights: Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.



Printed in USA